Honolulu High-Capacity Transit Corridor Project

FINAL ENVIRONMENTAL IMPACT STATEMENT/SECTION 4(f) EVALUATION

East Kapolei

UH West O'ahu

Ho'opili

West Loch

Waipahu Transit Center

Leeward Community College

Pearl Highlands

Pearlridge

Aloha Stadium

Pearl Harbor Naval Base

Honolulu International Airport

Lagoon Drive

Middle Street Transit Center

Kalihi

Kapālama

Iwilei

Chinatown

Downtown

Civic Center

Kaka'ako

Ala Moana

City and County of Honolulu
State of Hawaii

U.S. Department of Transportation
Federal Transit Administration

JUNE 2010

Honolulu High-Capacity Transit Corridor Project

City and County of Honolulu, O`ahu, Hawai`i

Final Environmental Impact Statement/Section 4(f) Evaluation

Submitted pursuant to 49 USC 1601 et seq., 16 USC 470(f), 49 USC 303, 42 USC 4332(2)(c)
42 USC 4371 et seq and 23 CFR 771

by the

U.S. Department of Transportation Federal Transit Administration
City and County of Honolulu Department of Transportation Services

in cooperation with the

U.S. Department of Defense (U.S. Army Garrison—Hawai'i)
U.S. Department of Defense (U.S. Naval Base Pearl Harbor)
U.S. Department of Transportation Federal Aviation Administration
U.S. Department of Transportation Federal Highway Administration
State of Hawai'i Department of Transportation

6/14/10

Date of Approval

Regional Administrator
U.S. Department of Transportation
Federal Transit Administration

6/12/10

Date of Approval

Director, Department of Transportation Services
City and County of Honolulu

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Honolulu High-Capacity Transit Corridor Project

City and County of Honolulu, O`ahu, Hawai`i

Final Environmental Impact Statement/Section 4(f) Evaluation

Submitted pursuant to Hawaiʻi Revised Statutes Chapter 343

by the

City and County of Honolulu Department of Transportation Services

6/12/10

Date of Approval

Director, Department of Transportation Services
City and County of Honolulu

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

Mr. Wayne Y. Yoshioka
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Abstract

This Final Environmental Impact Statement/Section 4(f) Evaluation is a joint *National Environmental Policy Act* (NEPA) and Hawai‘i Revised Statutes Chapter 343 document. It is intended to provide decision makers and the public with information on the Project's environmental impacts and benefits. It also serves as a summary documentation of the consultation conducted in compliance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and the Section 4(f) evaluation prepared pursuant to Section 4(f) of the *U.S. Department of Transportation Act of 1966*. This document identifies the current and future need to address mobility and travel reliability issues, to support transportation and land use planning policies, and to improve transportation equity in the study corridor on the Island of O‘ahu in the State of Hawai‘i. In compliance with NEPA, this document considers a No Build and a Build Alternative that will provide high-capacity transit service in the corridor between East Kapolei and Ala Moana Center and serving Honolulu International Airport. This Final EIS identifies the Preferred Alternative, which consists of a 20-mile elevated guideway that includes transit stations, park-and-ride facilities, a maintenance and storage facility, and other ancillary facilities to support the transit system. This Final EIS addresses agency and public comments on the Draft EIS and documents the transportation effects and potential consequences on the natural and human environment, including effects on land use and economic activity; communities and neighborhoods; visual and aesthetic conditions; air quality and energy; noise and vibration; hazardous materials; natural resources; water quality; and archaeological, cultural, and historic resources. It also includes documentation of measures to avoid and minimize effects to the natural and built environments and includes mitigation and other commitments. Financial implications of construction and operation of the transit system are also evaluated.

Comments concerning refinement of the design of the Airport Alternative subsequent to the Draft EIS may be addressed to Mr. Matley and Mr. Yoshioka at the addresses above during the 30 days following the *Federal Register* Notice of Availability. Substantive new comments received during the 30-day period will be addressed in the Record of Decision. A DVD of the Final EIS is available at no cost. The document is available on the project website at honolulutransit.org and may be reviewed at the following locations:

- City Municipal Library
- All State public libraries
- City and County of Honolulu Department of Transportation Services, 650 South King Street, 3rd floor

Printed copies of the document are available for purchase.

State of Hawai`i Chapter 343 Final EIS Summary Sheet

Description of Project	As discussed in Section 2.5, the Project, the National Environmental Policy Act Preferred Alternative, is a portion of the Locally Preferred Alternative that begins at the University of Hawai'i-West O'ahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center
Significant Beneficial and Adverse Effects	**Beneficial Effects** • Improve transit access, speed, and reliability • Improve access to planned development • Increase travel options for transit dependent, limited income, and aging populations • Moderate future traffic congestion • Reduce air-pollutant emissions • Reduce transportation energy use **Adverse Effects** • Eliminate parking and turn lanes in some locations • Acquire rights-of-way and displace residents and businesses in some locations • Block views in several areas, including protected mauka-makai views • Introduce new linear visual element; changes to view will be low to significant • Moderate noise impacts in eight areas • Prune, remove, and transplant street trees • Create adverse effects to historic and cultural resources • Create temporary effects during construction for access, noise, visual, and traffic
Mitigation Measures	• Incorporate new traffic management into design • Conduct spillover parking surveys in station areas • Provide relocation assistance for displaced residents and businesses • Minimize visual impacts with architecture and landscaping • Include wheel skirts in vehicle specifications and use sound-absorptive materials in areas with noise impacts • Transplant or replant street trees • Implement measures to avoid, minimize, and mitigate harm to archaeological, cultural, and historic resources (See Appendix I for a summary of mitigation and commitments.)
Alternatives Considered	**Final EIS** • No Build Alternative • Airport Alternative **Draft EIS** • No Build Alternative • Salt Lake Alternative • Airport Alternative • Airport & Salt Lake Alternative
Unresolved Issues	• Receipt of permits, approvals, and agreements • Receipt of Federal funds from Section 5309 New Starts program
Compatibility with Plans and Policies	The Project is compatible with applicable State and Local government transportation and land use plans and policies (see Appendix J)
Permits and Approvals	• Archaeological Inventory Survey Plan • Certificate of Inclusion HDLNR (Division of Forestry and Wildlife) • Clean Water Act Sections 401, 402, and 404 • Coastal Zone Management • DPP Special District and Building Permits • Drainage Injection Control • FAA unconditional approval of the Airport Layout Plan • FAA Form 7460.1 Notice of Proposed Construction or Alteration • Farmland Conversion Impact Rating • Interstate Access Modification and Airspace Approvals • Flood Hazard District Compliance • National Pollutant Discharge Elimination System (General and Dewatering) • Noise Permit and Variance • Road Closure • Section 9 of Rivers and Harbors Act • Section 10 of Rivers and Harbors Act • Sole Source Aquifer • Special Management Area • Stream Channel Alteration • Stormwater Connection (MS4) (See Section 4.21, Anticipated Permits, Approvals, and Agreements)

Wayne Y. Yoshioka

Director, Department of Transportation Services
City and County of Honolulu

6/12/10

Date

This document was prepared under my direction or supervision. The information, to the best of my knowledge, fully addresses document content requirements of HAR Section 11-200-17 and Section 11-200-18, as applicable.

Preface

Purpose of the Final Environmental Impact Statement

The purpose of this Final Environmental Impact Statement (EIS) is to provide the City and County of Honolulu Department of Transportation Services (DTS), the Federal Transit Administration (FTA), and the public and interested parties with the information necessary to make an informed decision about the Project based on a full and open analysis of costs, benefits, and environmental impacts of alternatives considered. Approval of this EIS is not an Administrative Action (as defined by 23 CFR 771.107) and does not commit FTA to approve any future grant request to fund the Project.

The **Honolulu High-Capacity Transit Corridor Project** is the project name used for FTA planning and project development for New Starts projects.

The **Locally Preferred Alternative** as identified by the City Council at the conclusion of the Alternatives Analysis process is a step required for FTA's discretionary New Starts Program. It represents the City's long-range plan for the rail system, including the **Project** (as defined below) and the potential extensions.

The **NEPA Preferred Alternative**, referred to in this Final EIS as the **Project**, is evaluated in more detail and is a 20-mile portion of the Locally Preferred Alternative (LPA) for which FTA may provide Federal funding. FTA and the City identified this alternative as preferred for meeting the Purpose and Need over other alternatives, including the No Build Alternative. The Project includes the construction and operation of a fixed guideway rail system. It is a portion of the LPA that begins at the University of Hawai‘i at West O‘ahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center. If FTA publishes a Record of Decision on this Preferred Alternative, then the City would continue pursuing funding for the Project by submitting an application to enter the Final Design stage of the New Starts Program.

Purpose of the Final Environmental Impact Statement for the Federal Aviation Administration

The Federal Aviation Administration (FAA) is a cooperating agency on this EIS, in accordance with 40 CFR Part 1501.6(a)(1), since it has special expertise and jurisdiction by law to approve proposed development at Honolulu International Airport. The FAA is assigned responsibilities pursuant to 49 USC 40101 et seq., for civil aviation and regulation of air commerce in the interests of aviation safety and efficiency. As a cooperating agency on this EIS, FAA will use the EIS documentation to comply with its own requirements under the National Environmental Policy Act (NEPA) for Federal actions. The FAA will also use the EIS to support subsequent decisions and Federal actions, including unconditional approval of the portion of the Airport Layout Plan that depicts the Project, determination of eligibility for Federal assistance under the Federal grant in-aid program, approval of an application to use Passenger Facility Charges, and approval to grant right-of-way at the airport to carry out the Project.

Overview of the Final Environmental Impact Statement

This document builds on the findings of the *Alternatives Analysis Report* (DTS 2006b) and the *Honolulu High-Capacity Transit Corridor Project Draft Environmental Impact Statement/ Section 4(f) Evaluation* (RTD 2008u), follows FTA planning and guidance, provides information on the preferred Fixed Guideway Transit Alternative via the Airport (Airport Alternative) and the No Build Alternative, and addresses agency and public comments on the Draft EIS.

This document is a joint NEPA and Hawai‘i Revised Statutes (HRS) Chapter 343 Final EIS. It has been compiled in good faith and sets forth sufficient information to enable the decision-maker to consider fully the environmental factors involved, to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the Project, and to make a reasoned choice between alternatives. It also serves as documentation of the coordination conducted in compliance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and the Section 4(f) evaluation prepared pursuant to Section 4(f) of the *U.S. Department of Transportation Act of 1966*.

The HRS Chapter 343 EIS preparation notice was issued for this Project on December 8, 2005. The Notice of Intent to prepare an EIS was published in the *Federal Register* on March 15, 2007, which began the NEPA scoping period. The March 15, 2007, notice superseded the December 7, 2005, Notice of Intent to prepare an Alternatives Analysis and Draft EIS. The Draft EIS was distributed for public and agency review beginning in November 2008 with the Notice of Availability published in the *Federal Register* on November 21, 2008, and in the State of Hawai‘i *Environmental Notice* on November 23, 2008. Public hearings were held to receive comments from the public and agencies, and comments were accepted until February 6, 2009. The Notice of Availability of this Final EIS will be published in the *Federal Register*.

HRS Section 343-5(f) and Hawai‘i Administrative Rules (HAR) Section 11-200-25(b) both require State and Local agencies to cooperate with Federal agencies to the fullest extent possible to reduce duplication between Federal and State requirements. This includes preparing joint environmental impact statements with concurrent public review and processing. The governor has final authority to accept the EIS. At the time of submission to the governor, Hawai‘i's EIS rules also require that the Final EIS be distributed to persons and agencies with jurisdiction or expertise in certain areas relevant to various actions and to Draft EIS commenters that request the Final EIS. The Final EIS will be submitted to the governor and distributed to the FTA. The FTA will issue a Notice of Availability of the Final EIS pursuant to its NEPA regulations.

No sooner than 30 days after publication of this Final EIS, the FTA will sign a Record of Decision. The Record of Decision will summarize the alternatives considered, factors that support selection of the recommended alternative, and commitments to measures that mitigate substantial environmental impacts.

The LPA includes the majority of housing and employment on O‘ahu. The east-west length of the corridor is approximately 23 miles. The north-south width is at most 4 miles because much of the corridor is constrained by the Ko‘olau and Wai‘anae Mountain Ranges to the north and the Pacific Ocean to the south. This document provides environmental analysis and documentation for the 20-mile Project as described in Section 2.5 between East Kapolei and Ala Moana Center.

Future planned extensions from East Kapolei to West Kapolei, following Salt Lake Boulevard, and from Ala Moana Center to UH Mānoa and to Waikīkī are included in the LPA and are addressed as cumulative effects in Sections 3.6.2 and 4.19.3 of this Final EIS. These planned extensions would be evaluated through a separate NEPA and HRS Chapter 343 process and designed and constructed once additional funding is secured.

Organization of the Final Environmental Impact Statement

This document is divided into two volumes. This volume contains the Final EIS for the Project, which includes a summary of changes between the Draft and Final EIS, explanation and analysis of design refinements to the Airport Alternative since the Draft EIS, and responses to comments on the Draft EIS. It consists of the following eight chapters:

Chapter 1 discusses the background, describes the study corridor from Kapolei to UH Mānoa and Waikīkī, and explains the Purpose and Need for the fixed guideway transit system.

Chapter 2 details the alternatives and technologies considered during the screening and selection process and summarizes the alternatives considered during the Alternatives Analysis and environmental impact analysis processes. It includes the basis for selection of the Preferred Alternative and a description of the project design elements and operating parameters.

Chapter 3 describes existing and future transportation conditions in the study corridor, presents consequences of the Project and compares them to the No Build Alternative, and discusses mitigation for potential transportation impacts.

Chapter 4 describes existing and future environmental conditions, presents consequences of the Project and compares them to the No Build Alternative, and discusses mitigation for potential environmental impacts.

Chapter 5 discusses the Project’s effects on public parks, recreational areas, and historic properties to support determinations required to comply with the provisions of the *U.S. Department of Transportation Act of 1966* [commonly referred to as Section 4(f)].

Chapter 6 presents the various funding sources and estimated capital and operating costs.

Chapter 7 summarizes the evaluation of the Project based on the information in Chapters 3 through 6.

Chapter 8 discusses the overall public outreach and agency coordination components and summarizes comments received on the Draft EIS and the responses to those comments.

Volume II consists of electronic files for the appendices referenced in the Final EIS, including comments received regarding the Draft EIS and the responses to those comments. The CD is located at the end of Volume I. Technical reports supporting the analysis presented in this Final EIS are available for review at the offices of the City and County of Honolulu Department of Transportation Services Rapid Transit Division and on the project website at www.honolulutransit.org.

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACHP	Federal Advisory Council on Historic Preservation
ADA	*Americans with Disabilities Act of 1990*
AIS	archaeological inventory survey
ALP	*Honolulu International Airport Layout Plan*
APE	Area of Potential Effect (applicable to archaeological, cultural, and historic resources)
ARRA	*American Recovery and Reinvestment Act* (U.S. Public Law 111-5)
AST	aboveground storage tank
AVO	average vehicle occupancy
BA	biological assessment
BMP	best management practice(s)
BRT	bus rapid transit
BTU	British thermal unit
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act of 1980* (42 USC 103)
CFR	Code of Federal Regulations
CIA	cultural impact assessments
CINCPACFLT	Commander-in-Chief Pacific Fleet
City	City and County of Honolulu
CLR	Cultural Landscape Report
CO	carbon monoxide
CPI-U	Consumer Price Index for all Urban Consumers
CWA	*Clean Water Act* (33 USC 1251-1387)
CWB	State of Hawaiʻi Department of Health, Clean Water Branch
CZM	Coastal Zone Management
CZMA	*Coastal Zone Management Act* (16 USC 1451 et seq.)
DA	U.S. Department of the Army
DAGS	State of Hawaiʻi Department of Accounting and General Services
DAV	Disabled American Veterans
dB	decibels
dBA	A-weighted decibels

DBEDT	State of Hawaiʻi Department of Business, Economic Development and Tourism
DBFS	City and County of Honolulu Department of Budget and Fiscal Services
DES	City and County of Honolulu Department of Environmental Services
DFM	City and County of Honolulu Department of Facility Maintenance
DHHL	State of Hawaiʻi Department of Hawaiian Home Lands
DLNR	State of Hawaiʻi Department of Land and Natural Resources
DLNR-DFW	State of Hawaiʻi Department of Land and Natural Resources, Division of Forestry and Wildlife
DLNR-Parks	State of Hawaiʻi Department of Land and Natural Resources, Division of State Parks
DPP	City and County of Honolulu Department of Planning and Permitting
DPP-LUPD	City and County of Honolulu Department of Planning and Permitting, Land Use Permits Division
DPR	City and County of Honolulu Department of Parks and Recreation
DTS	City and County of Honolulu Department of Transportation Services
EA	environmental assessment
EIS	environmental impact statement
EJ	environmental justice
EMF	electric and magnetic field
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
ʻEwa (direction)	toward the west (see also Waiʻanae)
FAA	Federal Aviation Administration
FFGA	Full Funding Grant Agreement
FHWA	Federal Highway Administration
ft	feet
FTA	Federal Transit Administration
FY	fiscal year
GEO	Governor's Executive Order
GET	general excise and use tax
GIS	Geographic Information System
GO	General Obligation (Bond)
GSP	gross state product
H-1	Interstate Route H-1 (H-1 Freeway)
H-2	Interstate Route H-2 (H-2 Freeway)
H-3	Interstate Route H-3 (H-3 Freeway)

HABS	Historic American Building Survey
HALS	Historic American Landscape Survey
HAR	Hawai'i Administrative Rules
HARC	Hawai'i Agriculture Research Center
HART	Honolulu Area Rail Rapid Transit
HBMP	Hawai'i Biodiversity and Mapping Program
HCDA	Hawai'i Community Development Authority
HCM	*Highway Capacity Manual*
HCP	Habitat Conservation Plan
HDOA	State of Hawai'i Department of Agriculture
HDOH	State of Hawai'i Department of Health
HDOT	State of Hawai'i Department of Transportation
HEC	State of Hawai'i Environmental Council
HECO	Hawaiian Electric Company
HHCTCP	Honolulu High-Capacity Transit Corridor Project
HNL	Honolulu International Airport
HOV	high-occupancy vehicle
HRS	Hawai'i Revised Statutes
HRT	Honolulu Rapid-Transit Development
HRT&L	Honolulu Rapid Transit & Land Company
HSC	The Supreme Court of the State of Hawai'i
HSVAP	Hawai'i Stream Visual Assessment Protocol
HUD	U.S. Department of Housing and Urban Development
IVT	in-vehicle time
JD	jurisdictional determination
kg	kilogram
Koko Head (direction)	toward the east
kV	kilovolts
Ldn	day/night noise level (descriptor of daily noise environment; incorporates a penalty for high noise levels at night)
LEDPA	least environmentally damaging practicable alternative
LEED	Leadership in Energy and Environmental Design
Leq	equivalent sound level (common environmental noise descriptor)
Leq(h)	hourly equivalent sound level
Lmax	maximum noise level during an event
LONP	Letter of No Prejudice

LOS	level-of-service
LOTMA	Leeward Oʻahu Transportation Management Association
LPA	Locally Preferred Alternative
LWCF	Land and Water Conservation Fund
makai (direction)	toward the sea
mauka (direction)	toward the mountains
MBTA	*Migratory Bird Treaty Act* (16 USC 703-711)
MBTU	million British thermal units
$\mu g/m^3$	micrograms per cubic meter
MMPA	*Marine Mammal Protection Act* (16 USC 1361-1407)
MOA	memorandum of agreement
MOT	Maintenance of Traffic (Plan)
mph	miles per hour
MPS	multiple property submissions
MSAT	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NAGPRA	*Native American Graves Protection and Repatriation Act* (25 USC 3001 et seq.)
NEPA	*National Environmental Policy Act* (42 USC 4321-4347)
NHL	national historic landmark
NHPA	*National Historic Preservation Act* (16 USC 470)
NO_2	nitrogen dioxide
NOAA/NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOI	notice of intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operating and maintenance
O_3	ozone
OʻahuMPO	Oʻahu Metropolitan Planning Organization
OEQC	State of Hawaiʻi Office of Environmental Quality Control
OHWM	ordinary high-water mark
OP	State of Hawaiʻi Department of Business, Economic Development and Tourism, Office of Planning

OR&L	Oʻahu Railway and Land Company
ORTP	*Oʻahu Regional Transportation Plan 2030*
OTS	Oʻahu Transit Services, Inc.
PA	Programmatic Agreement
Pb	lead
PE	preliminary engineering
PEEP	Preliminary Engineering Evaluation Program
PHNS	Pearl Harbor Naval Station
PIP	Public Involvement Plan
PM_{10}	particulate matter smaller than or equal to 10 microns in size
$PM_{2.5}$	particulate matter smaller than or equal to 2.5 microns in size
ppm	parts per million
Project	Honolulu High-Capacity Transit Corridor Project Fixed Guideway Transit Alternative via the Airport (Airport Alternative)
PUC	Primary Urban Center
ROD	Record of Decision
ROH	Revised Ordinances of Honolulu
RPW	relatively permanent non-navigable tributaries of traditional navigable waters
RTD	City and County of Honolulu Department of Transportation Services Rapid Transit Division
SAFETEA-LU	*Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (U.S. Public Law 109-59)
SCAP	Stream Channel Alteration Permit
Section 106	Section 106 of the *National Historic Preservation Act of 1966,* as amended (16 USC 470)
Section 4(f)	Section 4(f) of the *U.S. Department of Transportation Act of 1966* [49 USC 1653(f)]
SHPD	State Historic Preservation Division
SHPO	State Historic Preservation Officer
SMA	special management area
SO_2	sulfur dioxide
SSMP	Safety and Security Management Plan
SWMP	Storm Water Management Plan
TAA	Transportation Analysis Area
TCP	traditional cultural properties
TDM	transportation demand management

TMDL	total maximum daily loads
TMK	Tax Map Key
TMP	Transit Mitigation Program
TNW	traditional navigable waters
TOB	top of bank
TOD	transit-oriented development
TPSS	traction power substation
TSD	transit-supportive development
TSM	Transportation System Management
UCB	urban community boundary
UH	University of Hawai‘i
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USHHS	U.S. Department of Health and Human Services
UST	underground storage tank
V/C	volume-to-capacity
VdB	vibration decibels (measure of vibration velocity)
VHD	vehicle hours of delay
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOC	volatile organic compounds
vph	vehicles per hour
Wai‘anae (direction)	toward the west (see also ‘Ewa)
WMATA	Washington Metropolitan Area Transit Authority
WQC	water quality certification
YOE	year of expenditure
YOE $	year of expenditure dollars

Executive Summary

The U.S. Department of Transportation Federal Transit Administration (FTA) and the City and County of Honolulu Department of Transportation Services (DTS) are undertaking a project that will provide high-capacity rail service on the Island of Oʻahu.

The study corridor for the Honolulu High-Capacity Transit Corridor Project (HHCTCP) extends from Kapolei in the west (the Waiʻanae or ʻEwa direction) to the University of Hawaiʻi at Mānoa (UH Mānoa) and Waikīkī in the east (the Koko Head direction). It is confined by the Waiʻanae and Koʻolau Mountain Ranges in the mauka direction (toward the mountains, generally to the north within the study corridor) and the Pacific Ocean in the makai direction (toward the sea, generally to the south within the study corridor) (Figure S-1). This corridor includes the majority of residential and employment areas on Oʻahu. Its east-west length is approximately 23 miles, and between Pearl City and ʻAiea, its width is less than 1 mile between Pearl Harbor and the base of the Koʻolau Mountain Range.

The Project includes the construction and operation of a fixed guideway rail system. It is a portion of the Locally Preferred Alternative (LPA) that begins at the University of Hawaiʻi-West Oʻahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center (Figures 2-8 to 2-11 in Chapter 2). The system will use steel-wheel-on-steel-rail technology. All parts of the guideway will be elevated except near Leeward Community College, where it will be at-grade in exclusive right-of-way.

Purpose of and Need for Transportation Improvements

The purpose of the Honolulu High-Capacity Transit Corridor Project is to provide high-capacity rapid transit in the highly congested east-west transportation corridor between Kapolei and UH Mānoa, as specified in the *Oʻahu Regional Transportation Plan 2030* (ORTP) (OʻahuMPO 2007). The HHCTCP is intended to provide faster, more reliable public transportation service than

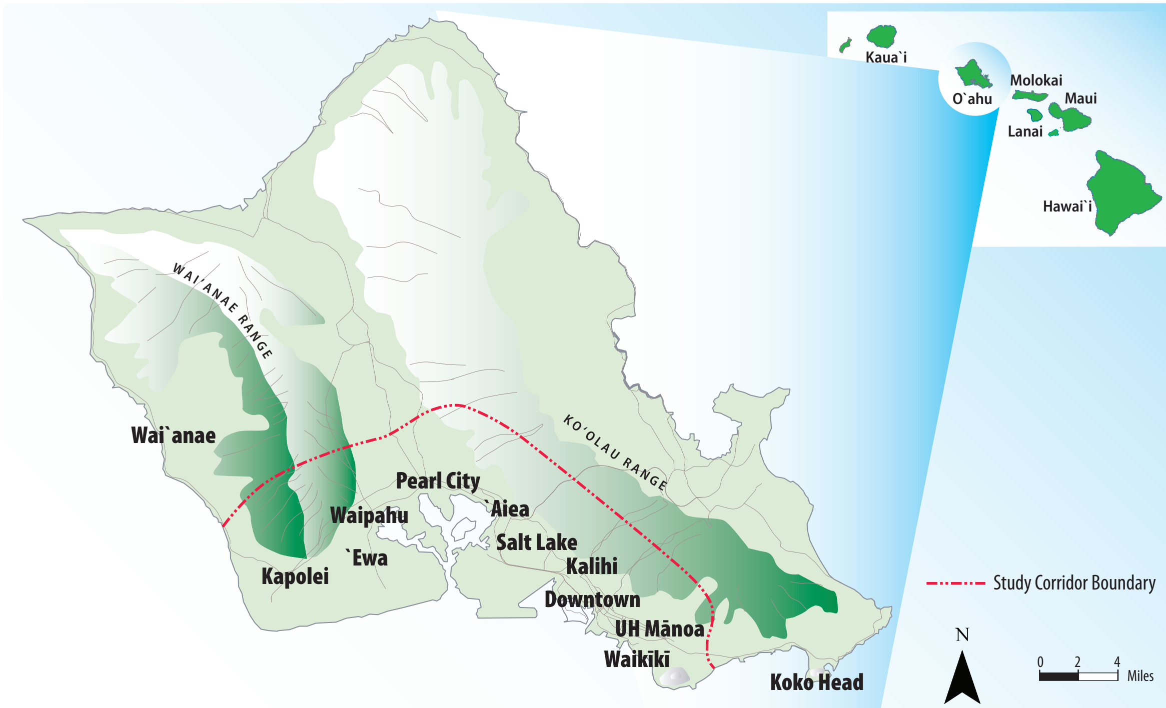


Figure S-1 Honolulu High-Capacity Transit Corridor Project Vicinity

can be achieved with buses operating in congested mixed traffic. It will provide reliable mobility in areas of the corridor where people of limited income and an aging population live and will serve rapidly developing areas of the study corridor. The HHCTCP will also provide additional transit capacity and an alternative to private automobile travel, as well as improve transit links within the study corridor. In conjunction with other improvements included in the ORTP, the HHCTCP will help moderate anticipated traffic congestion in the study corridor. It also supports the goals of the *City and County of Honolulu General Plan* (DPP 2002a) and the ORTP by serving areas designated for urban growth.

The project will improve mobility for travelers who face increasingly severe traffic congestion, improve transportation system reliability, provide accessibility to new development in the ‘Ewa-Kapolei-Makakilo area in support of the City and County of Honolulu (City) policy to develop that area as a “second city,” and improve transportation equity for all travelers.

Alternatives Considered

Prior to completing the Draft Environmental Impact Statement (EIS), alternatives were evaluated at three stages. First, a broad range of alternatives was considered and screened down to four alternatives that were evaluated as documented in the *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Report* (Alternatives Analysis) (DTS 2006b). Second, an alternatives analysis was conducted. The Alternatives Analysis Report recommended (and the City Council identified) the Fixed Guideway Alternative as the Locally Preferred Alternative. Third, scoping was

Scoping is an open process involving the public and other Federal, State, and Local agencies to identify the important issues for consideration in the EIS process.

completed under the National Environmental Policy Act (NEPA) process. No alternatives that had not been previously studied and eliminated for good cause would satisfy the Purpose and Need at less cost, with greater effectiveness, or with less environmental or community impact.

Prior to identifying an elevated fixed guideway system, the City and FTA evaluated a variety of high-capacity transit options. Options evaluated and rejected included an exclusively at-grade fixed guideway system using light rail or bus rapid transit (BRT) vehicles, as well as a mix of options consisting of both at-grade and grade-separated segments.

During the fall of 2005 and winter of 2006, the City conducted an alternatives screening. This is documented in the *Honolulu High-Capacity Transit Corridor Project Alternatives Screening Memorandum* (DTS 2006a).

The alternatives were screened through a series of steps, including gathering data, creating a comprehensive list of potential alternatives, developing screening criteria, and presenting viable alternatives to the public and interested public agencies and officials for comment. This process was completed in accordance with the Hawai‘i Revised Statutes (HRS) Chapter 343 (the State of Hawai‘i's environmental impact statement law) and the Alternatives Analysis scoping process. Input from the scoping process was analyzed and the alternatives were refined based on this input.

Once this evaluation was complete, the modal, technology, and alignment options were combined to create the following alternatives, which were evaluated and documented in the Alternatives Analysis Report (DTS 2006b), which is incorporated by reference:

- **No Build Alternative**
- **Transportation System Management Alternative**
- **Managed Lane Alternative**
  - Two-direction Option
  - Reversible Option
- **Fixed Guideway Alternative**
  - Kalaeloa-Salt Lake–North King–Hotel Option
  - Kamokila–Airport–Dillingham Option
  - Kalaeloa–Airport–Dillingham–Halekauwila Option

Chapter 2 of the Alternatives Analysis Report described these alternatives in detail, and Chapter 6 of that report compared them. After review of the Alternatives Analysis Report and consideration of public comments, the City Council identified a Locally Preferred Alternative that was signed into law by the Mayor, becoming Revised Ordinance of Honolulu (ROH) Section 07-001. This ordinance authorized the City to proceed with planning and engineering of a fixed guideway project from Kapolei to UH Mānoa with an extension to Waikīkī. The City Council also passed Resolution 07-039, which directed the first construction project to be fiscally constrained and to extend from East Kapolei to Ala Moana Center via Salt Lake Boulevard.

During the NEPA scoping process, several scoping comments were received requesting reconsideration of the Managed Lane Alternative. This alternative was considered during the Alternatives Analysis process and found to provide little benefit compared to the Fixed Guideway. Because no new information was provided that would have substantially changed the findings of the Alternatives Analysis process regarding the Managed Lane Alternative, this alternative was not included in the Draft EIS. Based on the findings of the Alternatives Analysis, the Managed Lane Alternative fails to meet the Purpose and Need because it does not moderate anticipated traffic congestion and because it does not provide a faster, more reliable and more equitable transportation option compared to the Fixed Guideway.

In addition to suggestions to reconsider previously eliminated alternatives, three separate proposals were received and documented in the *Honolulu High-Capacity Transit Corridor Project National Environmental Policy Act Scoping Report* (DTS 2007). One proposal was to provide additional bus service with either school buses or private vehicles. The second was for a High-Speed Bus Alternative to include aspects of the Fixed Guideway Alternative and the Managed Lane Alternative. These proposals were similar to alternatives that had already been considered and eliminated during the Alternatives Analysis process. Therefore, they were not considered in the Draft EIS. The third proposal was for an additional fixed guideway alternative serving the Honolulu International Airport. This alternative was included in the Draft EIS.

During the scoping process, comments were requested on five transit technologies. The comments received did not substantially differentiate any of the following five considered technologies as being universally preferable to the other technologies:

- Light-rail transit
- Rapid-rail transit (steel wheel on steel rail)
- Rubber-tired guided vehicles
- Magnetic levitation system
- Monorail system

Subsequent to the scoping process, a technical review process that included opportunities for public comment was used to select a transit technology. Transit vehicle manufacturers submitted 12 responses detailing the features of these different vehicle technologies. The responses were reviewed in February 2008 by a technology panel that ranked the performance, cost, and reliability of the proposed technologies and accepted public comment on the technology selection. The independent five-member technology panel was composed of four transit experts and a transportation academic appointed by the City Council. The panel's report resulted in the City establishing steel wheel operating on steel rail as the technology for the Project and eliminated the other technologies from further consideration.

The alternatives that were evaluated in the Draft EIS resulted from this process of developing alternatives and reflect comments received during the scoping process. This information is summarized in the *Honolulu High-Capacity Transit Corridor Project National Environmental Policy Act Scoping Report* (DTS 2007).

The following four alternatives were evaluated in the Draft EIS. They were developed to comply with the Locally Preferred Alternative adopted by the City Council and to address the public and agency comments received during the comment period for the HRS Chapter 343 preparation notice for this Project and the NEPA scoping process:

- No Build Alternative
- Fixed Guideway Transit Alternative via Salt Lake Boulevard (Salt Lake Alternative)
- Fixed Guideway Transit Alternative via the Airport (Airport Alternative)
- Fixed Guideway Transit Alternative via the Airport and Salt Lake (Airport & Salt Lake Alternative)

As documented in the Draft EIS, adverse impacts to environmental resources would be slightly greater with the Salt Lake Alternative than with the Airport Alternative with respect to hazardous materials and noise. The guideway and stations would be dominant elements in views near the Project, while viewpoints farther away from either alternative would be less affected. Visual effects would be greater with the Salt Lake Alternative because it runs makai of several residential neighborhoods where many viewers would have an increased sensitivity to view changes and blocked views.

The Airport Alternative will carry the most passengers and provide the greatest transit-user benefits. The Airport Alternative also will result in the fewest vehicle miles traveled and vehicle hours of delay. It will provide access to employment centers at Pearl Harbor Naval Base and Honolulu International Airport and will have substantially greater ridership to those areas than the Salt Lake Alternative. It will serve the Salt Lake neighborhood with connecting bus service. The Airport Alternative will have slightly lower potential for encountering archaeological resources but will affect more historic resources than the Salt Lake Alternative. The Airport Alternative will result in the least overall harm to resources that are protected by Section 4(f) of the U.S. Department of Transportation Act and would encroach the least into waters of the U.S. during both construction and operation.

Because the Airport & Salt Lake Alternative includes elements of the individual Salt Lake and Airport Alternatives, the combined alternative would have the greatest impact of the three Build Alternatives.

Based on technical performance of the alternatives, public comment, and City Council Resolution 08-261, the Airport Alternative was identified as the Preferred Alternative, and it is described in this Final EIS as the "Project." The City identified the Preferred Alternative based on the evaluation of all reasonable alternatives presented in the Draft EIS and consideration of public comments [23CFR 771.125(a)(1)]. The Project includes the construction and operation of a fixed guideway rail system. It is a portion of the LPA that begins at the University of Hawaiʻi-West Oʻahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center.

The No Build Alternative is included in this Final EIS to provide a comparison of what future conditions would be if the Project was not implemented. This alternative includes completion of the committed transportation projects identified in the Oʻahu Metropolitan Planning Organization (OʻahuMPO) ORTP.

The Project will provide a fixed guideway transit system from East Kapolei to Ala Moana Center via the Airport. Plans of the Project are included in Appendix B, Preliminary Alignment Plans and Profiles. The system will use steel wheel on steel rail technology. The vehicles are designed for fully automated (driverless) operation, but may carry a driver and are capable of manual operation. All parts of the system will either be elevated or in exclusive right-of-way.

In addition to the guideway, the Project will require construction of transit stations and supporting facilities. Supporting facilities will include a vehicle maintenance and storage facility, transit centers, park-and-ride facilities with a total of approximately 4,100 spaces, an access ramp from Interstate Route H-2 (H-2 Freeway) to the Pearl Highlands Station, and traction power substations. The maintenance and storage facility will be located either in Hoʻopili near Farrington Highway between North-South Road and Fort Weaver Road or near Leeward Community College, which is the preferred site option.

Some bus service will be reconfigured to bring riders on local buses to nearby fixed guideway transit stations. To support this system, the bus fleet will be increased. Analysis of the Project assumes completion of the committed transportation projects identified in the ORTP, including improvements to the H-1 Freeway and a Nimitz Viaduct.

Transportation

Existing and future (planning horizon year 2030) transportation system conditions, service characteristics, performance, and transportation effects for each of the alternatives (including the No Build Alternative) are evaluated in this Final EIS. The evaluation is organized into three sections:

- Existing (2007) conditions and performance
- Future (2030) conditions and performance, with comparisons between the Project and 2030 No Build conditions
- Construction-related effects

The existing transportation network (streets, highways, parking, bicycle and pedestrian network, Honolulu International Airport, and public transportation) was evaluated. Current transit service in the corridor is heavily used, resulting in bus service productivity that is among the highest in the U.S. Congestion-related delays occur on roadways within the study corridor. This includes peak a.m. and p.m. congestion, especially in the peak direction (i.e., toward Downtown in the morning) and on existing high-occupancy vehicle (HOV) lanes.

These congestion-related delays increase travel times for the entire network; and increasing congestion and constrained operating conditions for public transit services have led to transportation conditions that are becoming less reliable. Although the bus system's productivity exceeds several systems that operate in larger metropolitan areas, gradually slower speeds, increased costs, and reduced service reliability have resulted from buses operating in mixed traffic. Even with the $3 billion in planned roadway improvements outlined in the ORTP, congestion will increase, making it more difficult for bus transit to effectively serve the population.

Under the No Build Alternative, transit service would experience somewhat slower operating speeds and reduced reliability through the 2030 horizon year.

With the Project, overall transit speeds will increase, which will reduce travel times and improve operating efficiency as a result of the fixed guideway system. The Project will reduce travel time to major activity centers, such as Downtown and Ala Moana Center. For example, transit travel times from Kapolei to Downtown Honolulu in the a.m. peak would be 90 minutes in 2030 with the No Build Alternative and 55 minutes with the Project. Trips to and from Central O'ahu and Waikīkī, while not directly served by the Project, also will benefit from reduced transit travel times. Total congestion will be reduced by 18 percent with the Project.

Transit service will be improved through local bus routes and pedestrian and bicycle access to guideway stations, resulting in an increased transit share of total trips (particularly for work-related trips). A fixed guideway system will also improve transit equity by reducing travel times for transit-dependent populations to major employment areas.

With the Project, the fixed guideway will affect existing streets, parking capacity, and pedestrian and bicycle facilities. Effects of the Project will include reduced travel lane widths, parking, bicycle lanes, and sidewalks. Careful design and placement of guideway columns will minimize these potential effects. The Project will negatively affect traffic conditions at six intersections near the East Kapolei, UH West O'ahu, Pearl Highlands, and Ala Moana Center Stations. The Project will result in a loss of approximately 175 on-street and 690 off-street parking spaces. Traffic and parking effects will be mitigated. Construction of the Project will have temporary effects on the transportation system, and mitigation will include a Maintenance of Traffic Plan and Transit Mitigation Program.

Subsequent to the Draft EIS, additional coordination with FTA, the Federal Aviation Administration (FAA), and HDOT Airports Division revealed that the Aolele Street alignment required refinement to avoid impacting Honolulu Airport's runway protection zone. The refined project alignment is consistent with FAA's requirements for the approach surface, Runway Protection Zone, and runway safety areas, and will not result in long-term adverse effects on airport operations. There will be no significant adverse environmental effects from the refined design in the vicinity of the airport as documented in this Final EIS.

Environmental Analysis, Consequences, and Mitigation

The existing conditions, environmental effects of the No Build Alternative and the Project, and mitigation are documented in this Final EIS. All aspects of the natural and built environment were evaluated per NEPA and HRS Chapter 343 regulations. Efforts were made to avoid and minimize impacts to the natural and built environment. Following is a summary of those resources where an impact is anticipated and mitigation commitments have been made by the City (Appendix I, Mitigation and Commitments).

Displacements and Relocations

Property acquisition of 199 parcels will be required. The Project will require 40 full acquisitions. Partial acquisitions will include 159 parcels.

Acquisition of land used for residential and commercial purposes will result in displacements and relocations. Displaced residents will need to purchase or rent new dwellings. Displaced businesses will need to purchase or lease new commercial/industrial space, and the location where employees work will change.

Twenty residences, 1 church, and 66 businesses will be relocated by the Project. Acquisition of property for the Project will be conducted in accordance with Federal and State regulations. Where relocations will occur, affected property owners, businesses, or residents will receive compensation in compliance with all applicable Federal and State laws. Compensation will be in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act (49 CFR 24).

Visual and Aesthetics

Visually sensitive resources in the study corridor include landmarks, significant views and vistas, historic and cultural sites, and Exceptional Trees. These resources are important because of their scenic quality, scale, and prominence within the visual environment.

Protected views and vistas, including mauka and makai views and views of and from prominent landmarks in the study corridor are identified in City development plans, including the ʻEwa Development Plan, the Central Oʻahu Sustainable Communities Plan, and the Primary Urban Center Development Plan. Protected views and vistas are view planes that the City has determined are important to protect because of their scenic quality, scale, and prominence within the visual environment. These views are generally protected through the City's urban design principles that relate to appropriate building heights, setbacks, and design and siting controls. The Project is supportive of the land use objectives included in these plans as summarized in Appendix J, which discusses the Project's relationship to State and City land use plans, polices, and controls for the study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions. The City's general urban design principles protect public views based on the type of view and are applicable to both public streets and public and private structures. Some protected views and vistas will change as a result of the Project, including public views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks. The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. Viewers' responses to these changes will vary with their exposure and sensitivity and depend on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

Mitigation measures will focus on preserving visual resources, enhancing the Project with architectural and landscape design features—retaining existing trees where practical, providing new vegetation, shielding exterior lighting—and engaging the community in the design as appropriate.

Noise and Vibration

Noise impacts from the Project were evaluated using criteria established by the FTA, which are based on community reaction to environmental noise exposure (FTA 2006b).

Noise levels were measured at locations along the project alignment and near station locations to establish the most sensitive existing environment (i.e., existing baseline noise levels). Noise measurements were taken at ground-level and elevated noise-sensitive locations along the study corridor. Potential noise effects from transit park-and-ride lots and maintenance and storage facility operations were also evaluated.

A 3-foot parapet wall is included in the project design. As mitigation, wheel skirts have been added to the vehicle specifications to reduce noise generated from the Project by 3 dBA or more. Wheel skirts will reduce noise exposure levels below impact criteria at five of eight locations. Even with wheel skirts, three of these high-rise residential buildings will experience moderate noise impacts. The use of sound-absorptive materials under the tracks in these three areas will reduce the project noise exposure at upper floors to below the moderate noise impact threshold.

Traction power substations will be designed to meet the requirements of Hawaiʻi state law (HAR 11-46). Track lubrication will be provided at tight-radius curves within the maintenance and storage facility preferred site option near Leeward Community College to eliminate wheel squeal.

Once the Project is operating, noise measurements will be conducted at representative sites. Should the Project's noise exposure exceed the FTA noise impact criteria, further mitigation may be conducted on the receivers with the authorization of the property owners.

The Project will not create vibration effects, so no mitigation is required.

Hazardous Materials

A number of sites within the study corridor were identified as potential sites of concern for hazardous materials. In some locations, large or specialized hazardous waste or hazardous materials sites may be affected by right-of-way acquisition. These include underground and aboveground storage tanks (UST and AST), fuel islands, and engineered storage facilities. In a few cases, the Project may displace hazardous materials operations. This includes relocating gas station fuel islands and USTs and ASTs. Environmental site assessments will be conducted for potentially contaminated sites, and remediation will be completed where needed.

Water Resources

Twenty streams or conveyance channels are to be crossed by the guideway or other project structures. In 18 cases, where the Project crosses them, these stream channels have been modified within the study corridor. More importantly, the guideway traverses urban areas where streams have been realigned and otherwise modified for flood control purposes. The Project will, once constructed, permanently encroach upon 0.02 acre of waters of the U.S. These impacts are from placing piers in Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream and Waiawa Springs. Permanent mitigation features are proposed at Waiawa Stream, within the Pearl Highlands Station area.

The guideway will cross several floodplains in Waipahu and Pearl Highlands. However, the Project will not cause significant floodplain encroachment as defined by USDOT Order 5650.2. Any changes caused by the Project will be mitigated through design to comply with current flood zone regulations.

Where the guideway will cross floodplains, the columns supporting the guideway and stations will be designed to withstand flooding. Facilities in floodplains at ground level (e.g., stairs, elevators, and traction power substations) will be designed to function and remain safe during flooding. These features will comply with flood zone regulations. Hydraulic studies completed for specific locations where the Project will cross floodplains indicate that, with mitigation, the Project will not raise base flood elevations.

Pollution prevention best management practices (BMP), such as regular inspection and cleaning of the drainage system, will be a part of the stormwater management plan that will be developed during Final Design. Permanent BMPs will be installed at the maintenance and storage facility and the park-and-ride facilities. Permanent BMPs will also be installed for stormwater that drains from the guideway at all crossings of water bodies. Permanent BMPs will be installed as part of the Project to address stormwater quality before the water is discharged to streams or existing storm drain systems. The BMPs will promote a natural, low-maintenance, sustainable approach to managing and increasing stormwater quality. As part of the permitting process, project plans will be prepared that incorporate BMPs that will help prevent stormwater pollution.

Street Trees

Coordination regarding street trees was initiated with the City Department of Parks and Recreation Division of Urban Forestry and community groups, such as the Outdoor Circle and Sierra Club. This has resulted in identifying Exceptional Trees along the project alignment. The Department of Transportation Services will coordinate with the Department of Parks and Recreation Division of Urban Forestry and community groups as the Project progresses.

The Project will require tree pruning and removal. Tree removal will be minimized to the greatest extent possible, but if a street tree is close to the guideway, it will likely require periodic pruning if it is not removed.

Effects on street trees will be mitigated by transplanting existing trees or planting new ones.

Pruning will be in compliance with City and County ordinances and require supervision by a certified arborist. The City will coordinate with the State of Hawaiʻi Department of Transportation landscape architect and other agencies.

Archaeological, Cultural, and Historic Resources

Under the *National Historic Preservation Act* (NHPA) (USC 1966a), Section 106 requires Federal agencies to consider the effects of their actions on historic properties. This includes archaeological and traditional cultural properties, which are the beliefs, customs, and practices of a living community of people that have been passed down through the generations. Hawai‘i's historic preservation review legislation (HAR 2002) includes similar requirements.

Archaeological resources already documented within the APE include remnants of fishponds, cultivation terraces, irrigation systems, habitated sites, and subsurface cultural layers related to Native Hawaiians that may include religious or cultural artifacts and resources, including iwi kupuna or Hawaiian burials.

The City will develop an archaeological inventory survey (AIS) plan for the APE for each construction phase in accordance with 36 CFR 800.4, which allows for phased identification of archeological resources to limit disturbance of potential resources during the investigation. The City will use PE plans to focus the investigation in locations where there is the potential to affect archeological resources by project construction. The AIS plans will follow the requirements of HAR Chapter 13-276. The City will conduct the archaeological fieldwork as presented in the AIS plan for each construction phase. The archaeological fieldwork will be completed in advance of the completion of Final Design so that measures to avoid and/or minimize adverse effects to historic properties can be incorporated into the design. The O‘ahu Island Burial Council will have jurisdiction to determine the treatment of previously identified Native Hawaiian burial sites in accordance with HAR Chapter 13-300. Any ‘iwi kupuna (Native Hawaiian burials) discovered during the AIS shall be treated as previously identified burial sites.

The analysis of cultural resources was based on compliance requirements specified in NEPA, NHPA Section 106, and Act 50 (HHB 2000), as it amends the State of Hawai‘i EIS law (HRS Chapter 343) to include "effects on the cultural practices of the community and State."

Act 50 Findings: Based on personal consultations and examination of historic documents and existing archaeological information, the cultural impact assessment concluded that most of the traditional cultural practices associated with cultural resources, such as the gathering of plant and marine resources for subsistence activities within the study corridor, have been heavily damaged or destroyed through previous development. No ongoing practices related to traditional gathering were identified during the assessment.

Historic resources were identified and evaluated, and the Project's effects on them were determined. Properties within the Area of Potential Effects (APE) were identified as those with construction dates before 1969. The APE contains 81 historic resources (individual or districts). Of the 81 historic resources, FTA has determined that the Project will have adverse effects to 33 historic resources. While the Project was designed to avoid and minimize effects to historic properties, this was not always possible in meeting the Project's Purpose and Need. A draft Programmatic Agreement (PA) was developed in consultation among the consulting parties. The draft PA records the terms and conditions agreed upon to resolve potential adverse effects and is attached to this Final EIS in Appendix H. The Section 106 signatories (FTA, SHPO, and ACHP) clarified the language in the draft PA, and in May 2010 FTA distributed the draft PA to the Section 106 consulting parties for informational purposes. FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize this draft PA prior to the ROD. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signature as concurring parties to the PA (see Appendix H, Section 106 of the National Historic Preservation Act Programmatic Agreement).

Construction Effects

Construction is planned to begin in 2010 and be completed by 2019. Construction effects will be temporary and limited in areas as construction proceeds along the project alignment. These effects will vary depending on the land use in each sub-area. Construction-related effects will primarily result during construction of the main structural components: the foundations and columns, superstructure (the elevated guideway structure), and stations. Construction of other system components, such as traction power substations, will also have associated effects, but to a lesser degree. Construction activities at the maintenance and storage facility, park-and-ride lots, transit centers, and staging and support facilities will result in effects that are localized to the vicinity of those facilities.

During construction, access to businesses near construction activities will be maintained.

DTS has prepared a Safety and Security Management Plan Manual that requires contractors to adhere to safe practices. This plan will protect the general public, private property, and workers from construction risks.

During construction, visual quality may be altered for all viewer groups. Construction-related signage and heavy equipment will be visible at and near construction sites. Mature vegetation, including trees, may be removed from some areas or pruned to accommodate construction of the guideway, stations, and park-and-ride lots. This will degrade or partially obstruct views or vistas.

Noise during construction could be bothersome and annoying to nearby residents, visitors, and businesses. The Project will generate noise that will occur intermittently in different locations throughout the nine-year construction period.

Common sources of vibration during construction activities include jackhammers, pavement breakers, hoe rams, bulldozers, and backhoes. Pavement breaking and soil compaction will likely produce the highest levels of vibration. Depending on soil conditions in a given sub-area, activities such as pile driving can generate enough vibration to result in substantial short-term noise impacts. Prior to construction, the City, in cooperation with its contractors, will develop a noise and vibration construction mitigation plan. The plan will follow FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006a), meet HDOH noise permit requirements, and include for adjacent historic properties a construction vibration monitoring plan as part of the draft PA.

Archaeological resources or native Hawaiian burials could be encountered during construction. The potential to encounter these resources will be reduced through pre-construction site investigations completed in coordination with the State Historic Preservation Division (SHPD) and the Oʻahu Island Burial Council. Any resources encountered during construction will be treated as outlined in the Section 106 Programmatic Agreement.

Section 4(f)

Section 4(f) of the *U.S. Department of Transportation Act of 1966* (49 USC 303) protects public parklands, recreational lands, wildlife refuges, and historic sites of National, State, or Local significance from acquisition and conversion to transportation use. Because avoiding Section 4(f) properties was an important consideration, most public parks, recreational properties, and historic properties identified within the study corridor were avoided in designing the Project. However, the Project will result in the use of 11 Section 4(f) historic properties, de minimis use of two historic properties; de minimis use of three park and recreational properties; and temporary occupancy of 2 recreational properties. FTA and the City considered all possible planning to minimize harm to these Section 4(f) properties.

Cost and Financial Analysis

The capital cost of the Project, in year-of-expenditure dollars, will be $5.1 billion, excluding finance charges.

The local funding source for the Project is a dedicated 0.5-percent surcharge on the State of Hawaiʻi's General Excise and Use Tax (GET). This GET surcharge revenue is to be used exclusively for the Project's capital and/or operating expenditures and is expected to generate $3.5 billion (year-of-expenditure dollars) through 2022. The FTA has agreed to consider $1.55 billion (year-of-expenditure dollars) for the Federal contribution to the Project from its New Starts program. Based on the latest costs and user benefits results, the Project shows a New Starts rating of "Medium," which is required to qualify for New Starts funding.

The City receives Federal assistance through various funding programs from the FTA for ongoing capital investments to maintain and overhaul its transportation system. The financial analysis performed assumes the City will continue to receive these funds, some of which will increase noticeably after implementation of the Project.

Comments and Coordination

Agencies, non-governmental groups, and the public have been engaged throughout the project planning process, as required by Federal and State law. Public involvement efforts, including agency coordination and consultation, have been continuous throughout the Project, beginning with the Alternatives Analysis phase in December 2005 through the public comment period on the Draft EIS and during preparation of this Final EIS. In accordance with Executive Order 12898, particular attention has been paid to reaching low-income and minority populations, which are traditionally underserved and underrepresented in the public involvement process.

As part of the NEPA and HRS Chapter 343 process, the Draft EIS was circulated for a 75-day review and comment period starting in November 2008. Formal public hearings were held during this period. Attendance at the hearings was not required to submit comments.

In total, 586 comment submissions were received. The majority of the comments received were related to the following topics: alternatives considered, planned extensions, ridership and travel forecasting, parking, traffic analysis, visual, noise, cost and financing, construction phasing, construction effects, and acquisition and relocation.

Public involvement activities and program will continue throughout the construction period. This program will continue to involve the community while advancing project activities, education, and construction assistance. Project staff will work with businesses and residents prior to and during construction to provide information and address concerns about the construction process. The Project will also continue use of the Speakers Bureau, the project website (www.honolulutransit.org), and the hotline.

01

CHAPTER

Background, Purpose and Need

The U.S. Department of Transportation Federal Transit Administration (FTA) and City and County of Honolulu Department of Transportation Services (DTS) are undertaking a project that will provide high-capacity transit service on Oʻahu. The study corridor extends from Kapolei to the University of Hawaiʻi at Mānoa (UH Mānoa) and Waikīkī (Figure 1-1). The east-west length of the study corridor for the Honolulu High-Capacity Transit Corridor Project (HHCTCP) is approximately 23 miles. The north-south width is about 4 miles, because much of the study corridor is constrained by the Koʻolau and Waiʻanae Mountain Ranges to the north and the Pacific Ocean to the south. The Project is a portion of the Locally Preferred Alternative (LPA) that begins at the University of Hawaiʻi-West Oʻahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center.

This chapter includes additional details in Section 1.1.1 related to regional planning and in Section 1.1.2 to clarify the Project's development process. A new Section 1.1.3 updates the Project's history since the Draft Environmental Impact Statement (EIS) was published.

1.1 History of the Honolulu High-Capacity Transit Corridor Project

1.1.1 Conditions Leading to the Project

Transit has a long history on Oʻahu starting with the Oʻahu Railway and Land Company (OR&L) system that carried passengers on approximately 150 miles of track between 1890 and 1947. The route structure included a line in the corridor between ʻEwa and Honolulu (Chiddix 2004).

The Honolulu Rapid Transit and Land Company (HRT&L) began operating an electric streetcar system in Honolulu in 1903 and had more than 20 miles of lines in operation at its peak.

Roadway development, buses, and private automobile ownership decreased rail-transit demand throughout the United States, including Hawaiʻi, beginning in the 1920s. The HRT&L

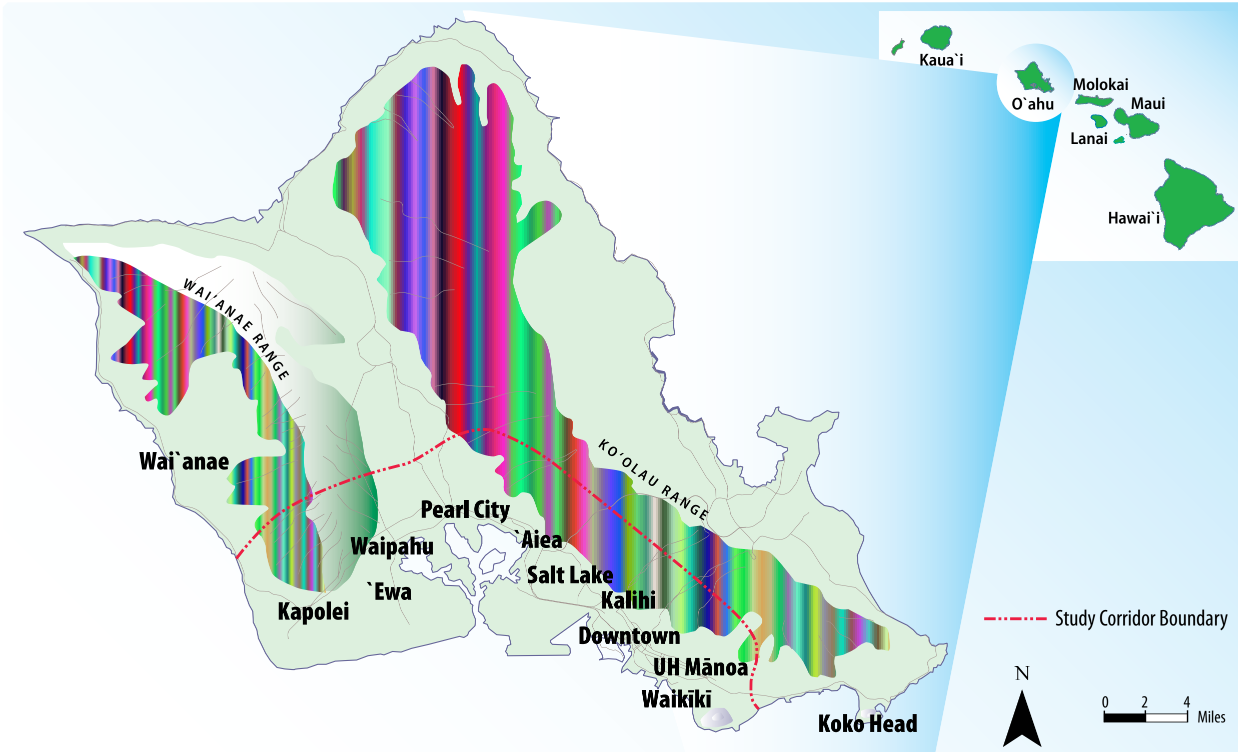
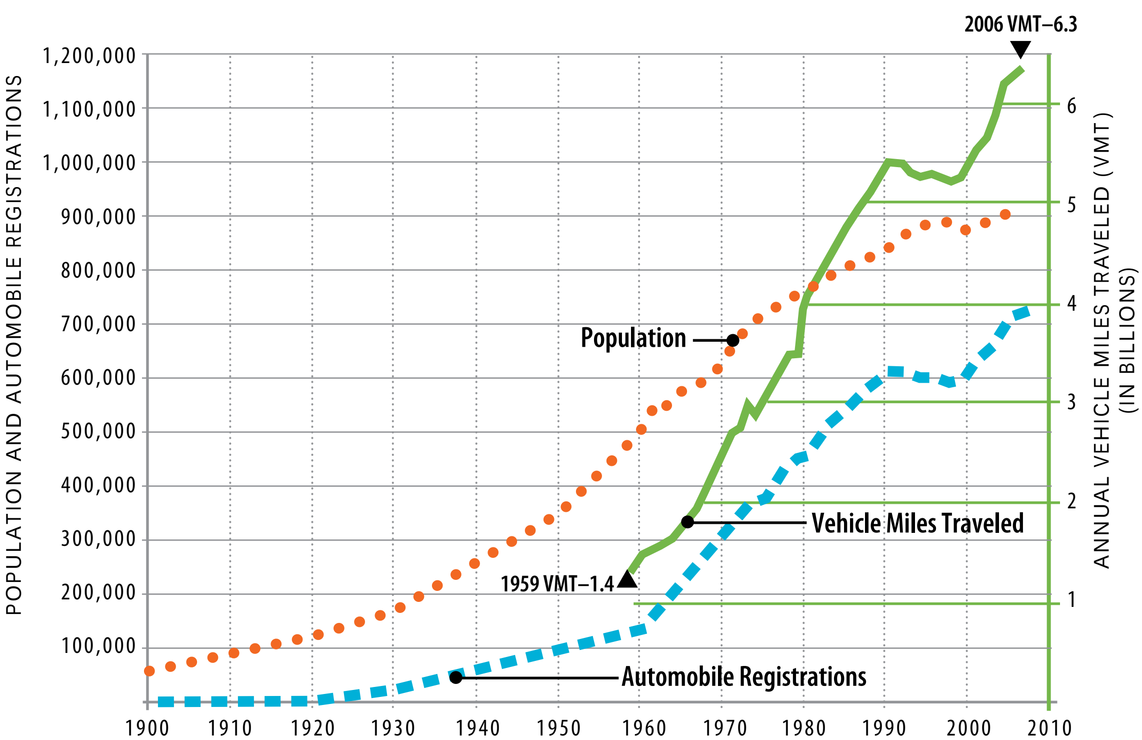


Figure 1-1 Honolulu High-Capacity Transit Corridor Project Vicinity



Source: City and County of Honolulu Department of Business, Economic Development and Tourism, 2007.

Figure 1-2 Population, Vehicle Ownership, and Vehicle Miles Traveled Trends for O`ahu streetcars were completely replaced by buses in 1942. Increasing transportation demand was met in the 1950s with the development of Interstate Route H-1 (H-1 Freeway). Population, automobile ownership, and vehicle miles traveled trends for Oʻahu are shown in Figure 1-2.

Despite increasing travel demand, public opposition to extensive freeway expansion began to develop in the early 1960s. A proposal for an elevated Makai Freeway along the waterfront between Kalihi and Mōʻiliʻili was abandoned because of a combination of public opposition, lack of funds, and ecological impacts. The 1967 islandwide *Oʻahu Transportation Study* (OTPP 1967) concluded that a fixed guideway transit system, serving a corridor between Pearl City and Hawaiʻi Kai, would provide cost-effective transportation capacity as part of a larger transportation system expansion needed to meet increased demand.

During the early 1970s, the Preliminary Engineering and Evaluation Program (PEEP) I and PEEP II studies further explored options for a fixed guideway transit system. Based on these studies, the City and County of Honolulu (City) began planning the Honolulu Area Rail Rapid Transit (HART) Project to provide transit in the corridor from Pearl City to Hawaiʻi Kai. A change in City administration resulted in different transportation priorities, and work on the HART Project stopped.

In 1985, the City began a new study for an exclusive right-of-way, fixed-guideway rapid transit project. The Honolulu Rapid Transit Development (HRT) Project built on the planning completed for the HART Project but explored new automated transit technologies. In 1992, a Final Environmental Impact Statement (EIS) was issued for the HRT Project. However, the City Council failed to authorize the general excise and use tax (GET) surcharge to provide needed local funding and the project ended.

In 1998, the City began developing the Oʻahu Trans 2K Islandwide Mobility Concept Plan (DTS 1998). Through an intensive public involvement program, the plan identified the increasing need for improved mobility and links between land use and transportation. The plan endorsed an integrated transportation approach, with roadway, high-occupancy vehicle (HOV), and transit improvements. This study led to the Primary Corridor Transportation Project.

Unlike prior projects, the Primary Corridor Transportation Project focused on alternatives that could be constructed within existing transportation rights-of-way to provide mobility improvements at a lower cost and with fewer impacts than previous proposals. A Major Investment Study and Draft EIS was completed in 2000, which proposed a system based on bus rapid transit (BRT) operations.

Some of the facilities from the BRT system proposal were completed, including extension of the morning reversible-flow “zipper lane” for buses and HOVs on the H-1 Freeway between Radford Drive and the Keʻehi Interchange, as well as additional transit stops.

As part of its work to update the Regional Transportation Plan to the *Oʻahu Regional Transportation Plan 2030* (ORTP), the Oʻahu Metropolitan Planning Organization (OʻahuMPO) surveyed Oʻahu residents about transportation issues in 2004. The survey results identified traffic congestion during the commute period in the study corridor extending from ʻEwa and Central Oʻahu to Downtown Honolulu as the biggest concern. By nearly a two-to-one margin, residents responded that improving transit was more important than building more roadways. Seventy percent of the respondents believed that rail rapid transit should be constructed as a long-term transportation solution, and 55 percent supported raising taxes to provide local funding for the system.

During development of the ORTP 2030 in 2004 and 2005, the need for a fixed guideway system was identified and a range of future transportation scenarios for O'ahu were evaluated, including fixed guideway transit in various corridors and alternatives that did not include a fixed guideway. The final ORTP summarized the findings as follows:

"A key component of the ORTP 2030 is a fixed guideway that will serve the H-1 travel corridor. It is important to note that building a fixed guideway will not eliminate congestion. We will also not be able to eliminate congestion by building more highways, for we do not have the resources to keep up with the demand. The fixed guideway will give priority to moving people rather than cars, will be a major factor in providing mobility options, and will work together with our land use policies in shaping our city. The proposed fixed guideway from East Kapolei to Ala Moana will become the backbone of the transit system—connecting major employment and residential centers to each other and to downtown Honolulu. This project also includes associated feeder bus services for each station and access ramps and other freeway improvements to facilitate the flow of buses that supplement the fixed guideway" (O'ahuMPO 2007).

The ORTP 2030 development was a system-planning effort that identified and prioritized the H-1 travel corridor as having the greatest need for improved transit service.

1.1.2 Progress of the Honolulu High-Capacity Transit Corridor Project

In 2005, the State Legislature recognized the need and public support for a high-capacity transit system on O'ahu and passed Act 247 (HRS 2005). The Act authorized the City to levy a General Excise and Use Tax surcharge to construct and operate a mass transit system serving O'ahu. The City Council subsequently adopted Ordinance 05-027 to levy a tax surcharge to fund public transportation. With dedicated, secure local funding established for the first time and the system-planning effort of the ORTP 2030 identifying the need for improved transit service, the City began the Alternatives Analysis process to evaluate high-capacity transit alternatives in the study corridor between Kapolei and UH Mānoa. A range of alternatives was evaluated and screened to select alternatives that would provide the most improvement to person-mobility and travel reliability in the study corridor, while minimizing adverse social, economic, and environmental effects (see Chapter 2, Alternatives Considered).

The FTA published a Notice of Intent to Prepare an Alternatives Analysis and Draft EIS in the *Federal Register* on December 7, 2005, and DTS published an EIS Preparation Notice for the HHCTCP in the *State of Hawai'i Environmental Notice* on December 8, 2005. The Notice of Intent discussed travel demand, delays, and the projected growth in traffic, described the need for affordable transit, and concluded the following:

"The intent of the proposed alternatives is to provide improved person-mobility in this highly congested east-west corridor. A high-capacity improvement project would support the goals of the regional transportation plan by serving areas designated for urban growth, provide an alternative to private automobile travel and improve linkages between Kapolei, Honolulu's Urban Center, UH Mānoa, Waikīkī, and urban areas between these points."

The Notice of Intent invited all interested individuals and organizations, and Federal, State, and local agencies to comment on the proposed alternatives, Purpose and Need, and the range of issues to be evaluated at a series of scoping meetings in December 2005. Scoping activities related to the Alternatives Analysis and the Hawai'i Revised Statutes (HRS) Chapter 343 EIS preparation notice comment period processes were completed between December 2005 and January 2006. In response to public comments during this scoping process, "moderating the growth in traffic congestion" was added to the Purpose and Need for the Project. Appendix G of this Final EIS includes the Scoping Report that documents comments received during this period and changes made to the Purpose and Need as a result of the comments.

Completed in November 2006, the *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Report* (Alternatives Analysis) (DTS 2006b) evaluated four alternatives to provide transit service in the study corridor between Kapolei and UH Mānoa:

- No Build
- Transportation System Management
- Express Buses Operating in Managed Lanes
- Fixed Guideway Transit System

After review of the Alternatives Analysis Report and consideration of nearly 3,000 comments received from the public, the City Council selected the Fixed Guideway Transit System Alternative, including an alignment extending from Kapolei to UH Mānoa with a branch to Waikīkī, as the Locally Preferred Alternative on December 22, 2006. Ordinance 07-001 made the City Council's selection law on January 6, 2007. The ordinance authorized the City to proceed with planning and engineering a fixed guideway transit system within these limits and following the alignment defined in the ordinance. The ordinance also required that a First Project be selected that is fiscally constrained. City Council Resolution 07-039, which was passed on February 27, 2007, defined the First Project as extending from East Kapolei to Ala Moana Center via Salt Lake Boulevard.

Following the preparation of the Alternatives Analysis Report and selection of a Locally Preferred Alternative, DTS and FTA proceeded with the NEPA process with a Notice of Intent to prepare this EIS, which was published in the *Federal Register* on March 15, 2007. The Notice of Intent requested public and agency input on the proposed alternatives, Purpose and Need, and the range of issues to be evaluated in this EIS. The Notice of Intent discussed the proposed purpose of the Project being to provide fixed-guideway transit on exclusive right-of-way in the highly congested east-west transportation corridor between Kapolei and UH Mānoa, as specified in the 2030 O'ahu Regional Transportation Plan (ORTP). The transportation, planning, and equity need for the Project also was discussed. Scoping, which was concluded in April 2007, is documented in the NEPA Scoping Report, which is included in. Appendix G of this Final EIS.

1.1.3 Developments since the Draft Environmental Impact Statement

On November 4, 2008, the voters of O'ahu passed a charter amendment that declared the City should establish a steel-wheel on steel-rail transit system.

The Notice of Availability of the Draft EIS was published on November 21, 2008, in the *Federal Register*, and notice also appeared in the November 23, 2008, State of Hawai'i Environmental Notice. In response to requests from the public and agencies, the public comment period on the Draft EIS was extended to February 6, 2009. Chapter 8 of this Final EIS includes a summary of comments received on the Draft EIS.

Having secured the support of voters and considering the information in the Draft EIS, the City Council passed Resolution 08-261 on January 28, 2009, which resolves that planning, engineering, design, and construction should be completed for the Airport Alternative. The resolution superseded Resolution 07-039.

1.2 Description of the Corridor

The study corridor for the Honolulu High-Capacity Transit Corridor Project extends from Kapolei in the west (Waiʻanae or ʻEwa direction) to UH Mānoa in the east (Koko Head direction). It is confined by the Waiʻanae and Koʻolau Mountain Ranges in the mauka direction (toward the mountains, generally to the north within the study corridor) and the Pacific Ocean in the makai direction (toward the sea, generally to the south within the study corridor) (Figure 1-1). From Pearl City to ʻAiea, the study corridor's width is less than 1 mile between Pearl Harbor and the base of the Koʻolau Mountain Range.

Directions on O`ahu:

- The Wai`anae or `Ewa direction is west.
- The Koko Head direction is east.
- The mauka direction is toward the mountains.
- The makai direction is toward the sea.

The *City and County of Honolulu General Plan* (Honolulu General Plan) (DPP 2002a) directs future population and employment growth to the ʻEwa and Primary Urban Center (PUC) Development Plan areas and the Central Oʻahu Sustainable Communities Plan area. The largest increases in population and employment are projected in the ʻEwa, Waipahu, Downtown, and Kakaʻako Districts, which are all located in the study corridor (Figure 1-3). Major activity centers in the study corridor are shown in Figure 1-4.

The ***City and County of Honolulu General Plan*** is a statement of objectives and policies for O`ahu. The General Plan delineates the island into planning areas, three of which, `Ewa, Central O`ahu, and the Primary Urban Center, are in the study corridor.

Table 1-1 identifies existing travel times, for both transit and autos, for selected origins and destinations. These times are modeled door-to-door trip times. In most cases, transit travel times are considerably longer than auto travel times.

According to the 2000 census, Honolulu ranks as the fifth densest city among U.S. cities larger than 500,000 in population.

In 2000, 63 percent of Oʻahu's population of 876,200 and 80 percent of its 501,100 jobs were located within the study corridor. By 2030, these distributions will increase to 69 percent of the population and 83 percent of the employment as development continues to be concentrated into the PUC and ʻEwa Development Plan areas. These trends are shown in Figures 1-5 and 1-6, which illustrate existing and year 2030 projected population of 1,117,200 and employment of 632,700, respectively, by transportation analysis area.

Kapolei is the center of the ʻEwa Development Plan area and has been designated Oʻahu's "second city." City and State government offices have opened in Kapolei, and UH has broken ground for a new West Oʻahu campus able to serve 7,600 students. The James Campbell Company and Campbell family donated money for the construction of the Salvation Army Kroc Center in Kapolei, which will be located on 12 acres and will be the largest community center in Hawai'i. It will contain swimming pools, basketball courts, a performing arts center, and educational facilities. It is expected to open in 2010. The Kalaeloa Community Development District (formerly known as Barbers Point Naval Air Station) covers 3,700 acres adjacent to Kapolei and is planned for redevelopment. The Department of Hawaiian Home Lands is also a major landowner in the area and has plans for residential and retail development. In addition, developers propose to continue the construction of residential subdivisions, the largest of which is Hoʻopili, which would cover approximately 1,600 acres with mixed-use development, including approximately 12,000 residences.

Continuing Koko Head, the study corridor follows Farrington and Kamehameha Highways through

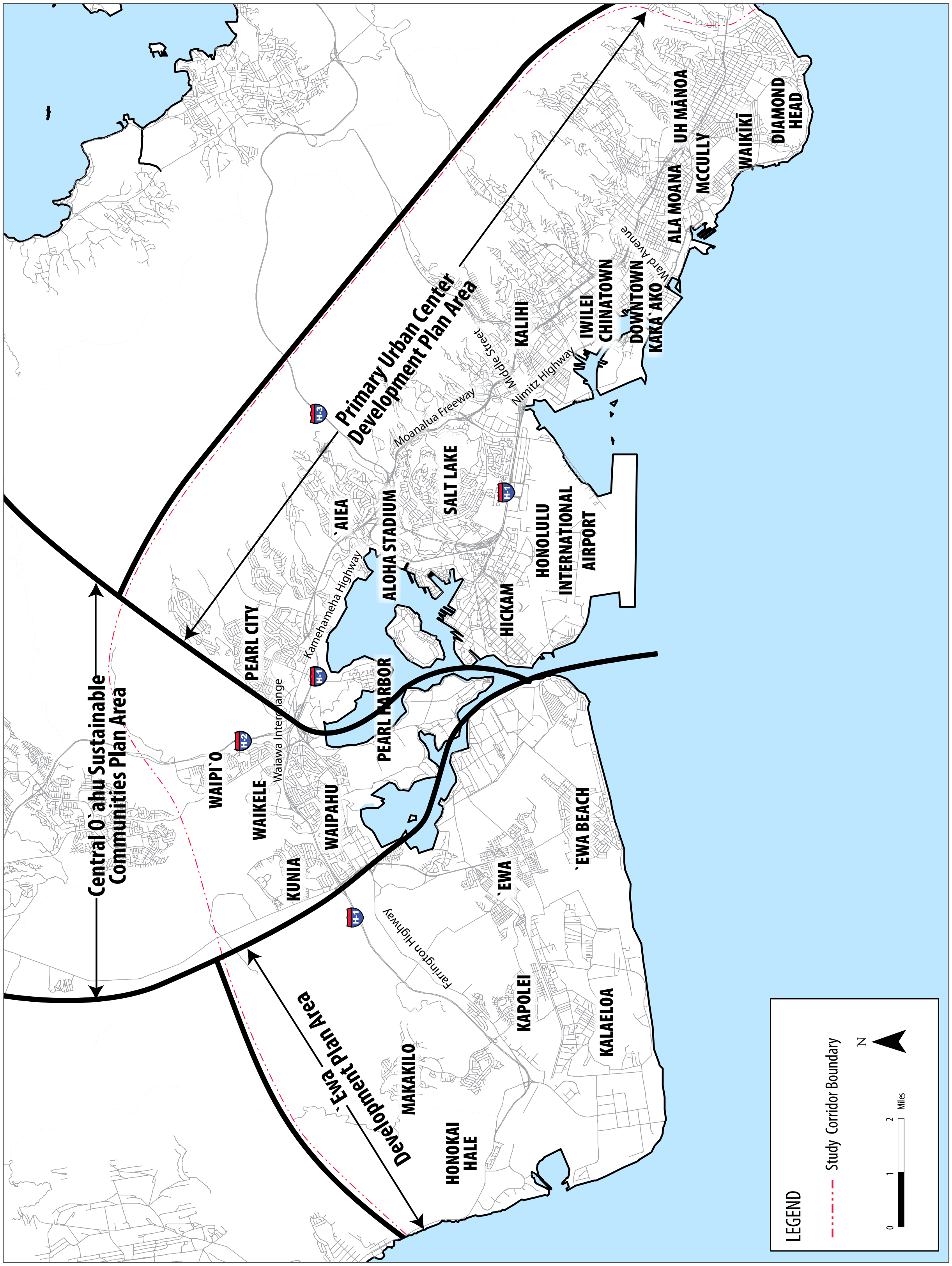
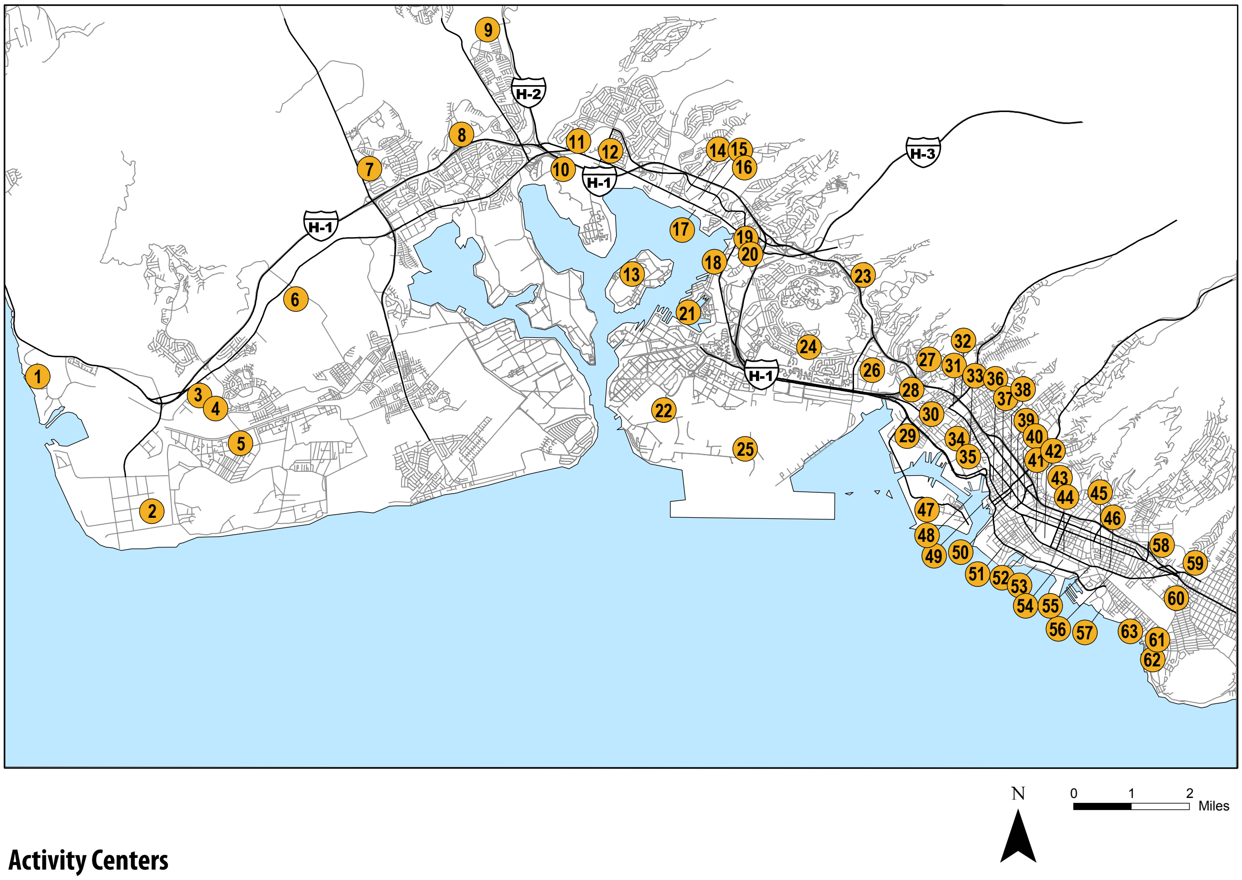


Figure 1-3 Areas and Districts in the Study Corridor



Activity Centers

1. Ko`Olina Resort
2. Campbell Industrial Park
3. State Office Building
4. Kapolei Hale
5. Kalaeloa
6. UH West O`ahu (under construction)
7. Royal Kunia Shopping Center
8. Waikele Premium Outlets
9. Costco Waipi`o
10. Leeward Community College
11. Pearl Highlands Center
12. Pearl City Shopping Center
13. Ford Island
14. Westridge Center
15. Pearlridge Center
16. Pali Momi Medical Center
17. Pearl Kai Center
18. Arizona Memorial & Visitor Center
19. Aloha Stadium
20. Stadium Mall
21. Pearl Harbor Naval Reservation
22. Hickam Air Force Base
23. Kaiser Medical Center
24. Salt Lake Shopping Center
25. Honolulu International Airport
26. Mapunapuna Industrial Area
27. Fort Shafter
28. Middle Street Industrial Center
29. Kalihi Kai Industrial Center
30. Kalihi-Palama Business District
31. Farrington High School
32. Bishop Museum
33. Honolulu Community College
34. Iwilei Industrial Area
35. Costco Iwilei
36. Chinatown
37. Downtown Financial District
38. State Capitol
39. Honolulu Hale
40. Queen's Medical Center
41. Neal S. Blaisdell Center
42. McKinley High School
43. Punchbowl National Memorial Cemetery
44. Kapi`olani Business District
45. McCully Business District
46. Tokai University Pacific Center
47. Sand Island Industrial Park
48. Honolulu Harbor
49. Aloha Tower
50. Hawai`i State Library
51. Kaka`ako Business District
52. Ward Centers
53. Ala Moana Beach Park
54. Ala Moana Center
55. Hawai`i Convention Center
56. Ala Wai Park
57. Fort DeRussy
58. University of Hawai`i at Mānoa
59. Chaminade University
60. Kapahulu Business District
61. Honolulu Zoo
62. Kapi`olani Park
63. Waikīkī

Figure 1-4 Major Activity Centers in the Study Corridor

Table 1-1 Existing (2007) A.M. Peak-Period Travel Times (in Minutes)

	Travel Origin and Destination																
	From Wai`anae to Downtown	From Kapolei to Downtown	From `Ewa to Downtown	From Waipahu to Downtown	From Mililani Mauka to Downtown	From Pearlridge Center to Downtown	From Downtown to Ala Moana Center	From Downtown to Waikīkī	From Downtown to UH Mānoa	From Airport to Waikīkī	From Waipahu to Waikīkī	From Downtown to Kapolei	From Wai`anae to UH Mānoa	From Kapolei to Ala Moana Center	From Salt Lake to Downtown	From `Ewa to Airport	From Airport to Downtown
2007 Base Year																	
Transit travel time	102	86	88	79	105	52	18	32	29	71	88	67	128	101	39	114	42
Auto travel time	100	89	88	58	84	35	14	19	18	35	69	32	109	94	26	75	25

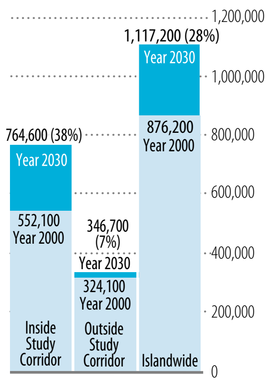
a mixture of low-density commercial, light industrial, and residential development. Population is projected to grow by more than 275 percent in the Waiawa area (Figure 1-5). This part of the study corridor passes through the makai portion of the Central O‘ahu Sustainable Communities Plan area.

Farther Koko Head, the study corridor enters the PUC Development Plan area, which is bounded by commercial and residential densities that begin to increase near Aloha Stadium. The Pearl Harbor Naval Reservation, Hickam Air Force Base, and Honolulu International Airport border the study corridor on the makai side. Military and civilian housing are the dominant land uses mauka of the H-1 Freeway, with a concentration of high-density housing along Salt Lake Boulevard.

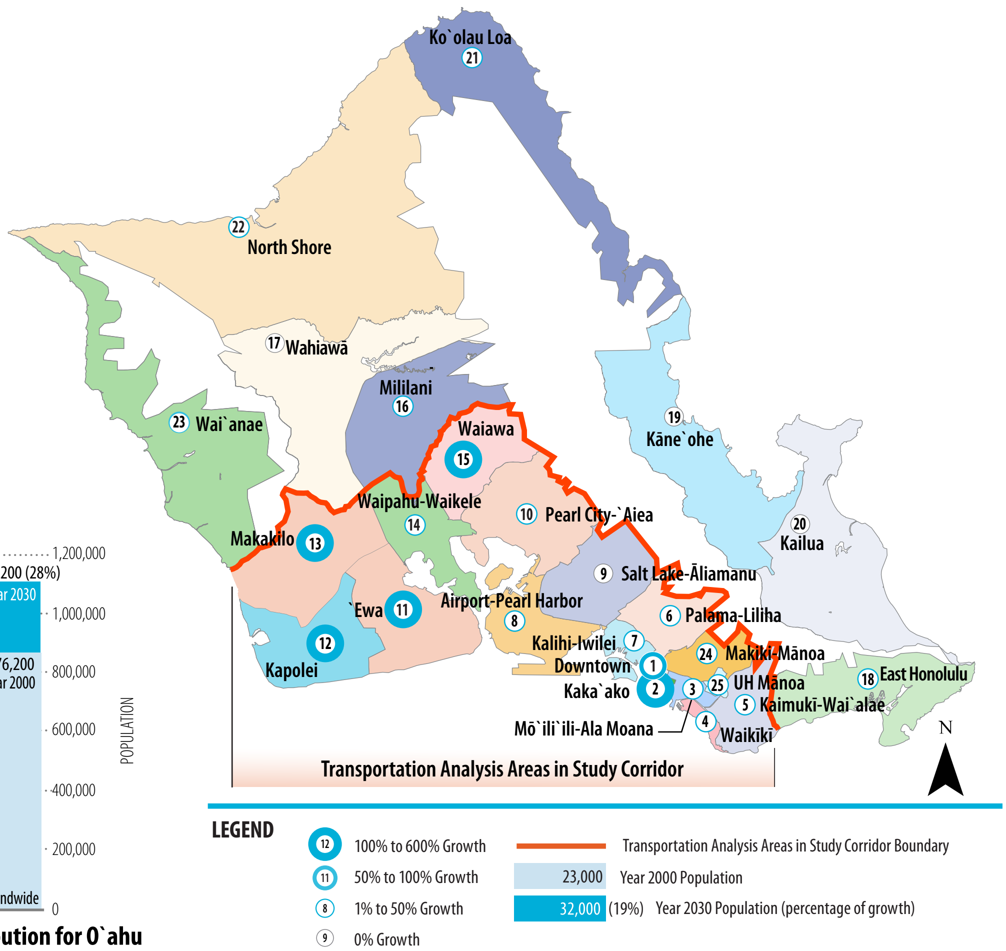
As the study corridor continues Koko Head across the H-1 Freeway, land use becomes increasingly dense. Industrial and port land uses dominate along the harbor, shifting to a mixture of low-rise commercial, residential, and institutional uses through Kalihi.

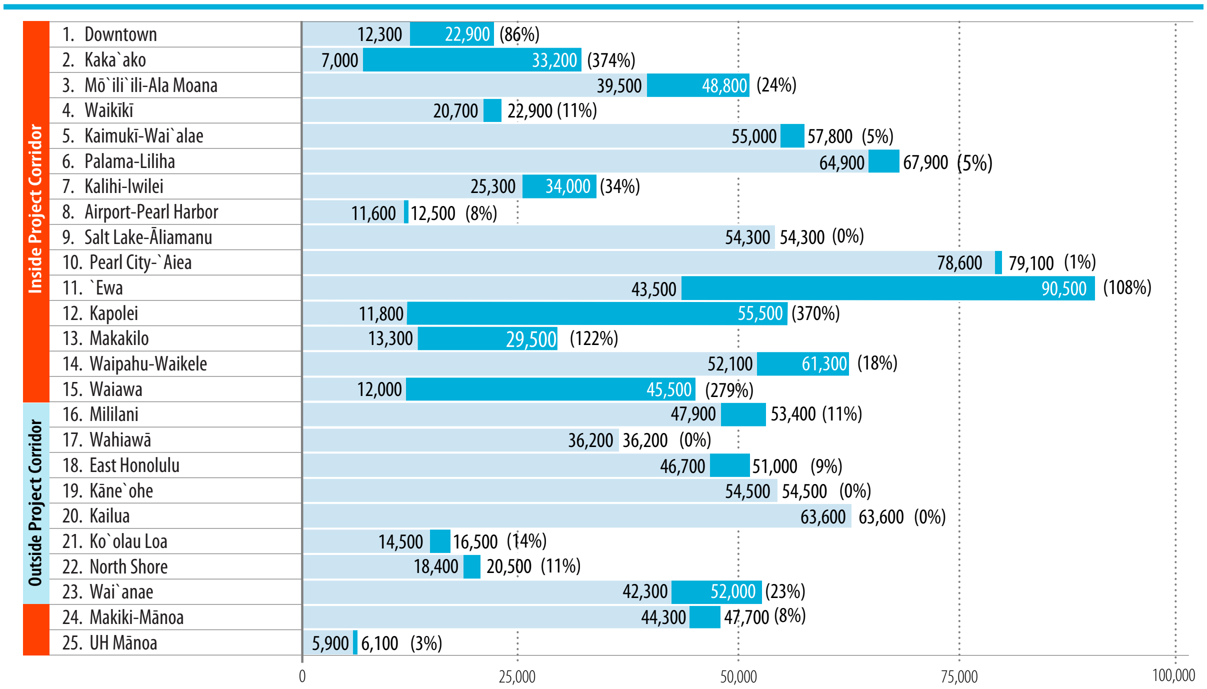
Koko Head of Nu‘uanu Stream, the study corridor continues through Chinatown and Downtown. The Downtown area, with 63,400 jobs, has the highest employment density in the study corridor (Figure 1-6). The Kaka‘ako and Ala Moana neighborhoods, comprised historically of low-rise industrial and commercial uses, are being revitalized with a mixture of high-rise residential, commercial, retail, and entertainment-related development. Ala Moana Center, both a major transit hub and shopping destination, is served by more than 2,000 weekday bus trips and visited by more than 56 million shoppers annually.

The study corridor continues to Waikīkī and through the McCully neighborhood to UH Mānoa. Today, Waikīkī has more than 20,000 residents and provides more than 44,000 jobs. It is one of the densest tourist areas in the world, serving approximately 72,000 visitors daily (DBEDT 2003). UH Mānoa has an enrollment of more than 20,000 students and approximately 6,000 staff (UH 2005). Approximately 60 percent of students do not live within walking distance of campus (UH 2002) and must travel by private vehicle or transit to attend classes.



Population Distribution for O`ahu

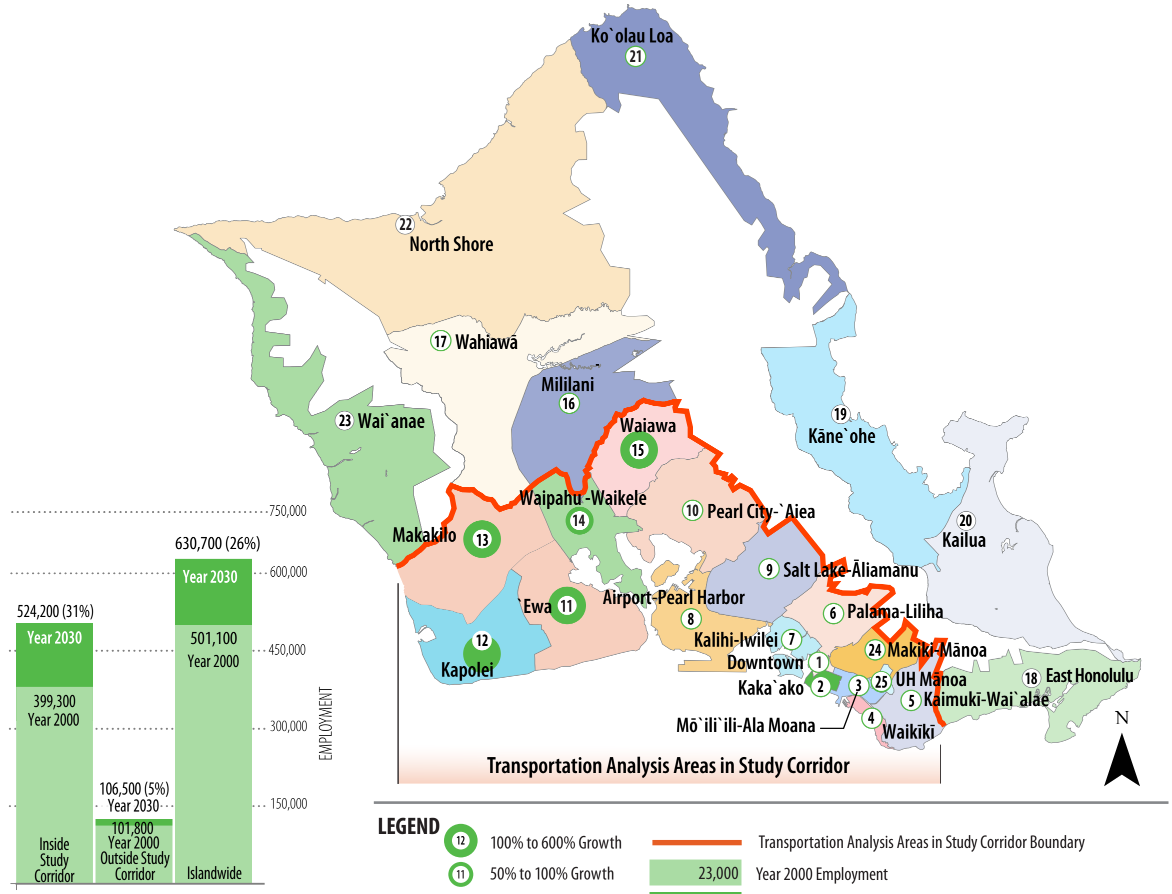




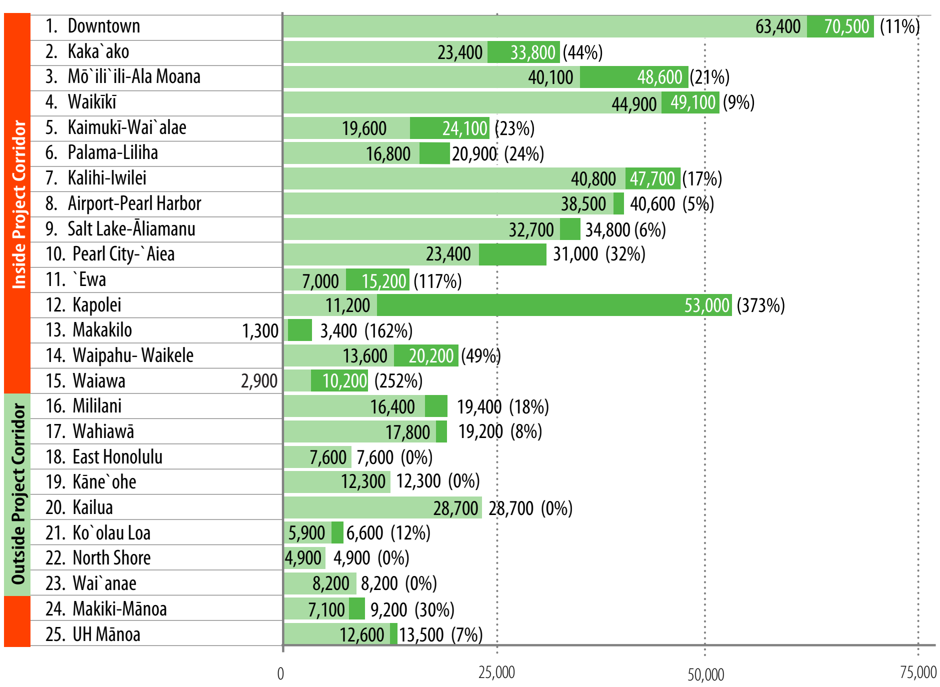
Analysis of Population Growth by Transportation Analysis Areas

Source: City and County of Honolulu Department of Planning and Permitting, 2008

Figure 1-5 Population Distribution for O`ahu



Employment Distribution for O`ahu



Anaylsis of Employment Growth by Transportation Analysis Areas

Source: City and County of Honolulu Department of Planning and Permitting, 2008

Figure 1-6 Employment Distribution for O`ahu

1.3 Existing Travel Patterns in the Corridor

The vast majority of trips made on the island occur within the study corridor. Currently, morning travel patterns in the study corridor are heavily directional. Morning town-bound (Koko Head direction) traffic volumes through the Waipahu and ʻAiea areas are more than twice the volume traveling in the ʻEwa direction. Afternoon flows are less directional with ʻEwa-bound traffic volumes about 50 percent greater than town-bound (Koko Head-bound) traffic.

Although most trips in the study corridor are made by residents, the large number of visitors to Oʻahu and the location of visitor attractions within the study corridor combine to create a transit market of visitors traveling within the study corridor. Oʻahu hosted 4.6 million visitors in 2007 (DBEDT 2008). Many of these visitors stay in the Waikīkī area and travel to points of interest outside of Waikīkī, including many of the activity centers in the study corridor (Figure 1-4). More than 17,000 transit trips are made by visitors daily.

1.3.1 Person-trip Patterns

Trip origins correlate closely with the level of population in a given area, while trip destinations correlate to a high degree with the level of employment. Based on these data, 2,036,000, or 73 percent, of the approximately 2,790,000 islandwide daily trips, and 350,000, or 64 percent, of the 544,000 a.m. peak-period work-related trips are currently generated within the study corridor. The study corridor attracts an even higher percentage of islandwide work-related trips with 446,000, or 82 percent, of a.m. peak-period work-related trips having destinations within the study corridor (Figure 1-7).

More trips will originate and remain within the PUC Development Plan area in 2030 than they do today. However, the greatest increases in trips will be to and from the ʻEwa Development Plan area.

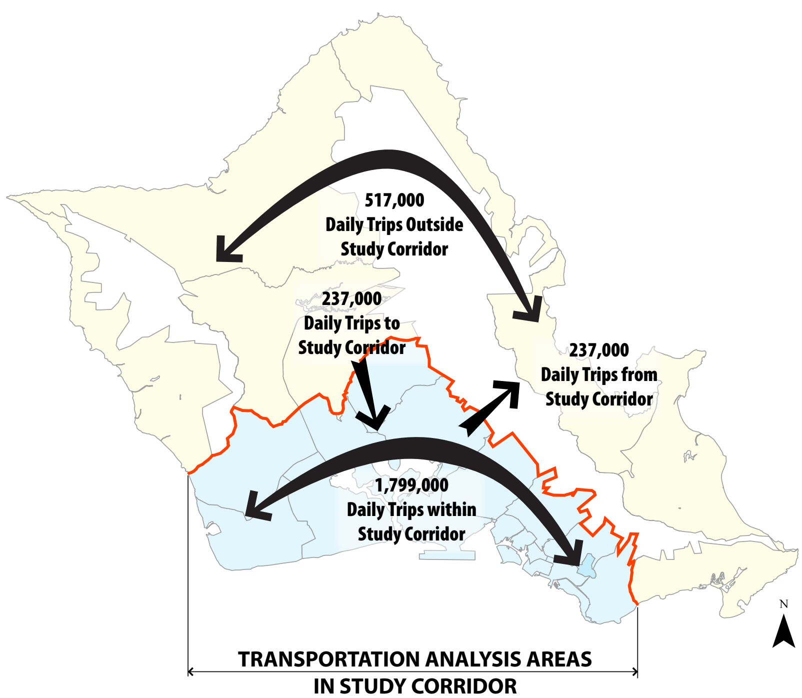


Figure 1-7 Current (2007) Daily Person-trip Patterns on O`ahu

These patterns illustrate the continued transportation importance of the study corridor with peak-period travel becoming less directional and more work trips destined for Kapolei.

1.3.2 Transit Travel Patterns

An on-board transit survey was conducted on all of the City's public transit system (TheBus) routes in December 2005 and January 2006. Information obtained from the survey included the origins and destinations of current transit bus users across a variety of trip purposes for both the 178,400 total daily transit trips and the 57,000 a.m. and p.m. peak-period work trips that were recorded over the survey period. A substantial majority of trips made by transit on the island occurred within the study corridor (Figure 1-8).

When compared to total travel, the number of transit trips within the study corridor as a percentage of total islandwide transit trips is even more pronounced. Based on the survey data, 83 percent of both islandwide daily and peak-period work-related transit trips originate within the study corridor, and the study corridor attracts 90 percent of total islandwide daily transit trips and 94 percent of peak-period work-related transit trips.

Daily Transit Trips

The major destinations for weekday bus riders are Downtown and the Mōʻiliʻili-Ala Moana area (Table 1-2). Downtown contains the island's highest concentration of jobs. Mōʻiliʻili-Ala Moana also contains a high concentration of jobs, as well as Ala Moana Center, the State's largest shopping complex.

Overall, the largest share of TheBus riders' trips originate in Waikīkī. In addition to Waikīkī, Kaimukī-Waiʻalae and Kalihi-Iwilei are the origins of a large number of trips. These areas are densely populated, with relatively high concentrations of transit-dependent households (Figure 1-9).

Peak-Period Transit Work Trips

Nearly 34 percent of all a.m. peak-period work trips are destined to Downtown, while Punchbowl-Sheridan-Date and Waikīkī each are destinations for about 12.5 percent of trips. Combined, these areas are the destinations of approximately 60 percent of the islandwide a.m. peak-period home-based work trips. Waikīkī, Punchbowl-Sheridan-Date, Pauoa-Kalihi, Waipahu-Waikele, and Kāhala-Pālolo together account for about 50 percent of the home-based origins for work trips taken during the a.m. peak period on TheBus.

A **contraflow lane (zipper lane)** typically provides vehicular travel in one direction, but is reversed during certain times of the day.

High occupancy vehicle (HOV) lanes are freeway or surface street lanes designated for exclusive use by buses, carpools, and vanpools.

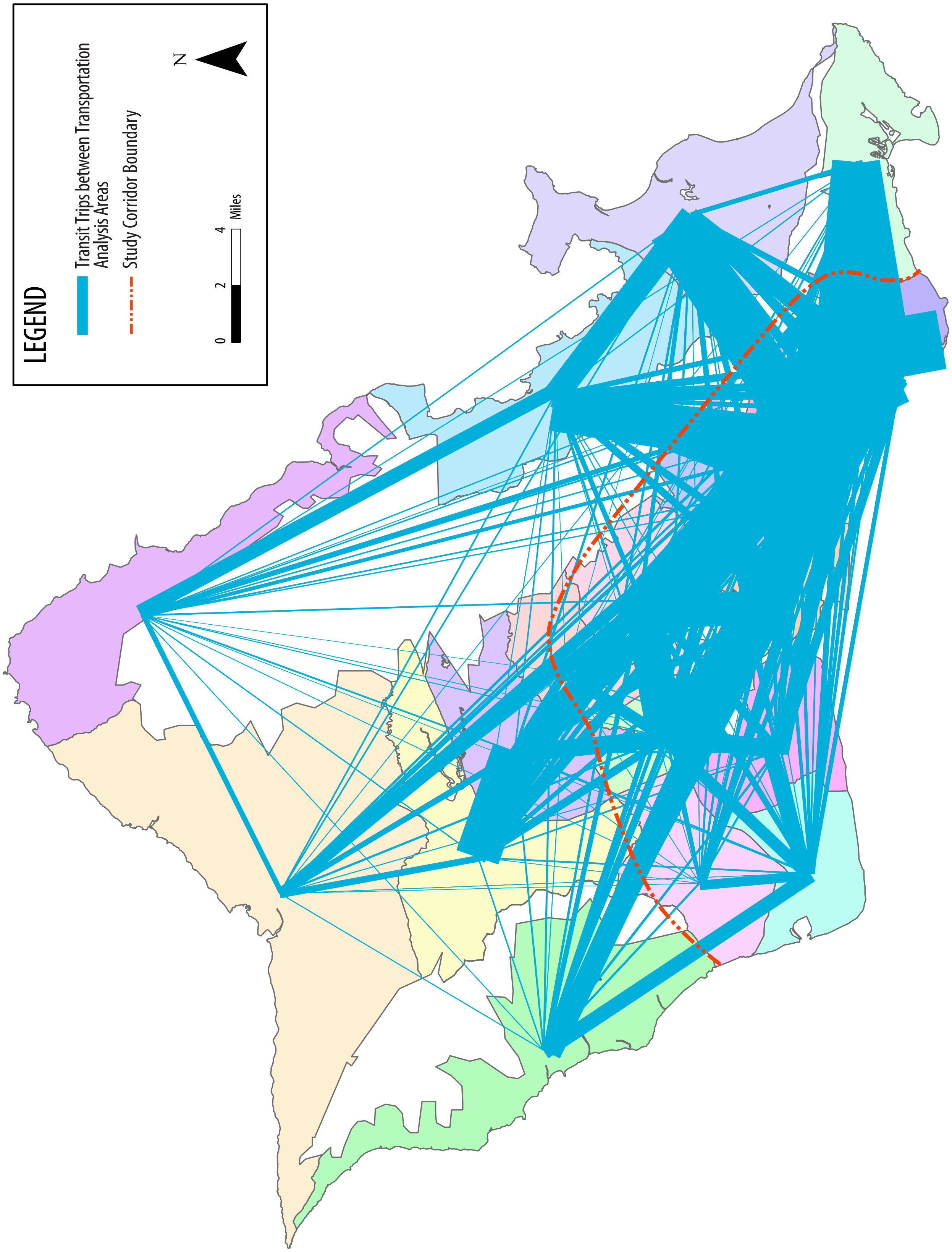


Figure 1-8 Daily 2007 Transit Trips between Transportation Analysis Areas

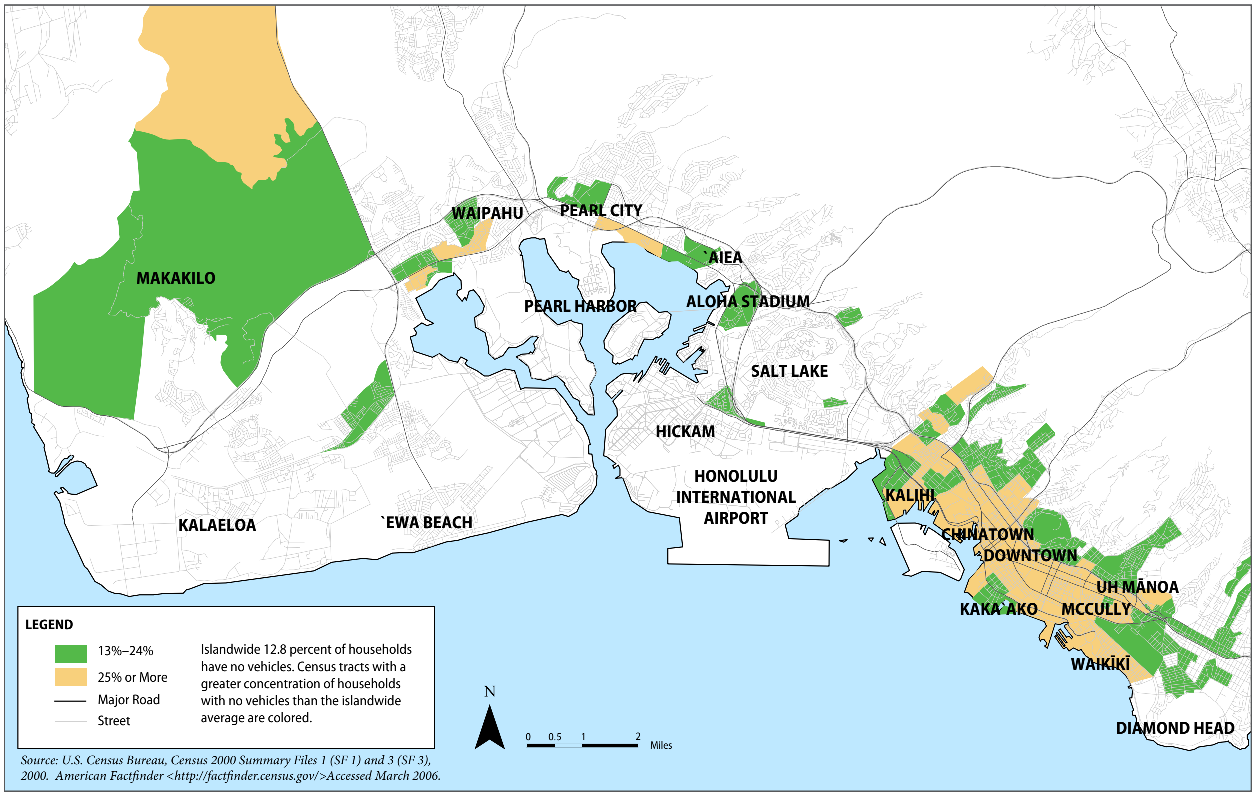


Figure 1-9 Concentrations of Transit-dependent Households (2000)

Table 1- 2 Major Trip Generators and Attractors for Existing Bus Trips (2007)

	Percent of Islandwide Daily Transit Trips	
Area	Originating from	Attracted to
Downtown	3	18
Mō`ili`ili-Ala Moana	2	13
Waikīkī	13	6
Kaimuki-Wai`alae	7	6
Kalihi-Iwilei	7	4

1.4 Existing Transportation Facilities and Services in the Corridor

The study corridor is currently served by roadway and transit systems, as well as parking, pedestrian, and bicycle facilities. Existing development throughout the study corridor, combined with the previously described geographic boundaries, limits the potential for new roadways or expansion of existing facilities.

1.4.1 Street and Highway System

The study corridor is served primarily by the H-1 and Moanalua Route H-201 Freeways, and the Farrington, Kamehameha, and Nimitz Highways. The H-2 Freeway provides access to the study corridor from Central O'ahu, and the H-3 Freeway provides access to the study corridor from the Windward side. Because of the constraints posed by geography and existing development, the expansion of existing roadways or the addition of new roadways in many sections of the study corridor would be extremely difficult and/or expensive. As a result, some sections of the study corridor are served by a relatively small number of facilities, and the lack of redundancy in the system at these locations can cause severe traffic problems should any of the facilities become overly congested or incapacitated. An example of this is in Pearl City, where only three primary roadways, the H-1 Freeway, Moanalua Road, and Kamehameha Highway, serve the high volume of traffic traversing this area. Of these roadways, the H-1 Freeway carries 70 to 75 percent of the a.m. and p.m. peak-hour traffic. Hence, when traffic is congested on the H-1 Freeway through this location, traffic is affected for miles along the adjacent study corridor segments.

To better use the existing roadway facilities, both the Hawai‘i Department of Transportation (HDOT) and the City have implemented a number of roadway management strategies, including the use of contraflow lanes and HOV lanes.

HDOT operates HOV lanes on several State highways during certain times of the day. HOV lanes currently require two or more occupants per vehicle and operate on the H-1 and H-2 Freeways, Moanalua Road, the H-1 zipper lane and shoulder express lane, and Nimitz Highway. As of July 8, 2008, the zipper lane occupancy requirement was increased to three or more.

1.4.2 Public Transit System

O‘ahu Transit Services, Inc. (OTS) operates TheBus on O‘ahu under contract to the City. TheBus system serves more than 80 percent of the developed areas of the island, carried approximately 72 million passenger trips in 2007, and experiences about 252,200 boardings on an average weekday. Annual transit passenger-miles-per-capita is higher in Honolulu than in any other major U.S. city without a fixed guideway transit system.

TheBus currently operates 100 routes that serve approximately 3,800 bus stops. Most of TheBus routes serve the study corridor. Bus route categories include Rapid Bus, Urban Trunk, Community Circulators, Community Access, and Peak Express. Most routes operate seven days a week, including holidays. Passenger amenities include passenger shelters and benches. Public transit on O‘ahu also includes paratransit service (TheHandi-Van).

Boardings represent the total number of times someone gets on a transit vehicle, whereas a **trip** can include transfers. Therefore, the number of daily boardings is higher than the number of daily trips.

1.4.3 Parking

Median daily parking rates for Downtown Honolulu are the highest in the U.S., while monthly parking rates are the ninth-most expensive in the U.S. (Colliers 2008). The availability of parking Downtown is limited, and garages have an average waiting list of three months for monthly parking. Parking availability also is limited in Waikīkī and near UH Mānoa.

1.4.4 Pedestrian and Bicycle Systems

The extent and quality of Honolulu’s existing pedestrian and bicycle systems vary by location. In certain neighborhoods, including Waikīkī, Chinatown, and Downtown, a continuous and accessible system of sidewalks provides pedestrians with a safe and convenient walking environment. In other areas, the pedestrian system is less complete. In addition, there are 98 miles of existing bicycle facilities on O‘ahu. Bike plans completed by both the City and the State anticipate more bikeways in the future.

1.5 Performance of the Existing Transportation System

This section includes information on the performance of the existing highway and transit system. It includes highway traffic volumes and existing operating conditions for transit.

1.5.1 Highway Traffic Volumes

The highest daily traffic volumes occur near Downtown Honolulu. In 2006, more than 395,000 vehicles crossed Kapālama Canal in Kalihi daily. During the a.m. and p.m. peak hours, more than 26,000 vehicles crossed Nuʻuanu Stream near Downtown each hour.

At the facility level, the Interstate Freeway system carries a considerable amount of the island's traffic, with the H-1 Freeway being the most heavily traveled on Oʻahu. At the Kalauao Stream screenline in Pearl City, approximately 20,000 and 17,000 vehicles currently travel on the H-1 Freeway (both directions combined) during the a.m. and p.m. peak hours, respectively. Approximately 245,000 vehicles travel through this section of the H-1 Freeway daily.

1.5.2 Highway Traffic Operating Conditions

The operating conditions of a roadway can be represented by a variety of measures, including operating speeds and the density of traffic on the facility. These measures can be used to determine level-of-service (LOS). Speeds are typically a reflection of the amount of congestion on a roadway or its geometric design characteristics. Traffic density is measured in terms of vehicles per mile per lane and is a function of both volumes and speeds. LOS is measured on a grading scale from "A" through "F" for roadway operation; LOS A represents a free flow or excess capacity condition, and LOS F represents more vehicles attempting to use a roadway than its capacity is able to accommodate.

Congested conditions (i.e., LOS E or F) occur during the a.m. and p.m. peak hours on many major roadways, particularly on sections of the H-1 Freeway from the Waiawa Interchange to the UH Mānoa area where stop-and-go conditions are typical. Signalized routes, such as Nimitz Highway, require motorists to wait more than one traffic-signal cycle to clear an intersection during peak periods. To avoid peak-hour congestion, motorists have changed their time of travel, resulting in extended peak traffic conditions.

Weekday a.m. and p.m. peak traffic conditions generally last three to four hours each. Weekend traffic during the mid-day resembles weekday peak-period conditions. Honolulu was recently ranked as having the worst travel time loss due to congestion in the U. S., with peak-period trips taking an average of 47 percent longer as a result of congestion (INRIX 2008).

Recent traffic counts for the study corridor indicate that existing travel conditions are congested during the a.m. peak period for Koko Head-bound traffic crossing Kalauao Stream in Pearl City (LOS F) and Kapālama Canal near Downtown (LOS F). These conditions are also indicated by estimated travel speeds along the H-1 Freeway in the study corridor, as shown in Table 1-3. The table indicates that existing speeds between the Waiawa Interchange and Downtown in the general purpose lanes range from 8 to 30 miles per hour (mph) (LOS F).

Travel-time measurements between Waiʻanae and Downtown during the a.m. peak period indicate that HOV traffic moves substantially faster than general-purpose traffic, but that travel-time reliability is poor for both types of traffic (Figure 1-10). Faster HOV travel times are attributable to the presence of a zipper lane on the H-1 Freeway. The zipper lane provides an additional lane exclusively for HOV traffic in the peak direction. Twenty percent of trips take more than one and one-half hours. The data shown in Figure 1-10 exclude extreme events, such as major accidents resulting in closure of multiple lanes of the H-1 Freeway.

Based on recent traffic counts and field observations, the p.m. peak period also experiences a high level of congestion in the study corridor. Analysis of operations at Kalauao Stream and Kapālama Canal show a p.m. peak-period LOS of D or worse; the H-1 Freeway is over-capacity and operating at LOS F.

Table 1-3 2007 A.M. Peak-Period Speeds and Level-of-Service on H-1 Freeway

	Average Speed (mph)	Level-of-Service[1]
Waiawa Interchange—Koko Head-bound		
General purpose traffic	18	F
HOV lane traffic	22	F
Zipper lane traffic	33	F
Kalauao Stream—Koko Head-bound		
General purpose traffic	30	F
HOV lane traffic	38	E
Zipper lane traffic	39	F
East of Middle Street Merge—Koko Head-bound		
General purpose traffic	8	F
Liliha Street—Koko Head-bound		
General purpose traffic	23	F
East of Ward Avenue—`Ewa-bound		
General purpose traffic	18	F
West of University Avenue—`Ewa-bound		
General purpose traffic	36	F

[1] Level-of-service is calculated based on vehicle density, a function of traffic volume and speed.

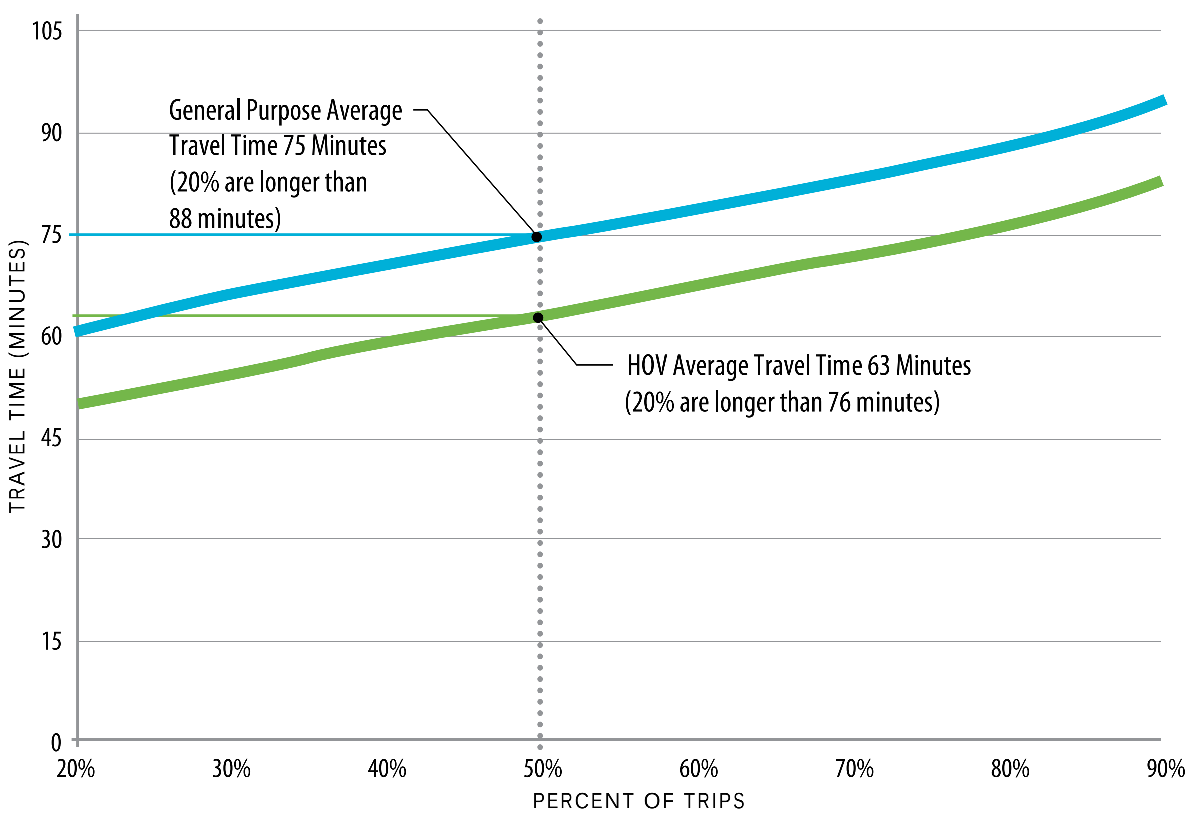


Figure 1-10 Existing A.M. Peak-Period Wai`anae to Downtown Travel Time Distribution (Highway Drive Time Only)

1.5.3 Transit Operating Conditions

TheBus uses the general roadway network described above. The major factors influencing bus operating conditions are the traffic conditions under which the service operates, passenger loading time, and bus-stop spacing. Honolulu has substantial traffic congestion, high ridership and load factors, and closely spaced bus stops. Combined, these factors have resulted in declining bus operating speeds over recent years. Between 2002 and 2007, islandwide average bus speeds decreased 4 percent to 13.2 mph. Because congestion in the study corridor is greater than in other parts of O‘ahu, the decrease in average bus speed in the study corridor is greater than the islandwide average. To account for the congestion, OTS has lengthened the peak-period scheduled trip travel times by between 9 and 26 percent for several routes in the study corridor. Trip travel times for these typical routes serving various parts of O‘ahu are shown in Figure 1-11. These routes are shown in Figure 1-12.

Implementation of peak-period HOV lanes on the H-1 and H-2 Freeways, as well as the addition of the H-1 Freeway a.m. peak zipper lane, were intended to provide higher priority and better mobility for buses and other HOVs. However, with a minimum eligibility requirement of only two persons per vehicle in 2007, these special lanes were often nearly as congested as the adjacent general purpose lanes (Table 1-3), thus negating much of the travel-time advantage for transit buses.

As roadways become more congested, they become more susceptible to substantial delays caused by incidents such as traffic accidents. As a result, current transit schedules in the study corridor are not reliable. Statistics from TheBus indicate that during 2006, 30 percent of all buses systemwide were more than five minutes late. During the a.m. peak period, express buses were, on average, more than five minutes late 30 percent of the time (OTS 2006). The Transportation Research Board defines more than 25 percent of buses running late as LOS F reliability. With mixed-traffic operations,

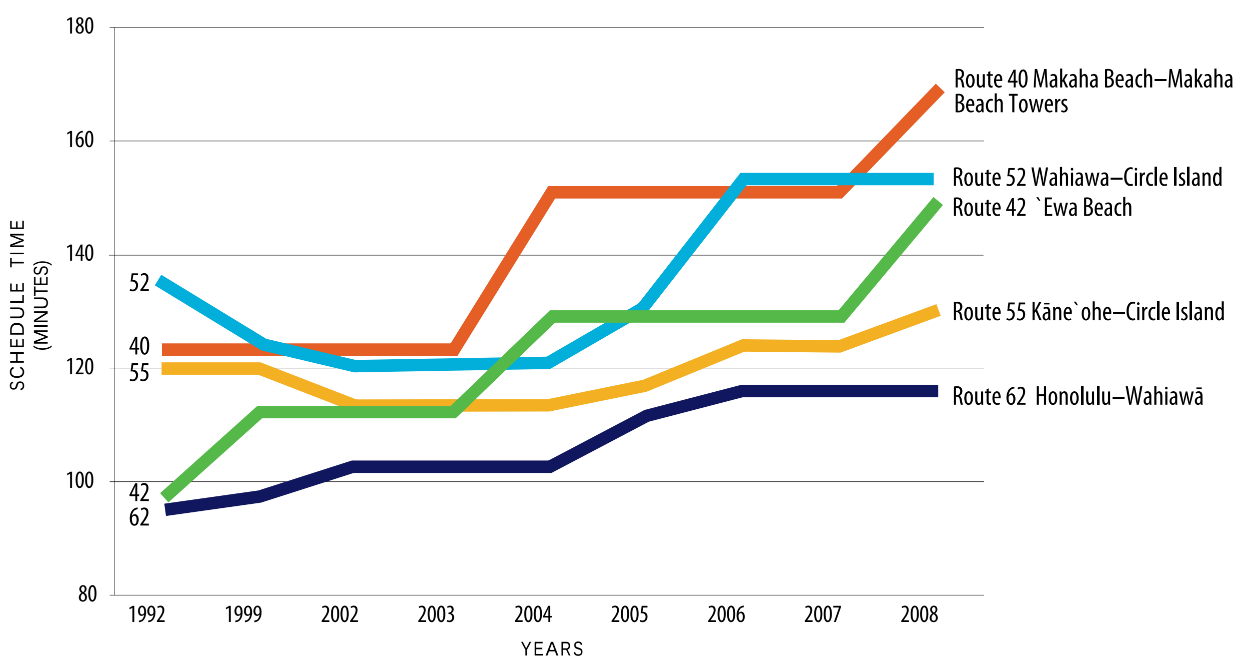


Figure 1-11 Selected Bus Trip Times for Selected Routes

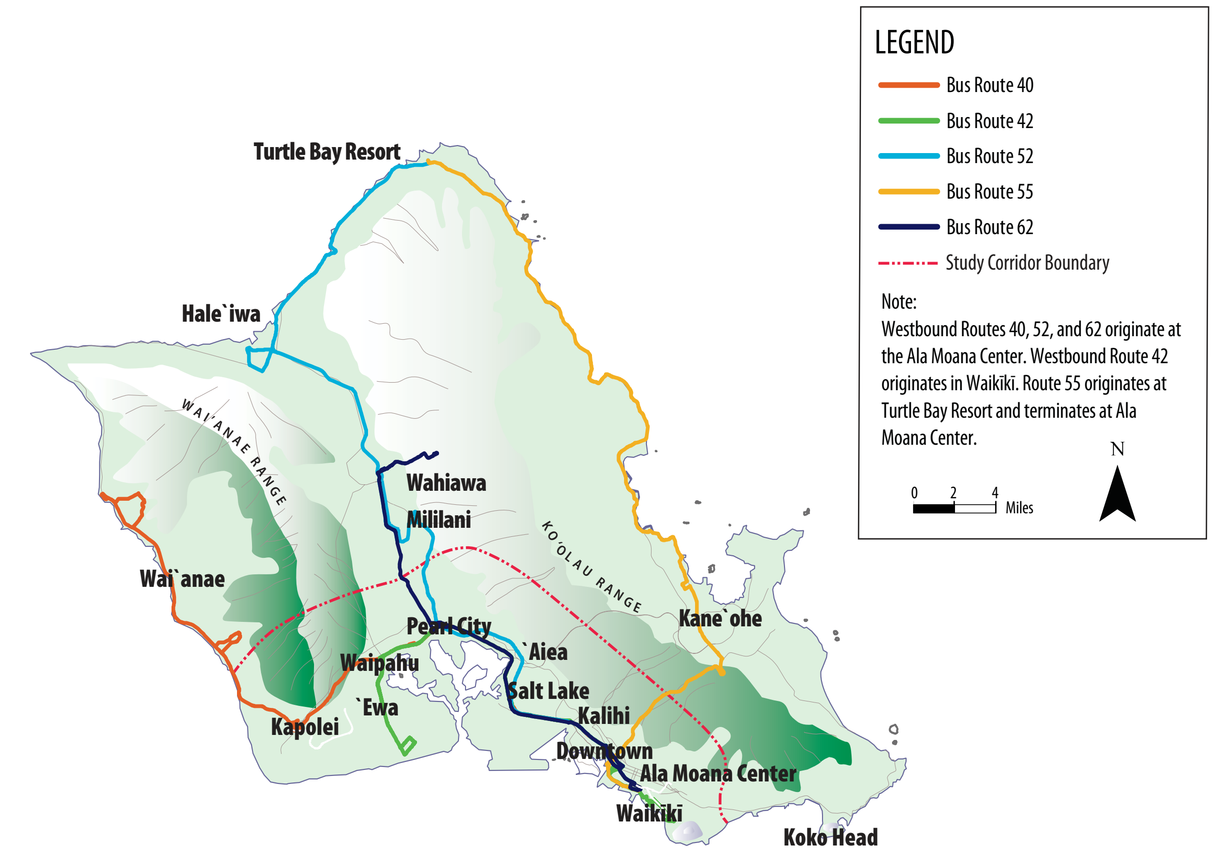


Figure 1-12 Route Maps for Sampled Routes

transit speed and reliability will continue to diminish in the study corridor as the number of transit passengers increases and traffic volumes approach roadway capacity on more streets.

1.6 Potential Transit Markets

A comparison of the location and number of new employment opportunities in relation to population growth shows that many workers will still be required to travel to the PUC Development Plan area for work (Figures 1-5 and 1-6). Despite the large growth of employment opportunities in the Kapolei area, population is projected to outpace and exceed the available employment in the area. Additionally, there will be a bidirectional flow of traffic throughout the day as more City and State administrative offices move their daily operations to Kapolei and as other employment grows in the area. The continued operation of UH Mānoa as a commuter school along with the opening of UH West Oʻahu will generate a strong student transportation market in the study corridor. These factors point to increased travel on the transportation system between Kapolei and the PUC Development Plan area and represent an important potential future transit market.

Relatively large areas within the study corridor are transit-dependent because they contain a large number of households without cars relative to other parts of Oʻahu. Many transit-dependent households include elderly and disabled residents. Persons living in households without cars are much more likely to use transit than other residents. Households without cars are concentrated in much of the PUC Development Plan area (including the Central Business District, Chinatown, Kakaʻako, Kalihi-Palama, and Iwilei) and some Waipahu neighborhoods, as indicated in Figure 1-9. These areas represent a robust transit market because they already rely on existing transit and are likely to use an improved system.

Finally, although the primary market for the study corridor improvements is residents, the tourist industry and location of tourist attractions within the study corridor combine to create a transit market for visitors. In 2007, Oʻahu hosted 4.6 million visitors (DBEDT 2008), who took more than 17,000 transit trips daily. Many of these visitors stayed in the Waikīkī area and traveled to points of interest outside of Waikīkī, including many of the activity centers in the study corridor (Figure 1-4).

1.7 Purpose of the Project

The purpose of the Honolulu High-Capacity Transit Corridor Project is to provide high-capacity rapid transit in the highly congested east-west transportation corridor between Kapolei and UH Mānoa, as specified in the ORTP (OʻahuMPO 2007). The project is intended to provide faster, more reliable public transportation service in the study corridor than can be achieved with buses operating in congested mixed-flow traffic, to provide reliable mobility in areas of the study corridor where people of limited income and an aging population live, and to serve rapidly developing areas of the study corridor. The project also will provide additional transit capacity, an alternative to private automobile travel, and improve transit links within the study corridor. Implementation of the project, in conjunction with other improvements included in the ORTP, will moderate anticipated traffic congestion in the study corridor. The HHCTCP also supports the goals of the Honolulu General Plan and the ORTP by serving areas designated for urban growth.

1.8 Need for Transit Improvements

There are several needs for transit improvements in the study corridor. These needs are the basis for the following goals:

- Improve corridor mobility
- Improve corridor travel reliability
- Improve access to planned development to support City policy to develop a second urban center
- Improve transportation equity

1.8.1 Improve Corridor Mobility

Motorists and transit users experience substantial traffic congestion and delay at most times of the day, both on weekdays and on weekends. Average weekday peak-period speeds on the H-1 Freeway are currently less than 20 mph in many places and will degrade even further by 2030. Transit vehicles are caught in the same congestion. In 2007, travelers on Oʻahu's roadways experienced 74,000 vehicle hours of delay on a typical weekday, a measure of how much time is lost daily by travelers stuck in traffic. This measure of delay is projected to increase to 107,000 daily vehicle hours of delay by 2030, assuming implementation of all planned improvements listed in the ORTP (except for a fixed-guideway system). Without these improvements, the ORTP indicates that daily vehicle hours of delay would increase to 154,000 vehicle hours.

Currently, motorists traveling from West Oʻahu to Downtown experience highly congested traffic during the a.m. peak period. By 2030, after including all the planned roadway improvements in the ORTP, the level of congestion and travel time are projected to increase further. Average bus speeds in the study corridor have been decreasing steadily as congestion has increased. TheBus travel times are projected to increase through 2030. Within the urban core, most major arterial streets will experience increasing peak-period congestion, including Ala Moana Boulevard, Dillingham Boulevard, Kalākaua Avenue, Kapiʻolani Boulevard, King Street, and Nimitz Highway. Expansion of the roadway system between Kapolei and UH Mānoa is constrained by physical barriers and by dense urban neighborhoods that abut many existing roadways. Given current and increasing levels of congestion, an alternative method of travel is needed within the study corridor independent of current and projected highway congestion.

1.8.2 Improve Corridor Travel Reliability

As roadways become more congested, they become more susceptible to substantial delays caused by such incidents as traffic accidents or heavy rain. Even a single driver unexpectedly braking can have a ripple effect that delays hundreds of cars. Because of the operating conditions in the study corridor, current travel times are not reliable for either transit or automobile trips. Because TheBus primarily operates in mixed-traffic, transit users experience the same level of travel time uncertainty as automobile users. To arrive at their destination on time, travelers must allow extra time in their schedules to account for the uncertainty of travel time. During the a.m. peak period, more than one-third of bus service is more than five minutes late. This lack of predictability is inefficient and results in lost productivity or free time. A need exists to provide more reliable transit services.

1.8.3 Improve Access to Planned Development to Support City Policy to Develop a Second Urban Center

Consistent with the Honolulu General Plan, the highest population growth rates for the island are projected in the ʻEwa Development Plan area (comprised of the ʻEwa, ʻEwa Beach, Kapolei, Kalaeloa, Honokai Hale, and Makakilo areas), which is expected to grow by approximately 150 percent between 2000 and 2030. This growth represents nearly 50 percent of the total growth projected for the entire island. The communities of Waiʻanae, Wahiawā, North Shore, Windward Oʻahu, Waimānalo, and East Honolulu will have much lower population growth of up to 23 percent, if infrastructure policies support the planned growth rates in the ʻEwa Development Plan area. Kapolei, which is developing as a "second city" to Downtown, is projected to grow by more than 350 percent, to 55,500 people, the ʻEwa district by more than 100 percent, and Makakilo by nearly 125 percent between 2000 and 2030.

Accessibility to the overall ʻEwa Development Plan area is currently severely impaired by the congested roadway network, which will only get worse in the future. This area is less likely to develop as planned unless it is accessible to Downtown and other parts of Oʻahu; therefore, the ʻEwa Development Plan area needs improved accessibility to support its future planned growth.

1.8.4 Improve Transportation Equity

Equity is about the fair distribution of resources so that no group carries an unfair burden of the negative environmental, social, or economic impacts or receives an unfair share of benefits. Many lower-income and minority workers who commute to work in the PUC Development Plan area live in the corridor outside of the urban core. Transit-dependent households concentrated in the Pearl City, Waipahu, and Makakilo areas (Figure 1-9) rely on transit availability, such as TheBus, for access to jobs in the PUC Development Plan area. Delay caused by traffic congestion accounts for nearly one-third of the scheduled time for routes between ʻEwa and Waikīkī. Many lower-income workers also rely on transit because of its affordability. These transit-dependent and lower-income workers lack a transportation choice that avoids the delay and schedule uncertainty currently experienced by TheBus. In addition, Downtown median daily parking rates are the highest among U.S. cities, further limiting access to Downtown by lower-income workers. Improvements to transit availability and reliability would serve all transportation system users, including minority and moderate- and low-income populations.

1.9 Goals of the Project

The goals of the Project correspond to the needs described in Section 1.8, Need for Transit Improvements. Table 1-4 lists these goals and measures used to evaluate the alternatives.

Table 1-4 Project Goals and Objectives

Goal	Measure of Objective
Improve corridor mobility	• Transit ridership (daily linked trips) • Transit-user benefits • Corridor travel time • Vehicle miles of travel • Vehicle hours of travel • Vehicle hours of delay
Improve corridor travel reliability	• Percent of transit trips using fixed guideway • Percent of transit passenger miles in exclusive right-of-way
Improve access to planned development to support City policy to develop a second urban center	• Development within station areas compared to existing amount of development
Improve transportation equity	• User benefits to transit-dependent communities • Percent of project costs borne by communities of concern

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02

CHAPTER

Alternatives Considered

This chapter summarizes the alternatives considered for the Honolulu High-Capacity Transit Corridor Project (HHCTCP). Section 2.2, Alternatives Screening and Selection Process, and Section 2.3, Alternatives Considered in the Draft Environmental Impact Statement, of this Chapter discuss each alternative that has been considered in detail and the reasons that other alternatives were eliminated from further study, including alternatives not within the jurisdiction of FTA and the City. The No Build Alternative is included for comparison and because it remains under consideration as a viable option. As described in Section 2.4, Preferred Alternative Identification Process, the Preferred Alternative evaluated throughout this Final Environmental Impact Statement (EIS) resulted from a rigorous process involving compliance with and response to Hawai‘i Revised Statutes (HRS) Chapter 343 EIS preparation notice comment period, Alternatives Analysis, National Environmental Policy Act (NEPA) scoping process, and comments received during the public review of the Draft EIS.

The Project was developed following the process outlined in the U.S. Federal Transit Administration's (FTA) *Advancing Major Transit Investments through Planning and Project Development* (FTA 2003), which is summarized as follows:

"Planning and project development for New Starts projects is a continuum of analytical activities carried out as part of the metropolitan planning and National Environmental Policy Act of 1969 (NEPA) review processes. Systems planning results in the identification and prioritization of transportation corridors in greatest need of more detailed planning and analysis. Alternatives analysis focuses on a specific transportation need (or set of needs), identifies alternative actions to address these needs, and generates information needed to select an option for further engineering and implementation. Once a Locally Preferred Alternative is selected and adopted in the region's long-range plan, the project sponsor may request FTA entrance into Preliminary Engineering (PE). PE includes additional engineering analysis and results in the completion of all environmental requirements. PE also typically marks the beginning of FTA's project management oversight function. The

next stage of development is Final Design, which also requires FTA approval. It is within Final Design that candidate projects are considered by FTA for a Full Funding Grant Agreement."

Figure 2-1 illustrates the process annotated with major steps that have been completed for the Project. Following FTA guidance, the Alternatives Analysis defined the range of alternatives for evaluation in the NEPA process, and the NEPA scoping process was completed after identification of the Locally Preferred Alternative (FTA 2006b). As summarized in Section 2.2, the Alternatives Analysis process and the Draft EIS rigorously explored and objectively evaluated all reasonable alternatives. Under FTA's New Starts Program, the alternatives considered in the NEPA process may be narrowed in those instances when the Alternatives Analysis required by 49 USC 5309(e) is conducted as a planning study prior to the NEPA review (FTA 2005). In this scenario, FTA's PE approval was for the alternative that was advanced from the Alternatives Analysis into the NEPA process and selected as the Preferred Alternative within the NEPA process (FTA 2003). This Final EIS addresses the Build Alternative approved by FTA for PE. Following a 30-day publication notice of this Final EIS and acceptance of the Final EIS by the governor per the requirements of HRS Chapter 343, FTA will issue a Record of Decision that will identify the selected alternative and conclude the Federal environmental review process.

FTA interim guidance on Design-Build Project Delivery (FTA 2000) allows for a variation to the final steps in Figure 2-1. The City intends to pursue the design-build project delivery model for early contracts. FTA extends automatic pre-award authority to incur certain costs using local funds upon approving projects to enter Preliminary Engineering and additional pre-award authority upon approval to enter Final Design (FTA 2009). The City may seek an FTA Letter of No Prejudice (LONP) for costs not covered by automatic pre-award authority. Under an LONP, the City would incur costs utilizing non-Federal resources with the understanding that the costs incurred after the issuance of the LONP may be reimbursable as eligible expenses if FTA approves a grant at a later date. After approval to enter Final Design, the FTA may issue an LONP that authorizes specific design-build activities prior to completion of the Full Funding Grant Agreement. The FTA also may grant pre-award spending authority that would allow the City to incur costs using non-FTA funds prior to the Full Funding Grant Agreement.

2.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been revised to reflect identification of the Airport Alternative as the Preferred Alternative for the Honolulu High-Capacity Transit Corridor Project. The term the "Project" refers to the Fixed Guideway Transit Alternative via the Airport that was evaluated in the Draft EIS. The following sections have been added since the publication of the Draft EIS or contain new details in response to public and agency comments received on the Draft EIS. The introductory section contains additional clarification of the alternative and project development process. In response to comments, information about the steps taken that led to elimination of at-grade light rail has been added to Section 2.2. Figures 2-17 through 2-39 in this chapter and the plans included in Appendix B, Preliminary Alignment Plans and Profiles, and Appendix C, Preliminary Right-of-Way Plans, reflect Preliminary Engineering design, including revisions that have resulted from coordination with agencies and landowners adjacent to the Project.

Section 2.3 describes alternatives considered, and Section 2.4 describes the selection process to identify the Preferred Alternative. Section 2.5 details the features of the Project and refinement to the Airport Alternative that were presented in the

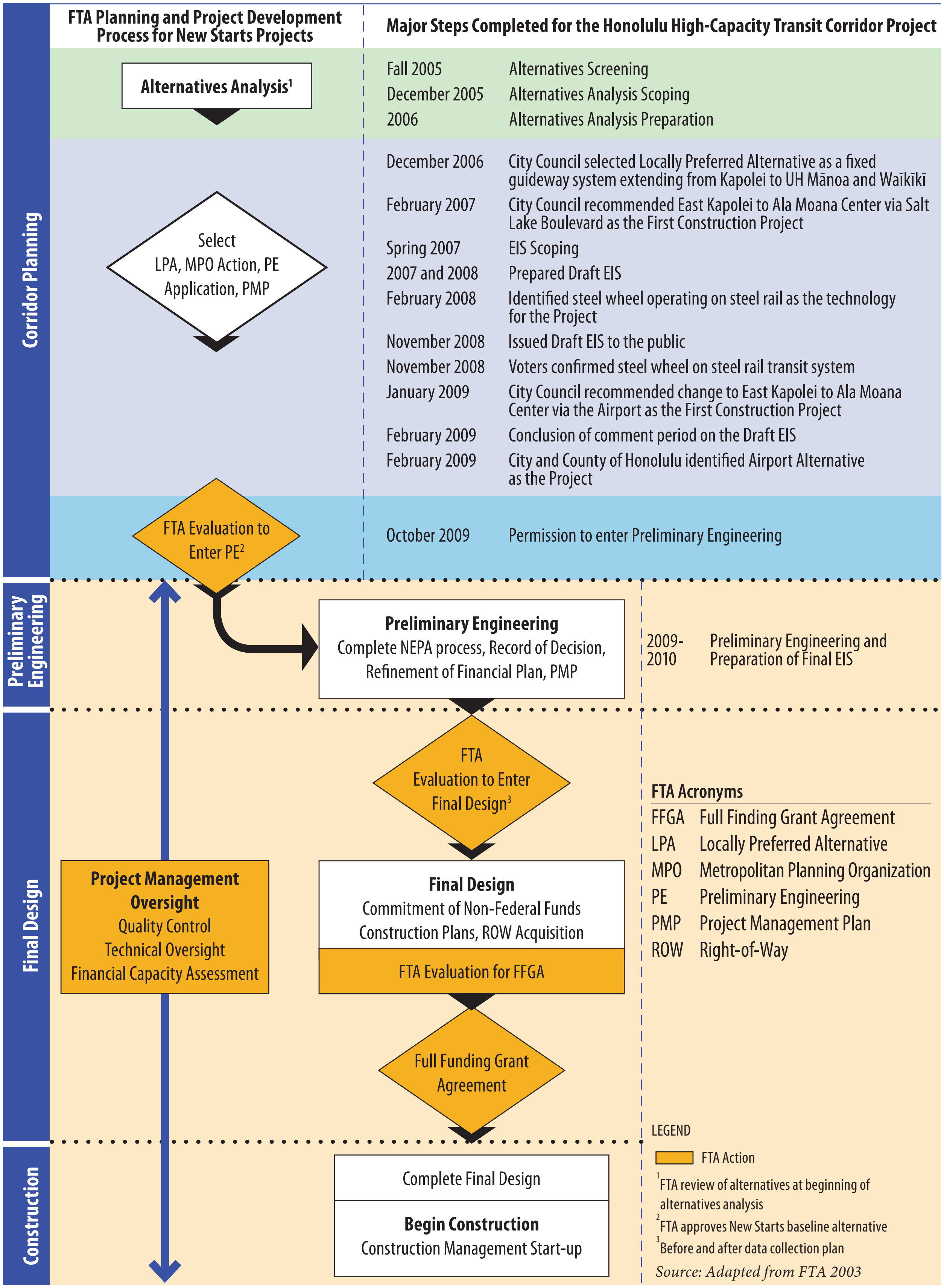


Figure 2-1 Planning and Project Development Process

Draft EIS that resulted from comments received on the Draft EIS and follow-up agency consultation. The changes include modifications to the Aloha Stadium Station, the Pearl Harbor Station, and the alignment and station near Lagoon Drive to reduce the effects of the Project in those locations. Section 2.5.4 provides additional information about safety and security, and Section 2.5.5 provides information about pedestrian and bicycle access to stations. Much of the detail of future bus operations has been moved from Section 2.5.6 to Chapter 3, Transportation. Section 2.5.8 identifies the site near Leeward Community College as the preferred site option for the maintenance and storage facility. Section 2.5.10 has been revised to reflect the latest project schedule and addition of the Salt Lake alignment as a planned extension that may be constructed as a future project.

The **Honolulu High-Capacity Transit Corridor Project** is the project name used for FTA planning and project development for New Starts Projects.

The **Locally Preferred Alternative** as identified by the City Council at the conclusion of Alternatives Analysis process is a step required for FTA's discretionary New Starts Program. It represents the City's long range plan for the rail system including the **Project** (as defined below) and the potential extensions.

The **NEPA Preferred Alternative**, referred to in this Final EIS as the **Project**, is evaluated in more detail and is a 20-mile portion of the Locally Preferred Alternative (LPA) for which FTA may provide Federal funding. FTA and the City identified this alternative as preferred for meeting the purpose and need over other alternatives, including the No Build Alternative. The Project includes the construction and operation of a fixed guideway rail system. It is a portion of the LPA that begins at the University of Hawaii-West Oahu (near the future Kroc Center), and proceeds via Farrington Highway and Kamehameha Highway (adjacent to Pearl Harbor), to Aolele Street serving the Airport, to Dillingham Boulevard, to Nimitz Highway, to Halekauwila Street, and ending at Ala Moana Center. If FTA publishes a Record of Decision on this Preferred Alternative, then the City would continue pursuing funding for the Project by submitting an application to enter the Final Design stage of the New Starts Program.

2.2 Alternatives Screening and Selection Process

Prior to completion of the Draft EIS, a full range of reasonable alternatives was evaluated at three stages. First, a broad range of alternatives was considered and screened down to four alternatives for evaluation in the *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Report* (Alternatives Analysis) (DTS 2006b). Second, the Alternatives Analysis recommended, and the City Council identified, the Fixed Guideway Alternative as the Locally Preferred Alternative. Third, scoping for the NEPA process confirmed that there were no alternatives that had not been previously studied and eliminated for good cause that would satisfy the Purpose and Need at less cost, with greater effectiveness, or less environmental or community impact.

Prior to selecting an elevated fixed guideway system, a variety of high-capacity transit options were evaluated during the Primary Corridor Transportation Project (1998–2002) and Alternatives Analysis. Options evaluated and rejected included an exclusively at-grade fixed-guideway system using light-rail or bus rapid transit (BRT) vehicles, as well as a mix of options consisting of both at-grade and grade-separated segments. In addition to comments received during the Alternatives Analysis and EIS scoping sessions, these studies provided a critical foundation for the conclusion that an elevated system would result in the best overall performance and better support the Purpose and Need for the Project.

2.2.1 Screening of a Broad Range of Alternatives

The Alternatives Analysis phase evaluated a range of transit mode and general alignment alternatives in terms of their costs, benefits, and impacts. An initial screening process considered alternatives identified through previous transit studies, a field review of the study corridor, an analysis of current population and employment data for the study corridor, a literature review of technology modes, work completed for the *O'ahu Regional Transportation Plan 2030* (ORTP) prepared by the O'ahu Metropolitan Planning Organization (O'ahuMPO) (O'ahuMPO 2007), and public and agency comments received during the formal Alternatives Analysis scoping process.

During the fall of 2005 and winter of 2006, the City and County of Honolulu (City) completed the alternatives screening process that is documented in the *Honolulu High-Capacity Transit Corridor Project Alternatives Screening Memorandum* (DTS 2006a). The alternatives screening was accomplished through an analysis completed in five major steps, as illustrated in Figure 2-2.

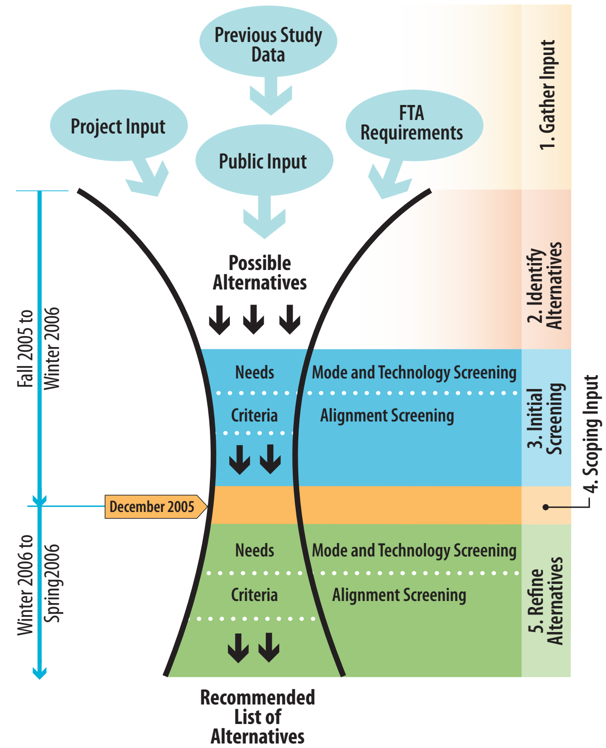


Figure 2-2 Alternatives Screening Process

The first step was to gather input needed for the analysis. The input included the preliminary Purpose and Need for the HHCTCP, past studies and their recommendations, requirements of the FTA Section 5309 New Starts Program, adopted community and area plans, and a visual assessment of the entire study corridor. The second step used the information gathered to identify a comprehensive list of potential alternatives. The third step included developing screening criteria and undertaking the initial screening of all potential alternatives to identify those that would address the needs of the corridor and would not have any "fatal flaws." The fourth step included a scoping process that involved a presentation of the viable alternatives to the public and interested public agencies and officials to receive comments on the Purpose and Need, alternatives, and scope of the analysis for the Alternatives Analysis. Also, the HRS Chapter 343 EIS preparation notice for the HHCTCP was issued in December 2005, and review comments were received in December 2005 and January 2006. Finally, input from the Alternatives Analysis scoping process and HRS Chapter 343 EIS preparation notice comment period was collected and considered and, where appropriate, refinements were made to the alternatives.

The following alternatives (Table 2-1) were eliminated through this screening process before the Alternatives Analysis.

- The tunnel crossing beneath Pearl Harbor was rejected because it would not improve connectivity within the study corridor, as it would bypass much of the corridor and it would not provide an alternative to the pri-

Table 2-1 Alternatives and Technologies Considered but Rejected

	Why Rejected	When Rejected
Alternative		
Pearl Harbor Tunnel	Would not meet Purpose and Need; rejected by O`ahuMPO based on high cost and limited benefit	Screening
Waterborne Ferry Service	Would not meet Purpose and Need; insufficient capacity and uncompetitive travel time	Screening
Transportation System Management	Would not meet Purpose and Need; would not have supported Honolulu General Plan; minimal reduction in vehicle miles traveled and vehicle hours of delay	Alternatives Analysis
Managed Lane Alternative	Would not meet Purpose and Need; would not have supported Honolulu General Plan; increase in vehicle miles traveled and vehicle hours of delay	Alternatives Analysis
Technologies		
Commuter rail	Not suitable for urban transit	Screening
Diesel multiple unit	Not suitable for urban transit	Screening
Personal rapid transit	Unproven technology and insufficient capacity	Screening
Emerging concepts	Unproven technology	Screening
Rubber-tired guided vehicles	Proprietary technology	After Alternatives Analysis
Magnetic levitation	Proprietary technology unproven in U.S.	After Alternatives Analysis
Monorail	Proprietary technology	After Alternatives Analysis

vate automobile. The tunnel crossing also had been considered for the ORTP (O‘ahuMPO 2007) but was rejected based on the cost compared to the limited benefit that it would have provided, as well as security concerns.

- Waterborne ferry service was eliminated as a primary transit system because its capacity and travel times were not competitive with the other alternatives considered. On a demonstration basis, ferry service was implemented in 2007 as part of a separate project to provide an additional transit option for travelers in the corridor. The service terminated in July 2009.

Several transit technologies also were eliminated from further consideration for various reasons (Table 2-1). Commuter rail, including diesel multiple unit, was eliminated based on poor operating and environmental performance because of the need for short station spacing in the study corridor. Personal rapid transit, which operates like a horizontal elevator, was eliminated based on lack of technical maturity and low capacity. Emerging rail concepts were eliminated because they have never been proven in real-world use and would not meet the rapid implementation schedule for the project.

Corridor-wide at-grade light-rail transit was rejected because it would have required conversion of traffic lanes to rail throughout the corridor, thereby substantially reducing roadway capacity since no abandoned or undeveloped alignments are available in the study corridor. At-grade light-rail would have required either the acquisition and removal of buildings throughout the corridor or the conversion of two or more traffic lanes. Acquisition of right-of-way and the associated displacements would be required for stations in any event.

An at-grade system would not have provided a reliable, high-capacity, exclusive right-of-way system. Short blocks in the downtown area would limit the length of trains to two vehicles, and coordination of signals would limit headways to three minutes. This would prevent any future expansion of capacity. Average speed would be approximately one-half of that of an exclusive right-of-way system. Any automobiles that block the tracks, either at intersections or by trespass onto the tracks, as well as accidents that affect the tracks, would delay the transit system. This would not occur with an exclusive right-of-way system.

Because trains come every few minutes and are quieter than cars and buses, pedestrians and motorists are often unaware of their approach. The potential for collisions with an at-grade light rail is high compared to a separated right-of-way system, where the probability of collisions is practically zero. Excavation to a depth of between 4 and 5 feet would be required for the entire length of the at-grade system to construct track support. As a result, the potential for disturbance to archaeological resources or burials would be much greater than it would be for an elevated system.

For the Fixed Guideway Alternative screening analysis, the corridor was divided into geographic sections. Within each section, the alignments retained for evaluation in the Alternatives Analysis phase were those that demonstrated the best performance related to mobility and accessibility, smart growth and economic development, constructability and cost, community and environmental quality, and consistency with adopted plans. In total, 75 fixed guideway alignment options were screened (DTS 2006a).

2.2.2 Alternatives Considered in the Alternatives Analysis

Once the screening evaluations were completed, the modal, technology, and alignment options were combined to create the following alternatives, which were evaluated and documented in the *Alternatives Analysis Report* (DTS 2006b):

- No Build Alternative
- Transportation System Management (TSM) Alternative
- Managed Lane Alternative
  - Two-direction Option
  - Reversible Option
- Fixed Guideway Alternative
  - Kalaeloa–Salt Lake–North King–Hotel Option
  - Kamokila–Airport–Dillingham Option
  - Kalaeloa–Airport–Dillingham–Halekauwila Option

These alternatives were evaluated based on their effectiveness in meeting the HHCTCP goals and objectives related to mobility and accessibility, supporting planned growth and economic development, constructability and cost, community and environmental quality, and planning consistency. Environmental factors that were considered during the Alternatives Analysis phase included land use and economic activity, displacements, neighborhoods and communities, farmlands, visual and aesthetic resources, air quality and energy, noise and vibration, water resources, natural resources, and cultural, historic, and archaeological resources. All four alternatives were evaluated to the same set of criteria. This Final EIS summarizes the individual criteria for each alternative that differentiated it from the other alternatives. Except for the fact that the Managed Lane Alternative faced significant funding limitations, there were no other major issues identified for any of the alternatives.

During the Alternatives Analysis phase, the City consulted with the State Historic Preservation Division regarding historic properties and evaluated the likely effect to historic properties of each alternative. The outcome is documented in the *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Historic and Archaeological Technical Report* (DTS 2006e). The Federal undertaking was defined by identification of the Locally Preferred Alternative. Following the selection, the City and FTA initiated consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC et seq.) after completion of the Alternatives Analysis.

The comparison of these alternatives concluded that the TSM Alternative would provide little benefit at a relatively low cost and that the Managed Lane Alternative would provide slightly more benefit at a substantial cost. In addition to the technical findings, the overwhelming majority (more than 80 percent) of the nearly 3,000 public testimonies received during hearings on the identification of the Locally Preferred Alternative were in favor of some form of the Fixed Guideway Alternative. The findings for the TSM and Managed Lane Alternatives are summarized in the following sections. Table 2-2 compares the alternatives evaluated during the Alternatives Analysis process for several performance measures. Table 2-3 details the environmental effects of each alternative that was considered. While the results for the No Build and Fixed Guideway Alternatives that are summarized here differ from the values presented in the Draft EIS as a result of refinement to the analysis and additional engineering work, the relative performance of the alternatives has not changed.

For the Fixed Guideway Alternative as compared to the Managed Lane Alternative, the cost per hour of transit-user benefits would be between 160 and 240 percent less; daily transit trips would be between 14 and 20 percent greater; vehicle miles traveled (VMT) would be reduced by between 3 and 5 percent; and congestion, as measured by vehicle hours of delay (VHD), would be reduced by between 6 and 22 percent, depending on the option constructed.

Transportation System Management Alternative

In the Alternatives Analysis phase, the TSM Alternative was developed to evaluate how well a combination of relatively low-cost transit improvements could meet the study area's transportation needs. FTA requires that the TSM Alternative reflect the best that can be done for mobility without constructing a new transit fixed guideway.

Table 2-2 Summary of Alternatives Analysis Findings

Alternative	Daily Islandwide Transit Trips	Vehicle Miles Traveled	Vehicle Hours of Delay	Hours of Transit-user Benefits[1]	Total Capital Cost (Millions 2006 Dollars)	Cost per Hour of Transit-user Benefits Compared to No Build	Environmental Effects
2030 No Build	232,100	13,971,000	82,000	N/A	$660	N/A	Low
2030 Transportation System Management (TSM)	243,100	13,874,000	80,000	4,325,100	$856	$13.54	Low
2030 Managed Lane	244,400–247,000[2]	14,002,000–14,034,000[2]	78,500–82,500[2]	5,528,500–5,632,700[2]	$3,601– $4,727[2]	$50.34–$63.42[2]	Medium
2030 Fixed Guideway	281,900–294,100[2]	13,464,000–13,539,000[2]	65,000–73,500[2]	15,153,600–18,770,200[2]	$4,192– $6,075[2]	$21.32–$27.05[2]	Medium

[1] Transit-user Benefits captures a set of benefits to transit riders—including reductions in walk times, wait times, number of transfers, and costs (converted to time)—in terms of savings in travel time.

[2] Range of values provided represents the range between options reported in the Alternatives Analysis Report (DTS 2006b).

Bus service was optimized, per FTA guidelines, by increasing bus service but without building a new fixed guideway for transit, such as a system of dedicated bus lanes. The analysis demonstrated that the Purpose and Need for the Project could not be met through a lower-cost, bus-based alternative alone.

After consideration of various service options and operating plans, the TSM Alternative was designed to serve the study corridor based on a hub-and-spoke network of bus routes, similar to today. The alternative included express bus service that operated as bus rapid transit in existing facilities. Bus frequencies would have been increased during peak periods to provide improved service for work-related trips, particularly from developing areas such as Royal Kunia, Koa Ridge, and Waiawa. The bus fleet was assumed to increase from 525 to 765 buses, and park-and-ride lots were assumed at West Kapolei, UH West Oʻahu, Waipiʻo, and Aloha Stadium. In addition, the present a.m. peak-hour-only zipper lane would have been modified to operate in both the a.m. and p.m. peak periods, and relatively low-cost improvements would have been made on selected roadways to give priority to buses.

The analyses found that the TSM Alternative would have improved transit travel times somewhat by reducing the amount of time riders would have to wait for a bus to arrive at a bus stop. As a result, the TSM Alternative would have led to a slightly larger number of daily transit trips than the No Build Alternative (Table 2-2). This alternative would have generated fewer hours of transit-user benefits than either the Managed Lane or Fixed Guideway Alternative. Since most buses would still operate in mixed traffic, the TSM Alternative would have done little to improve corridor mobility and travel reliability. Roadway congestion also would not have been alleviated. In addition, because of the dispersed nature of transit service, slow bus speeds, and unreliable service, the TSM Alternative would not have supported the City's goals of concentrating growth within the corridor and reducing development pressures in rural areas.

In terms of its environmental impacts, the TSM Alternative would have generated fewer physical impacts than the Managed Lane and Fixed Guideway Alternatives. However, it would have required more transportation system energy and generated more air pollutant emissions and water pollution than the Fixed Guideway Alternative (Table 2-3).

Although the TSM Alternative would have been very cost-effective, financial feasibility was a concern. Currently, State legislation does not allow the local excise and use tax surcharge to be used for enhancement of the existing bus transit system.

Managed Lane Alternative

The Managed Lane Alternative would have provided a two-lane elevated toll facility between Waipahu and Downtown, with variable pricing strategies for single-occupant vehicles to maintain free-flow speeds for transit and high-occupancy vehicles (HOVs). In response to public comments, two design and operational variations of the Managed Lane Alternative were evaluated: a Two-direction Option (one lane in each direction) and a two-lane Reversible Option (Figure 2-3). For both options, access to the facility from ʻEwa and Central Oʻahu would be via ramps from the H-1 and H-2 Freeways prior to the Waiawa Interchange. Both options would have required modification to the design of the Hawaiʻi Department of Transportation's planned Nimitz Flyover Project and would have terminated with ramps tying into Nimitz Highway at Pacific Street. An intermediate bus access point would have been provided near Aloha Stadium. The Two-direction Option would have served express buses operating in both directions during the entire day. The Reversible Option would have served peak-direction bus service, while reverse-direction service would have used the H-1 Freeway. Twenty-nine bus routes

Table 2-3 Summary of Alternatives Analysis Environmental Review

Alternative	Property Acquisitions	Park and Recreational Facilities Affected	Historic Resources Adjacent to Project	Cultural Resources Affected	Potential to Affect Archaeological Resources	Water Crossings	Known Hazardous Materials Sites	Visual Effects	Residences Affected by Noise (without Mitigation)	Air Pollutant Emissions	Energy Consumption
2030 No Build	0	0	0	0	None	0	0	None	0	Baseline	Baseline
2030 Transportation System Management (TSM)	0	0	0	0	None	0	0	Minor	0	Moderate reduction	Moderate reduction
2030 Managed Lane											
Two-direction Option	49	2	30	0	Moderate	8	17	Moderate	260	Increased emissions	Increased consumption
Reversible Option	44	2	30	0	Moderate	8	10	Moderate	260	Increased emissions	Increased consumption
2030 Fixed Guideway											
Kalaeloa–Salt Lake–North King–Hotel	193	4	119	11	Highest	16	31	High	432	Greatest reduction	Greatest reduction
Kamokila–Airport–Dillingham–King with a Waikīkī Branch	142	4	107	3	High	17	42	High	270	Moderate reduction	Moderate reduction
Kalaeloa–Airport–Dillingham–Halekauwila	180	4	82	2	High	15	37	High	190	Greatest reduction	Greatest reduction
20-mile Alignment	139	3	70	2	High	15	37	High	170	Moderate reduction	Moderate reduction

operating as bus rapid transit, with approximately 93 buses per hour, would have used the managed lane facility during peak hours for either option. The Alternatives Analysis found that of the two options, the Reversible Option would have provided a better transit-user benefit-to-cost ratio.

The Managed Lane Alternative was evaluated for its ability to meet project goals and objectives related to mobility and accessibility, supporting planned growth and economic development, constructability and cost, community and environmental quality, and planning consistency. VMT would have increased compared to any of the other alternatives. While this alternative would have slightly reduced congestion on parallel highways, systemwide traffic congestion would have been similar to the No Build Alternative as a result of increased traffic on arterials trying to access the facility. Total islandwide VHD would have increased with the Managed Lane Reversible Option as compared to the No Build Alternative, indicating an increase in systemwide congestion (Table 2-2). Transit reliability would not have been improved except for express bus service operating in the managed lanes. The Managed Lane Alternative would not have supported planned concentrated future population and

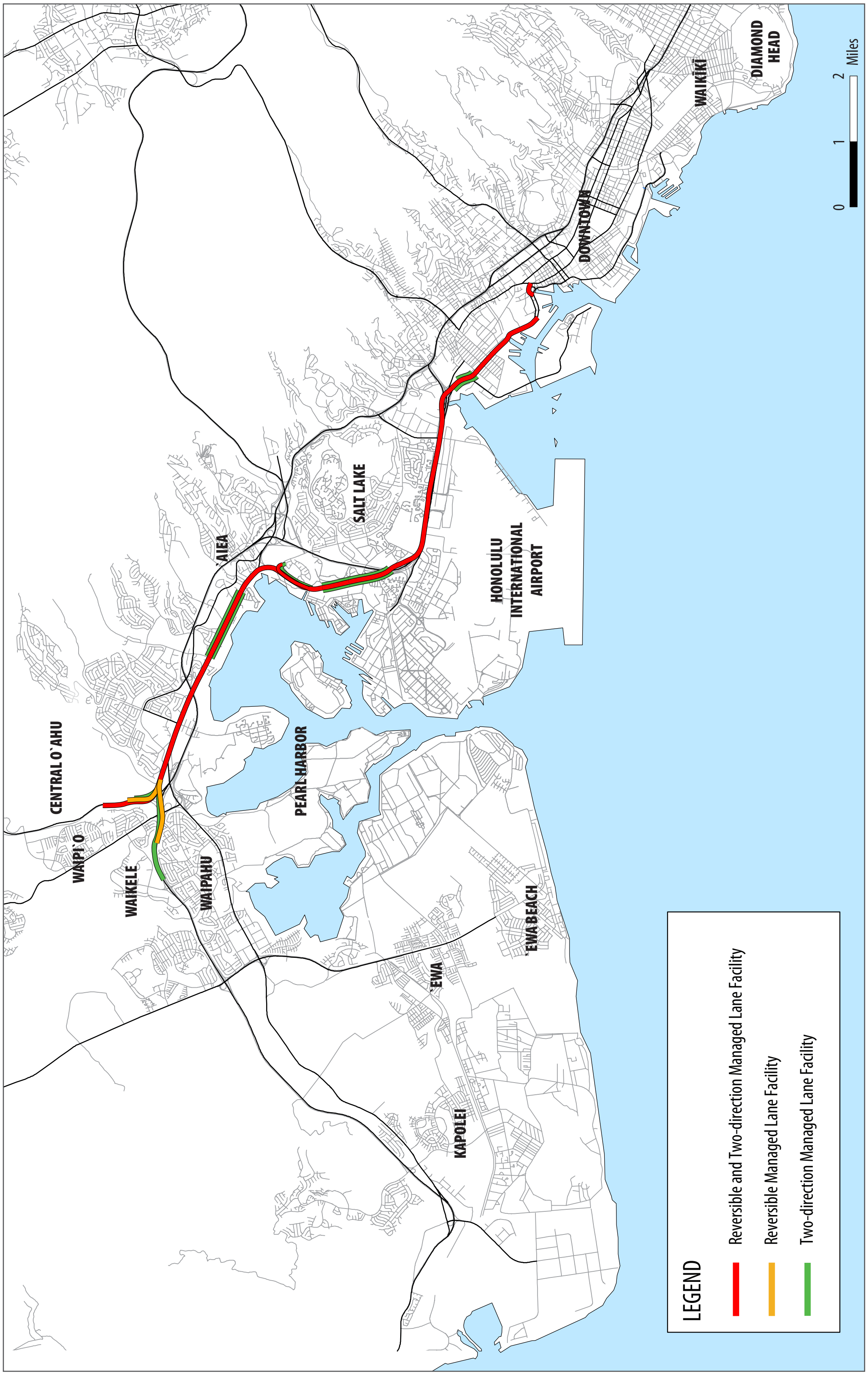


Figure 2-3 Managed Lane Alternative Evaluated in the Alternatives Analysis

employment growth because it would not provide concentrations of transit service that would serve as a nucleus for the development. The Managed Lane Alternative would have provided very little transit benefit at a high cost. The cost-per-hour of transit-user benefits for the Managed Lane Alternative would have been two to three times higher than that for the Fixed Guideway Alternative (Table 2-2). Similar to the TSM Alternative, the Managed Lane Alternative would not have substantially improved service or access to transit for transit-dependent communities.

This Final EIS concludes, based on the findings of the Alternatives Analysis, that the Managed Lane Alternative fails to meet the Purpose and Need, as described in Chapter 1 of this Final EIS, because it does not moderate anticipated traffic congestion. It also would be less effective than the Fixed Guideway Alternative at providing a faster and more reliable public transportation service as well as an alternative to private automobile travel. Because of the estimated high toll cost for users, the Managed Lane Alternative would also not support the identified need to improve transportation equity to all users, including low-income populations.

The Managed Lane Alternative would have generated the greatest amount of air pollution and required the greatest amount of energy for transportation use. It would have resulted in more transportation noise impacts than any of the other alternatives except for the Fixed Guideway Alternatives serving Salt Lake or Waikīkī (Table 2-3). Because the Managed Lane Alternative would have served a shorter portion of the study corridor, it would have resulted in fewer displacements and would have impacted fewer archaeological, cultural, and historic resources than the Fixed Guideway Alternative. The Managed Lane Alternative would not have affected any farmlands. The elevated structure would have extended a shorter distance, but it would have been more visually intrusive because its elevated structure, with a typical width of between 36 and 46 feet, would have been much wider than the Fixed Guideway Alternative. It would have provided little community benefit as it would not have resulted in substantially improved transit access in the corridor. Lastly, no funding sources were identified for the Managed Lane Alternative.

Fixed Guideway Alternative

The Fixed Guideway Alternative presented in the Alternatives Analysis included the construction and operation of a fixed guideway system between Kapolei and the University of Hawaiʻi at Mānoa (UH Mānoa). The study corridor for the Fixed Guideway Alternative was evaluated in five geographical sections to simplify the analysis and facilitate evaluation (Figure 2-4).

Each alignment was evaluated individually and compared to the other alignments in the respective section in relation to mobility and accessibility, supporting planned growth and economic development, constructability and cost, community and environmental quality, and planning consistency.

Effects to aquatic resources would have been similar for each of the Fixed Guideway options evaluated in the Alternatives Analysis (Table 2-3). Each option included construction of an elevated fixed-guideway through much of the corridor. The various alignments generally crossed the same water resources but at different river miles. The Kamokila–Airport–Dillingham–King Option would have tunneled under Nuʻuanu Stream rather than being on a bridge above the stream. This option was not financially feasible, however, since its costs exceeded the other options by more than $500 million.

The comparison resulted in an optimal alignment of Saratoga Avenue/North-South Road to Farrington Highway/Kamehameha Highway to Aolele Street to Dillingham Boulevard to Nimitz Highway/Halekauwila Street/Kapiʻolani Boulevard.

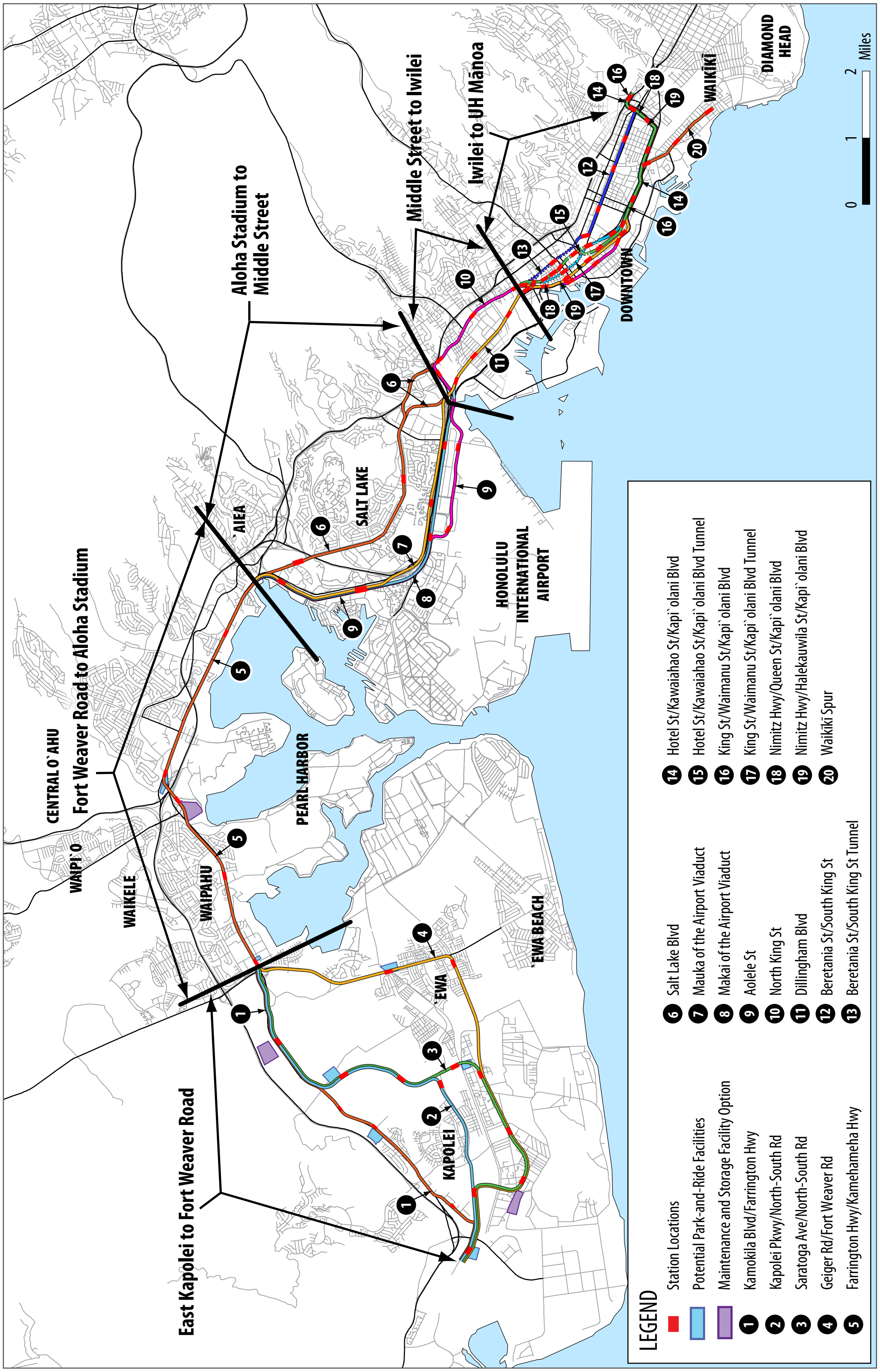


Figure 2-4 Fixed Guideway Alternative Evaluated in the Alternatives Analysis

The Alternatives Analysis included an evaluation of light-rail transit with at-grade operation in portions of the corridor. The Kalaeloa–Salt Lake–North King–Hotel Option included at-grade operation on Hotel Street that would have reduced visual impacts Downtown; however, it also would have decreased system speed, capacity, reliability, safety, and roadway capacity and speed. The Kalaeloa–Salt Lake–North King–Hotel Option had the greatest potential for disturbance of archaeological and burial resources and would have caused the greatest number of residential displacements. It would not have substantially changed impacts to other environmental resources. It would not have provided overall project cost savings, including the connections to grade-separated operations.

Summary of Alternatives Considered during the Alternatives Analysis

The Fixed Guideway Alternative performed better at meeting the Project's Purpose and Need than any of the other alternatives evaluated in the Alternatives Analysis. A fixed guideway system would improve transit performance and reliability, be more cost-effective, and substantially reduce VHD for all travelers, not just transit users (Table 2-2).

Table 2-1 summarizes the alternatives considered but rejected. The Managed Lane Alternative would not have qualified for local excise and use tax surcharge funding. Because single-occupant vehicles would have been permitted, even if tolled, Federal New Starts funding could not have been used. Because the Managed Lane Alternative would not have met the HHCTCP Purpose and Need, would not have resulted in substantially fewer environmental impacts, and would not have been financially feasible, it is not a practicable alternative.

The TSM Alternative would not have substantially reduced congestion relative to the No Build Alternative and would not have improved corridor mobility and travel reliability; therefore, it would not have met the Project's Purpose and Need and is not a practicable alternative.

After review of the *Alternatives Analysis Report* (DTS 2006b) and consideration of public comments, the City Council selected a fixed guideway transit system extending from Kapolei to UH Mānoa with a connection to Waikīkī as the Locally Preferred Alternative. The identification of the Locally Preferred Alternative balanced the performance of each alternative to all of the factors included in the Project's goals and objectives. The selection, which eliminated the TSM and Managed Lane Alternatives, became Ordinance 07-001 on January 6, 2007.

2.2.3 Alternatives Consideration Process after the Alternatives Analysis

Ordinance 07-001 authorized the City to proceed with the planning and engineering of a fixed guideway project from Kapolei to UH Mānoa with a connection to Waikīkī. The City Council also passed City Council Resolution 07-039, which directed the first construction project to be fiscally constrained and to extend from East Kapolei to Ala Moana Center via Salt Lake Boulevard.

The FTA issued a Notice of Intent to prepare this EIS in the *Federal Register* on March 15, 2007. All interested individuals and organizations, as well as Federal, State, and Local agencies, were invited to comment on the Purpose and Need to be addressed by a 20-mile fixed guideway transit system from East Kapolei to Ala Moana Center; the alternatives, including the modes and technologies to be evaluated and the alignments and termination points to be considered; and the environmental, social, and economic impacts to be analyzed.

The alternatives that were evaluated in the Draft EIS and described in this chapter are the result of the alternatives screening process and reflect comments received during the NEPA scoping process, as summarized in the *Honolulu High-Capacity*

Transit Corridor Project National Environmental Policy Act Scoping Report (DTS 2007).

The NEPA Notice of Intent and Scoping Information Package included the No Build and two Build Alternatives (a Fixed Guideway Transit Alternative via Salt Lake Boulevard and a Fixed Guideway Transit Alternative via the Airport & Salt Lake Boulevard). The Notice of Intent also included five technologies for consideration.

Several scoping comments were received requesting reconsideration of the Managed Lane Alternative that was considered and rejected during the Alternatives Analysis. Because no new information was provided that would have changed the findings of the Alternatives Analysis regarding the Managed Lane Alternative, it was not included in the Draft EIS for further consideration.

In addition to suggestions for reconsideration of previously eliminated alternatives, three separate alternatives were proposed during the NEPA scoping process and documented in the Scoping Report (DTS 2007). One comment suggested providing additional bus service with either school buses or private vehicles. The second proposal was for a High Speed Bus Alternative that would include aspects of both the Managed Lane Alternative and the Fixed Guideway Alternative. The third comment requested consideration of a third fixed guideway alternative.

Providing additional bus service with either school buses or private vehicles represents variations on the TSM Alternative that would provide additional bus capacity using different vehicles or be limited to certain times of day; it did not differ structurally from the TSM Alternative. As a result, providing additional bus service with school buses or private vehicles would not provide substantial benefit when compared to the TSM Alternative already evaluated. In addition, more acquisition of right-of-way would have increased the potential for additional impacts to burial sites and cultural resources; therefore, it was not included in the Draft EIS.

Constructing an elevated bus facility with multiple access points for the entire length of the Fixed Guideway Alternative would be more costly and have more severe impacts to many elements of the environment because of its increased width, both for the entire length of the system as compared to the Fixed Guideway Alternative and at stations where the width would approach 100 feet. These impacts would be similar to those of the Two-direction Managed Lane Alternative that was evaluated in the Alternatives Analysis but would have extended for the entire length of the corridor from Kapolei to UH Mānoa. Substantial right-of-way would have been required to accommodate the structure through urban Honolulu, including more right-of-way for the additional proposed ramps; therefore, this alternative was not included in the Draft EIS.

Scoping comments requested the evaluation of a third fixed guideway alternative that would serve the airport without an alignment following Salt Lake Boulevard. This alternative would meet the Project's Purpose and Need and could generate the same or fewer environmental or community impacts than the other fixed guideway alternative options under consideration; therefore, it was added for evaluation in the Draft EIS.

The NEPA Notice of Intent requested input on five transit technologies. The comments received did not substantially differentiate any of the following five considered technologies as being universally preferable to the other technologies:

- Light-rail transit
- Rapid-rail transit (steel wheel on steel rail)
- Rubber-tired guided vehicles
- Magnetic levitation system
- Monorail system

A technical review process that included opportunities for public comment was initiated subsequent to the scoping process to select a transit technology. The process included a broad request for information that was publicized to the transit industry. Transit vehicle manufacturers submitted 12 responses covering all of the technologies listed in the Notice of Intent.

The responses were reviewed in February 2008 by a five-member panel appointed by the City Council and the Mayor that considered the performance, cost, and reliability of the proposed technologies. The panel twice accepted public comment as part of its review. By a four-to-one vote, the panel selected steel wheel operating on steel rail as the technology for the Project evaluated in this Final EIS. Table 2-1 lists the technologies that were considered but rejected. The four panel members selected steel wheel technology because it is safe, reliable, economical, and non-proprietary. Proprietary technologies, meaning those technologies that would have required all future purchases of vehicles or equipment to be from a single manufacturer, were eliminated because none of the proprietary technologies offered substantial proven performance, cost, and reliability benefits compared to steel wheel operating on steel rail. Selecting a proprietary technology also would have precluded a competitive bidding process, likely resulting in increased overall project costs.

The panel's findings were summarized in its report to the City Council dated February 22, 2008. The panel's report resulted in the City establishing steel wheel operating on steel rail as the technology to be evaluated for the Project. Therefore, the analysis of the Project in this Final EIS is based on steel wheel on steel rail technology.

2.3 Alternatives Considered in the Draft Environmental Impact Statement

Based on the results of the preceding screening process, four alternatives were evaluated in the Draft EIS. They included the No Build Alternative and three fixed guideway alternatives (Build Alternatives):

- No Build Alternative
- Fixed Guideway Transit Alternative via Salt Lake Boulevard (Salt Lake Alternative)
- Fixed Guideway Transit Alternative via the Airport (Airport Alternative)
- Fixed Guideway Transit Alternative via the Airport and Salt Lake Boulevard (Airport & Salt Lake Alternative)

All alternatives included existing transit and highway facilities, as well as committed transportation projects, exclusive of the fixed guideway transit project, anticipated to be operational by 2030. Committed transportation projects are those identified in the ORTP (OʻahuMPO 2007). Highway congestion relief projects in the ORTP are listed in Table 2-4.

Current transit fare policy was assumed to be continued for all Build Alternatives.

Land use, population, and employment assumptions for the year 2030 were kept consistent for all alternatives. The data were provided by the City and County of Honolulu Department of Planning and Permitting (DPP) and are consistent with the ORTP forecast assumptions.

2.3.1 No Build Alternative

The No Build Alternative is evaluated to provide a comparison of what the future conditions would be if none of the Build Alternatives are implemented. The No Build Alternative also provides a point of comparison for identifying the benefits, costs, and impacts of each Build Alternative.

Table 2-4 Committed Congestion-relief Projects in the O`ahu Regional Transportation Plan 2030

Facility	Description
Farrington Highway	Widen Farrington Highway from Golf Course Road to just west of Fort Weaver Road
Fort Barrette Road	Widen Fort Barrette Road from Farrington Highway to Franklin D. Roosevelt Avenue
Hanua Street	Extend Hanua Street from Malakole Street to Farrington Highway and construct new on- and off-ramps at H-1
H-1 Freeway	Construct new H-1 Kapolei Interchange
H-1 Freeway	Widen H-1 in the eastbound direction from Middle Street to Vineyard Boulevard
H-1 Freeway	Modify the weaving movements on H-1, in the westbound direction, between the Lunalilo Street on-ramp and the Vineyard Boulevard off-ramp
H-1 Freeway	Construct a new eastbound off-ramp and westbound on-ramp to H-1 at the Makakilo Interchange
H-1 Freeway	Widen H-1 in the westbound direction from the Waiau Interchange to the Waiawa Interchange
H-1 Freeway	Widen H-1 in the westbound direction through the Waiawa Interchange
H-1 Freeway	Construct a zipper lane on H-1 in the westbound direction from the Ke`ehi Interchange to the Kunia Interchange
H-1 Freeway	Widen the Waipahu Street off-ramp in the westbound direction
H-2 Freeway	Widen ramps at the Waipi`o Interchange
H-1 Freeway	Improve operations between Ward Avenue and University Avenue
H-1 and H-2 Freeways	Modify the H-1 and H-2 Waiawa Interchange
Kamehameha Highway	Widen Kamehameha Highway between Lanikuhana Avenue and Ka Uka Boulevard
Kapolei Parkway	Extend Kapolei Parkway
North-South Road	Widen and extend North-South Road
Makakilo Drive	Extend Makakilo Drive south to H-1 and connect to North-South Road
Farrington Highway	Widen Farrington Highway from Kunia to Waiawa Interchange
Farrington Highway	Widen Farrington Highway from Hakimo Road to Kalaeloa Boulevard
H-1 Freeway	Widen H-1 in the eastbound direction from Liliha Street to Pali Highway
H-1 Freeway	Modify and/or close various ramps on H-1 from Middle Street to University Avenue
H-1 Freeway	Modify on- and off-ramps at the University Avenue Interchange on H-1
H-1 Freeway	Widen H-1 in the westbound direction from Vineyard Boulevard to Middle Street
H-1 Freeway	Construct HOV lanes from the Waiawa Interchange to the Makakilo Interchange
H-1 Freeway	Widen H-1 in the eastbound direction from the Waiawa Interchange to the Hālawa Interchange
H-1 Freeway	Widen H-1 in the eastbound direction from Ward Avenue to Punahou Street
H-2 Freeway	Construct a new interchange between Meheula Parkway and Ka Uka Boulevard
Kahekili Highway	Widen Kahekili Highway from Kamehameha Highway to Ha`ikū Road
Kunia Road	Widen Kunia Road from Wilikina Drive to Farrington Highway
Likelike Highway	Widen Likelike Highway from Kamehameha Highway to Kahekili Highway
Makakilo Mauka Frontage Road	Construct a new Makakilo Mauka Frontage Road from Kalaeloa Boulevard to Makakilo Drive
Nimitz Highway	Construct a new two-lane elevated and reversible HOV flyover above Nimitz Highway
Pi`ikoi and Pensacola Streets	Reverse the existing one-way Pi`ikoi Street and Pensacola Street couplet
Pu`uloa Road	Widen Pu`uloa Road from Pukuloa Street to Nimitz Highway
Central Mauka Road	Construct Central Mauka Road, a new road from Mililani Mauka to Waiawa
Wahiawā, Second Access	Construct a new second access road between Whitmore Village and Wahiawā
Wai`anae, Second Access	Construct a new second access road to Wai`anae from Farrington Highway

The No Build Alternative bus network would include all routes in operation today, plus planned route modifications and additions to the existing bus network that are likely to occur between now and the year 2030 to respond to the population and employment estimates for the year 2030.

The No Build Alternative's transit component would include an increase in bus fleet size (Table 2-5). However, due to increasing traffic congestion and slower travel times, transit service levels and passenger capacity would remain about the same as they are today.

Table 2-5 Transit Vehicle Requirements

Alternative	Bus		Fixed Guideway	
	Peak	Fleet	Peak	Fleet
2009 Existing Conditions	439	531	0	0
2030 No Build	514	618	0	0
2030 Project	490	588	76	85

2.3.2 Salt Lake Alternative

The Salt Lake Alternative would have included the construction and operation of a grade-separated fixed guideway transit system between East Kapolei and Ala Moana Center (Figure 2-5) with the same system characteristics described in Section 2.5 for the Project.

From Waiʻanae to Koko Head (west to east), the guideway would have followed North-South Road and other future roadways to Farrington Highway. The guideway would have followed Farrington Highway Koko Head on an elevated structure and continued along Kamehameha Highway to the vicinity of Aloha Stadium.

The guideway would have left Kamehameha Highway immediately ʻEwa of Aloha Stadium, crossed the Aloha Stadium main parking lot, and continued Koko Head along Salt Lake Boulevard. It would have followed Pūkōloa Street through Māpunapuna before crossing and following Moanalua Stream to cross over the H-1 Freeway and continued to the Middle Street Transit Center.

Koko Head of Middle Street, the guideway would have followed Dillingham Boulevard to the vicinity of Kaʻaahi Street and then turned Koko Head to connect to Nimitz Highway near Iwilei Road. It would have followed Nimitz Highway Koko Head to Halekauwila Street, then proceeded along Halekauwila Street past Ward Avenue where it would have transitioned to Queen Street. The guideway would have crossed from Waimanu Street to Kona Street near Pensacola Street. The guideway would have run above Kona Street to Ala Moana Center.

The Salt Lake Alternative would have included feeder bus connections from fixed guideway stations to Pearl Harbor Naval Base, Honolulu International Airport, and Hickam Air Force Base. The total guideway length for the Salt Lake Alternative would have been approximately 19 miles, and it would have included 19 stations.

2.3.3 Airport Alternative

The Airport Alternative (Figure 2-6) is identical to the Salt Lake Alternative except between Aloha Stadium and Middle Street where it will follow Kamehameha Highway and Aolele Street. Feeder bus connections from fixed-guideway stations will serve locations in the Salt Lake neighborhood. The total guideway length for this alternative is approximately 20 miles, and it includes 21 stations.

2.3.4 Airport & Salt Lake Alternative

The Airport & Salt Lake Alternative (Figure 2-7) would have been identical to the Salt Lake Alternative, with an additional segment that would have followed Kamehameha Highway and Aolele Street from Aloha Stadium to Middle Street. This alternative would have followed the alignments described for both the Salt Lake Alternative and the Airport Alternative. The Aloha Stadium

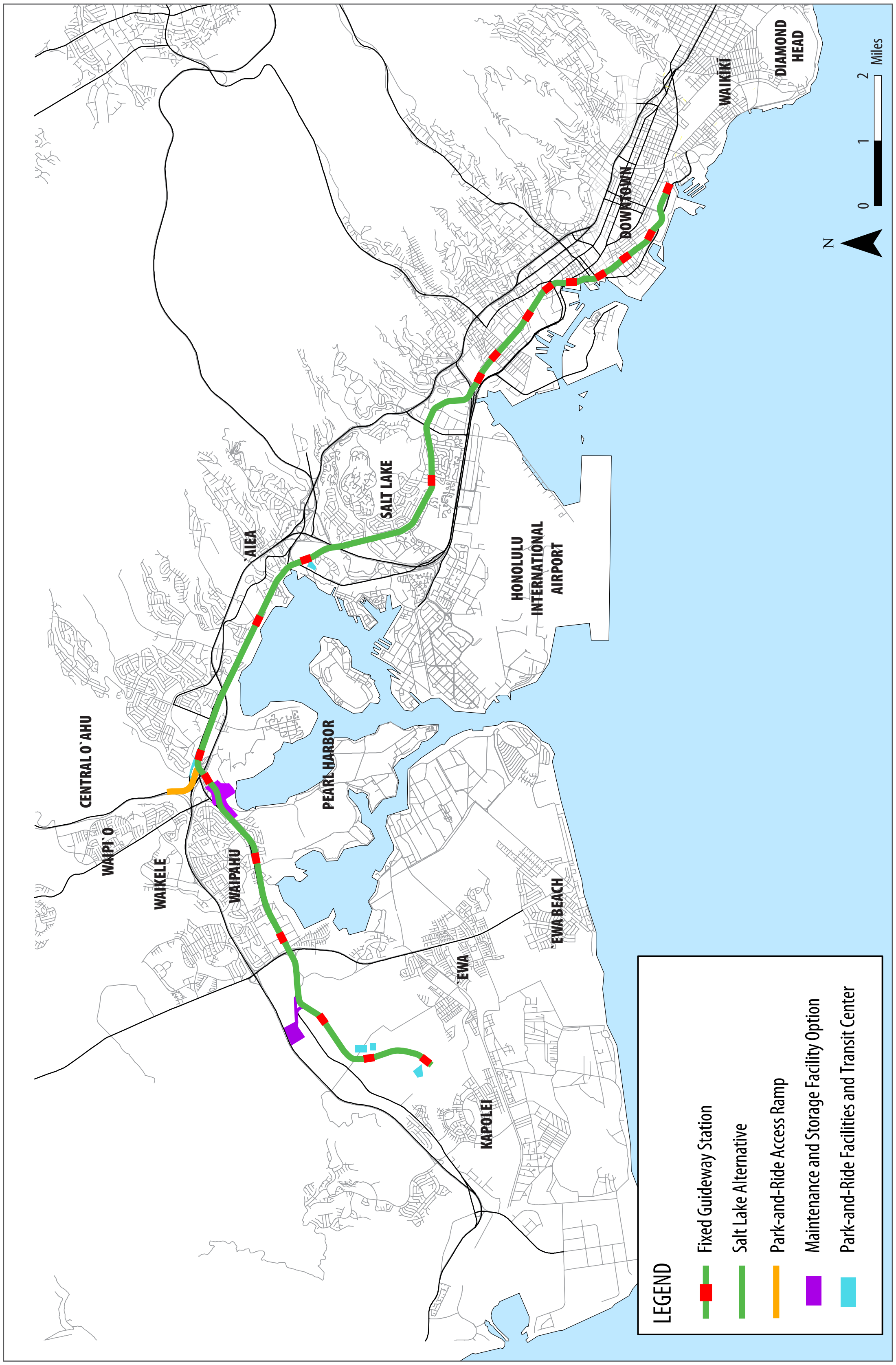


Figure 2-5 Salt Lake Alternative

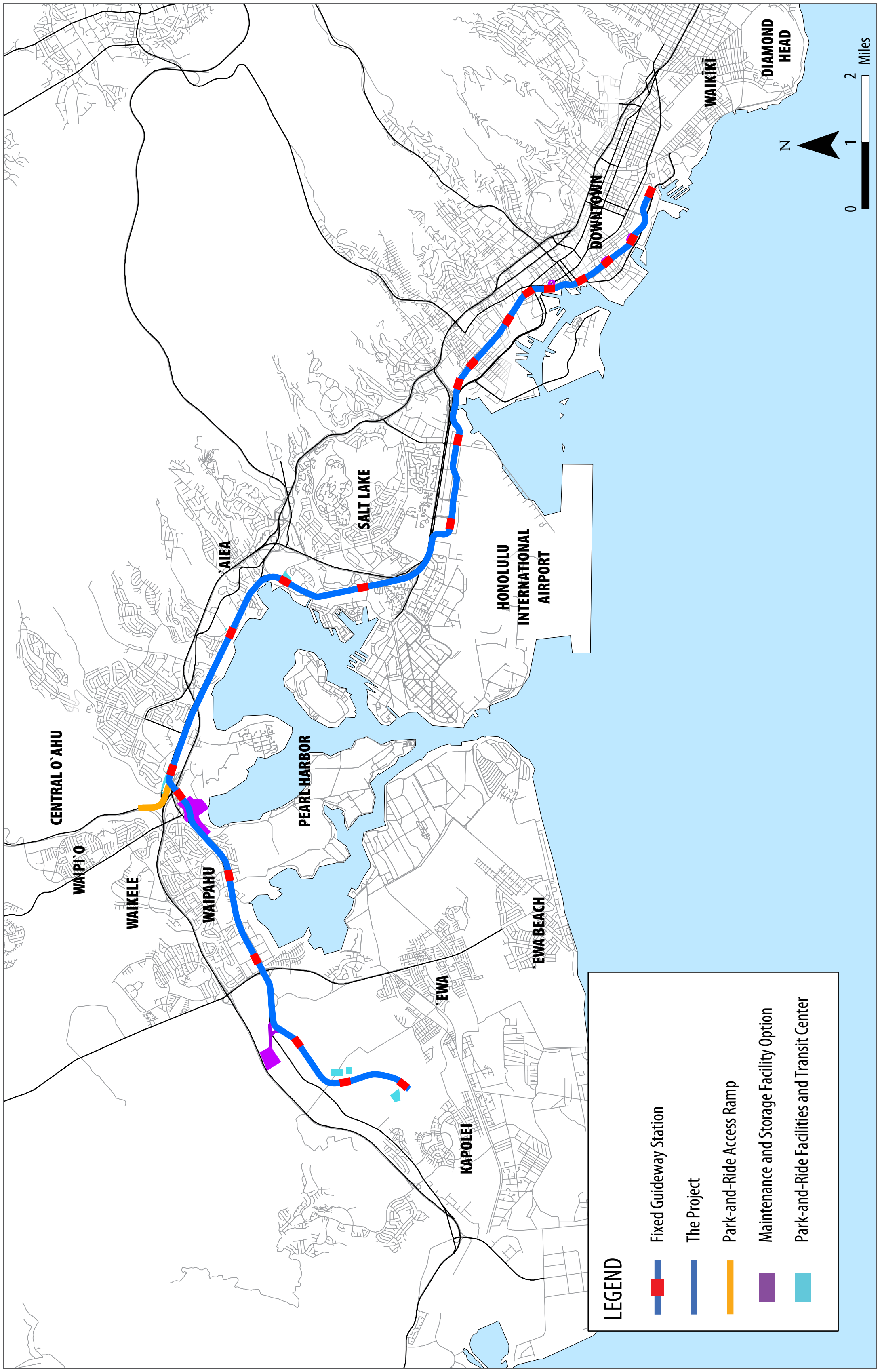


Figure 2-6 Airport Alternative

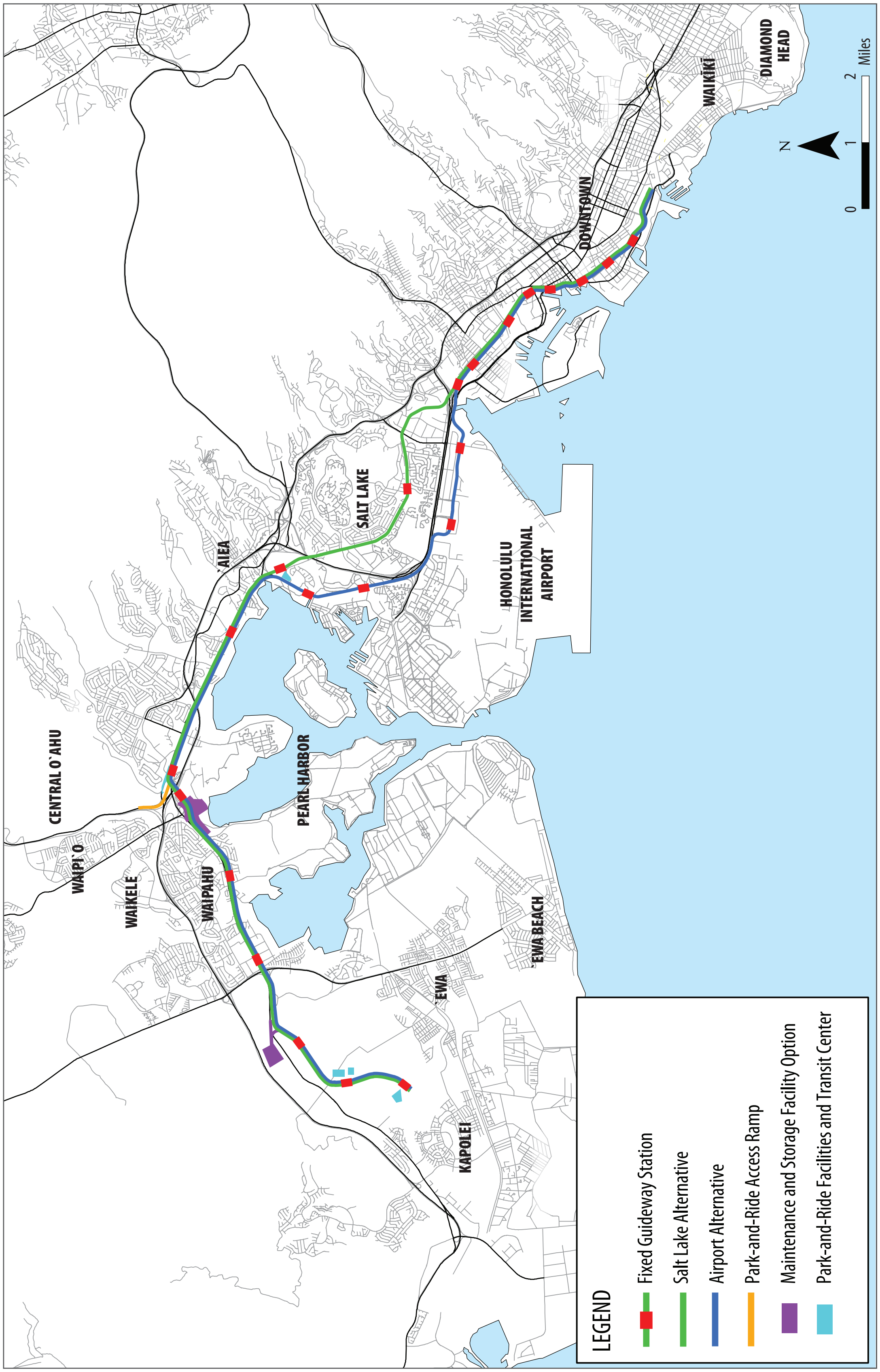


Figure 2-7 Airport & Salt Lake Alternative

Station on Kamehameha Highway would have been relocated makai to provide an Arizona Memorial Station instead of a second Aloha Stadium Station. At the Middle Street Transit Center Station, each line would have had a separate platform with a concourse providing a pedestrian connection between them to allow passengers to transfer. The total guideway length for this alternative would have been approximately 25 miles and it would have included 23 stations.

2.4 Preferred Alternative Identification Process

The Draft EIS documented that of the three Build Alternatives evaluated, the Airport Alternative will carry the most passengers, with 95,000 daily passengers and 249,200 daily transit trips in 2030, and provide the greatest transit-user benefits (Table 2-6). While these numbers have increased since the Draft EIS was published, the relative differences among the alternatives would remain similar. The Airport Alternative also will result in the fewest vehicle miles traveled and vehicle hours of delay. It will provide access to employment centers at Pearl Harbor Naval Base and Honolulu International Airport and will have substantially greater ridership to those areas than the Salt Lake Alternative. It will serve the Salt Lake neighborhood with connecting bus service.

The Airport Alternative will have noise impacts to five fewer residential high-rise buildings and it will also result in slightly less air pollution, energy consumption, and water pollution because it will have the greatest reduction in vehicle miles traveled than the Salt Lake Alternative. The Airport Alternative will have slightly lower potential for encountering archaeological resources but will affect more historical resources than would the Salt Lake Alternative. The Airport Alternative will have less visual effect than would the Salt Lake Alternative because the guideway and station would dominate views in residential areas along Salt Lake Boulevard.

The Airport & Salt Lake Alternative would have had the greatest impact because the most resources would have been affected.

Of the three Build Alternatives addressed in the Draft EIS, the Airport Alternative encroaches the least into Waters of the U.S. during both construction and operation.

During the public comment period on the Draft EIS, the public overwhelmingly supported the Airport Alternative. Of the comments that specifically supported one of the alternatives, more than 75 percent were in support of the Airport Alternative. Also, the City Council passed Resolution 08-261,

Table 2-6 Summary of Data for Alternatives Considered in Draft Environmental Impact Statement

Alternative	Daily Islandwide Transit Trips	Vehicle Miles Traveled	Vehicle Hours of Delay	Hours of Transit-user Benefits	Total Capital Cost (Millions 2008 Dollars)	Cost per Hour of Transit-user Benefits Compared to No Build
2030 No Build	226,000	13,583,000	107,000	—	$978	—
2030 Salt Lake Alternative	270,000	13,096,000	84,000	48,980	$4,876	$17.53
2030 Airport & Salt Lake Alternative	272,000	13,103,000	83,000	50,170	$5,767	$22.86
2030 Airport Alternative	273,000	13,086,000	82,000	51,900	$5,084	$17.78

which authorizes planning, engineering, design, and construction of the Airport Alternative.

The Salt Lake Boulevard Alignment is part of the Locally Preferred Alternative and may be constructed in the future as an extension if funding can be secured.

The Airport Alternative is the Preferred Alternative and is described in this Final EIS as the “Project.”

2.4.1 Refinement of the Preferred Alternative

As a result of consultation under the Section 106 process as discussed in Chapter 4.16 of this Final EIS, the Aloha Stadium and Pearl Harbor Station designs were refined to avoid passing through the Pearl Harbor National Historic Landmark.

In addition, subsequent to the Draft EIS, additional coordination with FTA, the Federal Aviation Administration (FAA), and HDOT Airports Division revealed that the Aolele Street alignment required refinement to avoid impacting Honolulu International Airport's runway protection zone. Although there are existing buildings within its limits, new objects and activities are discouraged from being added to the central portion of the runway protection zone. The Aolele Street alignment would have resulted in extensive impacts to Honolulu International Airport, as discussed in Appendix K.

This coordination resulted in an evaluation of a range of options to avoid impacts to the airport, including relocation of runway 22L/4R in the makai direction. A review of design options for transitioning the guideway along a range of alignments between Aolele Street and the H-1 Freeway was conducted. Based on this evaluation, DTS and HDOT Airports Division refined the design to transition the guideway alignment from Aolele Street to Ualena Street at the extension of Ohohia Street. This option has the lowest cost and fewer impacts to the airport than the Airport Alternative described in the Draft EIS.

The FAA’s evaluation of the design options with potential to avoid impacts to the airport and options which avoid conflicts to airport operations and to the runway protection zone is included in Appendix K of this Final EIS. This FAA evaluation is only for impacts to the airport from the various alignment design options to provide information to support the design refinement by DTS. The FAA evaluation does not review off-airport effects. The evaluation shows that the Aolele Street alignment would have resulted in significant impacts to the airport.

Preliminary cost estimates and a review of environmental impacts showed that the Aolele Street alignment would have been more costly and would have resulted in greater environmental impacts at the airport. The other alignment options would not result in the same level of impacts to the airport. The HDOT Airports Division submitted its Draft Airport Layout Plan showing the refined airport alignment that was selected, which is also included in Appendix K. The FAA indicated in an April 28, 2010, letter to FTA that the refined airport alignment submitted in the Draft Airport Layout Plan meets FAA's airport design standards. Of the options not requiring runway relocation, the Ualena option required acquisitions from the fewest private properties and will have the fewest effects during construction.

2.5 The Project: Fixed Guideway Alternative from East Kapolei to Ala Moana Center via the Airport

The Project will include the construction and operation of a grade-separated fixed guideway transit system between East Kapolei and Ala Moana Center (Figures 2-8 to 2-11). Plans of the alignment are included in Appendix B of this Final EIS. Revisions to the design since the Draft EIS reflect measures to minimize adverse effects to the natural and built environments. The system will use steel wheel on steel rail technology. The vehicles could either be manually operated by a driver or fully automated (driverless). Operating goals for system speed and reliability require that the entire system operate in exclusive right-of-way, with no potential for vehicle or pedestrian conflicts. All parts of the guideway will be elevated, except near Leeward Community College, where it will be at-grade in exclusive right-of-way.

From Waiʻanae to Koko Head (west to east), the guideway will follow North-South Road and other future roadways to Farrington Highway (Figure 2-8). The guideway will follow Farrington Highway Koko Head on an elevated structure and continue along Kamehameha Highway to the vicinity of Aloha Stadium (Figure 2-9).

The guideway will continue past Aloha Stadium along Kamehameha Highway makai to Nimitz Highway and turn makai onto Aolele Street. It will then follow Aolele Street, Ualena Street, and Waiwai Loop Koko Head to reconnect to Nimitz Highway near Moanalua Stream and continue to the Middle Street Transit Center (Figure 2-10). Koko Head of Middle Street, the guideway will follow Dillingham Boulevard to the vicinity of Kaʻaahi Street and then turn Koko Head to connect to Nimitz Highway near Iwilei Road.

The guideway will follow Nimitz Highway Koko Head to Halekauwila Street, then proceed along Halekauwila Street past Ward Avenue, where it will transition to Queen Street. The guideway will cross from Waimanu Street to Kona Street in the vicinity of Pensacola Street. The guideway will run above Kona Street to Ala Moana Center (Figure 2-11). The total guideway length for the Project will be approximately 20 miles.

In addition to the guideway, the Project will require the construction of 21 stations and supporting facilities. Supporting facilities include a vehicle maintenance and storage facility, transit centers, park-and-ride lots, traction power substations, a parking structure, and an access ramp from the H-2 Freeway to the Pearl Highlands park-and-ride. The vehicle maintenance and storage facility would either be located in the planned Hoʻopili development near Farrington Highway or near Leeward Community College (Figures 2-8 and 2-9).

The Project will require widening existing streets to accommodate the guideway columns, provide bus stops, improve sidewalks, or related improvements. Appendix C of this Final EIS shows which locations would require additional right-of-way to accommodate the widening. The widenings will occur at the following locations:

- Makai side of Farrington Highway at Waipahu High School (Figure 2-9)
- Kamehameha Highway at various locations between Pearl Highlands and Pearl Harbor Naval Base Station
- Makai side of Dillingham Boulevard between Puʻuhale Road and King Street (Figure 2-11)
- Makai side of Halekauwila Street between Cooke Street and Kamani Street (Figure 2-11)
- Both sides of Kona Street between Pensacola Street and Piʻikoi Street

Some bus routes will be reconfigured to bring riders on local buses to nearby fixed guideway transit stations. Service on duplicative routes will be reduced as the service is replaced by the fixed guideway system. To support this system, the bus fleet will be increased in 2030 (Table 2-5). Appendix D, Bus Transit Routes, details future transit routes.

The Project will provide high-capacity transit service between East Kapolei and Ala Moana Center with future extensions planned for West Kapolei to East Kapolei, Salt Lake Boulevard, and from Ala Moana Center to UH Mānoa and to Waikīkī.

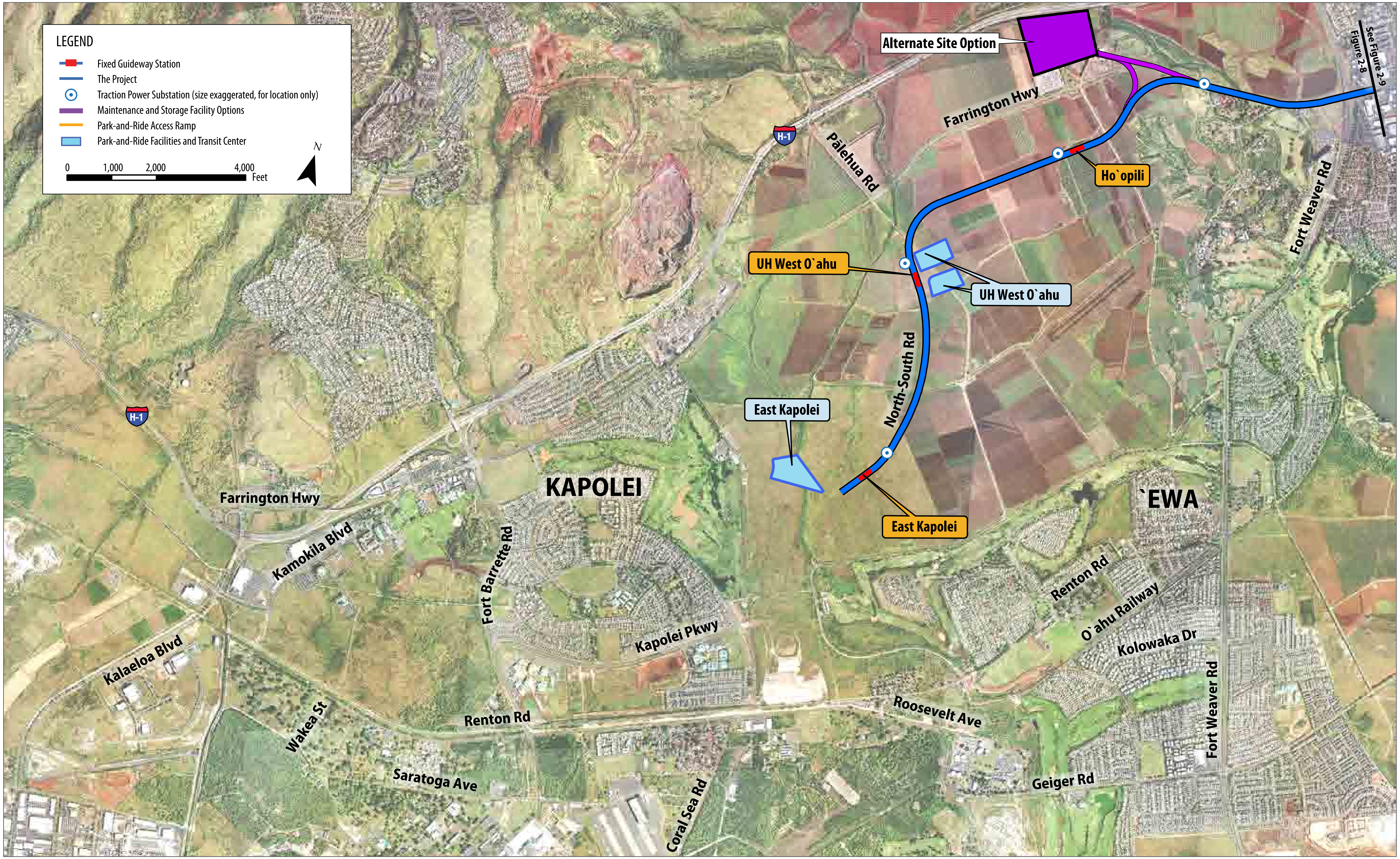


Figure 2-8 Fixed Guideway Transit Alternative Features (East Kapolei to Fort Weaver Road)

Figure 2-9 Fixed Guideway Transit Alternative Features (Fort Weaver Road to Aloha Stadium)

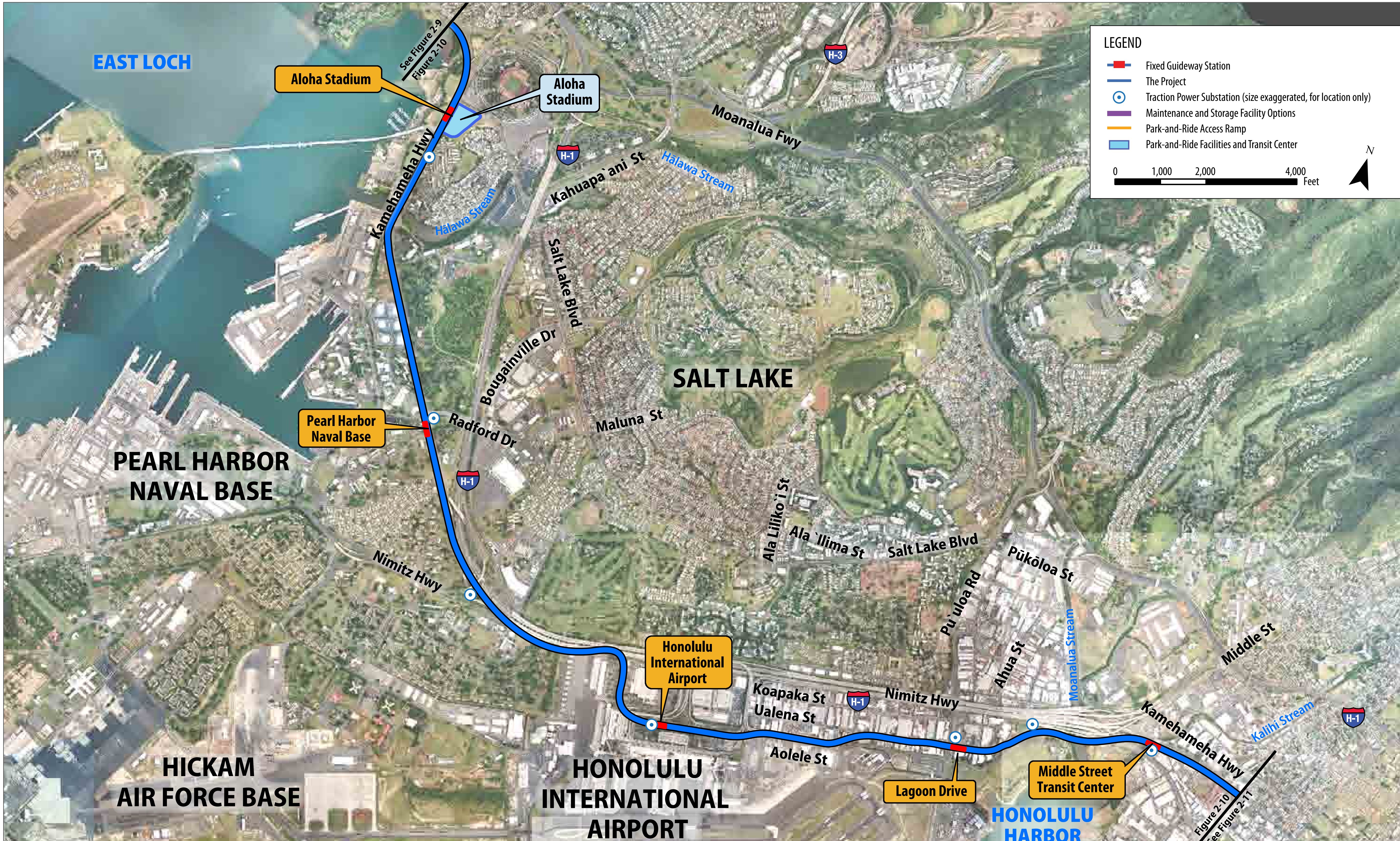


Figure 2-10 Fixed Guideway Transit Alternative Features (Aloha Stadium to Kalihi)

Figure 2-11 Fixed Guideway Transit Alternative Features (Kalihi to Ala Moana Center)

The East Kapolei Station is the proposed Waiʻanae terminus for the Project. It is located on North-South Road near the planned Salvation Army Kroc Center, approximately one mile Koko Head of the UH West Oʻahu Station (Figure 2-8). This area of East Kapolei is undergoing development that will be a mixture of residential, recreational, educational, industrial, and commercial land uses. The location of the terminus will support one of the project goals to "improve access to planned development to support City policy to develop a second urban center," as defined in the *ʻEwa Development Plan* (DPP 2000).

A future Department of Hawaiian Home Lands housing development is also planned for the immediate area as part of the planned development in the ʻEwa Development Plan. Kroc Center, scheduled to open in 2010, will be a 15-acre family support, education, recreation, and cultural arts facility for the general public and will provide services for low-income children, seniors, and families.

Projected year of opening of the entire system (2019) ridership shows that the East Kapolei Station will have among the highest boardings in the system. Because there is available space in the vicinity of the station, it will include a temporary park-and-ride lot that will accommodate automobile, motorcycle, and bicycle commuters. When the guideway is extended to West Kapolei, the park-and-ride facility would move to a location farther Waiʻanai. The station will serve local and express transit commuters from ʻEwa, ʻEwa Beach, Kapolei, and Kalaeloa.

Ala Moana Center is the logical Koko Head terminus because as Oʻahu's largest shopping center it is a major activity center. Ala Moana Center also is a major transit hub with more than 2,000 weekday bus trips. The Koko Head terminus will allow riders to link to the major employment centers and traffic generators in the area.

Therefore, East Kapolei and Ala Moana Center are logical termini for the system, and the Project can operate independent of any other transportation improvements. The Project does assume completion of those improvements planned as part of the No Build Alternative (Table 2-4) and assumed to be in place prior to project completion.

All buildings, facilities, and vehicles will conform to applicable Federal, State, and County accessibility guidelines and standards. HRS Section 103-50 requires that all State or County government buildings, facilities, and sites be designed and constructed to conform to the Architectural Barriers Act/Americans with Disabilities Act Accessibility Guidelines (36 CFR 1190 and 1191), issued by the U.S. Access Board, and other applicable design standards as adopted and amended by the Disability and Communication Access Board. The law further requires all plans and specifications prepared for construction of State or County government buildings, facilities, and sites be reviewed by the Disability and Communication Access Board for conformance to those guidelines and standards.

Project design criteria describe the Project's design goals, including track work, utilities, landscaping, architecture, station features, environmental, safety and security, and communications. The criteria for landscaping will apply to streetscapes, station areas, areas around traction power substations, and in medians. In addition, new plantings will be non-invasive as defined by the Hawaiʻi Chapter of the American Society of Landscape Architects, and native plants will be included where appropriate.

2.5.1 Operating Parameters

The fixed guideway system will operate in exclusive right-of-way to ensure system speed and reliability and to avoid conflicts with automobile and pedestrian traffic. It is planned to operate between 4 a.m. and midnight (Table 2-7), with a train arriving in each direction at each station

Table 2-7 Fixed Guideway Weekday Operating Assumptions

Time of Day[1]	System Headway
4 a.m. to 6 a.m.	6 minutes
6 a.m. to 9 a.m.	3 minutes
9 a.m. to 3 p.m.	6 minutes
3 p.m. to 6 p.m.	3 minutes
6 p.m. to 8 p.m.	6 minutes
8 p.m. to midnight	10 minutes

[1]System is closed from midnight to 4 a.m.

every three to ten minutes. Trains will be capable of reaching 50 miles per hour (mph) or greater and achieving an average speed, including dwell times at stations, of 30 mph or greater. Bicycles, luggage, and surfboards will be allowed on trains and regulated by policy to address high demand periods or special conditions.

A unified fare structure is planned, similar to the current structure for TheBus; however, other fare policies could be considered in the future. Fare vending machines will be available at all stations, and standard fare boxes will continue to be used on buses. Fare-collection for the fixed guideway system will be proof of payment. Fare inspectors will ride the system and randomly check that passengers have valid tickets, passes, or transfers. Violators will be cited and fined.

The system is planned to operate with multi-vehicle trains approximately 120 to 180 feet long, with each train capable of carrying between 325 and 500 passengers. This will provide a peak capacity of approximately 8,650 passengers per hour per direction. The system will be expandable to accommodate longer trains of up to 240 feet in the future to increase capacity. Also, the system could be operated with shorter headways (time between train arrivals) to increase peak capacity. This level of service will require a peak-period fixed guideway fleet of 75 vehicles in 2030 (Table 2-5).

2.5.2 Transit Technology

The selected transit technology will be electrically powered, industry-standard steel wheel on steel rail powered from a third-rail system (Figure 2-12). The selected vehicle will be capable of a top speed greater than 50 mph and meet the environmental and operating parameters discussed in this Final EIS. The vehicles will be equipped with wheel skirts.

The vehicles are designed for fully automated (driverless) operation, but may carry a driver and are capable of manual operation. This is possible because the fixed guideway will operate in exclusive right-of-way with no automobile or pedestrian crossings.

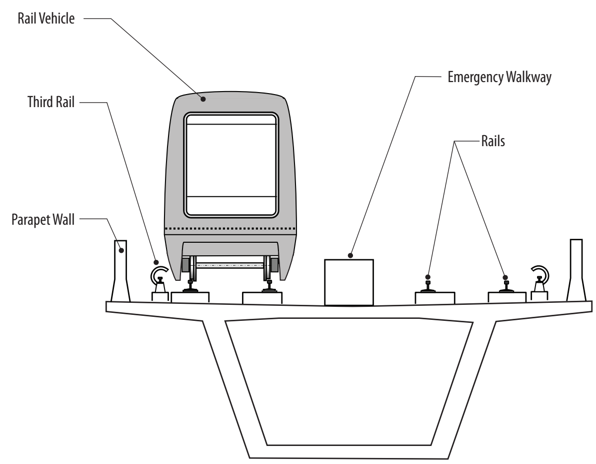


Figure 2-12 Example Vehicle on Elevated Guideway (Cross-section)

The system will draw power from many points along the route, so an electrical outage in a few areas will not disrupt service. If electrical power is lost systemwide, the train brakes will stop the rail cars. Backup batteries will provide lighting for several hours in trains and stations. The train operations center will communicate with passengers via the public address system and intercom. If power is restored within a short time, service will resume. With a prolonged outage, the operations center will direct passengers to exit the trains via a lighted

Each station will include the following:

- Stairs, elevators, and escalators for access
- Ticket-vending machines
- Bicycle parking
- Landscaping
- Lighting

emergency walkway to the nearest station. For those unable to exit rail cars, help will be provided by emergency responders and transit staff.

2.5.3 Station Characteristics

All fixed guideway stations will have similar design elements to make system use easier for all patrons, including infrequent users, the elderly, and persons with disabilities. The stations will provide one, two, or three platforms 240 feet long and be a minimum of 12 feet wide to accommodate passenger demand beyond 2030. Center platform stations will have a minimum 30-foot-wide platform. All platforms will be high level (at the same level as the vehicle floor) to provide level boarding for all passengers and to accommodate wheelchairs. In addition to stairs and escalators, elevators will be provided at all stations to accommodate elderly and disabled riders. Bicycle racks also will be provided.

Ticket-vending machines will be provided at all stations. Stations will be designed to accommodate fare gates and a station manager's booth should they be needed in the future. They could either be on the ground or concourse level. At stations with a concourse, which is an elevated level located below the platform, patrons will be able to transfer between platforms without descending to street level. The stations will have one of three general configurations:

- Side platforms without a concourse (Figure 2-13)
- Side platforms with a concourse (Figure 2-14)
- Center platforms with a concourse (Figure 2-15)

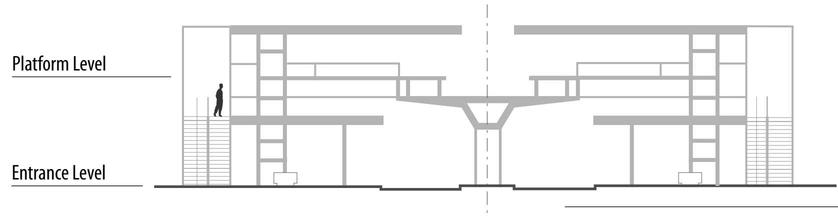
Side-platform stations without a concourse allow the guideway to continue through the station without changing its height above the ground, which averages approximately 30 feet to the top of the tracks. Side-platform and center-platform concourse stations require the guideway to climb approximately 15 feet higher to provide clearance for a concourse below the platform. Center-platform concourse stations will require the tracks to split several hundred feet before the station to pass on each side of the platform. The specific layout will vary at each station for all three station types, depending on available space, the location of bus connections, and the number of passengers that will use each station.

A conceptual layout for each of the 21 station locations is shown in Figures 2-17 through 2-37. Station layouts will be refined during Final Design of each station.

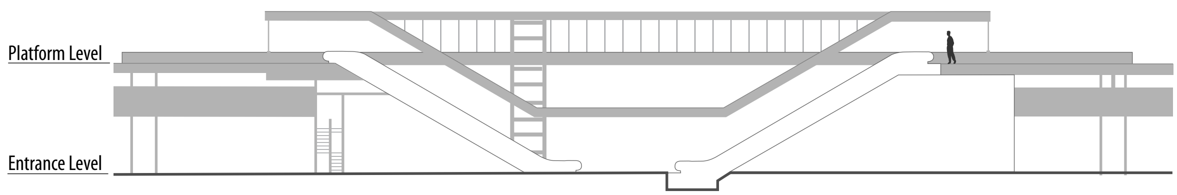
2.5.4 Safety and Security Measures

The Project is designed to meet safety and security criteria typical of fixed-guideway transit systems. The criteria have been developed in coordination with emergency service providers and comply with applicable National Fire Protection Association, American National Standards Institute, and Hawai'i Occupational Safety and Health Division standards.

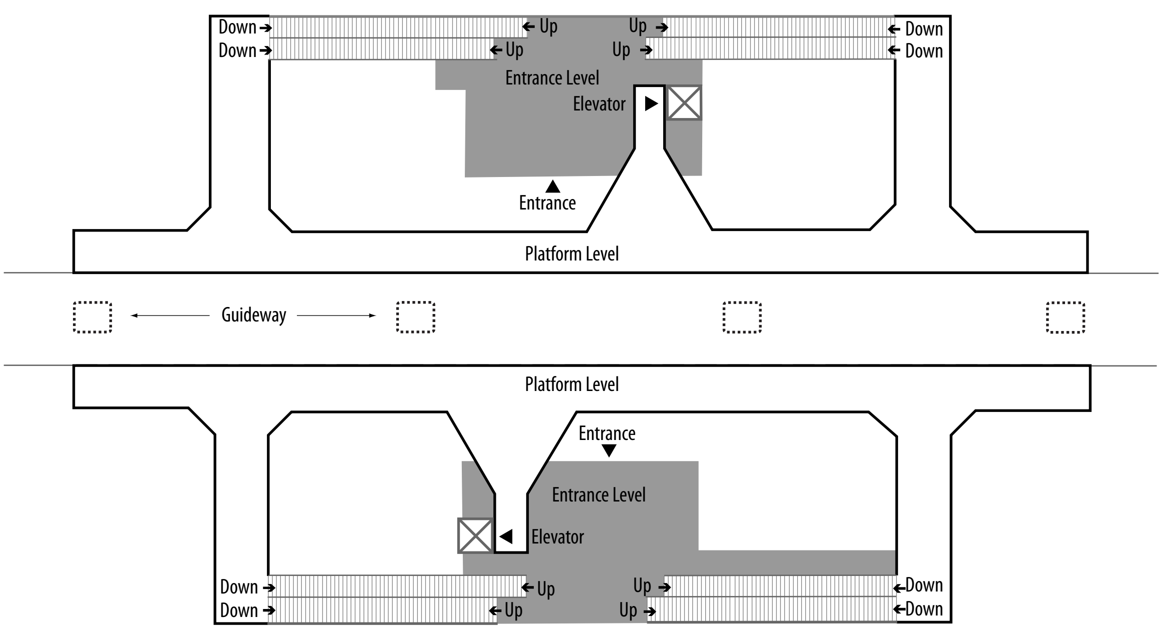
The design of stations and public areas will apply crime prevention through environmental design principles. Crime prevention through environmental design is a crime-prevention philosophy based on the theory that proper design and effective use of the built environment can reduce the fear and incidence of crime, as well as improve the quality of life. These measures have been effective with other transit systems. The principles include natural surveillance (maximizing visibility and interaction through placement of physical features), natural access control (differentiating between public and private space to control access and



Cross-section



Longitudinal Section



Plan View

Figure 2-13 Typical Side-platform Station Configuration without a Concourse

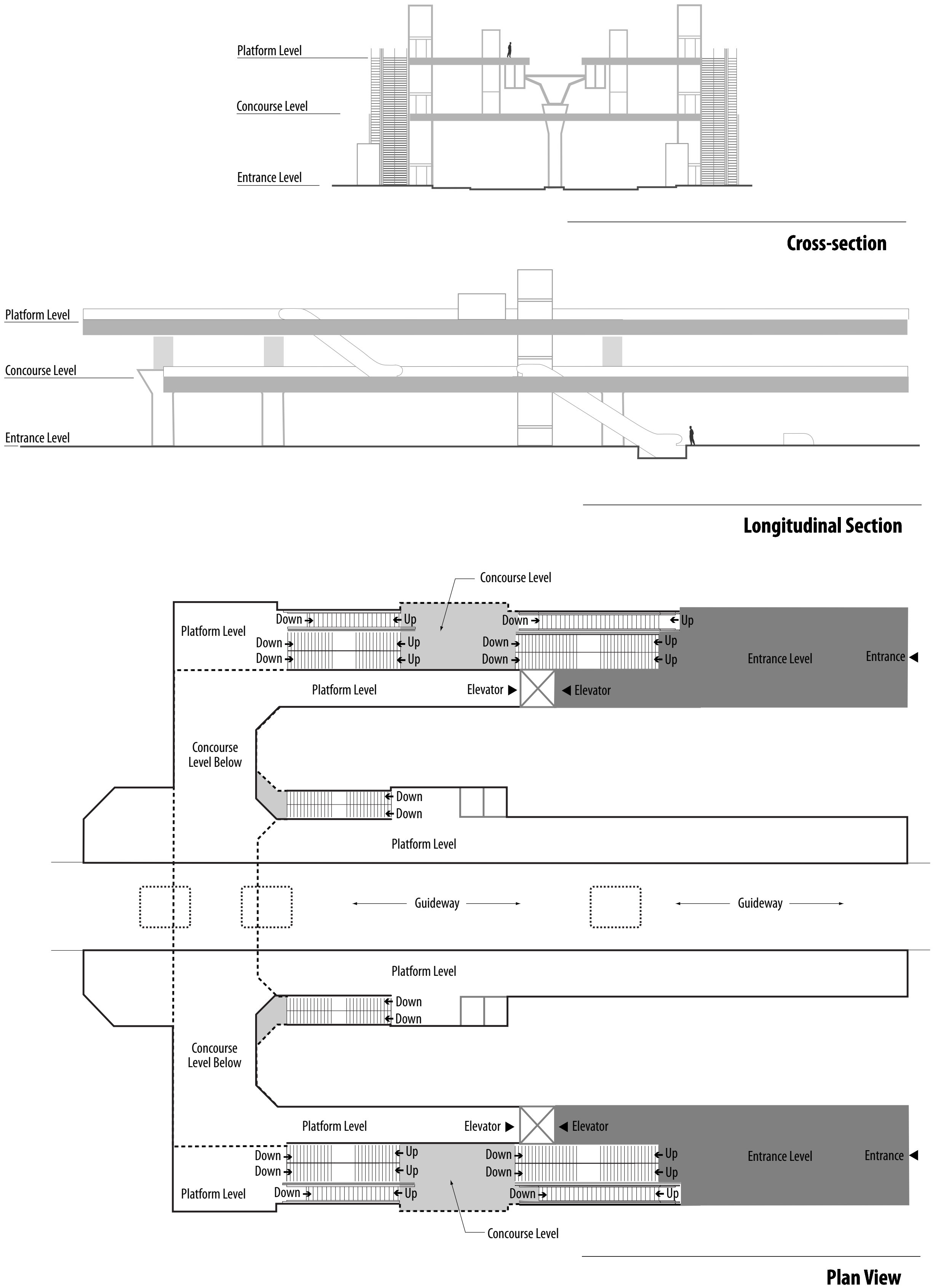
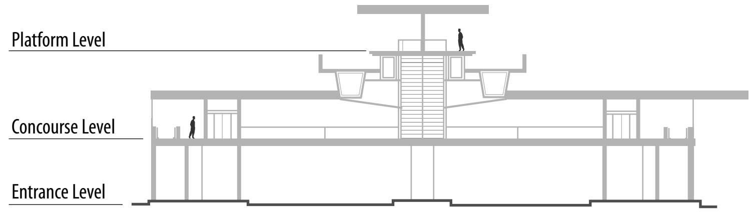
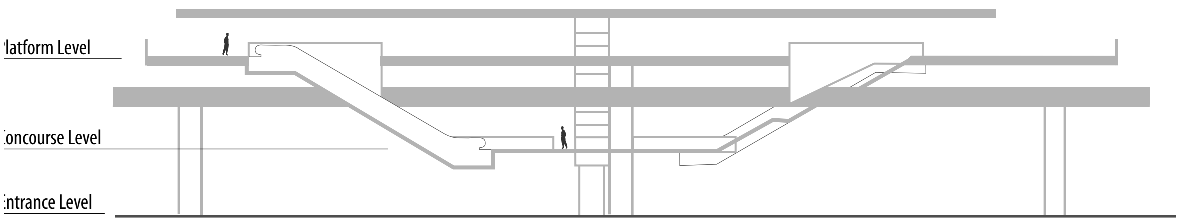


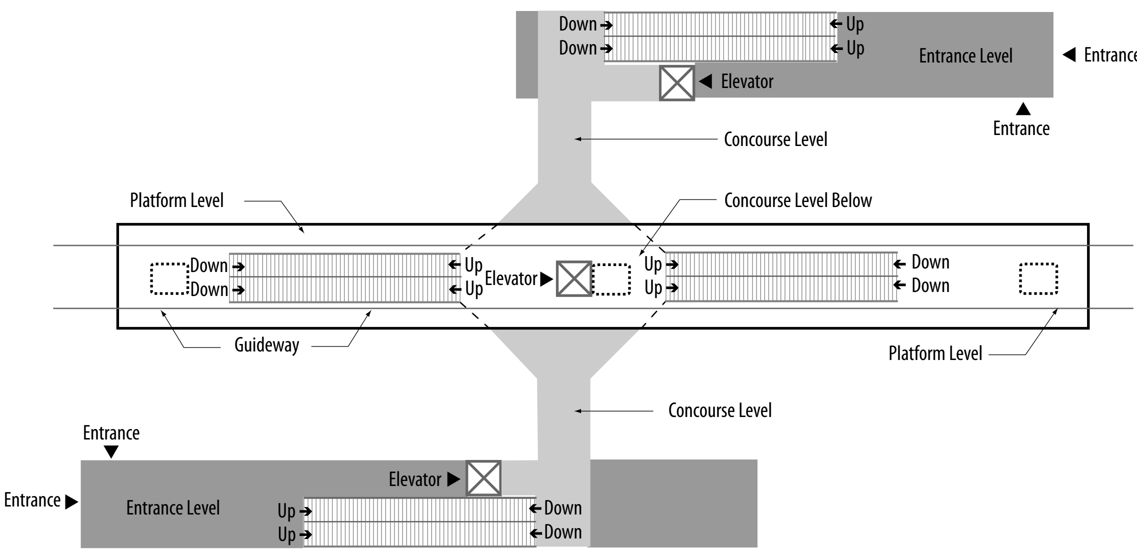
Figure 2-14 Typical Side-platform Station Configuration with a Concourse



Cross-section



Longitudinal Section



Plan View

Figure 2-15 Typical Center-platform Station Configuration with a Concourse

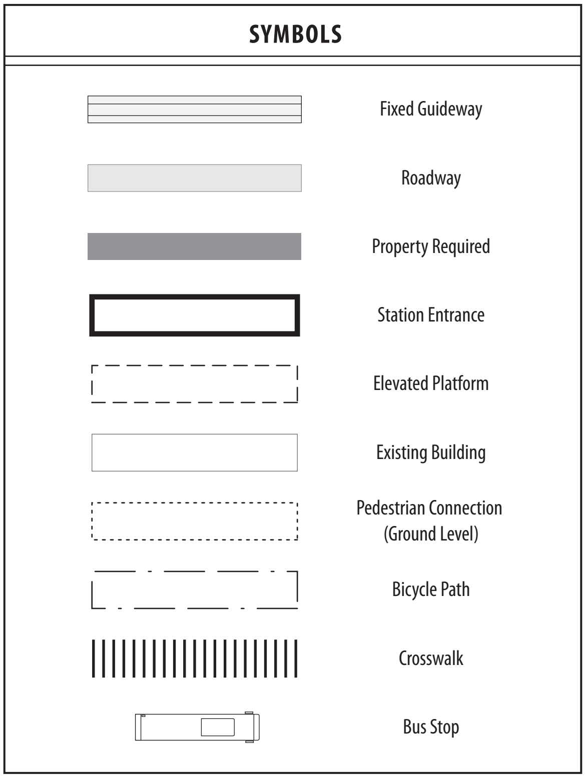


Figure 2-16 Legend for Figures 2-17 to 2-39

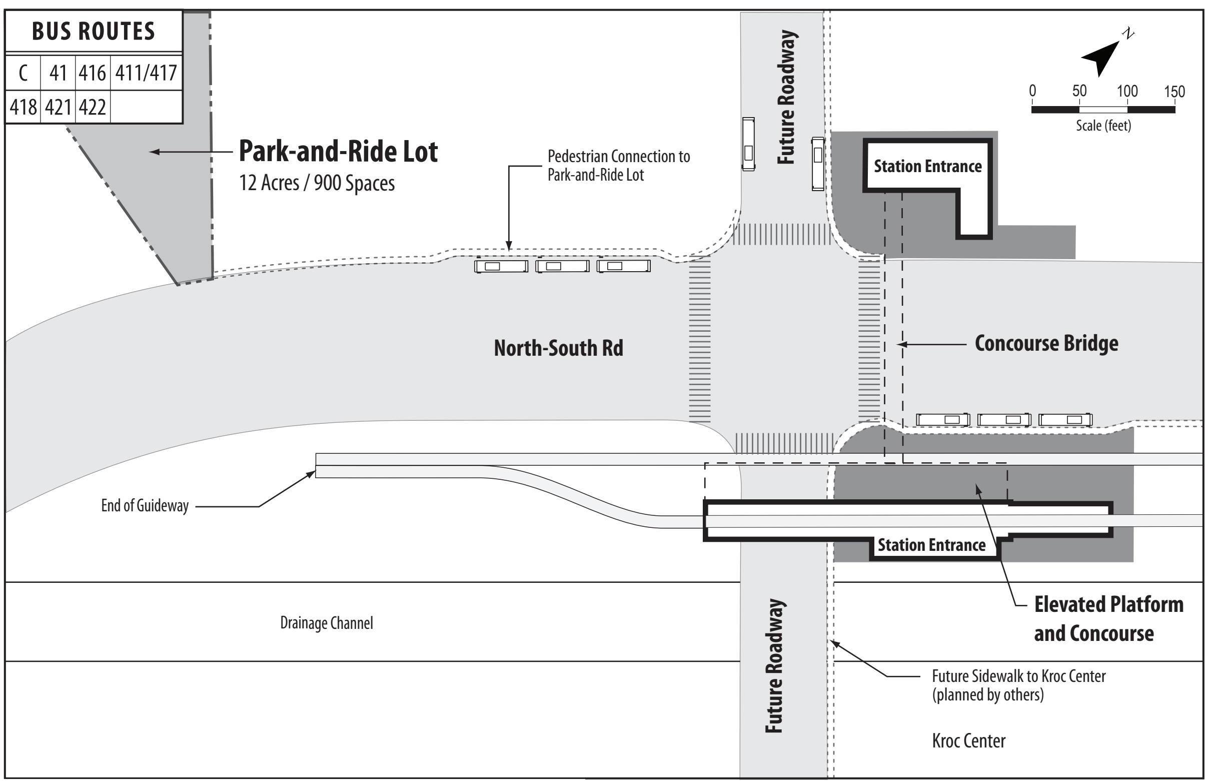


Figure 2-17 East Kapolei Station

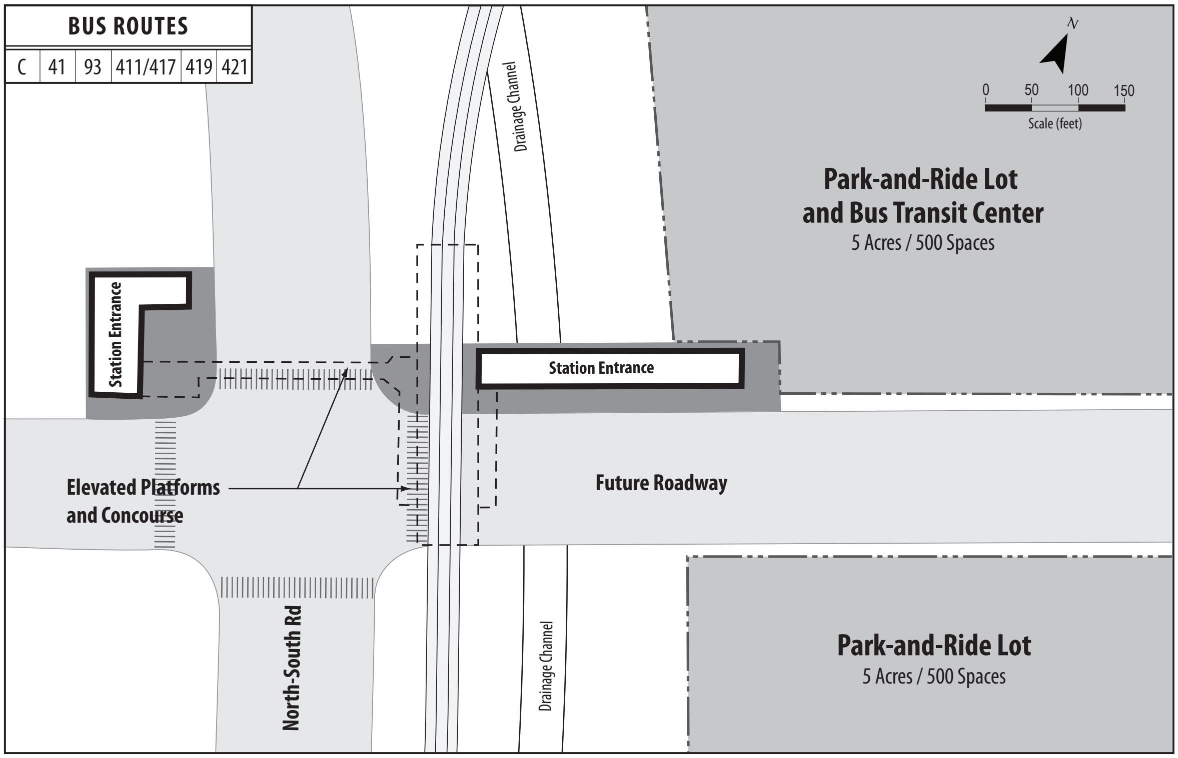


Figure 2-18 UH West O`ahu Station

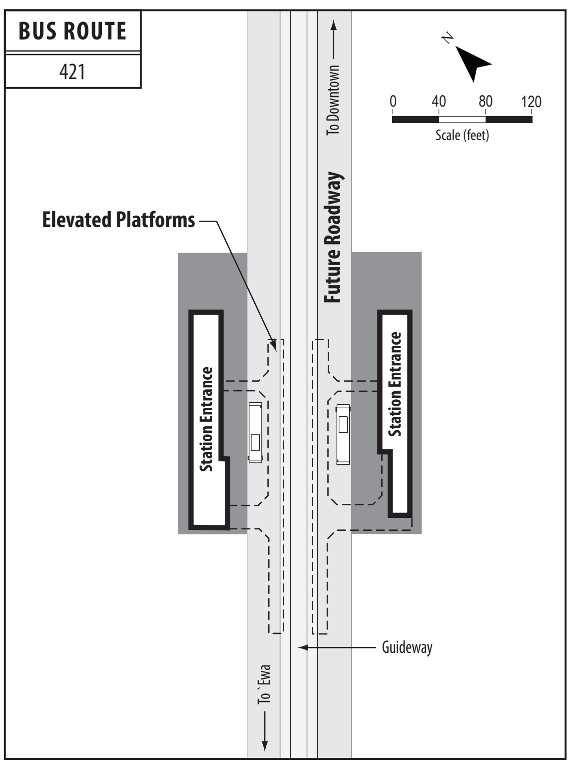


Figure 2-19 Ho`opili Station

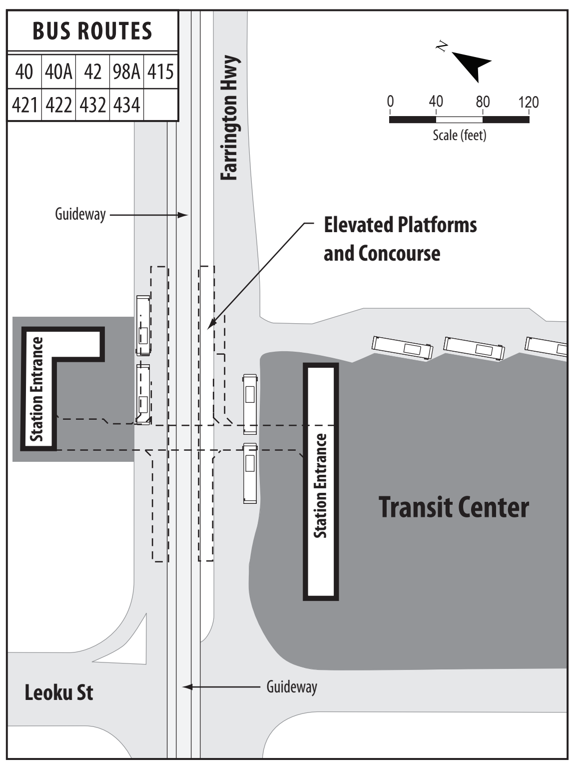


Figure 2-20 West Loch Station

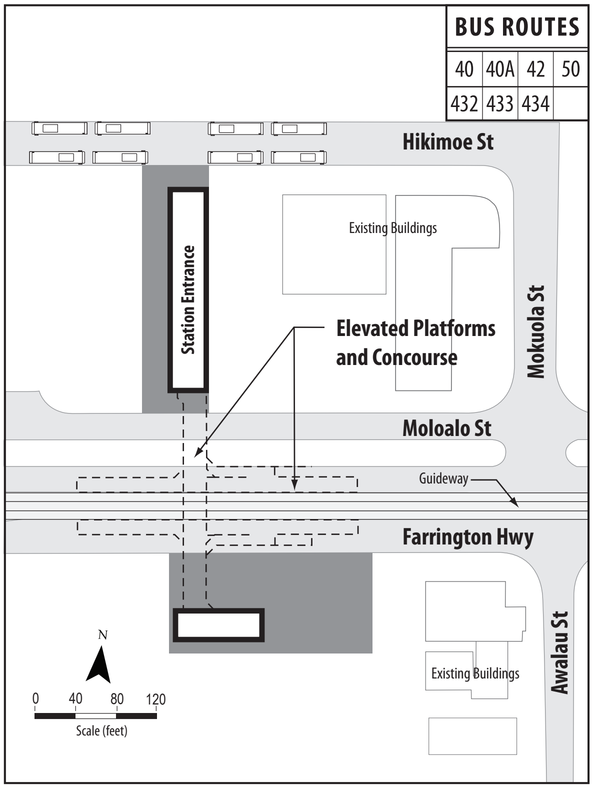


Figure 2-21 Waipahu Transit Center Station

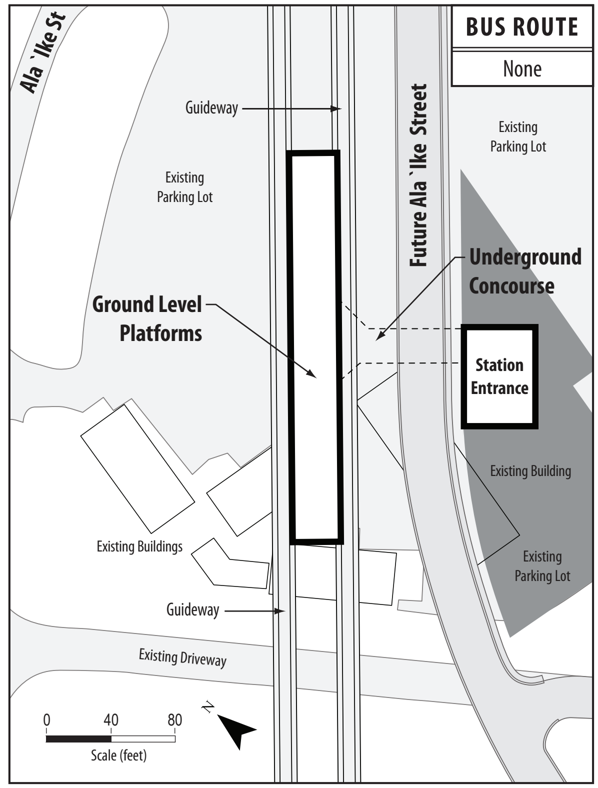


Figure 2-22 Leeward Community College Station

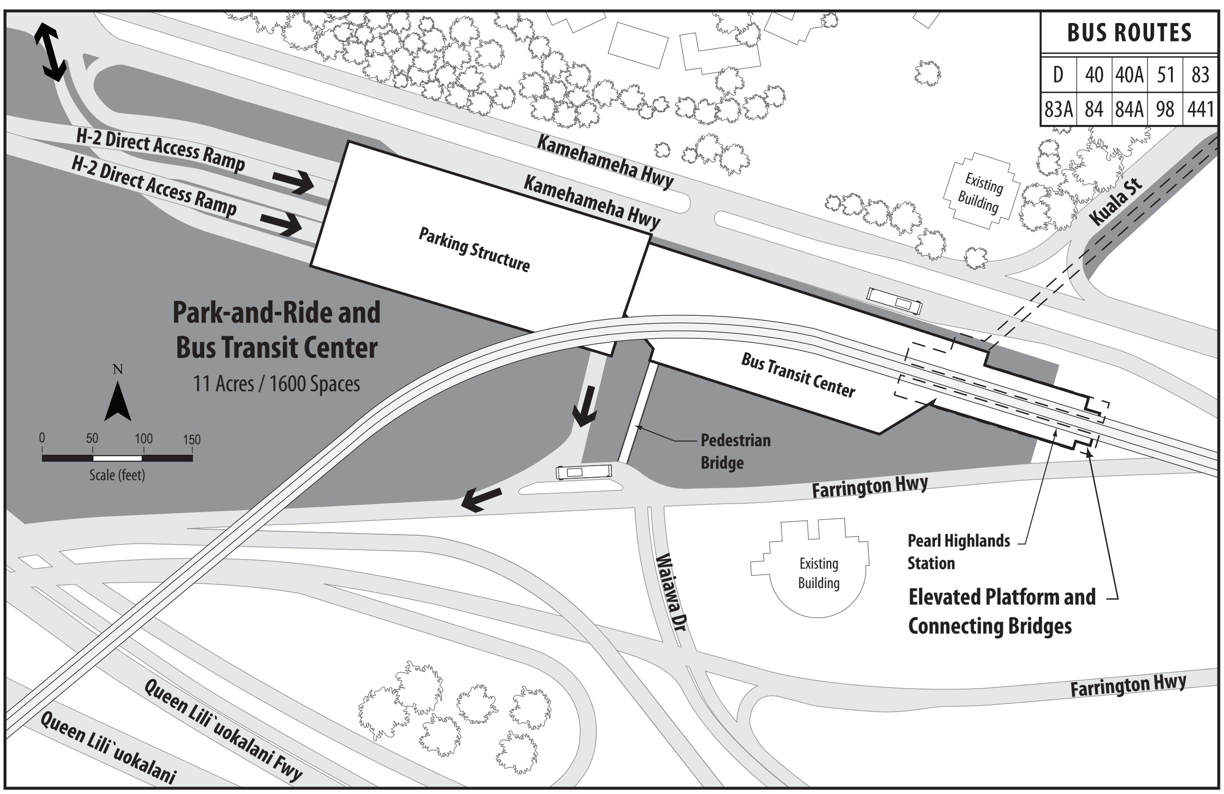


Figure 2-23 Pearl Highlands Station

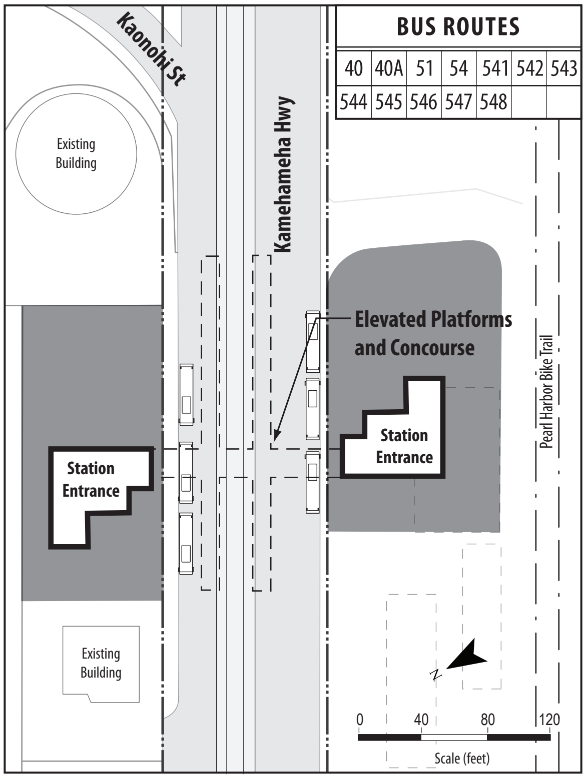


Figure 2-24 Pearlridge Station

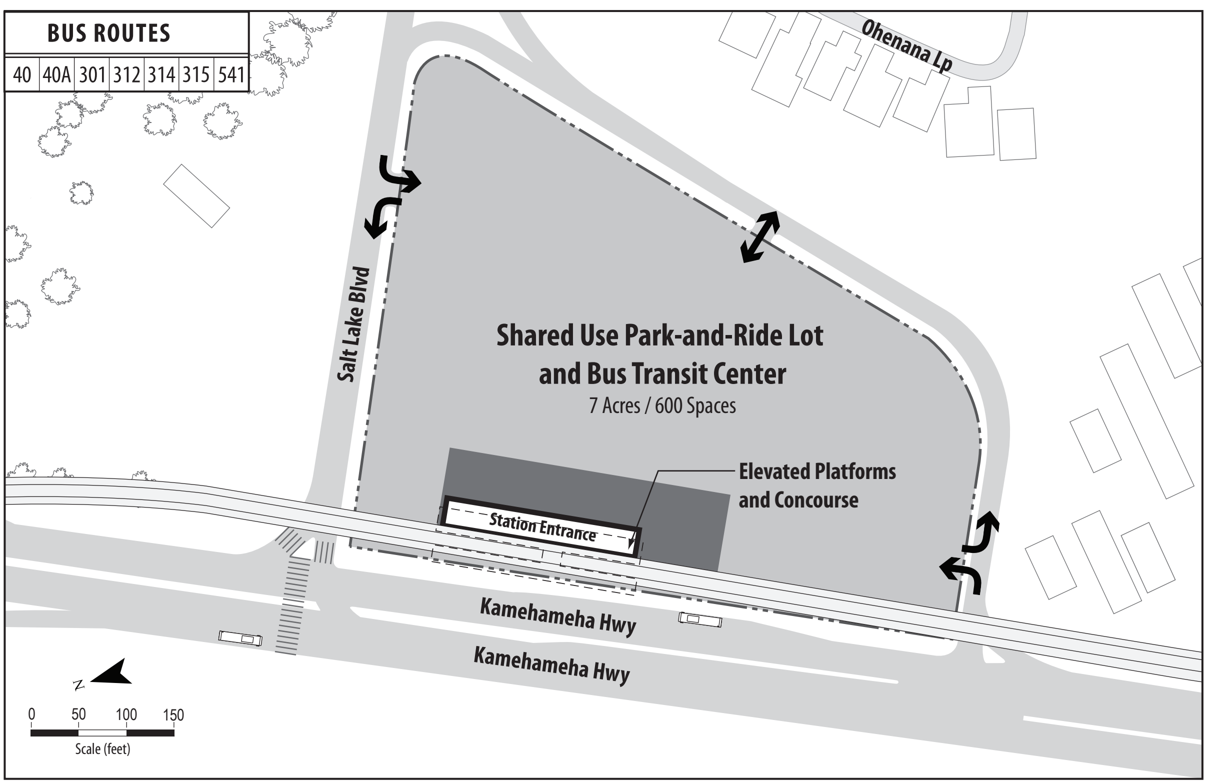


Figure 2-25 Aloha Stadium Station

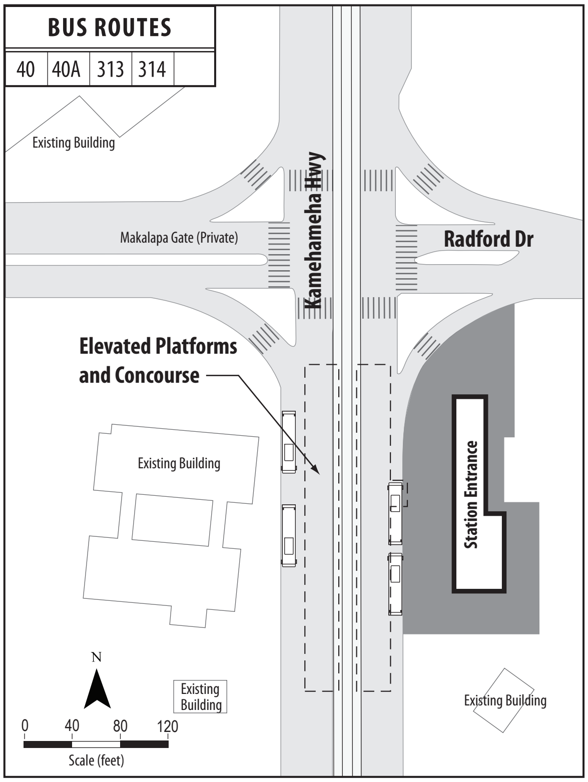


Figure 2-26 Pearl Harbor Naval Base Station

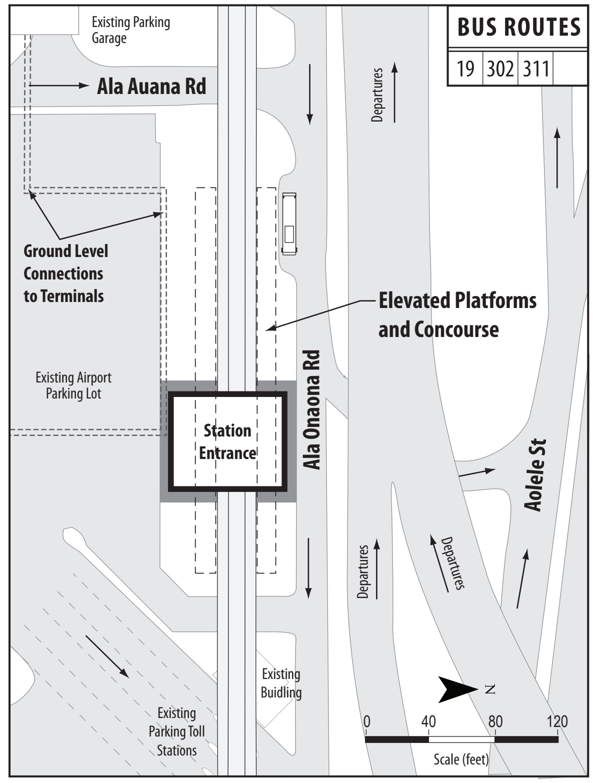


Figure 2-27 Honolulu International Airport Station

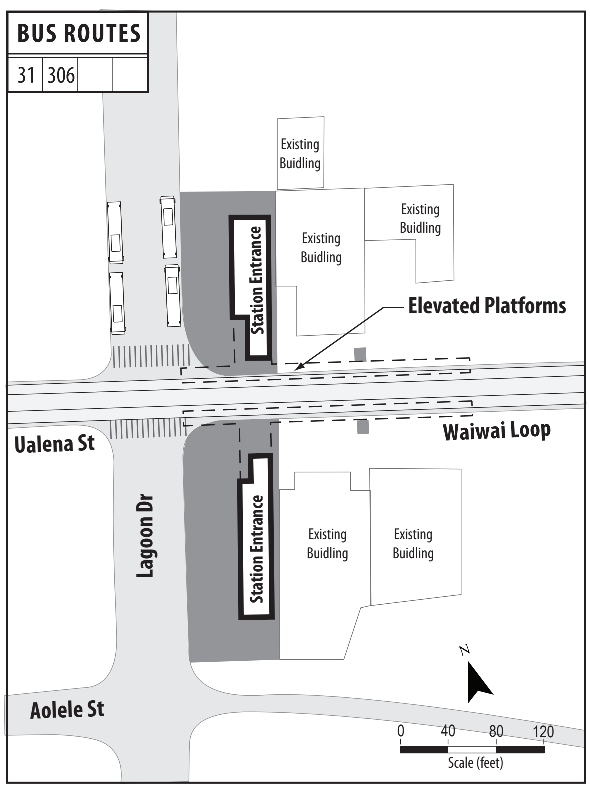


Figure 2-28 Lagoon Drive Station

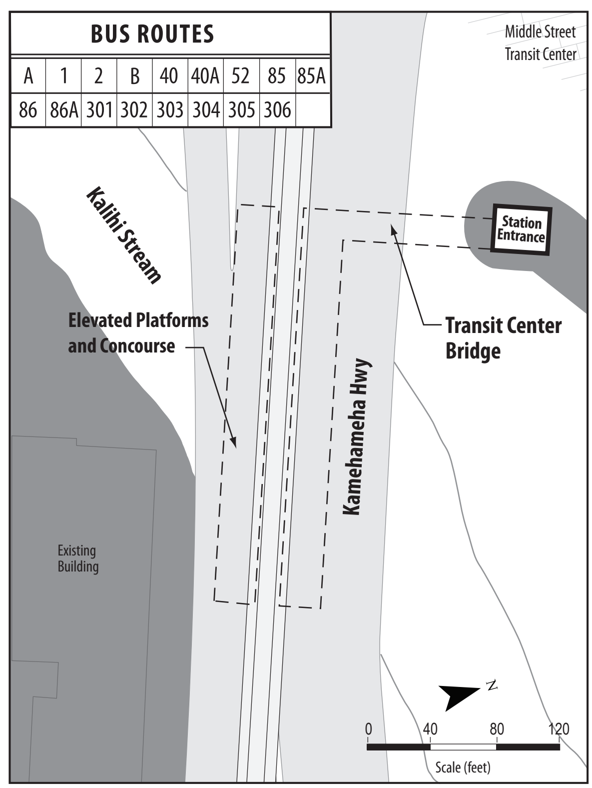


Figure 2-29 Middle Street Transit Center Station

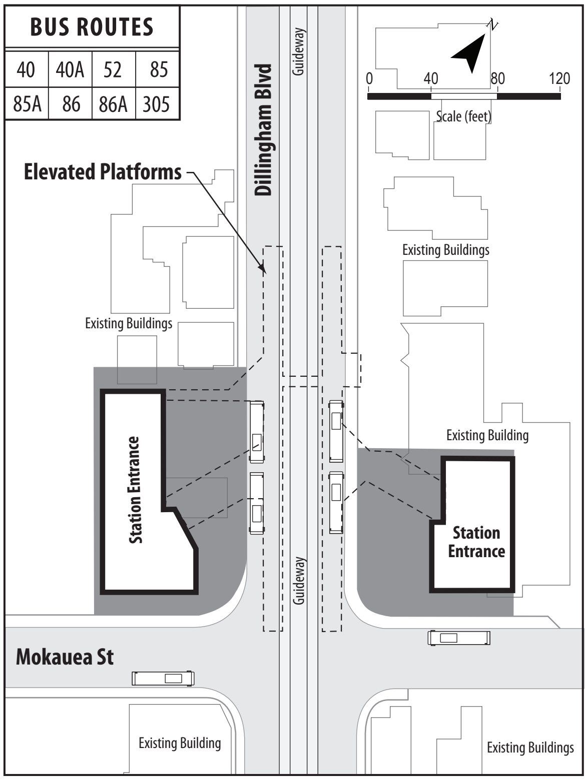


Figure 2-30 Kalihi Station

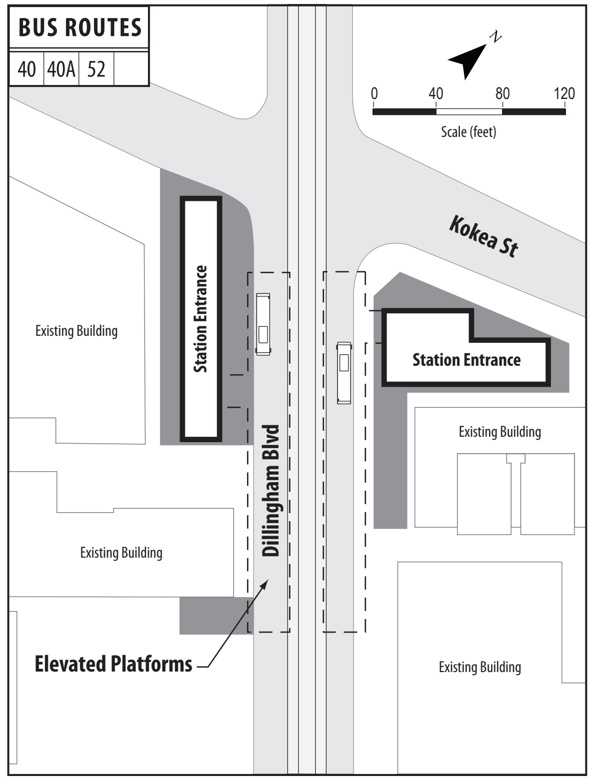


Figure 2-31 Kapālama Station

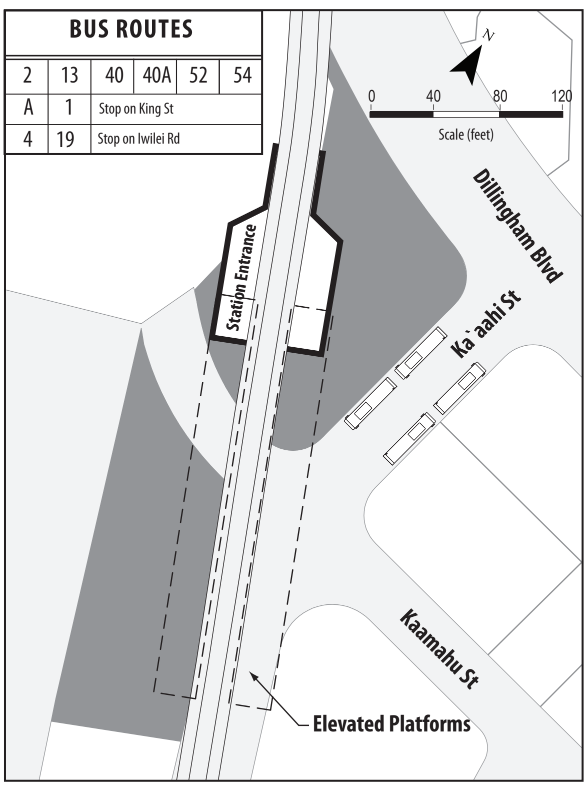


Figure 2-32 Iwilei Station

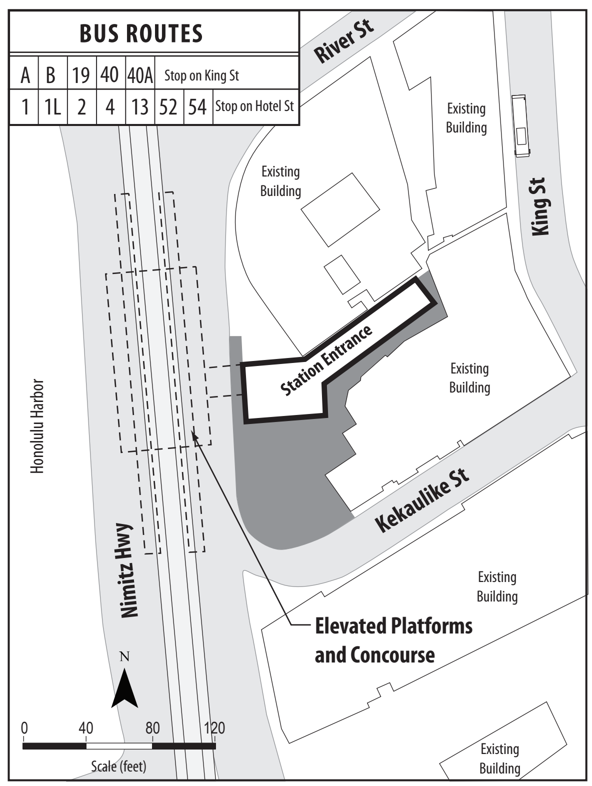


Figure 2-33 Chinatown Station

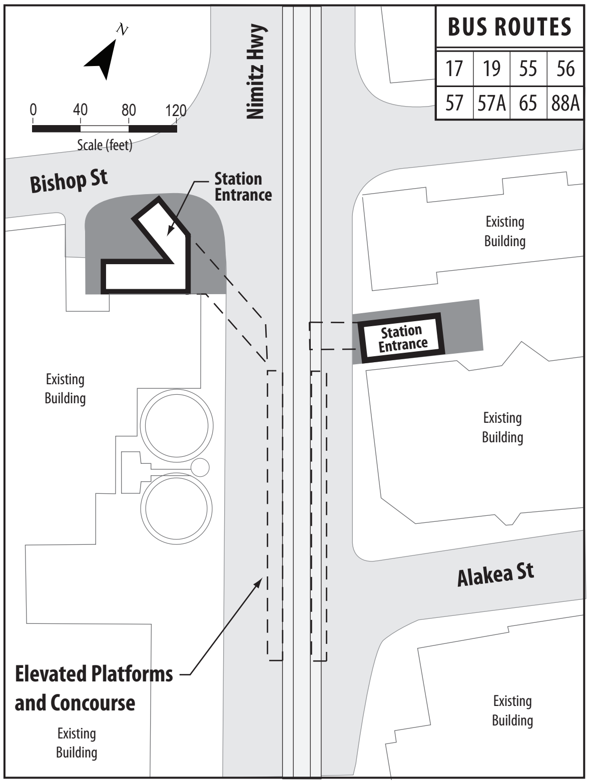


Figure 2-34 Downtown Station

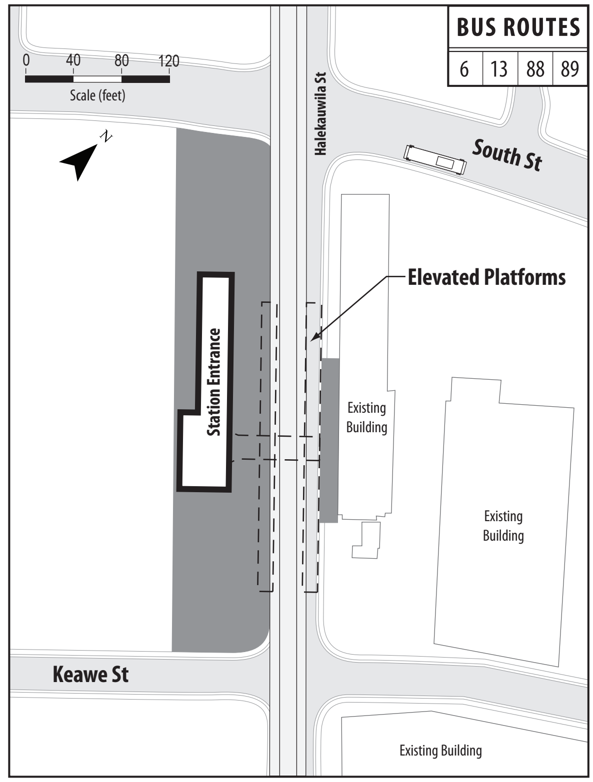


Figure 2-35 Civic Center Station

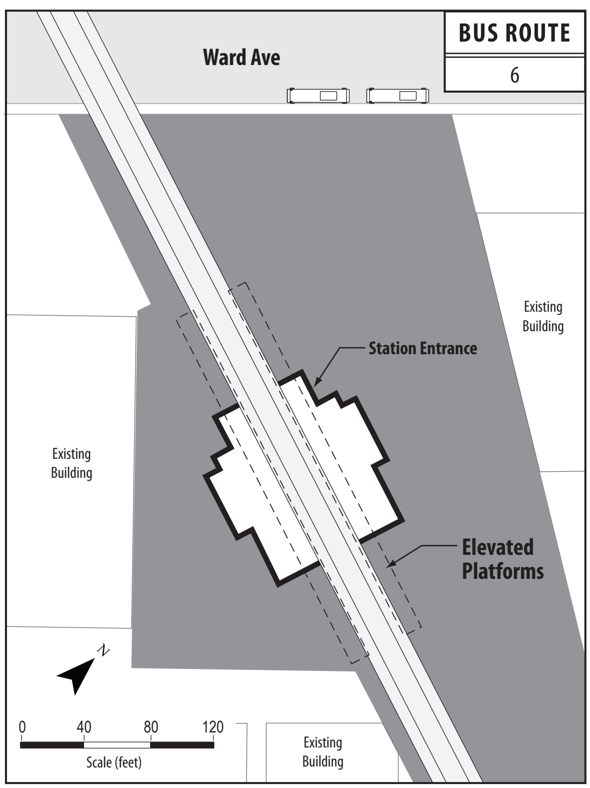


Figure 2-36 Kaka`ako Station

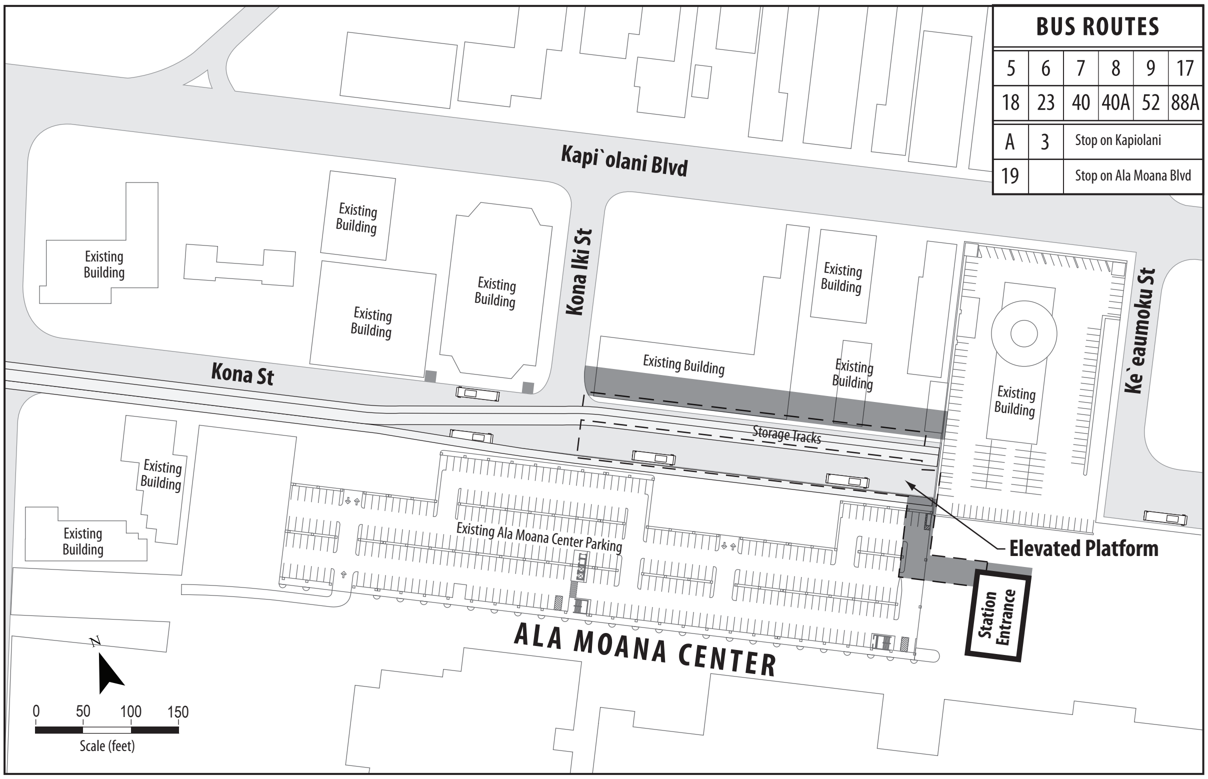


Figure 2-37 Ala Moana Center Station

flow), natural territorial reinforcement (delineating private space so "intruders" are more easily identified), and maintenance. Applying the design principles reduces crime and fear by reducing criminal opportunity and fostering positive social interaction among legitimate users of a building or space.

Operation in exclusive right-of-way eliminates the potential for accidents between automobiles and fixed-guideway transit vehicles. Because pedestrians will not be allowed to cross the tracks, the potential for pedestrian accidents is virtually eliminated. Platform edges will be delineated with high-contrast visual and textured markings. All stations, park-and-ride facilities, and vehicles will include security cameras that are monitored at all times of operation, audible and visual messaging systems, and an intercom link to the system operations center. Security personnel will also patrol the system. Interior and safety lighting will be provided at all stations and park-and-ride facilities.

A project-specific Safety and Security Management Plan has been developed in accordance with FTA requirements to define the safety and security activities and methods for identifying, evaluating, and resolving potential safety hazards and security vulnerabilities of these systems. It establishes responsibility and accountability for safety and security during the Preliminary Engineering, Final Design, construction, testing, and start-up phases of the Project. The Honolulu Police Department, the Honolulu Fire Department, the Department of Emergency Management, and the Honolulu Emergency Services Department have been involved in preparing and implementing the plan. The plan addresses public safety and security concerns, including threats and hazards associated with the Project, specific issues that were identified through community outreach efforts, and design and architectural details to enhance safety.

A Threat and Vulnerability Analysis has been prepared to identify security weaknesses created at potentially sensitive locations by the Project, such as near the Federal Courthouse on Halekauwila Street. A risk-level criticality matrix evaluated the severity of threats and the likelihood of occurrence to determine possible consequences. The consequences were assessed in terms of severity and probability for each threat. Security measures were developed to address any threats with high vulnerabilities.

The Transportation Safety Administration and airport security indicated in meetings that because the Project will be entirely located outside of the airport's secured areas, neither organization has security concerns about the Project.

2.5.5 Pedestrian and Bicycle Access

Stations will be designed to encourage and accommodate pedestrian and bicycle access. In addition to providing bicycle racks or lockers, non-motorized access will be supported by features included in the Design Criteria that guide the Preliminary Engineering and Final Design of the Project. The Design Criteria provide specific direction for pedestrian and bicycle access features at stations. For example, the criteria state that adequate pedestrian circulation routes shall be provided with an emphasis on avoiding pedestrian and vehicular conflicts and enabling good visibility to each station entrance. This emphasis will be complemented by distinct and clear graphic signage. For bicycle access, the criteria include language stating that racks shall be placed at the station plaza near the station entrance where public visual surveillance is possible and/or where closed circuit television monitoring is present. Bicycles will be allowed on trains in accordance with a system-wide policy that is compatible with ridership levels.

2.5.6 Bus System

Bus fleet requirements are shown in Table 2-5. Bus service will be enhanced and the bus network will be modified to coordinate with the fixed guideway system. Some existing bus routes, including peak-period express buses, will be altered or eliminated to reduce duplication of services provided by the fixed guideway system. Buses removed from service in the study corridor will be shifted to service in other parts of Oʻahu, resulting in improved transit service islandwide. Certain local routes will be rerouted or reclassified as feeder buses to provide frequent and reliable connections to the nearest fixed guideway station. Bus routes accessing the fixed guideway stations are shown in Figures 2-17 through 2-37.

Transit centers would be constructed as stand-alone facilities or as part of park-and-ride lots at the following locations:

- UH West O`ahu
- West Loch
- Pearl Highlands
- Aloha Stadium

Most fixed guideway stations will offer connections to local bus routes. In some cases, an off-street transit center either already exists or will be built to accommodate transfers. In other cases, an on-street bus stop with dedicated curb space or a pullout will be located adjacent to the fixed guideway station. Paratransit vehicles (The Handi-Van) will be accommodated at all stations and, in some cases, space for private tour buses, taxis, and/or special shuttles also will be included. Dedicated kiss-and-ride pullouts (passenger drop off) or parking spaces will be provided at many stations to facilitate drop-off and pick-up.

Transit centers are facilities that accommodate transfers between fixed guideway, bus, bicycle, and walking. Park-and-ride and kiss-and-ride access and passenger amenities (covered waiting areas, benches, and transit information) are also available at some transit centers.

2.5.7 Park-and-Ride Facilities

Park-and-ride facilities will be constructed at stations with the highest demand for drive-to-transit access (Table 2-8). With the exception of Pearl Highlands, which will be a parking structure, all park-and-ride lots are expected to be constructed as surface parking. Park-and-ride capacity may be built in phases as demand develops. The proposed size, location, and access for each proposed facility is shown in the Figures for the associated fixed guideway stations (Figures 2-17, 2-18, 2-23, and 2-25).

Table 2-8 Locations and Capacity of Park-and-Ride Facilities

Park-and-Ride Location	Size	Capacity
East Kapolei (temporary)	12 acres	900 spaces
UH West O`ahu	10 acres	1,000 spaces
Pearl Highlands	11 acres	1,600 spaces
Aloha Stadium	7 acres	600 spaces

2.5.8 Vehicle Maintenance and Storage Facility

The Project will include a vehicle maintenance and storage facility to maintain and store up to 150 vehicles. Maintenance operations will occur over the 24-hour day in three shifts. A 44-acre vacant site near Leeward Community College (Figure 2-38) is the preferred location for the maintenance and storage facility, which will allow for more efficient system operation because it is more centrally located and vehicles could enter and exit the fixed guideway in either direction. The facility will be located at-grade in a fenced area. A second site option, a 41-acre area currently in agricultural use adjacent to an electrical substation in Ho'opili (Figure 2-39), would be used if the site near Leeward Community College does not become available. Only one maintenance and storage facility site will be selected. Either site will include four buildings, maintenance facilities, a vehicle wash area, storage track, a system control center, and employee parking. The buildings will have a combined size of approximately 130,000 square feet. The buildings on the maintenance and storage

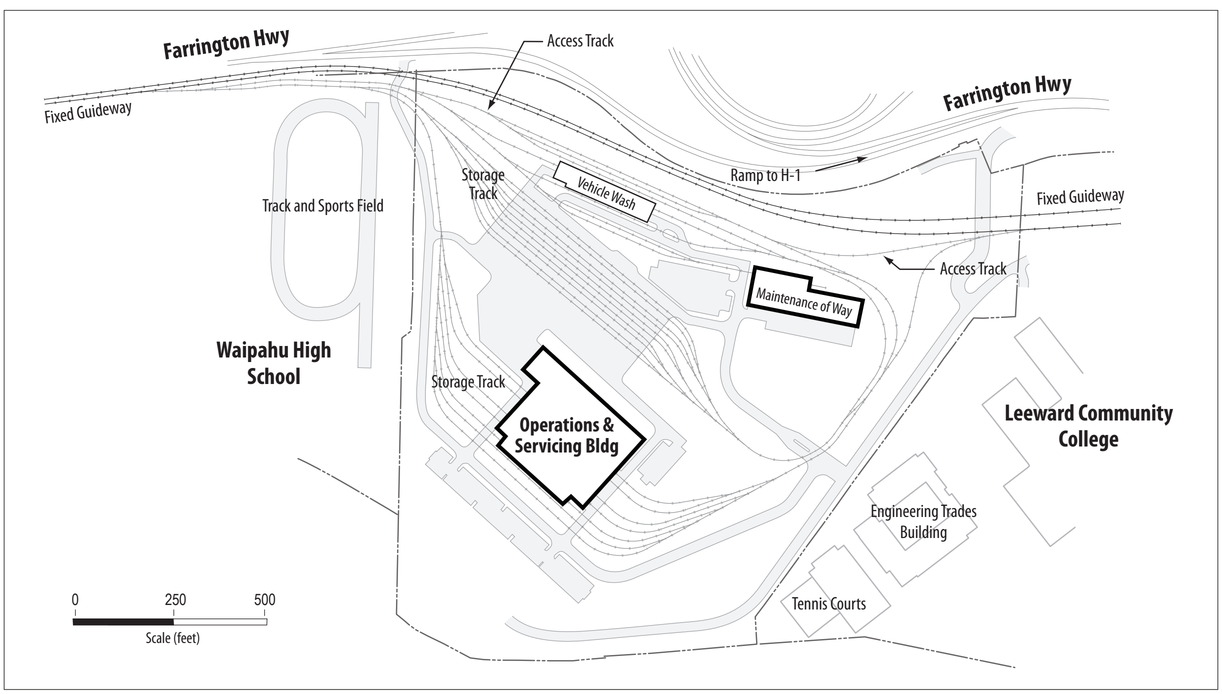


Figure 2-38 Leeward Community College Maintenance and Storage Facility Location and Conceptual Layout

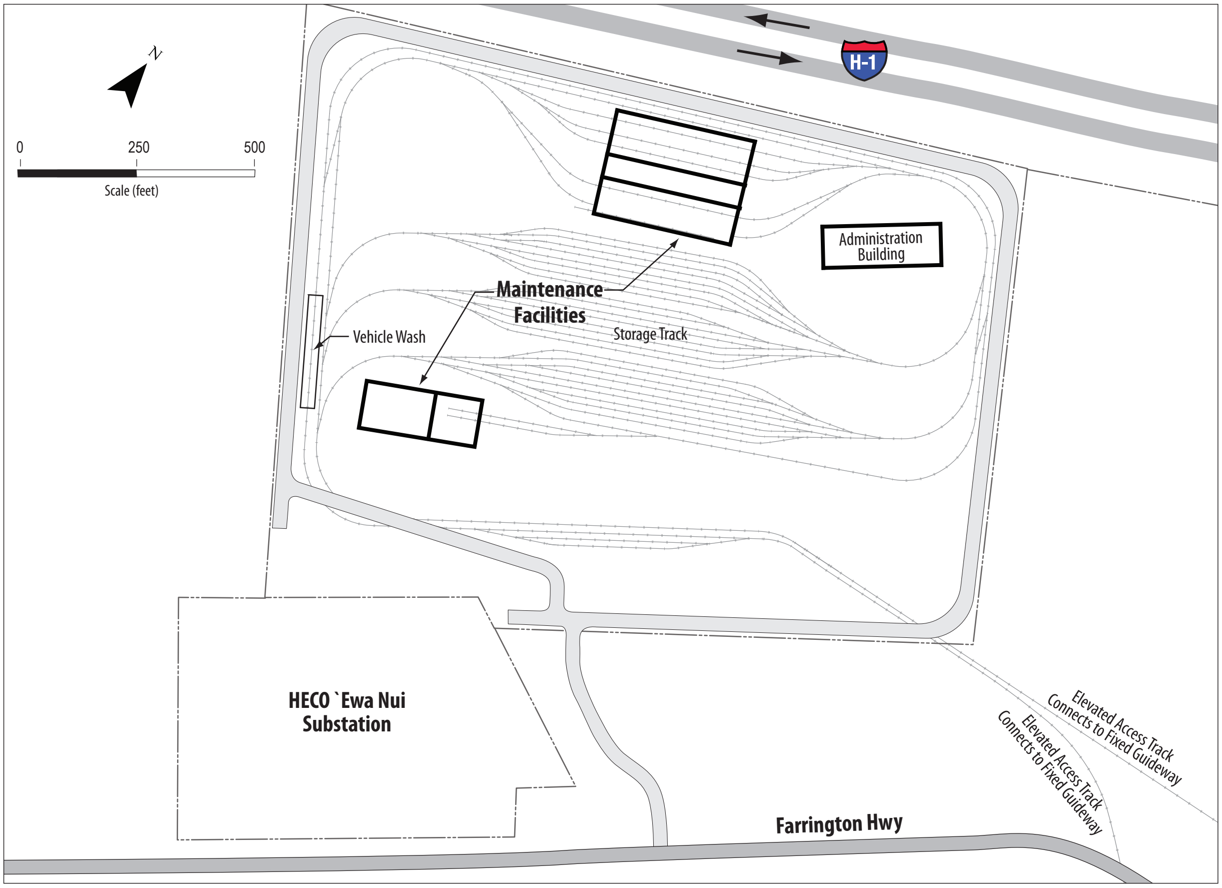


Figure 2-39 Maintenance and Storage Facility in Ho`opili Location and Conceptual Layout

facility site will be designed to meet Leadership in Energy and Environmental Design (LEED) silver certification requirements. Roadways and parking will require approximately 300,000 square feet of new paved area.

2.5.9 Traction Power Substations

The Project will require traction power substations approximately every mile to provide vehicle propulsion and auxiliary power. The planned locations are shown in Figures 2-8 through 2-11. Each substation will require an approximately 3,200-square-foot area to access and maintain an approximately 40-foot-long, 16-foot-wide, and 12-foot-high painted steel enclosure that houses transformers, rectifiers, batteries, and ventilation equipment (Figure 2-40). It will be connected to the existing power grid. As design progresses, some of the identified sites may not require all of the equipment included in a complete substation; therefore, some may be smaller than described. Many substations will be incorporated into fixed guideway stations. At other locations, the substations may be enclosed within a fence. Landscaping will be installed around substations.

Figure 2-40 Example of a Traction Power Substation

2.5.10 Project Phasing

The Locally Preferred Alternative adopted by the City Council identified a fixed guideway transit system between Kapolei and UH Mānoa with a branch line to Waikīkī. The Project described in this Final EIS will implement 20 miles of the overall 34-mile Locally Preferred Alternative. The Project will begin in East Kapolei near the planned UH West Oʻahu campus and extend to Ala Moana Center. This is the portion of the Locally Preferred Alternative that can be constructed with anticipated funding. The remainder of the Locally Preferred Alternative, referred to in this Final EIS as "planned extensions," would be evaluated through a separate NEPA and HRS Chapter 343 process and designed and constructed once additional funding is secured.

The Project will connect multiple activity centers, provide cost-effective transit-user benefits, and meet the Purpose and Need whether or not the planned extensions are built. Construction of the Project will not preclude future development of the planned extensions.

Because of its length, the Project will be constructed in phases to accomplish the following:

- Match the anticipated schedule for right-of-way acquisition and utility relocations
- Reduce the time that each area will experience traffic and community disruptions
- Allow for multiple construction contracts with smaller contract size to promote more competitive bidding
- Match the rate of construction to what can be maintained with local workforce and resources
- Balance expenditure of funds to minimize borrowing

The Project is proposed to be constructed in the following four phases (Figure 2-41):

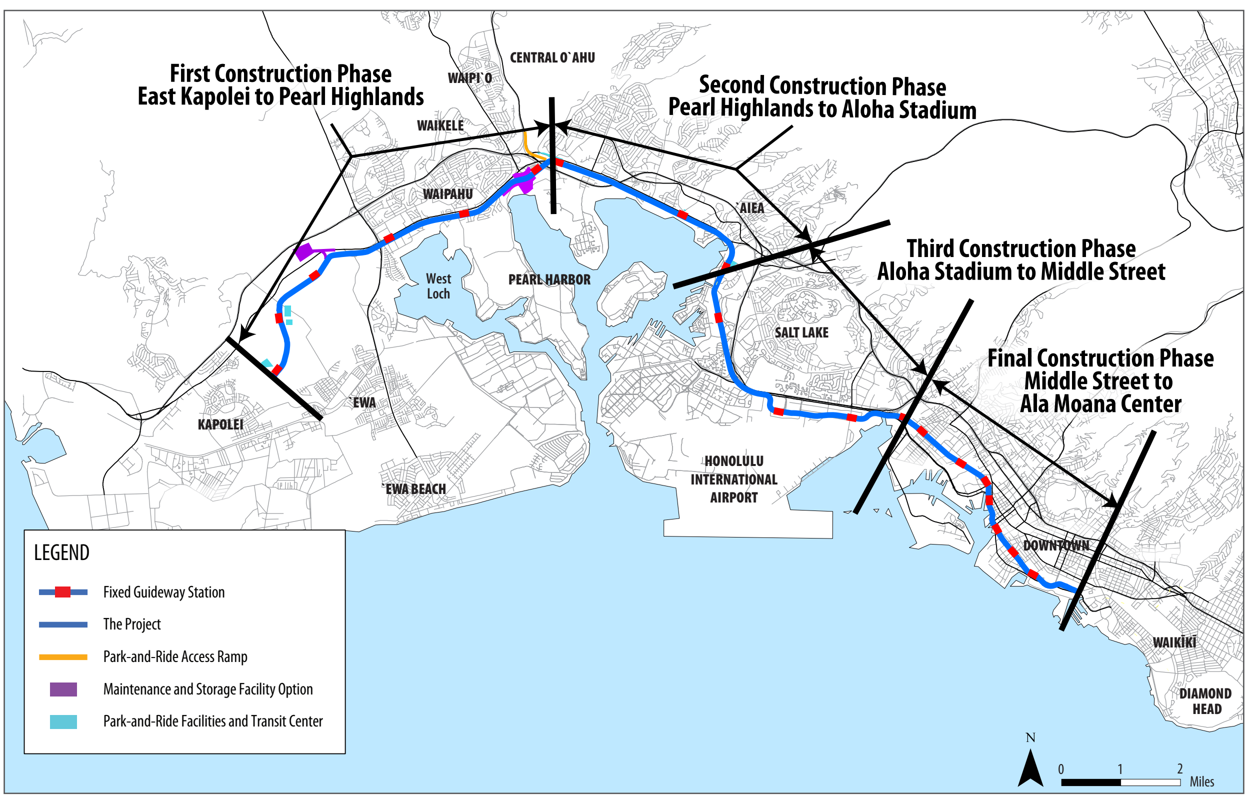


Figure 2-41 Project Construction Phases

- East Kapolei to Pearl Highlands
- Pearl Highlands to Aloha Stadium
- Aloha Stadium to Middle Street
- Middle Street to Ala Moana Center

The method of contracting the individual construction contracts will vary for the various phases of construction. The first and second construction phases will use design-build contracts where both design and construction are included in a single contract package. Later phases may use this method or the design and construction may be completed under separate contracts. The contract method will not change the effects of the Project as described in this Final EIS.

As portions of the Project are completed, they will be opened for revenue service so that system benefits, even if limited during the initial phases, will be realized prior to completion of construction of the entire Project. The temporary effects associated with the interim operations are discussed in Sections 3.5, Construction-related Effects on Transportation, and 4.18, Construction Phase Effects, of this Final EIS. The Project's cash flow analysis, which is presented in Section 6.5, Cash Flow Analysis, anticipates the use of Local funds for the first construction phase and a combination of Local and Federal funds for the remaining phases.

Construction Schedule

Construction is currently planned to be completed in four overlapping phases of work. Construction activities will be similar for each phase and are described in Appendix E, Construction Approach. The first phase will include construction of the vehicle maintenance and storage facility and a portion of the Project between the Wai‘anae end of the Project and Pearl Highlands. The limits of the first phase have been selected so that the fixed guideway could connect to either maintenance and storage facility site option. This is because system testing and operation could not be completed without access to a maintenance and storage facility. Selection of the vehicle maintenance and storage facility near Leeward Community College would allow construction phasing in either the ‘Ewa or Koko Head direction from that site. Because right-of-way is anticipated to be available ‘Ewa of Leeward Community College before it is available in the Koko Head direction, constructing Koko Head from that location would delay the start of construction and affect project cash flow. Station areas, park-and-ride lots, and the maintenance and storage facility site will function as construction staging areas for the first construction phase. The vehicle maintenance and storage facility near Leeward Community College is the preferred location; however, the Ho‘opili site remains an option.

The remainder of the Project likely will be built in three overlapping phases continuing Koko Head from Pearl Highlands—first to Aloha Stadium, then to Middle Street, and finally to Ala Moana Center. Construction staging areas for future phases beyond station areas, park-and-ride lots, and the maintenance and storage facility site will be identified and developed by the contractors and approved by the City. Variations to the schedule will continue to be evaluated during Preliminary Engineering. Preliminary Engineering for the Project is under way, and work on the first construction phase will begin in 2010 (Figure 2-42). Construction of the entire Project is planned to be completed in 2018, and the entire system is planned to open for revenue service in 2019.

Planned Extensions

In addition to the Project, the Locally Preferred Alternative includes four planned extensions connecting the Project to the following areas:

- West Kapolei
- UH Mānoa
- Waikīkī
- Salt Lake

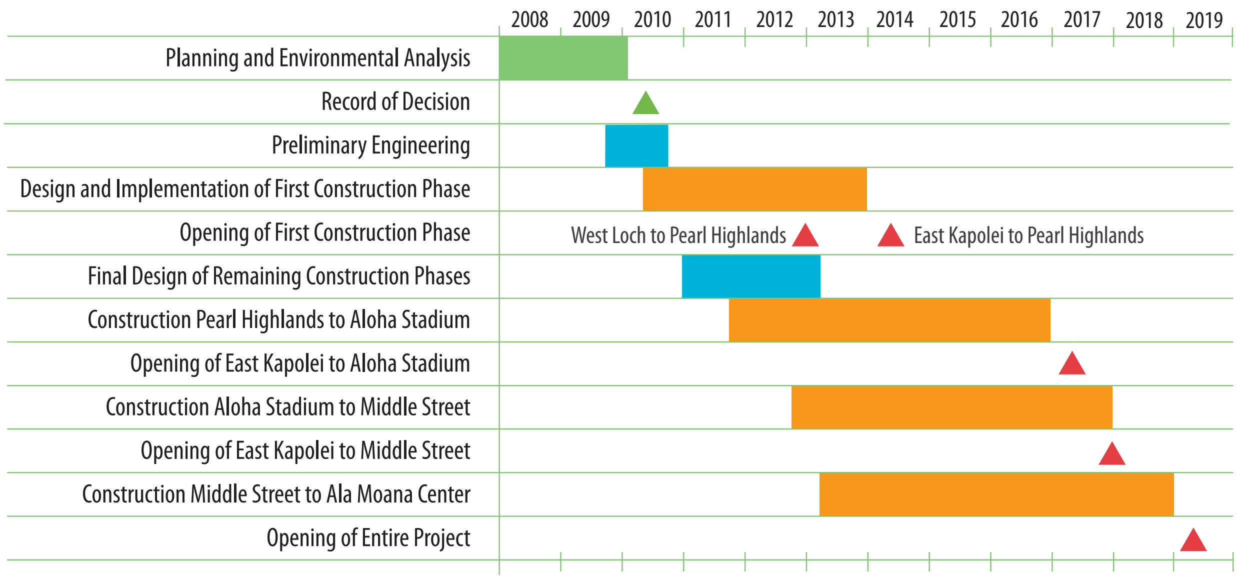


Figure 2-42 Project Schedule

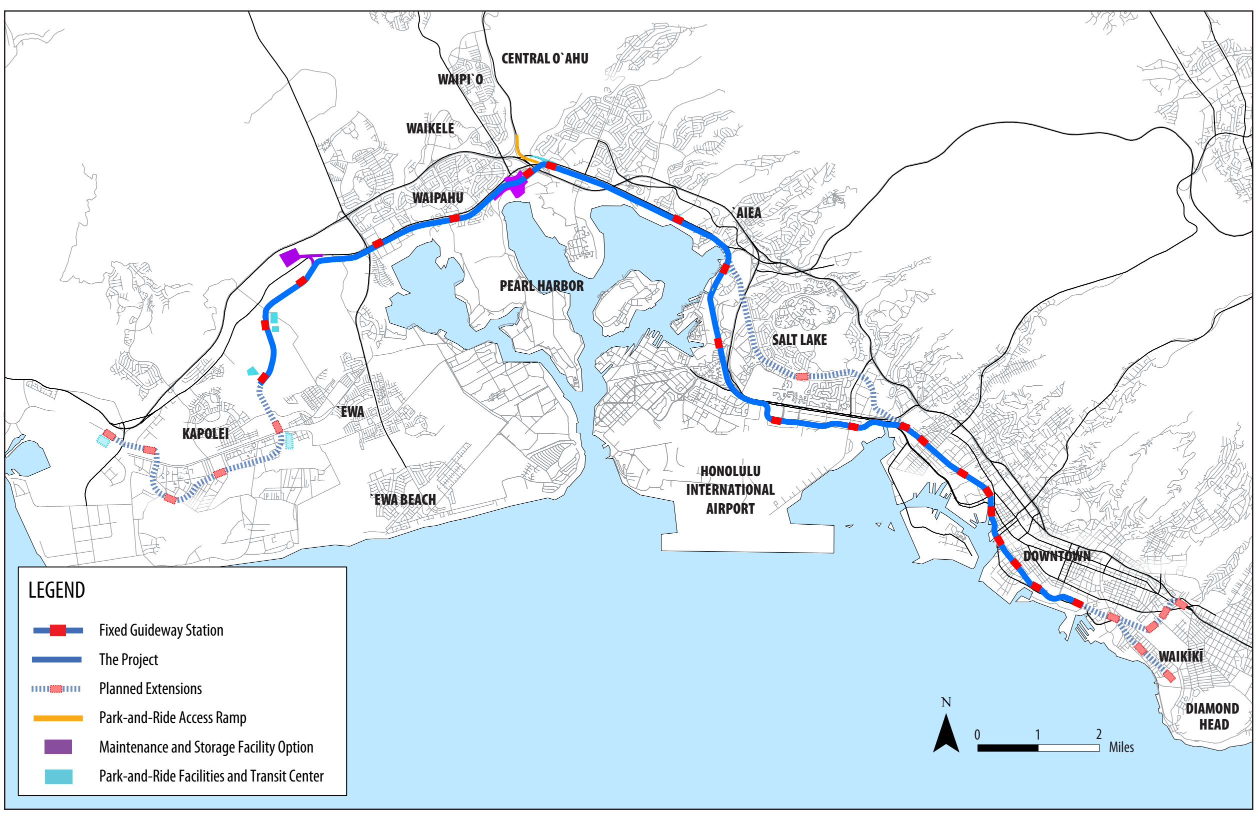


Figure 2-43 Planned Extensions

The planned extensions are included as illustrative projects in the ORTP (OʻahuMPO 2007) and are anticipated by DTS to be completed at some time in the future prior to 2030 as separate projects that would receive separate detailed environmental review. The extensions include approximately 14 additional miles of guideway and 12 additional stations (Figure 2-43).

The West Kapolei extension would begin at the Waiʻanae end of the corridor and is anticipated to follow Kapolei Parkway to Wākea Street and then turn makai to Saratoga Avenue. Proposed station locations and other project features in this area are shown in Figure 2-43. The guideway would continue on planned extensions of Saratoga Avenue and North-South Road and connect to the Waiʻanae end of the current Project.

The UH Mānoa and Waikīkī extensions would connect to the Project at Ala Moana Center. A third track would be constructed from ʻEwa of Piʻikoi Street that would climb above the parking garage for the shopping center. An additional station platform serving passengers continuing toward UH Mānoa and Waikīkī would be constructed along the higher track. The lower platforms that are being constructed as part of the current Project would continue to serve transit service terminating at Ala Moana Center.

The UH Mānoa extension would connect to the current Project at Ala Moana Center and then veer mauka to follow Kapiʻolani Boulevard to University Avenue. It would then turn mauka to follow University Avenue over the H-1 Freeway to a proposed terminal facility on UH Mānoa's Lower Campus (Figure 2-43).

The Waikīkī extension would follow Kalākaua Avenue to Kūhiō Avenue and end near Oʻahu Avenue (Figure 2-43). The Ala Moana Center Station and a future planned station at the Convention Center would be transfer points between the UH Mānoa and Waikīkī branch lines.

The Salt Lake extension would connect to the Project at Aloha Stadium and continue Koko Head along Salt Lake Boulevard. It would follow Pūkōloa Street through Māpunapuna before crossing and following Moanalua Stream to cross over the H-1 Freeway and continue to the Middle Street Transit Center where it would connect back to the Project.

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03

CHAPTER

Transportation

This chapter discusses existing and future 2030 transportation system conditions, service characteristics, performance, and transportation-related effects for the Project. Transportation effects include project benefits as well as impacts on traffic (e.g., automobiles and trucks), parking, pedestrians, and bicycles. The analysis includes station area and system-level transportation-related effects for the Project and makes comparisons to the No Build Alternative for the planning horizon year 2030.

The analysis is organized into four main sections:

- Existing (2007) conditions and performance
- Future (2030) Project conditions and performance, with comparisons made to the 2030 No Build Alternative conditions (including transit-user benefits and mitigation measures)
- Construction-related effects, including the effects of construction phasing
- Indirect and cumulative transportation system effects, including the effects of planned project extensions

The following transportation-related effects are addressed:

- Transit service, including changes in transit travel times
- Transit ridership, including changes in the transit share of total travel
- Bus, pedestrian, and bicycle access in station areas
- Traffic (direct effects from the placement of support columns, station locations, etc.)
- Traffic on adjacent parallel or intersecting roadways
- Traffic related to park-and-rides, kiss-and-rides (passenger drop off), local bus access, and a fixed guideway maintenance and storage facility
- Parking, including the loss of on- and off-street parking, potential spillover parking on neighborhood streets near project transit stations, and loading zones
- Honolulu International Airport
- Construction-related effects on traffic, transit, parking, and bicycle and pedestrian facilities

The transportation effects and proposed mitigation measures to avoid, minimize, and reduce the impacts that are detailed in this chapter are summarized in Table 3-1.

For additional information and references, including more details about the planned extensions to West Kapolei, Salt Lake Boulevard, UH Mānoa, and Waikīkī, see the *Honolulu High-Capacity Transit Corridor Project Transportation Technical Report* (RTD 2008a), *Addendum 02 to the Transportation Technical Report* (RTD 2009i) *and Addendum 03 to the Transportation Technical Report (RTD 2010a).*

Table 3-1 Summary of Transportation Effects and Mitigation (continued on next page)

Transit, Section 3.4.2 (Effects on Transit)	
Project effects	• Transit travel times on the fixed guideway will be reliable and consistent regardless of traffic congestion on streets. • Higher transit speeds will reduce overall transit travel times and improve operating efficiency for transit riders. • Transit travel times will improve between major employment centers, such as Downtown, and emerging population and employment centers in West O`ahu. For example, the travel time, including access to station and waiting time for rail, between Kapolei and Downtown Honolulu will be 55 minutes with the Project as compared to 90 minutes without the Project. This shorter travel time with the Project will occur regardless of traffic conditions. • Transit equity will improve since travel times will be reduced between areas with high concentrations of transit-dependent households and major employment areas. • Transit will carry a greater share of total travel, particularly for work-related trips during peak hours. For example, between Waipahu and Waikīkī, the transit share of work-related travel in the a.m. peak will be 36 percent versus 8 percent without the Project. • Daily transit ridership (as measured by total transit boardings) will grow by 44 percent over No Build conditions. • Comfort and convenience will be enhanced through a smooth ride and frequent service available 20 hours a day. • Transit user benefits will increase compared to No Build conditions. • Overall transit service mobility, reliability, equity, and access to both existing and new developments will improve.
Mitigation measures	• The Project is not expected to result in long-term adverse effects on the transit system. No mitigation measures are planned.
Traffic, Section 3.4.3 (Effects on Streets and Highways)	
Project effects	• Vehicle miles traveled, vehicle hours traveled, and vehicle hours of delay will all decline compared to No Build conditions. • Traffic congestion (as measured by vehicle hours of delay) will decrease 18 percent with the Project compared to No Build conditions. • Guideway support columns and station placement will reduce lane widths in some locations (while still maintaining AASHTO standards); however, no travel lanes will be removed. • Additional traffic from park-and-ride and kiss-and-ride facilities and feeder buses will affect one intersection near East Kapolei Station (temporary park-and-ride), one intersection near UH West O`ahu Station, three intersections near Pearl Highlands Station, and one intersection near Ala Moana Center Station. • Support columns have been located to minimize effects to freight movement. Access to all businesses will be maintained, and reduced roadway congestion resulting from the Project will generally have a positive effect on freight movement. • Traffic from the Pearl Highlands Station will not have a substantial effect on the H-1 or H-2 Freeway segments in the area. Additional traffic from the Pearl Highlands Station will affect the on-ramp to H-2 from Kamehameha Highway.
Mitigation measures	• At the six intersections affected by the Project, the City will widen roads to provide additional travel and turn lanes and install traffic signals. • To minimize the effect on traffic and ensure safety during major events at Aloha Stadium, the City will coordinate with the Stadium Authority to provide staff and/or resources as needed to help manage the flow of pedestrians walking between Aloha Stadium and the station entrance. • The City will restripe the section of the H-2 Freeway near the Kamehameha Highway ramp merge area.

Table 3-1 Summary of Transportation Effects and Mitigation (continued from previous page)

Parking, Section 3.4.4 (Effects on Parking)	
Project effects	• The placement of fixed guideway columns and stations will require removal of approximately 175 on-street and 690 off-street parking spaces. • Four park-and-ride facilities will provide 4,100 parking spaces for commuters using the rail system. • Demand for parking near stations without park-and-ride facilities could generate spillover parking. • Private, off-street parking spaces will be acquired, consistent with the requirements of the *Uniform Relocation Assistance and Real Property Acquisition Policies Act,* as part of additional right-of-way needed to construct the guideway or stations.
Mitigation measures	• Some new on-street parking spaces will be created by the Project as streets are rebuilt after project construction. • Freight and passenger loading zones removed by the Project will be replaced in the same general location after construction is complete. • The City will conduct surveys to determine the extent of spillover parking near stations and implement mitigation strategies as needed. Potential strategies include parking restrictions and shared-parking arrangements.
Bicycle and Pedestrian Facilities, Section 3.4.5 (Effects on Bicycle and Pedestrian Facilities)	
Project effects	• Bicycle facilities will not be removed as a result of the Project. Some existing facilities will be narrowed to accommodate column placement and station location. • Sidewalks will not be removed as a result of the Project. In some locations, sidewalk widths will be reduced to not less than 5 feet for short lengths to accommodate the guideway.
Mitigation measures	• The Project will not result in long-term adverse effects on the bicycle and pedestrian system. No mitigation measures are planned.
Airport Facilities, Section 3.4.6 (Effects on Airport Facilities)	
Project effects	• With the addition of the Project, air passengers and employees will have another transportation option to get to and from the airport. • The project alignment avoids the central portion of the runway protection zone. • All elements of the Project will be built to be entirely below the approach surface of all runways and clear of the transitional surface.
Mitigation measures	• As the Project complies with Federal Aviation Administration regulations and will not result in long-term adverse effects on Honolulu International Airport, no mitigation measures are planned.
Construction, Section 3.5 (Construction-related Effects on Transportation)	
Project effects	• Construction activity will temporarily affect the transportation system, including traffic, parking, bus service, and bicycle and pedestrian facilities. Travel lanes will be closed temporarily for construction activities.
Mitigation measures	• A Maintenance of Traffic (MOT) Plan and a Transit Mitigation Program (TMP) will be developed by the contractor and approved by the City or Hawai`i Department of Transportation, depending on location. The MOT Plan and TMP will mitigate construction-related effects on the transportation network, including effects on roadways, transit, and bicycle and pedestrian facilities. (The City has developed detailed parameters for an acceptable MOT Plan.) • On-street parking by construction workers will not be permitted near work sites. Construction workers will not use commercial parking facilities if doing so reduces available parking for customers or employees of that business. Contractors will need approval from business owners before private lots can be used for parking.

3.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been revised to reflect identification of the Airport Alternative as the Preferred Alternative. The Project refers to the Fixed Guideway Transit Alternative via the Airport that was evaluated in the Draft Environmental Impact Statement (EIS). The alignment has been refined and now transitions to Ualena Street at an extension of Ohohia Street, which is about 2,000 feet ‘Ewa of the Lagoon Drive Station, to avoid the central portion of the runway protection zone for Runway 22L/4R at Honolulu International Airport. This design refinement has been evaluated using the same criteria and methodology as all sections in this chapter and will not create any significant adverse effects to the transportation system. Extensive coordination with FAA and HDOT has been conducted as part of this design refinement. The No Build Alternative is now presented in comparison to the Project, rather than as a separate analysis. Additionally, the modeling results presented in Sections 3.3, 3.4, and 3.6 of this chapter have been revised since the Draft EIS to reflect refinement of travel forecasting based on consultation with the Federal Transit Administration (FTA). Revisions to this chapter also reflect public comments received during the Draft EIS review period and continued agency coordination, including those relating to parking effects.

The sections in Chapter 3 have been renumbered and are summarized below using the new Final EIS section number.

A summary of the effects of the Project and mitigation measures has been added as Table 3-1 in the beginning of this chapter.

Section 3.2, Methodology, now includes additional information related to the development and review of the travel demand forecasting model and results. This section also details the uncertainty analysis that was conducted as part of the modeling process and provides additional information on Highway Capacity Manual methodology, which was applied to existing and future traffic volume forecasts.

Section 3.3, Existing Conditions, was updated based on revisions to the travel forecasting model. This section was also revised to reflect the existing transit system without TheBoat, which was discontinued in July 2009. Tables 3-9 and 3-10 have been revised to include detailed traffic information for each roadway at screenlines. These tables provide information for 2005 and the 2030 No Build Alternative and the Project. A discussion of existing airport facilities was added as Section 3.3.6.

Section 3.4, Transportation Consequences and Mitigation, includes a comparison between the Project and the No Build Alternative. Modeling results have been revised based on refinements to the travel demand model. This section also provides a comparison of user benefits from the Project compared to both the No Build Alternative and the New Starts Baseline. Tables in Sections 3.4.3, 3.4.4, and 3.4.5 relating to column placement have been revised based on further design of the Project. Section 3.4.3 was also updated based on information regarding estimated demand at park-and-ride facilities. Traffic impacts were identified at two additional intersections. Further, an additional traffic analysis was conducted that focused on effects to highways near the Pearl Highlands Station, and a discussion of effects on interstate freeways was also added to Section 3.4.3. Section 3.4.4 was updated based on an additional parking survey that was completed in April 2009 in response to public comments received on the Draft EIS. An additional parking survey was completed near the airport in June 2010 when the alignment was refined to follow a section of Ualena Street near Lagoon Drive. A discussion on loading zones was also added to this section. A discussion of effects of the Project on Honolulu International Airport was added as Section 3.4.6. Section 3.4.7 describes measures to mitigate long-term effects of the Project.

Section 3.5, Construction-related Effects on Transportation, includes additional information regarding on- and off-street parking effects and mitigation during construction. This section also includes additional mitigation measures as identified in the Maintenance of Traffic (MOT) Plan.

Section 3.6, Indirect and Cumulative Transportation System Effects, includes a discussion of indirect effects from the Project.

3.2 Methodology

This section identifies the methodology used to estimate the potential transportation-related effects of the Project.

3.2.1 Analytical Tools and Data Sources

The primary quantitative method for evaluating the alternatives is a travel demand forecasting model used by the O'ahu Metropolitan Planning Organization (O'ahuMPO) for the *O'ahu Regional Transportation Plan 2030* (ORTP) (O'ahuMPO 2007). The O'ahuMPO model is based on "best practices" for urban travel models in the U.S. and consistent with consultation with FTA. The model is updated approximately every five years to reflect changes in land use, socioeconomic conditions, and transportation network improvements. The model is approved by the O'ahuMPO Technical Advisory Committee. This modeling approach has proven effective in estimating ridership levels in other areas, such as Los Angeles County, Salt Lake City, Denver, and Phoenix, in the last 10 years.

The O`ahuMPO travel demand forecasting model was used to predict future traffic conditions and transit ridership.

The O'ahuMPO model uses the "sequential" approach to travel forecasting, in which travel is assumed to be the product of a sequence of individual decisions:

- The number of trips that a household will make—*trip generation*
- The destinations of these trips—*trip distribution*
- The form of transportation that will be used for travel—*mode choice*
- The paths on the transportation network that the trips will take—*network assignment*

The O'ahuMPO's existing model was reviewed, enhanced, recalibrated, and validated to be consistent with current FTA guidelines. For the purpose of this Project, the model was refined and augmented to better represent transit alternatives in the study corridor. An on-board transit survey was completed in early 2006, and the latest socioeconomic information available as of October 2008 was incorporated. Finally, the mode choice component of the travel demand forecasting model was recalibrated and validated using data from the on-board survey.

Ridership projections for the forecast year of 2030 have been developed using the travel demand model. The model is based upon a set of realistic input assumptions regarding land use and demographic changes between now and 2030 and expected transportation levels-of-service on both the highway and public transit system. Before it is used in forecasting, the model is calibrated against collected traffic and transit ridership information and then validated against recent counts to be sure it properly represents travel activity in the transportation system. Sensitivity tests (e.g., changing highway speeds or transit fares) are performed to ensure the results are stable and predictable within a reasonable expectation of consistency.

Based upon the model and these key input assumptions, approximately 116,300 trips per day are expected on the fixed guideway system on an average weekday in 2030. Since the Draft EIS was published, the travel demand model has been refined by adding an updated air passenger model (which forecasts travel in the corridor related to passengers arriving at or departing from Honolulu International Airport), defining more realistic drive access modes (driving alone or carpooling) to project stations, and updating the off-peak non-home-based direct demand (trips that do not originate from or end at home) element based on travel surveys in Honolulu.

The Project is one of the first in the country to design and undertake an uncertainty analysis of this type of travel forecast. The uncertainty analysis evaluates the variability of the forecast by establishing likely upper and lower limits of ridership projections. FTA has worked closely with the City during this work effort. A variety of factors were considered in the uncertainty analysis, including the following:

- Variations in assumptions regarding the magnitude and distribution patterns of future growth in the ʻEwa end of the corridor
- The impact of various levels of investment in highway infrastructure
- The expected frequency of service provided by the Project
- Park-and-ride behavior with the new system in place
- The implications on ridership of vehicle and passenger amenities provided by the new guideway vehicles

Given all the factors considered, the anticipated limits for guideway ridership in 2030 are expected to be between 105,000 to 130,000 trips per day.

Additional detail on methodology, input, and model coding is documented in the *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Travel Demand Forecasting Results Report* (RTD 2009j), *the Honolulu High-Capacity Transit Corridor Project Model Development, Calibration, and Validation Report* (RTD 2009k), and *the Honolulu High-Capacity Transit Corridor Project Travel Forecasting Results and Uncertainties Report* (RTD 2009l). Recognizing the variability of input data, the results reflect the standard forecast of the travel modeling consistent with consultation with the FTA.

3.2.2 Approach to Estimating Transportation Effects

Using the model and other information sources, existing transportation system conditions and performance were analyzed. The future 2030 No Build Alternative conditions and performance were then analyzed and compared to existing conditions. Finally, future 2030 Project conditions and performance were analyzed and compared to the future No Build Alternative conditions and performance.

The model was used to generate existing and future traffic volume forecasts, parking demand information, and transit ridership statistics. Model results include the following:

- Trip volumes by purpose
- Trip volumes by mode (e.g., automobile, bus, fixed guideway, walk)
- Trip time
- Changes in vehicle miles traveled (VMT)
- Changes in vehicle hours traveled (VHT)
- Changes in vehicle hours of delay (VHD)

Vehicle miles traveled (VMT) equals the number of trips using a roadway multiplied by the facility's total length in miles.

Vehicle hours traveled (VHT) equals the number of trips using a roadway multiplied by the travel time for each travel period.

Vehicle hours of delay (VHD) equals the difference between the congested VHT and the VHT that would be expected under free-flow conditions.

Results include transit travel time changes for the No Build Alternative and for the Project. Information from the model also includes transit-system user benefits and time savings.

Effects on traffic at 215 intersections were estimated using traffic counts collected in October and November 2007 and January and March

Traffic Level-of-Service Definitions for Highways and Arterial Roadways

Level-of-Service (LOS)	Definition
A	EXCELLENT. Completely free-flow conditions. Vehicle operation is virtually unaffected by the presence of other vehicles. Minor disruptions are easily absorbed without causing significant delays.
B	VERY GOOD. Reasonably unimpeded flow; the presence of other vehicles begins to be noticeable. Disruptions are still easily absorbed, although local deterioration in LOS will be more obvious.
C	GOOD. The ability to maneuver and select an operating speed is clearly affected by the presence of other vehicles. Minor disruptions may be expected to cause serious local deterioration in service, and queues may form behind any significant traffic disruption.
D	FAIR. Conditions border on unstable flow. Speed and the ability to maneuver are severely restricted due to traffic congestion. Only the most minor disruptions can be absorbed without the formation of extensive queues and deterioration of service to LOS F.
E	POOR. Conditions become unstable. Represents operation at or near capacity. Any disruption, no matter how minor, will cause queues to form and service to deteriorate to LOS F.
F	FAILURE. Represents forced or breakdown flow. Operation within queues is unstable and characterized by short spurts of movement followed by stoppages.

Source: Highway Capacity Manual

2008. Effects were also analyzed using procedures outlined in the *Highway Capacity Manual* (HCM) (TRB 2000) of the Transportation Research Board. It was determined and agreed upon with the City and County that the most appropriate approach to analyzing intersection level-of-service (LOS) was to use the HCM methodology (applied in SYNCHRO). The HCM methodology takes into account various characteristics of the roadway network, including signal timing plans, intersection geometry, vehicle movements and pedestrian movements, and storage bay lengths. HCM is also the basis for the analysis of unsignalized intersections, of which there are 46 in the study corridor. Using HCM for both types of intersections allows for a consistent approach to the analysis across the whole corridor. While the HCM methodology has limitations, under certain specialized circumstances it works well for corridor-level analysis. Where the prospect of saturated conditions was found, such as at major transit center stations, further analysis was performed using micro-simulation models to evaluate more detailed conditions.

In areas that will be affected by the Project, the analysis identified existing operating conditions at intersections and projected conditions under the future No Build Alternative and with the Project.

Traffic effects were determined by comparing changes in LOS under the No Build Alternative with the Project in 2030. An effect was considered to exist when the Project will cause any of the following conditions during either the a.m. or p.m. peak hours:

- LOS declines from D or better to E or F
- LOS declines from E to F
- The No Build Alternative LOS is E or F and the average vehicle delay increases

Where appropriate, measures to lessen or mitigate the Project's effects are identified. For more detail on the methods used to analyze transportation effects, see the Transportation Technical Report (RTD 2008a) and Addendum 02 to the Transportation Technical Report (RTD 2009i).

3.3 Existing Conditions and Performance

This section discusses existing transportation conditions in the study corridor. The discussion includes existing travel patterns and the conditions and performance of public transit, streets and highways, freight movement, parking, and the bicycle and pedestrian network. Unless otherwise noted, the source for information presented in this section is the OʻahuMPO travel demand forecasting model (OʻahuMPO 2007).

> Information presented in this section primarily involves islandwide travel conditions and performance. Islandwide data reflect traffic and conditions for the study corridor since this corridor dominates in terms of total transportation demand. For example, 83 percent of both islandwide daily and peak-period work-related transit trips originate within the study corridor. The study corridor also attracts 90 percent of total islandwide daily transit trips and 94 percent of peak-period work-related transit trips.

Table 3-2 Islandwide Daily Person Trips by Trip Purpose—Existing Conditions

Trip Purpose	2007	
	Daily Person Trips	Percentage of Total Daily Trips
Trips by Residents		
To and from work	933,000	29%
While at work	173,300	5%
To and from school/university	288,200	9%
To and from shopping/other	995,000	31%
Do not end at work or home	401,800	12%
Total Trips by Residents	**2,791,200**	**86%**
Other Trips		
Trips by truck	44,700	1%
Ground access trips by air passengers	60,000	2%
Trips by visitors	364,400	11%
Total Daily Trips (All)	**3,260,200**	**100%**

Numbers are rounded to nearest hundred.

3.3.1 Existing Travel Patterns

Daily Person Trips

More than 3.2 million person trips are made on a daily (average weekday) basis on Oʻahu. As shown in Table 3-2, 86 percent of these trips are made by residents. Of this total, 34 percent originate or end at work. The remaining trips are made by visitors, trucks, and ground access by air passengers.

Mode of Travel

Oʻahu has a relatively high number of transit and bicycle or walking trips compared to other U.S. cities. Of the approximately 2.8 million daily person trips made by residents, 6 percent are by transit and 12 percent are by bicycle and walking. Of the approximately 364,000 daily trips made by visitors, 5 percent are by transit and 45 percent are by bicycle and walking (Table 3-3). Approximately 60,000 daily trips are made by air passenger travelers going to and from the airport. Of these trips, 36 percent are made by shuttle bus and 26 percent are by private automobile.

Transit Trips by Trip Purpose

More than 180,000 trips occur on transit each weekday (transit trips include transfers; information on boardings, or the number of times someone gets on a transit vehicle, is provided in Section 3.3.2). As shown in Table 3-4, 90 percent of transit trips are made by residents. Transit trips originating or ending at work account for half of all daily transit trips. Trips by visitors account for nearly 10 percent of all daily transit trips.

Major destinations for weekday bus riders include Downtown (18 percent) and the Mōʻiliʻili-Ala Moana area (13 percent). The Downtown area contains the region's highest concentration of jobs. The Mōʻiliʻili-Ala Moana area also contains a high number of jobs and the State's largest shopping complex.

Table 3-3 Islandwide Daily Trips by Mode—Existing Conditions

Trips by Mode	2007	
	Daily Trips by Mode	Percentage of Total Daily Trips
Residents		
Automobile–private	2,291,800	82%
Transit	166,400	6%
Bicycle and walk	333,000	12%
Total Daily Trips by Residents	**2,791,200**	**100%**
Visitors		
Automobile–private	116,400	32%
Transit	17,600	5%
Bicycle and walk	165,100	45%
Taxi	9,300	3%
Tour bus	56,000	15%
Total Daily Trips by Visitors	**364,400**	**100%**
Ground Access Trips by Air Passengers		
Automobile–private	16,300	27%
Transit	700	1%
Taxi	9,700	16%
Tour bus	12,000	20%
Shuttle bus	21,400	36%
Total Daily Trips by Air Passengers	**60,100**	**100%**
All Daily Trips		
Total daily automobile trips–private	2,424,500	75%
Total daily transit trips	184,700	6%
Total daily bicycle and walking trips	498,100	15%
Total daily trips–other modes	108,400	3%
Total Daily Trips–All	**3,215,700**	**100%**

Numbers rounded to nearest hundred. Numbers may not add to 100% due to rounding.
Trips by truck are not included in this table.

Approximately 50 percent of peak-period home-to-work trips by bus originate in the Waikīkī, Mōʻiliʻili-Ala Moana, Palama-Liliha, Waipahu-Waikele, and Kaimukī-Waiʻalae areas. These areas are all within the study corridor and are densely populated with relatively high concentrations of transit-dependent households and activity centers.

Table 3-4 Islandwide Daily Transit Trips by Trip Purpose—Existing Conditions

Trip Purpose	2007	
	Daily Person Transit Trips	Percentage of Total Daily Transit Trips
Trips by Residents		
To and from work	85,300	46.2%
While at work	8,700	4.7%
To and from school/university	27,200	14.7%
To and from shopping/other	41,200	22.3%
Do not end at work or home	4,000	2.2%
Total Trips by Residents	**166,400**	**90.1%**
Other Trips		
Ground access trips by air passengers	700	0.4%
Trips by visitors	17,600	9.6%
Total Daily Trips (All)	**184,700**	**100%**

Numbers rounded to nearest hundred.

Vehicle Occupancy

Average vehicle occupancy (AVO) data were last collected by the Hawaiʻi Department of Transportation (HDOT) in 1998. The four monitoring stations in the study corridor are Moanalua Freeway at Moanalua Stream Bridge, Kalanianaʻole Highway, Pali Highway at Tunnel No. 1, and Likelike Highway. During the a.m. commute period (5:30 to 9:00 a.m.), traffic using Moanalua Freeway at Moanalua Stream Bridge had the highest commute period AVO in the study corridor (1.28 persons per vehicle). Traffic on Pali Highway at Tunnel No. 1 experienced the highest peak-hour AVO in the study corridor at 1.31 persons per vehicle.

Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

Travel conditions can be described in terms of VMT, VHT, and VHD. VMT is computed by multiplying the number of trips using a roadway by the facility's total length in miles. VHT is derived by multiplying the number of trips using a roadway by the travel time for each travel period. VHD is calculated by finding the difference between the congested VHT and the VHT that would be expected under free-flow conditions.

Table 3-5 summarizes islandwide total daily VMT, VHT, and VHD by facility type on the classified street and highway system. Most delays in the system occur on freeways and highways. (Section 3.3.3 provides a description of facility types.)

Reverse Commute

Currently, commuter-related trips are dominated by demand to the Downtown Transportation Analysis Area (TAA) in the a.m. peak period (6:00 to 8:00 a.m.) and away from this TAA in the p.m. peak period (3:00 to 5:00 p.m.). (A TAA is a geographic area used for transportation planning purposes.) Downtown-bound (Koko Head) traffic volumes from Waipahu and ʻAiea during the a.m. two-hour peak period are more than twice the volumes traveling in the ʻEwa direction. This pattern is attributable to the dominance of Downtown and nearby areas as employment centers. However, the newly emerging employment centers in the ʻEwa-Kapolei area are expected to generate more reverse commuting in the future.

Captive versus Choice Riders

The on-board transit survey conducted in December 2005 and January 2006 provided information on captive and choice bus riders. In general, captive (transit-dependent) riders do not have access to a personal vehicle to make the trip. Choice riders have a vehicle available to make the trip but use transit instead. The survey indicated that 65 percent of bus riders were captive. The remaining share consisted of 29 percent who could have used a personal vehicle and 6 percent who did not answer the question.

3.3.2 Existing Transit Conditions and Performance

Transit in Honolulu consists of a fixed-route bus transit service known as TheBus and paratransit service known as TheHandi-Van. The transit service coverage area is approximately 277 square miles, and 95 percent of the urban population lives within one-quarter mile of a bus stop. TheBoat service was discontinued in July 2009.

System Characteristics

TheBus System

TheBus system currently consists of 100 routes that serve approximately 3,800 bus stops. Of the 100 routes, 96 are fixed routes and 4 are deviation routes operated by the paratransit division. Most of the TheBus routes serve the study corridor. The

Table 3-5 Islandwide Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay—Existing Conditions

Facility Type	Daily VMT		Daily VHT		Daily VHD	
Freeway	5,150,100	46%	117,400	36%	32,400	45%
Highway	1,308,000	12%	25,200	8%	3,500	5%
Arterial	3,289,500	29%	110,600	34%	16,100	22%
Collector	1,245,800	11%	50,400	15%	8,700	12%
Local	239,000	2%	22,100	7%	11,100	15%
Total	**11,232,400**	**100%**	**325,700**	**100%**	**71,800**	**100%**

Source: Oʻahu MPO Travel Forecasting Results Report.
Numbers rounded to nearest hundred. Numbers may not equal 100% due to rounding.

Transportation Technical Report (RTD 2008a) includes a route map of the existing system.

With 100 routes and 3,800 bus stops, 95 percent of O`ahu's urban residents can walk to a bus stop in 10 minutes or less.

Bus route categories include Rapid Bus, Urban Trunk, Urban Feeder, Suburban Trunk, Community Circulators, Community Access, and Peak Express. The characteristics of each service type are summarized below:

- **Rapid Bus** includes CityExpress! and CountryExpress! routes that provide limited-stop service in both directions. Service is provided early morning through late evening on weekdays. CityExpress! Routes A and B provide service every 15 minutes, and CountryExpress! routes typically provide 30-minute service.
- **Urban Trunk** routes provide frequent, direct service connecting neighborhoods within the Primary Urban Center (PUC) along major ‘Ewa/Koko Head corridors. Urban Trunk routes typically provide service every 15 minutes or less and include Routes 1, 2, 3, and 13.
- **Urban Feeder** routes connect the mauka/makai neighborhoods within the urban center. The routes serving the hills and valleys of Honolulu connect residential areas to the Urban Trunk and Rapid Bus routes and provide service to major destinations, such as Downtown, the University of Hawai‘i (UH) at Mānoa, and Waikīkī. These routes typically provide service every 30 minutes or less and include Routes 4, 5, 6, 7, and 8.
- **Suburban Trunk** routes provide service through late evenings and connect outlying communities to the urban center. These routes stop at all local bus stops every day. Suburban Trunk routes typically provide 30-minute service. Examples include Routes 40, 42, 52, 55, and 56.
- **Community Circulators** provide local transit access within their communities. They provide timed connections with other Community Circulators and Suburban Trunk routes at neighborhood hubs or transit centers. Routes with higher demand provide 30-minute service, and lower-demand routes provide 60-minute service. Some routes offer intermittent or peak-only service. Community Circulator service includes Routes 231–236 and 401–403.
- **Community Access** operates on a regular schedule using TheHandi-Van vehicles. Curb-to-curb service is provided to registered TheHandi-Van customers who give 24-hour advance notice and are located within one-quarter mile of the service route. TheHandi-Van service can be used to connect to transit hubs through route deviation. These routes operate every 60 minutes, and time is included in the schedule for possible route deviations. Examples include Routes 501, 503, and 504.
- **Peak Express** routes serve predominantly home-to-work trips by connecting neighborhoods to employment centers. Service is provided during peak periods and in the peak direction. Examples include Routes 81, 85, and 93.

Most bus routes operate seven days a week, including holidays. Passenger amenities include approximately 980 passenger shelters and 2,400 benches. The Transportation Technical Report (RTD 2008a) provides detailed information on the system, including schedules and routes.

TheHandi-Van Service

TheHandi-Van is the City's paratransit service for persons who are eligible according to the Americans with Disabilities Act (ADA) of 1990 or for persons certified by the City. The service area, days, and hours of operation are the same as TheBus. Trips must be reserved 24 hours in advance.

TheBoat Service

In September 2007, the City began offering a commuter ferry service between West Oʻahu (Kalaeloa Harbor) and Downtown Honolulu (Aloha Tower Marketplace). TheBoat service operated each weekday, with three trips in the morning and three trips in the evening. TheBoat service was discontinued in July 2009 as a cost-cutting measure. TheBoat ferry service was included in the traffic model; however, the ridership data attributable to TheBoat were minor and did not have any substantial impact on the results of the traffic model.

To complement TheBoat, local shuttle bus service connected ferry terminals with several locations in West Oʻahu and Downtown Honolulu, as well as UH Mānoa and Waikīkī. Shuttle bus routes were discontinued in July 2009.

Fleet

As of 2009, TheBus fleet consists of 531 buses. This includes 91 vehicles that are 60-foot articulated buses, 403 vehicles that are 40-foot buses; and 37 vehicles less than 40 feet long. A total of 76 hybrid buses and 9 clean diesel buses are part of TheBus fleet. TheHandi-Van vehicle fleet contains 166 vehicles.

TheBoat service was provided by two 149-passenger vessels chartered by the City with a third boat as a spare. The vessels were passenger-only and did not accommodate vehicles.

Fare Structure

Fare structures for the TheBus are established by the City Council. Current fares were set in 2009. Table 3-6 provides information on the 2007 breakdown of ridership by fare type. At 41 percent of total ridership, monthly adult pass holders predominate, followed by senior/disabled riders at 27 percent. Considering the various discounts available, the average fare paid is $0.80 per person trip. For TheHandi-Van, every cardholder and companion must pay a fare of $2.00 per person per trip.

Transit Facilities

Existing transit facilities include maintenance and storage bases, park-and-ride lots, transit centers, major transfer points, and two dedicated bus-only roadways (Hotel Street between River and Alakea Streets and Kūhiō/Kalākaua Avenue between Ena Road and Kuamoʻo Street).

There are two maintenance and storage facilities: the Kalihi-Middle Street facility and the Pearl City bus facility. Five park-and-ride lots are served by TheBus with a total capacity of 529 spaces. These lots are in Hawaiʻi Kai, Mililani Mauka, Royal Kunia, Wahiawā, and Haleʻiwa. The six transit centers are in Alapaʻi, Hawaiʻi Kai, Kapolei, Mililani, Waiʻanae, and Waipahu. There are also major transfer points, such as Ala Moana Center.

Table 3-6 TheBus Fare Structure—Existing Conditions

Fare Category	Current Fare	Percentage of Riders by Fare*
Adult	$2.25	12%
Youth	$1.00	5%
Senior/Disabled	$1.00	27%
Transfer (1 per trip)	$0.00	7%
Monthly Adult Pass	$50.00	41%
Monthly Youth Pass	$25.00	6%
Monthly Senior/Disabled Pass	$5.00	(included with Senior/Disabled)
Annual Adult Pass	$550.00	(included with Monthly Adult Pass)
Annual Youth Pass	$275.00	(included with Monthly Youth Pass)
Annual Senior/Disabled Pass	$30.00	(included with Senior/Disabled)

**Source: 2007 City and County of Honolulu records.*
Percentages do not add up to 100% because the table does not include minor fare categories, such as Visitor Pass.

Other Transit Services

In addition to public transportation services described previously, various privately owned transportation companies offer transit or ridesharing services to the public, including the Leeward O'ahu Transportation Management Association (LOTMA), the Mililani Trolley, and E Noa Corporation. LOTMA provides carpool matching and emergency ride home services in the 'Ewa and Central O'ahu areas. E Noa Corporation operates a variety of services serving the Koko Head and Wai'anae ends of the corridor with connections to Downtown and tourist centers.

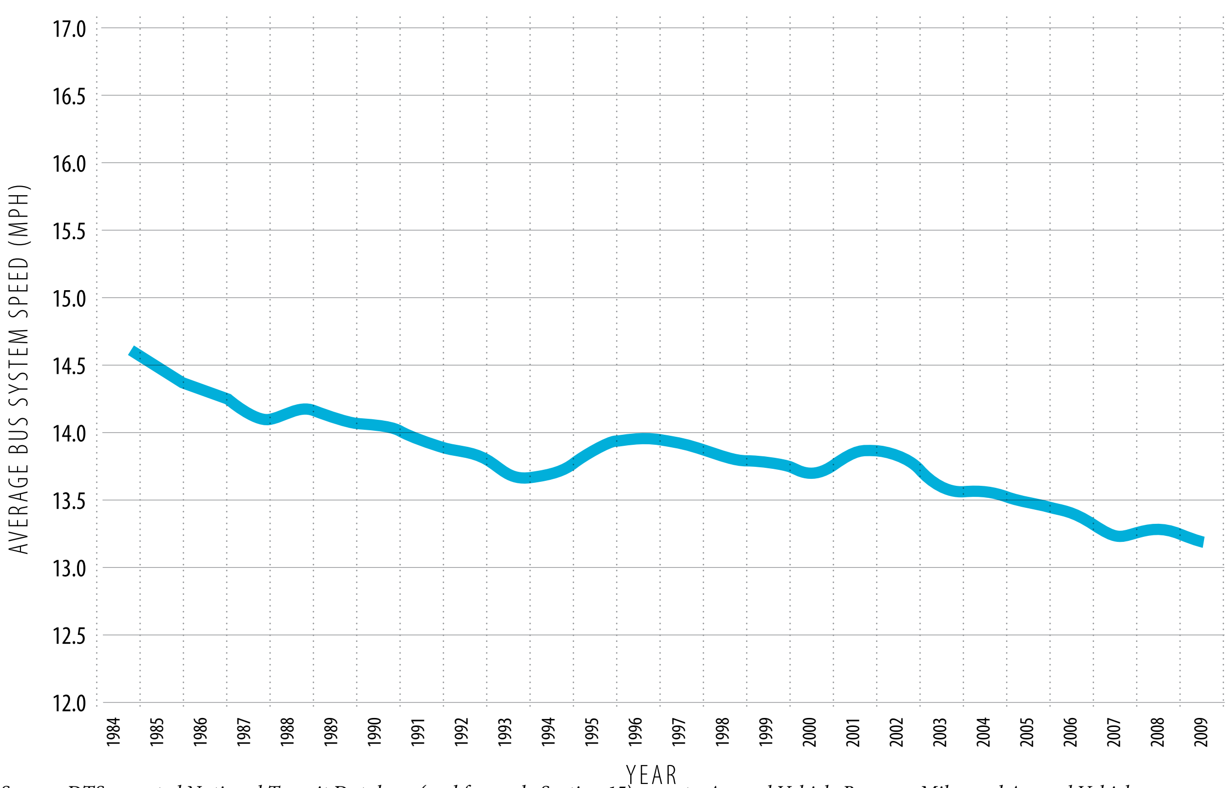
System Performance

This section examines existing transit system performance characteristics.

Transit Speed

TheBus operates in mixed traffic, without signal priority; therefore, buses are caught in the same congestion as general-purpose traffic. With increasing traffic congestion over the last 20 years, scheduled trip times for bus routes have been lengthened to reflect the additional time each bus trip takes. Average operating speeds for TheBus over time are shown in Figure 3-1.

As a result of longer bus travel times, approximately 128,600 additional revenue hours of bus service were needed in 2007 to deliver the same amount of service TheBus provided in 1984. This inefficiency consumed about $13.5 million in additional annual operating budget expenses in 2007 (in 2007 dollars).



Source: DTS reported National Transit Database (and formerly Section 15) reports: Annual Vehicle Revenue Miles and Annual Vehicle Revenue Hours.

Figure 3-1 TheBus Annual Average Operating Speed in Miles per Hour—1984–2009

Transit delays resulting from increased congestion consumed $13.5 million in additional operating budget expenses in 2007.

Temporary improvement to TheBus system's operating speeds was achieved by introducing new service concepts and restructuring the bus network in 2001. This improvement, known as the "hub-and-spoke" network, created new transit centers ("hubs") and new types of bus routes ("spokes") using rider-friendly features. For example, at a single facility riders can access routes that serve a variety of destinations. However, worsening roadway congestion further eroded average transit speeds. By 2007, a record low average speed of 13.2 miles per hour (mph) was recorded. To operate the same number of miles of service in 2007 at 13.2 mph required about 50 more buses than it did in 1984 when the operating speed was 14.7 mph.

Figure 1-11 (in Chapter 1, Background, Purpose and Need) depicts the total time required to complete one scheduled afternoon peak-period trip for each of five selected routes (40, 42, 52, 55, and 62) in different years starting in 1992. These five routes travel through at least part of the study corridor and are considered Suburban Trunks. Routes 40 and 42 travel from the Mākaha Beach and ʻEwa Beach areas to Ala Moana Center and Waikīkī. Routes 52 and 55 jointly form the "Circle Island" route, which travels from Ala Moana Center through Downtown, Mililani, Wahiawā, Haleʻiwa, and Kāneʻohe and returns to Ala Moana Center. Route 62 also travels from Wahiawā to Honolulu (Figure 1-12 in Chapter 1). All five routes have had time added to their schedules due to congestion.

Route 52 is perhaps most illustrative of this schedule issue. This route was changed in 1999 to operate on Interstate Routes H-1 and H-2 (the H-1 and H-2 Freeways) instead of on Kamehameha Highway. This resulted in a drop from 135 to 121 scheduled minutes to operate the entire trip. This time was adequate from 2002 to 2004, but congestion has overtaken this change. Time was added back into the schedule in 2005. In 2008, it is now scheduled to make a trip in 153 minutes—32 more minutes for the same distance than four years ago—and more buses have been added to maintain the same service frequency.

Transit Ridership

Systemwide

TheBus system serves more than 80 percent of Oʻahu's developed areas and has about 252,200 boardings on an average weekday (2007 data). Of those boardings, approximately 10 percent are made by visitors. In fiscal year (FY) 2007 (July 2006 through June 2007), annual boardings were approximately 72 million.

Selected Routes in the Study Corridor

Most of TheBus routes, as well as most transit ridership in Oʻahu, occur within the study corridor. Routes 40, 42, 52, 55, and 62 are among the Suburban Trunk routes that travel through the study corridor and are part of the system's backbone. Average weekday boardings are shown in Table 3-7. These routes represent almost 20 percent of total islandwide daily boardings.

Transit Reliability

On-time performance is a measure of reliability and is based on the following service standard: a bus is considered to be late if it arrives at a route time point (a location along each route that has an identified schedule time) more than five minutes

Table 3-7 Average Weekday Boardings on Selected Routes in the Study Corridor—2008

Route	Average Weekday Boardings
40	10,600
42	9,300
52	5,700
55	3,300
62	4,900

after the scheduled time. This standard has been used by the City's bus management services contractor to monitor service.

Figure 3-2 includes systemwide schedule adherence results for TheBus for weekdays in a typical month in each year since 1998. During four of the last six years, more than 30 percent of bus trips ran late. According to the level-of-service standards identified in the Transportation Research Board's *Transit Capacity and Quality of Service Manual* (TRB 2003), the extent of late trips by TheBus indicated a grade of "F" on a scale of "A" (best) to "F" (worst).

> Using national standards for reliability, transit service on O`ahu has been gradually getting worse and now rates an "F" on a scale of "A" (best) to "F" (worst).

Buses are sometimes so far behind schedule that the trip does not reach its final destination. The bus operator is instructed to abandon the trip, off-load all passengers, and turn back so the next scheduled assignment for the operator and vehicle can be initiated on time. Figure 3-3 includes the total annual service incidents involving "turnbacks" from 1998 to 2007. The low number of turnbacks in 2003 reflects a work stoppage due to a 34-day bus operator strike.

Transit Effectiveness/Load Factors

For a city of its size, Honolulu has a very effective bus system, as measured by bus passenger trips per revenue hour (also known as *load factor*). As shown in Table 3-8, TheBus is the only one of the largest 20 bus operations in the U.S. that operates in a region without rail transit or a separated transit guideway system. Only three transit agencies (New York, San Francisco, and Los Angeles) have bus systems with higher service effectiveness than Honolulu.

TheBus has maintained steady service effectiveness, as measured by bus passenger boardings per vehicle revenue hour. TheBus system's performance is consistently above the same service-effectiveness average for the nation among all transit modes.

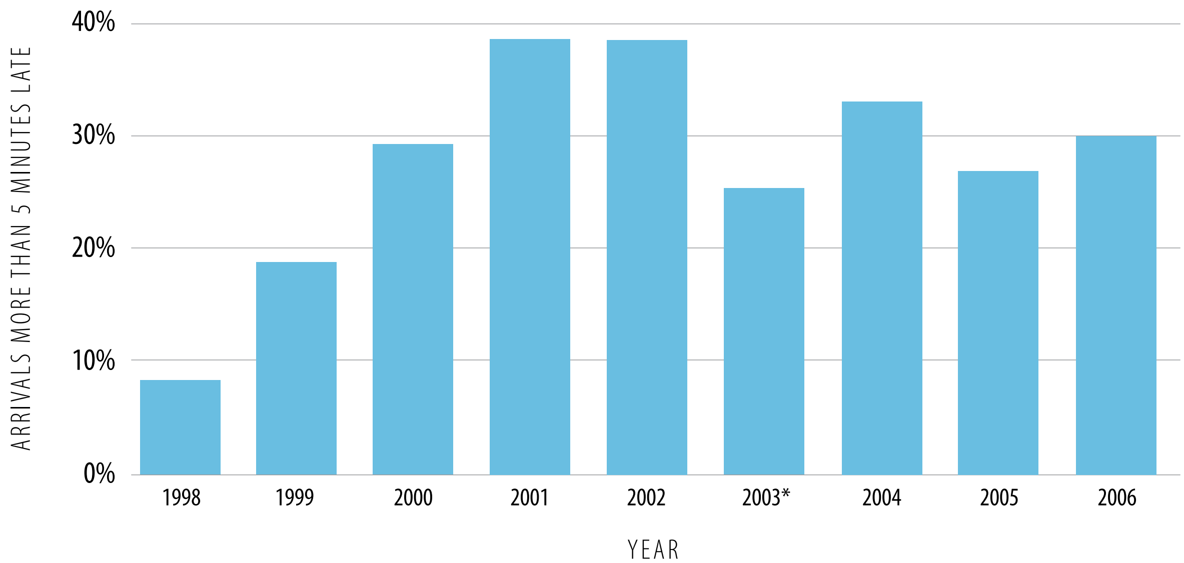
In Honolulu, passenger boardings per vehicle revenue hour averaged 41.0 to 45.3 from 2001 to 2006, while the range for the nation was between 37.3 and 40.4 during the same period. This is notable because the national rate includes the highest-capacity transit operations in the largest metropolitan areas.

Cost-effectiveness is measured by comparing service inputs (total operating expense) and service consumption (total passenger boardings). Between 2001 and 2006, the national average operating expense per passenger boarding increased from $2.39 to $3.09. TheBus experienced a commensurate increase in operating expense per passenger boarding of $1.60 to $2.25 over the same period, but TheBus expense has been consistently about 30 percent lower than the national average.

> O`ahu has some of the highest transit ridership per vehicle revenue hour of service anywhere in the United States, making Honolulu a very transit-oriented city.

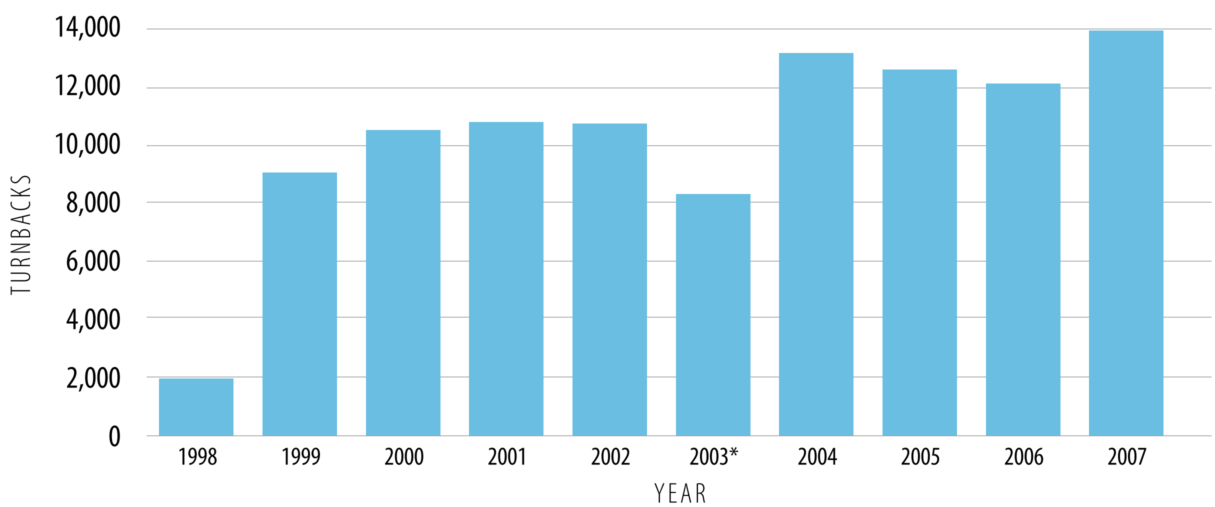
Access to Transit

Currently, access to transit service is dominated by walking and by transferring from other bus routes. According to the on-board survey conducted in December 2005 and January 2006, 88 percent of passengers walked to access TheBus. Ninety-five percent of the Honolulu urban population lives within one-quarter mile of a bus line. With regards to drive access to transit, there are currently more park-and-ride spaces than demand. The on-board survey revealed that 1 percent of passengers accessed TheBus by bicycle. More than 1,000 bikes are taken on TheBus daily for a monthly average of about 30,000 bikes.



Source: TheBus Schedule Adherence Reports, 1998 to 2006.
* Affected by a 34-day bus operator strike.

Figure 3-2 TheBus Systemwide Schedule Adherence (Percent of Weekday Systemwide Arrivals more than Five Minutes Late)



Source: TheBus Operator Service Incident Reports, 1998 to 2007.
* Affected by a 34-day bus operator strike.

Figure 3-3 TheBus Systemwide Annual Service Incidents Involving Turnbacks

Table 3-8 Bus Passenger Vehicle Trips per Revenue Hour for Major U.S. Bus Operations—2005

Transit Agency		Urbanized Area	Annual Bus Passenger Trips	Annual Bus Vehicle Revenue Hours	Bus Passenger Vehicle Trips per Revenue Hour	Transportation Modes Provided by Agency		
Rank	Name	Primary City	(1,000s)	(1,000s)		Bus	Rail	Other
1	MTA-NYC	New York, NY	952,418	12,870	74.0	B, DR	HR	–
2	MUNI	San Francisco, CA	163,149	2,495	65.4	B, TB, DR	LR	CC
3	LACMTA	Los Angeles, CA	377,268	7,482	50.4	B	HR, LR, CR	–
4	TheBus	Honolulu, HI	67,407	1,365	49.4	B, DR	–	–
5	SEPTA	Philadelphia, PA	187,960	3,830	49.1	B, TB, DR	HR, LR, CR	–
6	MBTA	Boston, MA	138,557	2,838	48.8	B, TB, DR	HR, LR, CR	FB
7	NYCDOT	New York, NY	71,347	1,559	45.8	B	–	FB
8	CTA	Chicago, IL	303,244	6,748	44.9	B, DR	HR	–
9	WMATA	Washington, DC	153,392	3,423	44.8	B, DR	HR	–
10	MTA	Baltimore, MD	77,806	1,922	40.5	B, DR	HR, LR, CR	–
11	MARTA	Atlanta, GA	71,066	1,798	39.5	B, DR	HR	–
12	TRI-MET	Portland, OR	68,765	1,873	36.7	B, DR	LR	–
13	OCTA	Santa Ana, CA	67,304	1,838	36.6	B, DR	–	–
14	AC Transit	Oakland, CA	64,601	1,800	35.9	B, DR	–	–
15	King County Metro	Seattle, WA	94,608	2,882	32.8	B, TB, DR	LR	VP
16	Metro Transit	Minneapolis, MN	61,797	2,011	30.7	B	LR	–
17	NJ Transit	New York, NY	156,147	5,184	30.1	B, DR	LR, CR	VP
18	MTA of Harris County	Houston, TX	81,547	2,848	28.6	B, DR	LR	VP
19	RTD	Denver, CO	74,683	2,639	28.3	B, DR	LR	VP
20	Miami Dade Transit	Miami, FL	76,753	2,732	28.1	B, DR	HR, AG	–

Source: 2005 Public Transportation Fact Book, APTA, April 2005.
Data include all bus and trolleybus trips and exclude all demand response trips.
B = Bus, TB = Trolleybus, DR = Demand Response, HR = Heavy Rail, LR = Light Rail, CR = Commuter Rail, AG = Automated Guideway, FB = Ferry Boat, VP = Van Pool, CC = Cable Car

Transfers

A major feature of O‘ahu’s existing transit service is reliance on transit centers and transfer locations as major focal points. The network of transit centers and the hub-and-spoke nature of the bus route system result in a high number of bus transfers. The current (2007) transfer rate is 37 percent, with an average of 1.4 bus rides or segments per transit trip.

3.3.3 Existing Streets and Highways Conditions and Performance

Freeways, highways, and streets are the basic transportation network elements responsible for the movement of people and goods on O‘ahu. This network is used by all types of vehicles, public and private transit services, bicycles, and pedestrians. O‘ahu’s roadway system is maintained by HDOT and the City and County of Honolulu Department of Facility Maintenance.

System Characteristics

The State highway system consists of approximately 280 route miles and 940 lane miles. It includes all freeways and major highways connecting various parts of the island.

Interstate freeways on Oʻahu are dedicated transportation facilities that are fully grade-separated, access-controlled roadways. Access to the Interstate system is restricted to dedicated ramps, which minimizes disruptions to the flow of traffic. This allows for higher operational speeds and improved capacity compared to surface streets. The study corridor is served primarily by the H-1 Freeway and the Moanalua Freeway. The H-2 Freeway provides access from Central Oʻahu, and the H-3 Freeway provides access from the Windward side.

Highways, unlike freeways, are not fully grade-separated and tend to be major surface streets or expressways. Because local traffic can access these facilities at intersections, capacities and operational speeds are reduced.

To maximize the efficiency of the freeway and highway systems, the State and the City employ a variety of Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies to reduce single-occupant motor vehicle trips and make the existing transportation system more efficient.

Examples of TSM measures used on Oʻahu include contraflow operations (vehicle travel in one direction is reversed during peak traffic periods to provide an additional travel lane in the peak direction) and special traffic and high-occupancy vehicle (HOV) lanes. TDM measures include carpool and vanpool matching services, bicycle and pedestrian transportation alternatives, and park-and-ride facilities. These measures are managed by either the City or HDOT. Reversible contraflow lanes operate during specific peak periods on portions of congested corridors, such as Kapiʻolani Boulevard, Ward Avenue, Atkinson Drive, Nimitz Highway, and Waiʻalae Avenue.

HDOT operates HOV lanes on the following facilities during certain times of day: H-1 Freeway, H-2 Freeway, Moanalua Freeway, H-1 Freeway zipper lane and shoulder express lane, and Nimitz Highway. The H-1 zipper lane and Nimitz Highway lane are contraflow lanes. Although transit vehicles use these HOV lanes, they still experience delays due to congestion. Once a vehicle exits an HOV lane, it is also subjected to congestion on surrounding roadways.

System Performance

Traffic on Oʻahu is generated by commerce, industry, and tourism. However, the nature of the island creates centralized locations for these generators, and distinct travel patterns are dictated by geography and socioeconomic factors. The high concentration of military bases also adds to the uniqueness of Oʻahu's traffic generators. Industrial areas scattered across the island and major shipping terminals near Honolulu Harbor generate a substantial amount of truck traffic. Another large traffic generator is the tourism industry, mainly because of Hawaiʻi's status as a popular vacation destination. Visitor-generated traffic is not limited to Honolulu International Airport; cruise ship terminals at Honolulu Harbor from Piers 2, 10, and 11 also contribute to this traffic.

For the purpose of this analysis, traffic volumes and other performance statistics were grouped by screenlines, which are virtual lines drawn across the road network at selected locations to enable comparisons. Six screenlines were used to describe existing conditions in the study corridor (as illustrated on Figure 3-4 and described in Tables 3-9 and 3-10) for the a.m. and p.m. peak travel hours. Traffic data for 2005 and 2006, the most recent set of counts, were used to analyze existing volume and level-of-service conditions (see Section 3.2, Methodology, for definitions of

Figure 3-4 Selected Screenline Facilities Locations

level-of-service). Tables 3-9 and 3-10 also present traffic volumes and level-of-service for 2030, both with and without the Project. Future traffic volumes are based on forecasts from the travel demand forecasting model. Future traffic conditions at screenlines are discussed in Section 3.4.3.

Screenline Volumes and Operating Conditions

The operation of the roadway segments was assessed by comparing traffic volumes on each roadway facility to the saturated volume level-of-service thresholds for each individual facility. The saturated volume thresholds represent the capacity of a roadway and were developed based on the roadway functional classification and operating characteristics (e.g., number of intersections or interchanges per mile, divided or undivided roadways, number of travel lanes, and one-way or two-way facility).

Tables 3-9 and 3-10 summarizes observed volumes and estimated level-of-service on each roadway facility for each direction during the a.m. and p.m. peak hours. In general, congested conditions (e.g., LOS E or F) occur during the a.m. and p.m. peak hours at several locations. Specifically, this occurs in the peak direction (i.e., toward Downtown in the morning and away from Downtown in the evening) at screenline locations such as ‘Ewa Koko Head-bound in the a.m. peak hour and Ward Avenue ‘Ewa-bound in the p.m. peak hour. As shown in Table 3-9, the Kalauao and Kapālama screenlines Koko Head-bound operate at LOS F in

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Table 3-9 A.M. Peak-hour Screenline Impacts Analysis—Existing Conditions, 2030 No Build Alternative, and 2030 Project (continued on next page)

Screenline/Facility			Year 2005 Conditions								2030 No Build Alternative								2030 Project							Screenline Impact Analysis	
			# of Lanes	Observed Volume (vph)[1]	Maximum Volume threshold[2]					LOS[2]	# of Lanes	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Project Impact?	Cumulative Impact?
					A	B	C	D	E				A	B	C	D	E			A	B	C	D	E			
`Ewa	Wai`anae-bound	H-1 Freeway	3	3,330	1,620	2,630	3,800	4,920	5,590	C	3	4,360	1,620	2,630	3,800	4,920	5,590	D	4,260	1,620	2,630	3,800	4,920	5,590	D		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	1,180	515	839	1,213	1,568	1,783	C	1,080	515	839	1,213	1,568	1,783	C		
		Farrington Highway	1	590	**	200	660	780	810	C	2	340	**	200	1,240	1,560	1,640	C	320	**	200	1,240	1,560	1,640	C		
		Fort Weaver Road (SB)	2	1,440	**	200	1,240	1,560	1,640	D	2	2,220	**	200	1,240	1,560	1,640	F	2,150	**	200	1,240	1,560	1,640	F		
		Totals		**5,360**						**C**		**8,100**						**D**	**7,810**						**D**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	3	4,130	1,620	2,630	3,800	4,920	5,590	D	3	3,870	1,620	2,630	3,800	4,920	5,590	D	3,500	1,620	2,630	3,800	4,920	5,590	C		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	1,790	515	839	1,213	1,568	1,783	F	1,540	515	839	1,213	1,568	1,783	D		
		Farrington Highway	2	210	230	1,390	1,650	1,700	**	A	3	210	**	310	1,920	2,340	2,460	B[3]	160	**	310	1,920	2,340	2,460	B[3]		
		Fort Weaver Road (NB)	2	3,120	**	200	1,240	1,560	1,640	F	2	2,770	**	200	1,240	1,560	1,640	F	2,570	**	200	1,240	1,560	1,640	F		
		Totals		**7,460**						**E**		**8,640**						**E**	**7,770**						**D**	**NO**	**NO**
Waikele Stream	`Ewa-bound	H-1 Freeway	4	6,110	2,210	3,580	5,180	6,710	7,620	D	5	10,070	2,800	4,540	6,570	8,490	9,660	F	9,760	2,800	4,540	6,570	8,490	9,660	F		
		Waipahu Street	1	360	**	**	440	700	740	C[3]	1	300	**	**	440	700	740	C[3]	290	**	**	440	700	740	C[3]		
		Farrington Highway	2	1,160	**	200	1,240	1,560	1,640	C	3	910	**	310	1,920	2,340	2,460	C	860	**	310	1,920	2,340	2,460	C		
		Totals		**7,630**						**D**		**11,280**						**E**	**10,910**						**E**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	4	7,380	2,210	3,580	5,180	6,710	7,620	E	4	8,460	2,210	3,580	5,180	6,710	7,620	F	8,080	2,210	3,580	5,180	6,710	7,620	F		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	1,560	515	839	1,213	1,568	1,783	D	1,360	515	839	1,213	1,568	1,783	D		
		Waipahu Street	1	580	**	**	440	700	740	D	1	290	**	**	440	700	740	C[3]	150	**	**	440	700	740	C[3]		
		Farrington Highway	2	1,210	**	200	1,240	1,560	1,640	C	3	1,530	**	310	1,920	2,340	2,460	C	1,210	**	310	1,920	2,340	2,460	C		
		Totals		**9,170**						**E**		**11,840**						**E**	**10,800**						**E**	**NO**	**NO**
Kalauao	`Ewa-bound	H-1 Freeway	5	6,840	2,800	4,540	6,570	8,490	9,660	D	5	7,280	2,800	4,540	6,570	8,490	9,660	D	7,120	2,800	4,540	6,570	8,490	9,660	D		
		Moanalua Road	2	1,130	**	**	1,020	1,480	1,560	D	2	1,370	**	**	1,020	1,480	1,560	D	1,150	**	**	1,020	1,480	1,560	D		
		Kamehameha Highway	3	970	**	310	1,920	2,340	2,460	C	3	1,080	**	310	1,920	2,340	2,460	C	1,050	**	310	1,920	2,340	2,460	C		
		Totals		**8,940**						**D**		**9,730**						**D**	**9,320**						**D**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	5	10,140	2,800	4,540	6,570	8,490	9,660	F	5	12,250	2,800	4,540	6,570	8,490	9,660	F	11,260	5,600	9,080	13,140	16,980	19,320	F		
		H-1 Freeway HOV	1	1,740	515	839	1,213	1,568	1,783	E	1	1,810	515	839	1,213	1,568	1,783	F	1,690	515	839	1,213	1,568	1,783	E		
		H-1 Freeway Zipper Lane	1	1,510	515	839	1,213	1,568	1,783	D	1	1,160	515	839	1,213	1,568	1,783	C	920	515	839	1,213	1,568	1,783	C		
		Moanalua Road	2	1,390	**	**	1,020	1,480	1,560	D	2	1,310	**	**	1,020	1,480	1,560	D	980	**	**	1,020	1,480	1,560	C		
		Kamehameha Highway	3	2,520	**	310	1,920	2,340	2,460	F	3	2,450	**	310	1,920	2,340	2,460	E	2,060	**	310	1,920	2,340	2,460	D		
		Totals		**17,300**						**F**		**18,980**						**E**	**16,910**						**E**	**NO**	**NO**
Salt Lake	`Ewa-bound	Moanalua Freeway	4	3,700	2,210	3,580	5,180	6,710	7,620	C	4	3,420	2,210	3,580	5,180	6,710	7,620	B	3,310	2,210	3,580	5,180	6,710	7,620	B		
		H-1 Freeway	3	2,460	1,620	2,630	3,800	4,920	5,590	B	4	3,630	2,210	3,580	5,180	6,710	7,620	C	3,530	2,210	3,580	5,180	6,710	7,620	B		
		H-1 Freeway HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	n/a	n/a	515	839	1,213	1,568	1,783	n/a	n/a	515	839	1,213	1,568	1,783	n/a		
		H-1 Freeway future Zipper Lane	n/a	n/a	515	839	1,213	1,568	1,783	n/a	n/a	n/a	515	839	1,213	1,568	1,783	n/a	n/a	515	839	1,213	1,568	1,783	n/a		
		Nimitz Highway	3	1,050	**	310	1,920	2,340	2,460	C	3	1,770	**	310	1,920	2,340	2,460	C	1,540	**	310	1,920	2,340	2,460	C		
		Salt Lake Boulevard	1	330	**	**	440	700	740	C[3]	2	370	**	**	1,020	1,480	1,560	C[3]	350	**	**	1,020	1,480	1,560	C[3]		
		Totals		**7,540**						**C**		**9,190**						**C**	**8,730**						**C**	**NO**	**NO**
	Koko Head-bound	Moanalua Freeway	2	3,730	1,030	1,680	2,420	3,130	3,560	F	2	3,960	1,030	1,680	2,420	3,130	3,560	F	3,650	1,030	1,680	2,420	3,130	3,560	F		
		Moanalua Freeway HOV	1	1,020	515	839	1,213	1,568	1,783	C	1	1,750	515	839	1,213	1,568	1,783	E	1,590	515	839	1,213	1,568	1,783	E		
		H-1 Freeway + Shoulder Express (1 lane)	5	7,600	2,800	4,540	6,570	8,490	9,660	D	5	7,700	2,800	4,540	6,570	8,490	9,660	D	6,800	2,800	4,540	6,570	8,490	9,660	D		
		H-1 Freeway HOV (1 lane)	1	1,620	515	839	1,213	1,568	1,783	E	1	1,640	515	839	1,213	1,568	1,783	E	1,380	515	839	1,213	1,568	1,783	D		
		H-1 Freeway Zipper Lane	1	1,510	515	839	1,213	1,568	1,783	D	1	1,520	515	839	1,213	1,568	1,783	D	1,460	515	839	1,213	1,568	1,783	D		
		Nimitz Highway	5	1,420	**	500	3,160	3,790	3,980	C	5	1,920	**	500	3,160	3,790	3,980	C	1,720	**	500	3,160	3,790	3,980	C		
		Salt Lake Boulevard	1	520	**	**	440	700	740	D	2	830	**	**	1,020	1,480	1,560	C[3]	600	**	**	1,020	1,480	1,560	C[3]		
		Totals		**17,420**						**D**		**19,320**						**D**	**17,200**						**D**	**NO**	**NO**

Table 3-9 A.M. Peak-hour Screenline Impacts Analysis —Existing Conditions, 2030 No Build Alternative, and 2030 Project (continued from previous page)

Screenline/Facility			Year 2005 Conditions								2030 No Build Alternative								2030 Project							Screenline Impact Analysis	
			# of Lanes	Observed Volume (vph)[1]	Maximum Volume threshold[2]					LOS[2]	# of Lanes	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Project Impact?	Cumulative Impact?
					A	B	C	D	E				A	B	C	D	E			A	B	C	D	E			
Kapālama Canal	\`Ewa-bound	Nimitz Highway	2	1,340	**	200	1,240	1,560	1,640	D	3	3,590	**	310	1,920	2,340	2,460	F	3,310	**	310	1,920	2,340	2,460	F		
		Dillingham Boulevard	2	690	**	200	1,240	1,560	1,640	C	2	660	**	200	1,240	1,560	1,640	C	610	**	200	1,240	1,560	1,640	C		
		North King Street	2	600	**	**	1,020	1,480	1,560	C[3]	2	840	**	**	1,020	1,480	1,560	C[3]	820	**	**	1,020	1,480	1,560	C[3]		
		H-1 Freeway	4	7,300	2,210	3,580	5,180	6,710	7,620	E	4	7,620	2,210	3,580	5,180	6,710	7,620	E	7,570	2,210	3,580	5,180	6,710	7,620	E		
		Hālona Street	2	1,160	**	**	1,220	1,770	1,870	C[3]	2	1,850	**	**	1,220	1,770	1,870	E	1,830	**	**	1,220	1,770	1,870	E		
		School Street	2	780	**	**	1,020	1,480	1,560	C[3]	2	850	**	**	1,020	1,480	1,560	C[3]	870	**	**	1,020	1,480	1,560	C[3]		
		Totals		**11,870**						**D**		**15,410**						**E**	**15,010**						**E**	**NO**	**NO**
	Koko Head-bound	Nimitz Highway	4	3,210	**	400	2,530	3,030	3,180	F	3	2,580	**	310	1,920	2,340	2,460	F	2,310	**	310	1,920	2,340	2,460	D		
		Nimitz Flyover (future facility)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	1,420	1,030	1,680	2,420	3,130	3,560	B	1,250	1,030	1,680	2,420	3,130	3,560	B		
		Dillingham Boulevard	2	1,400	**	200	1,240	1,560	1,640	D	2	1,390	**	200	1,240	1,560	1,640	D	1,140	**	200	1,240	1,560	1,640	C		
		North King Street	2	1,340	**	**	1,020	1,480	1,560	D	2	1,400	**	**	1,020	1,480	1,560	D	1,280	**	**	1,020	1,480	1,560	D		
		Olomea Street	2	1,950	**	**	1,220	1,770	1,870	F	2	2,430	**	**	1,220	1,770	1,870	F	2,240	**	**	1,220	1,770	1,870	F		
		H-1 Freeway	4	9,490	2,210	3,580	5,180	6,710	7,620	F	5	10,670	2,800	4,540	6,570	8,490	9,660	F	9,980	2,800	4,540	6,570	8,490	9,660	F		
		School Street	2	1,580	**	**	1,020	1,480	1,560	F	2	1,690	**	**	1,020	1,480	1,560	F	1,530	**	**	1,020	1,480	1,560	E		
		Totals		**18,970**						**F**		**21,580**						**E**	**19,730**						**E**	**NO**	**NO**
Ward Avenue	\`Ewa-bound	H-1 Freeway	3	7,290	1,620	2,630	3,800	4,920	5,590	F	3	7,380	1,620	2,630	3,800	4,920	5,590	F	7,360	1,620	2,630	3,800	4,920	5,590	F		
		Beretania Street	5	2,790	**	**	3,170	4,450	4,690	C[3]	5	3,300	**	**	3,170	4,450	4,690	D	3,180	**	**	3,170	4,450	4,690	D		
		Kapi\`olani Boulevard	4	1,920	**	**	2,110	2,970	3,130	C[3]	4	2,560	**	**	2,110	2,970	3,130	D	2,480	**	**	2,110	2,970	3,130	D		
		Ala Moana Boulevard	3	1,800	**	310	1,920	2,340	2,460	C	3	2,150	**	310	1,920	2,340	2,460	D	2,140	**	310	1,920	2,340	2,460	D		
		Totals		**13,800**						**E**		**15,390**						**E**	**15,160**						**E**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	3	5,740	1,620	2,630	3,800	4,920	5,590	F	4	6,810	2,210	3,580	5,180	6,710	7,620	E	6,580	2,210	3,580	5,180	6,710	7,620	D		
		Kīna\`u Street	3	1,250	**	**	1,900	2,670	2,810	C[3]	3	1,150	**	**	1,900	2,670	2,810	C[3]	1,100	**	**	1,900	2,670	2,810	C[3]		
		South King Street	5	2,080	**	**	3,170	4,450	4,690	C[3]	5	2,800	**	**	3,170	4,450	4,690	C[3]	2,200	**	**	3,170	4,450	4,690	C[3]		
		Kapi\`olani Boulevard	2	710	**	**	1,020	1,480	1,560	C[3]	2	820	**	**	1,020	1,480	1,560	C[3]	800	**	**	1,020	1,480	1,560	C[3]		
		Ala Moana Boulevard	3	1,610	**	310	1,920	2,340	2,460	C	3	1,740	**	310	1,920	2,340	2,460	C	1,510	**	310	1,920	2,340	2,460	C		
		Totals		**11,390**						**E**		**13,320**						**D**	**12,190**						**D**	**NO**	**NO**

[1]Peak hour traffic count data was obtained from the State of Hawai\`i Department of Transportation (2005).

[2]LOS thresholds were adapted from Quality Level of Service Handbook (2002) by the State of Florida's Department of Transportation. The Handbook provides the Generalized Peak Hour Two-Way Volumes for Florida's Urbanized Areas (2002). A directional split of 50% was applied to the two-way volumes to generate the peak hour direction volume thresholds for the purpose of this analysis.

[3]The reported LOS "C[3]" means C or better and "B[3]" means B or better.

**LOS thresholds not reported due to type of facility.

Table 3-10 P.M. Peak-hour Screenline Impacts Analysis—Existing Conditions, 2030 No Build Alternative, and 2030 Project (continued on next page)

Screenlines			Year 2005 Conditions								2030 No Build Alternative								2030 Project							Screenline Impact Analysis	
			# of Lanes	Observed Volume (vph)[1]	Maximum Volume Threshold[2]					LOS[2]	# of Lanes	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Project Impact?	Cumulative Impact?
					A	B	C	D	E				A	B	C	D	E			A	B	C	D	E			
`Ewa	Wai`anae-bound	H-1 Freeway	3	4,110	1,620	2,630	3,800	4,920	5,590	D	3	3,920	1,620	2,630	3,800	4,920	5,590	D	3,620	1,620	2,630	3,800	4,920	5,590	C		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	1,100	515	839	1,213	1,568	1,783	C	1,130	515	839	1,213	1,568	1,783	C		
		Farrington Highway	1	310	**	200	660	780	810	C	2	350	**	200	1,240	1,560	1,640	C	290	**	200	1,240	1,560	1,640	C		
		Fort Weaver Road (SB)	2	2,400	**	200	1,240	1,560	1,640	F	2	2,250	**	200	1,240	1,560	1,640	F	2,200	**	200	1,240	1,560	1,640	F		
		Totals		**6,820**						**E**		**7,620**						**D**	**7,240**						**D**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	3	4,080	1,620	2,630	3,800	4,920	5,590	D	3	5,500	1,620	2,630	3,800	4,920	5,590	E	5,370	1,620	2,630	3,800	4,920	5,590	E		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	990	515	839	1,213	1,568	1,783	C	940	515	839	1,213	1,568	1,783	C		
		Farrington Highway	2	620	230	1,390	1,650	1,700	**	B	3	290	**	310	1,920	2,340	2,460	B[3]	280	**	310	1,920	2,340	2,460	C		
		Fort Weaver Road (NB)	2	2,060	**	200	1,240	1,560	1,640	F	2	2,450	**	200	1,240	1,560	1,640	F	2,370	**	200	1,240	1,560	1,640	F		
		Totals		**6,760**						**D**		**9,230**						**E**	**8,960**						**E**	**NO**	**NO**
Waikele Stream	`Ewa-bound	H-1 Freeway	4	6,710	2,210	3,580	5,180	6,710	7,620	E	4	8,450	2,210	3,580	5,180	6,710	7,620	F	7,680	2,210	3,580	5,180	6,710	7,620	F		
		H-1 Freeway future HOV	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	490	515	839	1,213	1,568	1,783	A	440	515	839	1,213	1,568	1,783	A		
		Waipahu Street	1	530	**	**	440	700	740	D	1	170	**	**	440	700	740	C[3]	130	**	**	440	700	740	C[3]		
		Farrington Highway	2	1,280	**	200	1,240	1,560	1,640	D	3	1,150	**	310	1,920	2,340	2,460	C	1,000	**	310	1,920	2,340	2,460	C		
		Totals		**8,520**						**E**		**10,260**						**E**	**9,250**						**E**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	4	4,790	2,210	3,580	5,180	6,710	7,620	C	5	6,360	2,800	4,540	6,570	8,490	9,660	C	6,150	2,800	4,540	6,570	8,490	9,660	C		
		Waipahu Street	1	420	**	**	440	700	740	C[3]	1	300	**	**	440	700	740	C[3]	280	**	**	440	700	740	C[3]		
		Farrington Highway	2	790	**	200	1,240	1,560	1,640	C	3	640	**	310	1,920	2,340	2,460	C	600	**	310	1,920	2,340	2,460	C		
		Totals		**6,000**						**C**		**7,300**						**C**	**7,030**						**C**	**NO**	**NO**
Kalauao	`Ewa-bound	H-1 Freeway	5	8,410	2,800	4,540	6,570	8,490	9,660	D	4	8,670	2,210	3,580	5,180	6,710	7,620	F	8,000	2,210	3,580	5,180	6,710	7,620	F		
		H-1 Freeway HOV	1	1,530	515	839	1,213	1,568	1,783	D	1	1,720	515	839	1,213	1,568	1,783	E	1,520	515	839	1,213	1,568	1,783	D		
		H-1 Freeway Future Zipper Lane	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	950	515	839	1,213	1,568	1,783	C	800	515	839	1,213	1,568	1,783	B		
		Moanalua Road	2	2,020	**	**	1,020	1,480	1,560	F	2	2,060	**	**	1,020	1,480	1,560	F	1,730	**	**	1,020	1,480	1,560	F		
		Kamehameha Highway	3	2,110	**	310	1,920	2,340	2,460	D	3	2,140	**	310	1,920	2,340	2,460	D	1,920	**	310	1,920	2,340	2,460	C		
		Totals		**14,070**						**D**		**15,540**						**E**	**13,970**						**E**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	5	5,740	2,210	3,580	5,180	6,710	7,620	D	5	7,240	2,800	4,540	6,570	8,490	9,660	D	6,940	2,800	4,540	6,570	8,490	9,660	D		
		H-1 Freeway HOV (existing only)	1	1,360	515	839	1,213	1,568	1,783	D	n/a	n/a	515	839	1,213	1,568	1,783	n/a	n/a	515	839	1,213	1,568	1,783	n/a		
		Moanalua Road	2	870	**	**	1,020	1,480	1,560	C[3]	2	970	**	**	1,020	1,480	1,560	C[3]	910	**	**	1,020	1,480	1,560	C[3]		
		Kamehameha Highway	3	1,500	**	310	1,920	2,340	2,460	C	3	1,680	**	310	1,920	2,340	2,460	C	1,630	**	310	1,920	2,340	2,460	C		
		Totals		**9,470**						**D**		**9,890**						**D**	**9,480**						**D**	**NO**	**NO**
Salt Lake	`Ewa-bound	Moanalua Freeway	4	5,900	2,210	3,580	5,180	6,710	7,620	D	4	5,890	2,210	3,580	5,180	6,710	7,620	D	5,580	2,210	3,580	5,180	6,710	7,620	D		
		H-1 Freeway	4	3,550	2,210	3,580	5,180	6,710	7,620	B	4	3,460	2,210	3,580	5,180	6,710	7,620	B	3,060	2,210	3,580	5,180	6,710	7,620	B		
		H-1 Freeway HOV	1	1,410	515	839	1,213	1,568	1,783	D	1	1,320	515	839	1,213	1,568	1,783	D	1,090	515	839	1,213	1,568	1,783	C		
		H-1 Freeway Future zipper lane	n/a	n/a	515	839	1,213	1,568	1,783	n/a	1	810	515	839	1,213	1,568	1,783	B	660	515	839	1,213	1,568	1,783	B		
		Nimitz Highway	3	2,460	**	310	1,920	2,340	2,460	F	3	3,150	**	310	1,920	2,340	2,460	F	2,970	**	310	1,920	2,340	2,460	F		
		Salt Lake Boulevard	1	730	**	**	440	700	740	E	2	990	**	**	1,020	1,480	1,560	C[3]	860	**	**	1,020	1,480	1,560	C[3]		
		Totals		**14,050**						**D**		**15,620**						**D**	**14,220**						**D**	**NO**	**NO**
	Koko Head-bound	Moanalua Freeway	2	3,330	1,030	1,680	2,420	3,130	3,560	E	2	3,510	1,030	1,680	2,420	3,130	3,560	E	3,490	1,030	1,680	2,420	3,130	3,560	E		
		Moanalua Freeway HOV	1	240	515	839	1,213	1,568	1,783	A	1	960	515	839	1,213	1,568	1,783	C	1,070	515	839	1,213	1,568	1,783	C		
		H-1 Freeway + Shoulder Express (1 lane)	4	4,500	2,210	3,580	5,180	6,710	7,620	C	4	4,090	2,210	3,580	5,180	6,710	7,620	C	3,750	2,210	3,580	5,180	6,710	7,620	C		
		H-1 Freeway HOV (1 lane)	1	330	515	839	1,213	1,568	1,783	A	1	1,070	515	839	1,213	1,568	1,783	C	990	515	839	1,213	1,568	1,783	C		
		Nimitz Highway	5	1,500	**	500	3,160	3,790	3,980	C	5	3,130	**	500	3,160	3,790	3,980	C	3,080	**	500	3,160	3,790	3,980	C		
		Salt Lake Boulevard	1	350	**	**	440	700	740	C[3]	2	450	**	**	1,020	1,480	1,560	C[3]	420	**	**	1,020	1,480	1,560	C[3]		
		Totals		**10,250**						**D**		**13,210**						**D**	**12,800**						**D**	**NO**	**NO**

Table 3-10 P.M. Peak-hour Screenline Impacts Analysis—Existing Conditions, 2030 No Build Alternative, and 2030 Project (continued from previous page)

Screenlines			Year 2005 Conditions								2030 No Build Alternative								2030 Project							Screenline Impact Analysis	
			# of Lanes	Observed Volume (vph)[1]	Maximum Volume Threshold[2]					LOS[2]	# of Lanes	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Forecast Volume (vph)	Maximum Volume Threshold[2]					LOS[2]	Project Impact?	Cumulative Impact?
					A	B	C	D	E				A	B	C	D	E			A	B	C	D	E			
Kapālama Canal	`Ewa-bound	Nimitz Highway	3	1,780	**	310	1,920	2,340	2,460	C	3	1,790	**	310	1,920	2,340	2,460	C	1,590	**	310	1,920	2,340	2,460	C		
		Nimitz Flyover (Future Facility)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	880	1,030	1,680	2,420	3,130	3,560	A	810	1,030	1,680	2,420	3,130	3,560	A		
		Dillingham Boulevard	2	1,460	**	200	1,240	1,560	1,640	D	2	1,350	**	200	1,240	1,560	1,640	D	1,260	**	200	1,240	1,560	1,640	D		
		North King Street	2	1,340	**	**	1,020	1,480	1,560	D	2	1,440	**	**	1,020	1,480	1,560	D	1,280	**	**	1,020	1,480	1,560	D		
		H-1 Freeway	4	7,570	2,210	3,580	5,180	6,710	7,620	E	4	8,050	2,210	3,580	5,180	6,710	7,620	F	7,860	2,210	3,580	5,180	6,710	7,620	F		
		Hālona Street	2	1,800	**	**	1,220	1,770	1,870	E	2	2,230	**	**	1,220	1,770	1,870	F	2,110	**	**	1,220	1,770	1,870	F		
		School Street	2	1,220	**	**	1,020	1,480	1,560	D	2	1,380	**	**	1,020	1,480	1,560	D	1,280	**	**	1,020	1,480	1,560	D		
		Totals		**15,170**						**E**		**17,120**						**E**	**16,190**						**E**	**NO**	**NO**
	Koko Head-bound	Nimitz Highway	3	2,770	**	310	1,920	2,340	2,460	F	3	4,250	**	310	1,920	2,340	2,460	F	4,060	**	310	1,920	2,340	2,460	F		
		Dillingham Boulevard	2	1,080	**	200	1,240	1,560	1,640	C	2	1,100	**	200	1,240	1,560	1,640	C	910	**	200	1,240	1,560	1,640	C		
		North King Street	2	1,110	**	**	1,020	1,480	1,560	D	2	1,560	**	**	1,020	1,480	1,560	D	1,480	**	**	1,020	1,480	1,560	D		
		Olomea Street	2	1,670	**	**	1,220	1,770	1,870	D	2	1,890	**	**	1,220	1,770	1,870	F	1,880	**	**	1,220	1,770	1,870	F		
		H-1 Freeway	4	7,320	2,210	3,580	5,180	6,710	7,620	E	5	8,040	2,800	4,540	6,570	8,490	9,660	D	7,940	2,800	4,540	6,570	8,490	9,660	D		
		School Street	2	990	**	**	1,020	1,480	1,560	C[3]	2	1,210	**	**	1,020	1,480	1,560	D	1,150	**	**	1,020	1,480	1,560	D		
		Totals		**14,940**						**E**		**18,050**						**D**	**17,420**						**E**	**NO**	**NO**
Ward Avenue	`Ewa-bound	H-1 Freeway	3	6,790	1,620	2,630	3,800	4,920	5,590	F	3	7,130	1,620	2,630	3,800	4,920	5,590	F	6,990	1,620	2,630	3,800	4,920	5,590	F		
		Beretania Street	5	2,510	**	**	3,170	4,450	4,690	C[3]	5	3,020	**	**	3,170	4,450	4,690	C[3]	2,780	**	**	3,170	4,450	4,690	C[3]		
		Kapi`olani Boulevard	2	1,420	**	**	1,020	1,480	1,560	D	2	1,620	**	**	1,020	1,480	1,560	F	1,520	**	**	1,020	1,480	1,560	E		
		Ala Moana Boulevard	3	1,650	**	310	1,920	2,340	2,460	C	3	2,190	**	310	1,920	2,340	2,460	D	1,980	**	310	1,920	2,340	2,460	D		
		Totals		**12,370**						**E**		**13,960**						**E**	**13,270**						**E**	**NO**	**NO**
	Koko Head-bound	H-1 Freeway	3	6,150	1,620	2,630	3,800	4,920	5,590	F	4	7,370	2,210	3,580	5,180	6,710	7,620	E	7,310	2,210	3,580	5,180	6,710	7,620	E		
		Kīna`u Street	4	1,870	**	**	2,540	3,560	3,750	C[3]	4	1,800	**	**	2,540	3,560	3,750	C[3]	1,780	**	**	2,540	3,560	3,750	C[3]		
		South King Street	6	3,370	**	**	3,800	5,340	5,630	C[3]	6	3,710	**	**	3,800	5,340	5,630	C[3]	3,560	**	**	3,800	5,340	5,630	C[3]		
		Kapi`olani Boulevard	4	1,840	**	**	2,110	2,970	3,130	C[3]	4	2,550	**	**	2,110	2,970	3,130	D	2,490	**	**	2,110	2,970	3,130	D		
		Ala Moana Boulevard	3	2,120	**	310	1,920	2,340	2,460	D	3	2,330	**	310	1,920	2,340	2,460	D	2,270	**	310	1,920	2,340	2,460	D		
		Totals		**15,350**						**D**		**17,760**						**D**	**17,410**						**D**	**NO**	**NO**

[1]Peak hour traffic count data was obtained from the State of Hawai`i Department of Transportation (2005).
[2]LOS thresholds were adapted from Quality Level of Service Handbook (2002) by the State of Florida's Department of Transportation. The Handbook provides the Generalized Peak Hour Two-Way Volumes for Florida's Urbanized Areas (2002). A directional split of 50% was applied to the two-way volumes to generate the peak hour direction volume thresholds for the purpose of this analysis.
[3]The reported LOS "C[3]" means C or better and "B[3]" means B or better.
**LOS thresholds not reported due to type of facility.

the a.m. peak hour. None of the screenlines operate at LOS F during the p.m. peak hour.

> Traffic congestion occurs throughout the study corridor during peak travel hours, affecting cars, freight, and buses.

Under congested conditions, traffic speeds are slow and vehicles back up in queues. As a result, less traffic gets through and any traffic counts conducted under these conditions tend to under-represent the true demand for the facility, making the roadway appear to operate better in this analysis than it actually does. Table 1-3 (in Chapter 1) shows existing travel speeds at several locations in the a.m. peak hour. This information indicates a consistent LOS F throughout the study corridor and reflects current travel conditions in the corridor.

Congestion on roadways currently affects overall mobility within the study corridor while also influencing the ability to add bus service in a cost-effective, reliable manner. This is because buses are using the same congested roadways as automobiles.

Freight

The movement of goods and products is important to O'ahu's economic vitality. Ocean transportation delivers most imported food, building materials, manufactured goods, and energy products. Ocean transportation, shipbuilding and repair, commercial fishing, ocean recreation (as operated by the Division of Land and Natural Resources, Division of Boating and Ocean Recreation), and other support industries are the main activities in O'ahu's commercial harbors.

The harbors are widely used by a variety of interests, from major cargo carriers to commercial fishermen to charter boat operators with a single vessel. O'ahu's three commercial harbors are Honolulu Harbor, Kalaeloa Barbers Point Harbor, and Kewalo Basin. Operation of Kewalo Basin was transferred from HDOT to the Hawai'i Community Development Authority in March 2009. Charter boat operations only occur at Kewalo Basin. Downtown Honolulu and government offices grew around Honolulu Harbor. A network of highways connects this harbor with outlying areas. Freight also enters O'ahu via Honolulu International Airport, which is in the study corridor.

Trucks carrying freight enter and exit Honolulu Harbor on Nimitz Highway and Ala Moana Boulevard and use all major highways and freeways on O'ahu. Heavily used freight routes include Nimitz Highway, the H-1 Freeway, Kalihi Street, and Ala Moana Boulevard and near the airport and surrounding industrial area. These major roadways are also used by transit vehicles, so the same delays that automobiles and transit experience along major corridors are also experienced by truck traffic.

3.3.4 Existing Parking Conditions and Performance

Parking availability varies widely throughout the study corridor. Parking is relatively accessible in suburban areas such as Pearl City and 'Aiea and at most shopping facilities, residences, and along the street. Parking is notably more limited in Downtown Honolulu, Chinatown, Kaka'ako, and near UH Mānoa.

On- and off-street parking facilities are heavily used in Downtown Honolulu, Waikīkī, and along University Avenue. Off-street parking structures are used by commercial and employment centers and, although they are available to the general public, the cost is relatively high. Inadequate parking supply has been a long-term problem in this portion of the study corridor. Permanent on-street parking is not available on Nimitz Highway, Kapi'olani Boulevard, or Kalākaua Avenue, although metered parking is available and heavily used throughout these areas.

Downtown Honolulu parking rates are high. In 2008, the median daily parking rate in Honolulu was $44, nearly $29 more than the national median of $15.42. This rate exceeds those for major urban areas such as Midtown Manhattan ($40) and Chicago ($30). Monthly parking rates are the ninth highest of the 53 U.S. markets surveyed. Honolulu's monthly median parking rate for an unreserved space was $216, more than $60 higher than the national median of $154 (Colliers 2008).

3.3.5 Existing Bicycle and Pedestrian Network Conditions and Performance

Three primary bikeway types constitute the bicycle infrastructure on the island, as defined by the *Bike Plan Hawaiʻi Master Plan* (HDOT 2003):

- **Shared Roadway—**any street or highway open to both bicycles and motor vehicle travel. Signs may be present designating their status as a preferred bike route. Currently, there are 30.1 miles of shared roadway on Oʻahu.
- **Bike Lane—**a section of roadway designated by striping, signing, and/or pavement markings for the preferential or exclusive use of bicyclists. There are 33.6 miles of bike lanes on Oʻahu.
- **Shared-use Path—**a route, open to both bicyclists and pedestrians, that is physically separated from motorized vehicular traffic by an open space or barrier and is located either within the highway right-of-way or has an independent right-of-way. There are 34.3 miles of shared-use paths on Oʻahu.

Although there are approximately 98 miles of bicycle facilities on Oʻahu, topography, safety issues, and an auto-oriented environment have generally limited these facilities in the study corridor. For instance, signs for a shared roadway are located on Farrington Highway. However, high traffic volumes and average vehicle speeds of 35 to 45 mph pose safety concerns for bicyclists using this facility. In the less developed ʻEwa area of the study corridor, bicycle facilities are being constructed in many new subdivisions. Bicycle facilities are often narrow and not continuous. Public transit buses are also equipped with bicycle racks.

The quality and extent of Honolulu's pedestrian system varies depending on location. In certain areas, such as Waikīkī, Chinatown, and Downtown, the City has invested heavily in creating a continuous and accessible pedestrian system. Pedestrian linkages are not yet fully developed in the Kapolei area because of the less dense land uses and the highway network. In most other areas, pedestrian facilities exist but are sometimes narrow or not continuous.

3.3.6 Existing Airport Facilities

Honolulu International Airport is a multi-modal transportation hub located approximately 4 miles west of Downtown Honolulu. The airport is owned and operated by HDOT and includes 4,520 acres of land and water. The airport has four active runways; is served by 27 international and domestic carriers, 3 interisland airlines, and 4 commuter airlines; and serves more than 20 million air passengers each year. In addition, the airport is an international gateway for air freight activity between the United States and Pacific Rim countries. It has more than 450,000 square feet of warehouse space and more than 1 million square feet of cargo ramp area. Cargo facilities at the airport are located at five different sites in the airport complex. There are nine cargo terminal buildings. The airport provides the primary access to Hawaiʻi from elsewhere in the world and serves both domestic and international travelers.

At any given daytime or evening hour, an estimated 10,000 people are in the airport complex as passengers, employees, or visitors. Approximately 15,000 people work at the airport every day and another 20,000 depend on the airport daily for their livelihood.

The airport has four active runways for land-based aircraft operations and two sealanes for seaplane operations. Runway 8L/26R is an east/west runway that is 12,300 feet long and 150 feet wide. Runway 8R/26L (also known as the Reef Runway) is 12,000 feet long and 200 feet wide. These are the two primary runways for commercial operations at the airport. Runway 4R/22L is 9,000 feet long and 150 feet wide and is used primarily for arrivals on runway 4R during night time hours. Parallel Runway 4L/22R is 6,700 feet long and 150 feet wide and is used primarily by general aviation aircraft. The airport is used in various runway configurations so that aircraft can operate safely by taking off and landing into the wind as much as possible. Additional information on airport facilities is available in Appendix K.

Air passengers and employees have multiple transportation choices to get to and from the airport. Primary modes include private auto, rental car, taxicab, public transit (TheBus), charter bus, shuttle bus, and van service. Existing public transit service to the airport consists of routes 19, 20, and 31. Parking options include garage ($13 per day) and economy surface ($10 per day). Short-term parking and valet parking are also available. A cell-phone waiting lot is provided for those picking up airline passengers.

3.4 Transportation Consequences and Mitigation

This section analyzes the effects of the Project on the following topics and compares them to the No Build Alternative:

- Travel characteristics
- Transit effects, including changes affecting mobility, reliability, access, and equity
- Transit-user benefits
- Street and highway effects, including operating conditions that will result from the fixed guideway system and physical effects of the guideway's components
- Parking, including the effects of traffic conditions at guideway stations with park-and-ride access, on- and off-street parking eliminated due to placement of the fixed guideway stations and columns, and spillover parking
- Bicycle and pedestrian movement/access
- Freight movement
- Honolulu International Airport

The transportation-related consequences discussed in this section compare results of the Project with those of the No Build Alternative. While the No Build Alternative does not include the Project, it does incorporate transportation improvements identified in the ORTP.

The ORTP is the long-range plan for developing O'ahu's multimodal transportation system. It includes additional roadway, bus, and bicycle and pedestrian projects planned within the study corridor. These improvements include congestion-relief projects, such as widening Farrington Highway and the H-1 Freeway, extending Kapolei Parkway, constructing HOV and zipper lanes on the H-1 Freeway, the Nimitz Flyover, and widening and extending North-South Road.

Bus improvements are also planned and include service expansion to and within 'Ewa, Kapolei, and Central O'ahu. Bus transit centers are also planned at various locations islandwide.

Roadway elements of the ORTP are further described in Chapter 2. The projects listed above are included in the analysis of the No Build and Project conditions.

Plans to expand O'ahu's bikeway system are also underway and largely driven by the *Bike Plan Hawai'i Master Plan* (HDOT 2003) and the *Honolulu Bicycle Master Plan* (DTS 1999). An update to the Honolulu Bicycle Master Plan is currently underway. Since publication of these reports, construction has begun on the following:

- 19 miles of shared roadways with 172 miles planned
- 5 miles of bike lanes with 50 miles planned
- 14 miles of shared-use paths with 37 miles planned

3.4.1 Future Travel Patterns

The following paragraphs discuss 2030 travel patterns resulting from the Project and compares these with conditions under the No Build Alternative.

Daily Person Trips

Table 3-11 identifies daily person trips by trip purpose for 2007 and 2030. Total daily person trips are expected to increase by approximately 780,000 trips (24 percent) between 2007 and 2030. Travel patterns in 2030 are similar to 2007 trends. Of the 4 million trips forecast for 2030, over 3.4 million (or 85 percent) will be made by residents. Of this total, 33 percent originate or end at work, compared to 34 percent under 2007 conditions. Ground access trips by air passengers increases from 2 percent to 3 percent in 2030 compared to 2007.

Mode of Travel

As shown in Table 3-12, the private automobile share of resident trips under the Project will decrease from 81.5 to 80.1 percent and the transit share will increase from 5.9 to 7.4 percent in 2030 compared to the No Build Alternative. Bicycle and walk trips will remain at about 12 percent of all resident trips compared to the No Build Alternative. For trips made by visitors, transit mode share will increase slightly with the Project compared to the No Build Alternative, while private auto share will drop slightly. Visitor bike and walk mode shares will decrease between 2007 and 2030 No

> Even with more than $3 billion in roadway improvements under the No Build Alternative, traffic delay in 2030 would increase 46 percent compared to today.

Table 3-11 Islandwide Person Trips by Trip Purpose—2007 and 2030

Trip Purpose	2007		2030	
	Daily Person Trips	Percentage of Total Daily Trips	Daily Person Trips	Percentage of Total Daily Trips
Trips by Residents				
To and from work	933,000	28.6%	1,127,800	27.9%
While at work	173,300	5.3%	218,800	5.4%
To and from school/university	288,200	8.8%	356,700	8.8%
To and from shopping/other	995,000	30.5%	1,245,700	30.8%
Do not end at work or home	401,800	12.3%	504,900	12.5%
Total Trips by Residents	**2,791,300**	**85.6%**	**3,453,900**	**85.5%**
Other Trips				
Trips by truck	44,700	1.4%	51,600	1.3%
Ground access trips by air passengers	60,000	1.8%	103,900	2.6%
Trips by visitors	364,400	11.2%	430,700	10.7%
Total Daily Trips (All)	**3,260,400**	**100%**	**4,040,100**	**100%**

Totals may not add to 100% due to rounding. Numbers rounded to nearest hundred.

Table 3-12 Islandwide Daily Trips by Mode—Existing Conditions, No Build Alternative, and Project

Trips by Mode	2007 Existing Conditions		2030 No Build Alternative		2030 Project	
	Daily Trips by Mode	Percentage of Total Daily Trips	Daily Trips by Mode	Percentage of Total Daily Trips	Daily Trips by Mode	Percentage of Total Daily Trips
Residents						
Automobile–private	2,291,800	82.1%	2,815,800	81.5%	2,767,600	80.1%
Transit	166,400	6.0%	205,400	5.9%	255,500	7.4%
Bicycle and walk	333,000	11.9%	432,800	12.5%	431,700	12.5%
Total Daily Trips by Residents	**2,791,200**	**100%**	**3,454,000**	**100%**	**3,454,800**	**100%**
Visitors						
Automobile–private	116,400	31.9%	160,100	37.2%	157,800	36.6%
Transit	17,600	4.8%	19,700	4.6%	23,500	5.5%
Bicycle and walk	165,100	45.3%	163,600	38.0%	163,600	38.0%
Taxi	9,300	2.6%	9,700	2.3%	9,500	2.2%
Tour bus	56,000	15.4%	77,500	18.0%	76,200	17.7%
Total Daily Trips by Visitors	**364,400**	**100%**	**430,600**	**100%**	**430,600**	**100%**
Ground Access Trips by Air Passengers						
Automobile–private	16,300	27.1%	27,500	26.5%	26,800	25.8%
Transit	700	1.2%	1,200	1.2%	3,500	3.4%
Taxi	9,700	16.1%	16,400	15.8%	15,800	15.2%
Tour bus	12,000	20.0%	20,800	20.0%	20,800	20.0%
Shuttle bus	21,400	35.6%	38,000	36.6%	37,000	35.6%
Total Daily Trips by Air Passengers	**60,100**	**100%**	**103,900**	**100%**	**103,900**	**100%**
All Daily Trips						
Total daily automobile trips–private	2,424,500	75.4%	3,003,400	75.3%	2,952,200	74.0%
Total daily transit trips	184,700	5.7%	226,300	5.7%	282,500	7.1%
Total daily bicycle and walking trips	498,100	15.5%	596,400	15.0%	595,300	14.9%
Total daily trips–other modes	108,400	3.4%	162,400	4.1%	159,300	4.0%
Total Daily Trips–All	**3,215,700**	**100%**	**3,988,500**	**100%**	**3,989,300**	**100%**

Numbers rounded to nearest hundred. Numbers may not add to 100% due to rounding.

Trips by truck are not included in this table.

Build conditions as more auto-oriented tourist destinations, such as Ko‘ Olina and Turtle Bay, are developed. Other modes will remain the same for the No Build Alternative and the Project. Ground access transit trips by air passengers will increase 2 percent with the Project compared to without it. More than 51,000 fewer vehicle trips will occur daily with the Project.

Transit Trips by Trip Purpose

In 2030, without the Project, transit trips would account for 226,300 of all daily trips islandwide. As shown in Table 3-13, trips by residents would

Table 3-13 Islandwide Daily Transit Trips by Trip Purpose—Existing Conditions, No Build Alternative, and Project

Trip Purpose	2007 Existing Conditions		2030 No Build Alternative		2030 Project	
	Daily Person Transit Trips	Percentage of Total Daily Transit Trips	Daily Person Transit Trips	Percentage of Total Daily Transit Trips	Daily Person Transit Trips	Percentage of Total Daily Transit Trips
Trips by Residents						
To and from work	85,300	46.2%	104,100	46.0%	140,200	49.6%
While at work	8,700	4.7%	10,700	4.7%	12,200	4.3%
To and from school/university	27,200	14.7%	35,100	15.5%	43,200	15.3%
To and from shopping/other	41,200	22.3%	50,500	22.3%	54,400	19.3%
Do not end at work or home	4,000	2.2%	5,000	2.2%	5,500	1.9%
Total Transit Trips by Residents	**166,400**	**90.1%**	**205,400**	**90.8%**	**255,500**	**90.4%**
Other Trips						
Ground access trips by air passengers	700	0.4%	1,200	0.5%	3,500	1.2%
Trips by visitors	17,600	9.5%	19,700	8.7%	23,500	8.3%
Total Daily Transit Trips (All)	**184,700**	**100.0%**	**226,300**	**100.0%**	**282,500**	**100.0%**

Numbers rounded to nearest hundred. Totals may not add to 100% due to rounding.

account for 91 percent of daily transit trips. Approximately 50 percent of daily transit trips would either originate or end at work. Trips by visitors would account for approximately 9 percent of daily transit trips. Less than 1 percent of all daily trips would be made by air passengers.

The total number of daily transit trips in 2030 will increase to 282,500 with the addition of the Project. Trips by residents will continue to account for approximately 90 percent of all daily transit trips. There will be a 4 percent increase in trips originating or ending at work. Trips by visitors will account for approximately 8 percent of daily transit trips. With the Project, trips by air passengers will increase to 1.2 percent of daily transit trips.

Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

Under the 2030 No Build Alternative, approximately 13.6 million VMT per day are projected in the transportation system, including major freeways, highways, arterials, and collectors. This would be an increase of approximately 21 percent (or over 2 million miles) over 2007 conditions (Table 3-14). VHT would increase by 28 percent by 2030 compared to 2007 levels. VHD would increase by 46 percent. VHT and VHD would increase at a higher rate than VMT because as roadway facilities become oversaturated, travel times through the affected sections would increase dramatically.

VMT, VHT, and VHD are projected to decrease under the Project compared to the No Build Alternative (Table 3-14). Daily VMT will decrease by 4 percent and VHT will decrease by 8 percent. VHD will experience the greatest decrease: 18 percent. This reflects the fact that even moderate decreases in traffic volumes under congested conditions can result in relatively large decreases in travel delay.

Under congested conditions, even small reductions in traffic volumes can show large reductions in delay.

Table 3-14 Islandwide Daily Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay—Existing Conditions, No Build Alternative, and Project

Alternative	Daily VMT	Daily VHT	Daily VHD
2007 Existing Conditions	11,232,400	325,700	71,800
2030 No Build	13,623,100	415,600	104,700
Percent Change from 2007	*21%*	*28%*	*46%*
2030 Project	13,049,000	383,800	85,800
Percent Change from 2007	*16%*	*18%*	*19%*
Percent Change from 2030 No Build	*-4%*	*-8%*	*-18%*

Numbers rounded to nearest hundred.

Reverse Commute Markets

Reverse commute trips originate in central areas and are destined to outlying and more suburban locations. Similar to current conditions, the No Build Alternative would have two-way transit service along major travel corridors, thereby providing opportunities for reverse commute bus riders. However, the effectiveness of the service would be compromised by characteristics such as reduced overall bus travel speeds.

The fixed guideway system will address reverse commute markets by improving access to West Oʻahu communities. The fixed guideway service provided under the Project will support and reinforce land use plans associated with Oʻahu's planned "second city" in Kapolei. With an almost four-fold increase in employment estimated by 2030 for Kapolei, the quick and direct access provided by the fixed guideway system from PUC Development Plan area locations (e.g., Downtown and Kakaʻako) will help address the demand of future reverse commute markets. These markets include existing and planned local government offices and the future UH West Oʻahu campus. Based on travel forecasts, about 15 percent of home-to-work trips during the a.m. two-hour peak period in the ʻEwa-bound direction will be by transit versus only 9 percent without the Project. This demonstrates that the Project supports the goal of improving access to planned development and a second urban center.

Service to Transit-Dependent Households

Bus service under the No Build Alternative would provide access to areas with high concentrations of transit-dependent households. Transit-dependent communities are defined as areas where 25 percent or more of households do not have vehicles or where 25 percent or more of residents are unable to drive. Compared to 2007 conditions, some increases in transit travel times are projected for travel markets involving transit-dependent households. One example is between Pearlridge and Downtown Honolulu. Other travel markets would experience small reductions in transit travel times.

Under the Project, transit travel time benefits will occur for several communities with high concentrations of transit-dependent households (Figure 3-5). There will be substantial travel time benefits for transit-dependent communities such as Waipahu, West Loch, Waikīkī, Chinatown, and Makakilo. Benefits for transit-dependent households are explained further in Section 3.4.2.

3.4.2 Effects on Transit

This section describes the effects of the Project on various transit factors, including mobility, access, reliability, and equity.

> In 2030 under the No Build Alternative, even with ORTP planned improvements, the key measures of transit reliability, accessibility, mobility, and equity would all be worse than today.
>
> The Project will benefit the overall transportation system, enhancing the key measures of transit reliability, accessibility, mobility, and equity.

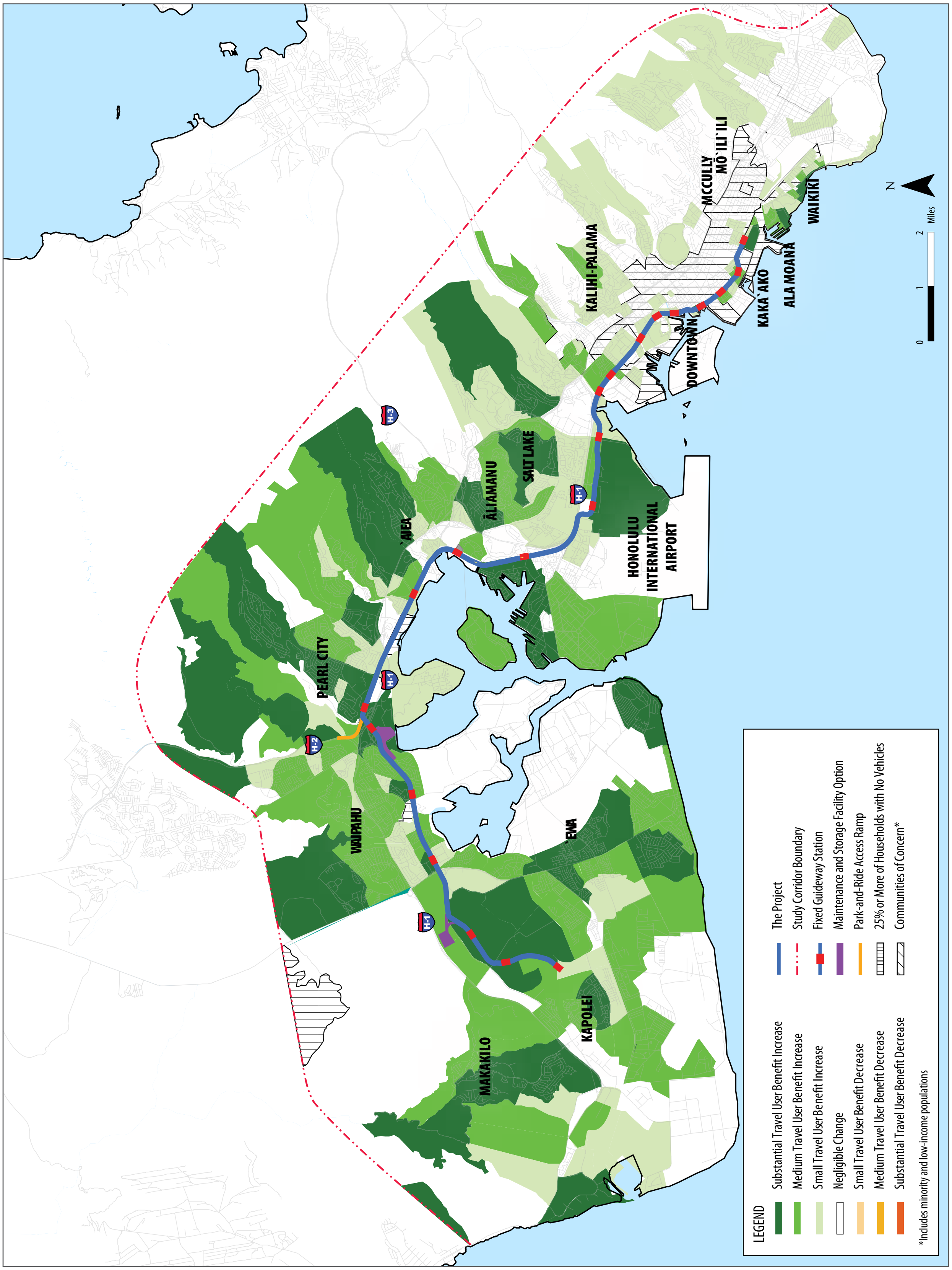

Figure 3-5 Transit-dependent Households and Transit-user Benefits—2030 Project

TheBus Network with the Project

Overall bus service hours will remain about the same with the Project, but the service network (routes) will be distributed differently to take advantage of the fixed guideway service. In Waiʻanae, local and express services will be enhanced through shorter routes and more frequent service to connect to the fixed guideway system in East Kapolei with the major connection point at the UH West Oʻahu Station. Central Oʻahu connections to the fixed guideway system will occur at the Pearl Highlands Station. Few changes will occur in Pearl City and ʻAiea. Pearl Harbor Naval Base and Hickam Air Force Base will be served by circulator buses connecting to fixed guideway stations. Kalihi services are anchored at the Middle Street Transit Center. A number of routes will connect to this transit center. In Downtown and Waikīkī, buses will continue to operate on the major east-west transit streets of King, Hotel, Beretania, Kapiʻolani, and Ala Moana to provide local circulation. In Windward Oʻahu, a few routes will be altered to connect with the fixed guideway system, thus offering Windward residents connections to Leeward Oʻahu.

Most fixed guideway stations will offer connections to local bus routes. In some cases, an off-street transit center either already exists or will be built to accommodate transfers. In other cases, an on-street bus stop with dedicated curb space or a pullout will be located adjacent to the fixed guideway station. TheHandi-Van vehicles will be accommodated at all stations and, in some cases, space for private tour buses, taxis, and/or special shuttles also will be included. Dedicated kiss-and-ride pullouts (passenger drop-offs) and parking spaces will be provided at several stations to facilitate drop-off and pick-up.

Bus transfers will be made at designated transit centers adjacent to fixed guideway stations at UH West Oʻahu, West Loch, Waipahu Transit Center, Pearl Highlands, Pearlridge, Aloha Stadium, and the Middle Street Transit Center. The transit centers at UH West Oʻahu, West Loch, Pearl Highlands, and Aloha Stadium will be constructed as part of this Project. The other transit centers already exist or are planned for construction to support bus operations independent of this Project. On-street bus transfers will be accommodated at most other fixed guideway stations. Transfers at Ala Moana Center will continue to occur on Kona and Piʻikoi Streets and Ala Moana Boulevard.

Enhanced bus service will be provided between the terminal stations of the Project and the planned extensions of the total fixed guideway system. System improvements will complement frequent bus service at the East Kapolei, Pearl Highlands, and Ala Moana Center Stations. Examples of potential bus system improvements could include the following:

- **Traffic Signal Priority**—allows buses to queue jump ahead of cars at signals or allows signals to stay green for approaching buses
- **Automated Vehicle Identification**—tracks exact location of buses remotely, allowing the operation center to make small, continuous adjustments to keep buses properly spaced and on schedule
- **Off-Vehicle Fare Collection**—allows passengers to purchase tickets and pay fares before the vehicle arrives, which speeds the boarding process, reduces dwell times, and increases operating efficiency

These bus system improvements will reduce travel times and improve intermodal transfers. Bus and fixed guideway departures and arrivals will be coordinated and predictable to minimize transfer waiting time and total trip time.

Appendix D details proposed changes and additions to the local bus system with the fixed guideway. For each route, the information identifies current service characteristics, including frequencies and proposed changes. All new routes and their service characteristics are also presented in both a table and series of maps.

Transit Speed

As a result of growth in traffic congestion and the lack of exclusive right-of-way for transit vehicles, bus speeds have gradually declined over the past several years and would continue to decline under the No Build Alternative. Under the Project, transit riders will experience substantially reduced travel times during the a.m. two-hour peak period (6:00 to 8:00 a.m.) compared to existing conditions and the No Build Alternative. Shorter travel times reflect faster systemwide transit speeds.

The fixed guideway operations will provide faster service compared to bus-only operations. Table 3-15 lists transit speeds for the existing conditions, the 2030 No Build Alternative, and the Project at selected locations. Figure 3-6 compares system-level transit speeds for the No Build Alternative (bus-only) with the Project (bus and rail). The projected temporary increase in transit speeds in 2016 is attributable to improved transit operations due to the planned implementation of a PM zipper lane on the H-1 Freeway.

Table 3-15 Average Transit Vehicle Speeds in Miles Per Hour—Existing Conditions, No Build Alternative, and Project

Travel Market	2007 Existing Conditions	2030 No Build Alternative	2030 Project (Bus and Rail)
Kapolei to Downtown	19	19	28
\`Ewa to Downtown	15	15	22
Waipahu to Downtown	19	19	32
Mililani to Downtown	20	18	30
Pearl City/\`Aiea to Downtown	15	13	29
Downtown to Ala Moana Center	13	10	24
Waipahu to Waikīkī	17	17	25
Kapolei to Pearl Harbor	22	10	28
Airport to Waikīkī	10	10	19
Ala Moana Center to UH West O\`ahu	15	29	31
Pearl City/\`Aiea to Kapolei	15	18	26

Figure 3-7 shows 2007 and 2030 travel times between selected travel markets. This information represents the time required to complete a trip from origin to destination and assumes that at least a portion of the trip will be made on the fixed guideway system. Travel-time information for 2030 is presented for the No Build Alternative and with the Project.

As shown in this figure, some transit travel times are projected to improve under the No Build Alternative. In general, these trips would take advantage of extended HOV lanes on the H-1 Freeway, improved operations of the zipper lane (assumed to be limited to vehicles with three or more occupants in the year 2030), and/or the proposed Nimitz Flyover facility (which would give priority to HOVs and transit vehicles).

As shown in Figure 3-7, travel times will improve substantially (up to a 60 percent travel time savings) with the Project as compared to the No Build Alternative. The largest improvement in travel time savings occurs for trips from Kapolei to Pearl Harbor. Even trips to and from Mililani and Waikīkī, which are not along the Project alignment, will benefit from reduced travel times when using the guideway. There will also be travel time savings for residents that reverse commute from Ala Moana to UH West Oʻahu or from Pearlridge Center to Kapolei for work.

Table 3-15 shows a substantial improvement in transit speeds with the Project. As a result of increased transit speeds with the Project, major reductions in transit travel times will occur for several major markets, such as between

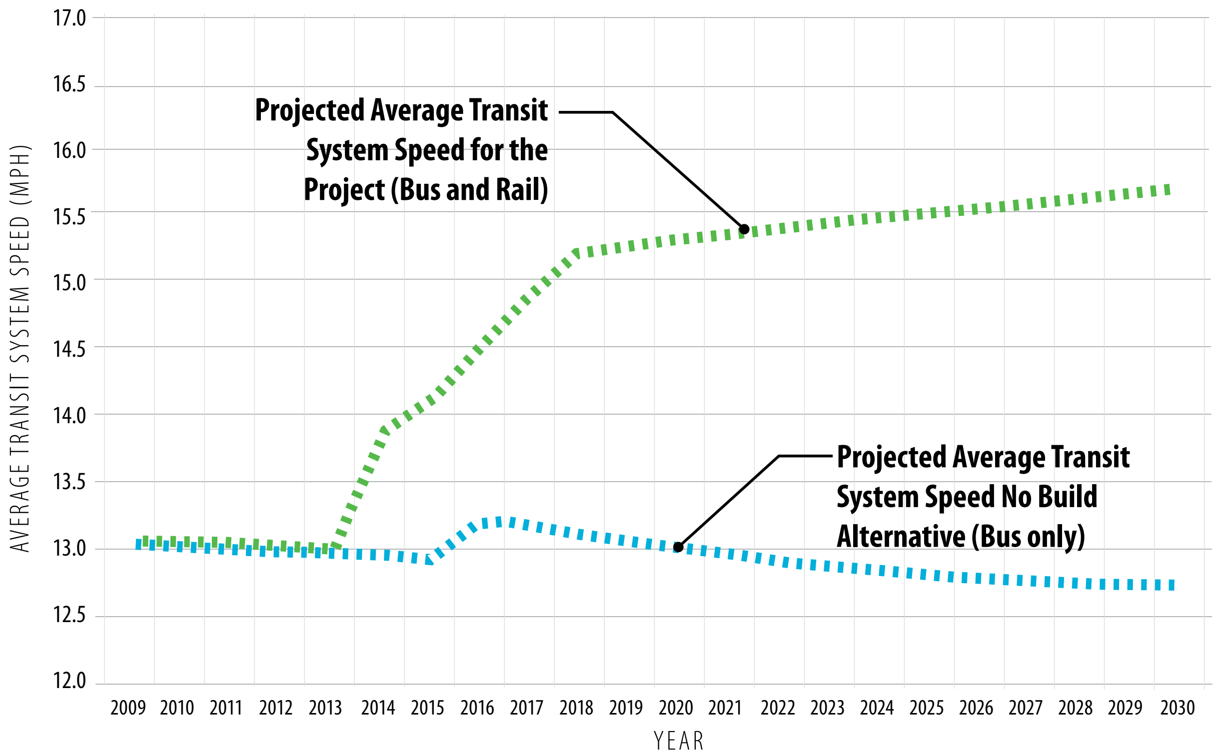

Figure 3-6 Transit Average Operating Speeds in Miles per Hour—No Build Alternative and the Project

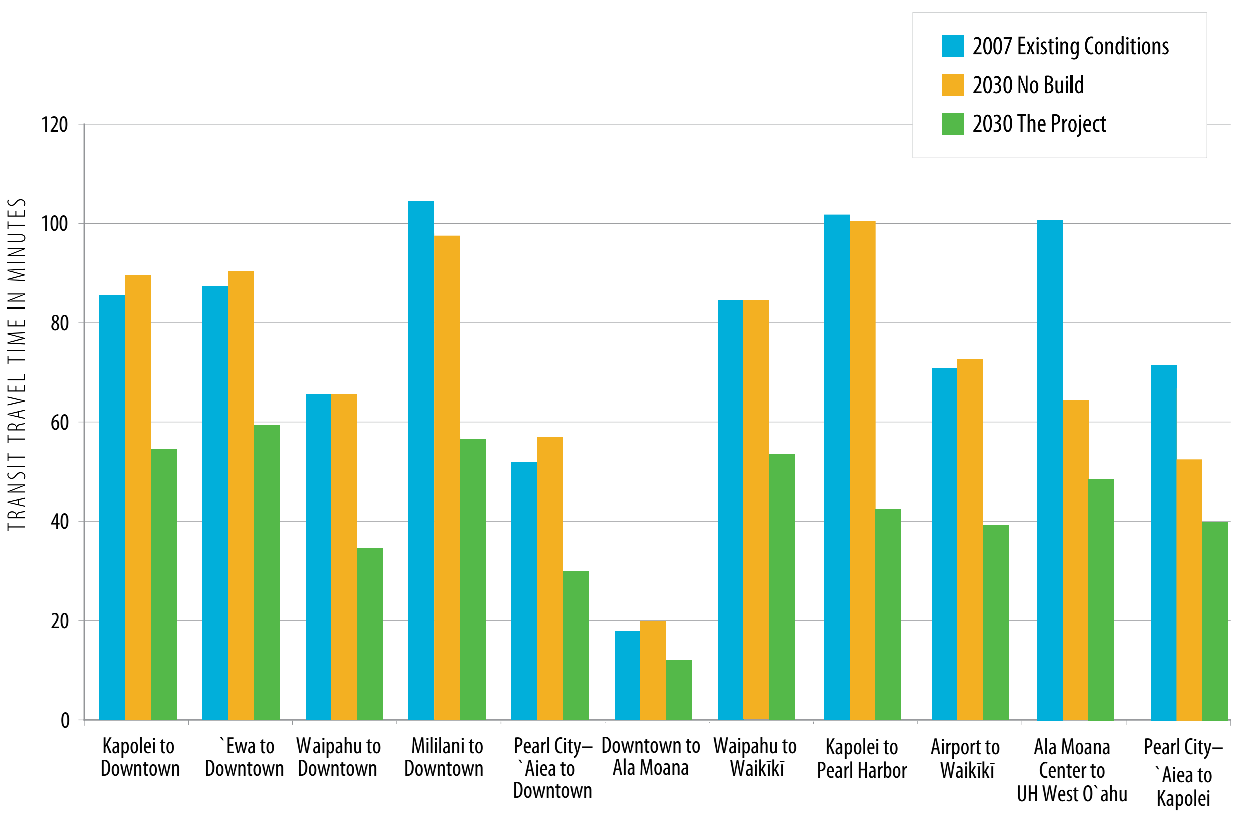

Figure 3-7 A.M. Peak-Period Transit Travel Times by Travel Market—Existing Conditions, No Build Alternative, and Project

developing areas in ʻEwa and Downtown Honolulu. The most substantial improvements in transit speeds will be from Kapolei to Pearl Harbor, Pearl City/ʻAiea to Downtown, and Downtown to Ala Moana Center. As demand increases after the fixed guideway system is fully operational, service will gradually be expanded with more frequent and longer trains. This will cause the overall average transit travel time to continue to decrease.

Under the Project, average travel times on transit will improve dramatically, enhancing overall mobility and accessibility. In some cases, transit travel times will be half of what they are today.

The improved travel time under the Project is largely attributable to very quick station-to-station travel times, as shown in Table 3-16. Since the fixed guideway system will operate independently from traffic, these travel times will be the same at all times of the day, thereby offering certainty and reliability to riders. For example, Table 3-16 shows that the travel time between the East Kapolei and UH West Oʻahu Station will only be two minutes. The travel time from East Kapolei to Pearlridge Station, a heavily traveled portion of the study corridor, will be the sum of the travel times in between, or 18 minutes.

Table 3-16 Fixed Guideway Station-to-Station Travel Times—2030

From Station	To Station	Travel Time Between Stations (in minutes, including dwell time)
East Kapolei	UH West O`ahu	2
UH West O`ahu	Ho`opili	4
Ho`opili	West Loch	2
West Loch	Waipahu TC	3
Waipahu TC	Leeward CC	2
Leeward CC	Pearl Highlands	1
Pearl Highlands	Pearlridge	4
Pearlridge	Aloha Stadium	3
Aloha Stadium	Pearl Harbor NB	2
Pearl Harbor NB	Airport	3
Airport	Lagoon Drive	2
Lagoon Drive	Middle Street TC	2
Middle Street TC	Kalihi	2
Kalihi	Kapālama	2
Kapālama	Iwilei	2
Iwilei	Chinatown	1
Chinatown	Downtown	1
Downtown	Civic Center	1
Civic Center	Kaka`ako	1
Kaka`ako	Ala Moana	2
Total Travel Time		**42**

CC = Community College TC = Transit Center NB = Naval Base

Transit User Benefits for New Starts

For the New Starts funding program, FTA requires that user benefits be compared to a baseline alternative that represents the best that can be done to improve transit service in the study corridor without building a fixed guideway transit facility. Transportation System User Benefits captures a set of benefits to transit riders—including reductions in walk times, wait times, ride times, number of transfers, and costs (converted to time)—in terms of savings in travel time. Identifying user benefits provides a comparison between a given transit alternative and a baseline alternative. The "New Starts Baseline Alternative," which is different from the NEPA No Build Alternative, includes all projects in the ORTP except the Project, plus additional bus service comparable to the TSM Alternative used in the Alternatives Analysis. Accordingly, user benefits with the Project are higher when compared to the No Build Alternative (as shown in Table 3-17).

This section discusses transit-user benefits of the Project compared to the New Starts Baseline. Identifying transit user benefits is an effective way to quantify the four key goals of the Project—improved mobility, reliability, access to planned development, and transportation equity.

Table 3-17 Estimated Transit User Benefits Resulting from the Project—2030

Key Travel Market[1,2]	Compared to New Starts Baseline		Compared to No Build Alternative	
	Benefits per Year (hours)	Benefits per Rail Rider per Trip (minutes)	Benefits per Year (Hours)	Benefits per Rail Rider per Trip (Minutes)
Work trips to Downtown	1,769,000	34	1,747,000	34
Visitor trips from Waikīkī	468,000	28	529,000	31
Other trips to Downtown	274,000	31	298,000	34
Work trips to Waikīkī	1,079,000	35	1,029,000	34
Work trips to Kalihi	643,000	30	629,000	29
School trips to UH Mānoa	1,003,000	38	992,000	37
Work trips to Kaka`ako	615,000	32	603,000	31
Work trips from Mō`ili`ili	491,000	35	485,000	35
Work trips from `Ewa	1,087,000	37	1,147,000	39
Work trips from Kapolei	564,000	42	596,000	45
Work trips from Waipahu	729,000	32	751,000	33
Work trips from Mililani	553,000	37	556,000	37
Subtotal	**9,275,000**	**34**	**9,362,000**	**35**
Other trips	11,500,000	31	13,256,000	36
Total	**20,775,000**	**32**	**22,618,000**	**35**

Source: O`ahuMPO Travel Demand Forecasting Model.

[1]Except for Visitor trips from Waikīkī, the markets involve home-based travel.

[2]Benefits in overlapping markets are not double counted. Refer to Addendum 01 to the Travel Demand Forecasting Results Report for complete user benefit matrices.

The main factors in determining benefits are travel time and cost. User benefits are measured in minutes and are a summary measure that incorporates travel-time and cost changes for all modes. In the case of transit, FTA defines differing weights to reflect the effective time of transfers, waiting, in-vehicle travel-time, etc., in addition to costs such as fares, to arrive at a total trip user benefit. These factors are based on empirical evidence from existing systems throughout the country.

Positive Attributes of a Fixed Guideway System

Research indicates that positive attributes (both perceived and real) are associated with the use of a fixed guideway system, thereby making the system more attractive than bus transit operating in mixed traffic. These benefits include such features as improved safety, security, visibility, convenience, speed, comfort, financial savings, and reliability. These features or attributes are not captured by the standard travel demand forecasting process. To account for these attributes in the user benefit analysis, FTA has approved an additional factor equivalent to a 14.5-minute savings of in-vehicle time. The factor was only incorporated for riders taking the fixed guideway based on the experience in several regions where existing rail transit service is a part of the transit system and where these systems have been recently surveyed. A more modest 5.5-minute savings of in-vehicle time was incorporated for riders taking feeder buses to the fixed guideway.

Transit User Benefits—Selected Major Travel Markets

Transit user benefits have been estimated for various travel markets and at the geographic level.

With the Project, it is estimated that approximately 20,775,000 hours of user benefits will be generated per year. Greater use of the transit system, higher transit speeds, and the other attributes noted previously will contribute to these user benefits.

The user benefits, expressed in terms of hours saved per year, can also be identified for specific transit travel markets. Table 3-17 shows estimated annual benefits for several markets on Oʻahu. These benefits will range from approximately 274,000 hours per year (for Home-based Other trips destined to Downtown) to almost 1,769,000 hours per year (for Home-based Work trips to Downtown Honolulu) when compared to the New Starts Baseline. In addition, user benefits accrue for work trips from ʻEwa and Kapolei, both planned development areas. The estimated cumulative savings of approximately 9,275,000 hours per year compared to the New Starts Baseline represents just under one-half of the approximately 20,775,000 estimated total annual user benefits that will result from the Project.

Table 3-17 also shows the number of minutes saved per fixed guideway rider per trip. Benefits range from a 28-minute savings for visitor trips from Waikīkī to a 42-minute savings for home-based work trips from Kapolei compared to the New Starts baseline.

System-level user effects were analyzed using travel time benefits for islandwide analysis zones. The main factors in determining benefits are transit trip travel time and cost. User Benefits maps are used to show which residents gain or lose utility from a project. Areas that will receive user benefits (e.g., a decrease in estimated travel time or cost) as a result of the Project are shown in green. Three shades of green are presented to illustrate benefits: (1) substantial benefits (dark green, top 40 percent of user benefits); (2) medium benefits (medium green, next 30 percent of positive user benefits); and (3) small benefits (light green, next 10 percent of positive user benefits). Areas that will experience negative user benefits are shaded red for substantial negative user benefits, medium orange for medium negative user benefits, and light orange for small negative user benefits. Areas shaded white will not experience either positive or negative user benefits as a result of the Project, or are not part of the analyzed area (e.g., Koʻolau and Waiʻanae Mountains).

As shown in Figure 3-8, the vast majority of islandwide zones will experience some benefit from the Project. Of the zones in the analyzed area, none will experience decreases in user benefits. Concentrations of zones experiencing moderate or major benefits are located in West Oʻahu and ʻAiea/Pearl City. In addition, several markets estimated to experience major user benefits will not be located on the alignment. These include Waikīkī, UH Mānoa, and ʻEwa. The Project will benefit users in these areas because residents can access the guideway via local bus service or park-and-rides.

Most areas within the study corridor will experience "user benefits" under the Project compared to No Build conditions due to a reduction in transit travel times.

As shown in Figure 3-5, there will be positive user benefits for communities with high concentrations of transit-dependent households (greater than 25 percent of households without automobiles or people able to drive), as well as other defined groups within communities of concern. Data collected and used as indicators for these communities of concern include linguistically isolated households, transit-dependent populations, and areas with public housing and community services. Substantial positive user benefits for communities of concern are shown in or near Waipahu, Pearl Harbor Naval Base, and Ala Moana Center. Overall, many communities of concern receive positive benefits from the Project. No community

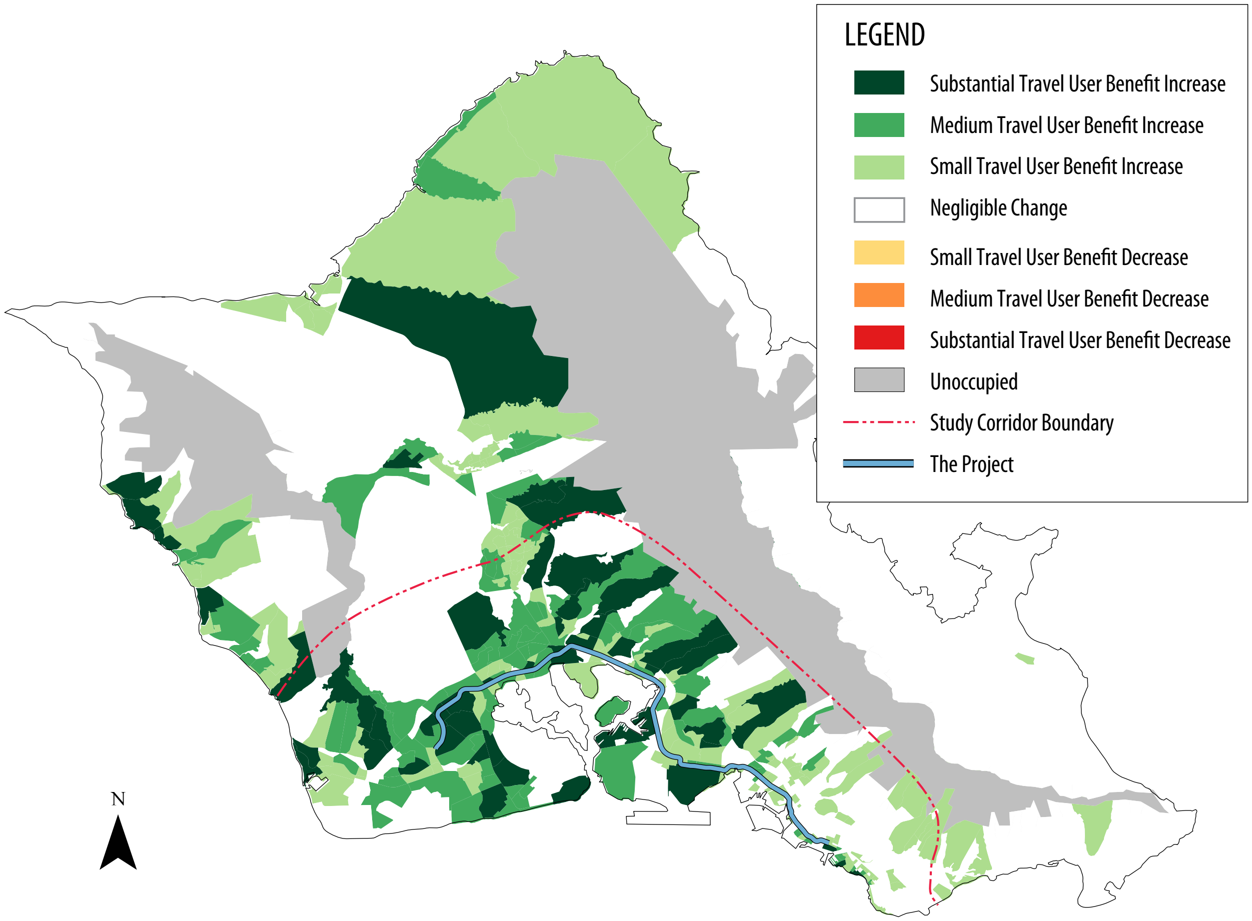

Figure 3-8 Positive User Benefits of the Project Compared to No Build Alternative—2030

of concern will experience negative user benefits. Those areas with high transit dependence, such as Waipahu, Pearl City, ʻAiea, Kalihi, Iwilei, Chinatown, Downtown, Kakaʻako, Ala Moana, and Waikīkī, as shown in Figure 3-5, benefit from more than 35 percent of the total user benefits. With user benefit improvements between planned population and employment areas and for transit-dependent households, the Project supports each of the four project goals.

Transit Ridership

No Build—Systemwide Ridership

Transit boardings under the No Build Alternative are expected to keep pace with population growth and increase over 2007 existing conditions by approximately 25 percent (Table 3-18). No major increases in the transit share of total travel are projected for the No Build Alternative.

Although some increases in bus services would occur under the No Build Alternative, a review of route-specific demand and service levels for 2030 indicates that bus capacity would be exceeded for several routes. In some cases the demand per bus trip would be more than twice the seating capacity. In these instances, passengers will be unable to board the bus.

Adding substantial passenger capacity with more buses is not feasible in some key locations along the system because of roadway capacity constraints.

Table 3-18 Islandwide Daily Transit Boardings and Trips for Existing Conditions, No Build Alternative, and Project

Alternative	Fixed Guideway Boardings	Total Transit Boardings	Total Transit Trips
2007 Existing Conditions	n/a	252,200	184,700
2030 No Build	n/a	314,200	226,300
% Change from 2007		*25%*	*23%*
2030 Project	116,300	453,400	282,500
% Change from 2007	*n/a*	*79%*	*53%*
% Change from No Build	*n/a*	*44%*	*25%*

Boardings represent the total number of times someone gets on a transit vehicle, whereas a trip can include transfers.

Numbers rounded to nearest hundred.

Choke points occur in Downtown Honolulu during the a.m. peak period, especially at the merger of North Beretania, North King, and Liliha Streets, and Dillingham Boulevard and along Hotel Street. King Street has been used to introduce new service in recent years due to the capacity limitation of Hotel Street; however, choke points occur at the Chinatown bus stops and at the Punchbowl Street and King Street stops. Buses often must wait to move into an open and safe boarding position. Continuing to add service to King Street without major physical improvements would add to the gridlock in this corridor, deteriorate transit service, and complicate pedestrian and traffic safety issues. In the p.m. peak period, choke points occur along Beretania Street, Hotel Street, Nimitz Highway, and Ala Moana Boulevard in the Downtown area.

Several routes, including CountryExpress! Routes C, D, and E are projected to be overloaded in 2030. Increasing frequency would require headways at five minutes or less. Further, the Downtown street network cannot support the number of buses that would be required to meet projected demand.

The Project—Systemwide Ridership

Table 3-18 shows projected 2030 daily transit ridership for the No Build Alternative and the Project. Ridership numbers are presented in terms of fixed guideway boardings, total transit boardings, and total transit trips. Daily transit boardings for the Project will increase 44 percent over the No Build Alternative. More than 9,900 visitors will use the fixed guideway daily, of which about 1,800 are to or from the airport. Approximately 40,000 automobiles will be removed from roadways as a result of the Project, compared to No Build conditions.

Station and Link Volumes

Figure 3-9 shows the number of fixed guideway boardings (passengers getting on) and alightings (passengers getting off) that will occur at each station during the a.m. two-hour peak period in each direction. The Pearl Highlands Station will have the highest number of boardings in the a.m. two-hour peak period, and the Ala Moana Center Station will have the highest number of alightings and total passenger activity (boardings plus alightings).

Figure 3-9 also shows the passenger volumes on trains between each station during the a.m. two-hour peak period. The location of the highest link volume will occur between Aloha Stadium and Pearl Harbor. The maximum peak direction (Koko Head) volume during the a.m. two-hour peak period will be about 14,700 passengers in 2030. This is below the fixed guideway system's currently planned minimum capacity of 17,300 passengers per direction for a two-hour period. Should higher passenger volumes be realized, the system will be designed to allow the City to provide substantially higher capacity by adding vehicles to each train or reducing headways. Such operational adjustments will be evaluated as the system approaches the planned capacity toward 2030.

Figure 3-10 shows the number of daily fixed guideway boardings and alightings projected for

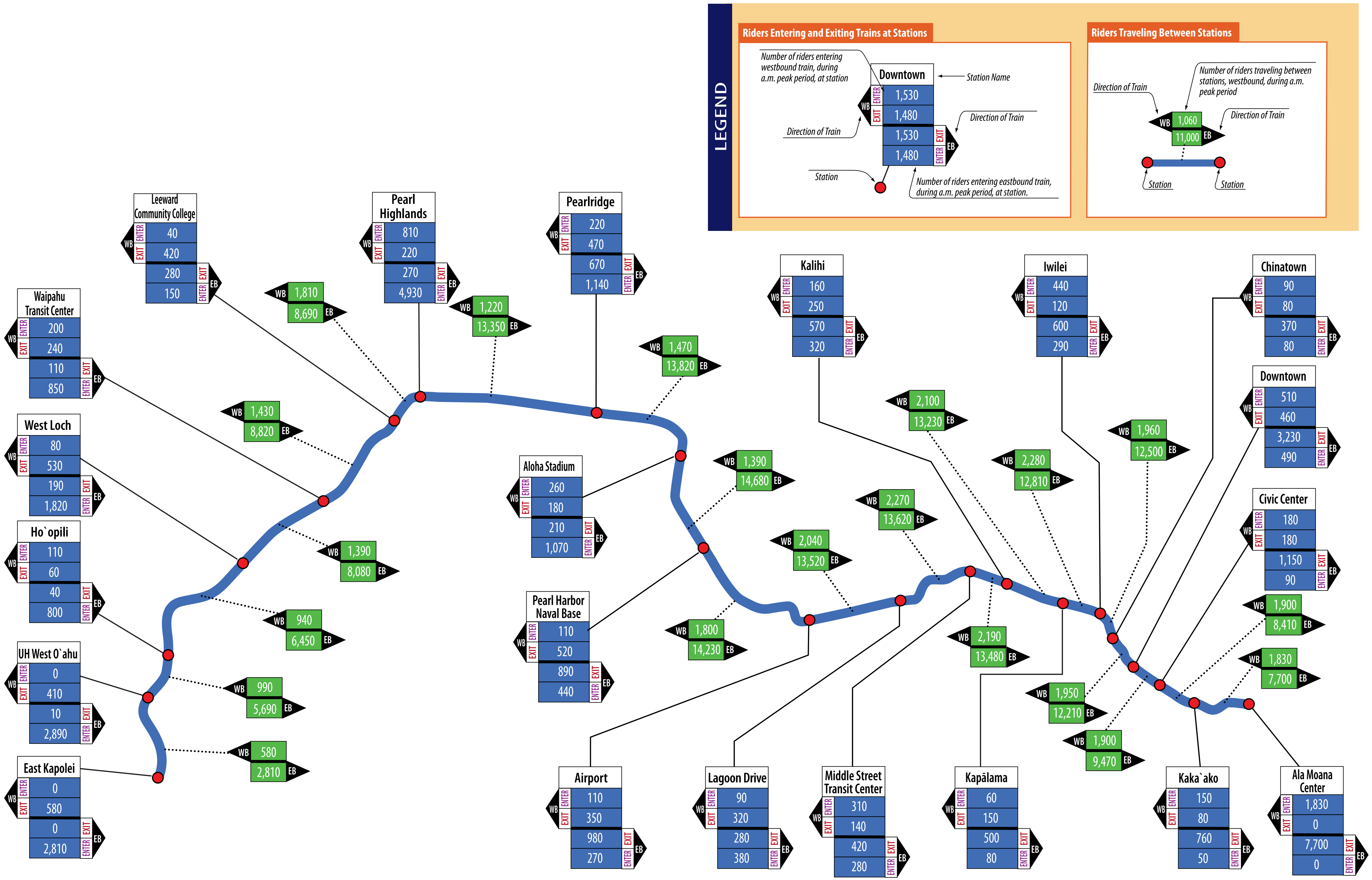

Figure 3-9 2030 A.M. Two-hour Peak Period Boardings, Alightings, and Link Volumes

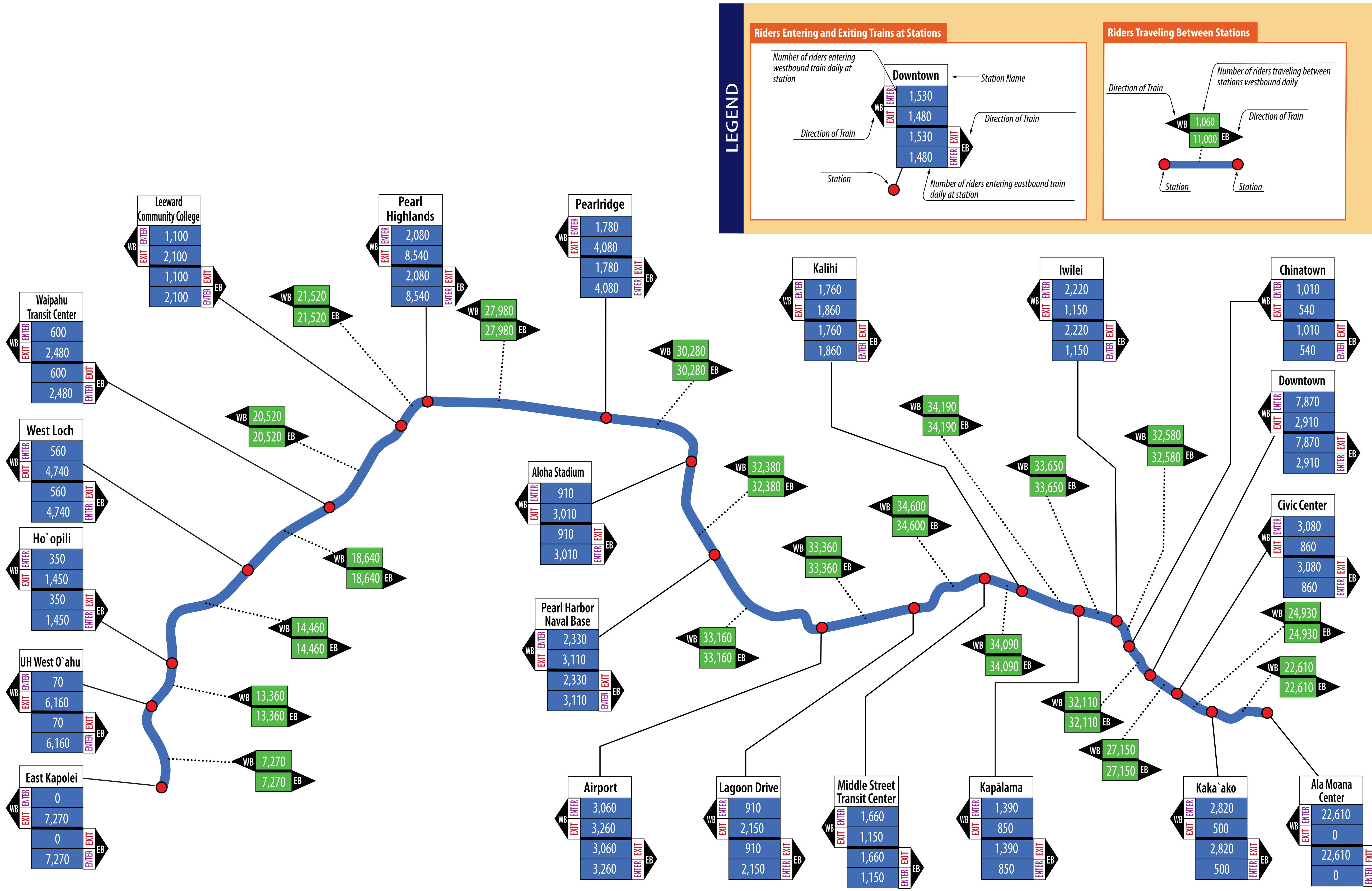

Figure 3-10 2030 Daily Boardings, Alightings, and Link Volumes

each station. For all-day travel, the Ala Moana Center Station will experience the highest boardings, alightings, and total passenger activity. Figure 3-10 also shows daily passenger volumes between stations. The highest daily link volume will occur between the Lagoon Drive and Middle Street Stations.

Ridership by Type of Service

Table 3-19 summarizes the estimated breakdown of transit boardings by service type for 2007, 2030 No Build Alternative, and the Project.

Under the No Build Alternative, local bus service would predominate with 98 percent of total boardings. With the Project, a shift in ridership will occur from local bus to fixed guideway service. Compared to the No Build Alternative, the local service share of total transit ridership will change from 98 percent under the No Build Alternative to approximately 74 percent for the Project.

Express bus service shares would be low, decreasing from 1.7 percent for the No Build Alternative to less than 0.5 percent for the Project with emphasis only on destinations not served by rail. The fixed guideway will serve as an express route for most of the system.

The amount of bus service provided under the Project will approximate that for the No Build Alternative. A review of estimated route-specific demand and service levels for 2030 indicated that bus service capacity will be sufficient to accommodate ridership.

Changes in Transit and Private Vehicle Demand

Figure 3-11 identifies the estimated transit share of home-based work trips under existing and 2030 No Build and Project conditions during the a.m. two-hour peak period. The information is provided for selected travel pairs in the study corridor. As indicated by the figure, there is little difference between existing conditions and the No Build Alternative.

In most cases, changes in transit share under the No Build Alternative would be less than 10 percent.

Under the Project, the transit mode share for home-based work trips during the a.m. two-hour peak period will increase substantially for most travel pairs compared to the No Build Alternative. For many travel markets, the transit share of trips under the Project will double or triple the share occurring under the No Build Alternative. For example, the home-to-work transit share of the Kapolei to Downtown Honolulu travel market would increase from 23 percent under the No Build Alternative to 60 percent under the Project. In other words, more than half of the people going from Kapolei to Downtown to work in the

Table 3-19 Shares of Total Daily Boardings by Transit Service Type (Residents plus Visitors)—Existing Conditions, No Build Alternative, and Project

Alternative	Local Bus		Express Bus		Fixed Guideway		Total
	Number of Boardings	Percent Share	Number of Boardings	Percent Share	Number of Boardings	Percent Share	
2007 Existing Conditions	245,030	97.1%	7,200	2.9%	n/a	n/a	252,230
2030 No Build Alternative	308,710	98.3%	5,370	1.7%	n/a	n/a	314,080
2030 Project	335,020	73.9%	2,050	0.5%	116,340	25.7%	453,410

Numbers rounded to nearest hundred.

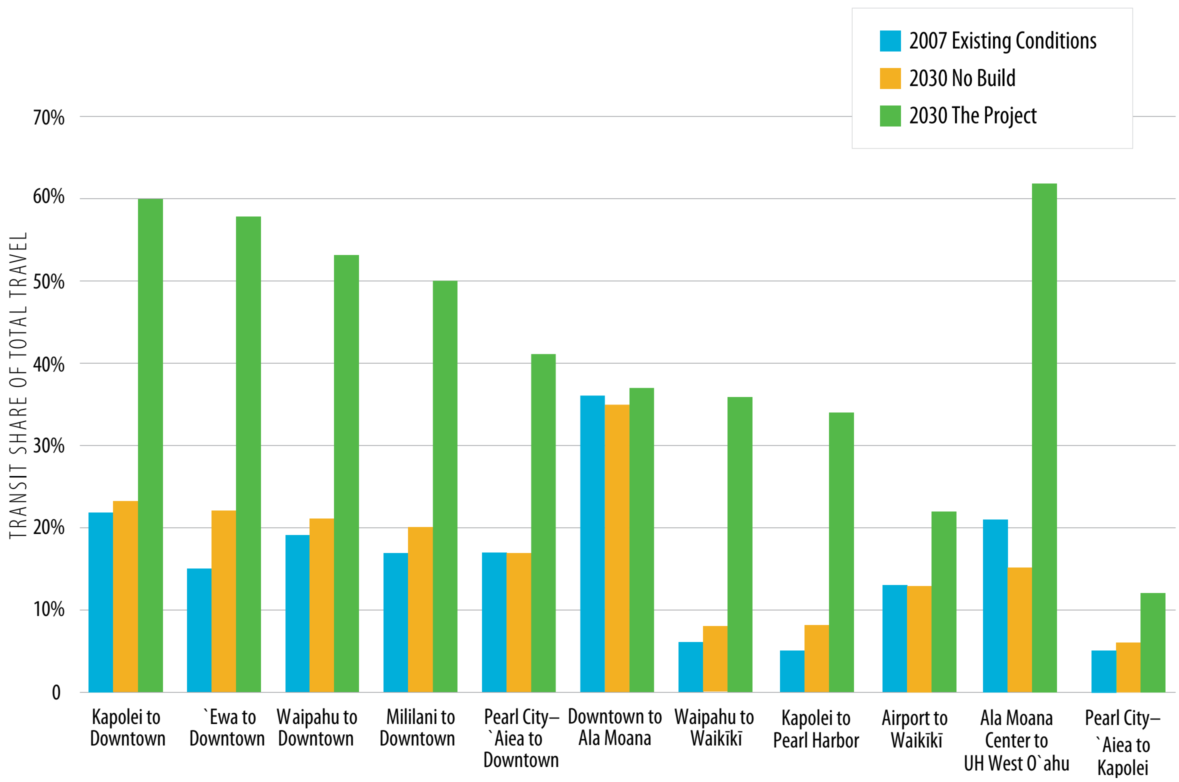

Figure 3-11 Transit Shares of Home-based Work Trips in A.M. Two-Hour Peak Period—Existing Conditions, No Build Alternative, and Project

morning will use transit with the Project, compared to only a quarter without the Project.

With the Project, public transit's share of total travel will increase. For several travel markets, transit's share of a.m. two-hour peak-period commute-to-work trips will double or even triple.

Substantial increases in transit share will also occur for travel markets not directly served by the fixed guideway. For example, the transit share of the Waipahu to Waikīkī travel market will increase from 8 percent under the No Build Alternative to 36 percent under the Project. This increase in transit share is related to faster systemwide transit speeds and improved access to the fixed guideway system due to more reliable feeder bus service.

Transit Reliability

In addition to the estimated increase in transit travel times, transit reliability under the No Build Alternative would likely worsen compared to existing conditions. This is due to projected increases in congestion and a longer duration of unstable traffic flow expected during the a.m. two-hour peak period. Operating conditions, such as missed trips and bus turnbacks, are expected to worsen. Of particular concern is the reliability of longer-distance service connecting the emerging population centers in West O'ahu with major destinations such as Downtown.

Transit service reliability is highly influenced by the number of vehicles operating in exclusive right-of-way. Under the No Build Alternative, express bus routes would operate in the a.m. and p.m. zipper lanes and HOV lanes. However, these lanes would not be exclusively reserved for transit operations.

The No Build Alternative does not provide any exclusive right-of-way for transit vehicles along major highways that could enhance transit service reliability. However, since the Project will completely separate fixed guideway vehicles from roadway traffic operations, it will provide substantially higher transit service reliability compared to the No Build Alternative. This reliability will not deteriorate over time, even with projected population and employment growth in the study corridor. The reliability of fixed guideway vehicles will be better than the reliability of transit vehicles operating on increasingly congested highways.

With the Project, the bus network will also be restructured to provide access from surrounding communities to the fixed guideway with more frequent bus service. Bus routes serving guideway stations will typically be shorter and will operate in less congested residential communities. These operations will help maintain service reliability compared to operations of longer-distance routes.

Bus service on Oʻahu has been experiencing a decline in service reliability, and this decline is predicted to continue under the 2030 No Build Alternative. Providing a separation between the guideway system and general traffic will address this gradual deterioration of service reliability.

Access to Fixed Guideway Stations

Under the No Build Alternative, access to transit services would be generally similar to current practice. New transit centers would be built at five locations to allow transfers between TheBus routes. One additional park-and-ride facility would be built at the Middle Street Intermodal Center.

With the Project, overall accessibility to transit will be enhanced. The Project will attract substantial ridership via local bus access and from people walking or biking to stations (Table 3-20). Although some drive access is projected at outlying stations, such as East Kapolei, the predominant access will be by local bus and walking. Bus, walk, and bicycle access to stations will account for 90 percent of total daily trips to fixed guideway stations. For those leaving stations, egress via walking dominates, particularly at stations with large employment concentrations. Escalators and elevators will be available at each station.

Access to stations will also be enhanced by accommodating bicyclists and pedestrians. Several stations will be located at or near existing or planned bicycle facilities. Each station will have facilities for parking bikes, and each guideway vehicle will be designed to accommodate bicycles as regulated by a bicycle policy. Sidewalks and crosswalks are currently available at stations or will become available as streets and sidewalks are built in developing areas. At many stations, the Project will include the addition of new sidewalks and crosswalks or widening or otherwise improving existing sidewalks or crosswalks.

The dominance of non-motorized (walk and bicycle) and bus access to stations indicates that overall accessibility will be broad. This is especially important for riders who do not have access to automobiles. Access to stations by walking, bicycle, and bus service will be complemented by project design criteria that place the highest emphasis on walk and bicycle access. Per the design criteria, pedestrian access to stations, including accessible routes, shall be given first priority for reasons of safety.

The City will continue to coordinate with HDOT and other State agencies as appropriate to develop and enhance connections between the stations and the surrounding transportation systems.

The importance given to pedestrian access is reflected in design features at project stations. For example, at the Pearl Highlands Station, pedestrian bridges will connect the station entrance with nearby residential and commercial areas.

Table 3-20 Daily Mode of Access to Project Stations—2030

Station	Daily Person Trips Using Guideway Stations by Mode								
	Walk/Bike		Bus		Kiss-and-Ride		Parking		
	Volume	% Share	Volume	% Share	Volume	% Share	Volume	% Share	Total
East Kapolei	420	6%	5,040	69%	380	5%	1,430	20%	7,270
UH West O`ahu	550	9%	4,750	76%	260	4%	680	11%	6,240
Ho`opili	1,390	77%	130	7%	230	13%	50	3%	1,800
West Loch	670	13%	4,020	76%	500	9%	110	2%	5,300
Waipahu Transit Center	550	18%	2,260	73%	230	7%	50	2%	3,090
Leeward Community College	2,850	89%	300	9%	40	1%	10	0%	3,200
Pearl Highlands	1,500	14%	5,410	51%	590	6%	3,110	29%	10,610
Pearlridge	490	8%	5,080	87%	230	4%	60	1%	5,860
Aloha Stadium	790	20%	1,410	36%	110	3%	1,610	41%	3,920
Pearl Harbor Naval Base	2,750	51%	2,530	47%	130	2%	30	1%	5,440
Honolulu International Airport	3,360	53%	2,910	46%	40	1%	10	0%	6,320
Lagoon Drive	700	23%	2,230	73%	100	3%	20	1%	3,050
Middle Street Transit Center	320	11%	2,320	83%	140	5%	30	1%	2,810
Kalihi	2,180	60%	1,200	33%	200	6%	50	1%	3,630
Kapālama	1,830	82%	330	15%	60	3%	10	0%	2,230
Iwilei	720	21%	2,010	60%	520	15%	120	4%	3,370
Chinatown	1,250	80%	300	19%	10	1%	-	0%	1,560
Downtown	2,830	26%	7,930	74%	10	0%	-	0%	10,770
Civic Center	3,020	77%	880	22%	30	1%	-	0%	3,930
Kaka`ako	2,650	80%	650	20%	20	1%	-	0%	3,320
Ala Moana Center	3,680	16%	17,790	79%	890	4%	250	1%	22,610
Total	**34,500**	**30%**	**69,480**	**60%**	**4,720**	**4%**	**7,630**	**7%**	**116,330**

Numbers rounded to nearest tens. Totals may not add to 100% due to rounding.

The Downtown Station design will include a pedestrian concourse open to the general public. The East Kapolei Station will include an enhanced pedestrian link between the park-and-ride facility and station entrances. For the Honolulu International Airport Station, pedestrian routes will connect the station to the Interisland and Overseas Terminals. Enhanced signage and wayfinding techniques will enable visitors to easily find the station from the airport terminals.

The design criteria also state that, as a non-motorized mode, bicycles will be given second priority and will be placed over all motorized vehicular access to Project stations. TheHandi-Van and TheBus access will have priority over all other motorized access modes.

Transfers

A major feature of O‘ahu’s existing transit service is reliance on transit centers as focal points of activity. The transfer rate in 2007 was 37 percent, and the estimated rate for the 2030 No Build Alternative would be 39 percent, which equals about 1.4 bus rides or segments per transit trip.

With the Project, the rate of transfers will be higher than under the No Build Alternative because of changes in local bus service to maximize access to the fixed guideway system. Some existing routes, including peak-period express service, will be altered to avoid duplication with the fixed guideway system. Some local routes will also be rerouted or reclassified as feeder buses to provide better service to the nearest fixed guideway station. The projected rate of transfers will be 60 percent, which is about 1.6 transfers per trip.

Because of the high frequency of the fixed guideway service (three-minute headways between trains during peak periods), riders transferring from buses to the fixed guideway will experience minimal wait times. Riders transferring from the guideway service to buses will benefit from improved frequencies on existing bus routes serving stations. Also, several new routes with high frequencies will be provided as feeders to the guideway system. Since these routes will primarily operate in residential areas, they will provide greater reliability versus routes operating along congested arterials. Riders transferring from rail-to-bus will also benefit from coordinated transfers between trains and buses, thereby minimizing wait times. Existing and future bus routes and frequencies are shown in Appendix D.

The use of local bus feeder service also makes the fixed guideway system highly accessible, particularly for people dependent on transit or who will prefer not to drive to stations. The fixed guideway system will facilitate the reorientation of the bus system and improve transit service beyond the immediate vicinity of the study corridor.

To facilitate transfers, project stations and other major transit hubs will provide conveniences such as covered waiting areas. Off-vehicle fare collection for the fixed guideway will also reduce travel and wait times.

Comfort and Convenience

With the No Build Alternative, additional bus service would be provided on some routes. Given the reliance on buses, most of which would continue to operate in mixed traffic, transit riders would be subject to service delays and long trip times for several travel markets. Riders who have to stand would be subject to frequent stop-and-go vehicle movements.

As described in Chapter 2, the fixed guideway system's service frequencies (every three to ten minutes) and hours of operation (between 4 a.m. and midnight) will minimize wait times and thus provide major conveniences to riders. The service frequency and train *consists* (the number of cars per train) will also be designed to better meet peak-period/peak-direction rider demand. Comfort for riders will be enhanced by station amenities, including covered waiting areas and seats.

Operation of the fixed guideway in exclusive right-of-way will improve convenience. For riders who stand, the guideway service will also provide increased safety compared to frequent stop-and-go travel that occurs on buses that travel in mixed traffic on uneven roadway surfaces. Because the station platforms will be at the same level as the vehicles, they will accommodate quick and easy boardings for all patrons, especially those in wheelchairs or with strollers.

3.4.3 Effects on Streets and Highways

This section presents the effects that the Project will have on traffic and compares these effects with those under the No Build Alternative. The presentation focuses on the following:

- Changes in peak-hour traffic volumes at selected screenlines

- Effects on traffic from placing columns to support the fixed guideway structure
- Effects on traffic and parking near fixed guideway stations and the maintenance and storage facility

Screenline Volumes and Operating Conditions

To determine the effects of the Project, street and highway system peak-period traffic volumes were evaluated at key screenline locations in the study corridor (Figure 3-4). As shown in Tables 3-9 and 3-10, under the No Build Alternative, vehicular traffic volumes on major roadways in the study corridor are projected to increase from existing conditions. Given the high rate of population and employment growth in ‘Ewa and Kapolei, peak hour traffic volumes are expected to increase even more substantially at the ‘Ewa end of the study corridor compared to existing conditions.

Under the No Build Alternative, traffic volumes at screenlines are projected to increase between 16 and 51 percent during the a.m. peak hour and between 12 and 37 percent during the p.m. peak hour at Waikele Stream and the ‘Ewa screenlines compared to existing conditions. Under 2030 No Build Alternative conditions, the Kapālama Canal screenline would be the most traveled with 36,990 vehicles crossing it in both directions during the a.m. peak hour and 35,170 vehicle crossings in both directions during the p.m. peak hour.

Traffic volumes at most screenlines will decrease with the Project compared to the No Build Alternative. Peak-hour/peak-direction traffic-volume will decrease by as much as 11 percent during the a.m. peak hour (at the Kalauao screenline Koko Head-bound and Salt Lake screenline Koko Head-bound) and up to 10 percent during the p.m. hour (at the Waikele Stream screenline ‘Ewa-bound and Kalauao screenline ‘Ewa-bound). Traffic reductions will result from people choosing to use transit during peak travel times. The Kapālama Canal screenline would continue to be the most traveled screenline, with 34,740 and 33,610 vehicle crossings in the a.m. and p.m. peak hour, respectively.

Effects of Guideway on Traffic

Columns to support the fixed guideway will be placed to minimize effects on traffic patterns. In some cases, widening the median to accommodate columns will require reducing lane widths slightly. During Final Design, the relationship of travel lanes, shoulders, sidewalks, and horizontal clearances to obstructions, such as columns, will be considered together in determining the final widths of each item. Some lane widths could be increased from what is shown in Table 3-21. Permits for construction will not be approved unless a roadway is safe and acceptable to the responsible transportation agency. Lane widths will meet American Association of State Highway and Transportation Officials and HDOT standards and will not be a hazard for larger trucks.

There will be no permanent reduction in the number of roadway travel lanes. Some left and right turn lanes will be removed as a result of column placement. These effects are summarized in Table 3-21.

In some instances, column placement will occur along narrow roadways. One such location is along Kona Street. In the future, a revision to traffic flow planned by others in the area will open Waimanu Street to ‘Ewa-bound traffic, which will provide a direct link between Ala Moana Center and the Ward area along Queen Street and reduce demand on Kona Street. This will make Kona Street better able to accommodate both the fixed guideway and local needs of the remaining adjacent businesses. This was evaluated in the assessment of traffic conditions resulting from the placement of a station at Ala Moana Center.

Traffic Effects at Stations

Four stations will have park-and-ride facilities (East Kapolei, UH West O‘ahu, Pearl Highlands,

Table 3-21 Fixed Guideway Column Placement Effects on Streets and Highways—2030

Street/Intersection	Column Placement	Summary of Effect
Farrington Highway and Fort Weaver Road at all existing signalized intersections	Side/Median	Expand median by 9 feet for column placement. Reduce existing through lanes to 11 feet and left turn lanes to 10 feet.
Farrington Highway from Kunia Road to Kahualii Street at all existing signalized intersections in this reach (see below three rows for exceptions).	Median	Expand median. Reduce through lanes to 11 feet and left turn lanes to 10 feet.
Farrington Highway and Moloalo Street	Median	Intersection will become right in–right out only; left turn pockets will be eliminated due to sight distance requirements.
Farrington Highway and Awamoku Street	Median	Intersection will become right in–right out only; left turn pockets will be eliminated due to sight distance requirements.
Farrington Highway—left turn midblock between Paiwa Street and Kahualii Street	Median	Intersection will become right in–right out only; left turn pockets will be eliminated due to sight distance requirements.
Kamehameha Highway from Acacia Road to Boathouse Entrance	Median	Expand median. Reduce through lanes to 11 feet and left turn lanes to 10 feet. May restrict left turns at certain driveways.
Kamehameha Highway—left turns on Kamehameha Highway midblock between Pu`u Momi Street and Pu`u Poni Street	Median	Will eliminate left turns.
Kamehameha Highway—left turn on Kamehameha Highway midblock between Kuleana Road and Kaluamoi Drive	Median	Will eliminate left turns.
Kamehameha Highway and Lipoa Place	Median	Columns will not fit in existing median. Median will need to be expanded. Reduce through lanes to 11 feet. Introduce 10-foot split left turn lane.
Kamehameha Highway and Entrance to Boathouse	Median	Eliminate left turn onto Kamehameha Highway.
Kamehameha Highway from Kalaloa Street to Center Drive	Median	Reduce existing through lanes to 11 feet and left-turn lanes to 10 feet. Reconstruct mauka shoulder.
Aolele Street	Side	Reduce existing through lanes. Reconstruct shoulders.
Ualena Street	Median	Columns will be placed in center of existing roadway. A center left-turn lane will be created between columns.
Kamehameha Highway from Middle Street to Laumaka	Varies	Construct 10-foot median. Lanes will be reduced and right-of-way will be acquired on makai side of roadway.
Dillingham Boulevard from Laumaka to Ka`aahi	On future median	Acquire approximately 10 feet of additional right-of-way on makai side of roadway to accommodate new median and maintain all through and left-turn lanes. Signal modification may be necessary to account for left-turn phasing.
Dilliingham Boulevard, Kapālama Bridge	On future median	No median exists; need 10 feet for median. All lanes will be maintained by widening the bridge by 20 feet on the makai side.
Dillingham Boulevard from Kohou to Costco Rear Parking	On future median	All through and left-turn lanes will be preserved by acquiring 10 feet of additional right-of-way on the makai side of the roadway.
Dillingham Boulevard from Ka`aahi Street to King Street	None	Add makai-bound left-turn lane for buses to turn into Ka`aahi. Add mauka-bound right-turn lane from Dillingham Boulevard into King Street; this will require acquiring right-of-way.
Nimitz Highway from Maunakea Street to Halekauwila Street	Median	Expand median. Reduce through lanes to 11 feet and left-turn lanes to 10 feet.
Halekauwila Street and South Street	Side	Exclusive `Ewa-bound right-turn-only lane will be removed.
Kona Street and Kona Iki Street	Median	Through lanes will be reduced to 11 feet and turn lanes to 10 feet. Median location will be shifted.

and Aloha Stadium) with a total of 4,100 parking spaces. A 1,000-space park-and-ride facility will be built at the Middle Street Intermodal Center, but is not part of the Project. In addition, five other stations will have substantial feeder bus activity (West Loch, Pearlridge, Middle Street, Downtown and Ala Moana). Most of these stations will also have substantial passenger drop-off/pick-up (kiss-and-ride) activity. Park-and-ride, kiss-and-ride, and spillover demand are shown in Table 3-22. The effects of spillover parking are discussed in Section 3.4.4.

Table 3-22 Daily Parking and Kiss-and-Ride Demand at Project Stations—2030

Station	Park-and-Ride (spaces)	Spillover Parking (spaces)	Kiss-and-Ride (vehicles)
East Kapolei	1,230	-	325
UH West O`ahu	585	5	220
Ho`opili	-	40	200
West Loch	-	85	435
Waipahu Transit Center	-	35	195
Leeward Community College	-	5	35
Pearl Highlands	2,680	-	510
Pearlridge	-	45	200
Aloha Stadium	1,390	-	95
Pearl Harbor Naval Base	-	25	115
Honolulu International Airport	-	10	35
Lagoon Drive	-	20	85
Middle Street Transit Center	-	25	120
Kalihi	-	35	170
Kapālama	-	5	50
Iwilei	-	95	445
Chinatown	-	-	5
Downtown	-	-	10
Civic Center	-	-	30
Kaka`ako	-	-	15
Ala Moana Center	-	195	765
Total	**5,885**	**625**	**4,060**

Numbers rounded to nearest five

To determine potential effects on traffic, key intersections near each of the above station locations were analyzed to determine potential effects resulting from park-and-ride, kiss-and-ride, and feeder bus traffic. Twenty-five intersections, both existing and planned, were studied. Delay and level-of-service were analyzed for both the 2030 No Build and Project conditions. The complete results of the analysis and number of buses serving each station are included in the Transportation Technical Report (RTD 2008a) and Addendum 02 to the Transportation Technical Report (RTD 2009i).

As shown in Table 3-23, six of the twenty-five intersections studied will be affected by project-related traffic in either the a.m. and/or p.m. peak hours. At these intersections (one near East Kapolei Station, one near UH West O'ahu Station, three near the Pearl Highlands Station and one near Ala Moana Station), traffic volumes under the Project will increase delay compared with the No Build Alternative. Planned mitigation measures to address traffic effects at the above intersections are discussed in Section 3.4.7, Mitigation of Long-term Transportation Effects. The effects of the mitigation measures are shown in Table 3-23.

The Project will not have an effect on traffic conditions near the Aloha Stadium Station during normal peak periods. However, during major events at Aloha Stadium, there will be an increase in the number of pedestrians walking between the stadium and the shared-use parking lot containing the fixed guideway station. To minimize the effect on traffic and to ensure safety, the City will coordinate with the Stadium Authority to provide staff and/or resources as needed to help manage the flow of pedestrians walking between Aloha Stadium and the station entrance during major events.

As at Pearl Highlands, the Kaka'ako area has high traffic and a complex network of streets. It was also evaluated through a more detailed subregional study to determine the effect of the Project stations

Table 3-23 Effects on Traffic near Park-and-Ride Facilities and Bus Transit Centers—Existing Conditions, No Build Alternative, and Project (without and with mitigation)

Station	Intersection			Control	Peak Hour	2007 Existing Conditions		2030 No Build Alternative		2030 Project		With Mitigation[1]	
						Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
East Kapolei	North-South Road	and	East-West Road[2]	S	A.M.	n/a	n/a	34	C	46	D	41	D
					P.M.	n/a	n/a	36	D	61	E	38	D
UH West O`ahu	North-South Road	and	Road B[3]	S	A.M.	n/a	n/a	55	D	74	E	54	D
					P.M.	n/a	n/a	45	D	46	D	46	D
Pearl Highlands	Kamehameha Highway	and	Waihona Street/ Pearl Highlands Station Park-and-Ride Driveway[4]	TWSC/S[5]	P.M.	>400	F	122	F	217	F	111	F
Pearl Highlands	Kamehameha Highway	and	Kuala Street	TWSC	A.M.	70	F	75	F	>400	F	13	B
					P.M.	>400	F	>400	F	>400	F	251	F
Pearl Highlands	Farrington Highway	and	Waiawa Road/ Pearl Highlands Station Park-and-Ride Driveway[6]	TWSC	A.M.	30	D	76	F	>400	F	34	C
					P.M.	29	D	30	D	>400	F	34	C
Ala Moana Center	Kona Street	and	Ke`eaumoku Street	AWSC	A.M.	7	A	185	F	317	F	117	F
					P.M.	13	B	255	F	487	F	250	F

S = Signal Control, TWSC = Two-Way Stop-Controlled, AWSC = All Way Stop Controlled, sec = seconds, n/a = road does not exist in 2007

[1] Mitigation measures are discussed in Section 3.4.7.

[2] Future 2030 lane configuration without mitigation assumed for North-South Road at East-West Connector Road—Northbound (NB): one left-turn lane, three through lanes, one right-turn lane; southbound (SB): one left-turn lane, three through lanes, one right-turn lane; eastbound (EB): one left-turn lane, one through lane, one right-turn lane; westbound (WB): two left-turn lanes, one through lane, one right-turn lane.

[3] Future 2030 lane configuration without mitigation assumed for North-South Road at Road B—NB: single left-turn lane, three through lanes, single right turn lane; SB: dual left-turn lanes, three through lanes, single right-turn lane; WB: single left-turn lane, one through lane, dual right-turn lanes; EB: single left turn lane, one through lane, single right-turn lane.

[4] With the Project, lane configuration without mitigation assumed for park-and-ride driveway—dual left-turn lane, single through lane, single right-turn lane.

[5] In 2007, Waihona Street currently provides a single left-turn lane and a right-turn lane and is controlled by stop signs. Traffic on Kamehameha Highway is currently uncontrolled. Under future 2030 conditions, the T-intersection of Waihona Street and Kamehameha Highway is assumed to be signalized, both without and with the Project. It is also assumed future planned Central Mauka Road would provide a direct connection to Kamehameha Highway eastbound through a grade-separation project rather than a direct connection to the intersection of Waihona Street and Kamehameha Highway.

[6] With the Project, this park-and-ride driveway will be limited to right-in and right-out access only.

at Civic Center, Kakaʻako, and Ala Moana on local street operations. The travel demand forecasting model predicts an all-day demand for park-and-ride of about 5,900 cars across the fixed guideway system in 2030. Honolulu has had little experience with park-and-rides up to now, and the 500 or so park-and-ride spaces in the current bus system are generally underused. It is anticipated that many people who currently drive to their destinations will be attracted to the speed and reliability of the fixed guideway system, and many of these people will prefer to access the fixed guideway system by car. A total of 4,100 park-and-ride spaces distributed among four different locations will be built as part of the Project. In addition, the 1,000-space park-and-ride garage at the Middle Street Intermodal Center, although not part of this Project, could provide additional park-and-ride capacity. Three of the four project locations will be built as surface lots that could be expanded to structured parking garages in the future based on demand.

An additional traffic analysis examined the potential effects on highways surrounding the Pearl Highlands Station. The analysis focused on the H-1/H-2 interchange, including the effects of a new H-2 southbound off-ramp with direct access to the park-and-ride and transit center, effects on the existing H-2 northbound on-ramp at Kamehameha Highway, and effects to westbound Farrington Highway between Waiawa Road and Kamehameha Highway. The analysis found that traffic from the Pearl Highlands Station will not substantially affect highway segments in the area. Figures 3-12 and 3-13 show predicted 2030 traffic volumes with and without the Project.

A worst-case scenario was evaluated in which park-and-ride bound vehicles on southbound H-2 were added to the No Build volumes, without any assumed reduction due to mode shift. This scenario would result in an additional 240 vehicles on southbound H-2 during the A.M. peak period. Even under those conditions, the roadway would still operate at LOS B. In the case of the H-2 northbound on-ramp at Kamehameha Highway, the Project will result in approximately 200 additional P.M. peak-hour trips.

To mitigate for the additional merging traffic, the City will restripe the section of H-2 near the ramp merge area to provide a parallel merge lane that will continue for approximately 500 feet across an existing bridge. The complete results of the analysis, including an Operational and Safety Analysis Report submitted to the Federal Highway Administration (FHWA), are included in Addendum 02 to the Transportation Technical Report.

Some fixed guideway stations will have on-street bus stops with dedicated curb space or pullouts. The volume of buses using these stops will be similar to today and will not negatively affect traffic. Many of these locations would have similar or greater volumes of buses stopping along roadways under the No Build Alternative. In some cases, the volume of buses serving fixed guideway stations will decline with the Project as bus service is replaced by fixed guideway service.

Maintenance and Storage Facility Effects on Traffic

The Project will require development of a maintenance and storage facility, where up to 100 fixed guideway vehicles will be maintained and stored. Two locations are being considered, but only one of the following sites will be selected:

- Near Leeward Community College
- Near Hoʻopili

A detailed traffic analysis was conducted to determine the traffic effects of a maintenance and storage facility at each location. The study found that 63 trips will be generated by the facility during each a.m. and p.m. peak period. The traffic analysis concluded that these vehicle trips will not affect any of the intersections analyzed. Addendum 02 to the Transportation Technical Report provides further discussions regarding the traffic analysis conducted for the Project.

Effects on Freight Traffic

The Project will generally have little direct effect on freight movement in the study corridor. Honolulu Harbor, Kalaeloa Barbers Point Harbor, and Honolulu International Airport are the principal ports for the import and export of goods on Oʻahu and the primary sources of freight-related traffic. Cargo is delivered from these ports by truck to a wide array of destinations across Oʻahu. Sections of the fixed guideway structure and several stations will be near these facilities.

Support columns have been located to minimize effects to freight movement. In some areas along the fixed guideway alignment, left turns in and out of driveways could be restricted due to column placements, requiring right-in/right-out access. In other

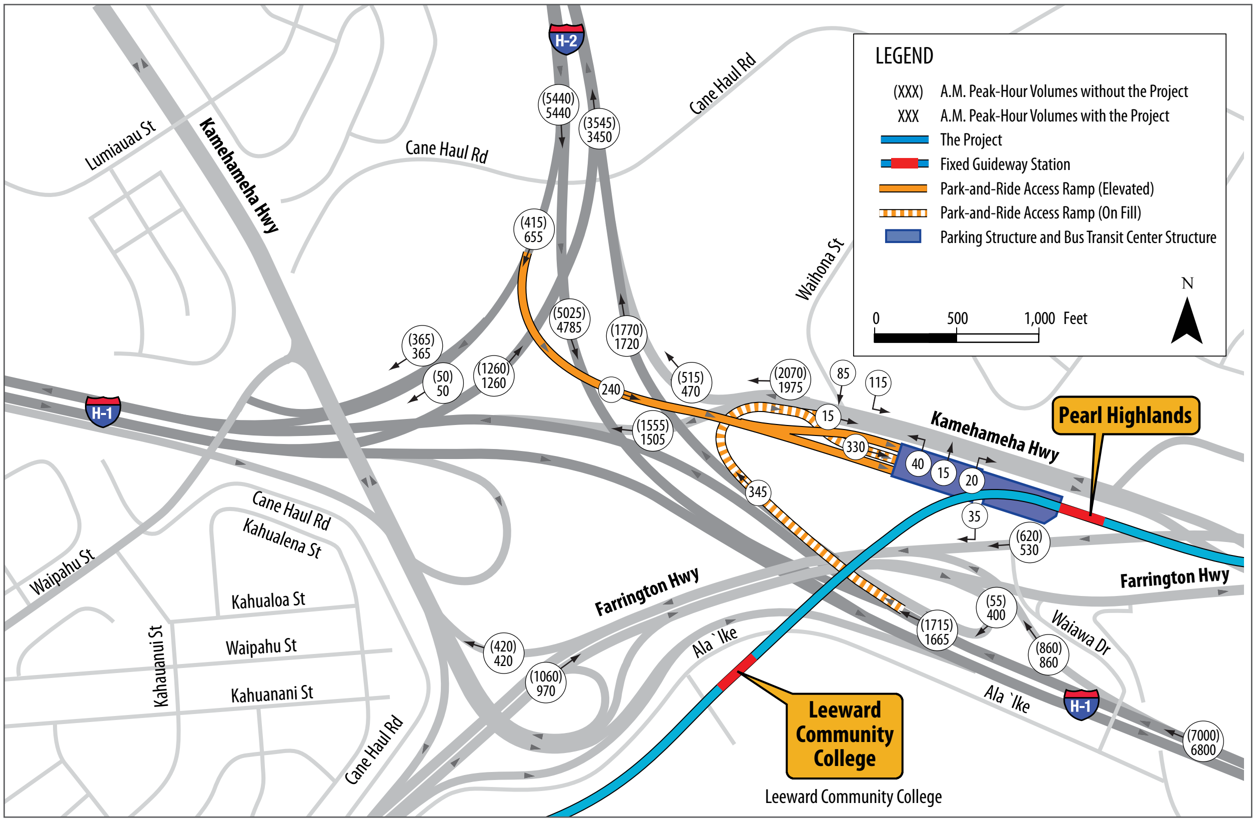

Figure 3-12 Pearl Highlands Station Area—2030 A.M. Peak-Hour Volumes

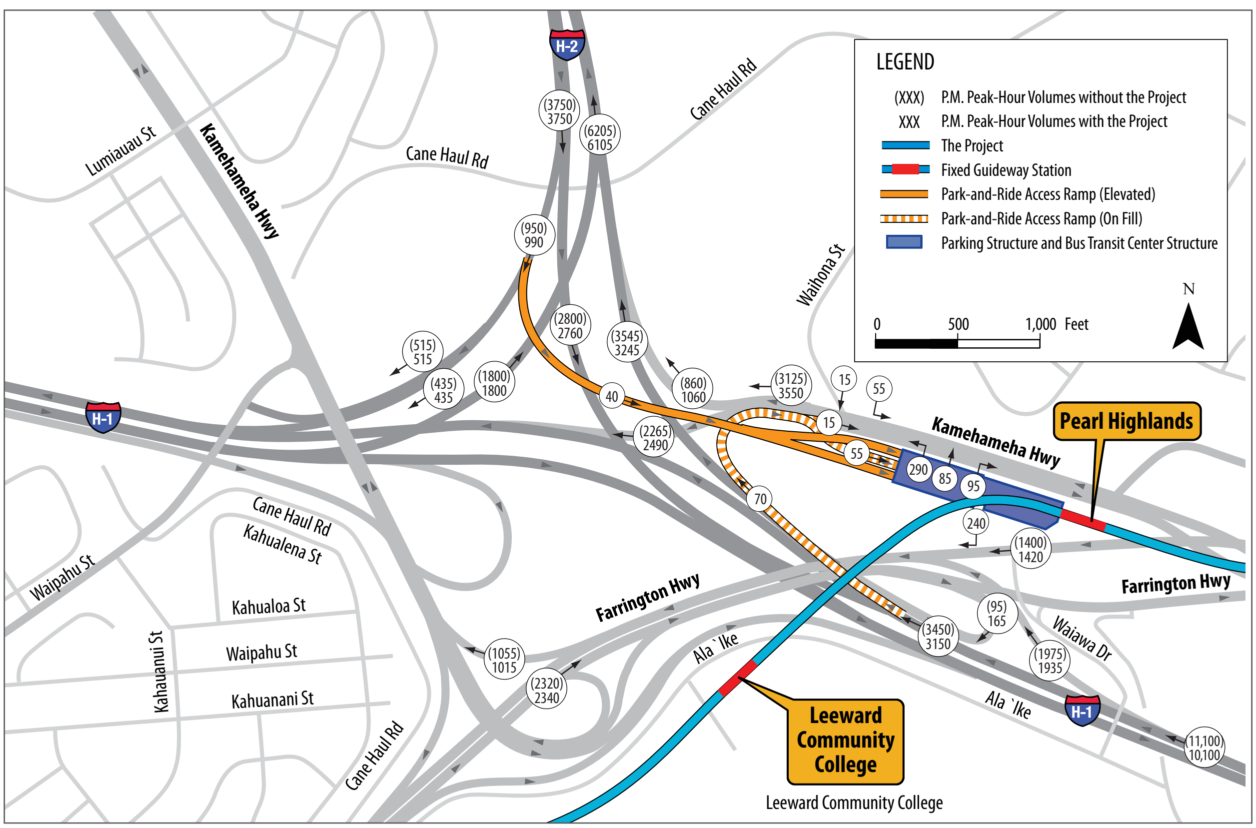

Figure 3-13 Pearl Highlands Station Area—2030 P.M. Peak-Hour Volumes

locations, such as Kaka'ako and near the Lagoon Drive Station, column placement could affect existing truck route traffic patterns along certain blocks and streets. However, access to all businesses will be maintained, and reduced roadway congestion resulting from the Project will generally have a positive effect on freight movement.

Effects on Interstate Freeways

There are six locations where the Project will either cross or enter Interstate freeway airspace, including freeway mainline and access ramps. The guideway will cross the H-1 Freeway in two locations, and a ramp from the H-2 Freeway to the Pearl Highlands Station parking garage and transit center will cross over the H-2 Freeway. In addition, the guideway will cross interstate freeway access ramps near Pearl Harbor Naval Base, and Ke'ehi Interchange. Finally, the guideway will enter airspace above the H-1 Freeway near the Airport Interisland Terminal. The City will coordinate with HDOT to obtain the necessary permits and approvals from FHWA related to airspace and access modification as listed in Table 4-40 (in Chapter 4). The crossing locations can be seen in Figures 2-9 and 2-10 (in Chapter 2). Plan and profile drawings of the proposed structures are shown in Appendix B. Standard minimum horizontal and vertical clearances have been incorporated into project design. There are no other identified effects resulting from project crossings of the interstate.

Agency Coordination

Coordination with both HDOT and FHWA has been taking place throughout the Project. Meetings were held with HDOT and FHWA regarding the effects of the Project on the highways surrounding the Pearl Highlands Station. The mitigation measure for the H-2 Freeway was developed as a result of this coordination. Additionally, there were discussion with FHWA about the use of interstate airspace. There has also been separate meetings with HDOT regarding station access on North-South Road and other State highways. Coordination will continue as the Project moves forward.

3.4.4 Effects on Parking

Effects on parking include: the loss of existing on-street and off-street parking supply due to placement of the guideway or stations, removal of freight and/or passenger loading zones, and effects relating to spillover parking demand in station areas.

Effects on Parking Supply

It is estimated that approximately 175 on-street and 690 off-street parking spaces will be removed as a result of the Project. Parking spaces will be removed primarily to accommodate guideway column placement or station entrance locations. About a third of the off-street spaces to be removed are in locations already planned for major redevelopment and reconfiguration. A summary of locations where parking will be removed by the Project, including a description of effects, is provided in Table 3-24.

Off-street parking supply affected by the Project is scattered throughout the study corridor and is exclusively on private property. The parking spaces will be acquired as part of additional right-of-way needed to construct the guideway or stations consistent with the requirements of the U.S. Uniform Relocation Assistance and Real Property Acquisition Policies Act.

On-street parking affected by the Project is primarily concentrated in three areas: near the Lagoon Drive and Iwilei Stations and in Kaka'ako along Halekauwila Street. To analyze the effect of losing on-street parking capacity, field surveys of existing parking spaces and use along the study corridor were conducted in June 2008. In response to public comments on the Draft EIS, a follow-up survey was conducted in April 2009. This follow-up survey provided further information on parking supply, including freight and passenger loading zones. The surveys examined usage of on-street parking spaces

Table 3-24 Effects on Parking and Loading Zones due to Fixed Guideway Column and Station Placement—2030 (continued on next page)

Roadway or Station Name	Cross Street From	Cross Street To	Column Placement	Anticipated Parking Spaces Removed			Description of Effect
				On-Street Mauka	On-Street Makai	Off-Street	
Farrington Highway	Leokū Street	Leokane Street	Median			21	Parking spaces will be removed from large retail parking lot for placement of station entrance. Affected spaces are far from store entrance, near Farrington Highway, and represent a small percentage of total.
Moloalo Street	`Ewa end of street	Mokuola Street	Median		4		Makai station entrance will require removal of some on-street parking spaces on frontage road.
Ala Ike Street/Leeward Community College Station	–	–	At-grade			n/a	Station will be built on mauka end of existing parking lot. Spaces will be replaced at an alternate location on campus. The City will coordinate with Leeward Community College during final design to relocate parking. There will be no net loss.
Kamehameha Highway	H-1/H-2 Interchange	Moanalua Freeway	Median			79	Widening of right-of-way to accommodate the guideway will affect some existing off-street parking spaces (makai side) currently serving retail businesses. Removed parking represents a small percentage of available parking.
Pearlridge Station	–	–	Median			43	Mauka and makai station entrances will require removal of off-street parking.
Aloha Stadium parking lot			Side			4	Placement of columns supporting guideway will require removal of four off-street parking spaces in the main parking lot, close to Kamehameha Highway, away from the stadium entrance.
Aloha Stadium overflow parking lot	–	–	Side			n/a	Existing gravel overflow lot will be transformed into rail station, bus transit center, and a shared use park-and-ride lot. Current parking configuration will change.
Honolulu International Airport Alaonaona Street	Alaauana Street	Parking garage exit lanes	Side			111	Construction of the station entrance will require removal of 111 of the approximate 175 spaces in the economy parking lot. The entire lot will be closed during construction; approximately 65 spaces will be restored once construction is complete.
Ualena Street	Ohohia Street	Lagoon Drive	Median	30			Guideway will require removal of all on-street parking along the mauka side of Ualena Street.
Lagoon Drive	Ualena Street	Koapaka Street	n/a	8			On-street parking spaces will be removed to accommodate a new bus stop to serve Lagoon Drive Station.
Waiwai Loop	–	–	Median	15	15	7	Guideway will require removal of all on-street parking along both sides of Waiwai Loop and some off-street parking.

Table 3-24 Potential Effects on Parking and Loading Zones due to Fixed Guideway Column and Station Placement—2030 (continued on next page)

Roadway or Station Name	Cross Street From	Cross Street To	Column Placement	Anticipated Parking Spaces Removed			Description of Effect
				On-Street Mauka	On-Street Makai	Off-Street	
Ke'ehi Lagoon Beach Park						n/a	Spaces displaced by the Project will be relocated within the Park. There will be no net loss.
Dillingham Boulevard	Laumaka Street	Pu`uhale Road	Median			13	OCCC parking will be affected by the realignment of Dillingham Boulevard.
Dillingham Boulevard	Mokauea Street	Kalihi Street	Median			16	Existing parking spaces used by businesses will be removed along the makai side of Dillingham Boulevard due to the realignment of the roadway.
Dillingham Boulevard	Kalihi Street	McNeill Street	Median			20	Existing parking lot used by several retail businesses will be reconfigured to accommodate the roadway realignment, resulting in a reduced number of parking spaces.
Dillingham Boulevard	McNeill Street	Waiakamilo Road	Median			26	Reconfiguration of existing parking lot to accommodate road widening will result in a loss of parking spaces serving various retail food establishments. Parking parallel to Dillingham Boulevard occurring in front of retail auto service store will be removed.
Dillingham Boulevard	Waiakamilo Road	Kohou Street	Median		2	10	Existing parking lot used by retail store will require reconfiguration to accommodate the road widening resulting in a loss of parking spaces. Some on-street parking along Colburn Street will also be lost due to widening.
Dillingham Boulevard	Kohou Street	Alakawa Street	Median			30	Parking spaces will be removed from parking lot for placement of station entrance. Affected spaces currently serve retail restaurant and businesses.
Ka`aahi Street	Dillingham Boulevard	End of existing road	Side	8	9		Some existing on-street parking will need to be removed for station. Survey found parking spaces (which are currently free with no time limit) to be heavily used (over 75% full) throughout the day.
Halekauwila Street	Punchbowl Street	South Street	Side	8	13		Guideway will require removal of on-street parking on Halekauwila. Survey found most spaces (which are metered) to be moderately used (50-75% full) on weekdays and mostly unused (less than 25% full) on Saturdays.
Halekauwila Street	South Street	Keawe Street	Side	9	6		Guideway will require removal of on-street parking on Halekauwila. Survey found most spaces to be mostly unused (less than 25% full) most days/times.
Halekauwila Street	South Street	Keawe Street	Off-street			35	Placement of station entrance will require the removal of a small percentage (less than 10%) of the existing off-street parking. Survey found the parking lot (paid) to be lightly used (25-50% full) most days/times.

Table 3-24 Potential Effects on Parking and Loading Zones due to Fixed Guideway Column and Station Placement—2030 (continued from previous page)

Roadway or Station Name	Cross Street From	Cross Street To	Column Placement	Anticipated Parking Spaces Removed			Description of Effect
				On-Street Mauka	On-Street Makai	Off-Street	
Halekauwila Street	Coral Street	Cooke Street	Side		2		Guideway will require removal of on-street parking on Halekauwila. Survey found most spaces lightly to moderately used (25-75% full) most days/times.
Halekauwila Street	Cooke Street	Kamani Street	Side	17	27	5	Guideway will require removal of on-street and some off-street parking on Halekauwila. Survey found parking spaces (which are currently free with no time limit) to be heavily used (over 75% full) throughout the day.
Kaka`ako Station	Ward Avenue	Queen Street	Off-street			183	Guideway and station will require removal of some of the off-street parking serving large retail businesses at Ward Shopping Center (some of the large retail businesses will also be removed). Parking to be removed represents a small percentage (less than 10%) of the total off-street parking in the area.
Kona Street	Pensacola Street	Pi`ikoi Street	Median			88	Placement of columns supporting the guideway will require removal of off-street parking spaces in this segment.
Freight Loading Zones							
Ka`aahi Street	Dillingham Boulevard	End of existing road	Side	n/a			Freight loading zone will be relocated nearby.
Passenger Loading Zones							
Halekauwila Street	`Āhui	Kamani Street	Side	n/a			Passenger loading zone used for day care facility will be relocated nearby on Ilaniwai Street from Cooke Street to Kamani Street.
Ilaniwai Street	Cooke Street	Kamani Street	n/a	n/a			Some of the existing on-street parking will be converted to passenger loading zones during the A.M. and P.M. peak periods to accommodate the lost passenger loading zone on Halekauwila Street from `Āhui to Kamani Street.
Halekauwila Street	Punchbowl Street	South Street	Side	n/a			Passenger loading zone will be relocated nearby.
			Totals	**95**	**78**	**691**	

on both weekdays and Saturdays. Another parking survey was completed in March 2010 for the area near the Lagoon Drive Station.

The results of the field surveys indicated that most on-street parking spaces to be removed by the Project are currently used at least part of the day, although the extent of parking demand varies depending on location and regulation (time limits, meters, etc.). The largest demand for parking generally occurs on weekdays in the morning and afternoon. The surveys also found that alternative parking was generally available within one block of the parking spaces to be removed. The approach to mitigating the effects of the Project on parking supply is addressed in Section 3.4.7.

Spillover Parking Effects on Station Areas

A review of ridership forecasts at each project station indicates that some guideway transit passengers may park near stations that do not have designated parking. This is known as spillover parking. Locations with the largest projected demand for spillover parking were selected for further study. These included West Loch, Pearlridge, Iwilei, and Ala Moana Center. These four stations could each attract a spillover parking demand of 50 to approximately 200 automobiles daily, depending on the location. Estimated spillover demand at all stations is shown in Table 3-22.

Analysis was completed to determine if spillover parking will affect traffic and parking supply near stations. The traffic analysis was conducted for the a.m. and p.m. peak hours. The intersection level-of-service analysis determined that additional traffic from spillover parking will not affect local traffic conditions. See the Transportation Technical Report (RTD 2008a) and Addendum 02 to the Transportation Technical Report (RTD 2009i) for more detail.

Spillover demand for parking was identified by the travel demand forecasting model for the year 2030. However, the actual extent of spillover parking near stations will be influenced by a variety of factors:

- Lack of available parking—some neighborhoods, such as near Ala Moana Center, do not have long-term parking available for commuters. As a result, the actual demand for spillover parking will be lower because transit patrons will choose to park elsewhere (and use a different station) or will use a feeder bus to access the fixed guideway system.
- Private parking—some stations have existing parking lots (intended for other use) nearby. Whether these facilities, such as a shopping center parking lot, are used by commuters will depend on regulation and enforcement. A shopping center with abundant parking near a station may welcome the commuters as potential customers. If commuters begin to displace regular customers, however, signage and enforcement may be necessary to discourage such use.
- Changing conditions between now and 2030—additional parking could be provided in the future, or feeder bus service could be utilized more extensively than anticipated.
- Future development around station areas—new land uses near stations could change the demand for and supply of parking. These factors could influence how people choose to access the stations and where they will drive and park.

Approaches to mitigating the effects of spillover parking are addressed in Section 3.4.7.

Loading Zones

The following three loading zones are part of the on-street parking supply that will be affected by the Project, as shown in Table 3-24: a freight loading zone on Ka‘aahi Street, a passenger loading zone on Halekauwila Street near South Street, and a passenger loading zone on Halekauwila Street near Kamani Street. The mitigation program described in Section 3.4.7 addresses the effect on loading zones.

3.4.5 Effects on Bicycle and Pedestrian Facilities

Locations where effects of the Project on bicycle and pedestrian facilities will occur are shown in Table 3-25. Effects will include either narrowing or widening sidewalks or bicycle facilities in some areas. No bicycle facilities or sidewalks will be removed as a result of the Project. Sidewalks will meet ADA requirements.

Many bicycle lanes planned by the City or State could connect to fixed guideway stations. Proposed bicycle lanes along Farrington Highway could connect to stations at West Loch, the Waipahu Transit Center, Leeward Community College, and Pearl Highlands. Proposed bicycle facilities along Kamehameha Highway would provide access to the Pearlridge and Aloha Stadium Stations. The Project will not prevent any planned bicycle facilities from being constructed. The Project will include the widening of curb lanes on Kamehameha Highway to 13 feet to allow possible designation as a bike route. Allowing bicycles on trains, as is currently envisioned, will create a demand for bicycle lanes or routes near stations.

The O'ahu Bike Plan is currently being updated and is scheduled to be adopted in 2010. The draft update includes a prioritized list of bicycle projects developed using criteria that include access to transit. Several projects that would connect existing or

Table 3-25 Summary of Effects on Bicycle and Pedestrian Systems due to Fixed Guideway Column Placement—2030

Roadway Name	Cross-street From	Cross-street To	Column Placement	Summary of Effects
Farrington Highway	Kunia Road	Awanui Street	Median	Signed shared roadway will be narrowed from 16 feet to 14 feet inbound and from 15 or 14 feet to 13 feet outbound.
Dillingham Boulevard and Kamehameha Highway	Pu`uhale Road	Mokauea Street	Median	Makai sidewalk will be reconstructed to a width of 6 to 8 feet (currently 4 to 6.5 feet).
Dillingham Boulevard	Mokauea Street	Kalihi Street	Median	Makai sidewalk will be reconstructed to a width of 6 feet (currently 4 to 8 feet).
Dillingham Boulevard	McNeill Street	Waiakamilo Road	Median	Makai sidewalk will be reconstructed to a uniform width of 6 to 8 feet (currently 4 to 6 feet).
Dillingham Boulevard	Kokea Street	Alakawa Street	Side	Makai sidewalk will be reconstructed to a width of 6 to 8 feet (currently 4 to 7 feet).
Dillingham Boulevard	Ka`aahi Street	King Street	None	New makai-bound left turn lane for buses to turn into Ka`aahi Street. This will require acquiring right-of-way. Makai sidewalk will be narrowed to 8 to 10 feet (currently 10 to 15 feet).
Kamehameha Highway	Hekaha Street	Kaonohi Street	Median	Makai sidewalk will be reconstructed to a width of 6 feet (currently 8 to 10 feet)
Kamehameha Highway	Kanuku Street	Kaonohi Street	Median	Mauka sidewalk will be reconstructed to a width of 5.5 to 6.5 feet (currently 4.5 to 16 feet)
Kamehameha Highway	Kaonohi Street	Pali Momi Street (West)	Median	Mauka sidewalk will be reconstructed to a width of 5 to 16 feet (currently 4 to 21 feet)
Kamehameha Highway	Lipoa Place	`Aiea Kai Place	Median	A portion of the makai sidewalk will be narrowed to 9 to 13 feet (currently 16 feet)

future bicycle facilities to rail transit stations are included in the draft update.

Higher volumes of pedestrians and bicycles are expected near stations. DTS will work with other City departments and HDOT to identify and improve key pedestrian and bicycle routes to stations as well as to improve overall safety and accessibility near station entrances.

3.4.6 Effects to Airport Facilities

The elevated project guideway alignment through the airport was developed in consideration of the *Honolulu International Airport Draft Master Plan* (2009) and the *Airport Layout Plan for Honolulu International Airport* to minimize effects on existing and future airport facilities and aviation activities. Support columns will be located to maintain normal roadway movements and minimize effects to parking, car rental operations, lei stands, freight movement, and other business interests near the airport.

Specifically, the guideway alignment minimizes the effect on current and future operations at the airport. The guideway alignment avoids the new Mauka Terminal and airplane ramp planned for the location of the existing commuter terminal parking lot. A total of approximately 2 acres of airport land will be needed to accommodate the placement of elevated guideway support columns and for a passenger station on airport property. A station entrance building will be constructed near the overseas parking garage on what is now a surface economy parking lot just ʻEwa of the parking garage exit lanes, fronting Ala Onaona Street, near the existing lei stands on Aolele Street. As shown in Table 3-24, approximately 110 of the 175 spaces will be permanently closed in this lot to accommodate the station. The Honolulu International Airport Station will serve airline passengers and employees of the airport and other businesses. This station will be connected to the overseas and interisland terminals with ground-level pedestrian walkways. Access to local buses and TheHandi-Van will be provided at the station's entrance.

Based on discussions with both HDOT-Airports Division and the United States Postal Service (USPS), DTS has refined the alignment to minimize overall impact to both facilities. Other design measures have been taken to minimize impact to airport facilities. DTS will continue to coordinate with HDOT-Airports Division and USPS on final alignment and design as the Project moves forward.

Continuing Koko Head, the alignment exits the airport on Aolele Street and then transitions to Ualena Street at an extension of Ohohia Street, which is about 2,000 feet ʻEwa of the Lagoon Drive Station. The alignment traverses airport property as it transitions to Ualena Street. Although use of a portion of the property could be constrained by the guideway and column locations, future commercial uses will not be precluded.

The guideway will pass near the end of runways 22R and 22L. Federal Aviation Administration (FAA) Form 7460-1, *Notice of Proposed Construction or Alteration,* will need to be submitted to the FAA at a minimum of 45 days prior to construction at the airport. Honolulu International Airport Operations has evaluated the project impact and verified that it does not affect airport operations. The evaluation of the alignment options at the airport and the review of the Airport Layout Plan completed by FAA are included in Appendix K of this Final EIS. The FAA found the rail guideway alignment refinement on Ualena Street consistent with airport design standards.

The Lagoon Drive Station has been located at the intersection of Waiwai Loop and Lagoon Drive. It will serve nearby businesses and employees in the area, including Māpunapuna and Salt Lake, and provide access to Keʻehi Lagoon Park. Local buses and TheHandi-Van will provide service to the station. Temporary construction-related effects at and near the airport are discussed in Section 3.5.6.

The FAA has specific horizontal and vertical clearance requirements for the runways at Honolulu International Airport. Due to the proximity of the Project to the ends of runways 22R and 22L, the following clearance requirements were evaluated for the elevated project guideway, including the Lagoon Drive Station: runway protection zone, approach surface, and the transitional surface. The refinement in the project alignment was made to avoid the central portion of the runway protection zone. As shown in Figure 3-14, the Project will pass through the less-restrictive controlled activity area. The FAA has indicated this is acceptable. Note that the runway 22R end in Figure 3-14 shows a Runway Protection Zone that has been reclassified for use by the smaller aircraft that currently use the runway. The preliminary airspace evaluation confirmed that the Project is consistent with requirements for the approach surface, Runway Protection Zone, and runway safety areas. Results of the evaluation are shown in Appendix K. In addition, the Airport Layout Plan was updated by HDOT to show the Project alignment and stations and found acceptable by the FAA. A copy of the Airport Layout Plan is included in Appendix K. The City will coordinate with FAA to obtain the necessary approvals related to construction at or near the airport as listed in Table 4-40 (in Chapter 4).

Agency Coordination

The City has been coordinating with FAA, HDOT Airport Division, and FTA to address the effects of the alignment on the airport, including future expansion as proposed in the Airport Master Plan and FAA requirements. As a result of coordination, the decision was made to refine the project routing to avoid the runway protection zone and any impacts that would be created by mitigations, such as relocating the runway to move the runway protection zone away from the Project if it were to remain on Aolele Street.

3.4.7 Mitigation of Long-term Transportation Effects

In general, the Project will improve performance of the overall transportation system. Where the Project will negatively affect roadways or intersections, improvements to maintain No Build level roadway operating conditions will be included. Measures are also provided to mitigate effects to parking supply.

Traffic

Park-and-ride, kiss-and-ride, and feeder bus activity will affect traffic at six intersections near the East Kapolei, UH West O‘ahu, Pearl Highlands, and Ala Moana Station areas. Traffic conditions with the planned mitigation are identified in Table 3-23. Planned mitigation measures are as follows:

- North-South Road and East-West Connector Road (East Kapolei Station): widening the northbound (or mauka-bound) direction of North-South Road to provide dual left-turn lanes, three through lanes, and one right-turn lane. The length of the dual left-turn lanes is a minimum of 210 feet.
- North-South Road and Future Road B (UH West O‘ahu Station): widening the westbound (or Waianae-bound) direction of Road B to provide two left-turn lanes, one through lane, and one right-turn lane. The length of the dual left-turn lanes is a minimum of 240 feet.
- Kamehameha Highway at Waihona Street (Pearl Highlands Station entrance): widening the north leg (southbound approach) of the Kamehameha Highway at Waihona Street to have a separate right-turn, and a combined through and left-turn lane (total of two southbound lanes into the intersection).
- Farrington Highway and Waiawa Road/Pearl Highlands Station park-and-ride driveway (Pearl Highlands Station): installation of a new traffic signal that will be coordinated with adjacent signals at the Farrington

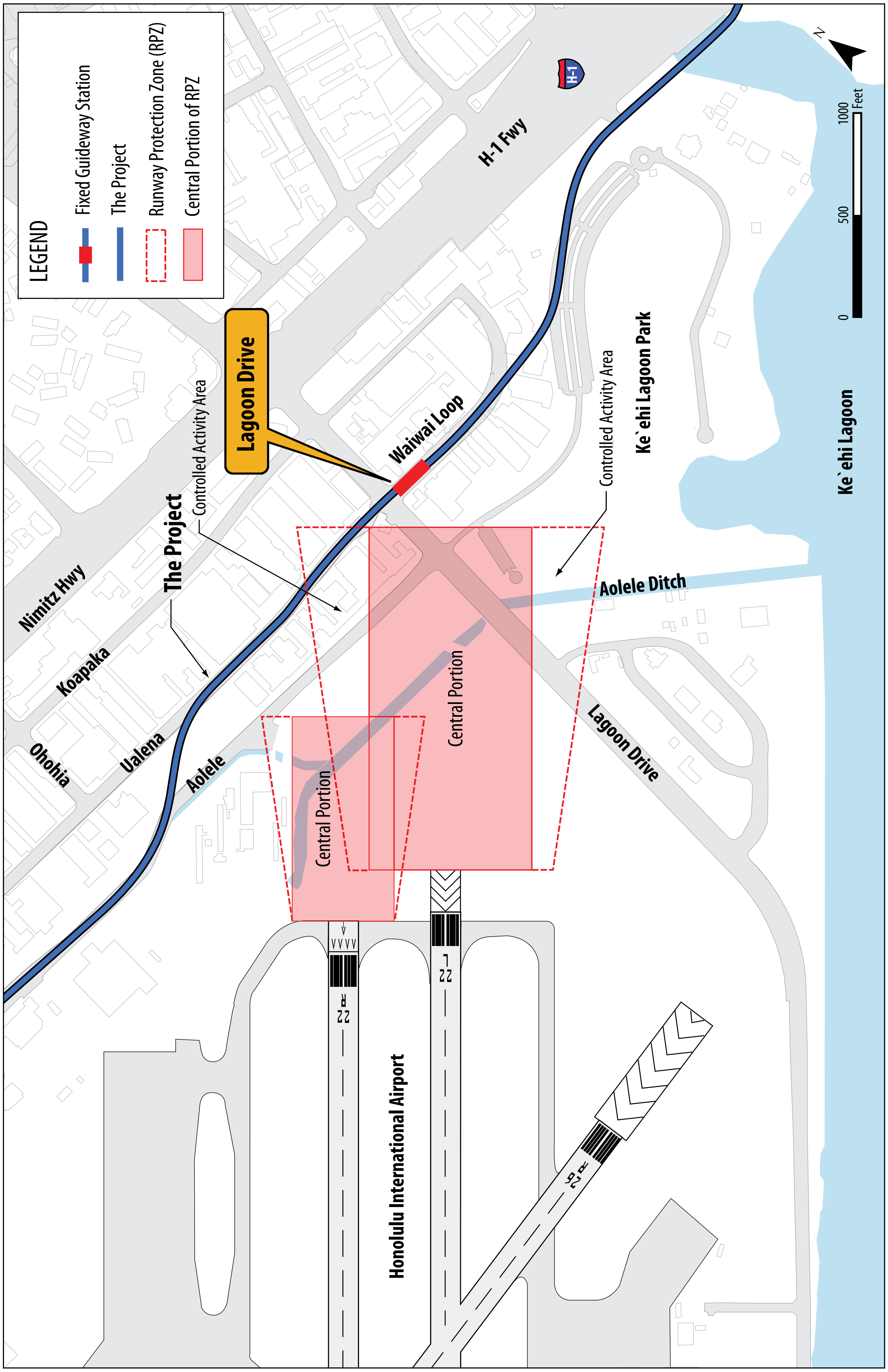

Figure 3-14 Airport Runway Protection Zone

Highway eastbound and Waiawa Road intersection.
- Kamehameha Highway and Kuala Street (Pearl Highlands Station): signalizing the ʻEwa-bound Kamehameha Highway at Kuala Street and widening Koko Head-bound Kamehameha Highway from one to two lanes.
- Kona Street and Keʻeaumoku Street (Ala Moana Center Station): signalizing this intersection will reduce the delay at this location. Because of the proximity of this intersection to the signalized intersection at Kapiʻolani Boulevard and Keʻeaumoku Street, the signals will be coordinated to enhance traffic flows and prevent additional effects at other locations.
- To minimize the effect on traffic and ensure safety during major events at Aloha Stadium, the City will coordinate with the Stadium Authority to provide staff and/or resources as needed to help manage the flow of pedestrians walking between Aloha Stadium and the station entrance.
- To mitigate for additional merging traffic on the H-2 northbound on-ramp at Kamehameha Highway, the City will restripe the section of H-2 near the ramp merge area to provide a parallel merge lane that will continue for approximately 500 feet across an existing bridge.

Parking

Removal of Off-Street Parking

Approximately 690 private, off-street parking spaces will be removed to accommodate right-of-way needed along the 20-mile length of the corridor. Acquisition will be in accordance with the requirements of the U.S. Uniform Relocation Assistance and Real Property Acquisition Policies Act. All landowners will be paid fair-market value for the land, including the value of the parking spaces. The City does not plan to generally replace all private, off-street parking purchased and removed for construction of the Project. However, the City will work with landowners to replace parking as appropriate. As stated in Table 3-24, all displaced parking spaces at Leeward Community College will be relocated on the Leeward Community College campus. The City will coordinate with the college during final design to relocate parking. Additionally, all displaced parking spaces at Keʻehi Lagoon Beach Park will be relocated within the park. No other mitigation for the loss of off-street parking is planned.

Removal of On-Street Parking

As a result of the Project, approximately 175 on-street parking spaces will be removed. Based on the results of the parking utilization surveys, parking is generally available within one block of the removed spaces. As a result, these on-street parking spaces will generally not be replaced by the City. However, some new on-street parking spaces will be created by the construction of the Project in the approximate locations of lost spaces as the streets are rebuilt after construction. The number and location of new parking spaces to be created by construction of the Project will depend on the final configuration of the guideway and station footprints. New parking spaces will be designated as short-term, long-term, or loading zones, depending on the need, as determined by the City.

Spillover Parking

The approach to mitigating the effects of spillover parking will be unique to each station area. The City will conduct surveys to determine the extent of spillover parking demand near stations and implement one or more mitigation strategies as needed. Strategies include, but are not limited to, the following:

- Parking restrictions (where parked cars cause safety or congestion problems)
- Parking regulation (e.g., meters, time limits, or other methods to encourage turnover)
- Permit parking (e.g., resident or employee parking)

- Shared parking arrangements (at locations where parking is available, but dedicated to another purpose such as retail centers, office uses, or places of worship)

The specific mitigation strategies and the schedule for implementation will be determined as the stations are opened. Parking surveys will be conducted prior to starting construction of a station, and again within six months after opening of the station. Results of the surveys will be used to determine the appropriate mitigation strategy, which will be selected by the City and implemented as soon as feasible. Follow-up surveys will be conducted by the City to determine if the mitigation strategies are effective. Additional mitigation measures will be implemented by the City as needed.

Loading Zones

The freight loading zone on Ka'aahi Street will be removed by the City when construction begins in the area, and a temporary freight loading zone will be established nearby for the duration of construction. A new permanent loading zone will be installed once construction is complete. The passenger loading zone on Halekauwila Street near South Street will be removed as construction begins in the area, but a temporary loading zone will be installed nearby for the duration of construction. A new permanent passenger loading zone will be installed in the same general location when the Project is completed. The passenger loading zone on Halekauwila Street near Kamani Street will be relocated to a new permanent location before construction to ensure safe access to the day-care facility. This new passenger loading zone will be nearby on Ilaniwai Street from Cooke Street to Kamani Street. Some of the existing on-street parking on Ilaniwai Street will be converted to passenger loading zones during the a.m. and p.m. peak periods to accommodate the lost passenger loading zone on Halekauwila Street near Kamani Street.

3.5 Construction-related Effects on Transportation

This section focuses on short-term, construction-related effects on transportation from the Project. Section 4.18, Construction Phase Effects, discusses construction-related effects on the natural and built environments. These effects will be temporary and are estimated to occur between 2010 and 2018 at various times and locations in the study corridor.

3.5.1 Construction Staging Plans

Construction staging areas and plans will be identified and developed by the contractors and approved by the City. Specific details will be developed and reviewed with the relevant authorities and approvals sought (see Section 4.21, Anticipated Permits, Approvals, and Agreements). These details will include, but are not limited to, the following:

- Specific permitted lane closures or road closures
- Hours of operation
- Penalties for extending beyond permitted hours
- Holiday restrictions

The maintenance and storage facility, park-and-ride facilities, and stations could be used for construction staging areas. Additional areas will be identified by the contractor. The contractor will be responsible for identifying necessary permits and approvals and, where applicable, the City will be the permit applicant. Additional construction and staging areas identified and requested by the contractor will be reviewed and approved by the City. Staging areas will be fenced to deter unauthorized entry. Upon completion of work, staging areas will be restored to a condition equal to or better than existing conditions as appropriate.

3.5.2 Construction-related Effects on Transit Service

Local access to transit will be affected by lane closures within the construction corridor. Bus routes will generally be maintained but could be temporarily diverted or relocated to provide reliable service near areas where the fixed guideway will be constructed. Bus stops could also be temporarily relocated, particularly if a street's right lane is closed for construction.

TheHandi-Van services will not be directly affected by the physical construction of the fixed guideway system. TheHandi-Van is a curb-to-curb operation not requiring posted bus stops to board and alight passengers. Since TheHandi-Van has flexibility in selecting a route to a destination, vehicles are able to access businesses, medical facilities, and other destinations using their respective driveways and parking lots. TheHandi-Van may experience some delays in service during construction in certain areas because of general traffic conditions; however, service will not be affected any more than will general purpose traffic.

Existing bus routes were examined to determine the degree of effect during construction. Effects were classified as none, minor, or direct. Minor effects will occur when a route intersects and crosses a street with construction activity or traverses a short section of a construction zone. Direct effects will occur where a transit route travels along a considerable length of the construction zone. Table 3-26 lists the bus routes that will be affected by construction. Some bus routes will pass through multiple parts of the construction corridor. A Transit Mitigation Program, further described in Section 3.5.7, Mitigation of Construction-related Effects, identifies efforts to address construction effects on transit service.

Table 3-26 Bus Routes Affected by Construction

Minor Effects	Direct Effects
7, 10, 44, 74, 201, 202, PH1, PH2, PH3, PH4, PH5, PH6	5, 6, 8, 9, 11, 17, 18, 19, 20, 23, 31, 32, 40, 40A, 42, 43, 52, 53, 55, 56, 57, 57A, 62, 65, 71, 73, 88A, 434, A, C, E

As discussed in Section 2.5.10, the Project will be constructed in the following four phases and opened as each phase is completed:

- East Kapolei to Pearl Highlands (rail service in this phase will be opened in three parts as stations are completed)
- Pearl Highlands to Aloha Stadium
- Aloha Stadium to Middle Street
- Middle Street to Ala Moana Center

This phased opening approach will require interim changes to bus transit service to complement the fixed guideway service. The operating time periods and headways provided by the rail service affects the degree to which bus services will be modified to complement the Project. Bus service modifications will be additive from one opening segment to the next, except as noted in each phase description (provided below). Phased openings will also affect the number of buses traveling to stations and the associated traffic and pedestrian effects from that bus service. Additionally, rail service levels will be adjusted to match ridership demand during the phased openings.

The identified phased openings and corresponding transit service changes are described as follows. Additional detail on routing changes as a result of phased openings is included in Appendix D of this Final EIS. An adjustment in the service hours described below may be needed for cut-over work to extend the rail line to the next phase.

Phase 1a: Waipahu to Leeward Community College

Three stations will be open for Phase 1a rail service—West Loch, Waipahu Transit Center, and Leeward Community College. Rail service will be provided during the midday on Saturdays and Sundays only.

Routes operating westbound on the H-1 Freeway during the PM period will utilize the new contraflow lane between Radford Drive and the Waiawa Interchange. Route 41 will be modified to operate along North-South Road providing access for ʻEwa and Kapolei residents to the UH West Oʻahu Campus. Route 418 will be added to provide connections via Kapolei Parkway between ʻEwa neighborhoods and Kapolei.

Phase 1b: East Kapolei to Leeward Community College

Three stations will be added to those identified in Phase 1a—East Kapolei, UH West Oʻahu, and Hoʻopili. Rail service will be provided during the weekdays with 15-minute headways between the hours of 8 a.m. and 6 p.m. Bus service in Kapolei will include a modification to Route 418 to connect to the East Kapolei Station, and Route C will provide service to the East Kapolei and UH West Oʻahu Stations serving the North-South Road accessing the H-1 Freeway from the North-South Road Interchange.

Phase 1c: East Kapolei to Pearl Highlands

Phase 1c rail service adds the Pearl Highlands Station operating on weekdays with 15-minute headways between the hours of 8 a.m. and 6 p.m. Bus service changes will include the implementation of two new routes in Kapolei taking advantage of new roadway connections. Route 416 will provide new service for Ko ʻOlina and West Kapolei connecting to the Kapolei Transit Center. Route 417 operating on the Makakilo Drive extension will provide direct access for Makakilo residents to the UH West Oʻahu and East Kapolei Stations continuing to the Kapolei Transit Center.

New Route 50 will operate between Mililani Transit Center and the Waipahu Transit Center and Station. Other Central Oʻahu transit service changes will include the implementation of the Wahiawā route restructuring—current Routes 62 and 72 will be replaced with Routes 51, 511, 512, and 513 serving the Wahiawā Transit Center and nearby communities, including Whitmore Village and Schofield Barracks. CountryExpress! Route D will provide limited stop service connecting the Wahiawā Transit Center, Mililani, and Waipiʼo transfer point at Ka ʻUka with Downtown Honolulu. New Route 441 will connect the Waiawa and Koa Ridge neighborhoods with the Pearl Highlands Station and businesses in Pearl City. Pearl City Route 73 will be reoriented to serve the Pearl Highlands Station, ceasing service to Leeward Community College.

Phase 2: East Kapolei to Aloha Stadium

The Pearlridge and Aloha Stadium Stations are added to the rail service in Phase 2. The operating periods are extended and will provide more frequent service. The line will operate on weekdays with 10-minute service between the hours of 6 a.m. and 10 a.m. and 4 p.m. and 8 p.m. and 20-minute midday service. Twenty-minute service will be provided on Saturdays and Sundays between the hours of 8 a.m. and 6 p.m.

Bus service changes will include truncating Routes A, 20, and 32 at Aloha Stadium. Route D will provide a stop at the Pearl Highlands Station, and Routes 44, 502, and 511 will offer more frequent service. The completion of the Project through the ʻAiea and Pearl City corridor will provide the opportunity to implement a restructuring of transit services in the area. Routes 54 and 71 will be replaced with a restructured Route 53 and Routes 543, 545, 546, and 548, all serving the Pearlridge Station. Thirty-minute peak and off-peak service will be provided on Routes 543, 545, and 546. Route 548 will offer more frequent service than the replaced Route 54 with 15-minute peak and 30-minute off-peak service. Route 53 will provide 20-minute peak and 30-minute off-peak service.

Phase 3: East Kapolei to Middle Street

Four stations will be added in Phase 3—Pearl Harbor Naval Base, Honolulu International Airport, Lagoon Drive, and Middle Street Transit Center. The operating periods and frequency of the line will be the same as in Phase 2. Bus service modifications will include more frequent peak period service (15-minute) on Route 41. Route 43 will be replaced by the rail service. More frequent peak-period service will be provided on Routes 501 and 502 in Mililani. Route D will be truncated at the Pearl Highlands Station and Routes 83 and 84 will provide 30-minute peak period service to the Pearl Highlands Station.

Community-oriented bus services in the Salt Lake, Airport, and Kalihi areas will be restructured to feeder routes offering more frequent service and travel opportunities via timed connections at the Aloha Stadium and Middle Street Transit Centers. Routes PH1, PH2, PH3, and 16 will be replaced with Route 311, serving Moanalua, Salt Lake, and the Honolulu International Airport Station; Route 312, serving Pearl Harbor Naval Base; Route 313, serving Hickam Air Force Base; and Route 314, serving the Aloha Stadium Station. Routes 312, 313, and 314 will provide 15-minute peak and 30-minute off-peak service. Route 311 will provide 30-minute peak and 60-minute off-peak service. Route 20 will be replaced with more frequent service on Route 19, which will terminate at Honolulu International Airport and provide 15-minute peak and off-peak service.

Routes A and 9 will be truncated at the Middle Street Transit Center and Station. Routes A and 1 will provide more frequent service (10-minute peak and off-peak) from the Middle Street Transit Center. Kalihi Routes 7, 10, and 32 will be replaced with Route 301, serving Māpunapuna, Salt Lake, and Foster Village; Route 303, serving Kalihi Valley Homes; Route 304, serving Ālewa Heights, Pauoa, and Palama; Route 305, serving Kalihi Valley and Kalihi Kai; and Route 306, serving Māpunapuna and Lagoon Drive. These five routes will all provide connections at the Middle Street Transit Center and Station.

Phase 4: East Kapolei to Ala Moana Center

The final construction phase occurs between Middle Street and Ala Moana Center and includes the following stations—Kalihi, Kapālama, Iwilei, Chinatown, Downtown, Civic Center, Kakaʻako, and Ala Moana Center. Rail service will operate on weekdays with 5-minute headways from 6 a.m. to 10 a.m. and 4 p.m. and 8 p.m. and with 15-minute headways from 10 a.m. to 4 p.m. Rail service will operate with 15-minute headways on Saturdays and Sundays between 8 a.m. and 6 p.m. Upon completion of this phase, bus service will be restructured. See Section 3.4.2 and Appendix D for a discussion of TheBus service with the Project. Table 2-7 (in Chapter 2) provides a discussion of rail operating hours and headways.

School buses may also be affected by temporary delays caused by construction activities. Construction-related detours may require alternative routes between school bus stops.

3.5.3 Construction-related Effects on Traffic

This section discusses potential construction-related traffic effects, such as lane closures, which may occur throughout the day, including peak travel periods. Additional lanes may be closed during off-peak travel periods. These additional lane closures will accommodate delivery of construction equipment. Construction activities will likely occur in temporary construction corridors. Estimates of construction-related procedures that will affect road closures are as follows:

- **Column Foundations (drilled shafts)**—lane closures will be required throughout the column foundation installation process. The degree of traffic disruption around areas of piling/caisson work will vary depending on the roadway's width and the availability of alternate routes. The following scenarios are anticipated:
  - **Off-peak closures**—two lanes will be closed for each half-mile construction segment for foundation and column

construction. If the alignment is along a roadway that is less than three lanes wide (e.g., Halekauwila Street), the road will be closed to non-local vehicular traffic during off-peak periods. If the street's median is more than 8 feet wide (e.g., Farrington Highway in parts of Waipahu), two lanes will remain open.
  - **Peak closures**—during peak travel periods, closure may be restricted to one or two lanes. If a street is only two lanes wide, efforts will be made to open one lane during peak periods, if necessary.
  - **Cross-streets**—if cross-streets are at least 150 feet apart to allow space for the required equipment, the only restrictions on cross-streets could be turning movements onto the alignment road where lanes are closed. Access could be closed in off-peak periods during erection of segments.
- **Columns**—lane closures will be required throughout the column construction process. Lane closures similar to those assumed for column foundations are assumed for aboveground column construction.
- **Guideway Structure**—during construction of the guideway structure between the columns, lane closures will be required. However, if the active work area spans an intersection, the cross-street will be open (with possible turning restrictions) during peak hours but closed during off-peak hours. Lane closure could also be needed in the off-peak direction during delivery and erection of segments.
- **Stations**—lane closures will be required at all locations where stations will be constructed over a roadway. Some work will likely require complete road closures, and this will be scheduled for permitted night work.
- **Park-and-Ride and Other System Facilities**—park-and-ride and other system facilities (e.g., traction power substations and the maintenance and storage facility) will primarily be built on parcels not located on public streets and highways. Substantial lane closures are not anticipated during construction of these facilities, but brief lane closures may be necessary during construction of entrances and exits.

Table 3-27 lists anticipated temporary lane closures during peak periods along the alignment. Additional lanes may be closed during off-peak periods. Utility relocation could also require additional lane closures. In addition to travel lanes, a number of turning lanes will also be temporarily closed. It is proposed that left-turn lanes along Farrington and Kamehameha Highways and Dillingham Boulevard be temporarily closed during construction. Traffic signals adjacent to the fixed guideway could also be temporarily replaced or re-timed. In addition, temporary traffic signals may be placed at some unsignalized intersections during construction. Delivery of construction materials will increase the number of trucks on local roadways.

Balanced cantilever construction likely will be used for the longer spans crossing the H-1 and H-2 Freeways and possibly Fort Weaver Road. Individual lanes will be closed to allow this work to be completed without a full roadway closure. A detailed schedule showing which lanes will be affected will be prepared for the erection of segments. The actual means and methods for erecting these segments will be the contractor's decision. Construction with segmented precast sections will avoid the need for substantial shoring or false work. Appendix E, Construction Approach, describes the general construction process and methods likely to be used to construct the Project.

Phased opening of the Project to the public will have only minor effects on traffic. This will be limited to the station areas where bus transit service has been temporarily altered to complement the interim configuration of the fixed guideway service.

Table 3-27 Potential Peak Period Temporary Lane Closures During Construction[1]

Roadway Name	Cross Street From	Cross Street To	Number of Lanes	Number of Lanes to be Temporarily Closed[2]	
				Kapolei Bound	Koko Head Bound
Farrington Highway	Makamaka Place	Waipahu Depot Road	5	1	0
Kamehameha Highway	Acacia Road	Boathouse Entrance	6[3]	0	1
Kamehameha Highway	Salt Lake Boulevard	Center Drive	5[3]	1[4]	1
Salt Lake Boulevard	Kamehameha Highway		4	1	0
Kamehameha Highway	Radford Drive		5[5]	1	1
Nimitz Highway	Valkenburgh		3[6]	0	1
Ualena Street	Ohohia Street	Lagoon Drive	2	1	0
Waiwai Loop	Lagoon Drive	Curve	2	1	0
Kamehameha Highway	Middle Street	Laumaka Street	5	1	1
Dillingham Boulevard	Laumaka Street	Ka`aahi Street	4	1	1
Dillingham Boulevard	Ka'aahi Street	King Street	5	0	1
Nimitz Highway	River Street	Fort Street	8	1	1
Ala Moana Boulevard	Bishop Street	Halekauwila Street	6	0	1
Halekauwila Street	Punchbowl Street	South Street	2	1	0
Halekauwila Street	Keawe Street	Ward Avenue	2	0	1
Kona Street	Pensacola Street	Pi`ikoi Street	2	1	0
Kona Street	Pi`ikoi Street	Ke`eaumoku Street	4	2	1

[1] Left turn lanes along Farrington Highway, Kamehameha Highway, and Dillingham Boulevard will also be temporarily closed during construction.
[2] Additional closures could occur in short segments and/or during off-peak travel periods.
[3] Kamehameha Highway narrows to four lanes around the Moanalua Freeway Interchange.
[4] One Kapolei bound lane will be closed at Kamehameha Highway and Center Drive only
[5] One Town bound lane will be closed to replace the left-turn lane. One `Ewa bound lane will be closed to replace the left-turn lane.
[6] The left-turn lane in the Town bound direction will be closed and replaced with an option left-turn/through lane.

The fixed guideway will be built along several roadways that are heavily used freight routes. Construction effects on freight could occur, especially during off-peak hours. Freight movement may be delayed by the need to use an alternate route. Loading zones along the route could be temporarily relocated.

3.5.4 Construction-related Effects on Parking

Approximately 230 on-street parking spaces will be temporarily affected by project construction. Table 3-28 identifies the locations where on-street parking will be temporarily unavailable at various points along the alignment. Parking spaces will be unavailable primarily during construction of foundations and columns, and spaces may not be lost all at once. On-street parking by construction workers will not be permitted near work sites. During the actual hours of work, only those vehicles absolutely necessary for construction shall be allowed within the safety zone or allowed to stop or park on the shoulder of the roadway with the approval from the City.

Table 3-28 Potential Effect on On-Street Parking During Construction

Roadway Name	Cross Street From	Cross Street To	On- Street Parking Temporarily Lost During Construction
Moloalo Place	Waipahu Depot Street	Mokuola Street	5
Ka`aahi Street	Dillingham Boulevard	Iwilei Road	17
Halekauwila Street	Punchbowl Street	South Street	21
Halekauwila Street	South Street	Keawe Street	15
Halekauwila Street	Keawe Street	Coral Street	38
Halekauwila Street	Coral Street	Cooke Street	10
Halekauwila Street	Cooke Street	Kamani Street	44
Halekauwila Street	Kamani Street	Ward Avenue	9
Queen Street	Ward Avenue	Kamake`e Street	46
Queen Street Extension	Kamake`e Street	Waimanu Street	21

Because of the limited amount of parking available to residents and businesses in and around construction sites, construction workers will not be allowed to park their personal vehicles in the public right-of-way.

In addition, some off-street parking spaces will be temporarily unavailable during construction. This temporary effect will generally last three to six months. Contractors will need approval from business owners before private lots can be used for parking. Construction workers also will not use commercial parking facilities if doing so reduces available parking for customers or employees of that business.

3.5.5 Construction-related Effects on Bicycle and Pedestrian Facilities

Access to existing bicycle and pedestrian facilities will be maintained during all phases of construction as safety allows. Warning and/or notification signs of modification to bicycle and pedestrian facilities during construction will be provided. Proposed pedestrian detours will be submitted to the City for review and approval to ensure they are reasonable for all pedestrians and meet ADA regulations.

Proper deterrents, such as barriers or fencing, will be placed to prevent access (shortcuts) through the construction area.

Effects will occur in these areas as a result of the proximity of sidewalks to the roadway median. Many crossings will be temporarily eliminated, and disruptions will occur along adjacent sidewalks and bike paths. Sidewalk diversions will be made when necessary. In areas where additional right-of-way may be required (e.g., Dillingham Boulevard), sidewalks may be temporarily removed and pedestrians rerouted to safe locations.

The Transportation Technical Report (RTD 2008a) identifies potential conflicts or physical effects on existing and proposed bicycle facilities and the pedestrian circulation system that will result from construction of the Project.

3.5.6 Construction-related Effects on Airport Facilities

Construction of the Project will have temporary effects on airport facilities and notification of any short-term obstructions (e.g., cranes and gantries) will be made to the appropriate parties. Temporary lane closures on Ualena Street and Waiwai Loop could cause short-term delays to trucking and deliveries at airport-related facilities. The economy surface parking lot will be closed during construction of the Honolulu International Airport station, and other nearby roadways could be temporarily affected when support columns and guideway sections are transported and installed. Additionally, lei stand parking may be temporarily relocated during construction. FAA Form 7460-1, *Notice of Proposed Construction or Alteration,* will be filed prior to any construction on airport property.

3.5.7 Mitigation of Construction-related Effects

A Maintenance of Traffic (MOT) Plan and Transit Mitigation Program (TMP) will identify measures to mitigate temporary construction-related effects on transportation. The MOT Plan will address effects on streets and highways, transit, businesses and residences, and pedestrians and bicyclists. Coordination with TheBus will identify additional bus service to mitigate construction effects. While the City has identified the general content of the MOT Plan, construction methods identified by each contractor will ultimately be included in the MOT Plan. The TMP will mitigate effects on transit service operating during project construction. These plans will be developed by the contractor for each phase and coordinated/approved by HDOT (for the MOT Plan and HDOT highways only) and the City prior to starting construction in an area.

> Construction-related transportation effects will be mitigated with implementation of a Maintenance of Traffic Plan and a Transit Mitigation Program to be prepared prior to construction.

The MOT Plan and TMP will include site-specific traffic-control measures and will be developed in conjunction with the Project's Final Design. The key objectives of these plans will be to limit effects on existing traffic and maintain access to businesses. These plans will be shared with the public. Business access during construction is discussed in Section 4.18.1.

Maintenance of Traffic Plan

The following sections discuss measures included in the MOT Plan that will help mitigate construction-related transportation effects. The contractor will be given parameters, such as the number of lanes that could be closed and the procedures for closures, and will develop the MOT Plan accordingly with approval from the City or HDOT. The MOT Plan will address roadway closures for streets identified in Table 3-27. The Plan will specifically account for the effect of drilled shaft installation, crane access and operations, and the delivery and operation of materials trucks. The MOT Plan will also address the delivery and unloading of pre-cast guideway sections, including crane positioning for unloading. The contractor will submit any proposed changes to the MOT Plan to the City for approval.

Streets and Highways

Construction will be phased so that the duration of pile, caisson, and column work (which have the largest effect on traffic) will be minimized. During final design, whether under design-build or design-bid-build processes, detailed *Work Zone Traffic Control Plans,* including detour plans, will be formulated in cooperation with the City, HDOT, and other affected jurisdictions.

It is not anticipated that major or secondary highways will be closed to vehicular or pedestrian traffic, with the exception of some freeways or major arterials during late night and early morning weekend hours. Vehicular or pedestrian access to residences, businesses, or other establishments will be maintained. Additional temporary lane closures will occur during non-peak hours so that effects on heavy commuter traffic will be minimized. The MOT Plan will also address traffic signal changes and relocation of freight loading zones and utilities that might be temporarily affected.

During construction of the Project, the City will minimize disruption to freight movement by limiting road and lane closures and timing work along busy freight routes to avoid conflicts with truck traffic. When construction reaches roadways frequented by heavy truck traffic, detour plans prepared as part of the MOT Plan will also account for truck traffic. Additionally, in areas with substantial truck traffic, the City will work with businesses to maintain access to properties taking into account their particular vehicular needs.

Delivery of large equipment, such as drilling devices, cranes, and launching gantry truss sections, will occur along arterial routes to the construction corridor. City and HDOT approvals will be sought for proposed haul routes and included in the contract packages.

In addition, Intelligent Transportation System (ITS) applications will be implemented to make travel through and around work zones safer and more efficient. Several ITS strategies will be used, including the following:

Traveler Information—the collection, processing, and dissemination of traffic conditions, “event” information (e.g., construction, incidents), information on alternative travel modes and links to other traveler services. Information is broadcast to motorists that are en route as well as through pre-trip options such as web, phone, and media outlets.

Arterial Traffic Management—modification of the signal system along some roadways will be needed in conjunction with implementation of planned detour routes.

Incident Management—includes rapid identification of an incident, rapid response to secure the incident scene, and subsequent removal of associated vehicles from travel lanes and restoration of lane capacity.

As construction moves through a neighborhood, residents and businesses will be informed of the type and duration of construction activities and what provisions will be made to minimize disruption to daily activities. Additionally, an extensive public information program will be implemented to provide motorists with a thorough understanding of the location and duration of construction activities, as well as anticipated traffic conditions. ITS information regarding traveler information or incident management will be distributed through both daily and instant public involvement means. The project website will continue to be the primary information source for up-to-date project information. In addition, the project hotline and newsletter, local newspapers, radio and/or television spots, news releases, instant messaging lists, and flyers may be used to provide information to the public.

Transit

The MOT Plan will determine when and where changes in bus services could be needed and will include TDM elements, as provided in the TMP. Identification of potential changes to bus routes, stops, and service resulting from construction of the Project will be coordinated with TheBus. Changes in bus service could include improving frequencies on existing routes or adding new routes that circumvent specific construction areas. The City will make adjustments as needed to TheHandi-Van operations resulting from access limitations.

Pedestrians and Bicycles

Pedestrian and bicycle access will be maintained during construction as much as possible while emphasizing safety. Measures to maintain safe and efficient pedestrian and bicycle access will meet ADA regulations and could include the following:

- Channelizing pedestrian flow in areas where sidewalks are near construction—channelized structures are generally steel-framed, three-sided plywood structures built above existing sidewalks
- Providing alternative routes to avoid hazardous areas
- Making extensive use of signage to direct pedestrians and bicyclists to the safest and most efficient routes through construction zones—signs will warn pedestrians and bicyclists well in advance of sidewalk and bike lane closures

Parking

Where existing parking is disrupted by construction, signs will be posted directing people to nearby locations with available parking. The public will be kept aware of upcoming work locations, and information will be available on the project website about parking disruptions and alternatives. The City will coordinate with property and business owners regarding the timing of construction and other issues to minimize disruption to off-street parking.

Loading Zones

Where passenger and freight loading zones are removed for construction, temporary loading zones will be established nearby. The public will be kept aware of upcoming work locations, and information will be available on the project website about loading zone disruptions and alternatives.

Airport Facilities

The City will continue work with the airport to minimize disruption to travelers and businesses during construction of the guideway and stations. To the extent possible, all roadways will be kept open and access will be maintained. The economy parking lot will be completely closed during construction. Where existing parking is disrupted by construction, signs will be posted directing people to nearby locations with available parking. If the lei stand parking area needs to be relocated, signs will direct customers to the temporary parking area and from there to the lei stands.

Construction Phasing

As discussed in Section 2.5.10, the Project will be constructed and opened in phases over nine years. As the stations are completed and opened, rail service will be extended and feeder bus service from surrounding neighborhoods will be implemented, as discussed in Section 3.5.2. Express bus service to Downtown from Kapolei, Waipahu, etc. will continue to operate until the Downtown Station opens. Park-and-ride facilities and bus transit centers will open at about the same time as the stations they serve, although park-and-ride capacity and bus service may be lower at first, growing over time with demand. As each station opens, temporary signage will be installed that provides driving directions to available parking (if provided) and to passenger drop-off and pick-up locations. Signage will also direct pedestrians and bicyclists to station entrances.

Phasing will not affect construction methods but will affect the areas that will be disturbed at any specific time. The MOT Plan and the TMP will be developed for the different construction phases to minimize effects to the traveling public.

Transit Mitigation Program

The TMP will define adjustments that will mitigate the effects of construction on existing bus and TheHandi-Van service and will be customized for each construction phase and sized to properly serve projected rider demands.

In some construction phases, parallel bus routes on roads not directly affected by construction may experience an increase in service to accommodate rider demand shifted from affected bus routes. Public information and outreach will be conducted to influence current and prospective transit rider behavior.

The TMP will consider the following factors in determining required bus route service adjustments:

- Minimization of the extent of changes for bus stops and rerouting (if necessary)
- The MOT Plan as it relates to bus routes and pedestrian access to existing or relocated bus stops
- The severity and duration of construction along each corridor section and within each construction phase
- Differences between the scheduled bus route travel time currently operating and the scheduled travel time expected during construction
- The difference between the current travel time for existing traffic and traffic during construction, and whether transit could and should be given temporary traffic priority treatments during construction
- The types of temporary traffic priority treatments for transit that could be provided at a reasonable cost during construction

The TMP will generally maintain existing bus routes and stops. In areas where interruptions are expected, the following approaches may be adopted:

- Relocating bus stops
- Rerouting existing service for short sections where no additional buses are required
- Rerouting existing service for longer segments that require additional buses
- Introducing new services if they operate on different alignments not affected as heavily by construction
- Ceasing operation of routes or portions of routes temporarily and redeploying service hours to parallel routes
- Initiating a public information program to inform transit riders of service changes during construction
- Rerouting school bus routes that will be substantially delayed

3.6 Indirect and Cumulative Transportation System Effects

3.6.1 Indirect Effects

Compared to the No Build Alternative, VMT will decrease islandwide with the Project. As a result, wear and tear on roadways could also decrease, which would reduce maintenance costs. As people shift from private vehicles to the fixed guideway system, the costs associated with building and maintaining parking and other transportation-related public facilities could decrease in some areas. Reduced VMT could also reduce traffic accidents (Jovanis 1986).

As stated in Section 4.19.2, transit-oriented development (TOD) could occur as an indirect effect of the Project. TOD would include high-density land uses located near transit stations. As a result, vehicular, bicycle, and pedestrian traffic in some areas, such as ʻEwa and Kapolei, could increase.

The indirect effect of removing parking spaces to make room for the Project will be that some people who parked in those spaces will either park in another space nearby, will choose another mode to reach their destination, or will not make the trip. The indirect effect of spillover parking around stations will result in an increased demand for existing parking spaces.

3.6.2 Cumulative Effects

Planned extensions to the fixed guideway system are described in Chapter 2 and include extensions to West Kapolei, Salt Lake Boulevard, UH Mānoa, and Waikīkī. These extensions would provide additional transportation benefits beyond those provided by the Project. Other planned transportation projects (see Table 2-4 in Chapter 2) are included in all of the 2030 analyses throughout this chapter. The estimated cumulative effects of building the Project and these extensions are discussed in this section. The planned extensions would be evaluated through a separate NEPA and Hawaiʻi Revised Statues Chapter 343 environmental review process.

Effects on Transit

The planned extensions would further improve transit performance compared to the Project by reducing transit travel times and increasing reliability. Bus system operating expenses also would decrease as more trips would be taken on the guideway and the overall need for transfers to UH Mānoa and Waikīkī would be eliminated.

As a result of the additional stations and destinations covered by the extensions, ridership on the fixed guideway system with the Project and planned extensions would be substantially higher than with the Project alone. As shown in Table 3-29, daily transit ridership is estimated to be 28 percent higher for the Project with the planned extensions compared to the Project. The additional ridership would come from people accessing the fixed guideway system from stations within the 20-mile study corridor, as well as those riders traveling to the extension areas, such as UH Mānoa or Waikīkī.

Table 3-29 Daily Transit Ridership—2030 Planned Extensions

Alternative	Fixed Guideway Boardings
Project	116,300
Project with planned extensions	148,300
% Change from Project	*28%*

Effects on Streets and Highways

As shown in Table 3-30, the planned extensions would reduce VMT, VHT, and VHD compared to the Project alone. The planned West Kapolei and Kapolei Parkway Stations would both have park-and-ride facilities. Neither park-and-ride facility would affect local traffic operations. The East Kapolei park-and-ride facility would be removed when the extension to West Kapolei is completed.

Table 3-30 Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay—2030 Planned Extensions

Alternative	Daily VMT	Daily VHT	Daily VHD
Project	13,049,000	383,800	85,800
Project with planned extensions	12,989,900	381,100	84,400

Other cumulative effects could include removing additional on-street and off-street parking spaces to accommodate the fixed guideway structure, some adjustments to widths of travel lanes, and possible spillover parking effects at stations without park-and-ride facilities. With the extensions, spillover parking effects would be reduced at Project stations as demand would become more dispersed.

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04 CHAPTER

Environmental Analysis, Consequences, and Mitigation

This chapter of the Final Environmental Impact Statement (EIS) discusses the environmental analysis, consequences, and mitigation for the No Build Alternative and the Airport Alternative (Project). The analysis is based on Federal and Hawai‘i regulatory requirements as well as Federal and State guidelines. The *National Environmental Policy Act* (NEPA) and Hawai‘i Revised Statutes (HRS) Chapter 343 require the evaluation of potential effects of proposed government actions on the environment. The U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), has adopted regulations to implement NEPA. This Final EIS identifies the Airport Alternative as the Preferred Alternative [23 CFR 771.125(a)(1)].

The Project is described in Chapter 2, Alternatives Considered. The No Build Alternative assumes that this project would not be built. All other projects in the *O‘ahu Regional Transportation Plan 2030* (ORTP) will be implemented. In this document, the No Build Alternative serves as an environmental baseline to which the impacts of the Project are compared.

Chapter 3, Transportation, includes a discussion of potential parking effects, including those to neighborhoods and businesses, and mitigation commitments during operation (Section 3.4.7) and construction (Section 3.5.7).

Section 4.1, Changes to this Chapter since the Draft Environmental Impact Statement, summarizes the changes made to this chapter since publication of the Draft EIS. Sections 4.2 through 4.16 address the regulatory context and methodology by which each resource is studied, the affected environment, and the long-term effects on individual aspects of the environment of the Project. Measures that will be incorporated into the Project to mitigate long-term adverse effects are also identified. These sections are as follows:

- 4.2 Land Use
- 4.3 Economic Activity
- 4.4 Acquisitions, Displacements, and Relocations
- 4.5 Community Services and Facilities
- 4.6 Neighborhoods
- 4.7 Environmental Justice
- 4.8 Visual and Aesthetic Conditions
- 4.9 Air Quality

4.10 Noise and Vibration
4.11 Energy and Electric and Magnetic Fields
4.12 Hazardous Waste and Materials
4.13 Ecosystems
4.14 Water
4.15 Street Trees
4.16 Archaeological, Cultural, and Historic Resources

Section 4.17, Maintenance and Storage Facility, describes the environmental consequences of the preferred site near Leeward Community College and the alternative site near the future Hoʻopili master planned community. Section 4.18, Construction Phase Effects, addresses the construction-phase effects and mitigation that will be considered and the relationship between short-term uses of the environment and long-term productivity. Section 4.19, Indirect and Cumulative Effects, presents the indirect and cumulative effects of the Project, including the effects of prior actions to the future planned extensions and other planned projects. Section 4.20, Irreversible and Irretrievable Commitments of Resources, describes resources that will be used by the Project. Section 4.21, Anticipated Permits, Approvals, and Agreements, includes a list of environmental permits required for the Project and their status as of the date of this Final EIS.

The following technical reports include analyses of the individual environmental topics that have been evaluated for the Project:

- *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b)
- *Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c)
- *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d)
- *Honolulu High-Capacity Transit Corridor Project Visual and Aesthetics Resources Technical Report* (RTD 2008e)
- *Honolulu High-Capacity Transit Corridor Project Noise and Vibration Technical Report* (RTD 2008f)
- *Honolulu High-Capacity Transit Corridor Project Air Quality and Energy Technical Report* (RTD 2008g)
- *Honolulu High-Capacity Transit Corridor Project Electric and Magnetic Fields Technical Report* (RTD 2008h)
- *Honolulu High-Capacity Transit Corridor Project Hazardous Materials Technical Report* (RTD 2008i)
- *Honolulu High-Capacity Transit Corridor Project Ecosystems and Natural Resources Technical Report* (RTD 2008j)
- *Honolulu High-Capacity Transit Corridor Project Water Resources Technical Report* (RTD 2008k)
- *Honolulu High-Capacity Transit Corridor Project Street Trees Technical Report* (RTD 2008l)
- *Honolulu High-Capacity Transit Corridor Project Geology, Soils, Farmlands, and Natural Hazards Technical Report* (RTD 2008m)
- *Honolulu High-Capacity Transit Corridor Project Archaeological Resources Technical Report* (RTD 2008n)
- *Honolulu High-Capacity Transit Corridor Project Historic Resources Technical Report* (RTD 2008o)
- *Honolulu High-Capacity Transit Corridor Project Cultural Resources Technical Report* (RTD 2008p)
- *Honolulu High-Capacity Transit Corridor Project* Wetland and Waters *of the U.S. Study* (RTD 2009b)
- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Historic Resources Technical Report* (RTD 2009c)
- *Honolulu High-Capacity Transit Corridor Project Historic Effects Report* (RTD 2009d)

- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Cultural Resources Technical Report* (RTD 2009e)
- *Honolulu High-Capacity Transit Corridor Project Ecosystem Function and Values of Wetland and Waters of the U.S.* (RTD 2009h)
- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Noise and Vibration Technical Report* (RTD 2010b)

The analyses demonstrated that the Project will not have an adverse effect upon geology, soils, or natural hazards; therefore, they are not addressed in this chapter. The Project will be designed to meet seismic and other design standards related to natural hazards, such as wind forces from tropical storms. The project alignment is outside the tsunami evacuation zones.

The traction power substations were evaluated as part of the analysis of the Project. Most of these facilities will be located in the right-of-way or on properties acquired for stations. Impacts related to traction power substations are discussed in the land use, noise, visual and aesthetic conditions, and hazardous materials sections of this chapter. Geographic areas are discussed in four categories, as appropriate to the resource:

- **Project Region—**the entire Island of O‘ahu (Figure 1-1 in Chapter 1, Background)
- **Study Corridor—**the southern coast of O‘ahu where the Project is located (Figure 4-1)
- **Project Station Area—**areas within one-half mile of a project station (Figure 4-1); one-half mile is generally considered an acceptable walking distance
- **Project Alignment—**the route of the fixed guideway (Figure 4-1); discussions involving the project alignment include those properties adjacent to the alignment (i.e., properties fronting the roadway along which the guideway will be built)

Table 4-1 summarizes the environmental effects of the Project; mitigation measures to avoid, minimize, or reduce the effects; and probable unavoidable adverse effects that are detailed in this chapter.

The City and County of Honolulu (City) will incorporate mitigation measures required by permits, approvals, and agreements into the Project during final design and construction. During construction, the City will employ an environmental compliance manager to oversee and enforce mitigation commitments.

While the Project will be environmentally preferable regarding effects on air quality, energy use, and water quality, the No Build Alternative is the environmentally preferable alternative based on overall consideration of the criteria listed in 40 CFR 1505.2(b). The No Build Alternative would affect fewer historic and cultural resources and waters of the U.S., have no visual impact, and cause no displacements. However, the No Build Alternative does not meet the Purpose and Need for the Project.

4.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been updated to include analyses of the effects of the Project on the natural and built environments as compared to the No Build Alternative. Table 4-1 includes updated mitigation commitments for the Project and identifies unavoidable adverse environmental effects (see Appendix I, Mitigation and Commitments).

This chapter has been revised to reflect identification of the Airport Alternative as the Preferred Alternative. The Project refers to the Fixed Guideway Transit Alternative via the Airport that was evaluated in the Draft Environmental Impact Statement (EIS). The alignment was refined to transition from Aolele Street to Ualena Street

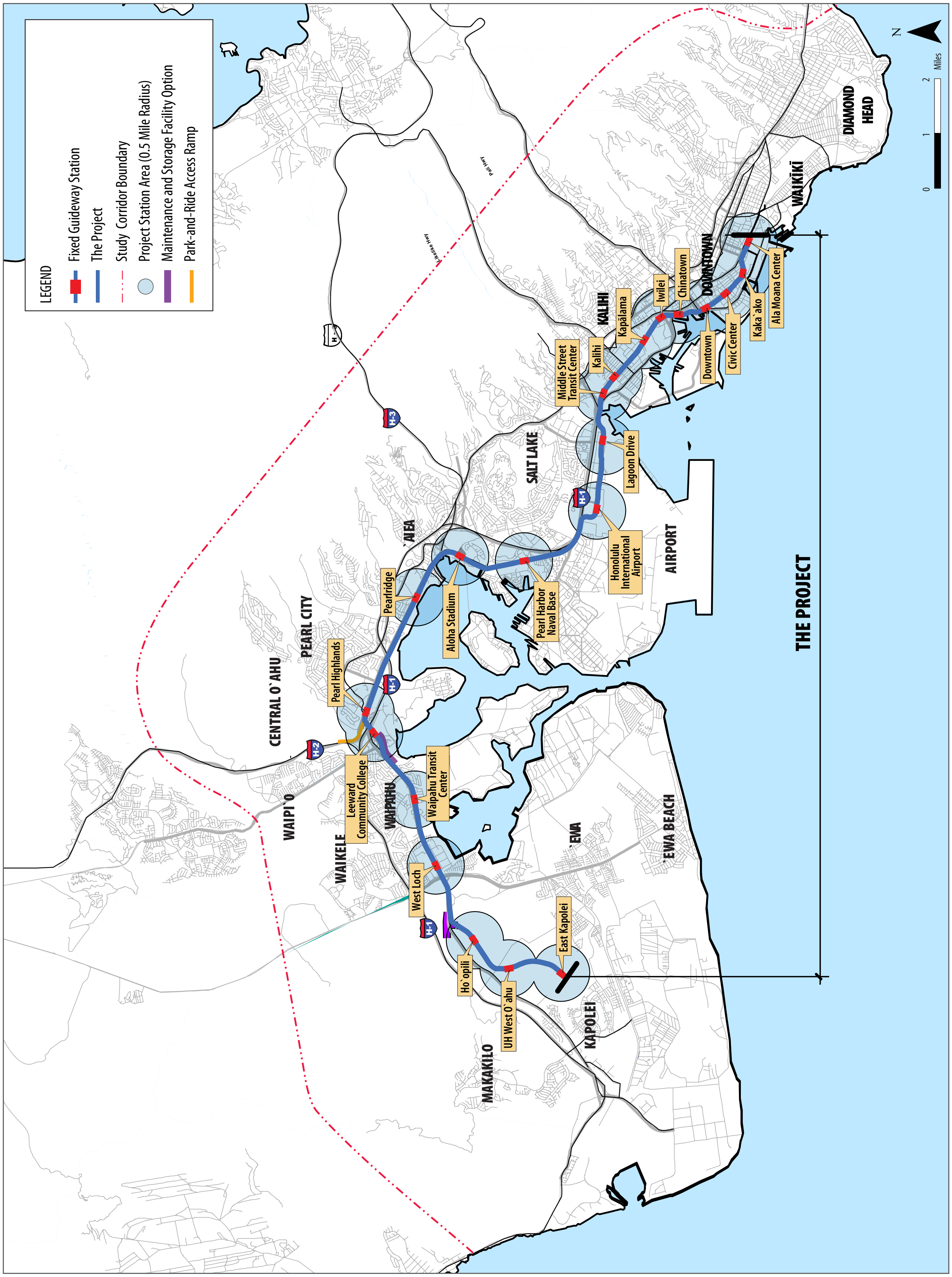

Figure 4-1 Project Overview

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts (continued on next page)

Land Use, Section 4.2	
Environmental Effects	Approximately 160 acres of existing land use will be converted to transportation use. Included are 88 acres of prime and statewide-important farmlands. This is less than one-tenth of one percent of available agricultural land on O`ahu. The Project is consistent with future land use plans and policies. The land needed for the Project represents approximately 1 percent of the total acreage within the study corridor. The land uses being converted are agricultural (42 percent), public (35 percent), and commercial (18 percent) with about 5 percent of the land conversions from residential use.
Mitigation Measures	Since the Project is consistent with adopted land use plans and policies, no mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Economic Activity, Section 4.3	
Environmental Effects	For the Project, property will be acquired from private owners and converted to a transportation use that will be owned by the City. This will result in a direct reduction in annual property tax revenues. These reductions are estimated to be $1.2 million annually. The Project is not expected to result in substantial long-term adverse effects on property tax revenues.
Mitigation Measures	No mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Acquisitions, Displacements, and Relocations, Section 4.4	
Environmental Effects	Acquisitions: 40 full, 159 partial Displacements: 20 residences, 67 businesses, 1 church
Mitigation Measures	Where acquisition of property will occur, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and will follow the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Community Services and Facilities, Section 4.5	
Environmental Effects	There will be impacts to schools, libraries, churches, parks, and recreational facilities adjacent to the alignment that are detailed below. There will be partial acquisition or use of land at 14 community facilities and displacement of 1 church. The Project will not affect the operation of the community facilities where partial acquisition is required, and the church will receive relocation assistance. A number of properties owned by utility providers will be affected by partial acquisitions, and some utilities will be relocated and/or modified to accommodate the Project.
Mitigation Measures	Buildings, parking, lighting, fencing, and other features will be replaced or compensation will be provided. Where acquisition of property will occur, compensation will be provided to affected property owners in accordance with all applicable Federal and State laws and will follow the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts (continued on next page)

Neighborhoods, Section 4.6	
Environmental Effects	The Project will provide people living and working in neighborhoods within the study corridor with increased mobility. The Project will provide an alternative to traveling by personal vehicle or bus within the existing transportation corridors. Passengers using the new transit system will experience reduced travel times to other neighborhoods and growth centers along the project alignment and near transit stations. The transit facility is not expected to be a physical barrier in neighborhoods and will not affect community identity or cohesion. Potential new development and redevelopment along the project alignment, as well as the scale of the transit system, will not substantially affect community character. Ongoing coordination efforts with the public will help develop design measures that will enhance the interface between the transit system and the surrounding community.
Mitigation Measures	Since there will be no adverse effects to neighborhoods, no mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Environmental Justice, Section 4.7	
Environmental Effects	There will be no disproportionately high and adverse effects on residents and businesses in O`ahuMPO Environmental Justice Areas.  The Banana Patch community was not identified as an Environmental Justice Area using the O`ahuMPO method. However, following public outreach, the area has been identified as an Environmental Justice area of concern. The community is 100 percent minority and will be relocated as part of the Project. A meeting was held in the Banana Patch community during the Draft EIS public comment period. All concerns expressed by residents were related to acquisition and relocation assistance and schedule. Where relocations will occur in O`ahuMPO Environmental Justice Areas and the Banana Patch community, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and will follow the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*.
Mitigation Measures	The Project will not result in disproportionately high and adverse impacts within O`ahuMPO Environmental Justice Areas or to the Banana Patch community. Therefore, no specific mitigation measures to reduce impacts are required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Visual and Aesthetic Conditions, Section 4.8	
Environmental Effects	The fixed guideway and stations will be elevated structures. They will change views where project elements are near existing views or in the foreground of these views. This change will also occur for motorists traveling on roadways along and under the guideway. Stations will be dominant visual elements in their settings and will noticeably change views. The Project will block views in several areas of the corridor, including protected mauka-makai views. The Project will introduce a new linear visual element to the corridor, and changes to views will be low to significant (or, a high level of visual impact) and unavoidable. Appendix J provides a summary of the Project's relationship to State of Hawai`i and City and County land use plans, polices, and controls for the project study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions. These policy documents include the *`Ewa Development Plan, Central O`ahu Sustainable Communities Plan,* and *Primary Urban Center Development Plan*. The Project is supportive of the land use objectives included in these plans.
Mitigation Measures	As part of the final design process, DTS has developed specifications and design criteria to address the City's requirements for the Project. Guideway materials and surface textures will be selected in accordance with generally accepted architectural principles to achieve integration between the guideway and the surrounding environment. Landscape and streetscape improvements will mitigate potential visual impacts, primarily for street-level views.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts (continued on next page)

Probable Unavoidable Adverse Environmental Effects	Although mitigation measures will minimize many adverse visual effects by providing visual buffers and reducing visual contrasts between the project elements and their surroundings, the Final EIS acknowledges, as concluded in the Draft EIS, that unavoidable adverse effects, such as view blockage, cannot be mitigated and will be significant (noted as a "high" level of visual impact in the Draft EIS) in some areas.
Air Quality, Section 4.9	
Environmental Effects	The Project will reduce regional pollutant emissions between 3.9 to 4.6 percent. The study area is in attainment for all national ambient air-quality standards. The Project will reduce emissions of greenhouse gases.
Mitigation Measures	Because no substantial air quality impacts are anticipated, no mitigation will be required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Noise and Vibration, Section 4.10	
Environmental Effects	Without mitigation, the Project would have moderate noise impacts at eight locations. The Project will have no vibration impacts.
Mitigation Measures	The elevated guideway will include a parapet wall on both sides of the guideway that extends 3 feet above the top of the rail. The design specification for the rail vehicles will require wheel skirts that block noise coming from the undercarriage. At three locations where the noise analysis shows that moderate noise impacts will occur even with the parapet wall and wheel skirts, the guideway structure will be lined with a material designed to absorb noise. The design specification for the traction power substations will require that the substations be designed to meet the standards in HAR Chapter 11-46. Automatic track lubrication devices will be installed on tight-radius curves in the maintenance and storage facility to eliminate wheel squeal on those curves.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Energy and Electric and Magnetic Fields, Section 4.11	
Environmental Effects	The Project will reduce daily transportation energy demand by 3 percent. Motor vehicle consumption islandwide: 90,760 MBTUs. Fixed guideway energy consumption: 1,690 MBTUs.
Mitigation Measures	None required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Hazardous Waste and Materials, Section 4.12	
Environmental Effects	Sites of concern near the Project could be contaminated. Sites where hazardous materials are or have been used or stored will be acquired. The City will perform a Phase I Environmental Site Assessment for properties that will be acquired for the Project. Depending on the outcome, a Phase II Environmental Site Assessment may be appropriate. The City will decide the necessity of the Environmental Site Assessment for each property acquisition.
Mitigation Measures	Properties identified as contaminated will be remediated in accordance with regulations.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts (continued from previous page)

Ecosystems, Section 4.13	
Environmental Effects	There will be "no effect" to threatened, endangered, or protected species or designated critical habitats.
Mitigation Measures	The City will secure a Certificate of Inclusion for the Habitat Conservation Plan from the Hawai`i Department of Transportation for Ko`oloa`ula *(Abutilon menziesii)*, if needed, and will comply with the measures identified by USFWS in the current and/or amended Habitat Conservation Plan. The City will survey all large canopy trees to be pruned prior to construction to ensure that no trees have white tern chicks.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Water, Section 4.14	
Environmental Effects	There will be effects to five streams from construction of guideway support columns below the ordinary high-water mark, which will affect approximately 0.02 acre of waters of the U.S. (linear transportation features) and 0.06 acre of other project features. Effects to wetlands will include shading from the guideway. As a result of rainfall collecting on impervious surfaces where infiltration currently occurs, there will be increases in stormwater runoff, which will be managed with best management practices. There will be no adverse effects to marine waters, groundwater, or floodplains.
Mitigation Measures	Permanent mitigation features to Waiawa Stream include enhancement, establishment of water quality basin, ecological restoration with native Hawaiian plantings, extension of existing culvert, and enhancement of floodway capacity conveyance to achieve zero rise in flood zone. Where the Project crosses an estuary reach and placement of columns cannot be avoided, the columns will align with existing columns. best management practices will be used to control the quality of stormwater runoff.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Street Trees, Section 4.15	
Environmental Effects	Tree removal will be minimized to the greatest extent possible, but pruning is likely next to the guideway. Twenty-eight "Notable" true kamani trees along Dillingham Boulevard will be removed. Approximately 100 street trees will be pruned, 550 will be removed, and 300 will be transplanted.
Mitigation Measures	Mitigation measures will consist of transplanting existing trees or planting new ones. Pruning will be in compliance with City and County ordinances and require supervision by a certified arborist. The City will coordinate with the State of Hawai`i Department of Transportation landscape architect.
Probable Unavoidable Adverse Environmental Effects	Street trees will be removed in areas where they are not compatible with the Project.
Archaeological, Cultural, and Historic Resources, Section 4.16	
Environmental Effects	There will be adverse effects to 33 historic properties and effects to 4 cultural resources.
Mitigation Measures	The draft Section 106 Programmatic Agreement (PA) was developed in consultation among the consulting parties. The Section 106 process identified historic properties potentially affected by the Project, assessed effects, and sought ways to avoid, minimize, or mitigate any adverse effects for properties included in, or eligible for inclusion in, the National Register of Historic Places. The draft PA records the terms and conditions agreed upon to resolve potential adverse effects and is attached to this Final EIS in Appendix H. The Section 106 signatories (FTA, SHPO, and ACHP) clarified the language in the draft PA and, in May 2010, FTA distributed the draft PA to the Section 106 consulting parties for informational purposes. FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize this draft PA prior to the ROD. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signatures as concurring parties to the PA.
Probable Unavoidable Adverse Environmental Effects	While mitigation will be provided for all adverse effects, the Project will still require demolition of three historic buildings.

about 2,000 feet ʻEwa of the Lagoon Drive Station to avoid the central portion of the runway protection zone at Honolulu International Airport. This design refinement has been evaluated using the same criteria and methodology as all sections in this chapter and will not create any significant effects to the natural and built environment. Extensive coordination with the Federal Aviation Administration (FAA) and the State of Hawaiʻi Department of Transportation (HDOT) has been conducted as part of this design refinement.

Since publication of the Draft EIS, design has been advanced, further analysis has been completed, and information has been added in response to comments on the Draft EIS and agency coordination. The sections in Chapter 4 have been renumbered and are listed below using the new Final EIS section number. The changes are summarized below.

Section 4.2, Land Use—acreage of land converted from existing use to transportation use was updated based on design refinement. The *Honolulu International Airport Layout Plan* (ALP) (HDOT 1995b) was added to this section.

Section 4.3, Economic Activity—no changes.

Section 4.4, Acquisitions, Displacements, and Relocations—the number of partial and full acquisitions and displacements was updated based on design refinement and coordination with property owners. Appendix B, Conceptual Right-of-Way Plans (in the Draft EIS), has been updated and is now Appendix C, Preliminary Right-of-Way Plans, for this Final EIS. Appendix C reflects design revisions since the Draft EIS and includes acquisitions, displacements, and general land use type. This was added to Appendix C to provide additional information to affected property owners.

Section 4.5, Community Services and Facilities—minor updates were made to this section to confirm community facilities adjacent to the alignment. Impacts and mitigation commitments were updated to reflect design refinements.

Section 4.6, Neighborhoods—discussion of the neighborhoods along the Salt Lake Alternative alignment was removed from this section.

Section 4.7, Environmental Justice—public outreach coordination with the Oʻahu Metropolitan Planning Organization (OʻahuMPO) Environmental Justice populations and the Banana Patch community during the Draft EIS comment period is described, and an Environmental Justice determination was added.

Section 4.8, Visual and Aesthetic Conditions—viewer group responses on the Draft EIS resulted in the refinement of the visual impact rating for several key views. Several additional simulations were added to illustrate project effects discussed in the Draft EIS. Mitigation commitments were updated and include measures to integrate project elements with surroundings. Also, discussion of unavoidable adverse environmental effects was added.

Section 4.9, Air Quality—air quality emission values were updated based on updated vehicle-miles-traveled data. An analysis of greenhouse gas emissions for the Project was added.

Section 4.10, Noise and Vibration—additional noise analysis was completed along the Airport Alternative alignment, for the maintenance and storage facility site options, and at high-rise buildings; mitigation commitments were further detailed. Additional noise analysis was also completed at the Honolulu International Airport when the Airport Alternative became the Preferred Alternative. At the request of the National Park Service, additional noise analysis was completed at three locations at the Arizona Memorial; after mitigation, no impact is expected from the Project.

Section 4.11, Energy and Electric and Magnetic Fields—energy demand was updated based on new vehicle-miles-traveled data.

Section 4.12, Hazardous Waste and Materials—additional information about probable contaminated sites and mitigation commitments was expanded in case hazardous materials are found prior to acquisition of properties.

Section 4.13, Ecosystems—changes were made to reflect agency coordination regarding inclusion in the HDOT Habitat Conservation Plan for koʻoloaʻula (*Abutilon menziesii*) (HDOT 2004) and informal consultation with the U.S. Fish and Wildlife Service (USFWS) on "no effect" to threatened and endangered species or designated critical habitats related to the Project.

Section 4.14, Water—this section was revised to include U.S. Coast Guard (USCG) and U.S. Army Corps of Engineers (USACE) input on navigable waters and waters under the jurisdiction of the USACE. Impacts and mitigation to waters of the U.S. were added based on design refinements and agency coordination since the Draft EIS.

Section 4.15, Street Trees—mitigation was refined to include coordination between the City and HDOT's highway landscape architect and gives further transplant mitigation details.

Section 4.16, Archaeological, Cultural, and Historic Resources—historic resources in the Area of Potential Effects (APE) were reevaluated following publication of the Draft EIS as a result of ongoing Section 106 consultation. The Historic Effects Report (RTD 2009d) was completed, and an effects determination recommended by the State Historic Preservation Officer (SHPO) was accepted by the FTA for the Project and the properties in the vicinity of the airport that were evaluated based on the refined design. The effects determination of the 81 historic resources are presented; the discussion of Section 106 consultation has been updated; and mitigation was added in accordance with the draft Programmatic Agreement (PA). Note: In the State of Hawaiʻi, the governor appoints the SHPO. The SHPO is the Chairperson of the Department of Land and Natural Resources (DLNR). The State Historic Preservation Division (SHPD) is a division within DLNR, and it is also where the deputy SHPO is located. In fulfilling Federal and State historic preservation requirements, the Project consulted with the SHPO through the SHPD. SHPD and SHPO are used interchangeably throughout this chapter unless otherwise indicated.

Section 4.17, Maintenance and Storage Facility—the site near Leeward Community College is identified as the preferred site for the maintenance and storage facility. A second site in Hoʻopili remains an option. Impacts and mitigation were revised to reflect design refinement of the preferred option.

Section 4.18, Construction Phase Effects—the section was revised to update effects and mitigation based on design refinements, agency coordination, and comments raised during the Draft EIS public comment period. A new section on invasive species was added as a result of agency comments and coordination. An updated schedule and cost estimates was used to estimate the annual employment impacts from construction.

Section 4.19, Indirect and Cumulative Effects—the section was updated to reflect adoption of the new City Transit-Oriented Development Ordinance 09-4 (ROH 2009). Additional detail is included on planned and foreseeable development. The indirect effect of the Project on growth and development and cumulative effects was expanded in the Final EIS.

Section 4.20, Irreversible and Irretrievable Commitments of Resources—irreversible and irretrievable commitments of natural and cultural resources was added.

Section 4.21, Anticipated Permits, Approvals, and Agreements—this section was revised to include permits, approvals, and agreements needed and notes the status of each permit as of the date of this Final EIS. The table also identifies the party responsible for submitting the permit, approval, or agreement.

4.2 Land Use

This section describes the existing land uses, including farmlands, development trends, and long-term plans for the study corridor. It also evaluates the Project's consistency with the long-term plans for the study corridor. An assessment of potential changes in land use that could result from the improved mobility that will be provided by the long-term operation of the Project is presented in Section 4.19. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b), the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d), and Appendix J, Relationship to Land Use Plans, Policies, and Controls. Farmlands are described in detail in the *Honolulu High-Capacity Transit Corridor Project Geology, Soils, Farmlands, and Natural Hazards Technical Report* (RTD 2008m).

4.2.1 Background and Methodology

A variety of data sources, including field surveys, were used to record existing land uses on properties adjacent to and within close proximity of the study corridor.

For farmlands, this investigation documented the location of existing properties that are actively cultivated and also checked information published by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), to determine if properties in the study corridor have been designated as prime, unique, or of statewide importance.

Additionally, government documents related to planned transportation improvements and land development were reviewed to assess the future context of the Project in the urban environment. The Project was also evaluated to determine consistency with adopted coastal zone management and development plans and policies.

4.2.2 Affected Environment

Existing Land Use

Table 4-2 provides an overview of existing land use within the study corridor in the planning areas delineated by the *City and County of Honolulu General Plan (as amended)* (DPP 2002a). Figure 4-2 illustrates the location of these planning areas and shows the future planned land uses. The corridor traverses through three major planning areas—ʻEwa, Central Oʻahu, and the Primary Urban Center (PUC).

The *ʻEwa Development Plan* (DPP 2000) was the first of the conceptual development plans to be adopted by the City. Significant growth in population and employment are projected for the ʻEwa area by 2030.

The ʻEwa region is a rural and agricultural area that is undergoing urbanization and includes Kapolei, which is developing as Oʻahu's "second city." The Waiʻanae terminal station for the Project is at East Kapolei. The Waiʻanae end of the Project will serve the area where both population and employment are forecasted to grow by approximately 400 and 300 percent, respectively. Some of the new developments in this area include the University of Hawaiʻi (UH) at West Oʻahu campus, the Salvation Army Kroc Center, and the Hoʻopili master planned development.

Commercial space in ʻEwa is anticipated to increase to 7.1 million square feet (compared

Table 4-2 Existing Land Use Overview by Planning Area

Planning Area	Land Use Overview[1]
\`Ewa—includes Kapolei-\`Ewa and Makakilo	\`Ewa, previously a predominantly agricultural area, is now being developed rapidly into single-family and garden-style apartment residential uses, as well as some light industrial and commercial uses. A number of State and Local government offices , as well as some light industry, have moved to Kapolei.
Central O\`ahu—includes Waipahu-Waikele and Waiawa[2]	Waipahu, the portion of the Central O\`ahu planning region nearest the Project, is comprised of moderate-density residential, commercial, and light industrial uses. Waipahu's commercial and light industrial uses are mostly clustered along Farrington Highway. Other portions of the Central O\`ahu planning region within the study corridor include lower-density residential developments and some commercial and light industrial areas in Waikele and Kunia. The Waiawa and Koa Ridge areas remain largely undeveloped at this time.
Primary Urban Center—includes Pearl City-\`Aiea, Salt Lake-Āliamanu, Airport-Pearl Harbor, Kalihi-Iwilei, Palama-Liliha, Downtown, Kaka\`ako, Makiki-Mānoa, Mō\`ili\`ili-Ala Moana	The Primary Urban Center is a wide-ranging development region stretching from Pearl City through Salt Lake, Honolulu International Airport, Downtown, and Kaka\`ako to the Koko Head end of the study corridor. The uplands in this area are dominated by single-family residential uses while the coastal plain has a broader range of uses. Land uses in the Pearl Highlands and Pearlridge Station areas include big-box retail, a regional shopping center, health services, smaller commercial and industrial uses, and apartments. The Aloha Stadium Station area is dominated by the stadium and nearby military uses, but some civilian residential development and neighborhood shopping centers are also present. All the station areas along the Airport Alignment are dominated by military, military housing, airport, or light industrial uses. As the corridor approaches Downtown, moderate- to high-density uses become more prominent. The four station areas in Kalihi and Iwilei are dominated by residential and commercial uses with commercial uses generally increasing closer to Downtown. The Chinatown and Downtown areas are comprised of high-density uses, including major office buildings, retail, and high-density condominiums. Federal, State, and Local government offices are also located near the Downtown and Civic Center Stations. Adjacent to Downtown, Kaka\`ako contains a mix of large retail uses, industrial uses, restaurants, and theaters. Ala Moana Center has 1.8 million square feet of retail space; this area is dominated by this shopping center. Big-box retailers, medical, smaller commercial development, hotel, and residential uses are also in this area.

[1] Land uses described include current uses within the study corridor.

[2] Planning area extends beyond the study corridor.

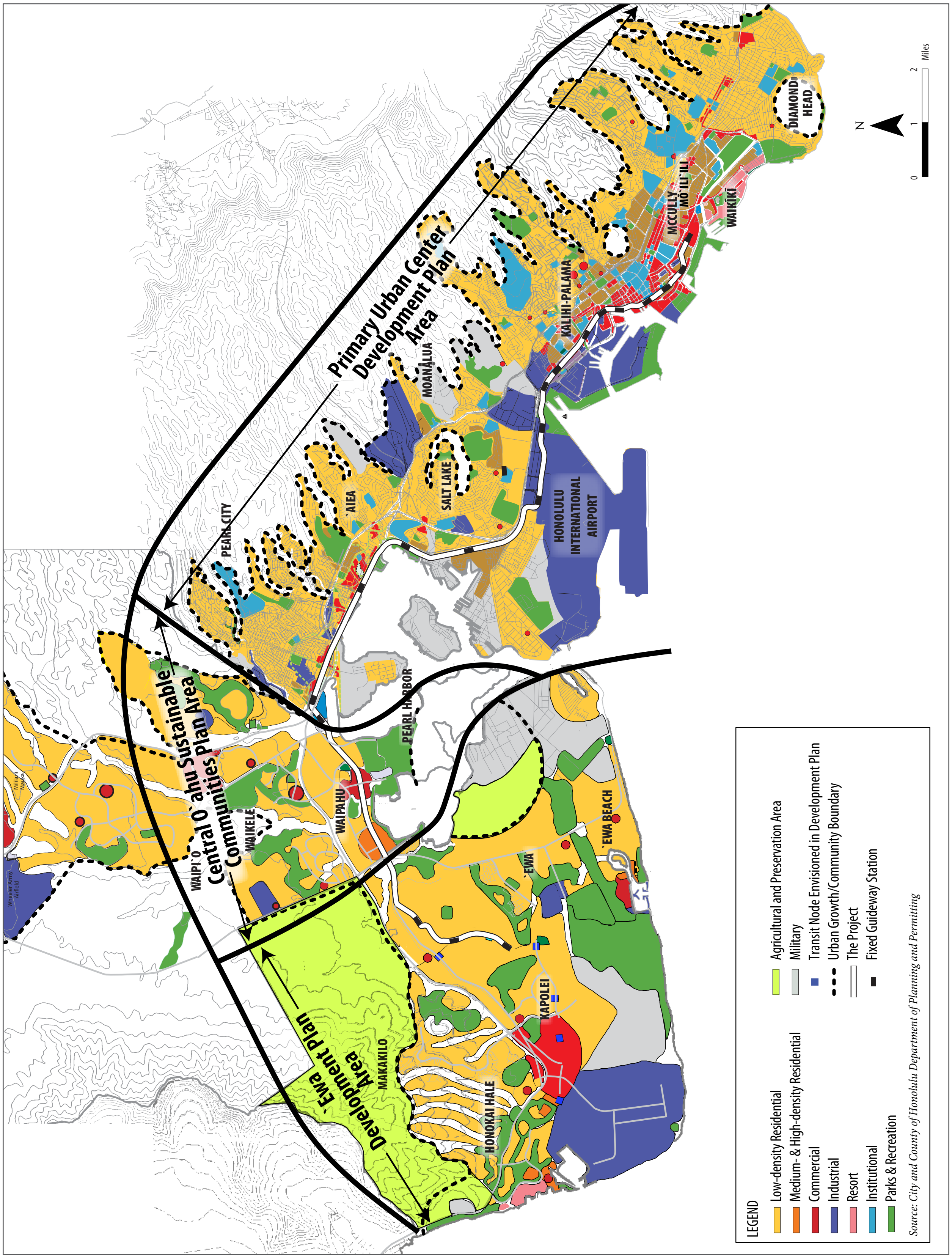

Figure 4-2 Planning Regions and Planned Land Use

to 8.4 million square feet existing in Honolulu today). The new UH West Oʻahu campus will support pedestrian access to and from a major transit node on North-South Road. The campus is projected to have 7,600 students and 800 staff and faculty by 2020. Central Oʻahu has a suburban development pattern encompassing smaller cities and community centers. Only part of the Central Oʻahu planning area is within the study corridor. The *Central Oʻahu Sustainable Communities Plan* (DPP 2003) establishes a Central Oʻahu Urban Community Boundary (UCB) that protects agricultural lands and open space and focuses planned urban development within its boundaries. This plan calls for moderate density/mid-rise housing and commercial development within walking distance of two major nodes and transit stations in Waipahu.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing agricultural crops.

Unique farmland is land other than prime farmland with a special combination of qualities to produce specific high-value crops.

Farmland of statewide importance is land other than prime or unique farmland, important for the production of agricultural crops as determined by the State.

The PUC Development Plan (DPP 2004a) area encompasses the most urbanized part of the island, including Downtown Honolulu. Figures 4-3 through 4-6 show existing land uses within one-half mile of the project alignment. The *ʻAiea-Pearl City Livable Communities Plan* (DPP 2004b) and the *Kaiāulu ʻo Kakaʻako Master Plan* (HCDA 2008) are two of the special community plans within the PUC.

Farmlands

Much of the study corridor is currently developed, and only a small portion of the corridor—primarily in the ʻEwa Development Plan area—consists of land that is currently used for agriculture.

The ʻEwa Plain, which is contained within the ʻEwa Development Plan area and includes properties surrounding the Project, was once a major agricultural area. Prior to 1995, the primary crop had been sugar cane. Despite recent rapid urbanization, much of the ʻEwa Plain is still classified or zoned for agricultural use by either the State of Hawaiʻi or the City. Much of ʻEwa that is not developed is also classified as "prime agricultural land." The *ʻEwa Development Plan* (DPP 2000) includes an agricultural preservation area as illustrated on Figure 4-7. A small amount of agricultural land located near Pearl Highlands Station is illustrated in Figure 4-8.

Future Land Use Plans and Policies

State, regional, and community plans and policies affecting future land use are currently in place and enforced through zoning and other requirements at State and Local levels. Proactive neighborhood-based plans establish a comprehensive framework for implementing long-range land use policies and goals for Oʻahu's future. The plans that are relevant to the goals and objectives of providing improved transit services within the study corridor include the following:

- *Hawaiʻi Statewide Transportation Plan* (HDOT 2002)—this plan envisions a multimodal transportation system and promotes transit-supportive development (TSD) in activity centers along the corridor.
- *Oʻahu Regional Transportation Plan 2030* (OʻahuMPO 2007)—this plan focuses on improving mobility with a series of strategies and programs to address future transportation needs. Within the 2030 planning horizon, this plan calls for a rail transit system that will serve the corridor between Kapolei and Honolulu.
- *City and County of Honolulu General Plan (as amended)* (DPP 2002a)—this plan establishes

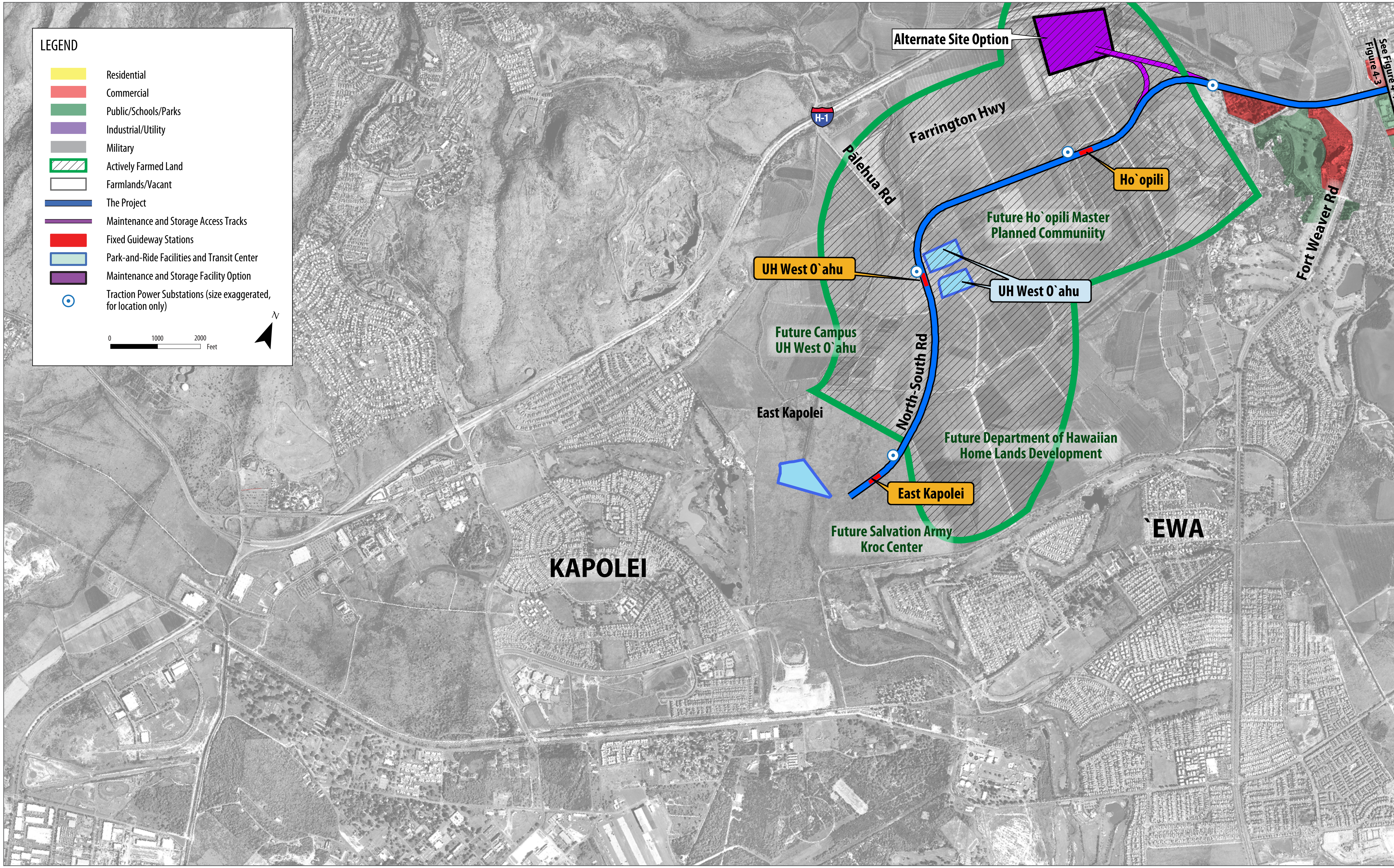

Figure 4-3 Existing Land Use (East Kapolei to Fort Weaver Road)

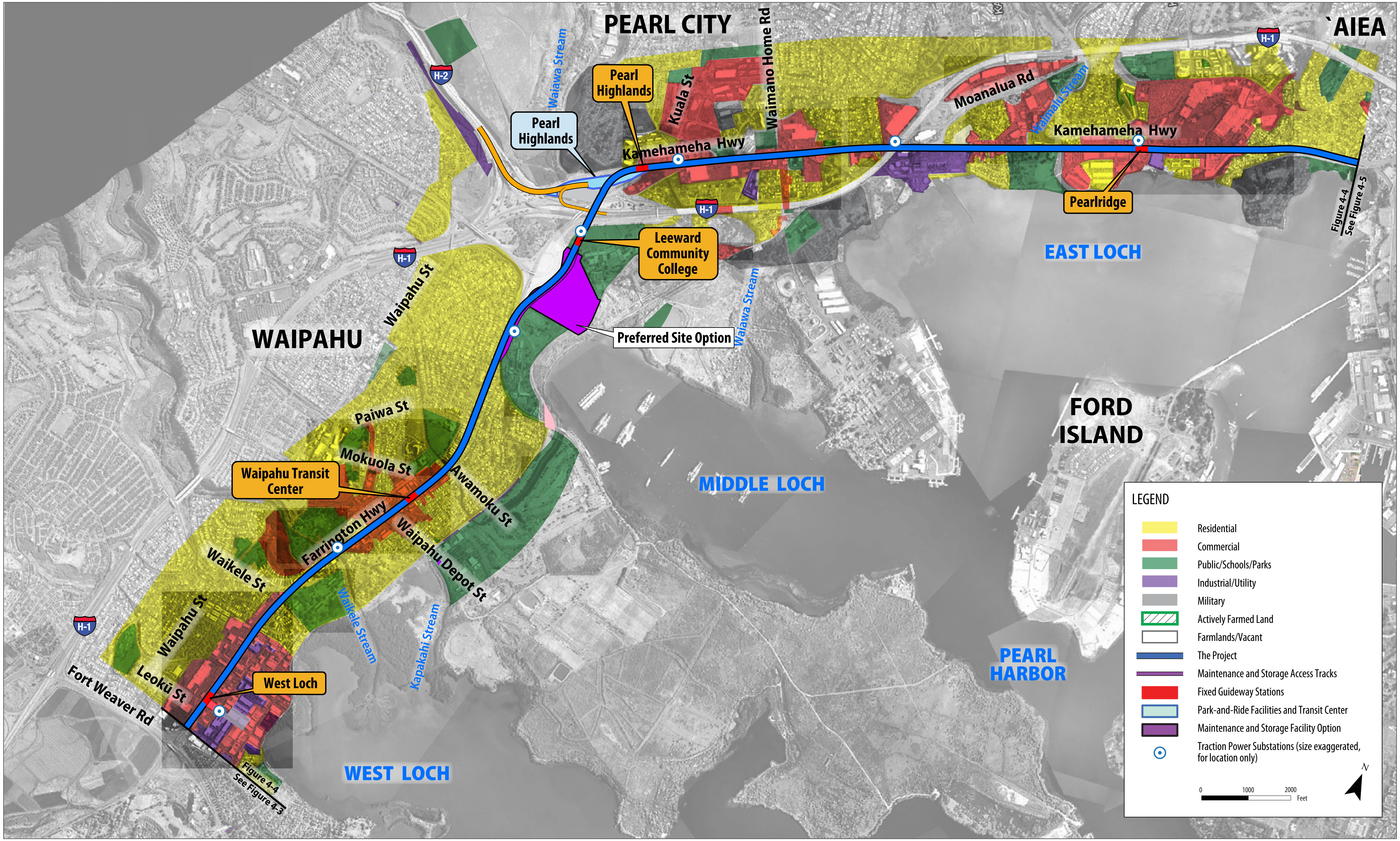

Figure 4-4 Existing Land Use (Fort Weaver Road to Aloha Stadium)

Figure 4-5 Existing Land Use (Aloha Stadium to Kalihi)

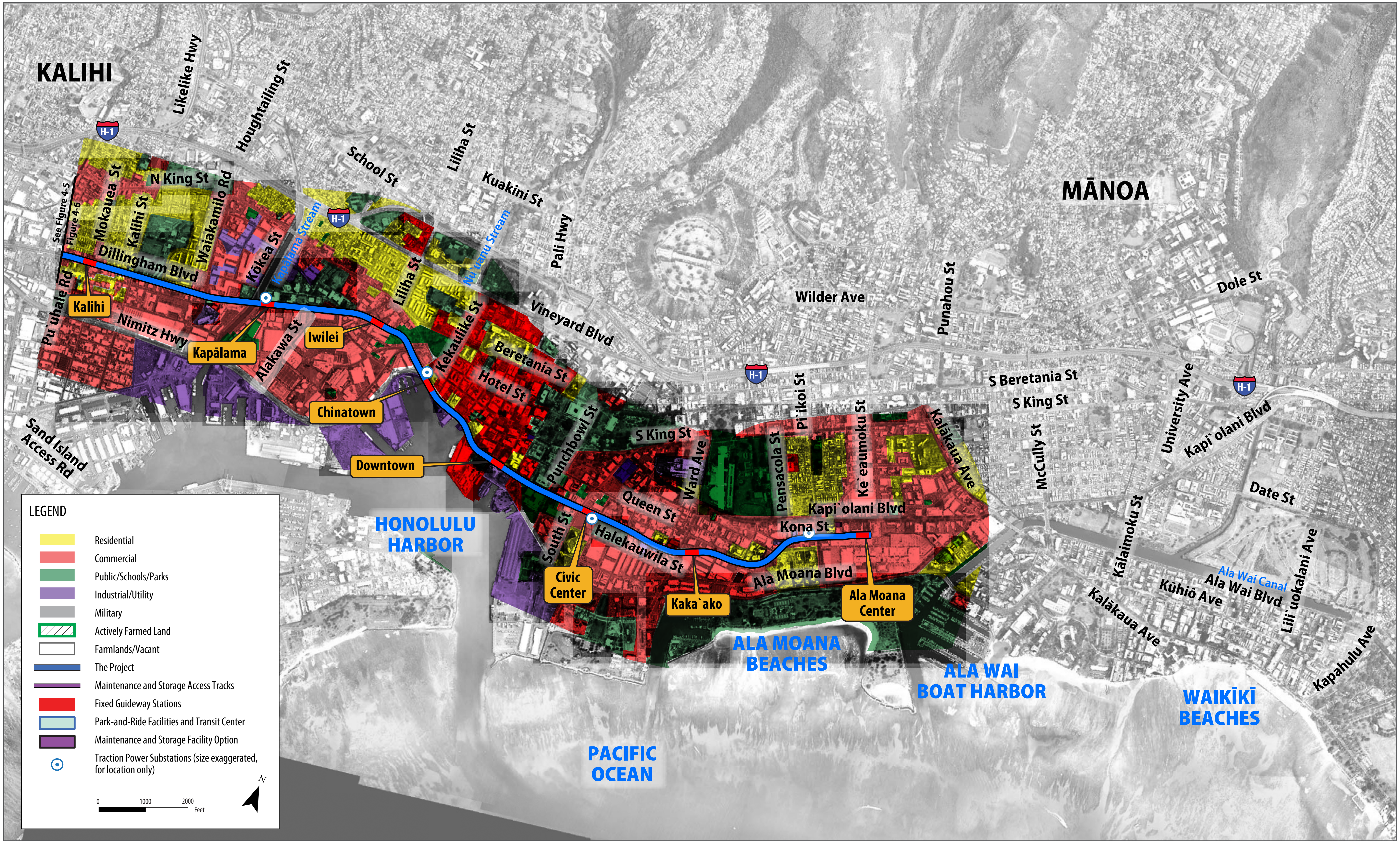

Figure 4-6 Existing Land Use (Kalihi to Ala Moana Center)

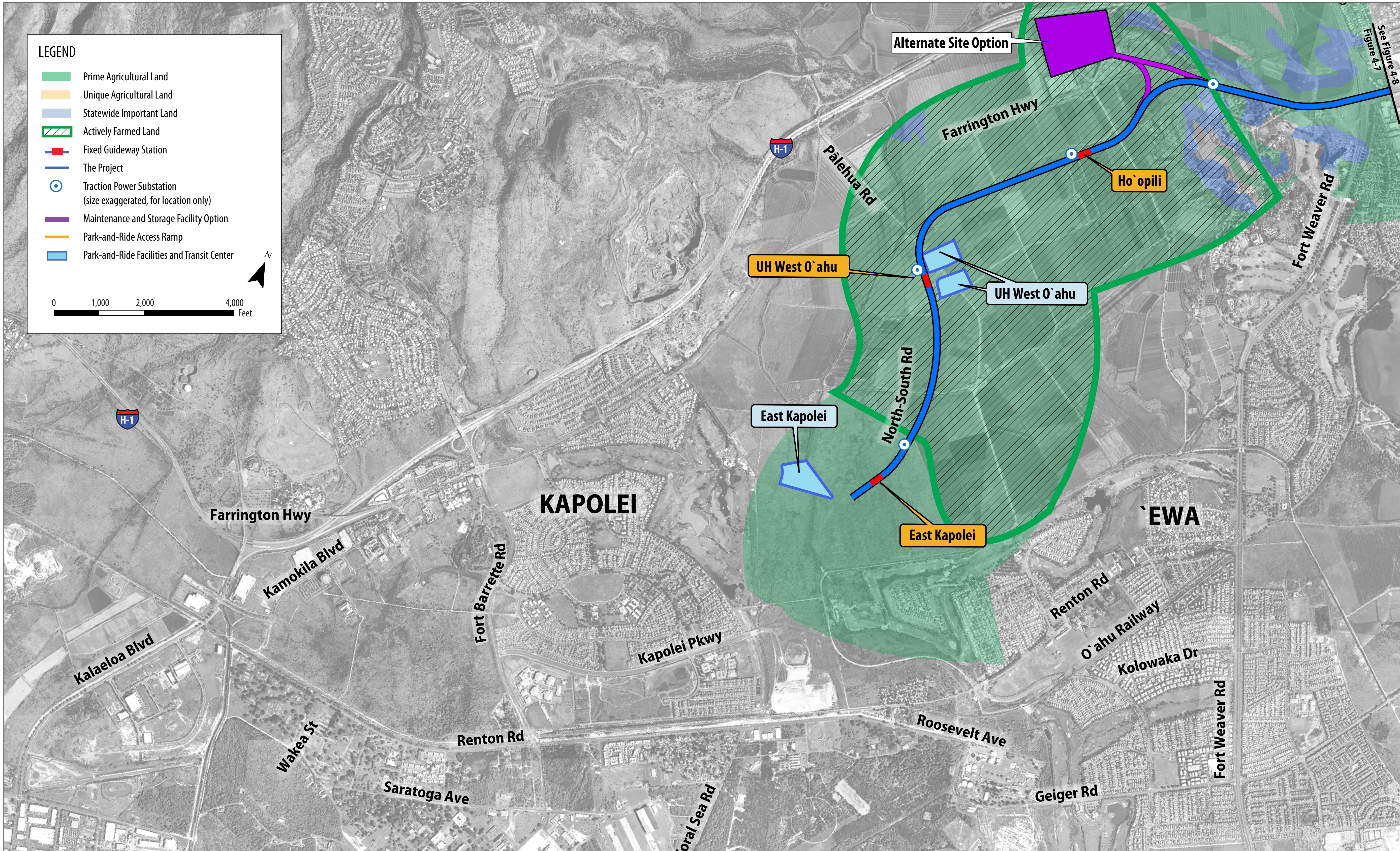

Figure 4-7 Designated Agricultural Lands (East Kapolei to Fort Weaver Road)

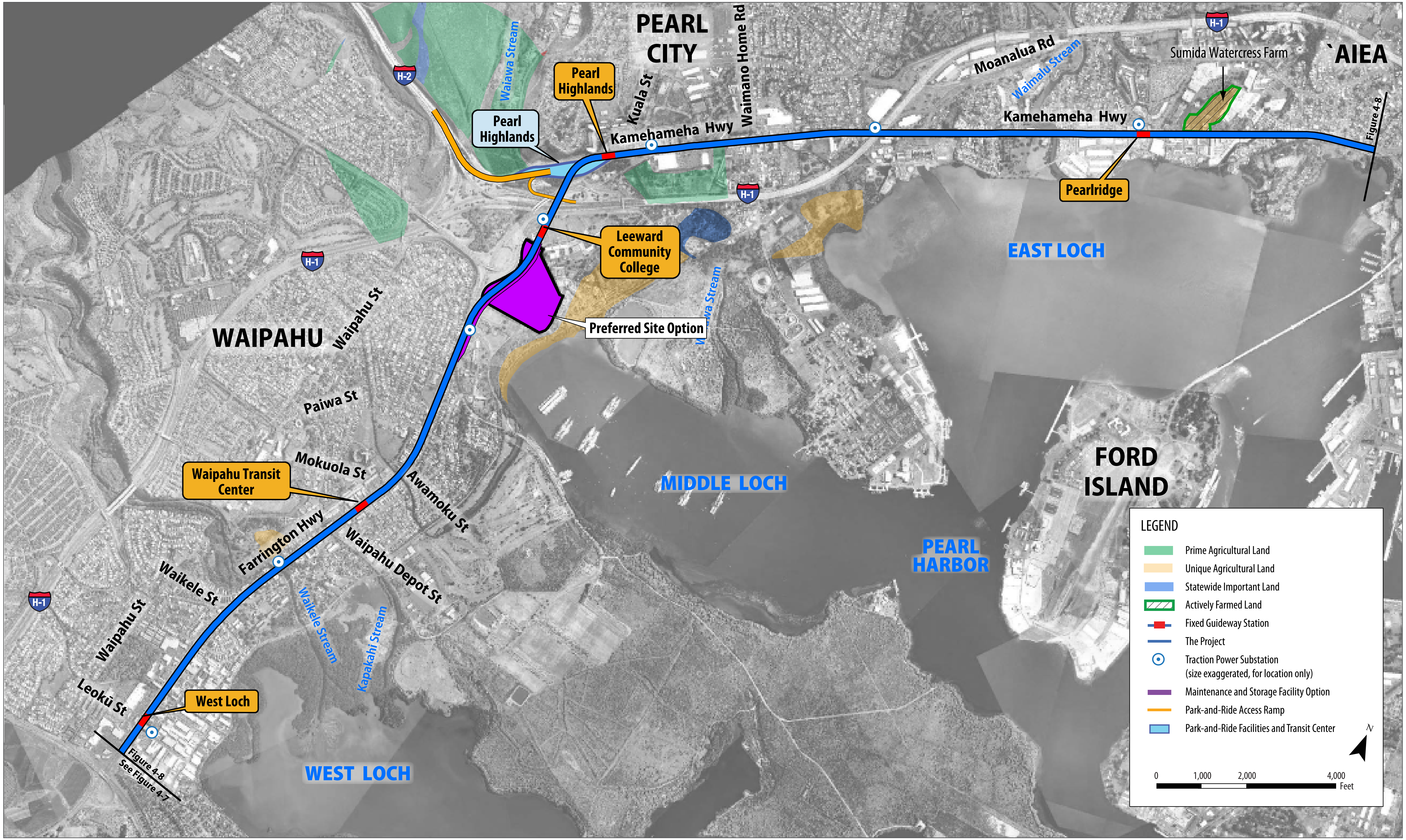

Figure 4-8 Designated Agricultural Lands (Fort Weaver Road to Aloha Stadium)

transit-supportive objectives and policies for Honolulu's future and directs future growth on O'ahu to the PUC, Central O'ahu, and 'Ewa.

Development plans for the PUC and 'Ewa direct new growth and its supporting transit facilities and TOD to these areas. Sustainable community plans for East Honolulu, Central O'ahu, and other parts of the island focus on supporting the character of these communities and preserving their natural and cultural resources.

The City passed a TOD special district amendment to a land use ordinance (ROH 2009) in March 2009. TOD special districts will restrict development in agricultural and open-space areas and encourage mixed-use, high-density, walkable communities around transit stations. The special districts also encourage public input into the design of TOD neighborhood plans to reflect unique community identities. TOD planning is underway and will occur before the fixed guideway stations are constructed. Developers who desire to build in TOD special districts will be subject to applicable Local, State, and Federal land use laws, which may include compliance with environmental impact statement laws.

4.2.3 Environmental Consequences and Mitigation

Environmental Consequences

Land Use

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to existing land use. It is assumed that the projects in the ORTP will be built and their environmental impacts will be studied in separate documents. The No Build Alternative is not consistent with local and regional long-range plans.

Project

Approximately 160 acres will be affected by the Project where existing land use will be converted to a transportation use. Only those parcels that will be completely acquired (full acquisition) will result in changes in land use resulting directly from the Project. For some properties, only a small portion of the parcel will be required (partial acquisition), and existing land uses will remain unchanged by the Project. The preferred maintenance and storage facility site option near Leeward Community College is vacant, previously industrial land. The largest potential effect would be displacement of Aloun Farms mauka of Farrington Highway for the proposed 41-acre maintenance and storage facility Ho'opili site option. Traction power substations will be located approximately every mile along the project alignment. A description of the substations is provided in Section 2.5.9. The substations have been placed in roadway rights-of-way, vacant lots, or in rights-of-way that will be acquired for stations and station features. Acquisitions and displacements are discussed in Section 4.4 and included in Appendix C. General land use categories for land that will be acquired or obtained by easement are included in Appendix C.

The acquired acreage for the Project will be approximately 160 acres, which represents approximately 1 percent of the total acreage within the study corridor. A majority of the land uses being converted to a transportation use represent agriculture (42 percent), public (35 percent), and commercial (18 percent). The remaining land conversions (about 5 percent) will be from residential land uses.

Farmlands

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to farmlands designated prime, unique, or agricultural lands of statewide importance. Although the projects in the ORTP are assumed to be built, their environmental impacts will be studied and reported in separate documents. The adopted *ʻEwa Development Plan* (DPP 2000), however, has recognized that agricultural lands adjacent to the project alignment will be developed in the future.

Project

The only farmlands that will be acquired for the Project are in the ʻEwa Plain. Because the properties are relatively large, only a small portion of each agricultural parcel will be acquired (Figures 4-7 and 4-8). These figures show the agricultural lands currently in cultivation, as well as agricultural lands that have been designated by USDA, NRCS, or the State of Hawaiʻi as prime, unique, or of statewide importance. Some of the designated lands are not currently in active cultivation. Approximately 80 acres of prime farmland and 8 acres of statewide-important farmlands will be acquired by the Project, of which 70 acres are actively cultivated. This acreage is designated for agriculture by County zoning.

All of the affected properties designated as prime, unique, or of statewide importance and/or actively being farmed are owned by individuals, corporations, or agencies that plan to develop them in conformance with the *ʻEwa Development Plan* (DPP 2000). About half of the agricultural property needed would be for the Hoʻopili maintenance and storage facility. The preferred site for the maintenance and storage facility is, however, the former Navy fuel storage and delivery facility near Leeward Community College. If the Project can acquire this site, about 47 acres of agricultural land designated prime or of statewide importance will be acquired for the Project.

The City coordinated with the Hawaiʻi State Office of the NRCS, pursuant to the *Farmland Protection Policy Act* (USC 1981). As shown on the NRCS-CPA-106 Form for the Project, the total of points is below the established threshold (Appendix F, Record of Agency Correspondence and Coordination).

The *2002 Census of Agriculture* (USDA 2004) reported that there are more than 70,000 acres of agricultural land in cultivation on Oʻahu, including those designated as prime, unique, or of statewide importance. The displacement of agricultural lands as a result of the Project represents less than one-tenth of one percent of available agricultural land. Considering that the amount of affected farmland is such a small proportion of all agricultural lands on Oʻahu, including those designated as prime, unique, or of statewide importance, the effect will not be substantial and no mitigation will be required.

Future Land Use Plans and Policies

No Build Alternative

Under the No Build Alternative, a transit system would not be constructed. However, this is not consistent with transportation and land use components in planning documents that support the development of a central transit system within the study corridor. Future projects on the ORTP are assumed to be constructed, and separate environmental documents will be prepared for those projects.

Project

The Project is consistent with the transportation and land use elements of adopted State and Local government plans (see Appendix J, Relationship to Land Use Plans, Policies, and Controls, for more information). The transit system will link Honolulu with outlying developing areas and activity centers that have been designated to receive increasing amounts of future residential and employment growth. The system will provide reliable rapid transit within the study corridor that will serve all population groups, improve transit links, and offer an alternative to the use of private automobiles.

Coastal Zone Management Program

The Federal *Coastal Zone Management Act of 1972* (CZMA) was enacted to encourage states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources. Pursuant to 15 CFR 930.32, federally permitted, licensed, or assisted activities undertaken in or affecting Hawai‘i's coastal zone must be consistent with the CZMA objectives and policies.

The Hawai‘i Coastal Zone Management (CZM) program was enacted in 1977 and codified in HRS Chapter 205A and is administered by the State of Hawai‘i Department of Business, Economic Development and Tourism (DBEDT) Office of Planning. The Hawai‘i CZM area encompasses the entire state, including all marine waters.

Other important elements of the Hawai‘i CZM program include a permit system to control development within the Special Management Area (SMA), a relatively narrow zone along the coastline. The SMA permit is administered by the counties of Hawai‘i.

The goals of the Hawai‘i CZM program are to

- Protect valuable resources
- Preserve management options
- Ensure public access to beaches, recreational areas, and natural reserves

A full CZM consistency assessment will be reviewed by the DBEDT Office of Planning, the agency administering the State's CZM program, when the City applies for Federal grants and Federal permits to allow construction.

The Project

The Project is consistent with the objectives and policies of the State's CZM program, as described in the following text.

Recreational Resources

The Project will not affect the existing coastal recreational resources or their uses by the public. Overall, the Project will improve the availability of access to existing and future parks and recreational facilities along the alignment.

Historic Resources

Section 4.16 provides the regulatory context that governs archaeological, cultural, and historic resources and identifies the historic properties eligible for the National Register of Historic Places (NRHP). The City will comply with Federal and State archaeological, cultural, and historic preservation laws and regulations. There are 33 adverse effects on historic properties. A draft PA was prepared in coordination with the SHPO and the Section 106 consulting parties to outline measures to minimize and mitigate Project effects on these resources.

Scenic and Open Space Resources

Section 4.8 identifies the protected mauka and makai views in the study corridor and identifies impacts and mitigation to those views. The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. The View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views that include the shoreline.

The *Coastal View Study* (DLU 1987) also considers the creation of new views along with the preservation of existing views. Transit users on the elevated guideway will have expansive panoramic views of the shoreline except where disrupted by trains traveling in the opposite direction, station structures, and multi-story buildings. These views will be similar to those from the street below, but better due to the elevated perspective (as described in Section 4.8).

Coastal Ecosystems

Portions of the Project are in the SMA. An SMA permit will be obtained from DPP for four areas as described in Section 4.21. The only project element in the Shoreline Setback Area will be the stormwater outfall from the maintenance and storage facility preferred site option near Leeward Community College that will drain into Pearl Harbor.

Stormwater discharge into Pearl Harbor will meet water quality requirement for the estuary. Permanent impacts are discussed in Section 4.14.3, and temporary impacts during construction that could affect coastal water quality will be mitigated as described in Section 4.18.

Economic Uses

To accomplish the economic development objectives for Oʻahu's urban corridor, suitable infrastructure must be developed as described in Section 4.3.

Coastal Hazards

The Project is not located in a tsunami evacuation zone and is being designed to applicable standards and specifications regarding storm weather, seismic events, and associated risks. The Project will not affect coastal erosion (RTD 2008m).

Managing Development

The Project will require Federal, State, and City permits and approvals that include provisions for public participation and ensure protection of coastal resources (see Section 4.21). The Project will also provide necessary infrastructure to accommodate existing and planned future travel demand. The Project is consistent with the transportation and land use elements of adopted State and Local government plans.

Public Participation

Agencies, non-governmental groups, and the public have been engaged throughout the Project's planning process, as required by Federal and State law. For more details on public participation opportunities, see Chapter 8, Comments and Coordination.

Beach Protection

The Project will not have a direct impact on Oʻahu's beaches and will not affect coastal erosion.

Marine Resources

The Project does not affect the sustainability of marine and coastal resources.

Airport Layout Plan

The ALP shows the existing airport layout and proposed future development at the airport. The refined alignment was identified by HDOT-Airport Division in an updated ALP and submitted to the FAA for review of airport design standards. The FAA accepted the ALP on April 28, 2010, indicating the ALP shows an acceptable alignment at the airport. The Project will not conflict with airport uses. A preliminary airspace review also indicates that, based on the DTS-submitted rail heights, there are no conflicts with airspace at the airport. An ALP review also indicates the guideway is compatible with airport-related uses.

Mitigation

Based on the relatively small number of parcels affected by full acquisitions, the effects on different types of land uses in the study corridor will be minimal. No mitigation measures will be needed.

4.3 Economic Activity

This section describes the effect of the Project on regional economics in the study corridor. Existing and future employment and growth in the study corridor were considered in the analysis. In addition, the anticipated changes to property tax revenues that will result from acquisition of property for the Project were evaluated. Economic effects related to construction are discussed in Section 4.18, and the Project's financial analysis is presented in Chapter 6, Cost and Financial Analysis. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c).

4.3.1 Background and Methodology

Regulatory Context

Regulations applicable to this analysis are as follows:

- Definition of Real Property Tax Rates—Real Property Tax Rate Tables, City of Honolulu, Department of Budget and Fiscal Services, Real Property Assessment Division
- Definitions of Real Property Tax Classifications—Revised Ordinances of Honolulu, Chapter 8

Methodology

Employment trends and forecasted growth were reviewed for the three development and sustainable plan areas in the study corridor—PUC, ʻEwa, and Central Oʻahu. The data were obtained from the Oʻahu Regional Transportation Plan data and DBEDT.

Based on land acquisition information identified in Section 4.4, changes in tax revenue were estimated using the City's 2008 tax rates.

4.3.2 Affected Environment

Employment

The PUC has more jobs than any area on Oʻahu or in the State, accounting for 74 percent of the State's total non-farm employment. Employment is primarily dependent on the tourism industry, although the professional and business services sectors are growing and currently account for 14 percent of total non-farm employment.

In general, employment in Oʻahu and in the study corridor is expected to increase at a compound annual growth rate of approximately 1 percent per year between 2000 and 2030 (Table 4-3). In particular, growth in high-tech jobs in the sectors of biotechnology, research and development, and professional and business services is expected. According to DBEDT's second-quarter 2008 forecasts, visitor arrivals will decrease in 2008 and stabilize in 2009. However, tourism will continue to be the largest industry and job generator on Oʻahu.

Table 4-3 Forecast Employment for the Project Region and Study Corridor

	2000	2030	2000-2030 Compound Annual Growth Rate
O`ahu	501,100	630,700	0.8%
Study corridor	399,300	524,200	0.9%

Source: O`ahu Regional Transportation Plan Data, Department of Business, Economic Development and Tourism.

As Oʻahu's emerging "second city," the ʻEwa and Kapolei areas are expected to experience the most growth in the study corridor (DPP 2000). This is due in large part to several major residential, governmental, and education projects currently under development. In particular, residential growth in West Oʻahu is expected to result in the need for additional population-serving employment, such as retail and service jobs.

Real Property Tax

For the fiscal year ending June 30, 2007, real property tax revenues totaled $685,868,000. This comprised approximately 70 percent of total revenues for the General Fund, which is the primary funding source for the City's operating budget, and accounts for more than 60 percent of all City revenues. Other budget funds, including the Highway Fund, Sewer Fund, and Liquor Commission Fund, have different sources of revenue and collectively comprise less than 40 percent of the total budget.

4.3.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be constructed. There would not be a conversion of property and associated reduction in tax base. This alternative would result in increased traffic congestion and delays with an associated loss in productivity.

Project

Employment

The Project will require the acquisition of some commercial and industrial properties. This will displace the businesses using the properties as well as their employees. However, it is anticipated that these businesses will be relocated to new sites.

Once constructed, the Project will employ workers for maintenance and operation of the system. It is anticipated that workers will be hired from the existing local labor force and trained to meet job requirements. The number of new workers will be small compared to the total labor force on Oʻahu and is included in the operating and maintenance costs for the Project. Workforce costs are included in the operating and maintenance cost estimates discussed in Section 6.4.1. Employment related to construction of the Project is discussed in Section 4.18.

Real Property Tax

For the Project, property will be acquired from private owners and converted to a transportation use that is owned by the City. This will result in a direct reduction in annual property tax revenues. These reductions are estimated to be $1.2 million as a result of the Project. A more detailed table of results is included in the Economics Technical Report (RTD 2008c). Section 4.19 discusses the potential indirect economic effects of new development and redevelopment near the project alignment and around the stations, which could have a beneficial effect on the regional economy.

Mitigation

The Project is not expected to result in long-term adverse effects on the economy or property tax revenues. No mitigation measures will be needed.

4.4 Acquisitions, Displacements, and Relocations

This section documents the effects on properties from required right-of-way acquisition for the Project. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b) and the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.4.1 Background and Methodology

Regulatory Context

Federal and State laws govern the acquisition of property for transportation projects. The Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, as amended (49 CFR 24), requires all Federal agencies to meet certain standards for the fair and equitable treatment of persons displaced by federally supported actions. The USDOT's regulations implementing this act require that relocation and advisory assistance be provided to all individuals and businesses displaced and that it be done in accordance with the provisions set forth in 49 CFR 24. Comparable housing that is decent, safe, and sanitary must be available and affordable for displaced persons, and commercial space must be available for displaced businesses. It also prohibits discrimination with regard to appraisals and acquisitions of properties. HRS Chapter 101, *Eminent Domain*, and HRS Chapter 113, *Land Acquisition Policies for Federally Assisted Programs*, encompass these Federal regulations.

Methodology

The parcels that could be affected by the Project were identified based on preliminary engineering drawings prepared for the Project. Generally, if only a portion of the property will be required and remain usable, then it is considered a partial acquisition. However, if a substantial amount of the land or the primary structure is located within the portion of the parcel to be acquired, then the entire property will be purchased. This is referred to as a full acquisition. For residential properties, if the right-of-way line comes within approximately 5 feet of a residential structure, it is considered a full acquisition. If the right-of-way line is more than 5 feet away, it is generally considered a partial acquisition. For commercial properties, including situations where the commercial property could lose its function, full acquisition will be considered. Once it is determined that a parcel will be acquired, the displacement and relocation of residences, businesses, and uses will be analyzed. Lands needed for the guideway columns and other project features are considered property acquisitions and will be processed within the limits of the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*. DTS will coordinate with property owners with regard to acquisition, easement, or lease of land. Information regarding the amount of acreage needed for the Project, the number of parcels to be acquired, the type of acquisition (partial or full), the type of uses affected, and the number of dwelling units and businesses that will be relocated were included in the analysis.

Most of the information used to assess the types of land uses that will be affected by displacements and relocations was based on property tax assessment records. This information was used to determine land use type, including residential structures and units, commercial-type structures, and square footage. In addition to reviewing real property tax records, a windshield survey was conducted in May 2009 to determine the number of businesses and, in some cases, residential units that will be acquired.

4.4.2 Affected Environment

The project alignment traverses a variety of different land uses and different urban, suburban, rural, and agricultural environments as described in Section 4.2.

Some land within the study corridor has been designated as ceded land. Ceded lands are those crown, public, and government lands that were once held by the Kingdom of Hawaiʻi. With the annexation of Hawaiʻi in 1896, 1.8 million acres were ceded to the Federal government. In 1959, the Federal government granted absolute title to approximately 1.2 million acres of ceded lands to the State. These lands are held by the State as a public trust.

4.4.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to residential or commercial properties. Although the projects in the ORTP will be built, their environmental impacts will be studied in separate documents.

Project

Table 4-4 summarizes the number of partial and full parcel acquisitions required for the Project. Appendix C provides information on a parcel-by-parcel basis for partial and full acquisitions anticipated for the Project.

A partial acquisition typically is either a narrow strip of land or a more substantial portion of a large parcel. It is assumed that for the properties that will be partially acquired, existing land uses will not change.

Table 4-4 Acquisitions and Displacements Summary

	Parcel Acquisitions			Access Easements	Displacements by Land Use			
	Total*	Partial	Full		Residential Units	Commercial and Industrial Businesses	Churches	Total
Project	199	159	40	12	20	67	1	88

*Total parcel acquisitions includes full and partial acquisitions.

Partial Acquisition = acquisition of only land and possibly minor buildings on a property. The existing owners will continue to be able to own and use the property in the future.

Full Acquisition = acquisition of the entire property—land and all buildings on the property. The existing owner and existing land uses will be displaced by project improvements.

Full acquisition of land will result in displacements and relocations. *Displacement* means that the land, including any structures, will be acquired and converted to transportation use and the user of that property will be relocated.

Table 4-4 also shows the number of residential units, commercial and industrial businesses, and a church located on the parcels that will be displaced as a result of the anticipated full acquisitions.

Considering that there are approximately 780 parcels adjacent to the alignment, the full acquisitions and displacements from the Project will be a small change to the commercial and residential elements along the alignment. While displacements of residential and commercial properties may be difficult for the individuals involved, the number of displacements for a project of this length and magnitude will not have a substantial effect.

For land designated as ceded lands within the project right-of-way, ownership of these lands will not change. The City will obtain the appropriate permissions from the State for any ceded lands needed for the Project.

Mitigation

Where relocations will occur, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and will follow the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act* (49 CFR 24). The following measures will be implemented for relocations:

- The City will assist all affected persons in locating suitable replacement housing and business sites within an individual's or business's financial means.
- A minimum 90-day written notice will be provided before any business or resident will be required to move.
- Relocation services will be provided to all affected business and residential property owners and tenants without discrimination; persons, businesses, or organizations that are displaced as a result of the Project will be treated fairly and equitably.
- Where landscaping, sidewalks, and driveway access will be affected by the Project, coordination will occur with the landowner, and these property features will be replaced and/or the property owner will be compensated in accordance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act.*

4.5 Community Services and Facilities

This section describes the community services and facilities, public services, and utilities in the study corridor and the potential effects on these resources for the Project as compared to the

No Build Alternative. Community facilities are schools, libraries, religious institutions, cemeteries, government institutions, and military installations. Public and private parks and recreational facilities include pedestrian trails, golf courses, regional recreational complexes, community and neighborhood parks, memorial parks, and a major sports stadium. Public services include police, fire, hospitals and emergency medical services, and transit (bus). Utilities include electricity, natural gas, telecommunications, and surface water management. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.5.1 Background and Methodology

Regulatory Context

Section 6(f) of the *Land and Water Conservation Fund Act of 1965* (16 USC 4601 et seq.) was created to preserve, develop, and increase accessibility of outdoor recreational resources. In the case of a transportation project, Section 6(f) protects recreational properties that were constructed with Land and Water Conservation Fund (LWCF) funds from being converted to transportation use. Section 4(f), as amended, of the USDOT Act of 1966 (49 USC 303) protects public parks and recreational lands, wildlife refuges, and historic sites of National, State, or Local significance.

The National Park Service's Federal Lands to Parks program conveys surplus Federal land to communities under Section 203(k)(2) of Public Law 91-485, as amended (40 USC 484). The program helps ensure continued public access and stewardship of resources and, for public park and recreational purposes, is usually done at no cost.

Methodology

Community services and facilities within one-half mile of the project alignment were identified via Geographic Information System (GIS) information provided by the City, Internet sources, and field verification. Parks and recreational facilities within one-half mile of the alignment were identified based on information from the City General Plan (DPP 2002a), the Department of Planning and Permitting (DPP), the Department of Parks and Recreation (DPR), land use and zoning plans, DLNR, and field visits. Public services within one-half mile of the project alignment also were identified from the information above. These included fire stations, police stations, and hospitals.

Right-of-way acquisition and displacement impacts were analyzed to assess if community services and facilities, public service buildings, and/or public services would be disrupted or changed as a result of long-term operation of the Project. If right-of-way would be required, it was then determined whether full or partial acquisition would be required and the types of facilities and amenities that would be displaced by property acquisition (see Section 4.4 for information on acquisitions).

4.5.2 Affected Environment

The following sections describe existing community facilities, parks and recreational facilities, public services, and utilities within one-half mile of and along the project alignment. Figures 4-9 through 4-12 illustrate the general location of existing religious institutions, police and fire services, hospitals and medical facilities, libraries, schools, parks, and recreational facilities within one-half mile of the project alignment. These figures identify, by name, facilities affected by the Project.

Community Facilities

Many community facilities are within one-half mile of the project alignment and station areas. Some are on large parcels with associated recreational amenities or large parking facilities. Others are buildings or structures located on small parcels. Only a few community facilities are located in the ʻEwa area because of its rural,

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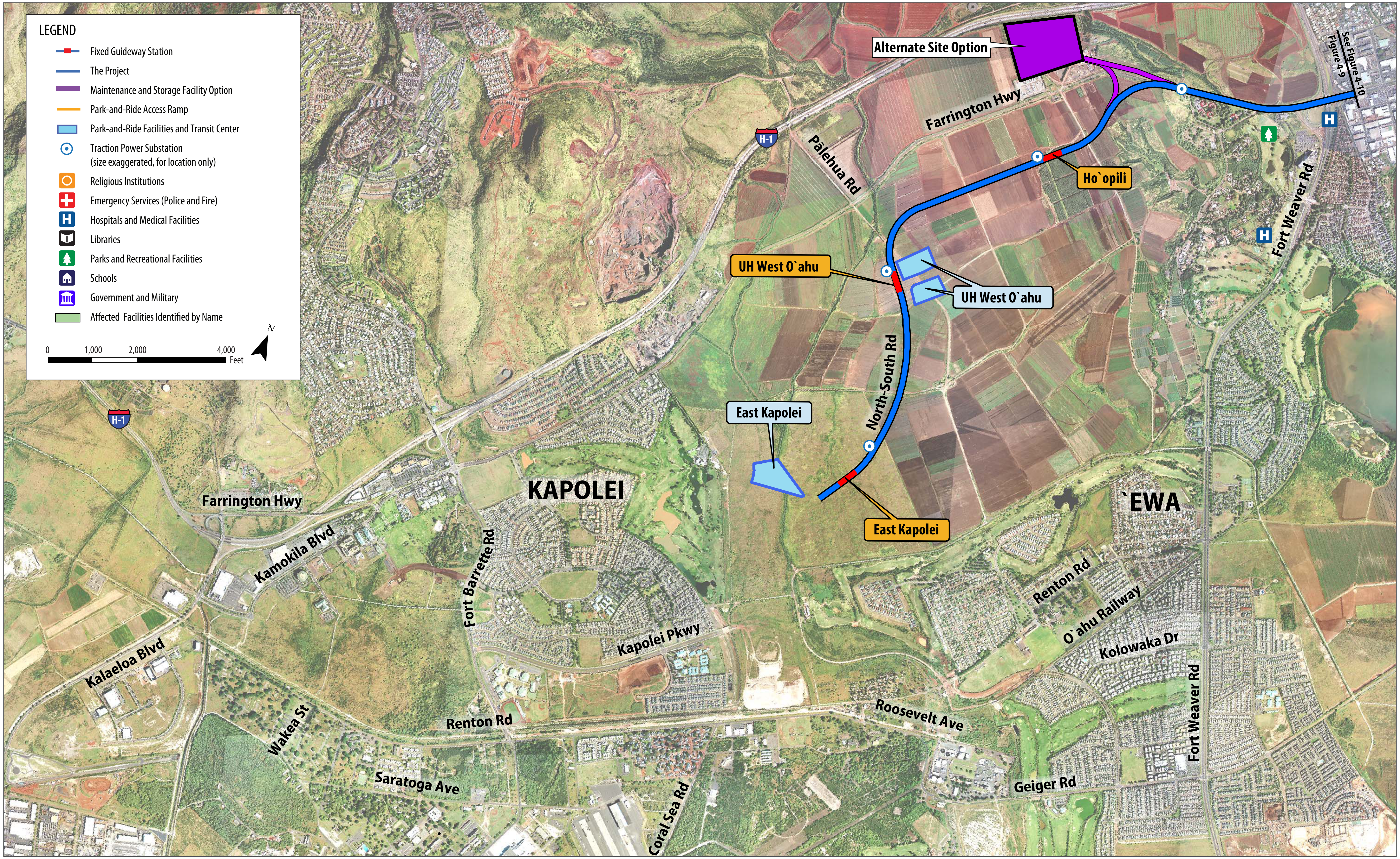


Figure 4-9 Community Resources and Facilities within One-half Mile (East Kapolei to Fort Weaver Road)

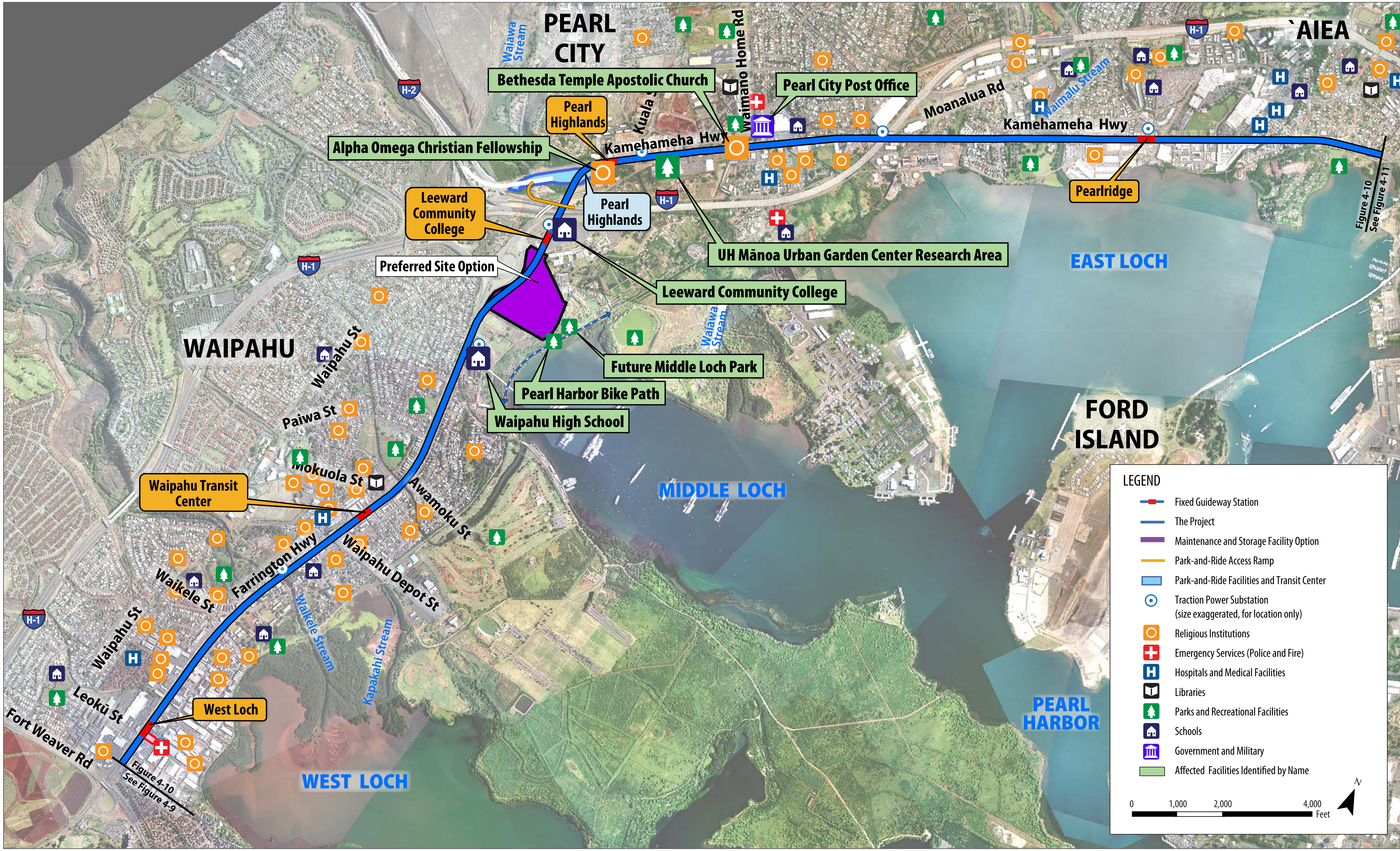


Figure 4-10 Community Resources and Facilities within One-half Mile (Fort Weaver Road to Aloha Stadium)

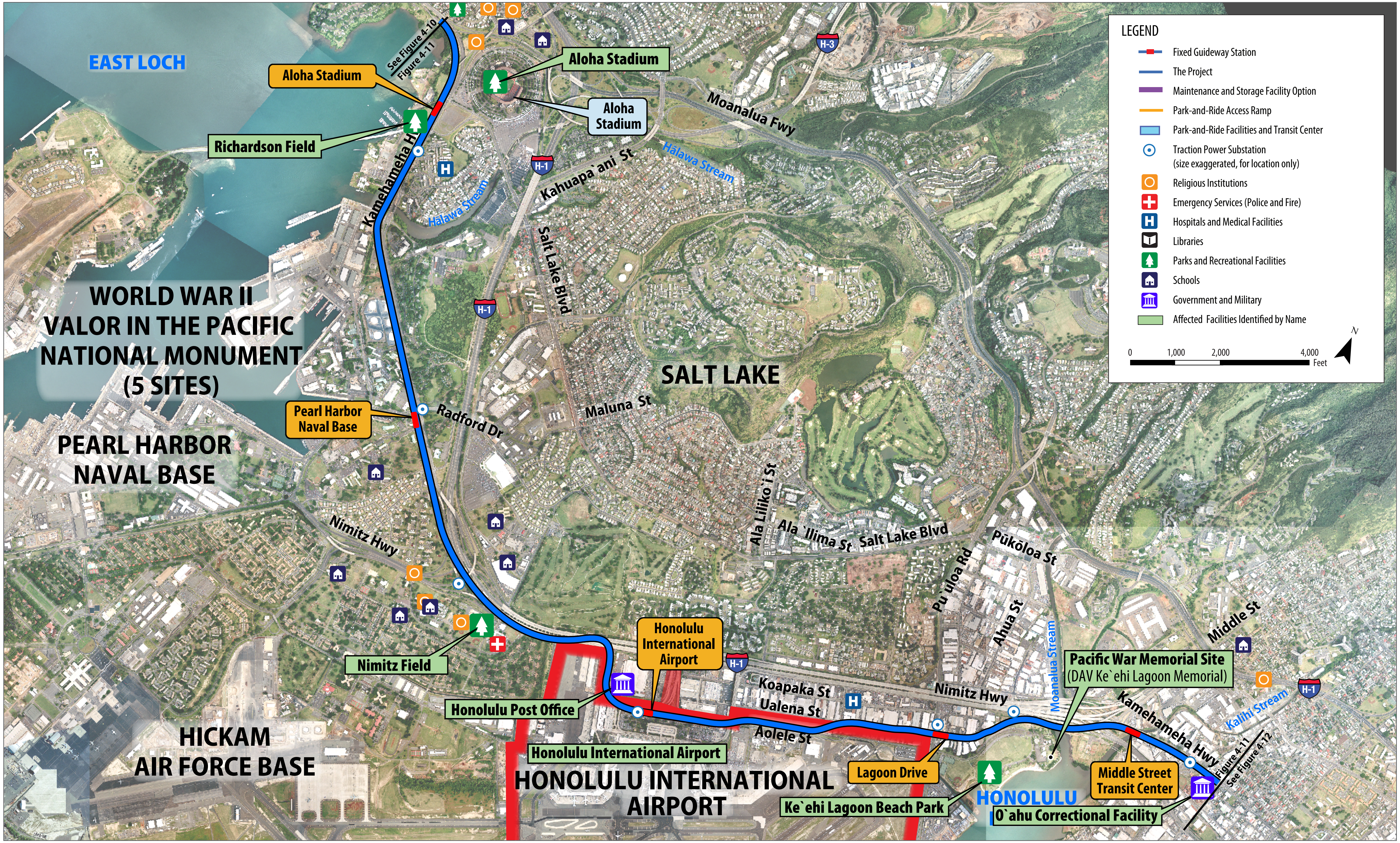


Figure 4-11 Community Resources and Facilities within One-half Mile (Aloha Stadium to Kalihi)

Figure 4-12 Community Resources and Facilities within One-half Mile (Kalihi to Ala Moana Center)

agricultural environment. In contrast, substantial numbers of community facilities are clustered in Central Oʻahu and the PUC, including the dense urban environment of Downtown Honolulu.

Many different types of community facilities are within one-half mile of the project alignment. These include schools, libraries, churches, hospitals, parks and recreational areas, and cemeteries. Each is noted below.

Schools

There are 46 schools within one-half mile of the project alignment. The following 11 schools are adjacent to the alignment:

- Waipahu Intermediate
- St. Joseph Elementary (private)
- Waipahu High School
- Leeward Community College
- UH Mānoa Urban Garden Research Center
- Pearl City Elementary
- Joy of Christ Preschool (private)
- Holy Family Catholic Academy (private)
- Kalihi Kai Elementary
- Kalākaua Middle School
- Honolulu Community College

Public schools also typically have recreational amenities, including baseball diamonds, soccer fields, and gymnasiums. However, these types of recreational resources are considered a community facility, not a park, because their primary use is public education, not recreation.

Libraries

Five libraries are within one-half mile of the project alignment. There are no libraries adjacent to the Project.

Religious Institutions

Approximately 82 religious institutions are within one-half mile of the project alignment. Fifteen of these are adjacent to the project alignment. They are listed in Table 4-5 with addresses.

Table 4-5 Religious Institutions Adjacent to Project Alignment

Name	Address
New Hope Leeward	94-050 Farrington Highway
Koinonia Christian Center	94-216 Farrington Highway #A2
West O`ahu Christian Church	94-420 Farrington Highway
Iglesia Ni Cristo	94-592 Farrington Highway
St. Joseph Waipahu	94-675 Farrington Highway
Bible Baptist Church	94-210 Hanawai Circle
Hawai`i Fellowship	94-810 Moloalo Street
Church of Jesus Christ of Latter Day Saints	94-210 Kahualii Street
Waipahu Church of Christ	94-289 Kahualena Street
Alpha Omega Christian Fellowship Church	96-171 Kamehameha Highway
Bethesda Temple Apostolic Church	941 Kamehameha Highway #202
Joy of Christ Lutheran Church	784 Kamehameha Highway
La Luz Del Mundo	719 Kamehameha Highway #A206
Child Evangelical Fellowship	1190 Dillingham Boulevard
Ola Nui	760 Halekauwila Street

Cemeteries

Five cemeteries are located within one-half mile of the project alignment. One cemetery near Aloha Stadium and one near Waimano Home Road are adjacent to the project alignment.

Government and Military Facilities

For many decades, a sizable Federal government presence has been located on Oʻahu. The project alignment is adjacent to Pearl Harbor Naval Station, Hickam Air Force Base, and Fort Shafter Military Reservation. Land uses within these installations nearest the project alignment are primarily for housing, offices, or recreation.

There are both Local government and Federal office buildings adjacent to the project alignment, as well as Honolulu International Airport (a State facility). In addition, a correctional facility, a post office, and several public housing complexes are in the study corridor.

In addition to military facilities, the following government-owned facilities are adjacent to the project alignment:

- Pearl City Post Office
- Honolulu Post Office
- Honolulu International Airport
- Keʻehi Transfer Station
- Oʻahu Community Correctional Facility
- Prince Jonah Kūhiō Kalanianaʻole Federal Building

Parks and Recreational Facilities

There are approximately 53 parks and recreational facilities within one-half mile of the project alignment, including two future parks. These parks and recreational resources are scattered throughout the area and include large regional or community facilities exceeding 100 acres, as well as smaller neighborhood resources less than one-half acre in size. They include pedestrian trails, golf courses, regional recreational complexes, community and neighborhood parks, memorial parks, national monuments, and a major sports stadium. These facilities include publicly owned resources, some of which are on military bases where public access is restricted, as well as resources that are privately owned. Of these 53 facilities, 14 are directly adjacent to the project alignment right-of-way:

- West Loch Golf Course (public)
- Pearl Harbor Bike Path
- Future Middle Loch Park
- Neal S. Blaisdell Park (public)
- ʻAiea Bay State Recreation Area (public)
- Walker Park (public)
- Irwin Memorial Park (public)
- Mother Waldron Neighborhood Park (public)
- Aloha Stadium (public)
- Keʻehi Lagoon Beach Park (public)
- Pacific War Memorial Site (DAV Keʻehi Lagoon Memorial)
- Future Queen Street Park (public)
- Richardson Field (military)
- Pearl Harbor historic sites (public and private)
- Nimitz Field (military)

The Pearl Harbor historic sites (USS Bowfin Submarine Museum and Park, Pacific Aviation Museum, Battleship Missouri Memorial, and World War II Valor in the Pacific National Monument [formerly the USS Arizona Memorial]) receive more than 1.5 million visitors a year, making them among the most visited destinations in the Pacific. These resources are adjacent to the Project.

Section 6(f) Resources

The Division of State Parks under DLNR and DPR were contacted in September 2008. Two parks adjacent to the alignment have received LWCF funding and are, therefore, Section 6(f) resources. They are the Neal S. Blaisdell Park and ʻAiea Bay State Recreation Area. No Section 6(f) lands will be converted to a project use. For this reason, they are not considered in Section 4.5.3.

Aloha Stadium

Aloha Stadium, owned and maintained by the State, comprises 97 acres. Approximately 56 acres of this property was originally owned by the U.S. Department of the Interior and was transferred to the City on June 30, 1967. The Quitclaim Deed for that transfer contains use conditions and covenants that require the land to 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 the Interior is satisfied can ensure 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 is to revert to the United States upon demand in writing by the Secretary of the Interior.

In October 1970, with the approval of the Department of the Interior, the property was transferred to the State with similar provisions as the

Quitclaim Deed. 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 (DTS 1992).

Emergency Services

The Island of Oʻahu is governed by the City, which provides a number of public services to both residents and businesses. The City has 18 emergency management centers that are typically located at either fire stations or hospitals and provide advanced life support, ambulance, and paramedic services. In addition, the Honolulu Department of Emergency Services has responsibility over Homeland Security and natural disasters caused by thunder and lightning, hurricanes, tropical storms, tsunamis, high surf conditions, floods, and earthquakes.

Police

The Honolulu Police Department provides public safety to residents and businesses via eight patrol districts. The project alignment traverses District 1 Downtown, District 3 Pearl City, District 5 Kalihi, District 7 East Honolulu, and District 8 Kapolei.

The police stations listed below are within one-half mile of the alignment, but none of them are adjacent to the alignment.

- Waipahu Police Department
- Pearl City Police Station
- Central Honolulu City Police Department
- Honolulu City Police Department Alapaʻi Headquarters

Fire

The Honolulu Fire Department has 5 battalions, or districts, on Oʻahu and 42 individual fire stations; 11 of these are within one-half mile of the alignment. Two are adjacent to the alignment:

- Waterfront Fire Station
- No. 8 Mokulele Fire Station

Hospitals and Medical Facilities

There are 21 hospitals and medical facilities within one-half mile of the alignment. Five of these are adjacent to the project alignment:

- Kahi Mohala Behavioral Health
- St. Francis Medical Center West
- Waipahu Medical Center
- Y. Makalapa Branch Medical Clinic
- Dillingham Medical Building

Buses

Oʻahu Transit operates the bus system in the project region. The company works closely with the Honolulu Police Department. Individual bus operators are provided with two-way communication equipment and can call for assistance should there be a problem on a bus. In addition, the company participates with the Honolulu Police Department in the Mobile Watch Program. This program provides assistance to anyone in need of help. Anyone can board a bus and inform the bus operator of his or her need for either public safety or emergency medical assistance.

Utilities

Both public and private utilities operate within or adjacent to the study corridor and within the project alignment. The City provides many urban services. The Honolulu Board of Water Supply provides drinking water. The Department of Environmental Services (DES) provides solid waste, wastewater, and stormwater services. The Hawaiian Electric Company (HECO), an investor-owned utility regulated by the Hawaiʻi Public Utilities Commission, provides electricity to residential, commercial, and industrial customers. The Gas Company is also an investor-owned utility regulated by the Hawaiʻi Public Utilities Commission and provides synthetic natural gas manufactured at Campbell Industrial Park to mostly commercial and industrial customers on Oʻahu. Telecommunications services are provided by Hawaiian Telecom. Cable services are provided by Oceanic Time Warner Cable.

Much of the project alignment is along heavily urbanized roadways. Many utilities and associated infrastructure are located in the study corridor. Typically, overhead utility lines and buried conduits and pipelines are installed in the right-of-way for those roadways. At-grade utility facilities, such as substations, pumping stations, pressurizing stations, and gas odorizing stations, are on parcels adjacent to the right-of-way.

4.5.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and, therefore, would not have any impacts to community services and facilities, parks and recreational facilities, public services, or utilities. However, continued congestion within the project alignment would impact emergency response times. Although the projects in the ORTP are assumed to be built, their environmental impacts will be studied and reported in separate documents.

Project

Community Facilities

Section 4.5.2 lists schools, libraries, churches, parks and recreational facilities, and cemeteries adjacent to the alignment. Of these, one church will be displaced by the Project. Land from 14 community facilities will be partially acquired by the City. Table 4-6 lists community, government, and military facilities that will be affected by the Project. No cemeteries or known burial sites will be affected by the Project.

The schools that will be affected by partial acquisitions from the Project are Honolulu Community College, Waipahu High School, Leeward

Table 4-6 Affected Community, Government, and Military Facilities (continued on next page)

Community Facility	Effect[1]	Mitigation
Schools		
Honolulu Community College	Partial acquisition of land (0.3 acre); 7 light posts will be removed and impacts a lawn area.	Light posts will be replaced. Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
Waipahu High School	Partial acquisition of land (1.4 acres); relocation of portable classroom buildings and area near the football field.	The affected portable buildings will be replaced or relocated on school property. A retaining wall and a new access road to the football field will be provided.
Leeward Community College	Partial acquisition of land (2.5 acres); affected area includes portable administration buildings and parking lot; 180 parking spaces will be removed.	The portable administration buildings and parking spaces will be relocated. There will be no net loss of parking. Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
UH Mānoa Urban Garden Research Center	Partial acquisition of land (0.2 acre); an urban agricultural research garden owned and operated by UH Mānoa.	Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
Religious Institutions		
Alpha Omega Christian Fellowship Church	Displacement of community church located in the area being acquired for the Pearl Highlands Station.	Property will be acquired in accordance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act.*
Parks and Recreational Facilities		
Pearl Harbor Bike Path	Temporary impact to construct a 280-foot-long underground stormwater outfall that will drain into Pearl Harbor from the maintenance and storage facility.	The City will provide a temporary crossing over the trench to maintain bikeway access during construction. The bicycle path will be repaved in the affected area, and surrounding plantings disturbed by construction will be restored.

Table 4-6 Affected Community, Government, and Military Facilities (continued from previous page)

Community Facility	Effect[1]	Mitigation
Future Middle Loch Park	Temporary impact to construct a 280-foot-long underground stormwater outfall that will drain into Pearl Harbor from the maintenance and storage facility.	The area will be restored when outfall construction is complete, and surrounding plantings disturbed by construction will be restored.
Nimitz Field	0.7 acre needed adjacent to the H-1 Freeway.	Property use agreement or acquisition will be negotiated with the Federal government.
Ke`ehi Lagoon Beach Park[2]	1 acre affected either directly or by overhead guideway; affects parking and tennis courts near the H-1 Freeway.	The City will provide lighting and associated resurfacing for four of the tennis courts near the park entrance prior to construction so that nighttime tennis court use will be maintained during construction. After construction, the four tennis courts closed during construction will be restored in original location.
Pacific War Memorial Site (DAV Ke`ehi Lagoon Memorial)	Partial acquisition or use of land (0.5 acre).	Property use agreement or acquisition will be negotiated with the State.
Aloha Stadium[2]	2 acres affected at `Ewa edge of property for guideway and station.	Transit will provide additional access to the stadium. Kamehameha lot will be paved as a shared-use parking area. The shared park-and-ride will be used for stadium events.
Government and Military	**Effect[1]**	**Mitigation**
Pearl City Post Office	Partial acquisition or use of land (0.1 acre) adjacent to Kamehameha Highway.	Property use agreement or acquisition will be negotiated with the Federal government.
Honolulu International Airport	Access easement.	Property use agreement will be negotiated with the State (additional mitigation included in Chapter 3 and Appendix I).
Honolulu Post Office	Partial acquisition or use of land (0.2 acre).	Property use agreement or acquisition will be negotiated with the Federal government.
Prince Kūhiō Kalaniana`ole Federal Building/Courthouse	Partial acquisition or use of land (0.3 acre).	Property use agreement or acquisition will be negotiated with the Federal government.
O`ahu Correctional Facility	Partial acquisition of land (0.2 acre); 13 off-street parking spaces will be displaced.	Property use agreement or acquisition will be negotiated with the State.
Pearl Harbor Complex	Partial acquisition or use of land (0.3 acre).	Property use agreement will be negotiated with the Federal government.

[1] Acres of land acquisition are estimated based on Preliminary Design Plans and indicate the area of land underneath the elevated guideway. For many resources, the acquisition of land will be from support columns, and the actual acreage of impact will be less than shown in this table.

[2] Section 4(f) uses are discussed in Chapter 5, Section 4(f) Evaluation.

Community College, and the UH Mānoa Urban Garden Research Center. The Alpha Omega Christian Fellowship will be displaced as part of full acquisition of the building where this facility is located.

Government and Military Facilities

Additional community facilities affected by partial property acquisition will involve various parcels owned by the State and Federal governments. The Project will require partial acquisition or use of land from parcels associated with government or military facilities. These are the Pearl City Post Office (0.1 acre), Honolulu Post Office (0.1 acre), the Prince Kūhiō Kalanianaʻole Federal Building/Courthouse (0.3 acre), and the Oʻahu Correctional Facility (0.2 acre). Partial acquisitions will be required from the Pearl Harbor Naval Reservation and Hickam Air Force Base. The military properties include lands used for military operations as well as residential accommodations for enlisted personnel and their families.

Parks and Recreational Facilities

The Project will affect Keʻehi Lagoon Beach Park and Nimitz Field.

The City-owned Keʻehi Lagoon Beach Park is a 70-acre park located at Lagoon Drive near Honolulu International Airport. It contains 12 tennis courts, a baseball diamond, walking trails, picnic areas, and restrooms. The project guideway will cross over approximately 1 acre of the park at its mauka edge and have no direct effect on the tennis courts nearby. Approximately 10 guideway support columns will be placed in the park at 120-foot intervals in the vicinity of the access road. The guideway will cross above the park, just makai of the four lighted mauka tennis courts near Nimitz Highway. Given their proximity to the guideway, these tennis courts will be closed during construction and re-opened once this portion of the Project is completed. To mitigate temporary impacts to these lighted mauka tennis courts, DTS will coordinate with DPR during Final Design to provide lighting and associated resurfacing for four of the tennis courts near the park entrance prior to construction so that nighttime tennis court use will be maintained during construction and after project completion. The lighting will be designed and constructed in accordance with regulatory requirements. During construction, there will be a temporary loss of approximately 10 percent of the parking spaces. During construction, DTS will temporarily provide additional bus service from existing City transit centers or parking lots for major events. After construction, the parking area will be restored and there will be no net loss of parking.

Nimitz Field consists of five baseball diamonds on 10 acres on a larger military-owned property. Use or partial acquisitions of the grass fields near the fence line along Kamehameha Highway will be required for guideway supports.

Aloha Stadium

Aloha Stadium will be affected by the Project by construction of an elevated guideway and rail transit station through a portion of the Aloha Stadium parking area along the ʻEwa edge of the property parallel to Kamehameha Highway. The Project will affect approximately 2.0 acres of land that is either under the guideway or station and the existing unpaved stadium event overflow parking area Koko Head of Salt Lake Boulevard.

The elevated guideway will be about 35 to 40 feet above the ground through this area and 28 to 30 feet wide. It will be supported by columns that are about 6 to 8 feet in diameter, placed about 120 feet apart. The base of each of the columns will impact approximately 100 square feet of area. The elevated guideway will pass over a small portion of the main parking lot, next to Kamehameha Highway. Approximately four columns will be placed in the main parking lot to support the guideway, requiring removal of approximately four parking spaces. The guideway will cross over Salt Lake Boulevard at Kamehameha Highway, continuing above the existing gravel overflow parking lot, supported by approximately six columns. In the overflow lot, the City will construct a rail station and bus transit center to serve the stadium and will pave and stripe the existing gravel lot. Approximately 600 paved parking spaces will be for use by stadium patrons during stadium events. Currently, the gravel overflow lot is not used for stadium parking except during events, when attendants are required to help guide cars and collect parking fees.

Approximately six additional guideway support columns will be located on the strip of Aloha Stadium property south of the overflow parking lot next to Kamehameha Highway. At the request of the State of Hawaiʻi Department of Accounting and General Services (DAGS), a third track on the elevated guideway will be constructed for trains to park in this area to provide more frequent service before and after stadium events. This will benefit stadium patrons by providing additional transit service during stadium events to accommodate the anticipated demand.

This Project will provide transportation benefits to Aloha Stadium that will enhance its ability to provide recreational opportunities to users, offering additional transit choices, greater transit capacity, and improved service. The recreation use of the site will not change as a result of the Project. The Stadium will be 1 of 21 station stops on the 20-mile system that will be used by more than 100,000 riders on an average weekday. Trains will arrive every few minutes, and extra trains can be coordinated to accommodate peak demand during Aloha Stadium events. Normally, the system will provide capacity for more than 6,000 riders per hour in each direction, but this could be greatly increased to meet demand during Stadium events or other peak periods. In addition to providing train service, the City will also improve automobile access by transforming the existing gravel overflow parking area into a paved, striped parking lot and bus transit center. This will enhance the existing auto access to the overflow parking lot. In addition, buses, shuttles, and taxis will be able to pull off-street to serve the station and Aloha Stadium, providing a multi-modal transit center that will provide access from all directions. The lot will continue to be set aside for the exclusive use of stadium patrons during events, but at other times would be available for commuters. The project will provide additional transportation options and increase overall accessibility for stadium property users.

The Aloha Stadium Authority, Aloha Stadium Manager, and DAGS have participated in the planning of the Project through the Aloha Stadium property, including the elevated guideway, parking area, and station elements, to minimize impact to the stadium property. In the context of the original land transfer, DAGS requested Federal Lands to Parks program concurrence that this Project is an acceptable transportation improvement and provides value in supporting the recreational use of Aloha Stadium. The effects on Section 4(f) recreational resources are discussed in more detail in Chapter 5, Section 4(f) Evaluation.

Public Services

For all public services, response time during emergencies is critical and, for most of them, access to the sites of emergencies requires the use of public roadways. The Project will improve the operation of the roadway network as compared to the No Build Alternative by reducing congestion and will improve emergency response times. The Project will not affect police, fire, or emergency medical facilities adjacent to the alignment. A Maintenance of Traffic (MOT) Plan will also be developed during final design to manage traffic and emergency services during construction (see Chapter 3 for more information about the MOT Plan).

Section 4.5.2 lists two fire stations and six hospitals and medical facilities adjacent to the alignment. There will be no effect on these facilities.

Utilities

A number of properties owned by utility providers will be affected by partial acquisitions. This includes two properties owned by HECO and one owned by HDOT. A narrow strip of land will be acquired from each. Coordination will occur to further assess these effects during preliminary and final engineering.

In addition to the direct effects on utilities from project right-of-way acquisitions, the construction of a new fixed guideway transit system will involve relocation and modification of existing utilities. These construction effects are discussed in more detail in Section 4.18.

Mitigation

Measures to mitigate effects to community, government, and military facilities are summarized in Table 4-6.

Community Facilities

Mitigation efforts will involve coordination with individual property owners as necessary to appropriately address effects to community facilities. Effects on access, signage, or parking will be replaced or compensation will be provided. In addition, all property will be acquired following the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act* and applicable State regulations.

The City will coordinate and consult with other agencies and stakeholders on the final design of the streetscape affected by the Project.

Parks and Recreational Facilities

Effects to parks and recreational resources from partial acquisitions will be mitigated in coordination with parkland property owners. Table 4-6 lists mitigation measures for each affected resource. A separate evaluation has also been conducted for each publicly owned parkland property that meets Federal criteria as a Section 4(f) resource (see Chapter 5).

Public Safety and Security

As described in Section 2.5.4, the Project includes safety and security measures to protect public services and facilities. Additional mitigation measures will include:

- Design and architectural details to enhance safety
- Use of closed-circuit television cameras and lighting included as a specific design measure
- Security patrols of transit property and vehicles, ongoing train safety awareness education, and ongoing public security awareness education

4.6 Neighborhoods

This section describes the neighborhoods adjacent to the project alignment and the anticipated effects on these neighborhoods from the long-term operation of the Project. Effects on neighborhoods include adverse and beneficial effects on neighborhood character, quality of life, and cohesion. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.6.1 Background and Methodology

Neighborhood board boundaries were used to define neighborhood divisions. Neighborhood boards were created by City Charter to facilitate citizen participation on the island and in regional planning activities. Only those neighborhoods adjacent to the project alignment are discussed in this section. Figure 4-13 illustrates the neighborhood boundaries. The discussion of local neighborhoods is focused on their individual demographics and character.

4.6.2 Affected Environment

Neighborhoods

The Project transects eight city-designated neighborhoods (Figure 4-13). In 2000, the population within the study corridor was about 552,100. The area had experienced moderate growth over the previous decade with less than 1 percent average annual growth per year.

Residents in the neighborhoods of the study corridor are very diverse with 60 to 80 percent of Asian ancestry. However, based on the 2000 census, the Airport and Waikīkī neighborhoods are more than 50 percent White, including military personnel and their dependents, as well as people who have moved from the mainland. In general, there is a wide diversity of household sizes throughout the study corridor, ranging from studio apartments to larger multi-family households.

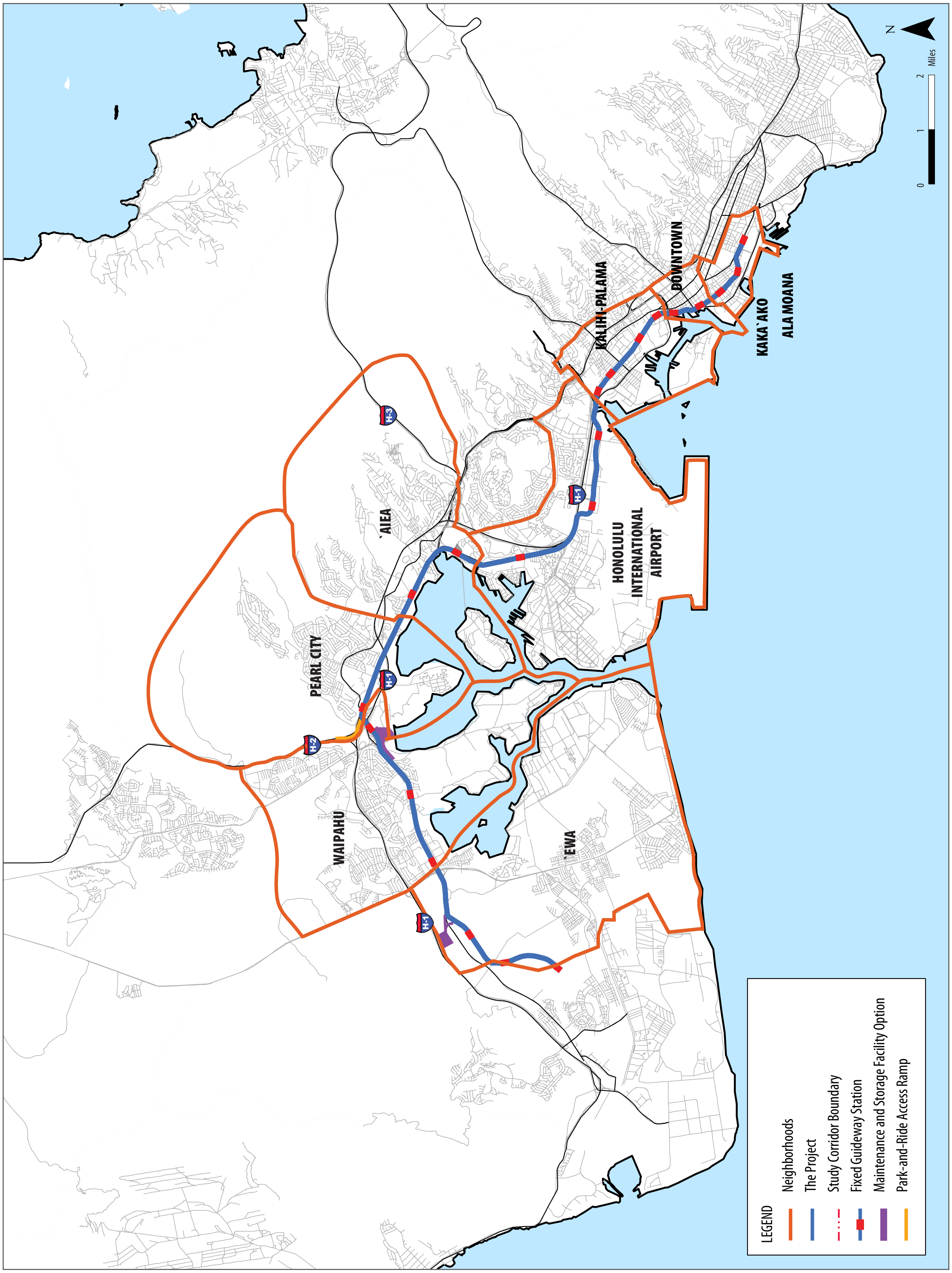


Figure 4-13 Corridor Neighborhoods

Due to their location in the urban core, the Kalihi-Palama, Downtown, Ala Moana-Kakaʻako, Waikīkī, and McCully-Mōʻiliʻili neighborhoods are distinct from the ʻEwa Oʻahu neighborhoods, which are predominantly comprised of single-family residences. Households in these urban core neighborhoods tend to be smaller with more than 40 percent of individuals living alone.

The following paragraphs describe the general land use, character, and unique physical or social attributes of the study corridor neighborhoods.

`Ewa

ʻEwa is one of Oʻahu's suburban growth centers and is experiencing rapid change. It encompasses the communities of Kapolei (the "second city"), ʻEwa Villages, ʻEwa by Gentry, Honouliuli, ʻEwa Beach, Ocean Pointe, and Iroquois Point. Between 1990 and 2000, the population of this neighborhood doubled as sugar cane lands were developed into housing and commercial uses. Despite ongoing development, some former sugar cane land is being used for diversified agriculture.

Waipahu

Historically, the Waipahu community makai of Interstate Route H-1 (H-1 Freeway) was a sugar plantation town, and the community retains strong identity to this historic economic activity. Newer apartment buildings and strip retail plazas are generally limited to the fringes of the commercial district along Farrington Highway. Waipahu has a recreational center, health clinics, churches, and social services offices. Many residents travel outside of the community for employment.

Pearl City

The Pearl City area consists of residential development, mixed-commercial uses, and military housing and facilities. The community was originally developed by Benjamin Dillingham in the 1890s as Hawaiʻi's first planned city and suburban development for affluent and independent farmers. Retail and commercial venues include the Pearl City Shopping Center and the Pearl Highlands Center. Neal S. Blaisdell Park at the edge of Pearl Harbor (East Loch) is a regional recreational amenity that is popular for outdoor community activities. A small area known as the Banana Patch lies within the Pearl City neighborhood boundary. This neighborhood is unique in that, while it is in an urban region, residents are able to maintain an agricultural, subsistence lifestyle. The community, which is discussed in more detail in Section 4.7, has a high concentration of Filipinos.

`Aiea

This community consists of residential development, mixed-commercial uses, and military housing and facilities. Most of the residential subdivisions are mauka of Kamehameha Highway. The makai areas tend to be commercial, light industrial, and military. Pearlridge Center is a major employment center and tourist destination. Many ʻAiea residents work at nearby Pearl Harbor Naval Base, Hickam Air Force Base, and Marine Corps Base Camp Smith.

Airport

The Airport neighborhood is characterized by non-residential land uses. The Airport Commercial District, located makai of the Nimitz Viaduct, is primarily an industrial, commercial, service-oriented district. The Māpunapuna Light Industrial District, between the Moanalua Freeway, Moanalua Stream, Nimitz Highway, and Puʻuloa Road, includes primarily light industrial businesses with some retail and commercial businesses and offices. The Fort Shafter Military Reservation, mauka of the H-1 Freeway in Moanalua, is an active military base. The Pearl Harbor Naval Base residential housing area (known as Catlin Park Housing) is bounded by Salt Lake Boulevard, Puʻuloa Road, Nimitz Highway, and Namur Road/ Valkenburgh Street.

Kalihi-Palama

The Kalihi-Palama neighborhood contains a wide variety of land uses with unique community identities, such as Kalihi Kai, Kapālama, and Iwilei. The Kalihi-Palama communities makai of the H-1 Freeway are a mix of residential, business, retail, and industrial-commercial land uses. Residential housing is generally more prevalent in the mauka areas, and commercial and industrial businesses are more prevalent in the makai areas. Businesses vary in size from "mom-and-pop" stores to big box retail establishments, such as Costco and Best Buy, as well as Dole Cannery Mall. The Bishop Museum (mauka of the H-1 Freeway) is a popular tourist attraction that houses an extensive collection of Hawaiian artifacts and royal family heirlooms.

Downtown

Downtown Honolulu is a vibrant city center and one of the State's largest employment centers. It is experiencing substantial redevelopment to higher-density land uses. It is the State's principal government office and business center, as well as the location of many tourist attractions. It continues to have a substantial residential population. The Hawai'i Capital District is the seat of City and County, State, and Federal government offices and includes a number of historic mid-19th century buildings. The historic Chinatown District is a popular attraction for O'ahu residents and tourists. High-rise condominiums and apartments are interspersed throughout Downtown. Fort Street Mall is a major gathering place for Hawai'i Pacific University students, downtown workers, and residents.

Ala Moana-Kaka`ako

The Kaka'ako community encompasses the 614-acre Kaka'ako Community Development District from the shoreline makai of South King Street and between Pi'ikoi and Punchbowl Streets. Redevelopment is replacing old one- and two-story warehouses and light industrial uses with new urban mixed-use development. The area between Ke'eaumoku and Pensacola Streets mauka of Kapi'olani Boulevard is characterized by two- and three-story walk-up apartments in a quieter residential environment. The neighborhood's shopping and retail centers, especially the Ala Moana and Ward Centers, are popular with residents as well as tourists staying in nearby Waikīkī. These centers are being expanded and redeveloped. Other activity centers include a number of popular parks, the Neal S. Blaisdell Center and Concert Hall, and the Hawai'i Convention Center.

Demographic Characteristics

Table 4-7 presents economic and racial characteristics for each neighborhood based on the 2000 census data. It illustrates considerable variation in neighborhood population size and median household income. Racial characteristics vary less widely. Military housing areas in the Airport neighborhood have higher percentages of White and Black residents in comparison to the racial composition of O'ahu.

4.6.3 Environmental Consequences and Mitigation

Environmental Consequences

This section evaluates potential effects on neighborhoods adjacent to the project alignment. A discussion of neighborhood safety and security issues is found in Section 4.5. Aesthetic issues and their effect on adjacent land uses are discussed in Section 4.8.

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to neighborhoods. The quality of life, however, would be reduced by increased congestion, increased travel time, and reduced mobility affecting single-occupancy vehicles, high-occupancy vehicles, and bus transit passengers.

Table 4-7 Year 2000 Demographic Characteristics of Neighborhoods

Neighborhood	Household Median Income	White	Black	American Indian & Alaska Native	Asian	Native Hawaiian & Pacific Islander	Other	Two or More Races
`Ewa	$58,230	17%	2%	0.2%	50%	7%	1%	23%
Waipahu	$60,270	9%	2%	0.2%	62%	9%	1%	18%
Pearl City	$66,500	16%	2%	0.2%	56%	6%	1%	18%
`Aiea	$55,240	18%	2%	0.3%	49%	9%	1%	21%
Airport	$41,000	61%	12%	1.0%	11%	1%	4%	9%
Kalihi-Palama	$31,630	4%	1%	0.1%	66%	14%	1%	14%
Downtown	$29,950	22%	1%	0.2%	58%	6%	1%	12%
Ala Moana-Kaka`ako	$30,620	19%	1%	0.2%	62%	4%	1%	12%
Total O`ahu	$52,280	21%	2%	0.2%	46%	9%	1%	20%

Source: Department of Planning and Permitting, City and County of Honolulu, 2006. Selected Economic Characteristics: 2000 by Neighborhood Area.

Project

The Project will provide people living and working in the neighborhoods within the study corridor with increased mobility. The Project will provide an alternative to traveling by personal vehicle or bus transit within the existing transportation corridors. Passengers using the new transit system will experience reduced travel time to other neighborhoods and growth centers along the project alignment and near transit stations. The Project will provide a reliable and efficient travel mode for accessing the region's current and future jobs, shopping, and social resources, particularly those in Kapolei and Downtown—the major urban centers of the study corridor in the future. This increase in mobility for neighborhood residents will generally improve the quality of life, especially for those with limited financial resources and those who may be transit-dependent.

The transit agency could experience three types of crimes—crimes against persons, crimes involving transit property, and other crimes committed on transit property. To reduce the potential for crime, the FTA requires the development and implementation of a Safety and Security Management Plan (SSMP) for new fixed guideway projects (49 CFR 633). The SSMP addresses the technical and management strategies for analyzing safety or determining security risks throughout the life of the Project. The SSMP commits that the highest practical level of operational safety and security will be used. In addition, it lays the foundation for future safety and security once the Project is operating. The Honolulu Police Department, the Honolulu Fire Department, the Department of Emergency Management, the Honolulu Emergency Services Department, and other State and Federal agencies, as appropriate, will be involved in preparing and implementing the SSMP. The SSMP is reviewed and updated regularly throughout the life of the Project.

Potential new development and redevelopment along the project alignment, as well as the scale of the transit system itself, may affect the character of development along the alignment. This change in character will not have a substantial effect on the existing development patterns or community character within the surrounding neighborhoods. Currently, most of the residential housing is more prevalent within the mauka areas, and commercial and industrial businesses are primarily within the makai areas. The Project will not substantially change this development pattern. Since the transit system will be elevated, it will not create a physical barrier to pedestrian or other forms of travel within the study corridor. It also will not pose a barrier to the social network of the community since it will be located within an existing transportation corridor or in the ʻEwa area, along a planned future transportation system.

The following paragraphs describe the Project's effects on individual neighborhoods.

`Ewa

The three transit stations in ʻEwa—East Kapolei, UH West Oʻahu, and Hoʻopili—as well as the project alignment will not affect community character and cohesion in ʻEwa because the affected area is undeveloped and primarily used for agriculture (see Section 4.2 for more information on farmlands). The area is planned to be developed into urban land uses, and the Project will support these development plans.

Waipahu

The project alignment follows Farrington Highway through the Waipahu neighborhood. The area is urbanized, with land uses along the highway consisting primarily of commercial uses, strip retail plazas, and both mid-rise and medium-density apartments. The Koko Head end of Farrington Highway in Waipahu consists mostly of single-family housing but also includes Waipahu High School. Most of the residential communities are oriented away from this heavily traveled roadway. Because Farrington Highway functions as both a major arterial and collector road, and varies in width from four to six lanes with a landscaped median, the transit facility will not create an access or transportation barrier between the makai and mauka sides of the road. As an elevated structure, which will span all intersections, it will not prevent pedestrians and motorists from conducting their normal travel patterns within the community. Potential redevelopment along the project alignment, and in particular at the station locations, may represent an asset to the neighborhood by providing new resources and an accessible transit option.

Pearl City

The project alignment extends through the Pearl City neighborhood, along the median of Kamehameha Highway, a heavily traveled roadway with adjacent multi-story commercial uses near the Pearl Highlands Station. The surrounding residential uses will not be affected by property acquisitions and, being located within the highway median, the Project will not form a barrier to adjacent residential communities as residences are oriented away from the highway. In addition, being an elevated structure, the transit system will not create a physical barrier to pedestrians or other forms of travel within the community. The Project will not affect community identity or cohesion as the transit system will be compatible with the existing community character along the alignment. The Project will impact the Banana Patch community, which is discussed in Section 4.7.

`Aiea

The route through the ʻAiea neighborhood continues to follow Kamehameha Highway, and the effects will be very similar to those described for the Pearl City and Waipahu neighborhoods. Most of the residential areas are mauka of Kamehameha Highway with land uses makai of the highway being primarily commercial or military. As such, the Pearlridge Station will not create a barrier to adjacent communities nor will it limit pedestrian or other travel modes within these communities. As the transit route passes Aloha Stadium, there are very few buildings adjacent to the alignment due to the expanse of the stadium parking. Few residential communities are located nearby.

Airport

The Project will travel along busy, heavily traveled Kamehameha Highway and enter the Airport on Aolele Street. The neighborhood is primarily characterized by military and industrial uses and Honolulu International Airport. Most of the residential land uses are mauka of the Nimitz Viaduct. The Project will require acquisition of some businesses on Ualena Street and Waiwai Loop and no changes in current land uses. The guideway is not expected to be a visual or physical barrier in the neighborhood and will not affect community identity or cohesion.

Kalihi-Palama

The Project through the Kalihi-Palama neighborhood follows Dillingham Boulevard. The boulevard is a major arterial that travels through smaller, well-established residential communities, but also functions as a major collector for neighborhood circulation. Small-scale commercial businesses and a few historic land uses line the boulevard. Dillingham Boulevard is a much narrower roadway than either the Farrington or Kamehameha Highways. As a result, the Project will require widening the roadway to maintain the same number of travel lanes while accommodating the guideway's support columns. Several true kamani trees will also be removed by the Project. Impacts will occur to historic properties, as discussed in Section 4.16.

Downtown

The Project will continue through the Downtown neighborhood within the median of Nimitz Highway. This highway is similar to Farrington and Kamehameha Highways as it is a heavily traveled roadway with limited cross traffic. As such, the highway already represents a physical barrier to the neighborhoods on each side. The Project will not create a new barrier or affect the physical character of adjacent communities. Within the Downtown area, the Project will pass the historic districts of Chinatown and Merchant Street. Nimitz Highway is located along the perimeter of these two districts between the Downtown uses and Honolulu Harbor; therefore, the transit system will have little effect on their uses. However, it will contrast with their historic character. As the alignment transitions to Halekauwila Street, a relatively narrow city street, the adjacent buildings become primarily mid-rise government office buildings with little or no open space between them. Views of the alignment will be limited to short segments as the guideway crosses city streets since high-rise buildings and tall trees already obstruct views. The transit system will be elevated so it will not affect the flow of traffic, bicyclists, or pedestrians within the Downtown neighborhood.

Ala Moana and Kaka`ako

The Project will extend to Ala Moana Center traveling mostly along Halekauwila and Kona Streets. The transition between these streets will require property acquisitions and displacements. Land uses adjacent to the alignment include two- and three-story walk-up apartments and commercial uses within the Kakaʻako area and newer urban mixed-use development within the Ala Moana area. In general, land uses are less dense than in the Downtown neighborhood. Kakaʻako has been designated a redevelopment area, which may result in a change in character along the Project alignment. However, substantial development has recently occurred in the neighborhood; several high-rise condominium developments have been built, and additional residential and commercial developments are planned. The elevated transit structure will not create a barrier to pedestrian or other modes of travel.

Mitigation

Since there will be no adverse effects to these neighborhoods, no mitigation is required. Ongoing coordination efforts with the public will help develop design measures that will enhance the interface between the transit system and the surrounding community.

4.7 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (USEO 1994) was signed by President Clinton on February 11, 1994. This Executive Order directs Federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of their projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. The order directs Federal actions, including transportation projects, to use existing law to avoid discrimination on the basis of race, color, or national origin and to avoid disproportionately high and adverse impacts on minority and low-income populations. These are often referred to as environmental justice (EJ) populations.

There are three fundamental EJ principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations

Executive Order 12898 requires all Federal agencies to incorporate EJ into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. A "disproportionately high and adverse effect" is defined as follows:

> Disproportionately High and Adverse Effect on Minority and Low-Income Populations means an adverse effect that:
> (1) is predominately borne by a minority population and/or a low-income population; or
> (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population. (USDOT Order 5610.2).

The EJ analysis for the Project identifies Oʻahu Metropolitan Planning Organization (OʻahuMPO) EJ Areas within the study corridor and presents the impact determinations regarding the likelihood that disproportionately high and adverse impacts will be experienced in those areas. This section discusses potential measures to avoid, minimize, and/or mitigate those impacts to EJ populations and documents the Project's public outreach efforts to EJ communities. For more detailed information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.7.1 Background and Methodology

Regulatory Context

The principles of EJ are rooted in Title VI of the *Civil Rights Act of 1964*, which prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving Federal financial assistance. Additional laws, statutes, guidelines, and regulations that relate to EJ issues include the following:

- Title 49 of the United States Code Section 5332 (49 USC 5332), *Mass Transportation* (USC 1994)
- Title 49 of the Code of Federal Regulations Part 21 (49 CFR 21), *Nondiscrimination in Federally Assisted Programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964* (CFR 1996d)
- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority*

Populations and Low-Income Populations (USEO 1994)

- *Environmental Justice Guidance Under the National Environmental Policy Act* (CEQ 1997b)
- *USDOT Order to Address Environmental Justice in Minority Populations and Low-Income Populations* (USDOT 1997)
- *FHWA Actions to Address Environmental Justice in Minority Populations and Low-income Populations* (FHWA 1998)
- Hawai‘i Revised Statutes (HRS) Chapter 368, Hawai‘i Civil Rights Commission (HRS 1989)
- Executive Order 13166, *Improving Access to Services for Persons with Limited English Proficiency* (USEO 2000)
- *Americans with Disabilities Act of 1990* (ADA 1990)
- *Hawai‘i Environmental Justice Initiative Report* (HEC 2008)

Methodology

This analysis identifies potential effects on minority and low-income populations that reside within the study corridor. The effects of the Project on identified O‘ahuMPO EJ Areas were analyzed as follows:

- How well the Project will serve the transportation needs of the identified EJ populations and communities of concern in comparison to all other population groups within the study corridor
- Whether the effects of the Project (e.g., construction, visual, noise) will have disproportionately high and adverse effects on the social, cultural, health, and well-being of the identified EJ populations and communities of concern as compared to other population groups within the study corridor

Defining Environmental Justice Areas

USDOT Order 5610.2 and subsequent agency guidance defines the term “minority” to include any individual who is Black, Hispanic, Asian-American (Asian), American Indian or Alaska Native, or Native Hawaiian or Other Pacific Islander. Based on guidance from the Federal Council on Environmental Quality (CEQ), “minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis” (CEQ 1997b).

The term “low-income,” in accordance with USDOT Order 5610.2 and agency guidance, is defined as a person with a household income at or below the U.S. Department of Health and Human Services (USHHS) poverty guidelines. These poverty guidelines are a simplified version of the Federal poverty thresholds used for administrative purposes (e.g., for determining financial eligibility for certain Federal programs). The U.S. Census Bureau has developed poverty thresholds, which are used for calculating all official poverty population statistics. The Census Bureau applies these thresholds to a family’s income to determine its poverty status.

O‘ahu, however, has unique demographic characteristics because minorities make up the majority of the population. Because of this racial and ethnic diversity, the O‘ahuMPO developed a method to define O‘ahuMPO EJ Areas that are more meaningful to the demographics of the island. O‘ahuMPO EJ Areas are defined as areas where the minority or low-income population concentration is meaningfully greater than the surrounding population.

Using 2000 Census data, O‘ahuMPO’s analysis uses the Federal definition of minority as well as the “poverty thresholds” as defined by the Census Bureau. Rather than relying on EJ definitions that are less meaningful to O‘ahu’s unique demographic composition, O‘ahuMPO’s method normalizes census block group data so that basic statistical measures can be applied. The method relates the relative concentration of a minority group or low-income households within a census block group to the total population within the census block group. A block group qualifies as EJ if the relative frequency of one or more minority groups or low-income households was in the highest 16 percent (greater than one standard deviation) of frequencies across the island. Block groups were then assembled into the OʻahuMPO EJ Areas (OʻahuMPO 2004) (Figure 4-14). These data are presented in Section 4.7.2.

Coordination with the City and County of Honolulu Department of Transportation Services (DTS), DPP, HDOT, FTA, and the U.S. Environmental Protection Agency (EPA) resulted in the determination that the OʻahuMPO method for determining OʻahuMPO EJ Areas was appropriate for the Project. Therefore, EJ populations for this Project consist of low-income and/or minority populations that are within the OʻahuMPO EJ Areas.

Communities of Concern

In addition to minority and income status, other data were used as additional indicators of communities of concern, including linguistically isolated households, transit-dependent populations, and areas with public housing and community services. The U.S. Census Bureau defines a *linguistically isolated household* as a household in which all members age 14 or over speak English less than "very well." Block groups with 25 percent or more of households with no vehicle or with 21 percent or more linguistically isolated households are included in the areas designated as communities of concern and are illustrated on Figure 4-15. These criteria serve to further identify potentially transit-dependent populations but are not included in the definition of EJ populations. Data on communities of concern also serve to direct public outreach efforts. In addition to the census data, field surveys, data gathered for other projects within the study corridor, and on-going public involvement activities were used to assist in identification of communities of concern.

4.7.2 Affected Environment

Figure 4-14 shows the areas that have met the OʻahuMPO EJ threshold that are within one-half mile of the project alignment. Figure 4-15 shows areas identified as containing communities of concern. As described in Section 4.6, the physical, social, and economic characteristics across and within each neighborhood vary, including the racial, ethnic, and economic composition of the population. The demographics of the neighborhood areas are also described in Section 4.6.

Table 4-8 lists each of the OʻahuMPO EJ Areas illustrated in Figure 4-14, with the demographic data from the 2000 census. It shows there is considerable ethnic and racial diversity along the project alignment.

Banana Patch Community

Through public involvement activities, a previously unidentified minority EJ area was identified. The Banana Patch community is not an OʻahuMPO EJ Area. The Banana Patch, or lower Waiawa, is located along the border of the Pearl City and Waipahu neighborhoods. It is bounded by Kamehameha Highway mauka, Farrington Highway makai, and the H-1 Freeway ʻEwa. Neither the Pearl City nor the Waipahu neighborhoods were identified as EJ Areas using the OʻahuMPO method. However, the Banana Patch area was identified as a minority EJ area after outreach in July 2008 revealed that all residents who will be relocated as a result of the Project belong to a minority group. No other previously identified EJ Areas were identified.

The Banana Patch community is located in Census Tract 80.01 Block Group 2, Block 2001, and Census Tract 87.01 Block Group 2, Block 2001. Some of the land in Census Tract 87.01 is used for construction equipment storage. There are no residences in this

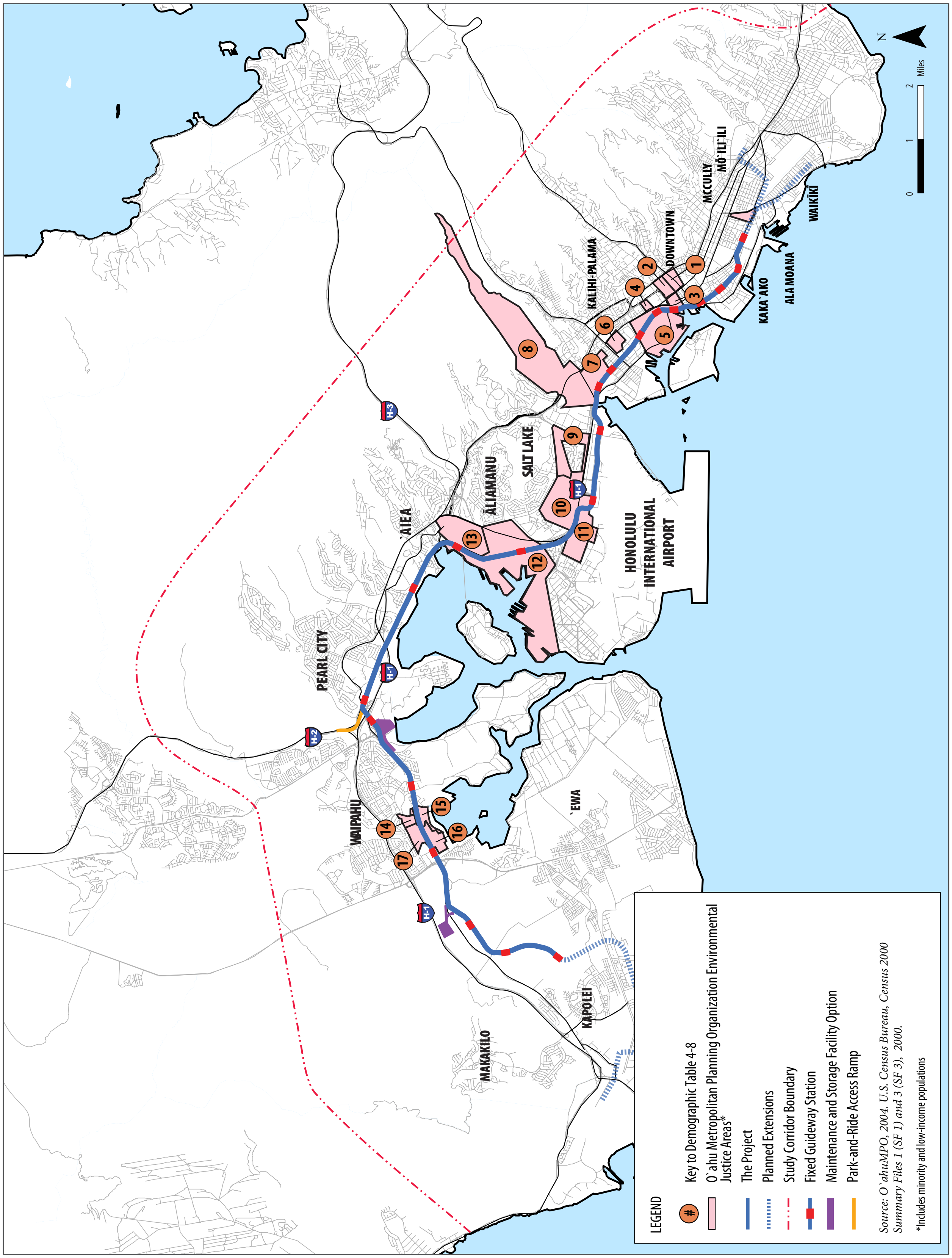


Figure 4-14 Environmental Justice Populations within the Study Corridor

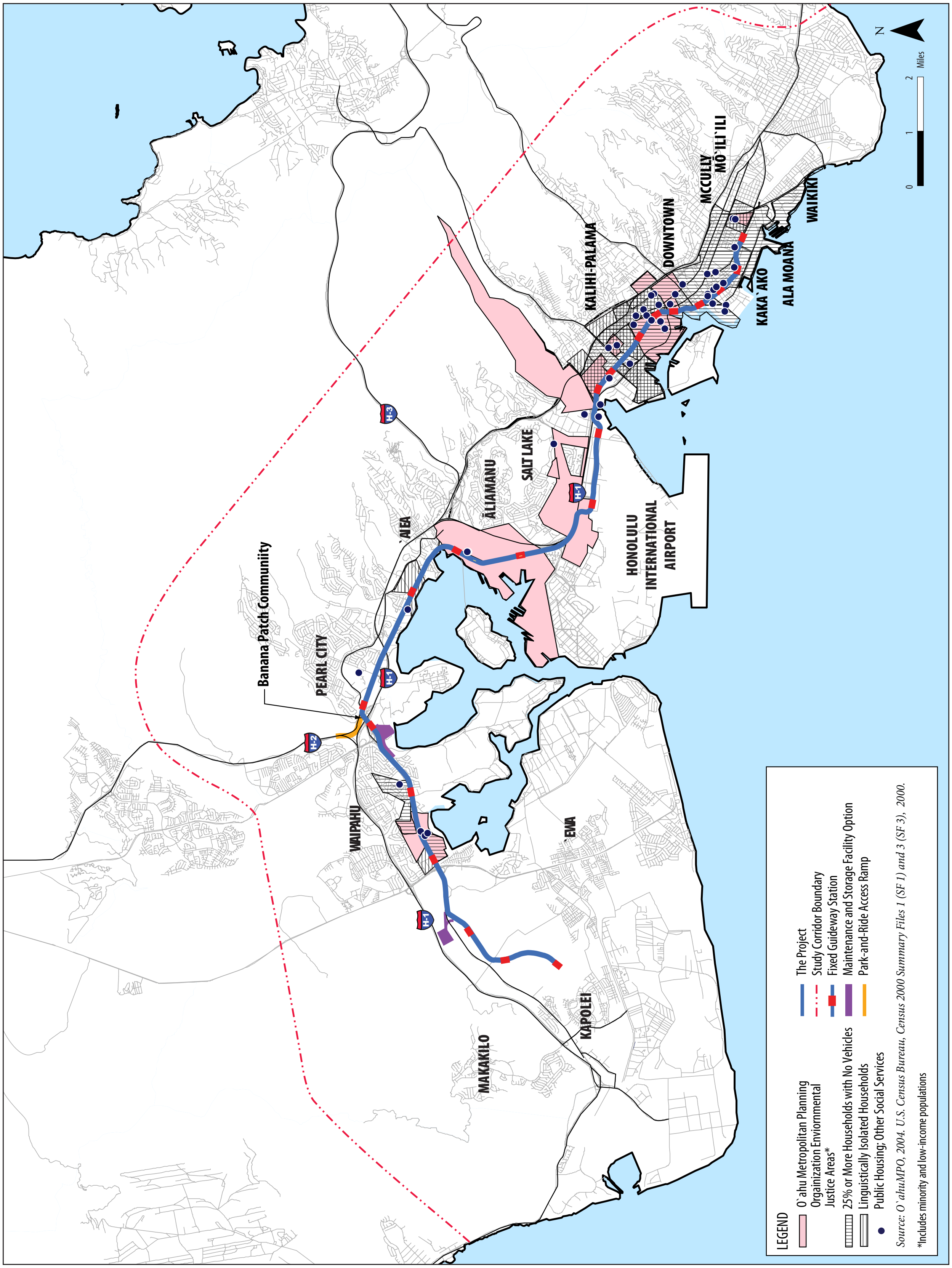


Figure 4-15 Communities of Concern within the Study Corridor

Table 4-8 Demographic Characteristics of O`ahuMPO Environmental Justice Areas

O`ahuMPO EJ Area (illustrated on Figure 4-14)	% White	% Black	% American Indian or Alaska Native	% Asian	% Native Hawaiian or Pacific Islander	% Hispanic	Low Income?
1	23	1	0	57	4	3	Yes
2	14	0	1	75	2	3	Yes
3	11	2	0	69	6	5	Yes
4	1	1	0	53	23	5	Yes
5	17	5	0	43	16	7	Yes
6	4	1	0	46	18	14	Yes
7	6	1	0	62	13	6	No
8	60	20	1	6	2	11	No
9	62	11	1	13	1	11	No
10	60	10	1	14	1	7	No
11	58	15	1	9	3	11	No
12	63	16	1	11	1	6	No
13	7	1	0	33	27	13	Yes
14	3	1	0	25	49	5	No
15	5	2	0	19	50	8	Yes
16	4	1	0	23	43	11	No
17	7	2	0	54	18	10	No

Source: O'ahuMPO, 2004. U.S. Census Bureau, Census 2000 Summary Files 1 (SF 1) and 3 (SF 3), 2000.

portion of the Banana Patch. However, approximately 10 residential structures and the Alpha Omega Christian Fellowship Church are located within Census Tract 80.01. According to the 2000 Census, approximately 55 persons who identified themselves as Asian reside in this area. As such, the census block that encompasses the Banana Patch residential community is 100 percent minority. Because income data are not available at the census block level, income determinations cannot be made.

Other characteristics of the community stand out. Several parcels within the Banana Patch area have multi-generational families living in one or more dwelling units on the property. In some instances, the structures have been substantially altered to provide the multi-generational housing. The residents do not have access to public water and sewer services. In addition, the community is unique in that it is located in an urban region but some residents maintain an agricultural lifestyle. While farming does not appear to be the primary source of employment or income for community residents, it is a part of household income for some of the families.

4.7.3 Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to O'ahuMPO EJ Areas or populations. However, some populations, such as transit-dependent and low-income, may continue to be underserved. Although the projects in the ORTP will be built, their environmental impacts will be studied in separate documents.

Project

As a result of public outreach efforts, this EJ analysis, and the analyses presented throughout Chapter 4, the following have been identified as areas of particular concern for EJ populations:

- Impacts from right-of-way acquisition
- Impacts to community cohesion
- Impacts to social and cultural resources
- Visual quality impacts
- Noise and air quality impacts
- Traffic and transportation impacts
- Short-term construction impacts

Section 4.4 discusses right-of-way acquisitions. There are approximately 780 parcels adjacent to the project alignment. The City will acquire partial or full right-of-way from 24 percent of the parcels adjacent to the alignment. Of this 24 percent, 22 percent lie within Oʻahu MPO EJ Areas. This demonstrates that the relative proportion of the right-of-way acquisitions inside the OʻahuMPO EJ Areas is less than the Project as a whole. Therefore, there are no disproportionately high and adverse effects on OʻahuMPO EJ Areas for the Project.

Sections 4.5 and 4.6 discuss potential effects on social and community cohesion and community facilities. Because the Project will be constructed primarily within an existing transportation corridor in developed areas, it will not physically divide or bisect any communities beyond existing conditions or the No Build Alternative. Therefore, there will be no adverse effect on community cohesion in OʻahuMPO EJ Areas. Unlike freeways with restricted access, vehicular and pedestrian access to areas along the project alignment will not be restricted by the Project.

Section 4.8 discusses visual impacts from the Project. Examples of visual impacts include loss of trees, altered ʻEwa-Koko Head and mauka-makai views, and inconsistent scale and context of setting. The Project is set in an urban context where visual change is expected and differences in scales of structures are typical. Moderate to high visual impacts will occur throughout most of the study corridor. There will not be any disproportionately high and adverse effects in OʻahuMPO EJ Areas.

The air quality analysis described in Section 4.9 indicates a net improvement in air quality by 2030. OʻahuMPO EJ Areas will not experience any disproportionately high and adverse impacts to air quality.

Section 4.10 discusses potential noise impacts that could occur along the project alignment. The noise analysis indicates there will be no severe noise impacts caused by the Project, although moderate impacts will occur in three areas. These noise impacts will occur outside of OʻahuMPO EJ Areas.

Section 4.16 indicates the Project will result in 33 adverse effects on historical resources. None of these occur in OʻahuMPO EJ Areas. Overall, the Project will have few effects on social or community facilities within OʻahuMPO EJ Areas. While there will be partial acquisition of some community facilities, there will not be any disproportionately high and adverse effects to resources of special importance to EJ populations within OʻahuMPO EJ Areas.

The effects of construction within the study corridor are discussed in Chapters 3 and 4. Section 3.5, Construction-related Effects on Transportation, discusses traffic-related impacts during construction, including road closures and rerouting, sidewalk and bike lane closures and rerouting, and bus stop closures. Section 4.18 discusses construction impacts, including those related to relocations; noise and dust generated by construction vehicles and activities; and visual disruption associated with large equipment use and storage, work-site screening, and removal of vegetation or structures.

These construction effects will be temporary, and measures to mitigate or minimize temporary construction impacts will be implemented. Construction activities will occur throughout the study corridor and will affect both Oʻahu MPO EJ and non-EJ Areas alike. Therefore, there will be no disproportionately high and adverse impacts on OʻahuMPO EJ Areas.

Effects of the Project also will result in benefits to transit users. These benefits include increased transit options, improved mobility, proximity to transit links, and access to expanding employment opportunities. As Chapter 3 illustrates, traffic and transit performance will improve within the study corridor, and these benefits can be realized by all populations. There are 21 stations proposed for the Project. Nine are in, or adjacent to, OʻahuMPO EJ Areas. Therefore, people living in OʻahuMPO EJ Areas will have the same opportunity to access the transit and mobility improvements.

Based on the demographics within the study corridor, the need for public transit appears to be greatest within the project alignment. Transit service is meant to serve where the demand is greatest, and these areas are often within neighborhoods that have OʻahuMPO EJ Areas and communities of concern. Although populations adjacent to the alignment will be affected the most by operational and construction-related impacts, these groups include OʻahuMPO EJ and non-EJ Areas, and they will also receive improved transit access. Effects will be the same for all population groups and will not represent a high or disproportionate impact to residents in OʻahuMPO EJ Areas or communities of concern.

Public Outreach

During the public outreach effort for the Project, particular attention has been paid to identifying and reaching low-income and minority populations that are traditionally underserved and underrepresented in the public involvement process. This is in accordance with Executive Order 12898 and the OʻahuMPO Public Participation Plan (OʻahuMPO 2004). Materials have been prepared in the major languages of Oʻahu, and translators have been available upon request at meetings. Information has been distributed through cultural organizations, ethnic associations, housing associations, community development groups, and similar organizations. Community issues brought forth in community meetings, stakeholder interviews, and at public workshops were addressed as part of evaluating the Project.

To reach populations that do not speak or read English, information on how to obtain reading materials in native languages has been provided. Project flyers containing information about the scoping meetings and Draft EIS public hearings were printed in 11 languages (English, Chinese, Japanese, Korean, Vietnamese, Tagalog, Ilocano, Samoan, Spanish, Hawaiian, and Chuukese) and placed at several local churches, health centers, and local civic and ethnic organizations. The project website was updated as new project information became available. Information concerning upcoming public meetings regarding the Project was distributed periodically by “walkers” in several of the OʻahuMPO EJ Areas. Important project notifications were placed in local ethnic and cultural newspapers, including the following:

- *Hawaiʻi Hochi*
- *Korean Times*
- *Filipino Chronicle*
- *Korean Times*
- *Ka Nūpepa*
- *Fil-Am Courier*
- *Ka Wai Ola*

In addition to sending flyers to all addresses on the project mailing list, an effort was made to distribute information to non-native English speakers in their appropriate languages. This action consisted of sending information to local churches and community service organizations that may have access to EJ populations and communities of concern.

An effort was made to reach out to local churches, elderly care, and community organizations through the efforts of the Speakers Bureau. Thirty-nine Speakers Bureau presentations were given to senior care facilities and local ethnic organizations, as well as organizations that serve the disabled and low-income communities.

Community updates were held in or near communities of concern, including at Waipahu Elementary School, Alvah Scott Elementary School, Radford High School, and Farrington High School. Community updates were conducted at major project milestones. Presentations were given at senior living facilities throughout the study corridor.

Communications with Native Hawaiian groups have also identified potential concerns regarding impacts to burials, native Hawaiian landscapes, and indigenous flora and fauna. Communications with Hawaiian civic groups, recognized community leaders, and community organizations have increased as project information has become available, and this will continue throughout the process.

Public involvement efforts to work with EJ populations, the elderly, and communities of concern will continue throughout the design and construction of the Project.

Strategic Outreach during the Draft EIS Comment Period

Outreach activities were performed to promote the maximum participation by, and awareness of, the Project and the availability of the Draft EIS to stakeholders in Oʻahu MPO EJ Areas and communities of concern.

A project information postcard was developed and mailed within three days of release of the Draft EIS to social services, public housing units, and churches within one-half mile of the project alignment. Some of the social service providers included the Pacific Gateway Center, Kalihi-Palama Center, Mayor Wright Housing, Hale Pauahi, Chinatown Gateway residences, Kūhiō Park Terrace, Kamehameha IV Housing, and Federated States of Micronesia Consulate. The postcard alerted readers to the release of the Draft EIS and presented information about how to comment on the document.

Public Hearings

Draft EIS public hearings were held at the following locations in or adjacent to communities of concern:

- Downtown—transit-dependent, December 8, 2008, 777 Ward Avenue, Blaisdell Center
- Waipahu—adjacent to transit-dependent and linguistically isolated, December 10, 2008, 94-428 Mokuola Street, Waipahu
- Kalihi—linguistically isolated, December 11, 2008, 1525 Bernice Street

Multi-language Outreach

Information about the Project, the Draft EIS, and the beginning of the comment period was translated into 11 languages common to cultural groups that had been identified as EJ populations in the project corridor (English, Chinese, Japanese, Korean, Vietnamese, Tagalog, Ilocano, Samoan, Spanish, Hawaiian, and Chuukese) in the form of flyers, ads, and other mediums. The translations provided a short summary of project highlights, a summary of the purpose and topics included in the Draft EIS, and information on how to comment on the Draft EIS. The translated material also included a listing of all public hearing dates, times, and locations in English.

Distribution of the translated material was a critical element of the outreach in EJ Areas and to communities of concern. Efforts included distribution of flyers to the Chinese Chamber of Commerce and businesses in Chinatown, Kalihi, and along the Dillingham Boulevard corridor and dissemination through business networks and to customers. To effectively reach the Vietnamese community, flyers were given to church leaders at St. Theresa's Catholic Church to distribute to their communities. The owner of Duc's Bistro, a Vietnamese restaurant in Chinatown, facilitated the distribution of 150 flyers in Vietnamese to the community through his business contacts.

For communities with radio media, paid radio advertisements were aired during peak commute and listening hours in the morning and afternoon. Three ethnic radio stations aired the advertisements: KZOO, a Japanese station; Radio Korea, a Korean station; and KNDI, which broadcasts in many languages, such as Filipino dialects (Tagalog and Ilocano), Chinese dialects (Cantonese and Mandarin), Vietnamese, and Spanish.

Bus Advertisements

An advertisement was placed in TheBus for two months that notified the transit-dependent community regarding release of the Draft EIS and how to comment on it. The advertisement included a map of the project alignment, encouragement to provide comments, and information on how to make comments. The advertisement was posted in the entire active bus fleet of 528 vehicles during the comment period through December 2008 and January 2009.

Military

Military communities are within the OʻahuMPO EJ Areas. To ensure these communities were engaged with the Draft EIS process and aware of the comment period, paid advertisements were placed with local military specialty newspapers—*The Hawaii Army Weekly, Navy News,* and *Hickam Kukini.* A special press release requesting Draft EIS comments from members of the military community was released to these same newspapers.

Mitigation

While the Project will not result in disproportionately high and adverse impacts within OʻahuMPO EJ Areas, the Banana Patch community will be affected, and residents and the church will be relocated in compliance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act.*

4.7.4 Environmental Justice Determination

The EJ analysis below examines both the OʻahuMPO EJ Areas, as well as one specific EJ area of concern—the Banana Patch community.

Environmental Justice Finding with Respect to O`ahuMPO EJ Areas

No minority or low-income communities consistent with the OʻahuMPO EJ Areas were identified to have potential disproportionately high and adverse effects in either the analysis of the Project or as a finding of the public outreach activities. As a result, no additional special measures were required by the USDOT Order on Environmental Justice (USDOT 1997).

Environmental Justice Finding with Respect to the Banana Patch Community

The Pearl Highlands Station will be located immediately Koko Head of the Banana Patch. The parking facility and approach roads will be located in the Banana Patch. The Project will displace this small community. In total, the Project will displace 14 residences, 1 business, and 1 church. Because the Banana Patch community was identified as an EJ area of concern, special strategic outreach was conducted to involve the community in the public decision-making process and to better understand the community's views of the potential impacts and mitigation measures.

Strategic Outreach for the Banana Patch during the Draft EIS Comment Period

The City has been coordinating with residents of the Banana Patch community since October 2008.

Every household has been visited by City staff, right-of-way staff, and engineering staff to discuss the Project, as well as special needs and relocation assistance for residents who will be displaced.

A special community meeting was held at the Alpha Omega Christian Fellowship Church on January 24, 2009. Invitations were sent to each Banana Patch community household. At this meeting, a brief presentation was given on the Project and public testimony was recorded by a court reporter. A complete transcript is included in Appendix A, Comments Received on the Draft Environmental Impact Statement and Responses, of this Final EIS.

Several key comments were raised at this community meeting. Mostly, residents were interested in learning more about the right-of-way acquisition process. Residents asked when acquisition might occur, how their property would be appraised, and how soon they might receive compensation, since it appeared that housing prices were currently declining in the area. As such, residents of the community did not object to being relocated to decent, safe, and sanitary housing in compliance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*. Nor was there concern expressed about keeping the community intact for relocation purposes.

At the time the Draft EIS was published, community cohesion was assumed to be a concern of the residents of the Banana Patch. After meeting with the residents of this community, the City learned that the residents were primarily interested in the right-of-way acquisition process and relocation issues. Therefore, community cohesion as an issue for the Banana Patch community was removed from this Final EIS as a concern.

Environmental Justice Finding

Because the Banana Patch community is made up of people of Asian descent, it was identified as an EJ area of concern. Because the Pearl Highlands Station will displace this community, the location of the station and associated facilities was examined under the USDOT Order on Environmental Justice (USDOT 1997).

First, the need for the station was examined. Analysis showed that the Pearl Highlands Station is projected to have the second highest passenger volume of all of the project stations. It will serve as the transfer point for all users in Central O‘ahu, whether they drive to the station or transfer from TheBus. The transit center and park-and-ride facility will provide easy access to the fixed guideway transit system from the H-1 and H-2 Freeways, Kamehameha Highway, and Farrington Highway. The station location will provide the most convenient access to the transit system for residents of Central O‘ahu. As such, there is a substantial need for the Pearl Highlands Station.

Second, two alternatives to the guideway and highway ramp alignments, station locations, and park-and-ride locations for the Pearl Highlands Station were evaluated to assess feasibility. One alternative would move the park-and-ride to Leeward Community College. This modification of the station layout would require a number of changes. The H-2 Freeway access ramp would need to be redesigned from a one-way ramp to a two-way ramp. The access road for Leeward Community College would require improvement. In addition, the guideway's crossing of the H-1 Freeway would need to be realigned. Additional right-of-way would need to be required from the Hawai‘i Laborers Training Program site Koko Head and makai of the ramp connecting Farrington Highway to Kamehameha Highway. The existing parking for the college would need to be replaced. The net increase in cost for this alternative would be approximately $90 million.

The second alternative considered moving the park-and-ride to the Hawai‘i Laborers Training program site. This change would prevent the placement of a track switch to access the maintenance and storage facility site near Leeward Community College in the Koko Head direction, which would make this maintenance and storage facility site impractical. Both directions of the H-1 Freeway would need to be spanned with a single guideway approximately 300 feet in length. A longer access ramp from the H-2 Freeway would be required, and access roads would be needed. There would be additional land improvement, right-of-way, relocation, and park-and-ride structure costs. The net increase in cost for this alternative would be more than $63 million.

In conclusion, relocating the park-and-ride facilities under either of the two alternatives would provide less efficient transportation access and circulation to the park-and-ride. Moreover, displaced residents of the Banana Patch community did not voice opposition to the Project, did not express concern about the adverse effects, and appeared satisfied with mitigation measures with regard to relocation. As such, the Project will not result in disproportionately high and adverse impacts to the Banana Patch community.

4.8 Visual and Aesthetic Conditions

This section describes the existing landscape's character and quality and discusses the Project's potential visual effects. It discusses potential mitigation measures, including ways to avoid or minimize effects on visual quality and restore or enhance visual quality.

The Project's potential effects include removing trees, altering ʻEwa-Koko Head and mauka-makai views, blocking some views, and introducing project components that are out of scale or character with their setting. Potential effects consider viewer response to project changes, new light and shadow sources in sensitive areas, and effects on views designated in policy documents. The viewpoints and view direction are identified in Figure 4-16. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Visual and Aesthetics Resources Technical Report* (RTD 2008e).

4.8.1 Background and Methodology

City policy documents and ordinances include provisions for protecting, enhancing, and developing resources related to the visual integrity and quality of communities and areas covered by these plans. The following plans include objectives related to the visual environment and identify key views within their plan areas:

- *City and County of Honolulu General Plan* (as amended) (DPP 2002a)
- *ʻEwa Development Plan* (DPP 2000)
- *Central Oʻahu Sustainable Communities Plan* (DPP 2002b)
- *Primary Urban Center Development Plan* (DPP 2004a)
- *ʻAiea-Pearl City Livable Communities Plan* (DPP 2004b)
- *Waipahu Livable Communities Initiative* (DPP 1998a)
- *Waipahu Town Plan* (DPP 1998b)
- *Coastal View Study* (DLU 1987)

Special District Regulations in Chapter 21 of the Revised Ordinances of Honolulu (ROH) (ROH 1978a) include policies that safeguard special features and characteristics of particular districts to allow for their preservation and enhancement. Special districts that may be affected by the Project include Hawaiʻi Capitol (Section 21-9.30), Punchbowl (Section 21-9.50), and Chinatown (Section 21-9.60). The *Coastal View Study* (DLU 1987) supports the goals and objectives of SMA regulations, which include shaping development along the scenic coastal highways throughout Waiʻanae, North Shore, Windward, and Koko Head areas.

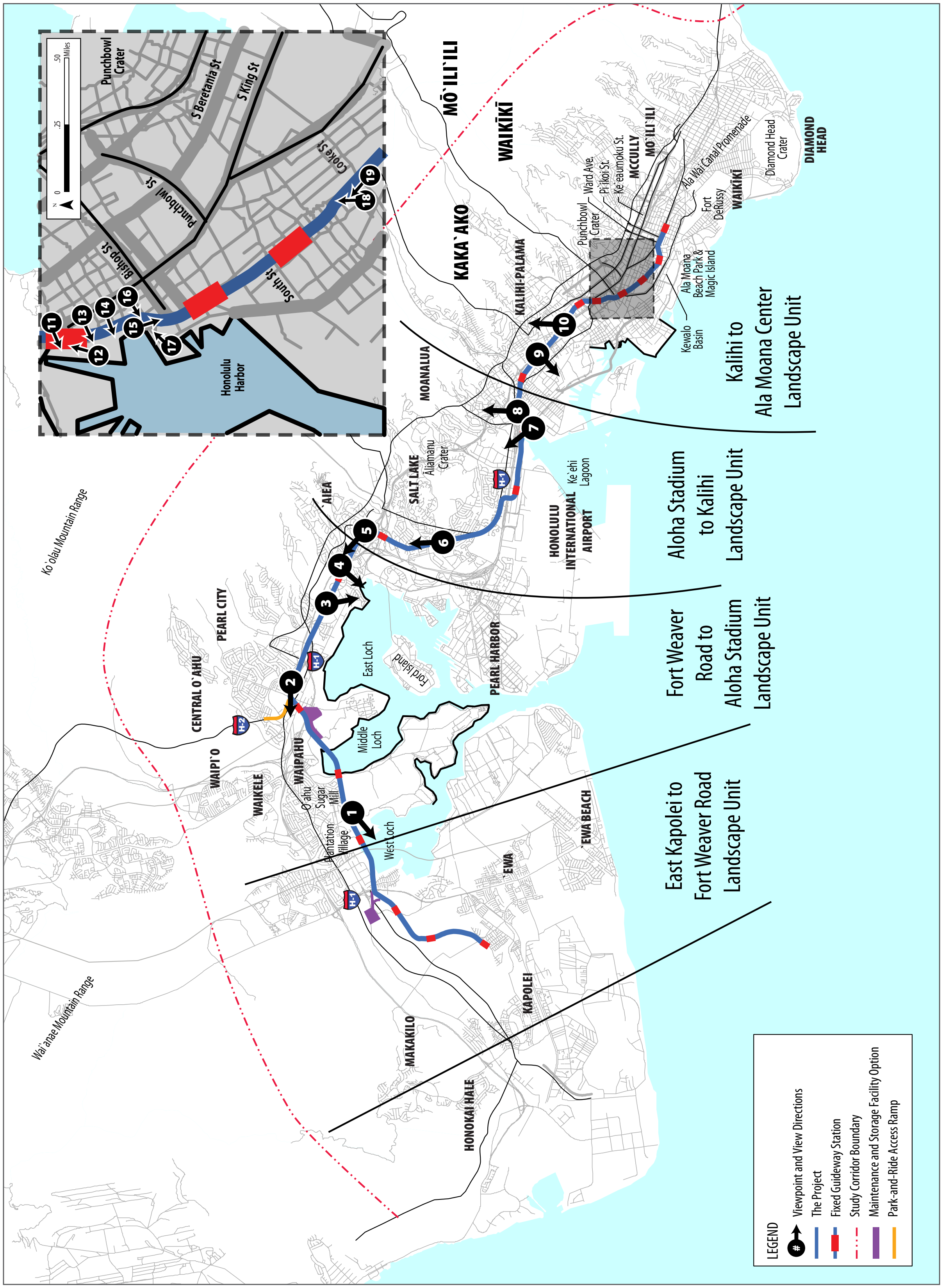


Figure 4-16 Visually Sensitive Resources and Representative Viewpoints within the Project Corridor

Visual assessment for the Project follows USDOT guidance. Although this guidance was developed for highway projects, it was used because the Project is a linear transportation facility and the FTA has not issued guidance specific to transit projects. DPP and other interested groups (e.g., the Outdoor Circle, Scenic Hawai‘i, Inc., the Honolulu Chapter of the American Institute of Architects) also provided data or input. The major components of the visual assessment process included the following tasks:

- Establishing the affected environment—this includes identifying visually sensitive resources, such as landmarks, significant views and vistas, and view corridors
- Describing and assessing the affected environment's character and quality
- Determining major viewer groups that have views to and from the project alignment
- Evaluating views that will be interrupted by the facility and views from the facility, including viewer group response
- Describing visual effects that will occur—this includes the change in visual character and view plane changes plus the viewer group response
- Developing measures to mitigate the Project's significant impacts

4.8.2 Affected Environment

The visual environment that will be affected by the Project includes areas that will have a view of the Project, areas visible from the corridor, and views that the Project could affect or create.

The Wai‘anae and Ko‘olau Mountain Ranges and the coastline are visible from most of the project corridor along Farrington Highway, Kamehameha Highway, and the H-1 Freeway. The integrity of these landforms and the condition of public open spaces are important factors in determining visual character and quality.

Within coastal areas, the most scenic views are often captured when looking laterally along the coastline. These views capture the contrast between ocean and land form, usually in a distinctive visual pattern. Views at a strict 90-degree angle from the shoreline (e.g., along roadway corridors) are generally flat and uniform.

Viewer Groups

Major viewer groups within the project corridor include residents, commuters, business owners, recreationists, and visitors. *Residents* are people who observe the visual environment daily and for extended periods. *Commuters* are those who frequently travel through an area and, therefore, are familiar with the existing visual environment. However, this group may not have the same sense of ownership as residential viewer groups because they do not reside within that environment but only pass through it. *Business owners* have a vested interest in the visual environment surrounding their operations. Most business owners are familiar with their surrounding environment and may have a sense of ownership. *Recreationists* include people who frequent local parks, hiking trails, bikeways, and watercourses. They have definite expectations about the visual environment's condition. Visitors consist of both first-time and repeat visitors to the area. *Visitors* may consist of tourists, delivery or service personnel, or business employees and customers. This viewer group is less familiar with the existing visual environment's specific details, but they tend to have some sensitivity to and expectation of the surrounding environment.

Visually Sensitive Resources

Visually sensitive resources in the study corridor include landmarks, significant views and vistas, historic and cultural sites, and Exceptional Trees. These resources are important because of their scenic quality, scale, and prominence within the visual environment and have been identified as such. Cultural and historic sites are discussed in

Section 4.16, and Exceptional Trees are discussed in Section 4.15.

Landmarks, such as parks or open spaces, represent unique characteristics of a place or provide great value to local residents and visitors. Landmarks are also places or structures that have a unique style based on their architectural period, artistic merit, and the intrinsic qualities of Hawaiʻi. Landmarks represent the heart of a community and the people affected by events that occurred. Pearl Harbor is considered a historical landmark because of the part it played in the island's history.

Protected views and vistas are identified in policy documents that govern the project corridor and include protected mauka and makai views, as well as views of prominent landmarks. These policy documents include the following:

- *ʻEwa Development Plan*
- *Central Oʻahu Sustainable Communities Plan*
- *Primary Urban Center Development Plan*

The protected views and vistas are identified in Figures 4-17 to 4-19. These figures are included in the Visual and Aesthetics Resources Technical Report (RTD 2008e) and were used in the preparation of the Draft EIS. They were included in the Final EIS based on comments received on the Draft EIS.

> **Landscape Units are geographic areas where views of the Project would have a similar context or character.**

The Project's visual environment changes from rural in the Waiʻanae end of the corridor to dense high-rise development at the Koko Head end. The visual analysis considers the corridor in the following four landscape units, each of which is incrementally more urbanized (Figure 4-16).

East Kapolei to Fort Weaver Road Landscape Unit

This landscape unit extends from East Kapolei to Fort Weaver Road and includes the communities of Kapolei and ʻEwa. Much of Oʻahu's current and future population growth is expected to take place in this area, but it is still relatively rural and most of the area currently consists of agricultural cultivation and open space. Views across the ʻEwa Plain are still relatively open, allowing for mountain and ocean vistas as well as distant views of Downtown high-rises. Protected views and vistas (Figure 4-17) in this landscape unit are identified in the *ʻEwa Development Plan* (DPP 2000) and include the following:

- Views of central Honolulu and Diamond Head from the ʻEwa Plain (see View and Vista A)
- Views of na puʻu at Kapolei, Pālailai, and Makakilo (see View and Vista B)
- Distant views of the shoreline from the H-1 Freeway above the ʻEwa Plain (see View and Vista C)
- Views of the Waiʻanae Mountain Range from the H-1 Freeway between Kunia Road and Kaloʻi Gulch and from Kunia Road (see View and Vista D)

Fort Weaver Road to Aloha Stadium Landscape Unit

This landscape unit extends from Fort Weaver Road to Aloha Stadium. This area contains the wide fertile plateau that connects the Waiʻanae and Koʻolau Mountain Ranges and was previously in extensive agricultural use. It is now a growing suburban area, with access facilitated by the H-1 Freeway, Kamehameha Highway, and Moanalua Road. The demands of growth and development within the Central Oʻahu area have affected the natural environment, reducing some of its natural assets and replacing them with a built environment. This landscape unit is characterized by residential neighborhoods with one- and two-story residences. Clustered one- and two-story businesses are located along the Farrington Highway and Kamehameha Highway corridors. Most businesses are surrounded by parking lots that include large paved areas. Some of the paved areas include pockets of mature trees and shrubs that make the pavement appear less dominant. Utility poles and overhead utility lines are prevalent along both highway corridors. Significant protected views and vistas (Figures 4-17 and 4-18) in this landscape unit are identified in the *Central Oʻahu Sustainable Communities Plan* (DPP 2002b) and the *Primary Urban Center Development Plan* (DPP 2004a) and include the following:

- Views of the Waiʻanae Mountain Range from the Waipahu Cultural Garden (see View and Vista E)
- Views of the Oʻahu Sugar Mill from Waipahu Depot Road (see View and Vista F)
- Views of Pearl Harbor from Farrington Highway near Waipahu High School (see View and Vista G)
- Waimano Home Road/Kamehameha Highway Intersection (see View and Vista H)
- Kaʻahumanu Street/Kamehameha Highway Intersection (see View and Vista I)
- Kaonohi Street/Kamehameha Highway Intersection (see View and Vista J)
- Honomanu Street/Kamehameha Highway Intersection (see View and Vista K)

Aloha Stadium to Kalihi Landscape Unit

The landscape unit from Aloha Stadium to Kalihi includes the Salt Lake portion of the PUC Development Plan Area, which comprises the communities of Salt Lake, Moanalua, and the Airport Area. These consist primarily of residential neighborhoods of one- and two-story residences and supporting commercial uses. The Airport

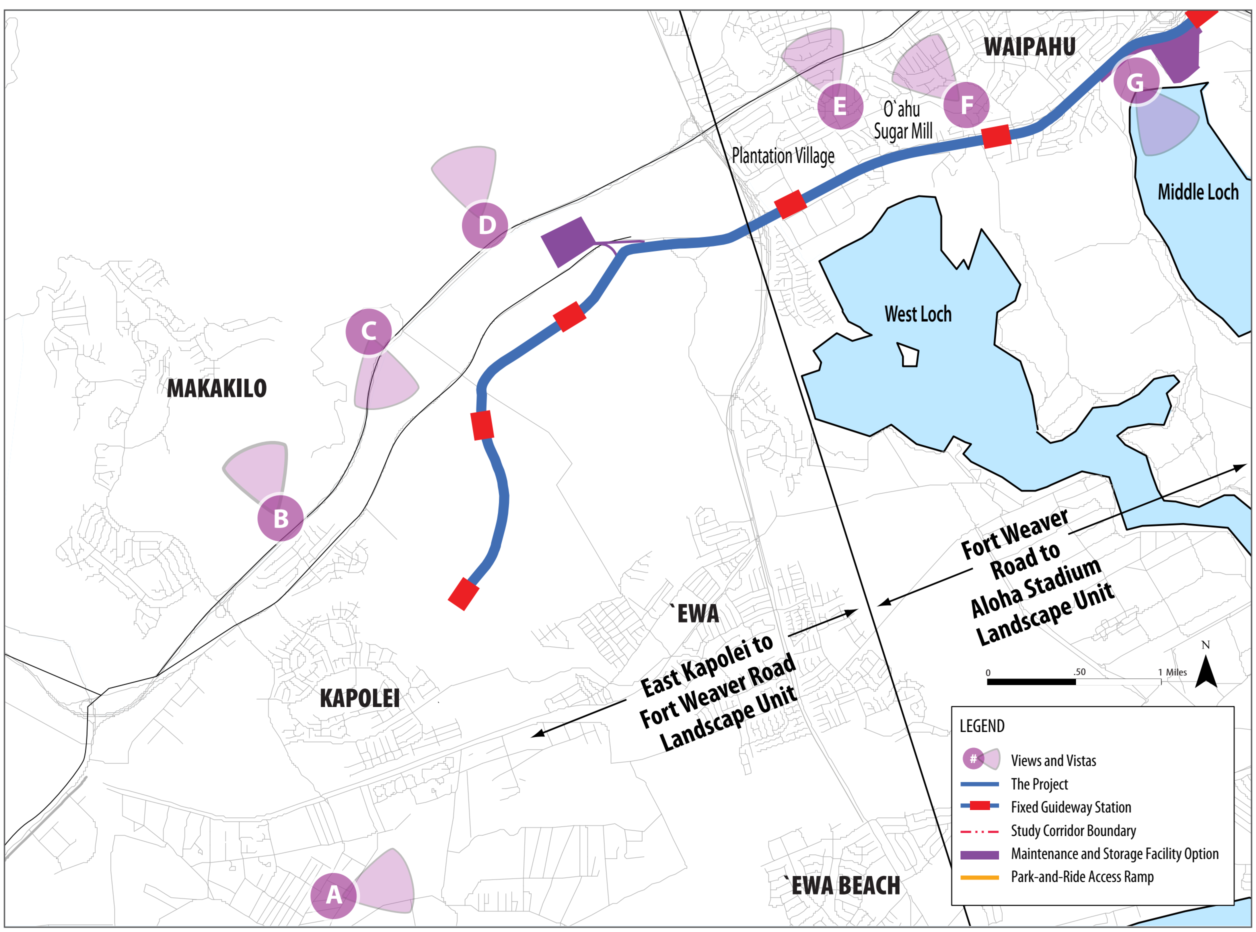


Figure 4-17 Protected Views and Vistas (East Kapolei to Fort Weaver Road)

Area encompasses industrial and commercial service-oriented buildings surrounded by large paved areas. Honolulu International Airport, Pearl Harbor Naval Base, and Hickam Air Force Base are located within this landscape unit. Views within this landscape unit are somewhat limited to the immediate surroundings because of dense development and the large scale of the many commercial and industrial buildings. The mountains can be viewed periodically from elevated locations and transportation corridors, such as Salt Lake Boulevard and Kamehameha Highway. Protected views and vistas (Figure 4-18) in this landscape unit are identified in the *Primary Urban Center Development Plan* (DPP 2004a) and include the following:

- Bougainville Drive—mauka/makai (see View and Vista L)
- Maluna—mauka/makai (see View and Vista M)
- Wanaka Street—mauka/makai (see View and Vista N)
- Ala Liliko‘i Street—mauka/makai (see View and Vista O)

Kalihi to Ala Moana Center Landscape Unit

The Kalihi to Ala Moana Center landscape unit comprises a continuous urban corridor and the highest densities of the PUC. Kalihi to Iwilei includes the neighborhood community of Kalihi-Palama, which contains waterfront properties that house extensive maritime operations. Business

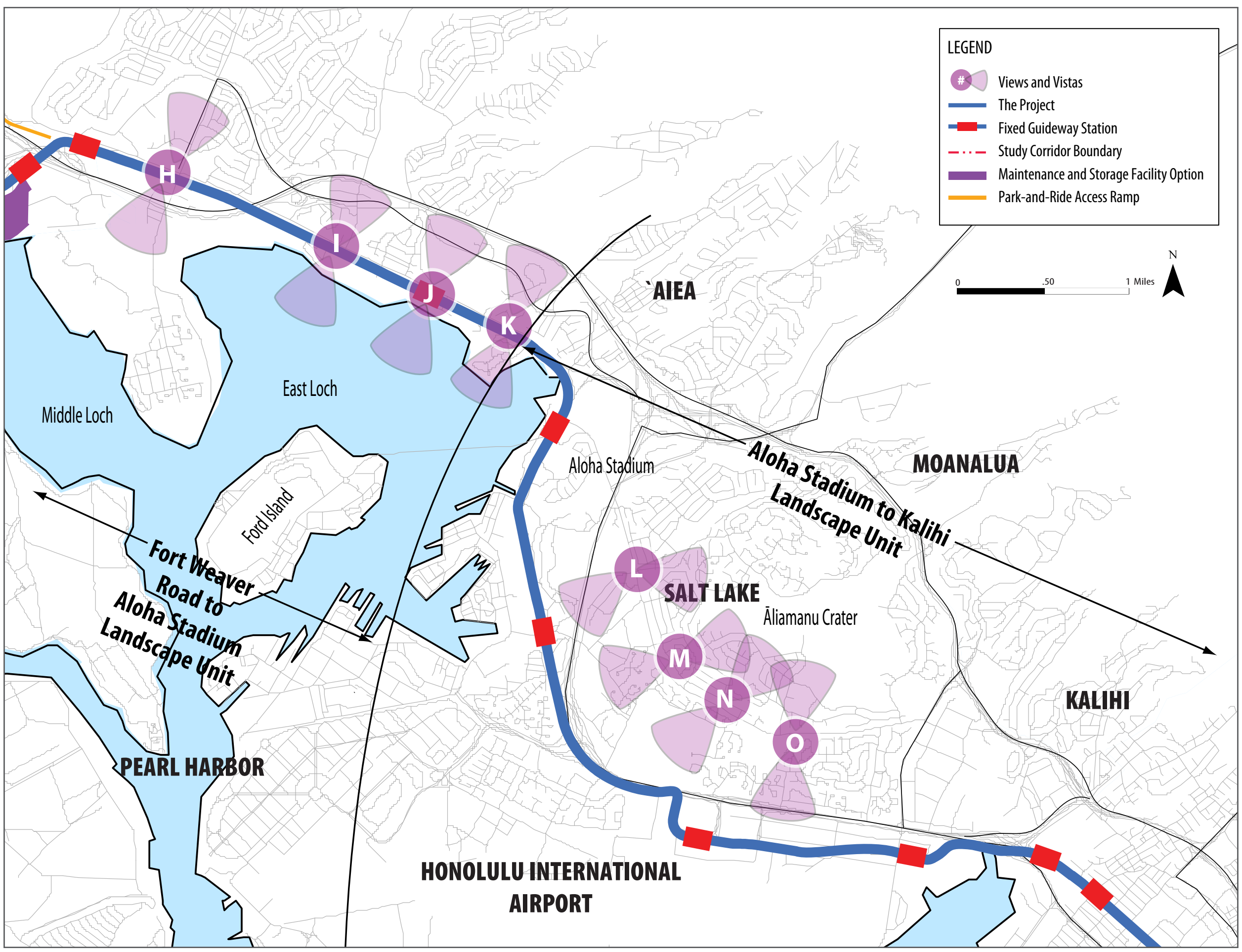


Figure 4-18 Protected Views and Vistas (Fort Weaver Road to Aloha Stadium)

districts with major wholesale and distribution facilities line King Street and Nimitz Highway. Farther Koko Head, this landscape unit encompasses Downtown, Kaka'ako, and Ala Moana. The mountains and shoreline that define the mauka and makai edges of this landscape unit are dominant elements of the landscape. Within the corridor, open space consists of volcanic craters, streams, and other water bodies, as well as larger parks and campuses. The mauka edge includes the Ko'olau Mountain Range and its undeveloped foothills and slopes. The makai edge includes the shorelines and waters of the Pacific Ocean and such landmarks as Honolulu Harbor, Kewalo Basin, and Ala Wai Harbor. Direct views of the mountains and ocean are not common, but the Downtown skyline is visible from several areas. Significant protected views and vistas (Figure 4-19) in this landscape unit are identified in the *Primary Urban Center Development Plan* (DPP 2004a) and include the following:

- Bishop Street—mauka/makai (see View and Vista P)
- Panoramic views—Punchbowl Lookout toward Diamond Head (see View and Vista Q)
- Panoramic views—Kaka'ako Waterfront Park toward Punchbowl and the Ko'olau Mountain Range (see View and Vista R)
- Cooke Street—mauka/makai (see View and Vista S)
- Ward Avenue—mauka/makai (see View and Vista T)
- Panoramic views—Kewalo Basin toward the Ko'olau Mountain Range and Punchbowl (see View and Vista U)

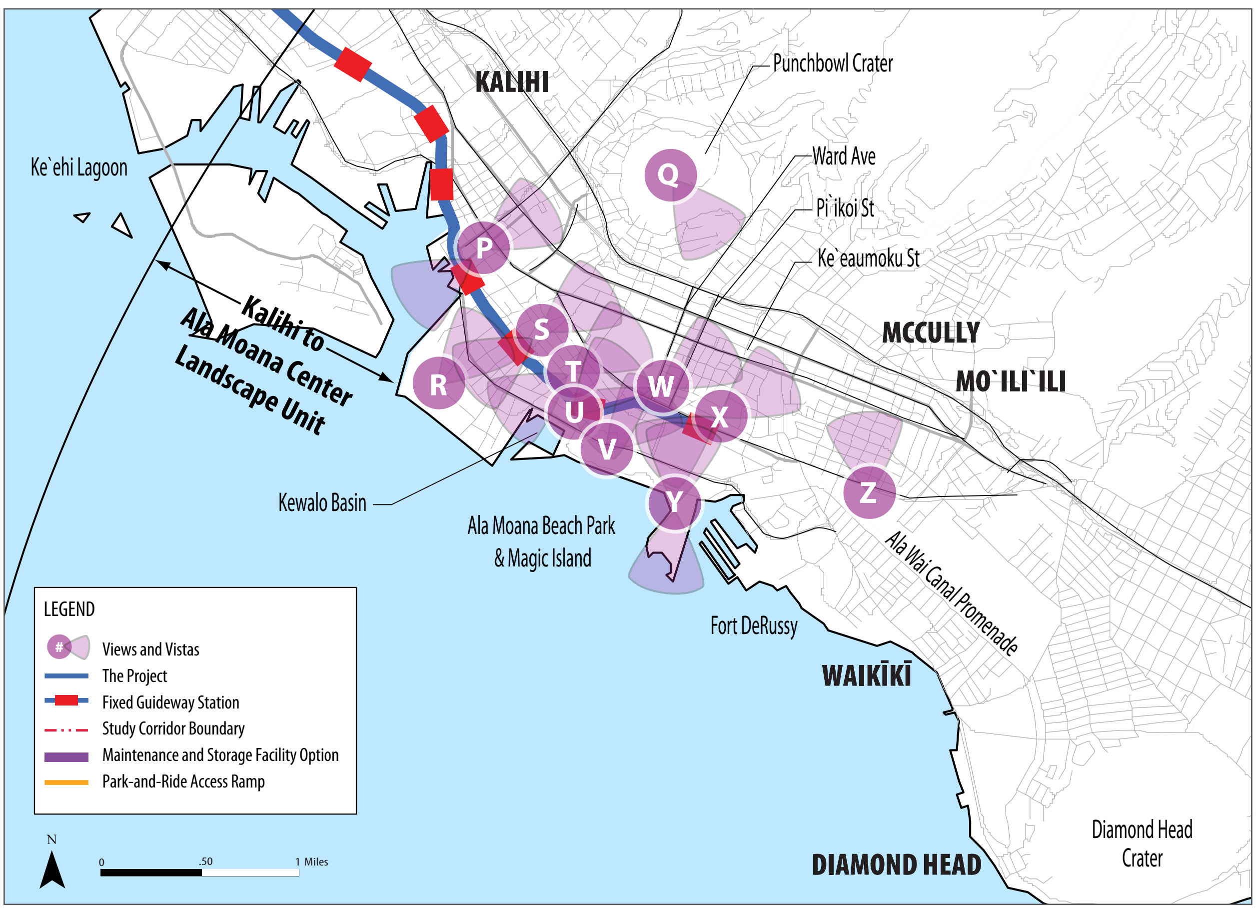


Figure 4-19 Protected Views and Vistas (Kalihi to Ala Moana Center)

- Panoramic views—Ala Moana Beach Park toward the Koʻolau Mountain Range (see View and Vista V)
- Piʻikoi Street—mauka/makai (see View and Vista W)
- Keʻeaumoku Street—mauka/makai (see View and Vista X)
- ʻĀina Moana Park (Magic Island)—mauka/makai (see View and Vista Y)
- Panoramic views—Ala Wai Canal Promenade toward the Koʻolau Mountain Range (see View and Vista Z)

4.8.3 Environmental Consequences and Mitigation

Throughout the Draft EIS review and comment period, many commented that visual changes associated with the project elements will result in substantial visual effects. Many comments received expressed concern that the elevated fixed guideway transit system will adversely affect Oʻahu's unique visual character by creating blight and degrading views. In addition, commenters requested more information on how the project elements will be integrated with their communities, especially in the areas around stations.

These commenters on view effects are representative of the various viewer groups that have been considered in the visual and aesthetic conditions analysis presented in the Draft EIS and this Final EIS. In response to the viewer group responses, received during the Draft EIS comment period, further analysis of views and vistas has been done and the visual effects of several key views have been reevaluated. The refinement resulted in revised ratings from moderate to significant for Views 12, 14, and 15 in the Downtown area. In addition, the discussion of protected views and vistas provided in this Final EIS includes new summary tables and new visual simulations that were not part of the Draft EIS. The analysis of protected views and vistas was provided in earlier technical documents; however, this Final EIS more clearly describes the visual effects on these resources.

The overall conclusions of the Draft EIS have not changed, but, through these refinements, the following clarifications have been made:

- Viewpoint 12—visual impact rating refined to reflect that some views will be blocked and to expressly point out the contrast of project elements with Chinatown's historic character
- Viewpoint 14—visual impact rating refined to reflect the bulk and scale of the guideway and columns being out of character with the pedestrian-oriented environment at this viewpoint
- Viewpoint 15—visual impact rating refined to reflect the bulk and scale of the station as well as the other elements noted in the Draft EIS.

Viewpoint 7 was changed to reflect the Aolele Street to Ualena Street transition through Keʻehi Lagoon Beach Park. The overall conclusions of the Draft EIS have not changed with regard to visual impact in the park.

The Draft EIS described several types of visual effects, and the refinements reflect the same type of visual effects identified in the Draft EIS and shown in these viewpoints in the Draft EIS. The Draft EIS concluded that changes to some views, including protected views and vistas, would be unavoidable. The refinements confirmed this conclusion.

Protected views and vistas, including mauka and makai views and views of prominent landmarks in the study corridor are identified in City development plans, including the *ʻEwa Development Plan, Central Oʻahu Sustainable Communities Plan,* and the *Primary Urban Center Development Plan*. Protected views and vistas are view planes that the City has determined are important to protect because of their scenic quality, scale, and prominence within the visual environment. These views are developed through the City's general, development, and community plans. These plans guide the adoption of zoning ordinances, which regulate the use of land within demarcated zones, and set detailed standards for the height, bulk, size, and location of buildings. The Project is supportive of the land use objectives included in these plans, as summarized in Appendix J. Appendix J provides a summary of the Project's relationship to State of Hawaiʻi and City and County land use plans, polices, and controls for the project study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions. The City's general urban design principles protect public views based on the type of view and are applicable to both public streets and public and private structures. Some protected views and vistas will change as a result of the Project, including public views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks. The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. Viewer responses to these changes will vary with their exposure and sensitivity and depend on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

The mitigation section of this Final EIS has also been expanded to include detailed mitigation measures. Although mitigation measures will minimize many adverse visual effects by providing visual buffers and reducing visual contrasts between the project elements and their surroundings, the Final EIS acknowledges, as concluded in the Draft EIS, that unavoidable adverse effects, such as view blockage, cannot be mitigated and will be significant (noted as a "High" level of visual impact in the Draft EIS) in some areas.

Environmental Consequences

Visual and aesthetic consequences are changes to the visual landscape and viewer response to those changes. The Project's visual consequences have been categorized as low, moderate, or significant.

- *Low* visual effects generally occur when transportation elements (such as roadways) are already part of the view, when the view has few or no visually sensitive resources, and when the Project will introduce few (if any) noticeable changes. Viewer groups will not likely notice a visual change or expect a scenic viewpoint. Minor changes in light and glare may occur.
- *Moderate* visual effects occur when changes to the existing view will be noticeable but not substantial and/or when visually sensitive resources will undergo a noticeable change in view. Viewer groups will be somewhat aware and sensitive to visual change. Noticeable changes in light and glare may occur.
- *Significant* visual effects occur when substantial changes to existing views will be made and will result in a greatly changed view or when visually sensitive resources will undergo a substantial change in view. Viewer groups will be sensitive to visual change because they will expect attractive views or surroundings. Substantial changes in light or glare will occur.

View obstructions and changes to views will be most noticeable where the guideway and stations are nearby or in the foreground of views, and some viewers may consider this an adverse visual effect. Viewpoints that are not located near these project elements will generally be less affected. For example, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape. The guideway and stations will not be dominant elements in these views.

Viewer response to view changes may vary with exposure and sensitivity and depend on the alignment orientation and the height of the guideway, stations, and surrounding trees and buildings. Overall, the Project will be set in an urban context where visual change is expected and differences in scales of structures are typical. The Project will also provide users with expansive views from several portions of the corridor by elevating riders above highway traffic, street trees, and low structures adjacent to the alignment.

The visual effects of the Project are summarized in Table 4-9.

No Build Alternative

Under the No Build Alternative, the Project will not be built and there will be no impact to the visual and aesthetic conditions. Although the projects in the ORTP will be built, their environmental impacts will be studied in separate documents.

The Project

The Project will be set in an urban context where visual change is expected and differences in scales of structures are typical. However, during the Draft EIS review process, many viewers have commented that visual changes associated with the Project will be substantial. As described in the Draft EIS, significant visual effects will result, particularly when considered at a single location. Residents living in high-rise buildings adjacent to the project alignment will experience varied visual changes as a result of the Project.

Visual simulations of the Project were developed for 19 representative viewpoints that will be affected by the Project to illustrate commonly experienced visual effects. The locations of these viewpoints are shown on Figure 4-16. The simulations (Figures 4-20 through 4-38) depict the guideway and other project elements to illustrate the facilities' sizes and positions but do not include detailed design features. For stations, they show a typical prototype without design detail because station configurations and finishes have yet to be developed, and input will be considered from communities surrounding each station through the Final EIS and design processes.

The fixed guideway and stations will be elevated structures. They will result in noticeable changes to views where project elements will be near existing views or in the foreground of these views. This change will also occur for motorists traveling on the roadways along and under the guideway. Some adverse visual effects, such as view blockage, cannot be mitigated and will result in unavoidable adverse environmental effects.

The stations will be dominant visual elements in their settings and will noticeably change views. Stations are shown in the visual simulations in Figures 4-25, 4-29, 4-31, and 4-34. Support facilities, such as traction power substations, will also noticeably change existing views. However, most will be located adjacent to roadways where utilities are already part of the view, so the change will not be dramatic or substantial.

There will be additional lighting associated with park-and-ride facilities, stations, maintenance and storage facility, and trains, which includes interior and safety lighting for the stations and interior lighting and headlights on the trains. For most of the alignment, light and glare associated with the

Table 4-9 Visual Effects of the Project (continued on next page)

Viewpoint (illustrated on Figure 4-16)	Location/View Direction	Existing Visual Quality	Visual Impact	Assessment
East Kapolei to Fort Weaver Road Landscape Unit				
n/a	Views assessed are in the general context of planned development	Moderate to High	Low to Moderate	The guideway and stations will noticeably contrast with the smaller scale buildings nearby, such as the U.S. Navy housing. They will also contrast with the open, undeveloped character that is predominant in this area. However, these areas are expected to be developed or redeveloped under the City's land use plans and zoning and become more urban in character. This is expected to occur in a similar time frame as the transit improvements. As a result, the contrast will become less noticeable.
Fort Weaver Road to Aloha Stadium Landscape Unit				
1	Farrington Highway near Waikele Road, looking \`Ewa	Moderate	Moderate	The guideway will not substantially affect most panoramic and distant views of the mountains and will have a limited effect on the area's scenic quality. Farrington Highway is a major transportation corridor, and project elements will be in character with the surrounding area.
2	Kamehameha Highway Near Acacia Road, looking \`Ewa	Moderate	Moderate	The guideway will affect mauka views by partially blocking existing distant views of the sky and mountains. The scale and height of the guideway are in character with the adjacent buildings.
3	Kamehameha Highway at Ka\`ahumanu Street, looking makai	Moderate	Significant	The bulk and scale of the guideway and columns will be dominant features, obstructing views of the tree canopies in Neal S. Blaisdell Park and substantially changing makai views toward the park.
4	Kamehameha Highway at Kaonohi Street, looking makai	Low	Moderate	Although changes to the existing view will be noticeable, the project elements will blend with the existing visual environment. The utility lines will be less prominent against the guideway in the background.
Aloha Stadium to Kalihi Landscape Unit				
5	Aloha Stadium, looking \`Ewa	High	Moderate	The project elements will change the composition of panoramic views with the high visibility of the guideway. However, these more distant views, which include the mountains and urban skyline, take in a wider view and will not be substantially affected.
6	Kamehameha Highway near Radford Drive and the Pearl Harbor Naval Base Station Area, looking mauka	Low	Moderate	The Pearl Harbor Naval Base Station and guideway will dominate the linear view corridor above Kamehameha Highway. However, the highway is a major transportation corridor, and visual effects will not be substantial.
7	Ke\`ehi Lagoon Beach Park, looking mauka and \`Ewa	High	Moderate	The guideway and columns will be located along the mauka perimeter of the park. They will be prominent elements in the background of mauka views from the park. The guideway's bulk and scale will contrast with the open character of park facilities as it traverses the perimeter of tennis courts near the mauka side and the open field. Farther Koko Head, it will run parallel with the H-1 Freeway viaduct, where it will be less noticeable (viewpoint revised since Draft EIS).
8	Ke\`ehi Lagoon Beach Park, looking mauka	High	Low	The guideway will be slightly more visible than the highway in the background. However, it will not noticeably conflict with the view's character.
Kalihi to Ala Moana Center Landscape Unit				
9	Dillingham Boulevard at Kalihi, looking makai	Low	Moderate	The bulk of the guideway and columns will be out of scale with existing buildings. However, overhead utility lines are prevalent along Dillingham Boulevard, and the project elements will not contrast substantially with the setting's character.

Table 4-9 Visual Effects of the Project (continued from previous page)

Viewpoint (illustrated on Figure 4-16)	Location/View Direction	Existing Visual Quality	Visual Impact	Assessment
10	Dillingham Boulevard near Honolulu Community College and Kapālama Station Area, looking `Ewa	Moderate	Moderate	The Kapālama Station and guideway will be dominant features in views along Dillingham Boulevard. The remaining trees will soften this effect.
11	Nimitz Highway Bridge and Chinatown Station Area, looking makai	Moderate	Significant	The Chinatown Station and guideway will be dominant features in views along Nimitz Highway. Distant makai views over Nu`uanu Stream and Honolulu Harbor will be partially blocked. The project elements will contrast substantially with Chinatown's historic character.
12	Nimitz Highway, makai of Nimitz Highway/ Maunakea Street Intersection, looking `Ewa and mauka	Low	Significant	The Chinatown Station and guideway will dominate features in views along Nimitz Highway, and mauka views of the Ko`olau Mountain Range will be blocked. These project elements will also contrast with Chinatown's historic character. (Viewpoint added since Draft EIS.)
13	Maunakea Street, looking makai	High	Moderate	The guideway and columns will be prominent features in makai views of Honolulu Harbor, partially blocking views of the sky.
14	O`ahu Market at King Street, looking makai	High	Significant	The guideway and columns will be prominent features in views down Kekaulike Street in Chinatown's O`ahu Market. The bulk and scale of these project elements will be out of character with the pedestrian-oriented environment created by the O`ahu Market's architecture and streetscape.
15	Nimitz Highway/Fort Street Intersection mauka of Irwin Park and Aloha Tower Marketplace, looking Koko Head	Moderate	Significant	The Downtown Station and guideway will be dominant features in views along Nimitz Highway. These project elements will contrast substantially with Irwin Park street trees along the highway and the nearby smaller-scale office buildings.
16	Fort Street Mall at Merchant Street, looking makai	High	Low	Just visible through the trees, the guideway structure will partially block a view of the Aloha Tower. Visual effects will be more noticeable for viewers closer to Nimitz Highway.
17	Aloha Tower Drive at Irwin Park and Aloha Tower Marketplace, looking mauka	High	Moderate	The guideway and columns will only be slightly visible beyond the trees. However, the bulk and scale of the guideway will contrast with the more pedestrian-scale character of the streetscape.
18	Halekauwila Street/Cooke Street Intersection, looking mauka past Mother Waldron Neighborhood Park	Moderate	Significant	The bulk and scale of the straddle bent guideway and columns will contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the four-story residential building mauka of Halekauwila Street.
19	Mother Waldron Neighborhood Park near Halekauwila Street/ Cooke Street Intersection, looking `Ewa	High	Significant	The straddle bent guideway and columns will create a sense of enclosure for drivers on Halekauwila Street and pedestrians on adjacent sidewalks. These project elements will also contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the adjacent four-story residential building. Makai views from these upper-story residences will also be blocked.

The information in this table has been summarized from the Visual and Aesthetics Resources Technical Report (RTD 2008e).

Figure 4-20 Viewpoint 1—Farrington Highway near Waikele Road, looking `Ewa

The guideway will not substantially affect most panoramic and distant views of the mountains and will have a limited effect on the area's scenic quality. Farrington Highway is a major transportation corridor, and project elements will be in character with the surrounding area.

Figure 4-21 Viewpoint 2—Kamehameha Highway near Acacia Road, looking `Ewa

The guideway will affect mauka views by partially blocking existing distant views of the sky and mountains. The scale and height of the guideway are in character with the adjacent buildings.

Figure 4-22 Viewpoint 3—Kamehameha Highway at Ka`ahumanu Street, looking Makai

The bulk and scale of the guideway and columns will be dominant features, obstructing views of the tree canopies in Neal S. Blaisdell Park and significantly changing makai views toward the park.

Figure 4-23 Viewpoint 4—Kamehameha Highway at Kaonohi Street, looking Makai

Although changes to the existing view will be noticeable, the project elements will blend with the existing visual environment. The utility lines will be less prominent against the guideway in the background.

Figure 4-24 Viewpoint 5—Aloha Stadium, looking `Ewa

The project elements will change the composition of panoramic views with the high visibility of the guideway. However, these more distant views, which include the mountains and urban skyline, take in a wider view and will not be substantially affected.

Figure 4-25 Viewpoint 6—Kamehameha Highway near Radford Drive and the Pearl Harbor Naval Base Station Area, looking Mauka

The Pearl Harbor Naval Base Station and guideway will dominate the linear view corridor above Kamehameha Highway. However, the highway is a major transportation corridor, and visual effects will not be substantial.

Figure 4-26 Viewpoint 7—Ke`ehi Lagoon Beach Park, looking Mauka and `Ewa

The guideway and columns will be located along the mauka perimeter of the park. They will be prominent elements in the background of mauka views from the park. The guideway's bulk and scale will contrast with the open character of park facilities as it traverses the perimeter of tennis courts near the mauka side and the open field. Farther Koko Head, it will run parallel with the H-1 Freeway viaduct, where it will be less noticeable.

Figure 4-27 Viewpoint 8—Ke`ehi Lagoon Beach Park, looking Mauka

The guideway will be slightly more visible than the highway in the background. However, it will not noticeably conflict with the view's character.

Figure 4-28 Viewpoint 9— Dillingham Boulevard at Kalihi, looking Makai

The bulk of the guideway and columns will be out of scale with existing buildings. However, overhead utility lines are prevalent along Dillingham Boulevard, and the project elements will not contrast substantially with the setting's character.

Figure 4-29 Viewpoint 10—Dillingham Boulevard near Honolulu Community College and Kapālama Station Area, looking `Ewa

The Kapālama Station and guideway will be dominant features in views along Dillingham Boulevard. The remaining trees will soften this effect.

Figure 4-30 Viewpoint 11—Nimitz Highway Bridge and Chinatown Station Area, looking Makai

The Chinatown Station and guideway will be dominant features in views along Nimitz Highway. Distant makai views over Nu'uanu Stream and Honolulu Harbor will be partially blocked. The project elements will contrast substantially with Chinatown's historic character.

Figure 4-31 Viewpoint 12—Nimitz Highway, makai of Nimitz Highway/Maunakea Street Intersection, looking `Ewa and Mauka

The Chinatown Station and guideway will be the dominate features in views along Nimitz Highway and mauka views of the Ko`olau Mountain Range will be blocked. These project elements will also contrast with Chinatown's historic character.

Figure 4-32 Viewpoint 13—Maunakea Street, looking Makai

The guideway and columns will be prominent features in makai views of Honolulu Harbor, partially blocking views of the sky.

Figure 4-33 Viewpoint 14—O`ahu Market at King Street, looking Makai

The guideway and columns will be prominent features in views down Kekaulike Street in Chinatown's Oʻahu Market. The bulk and scale of these project elements will be out of character with the pedestrian-oriented environment created by the Oʻahu Market's architecture and streetscape.

Figure 4-34 Viewpoint 15—Nimitz Highway/Fort Street Intersection Mauka of Irwin Park and Aloha Tower Marketplace, looking Koko Head

The Downtown Station and guideway will be dominant features in views along Nimitz Highway. These project elements will contrast substantially with Irwin Park street trees along the highway and the nearby smaller-scale office buildings.

Figure 4-35 Viewpoint 16—Fort Street Mall at Merchant Street, looking Makai

Just visible through the trees, the guideway structure will partially block a view of the Aloha Tower. Visual effects will be more noticeable for viewers closer to Nimitz Highway.

Figure 4-36 Viewpoint 17—Aloha Tower Drive at Irwin Park and Aloha Tower Marketplace, looking Mauka

The guideway and columns will only be slightly visible beyond the trees. However, the bulk and scale of the guideway will contrast with the more pedestrian-scale character of the streetscape.

Figure 4-37 Viewpoint 18—Halekauwila Street/Cooke Street Intersection, looking Mauka past Mother Waldron Neighborhood Park

The bulk and scale of the straddle bent guideway and columns will contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the four-story residential building mauka of Halekauwila Street.

Figure 4-38 Viewpoint 19—Mother Waldron Neighborhood Park near Halekauwila Street/Cooke Street Intersection, looking `Ewa

The straddle bent guideway and columns will create a sense of enclosure for drivers on Halekauwila Street and pedestrians on adjacent sidewalks. These project elements will also contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the adjacent four-story residential building. Makai views from these upper-story residences will also be blocked.

guideway and trains are not anticipated to have an effect because the guideway will generally be located in existing roadway rights-of-way, which currently produce transportation-related light and glare. Furthermore, the light intensity from trains is expected to be comparable to or less than existing buildings and vehicles along the alignment.

The shadow pattern created by the elevated stations and guideway will change throughout the day and seasonally, depending on the alignment's direction, time of day, and time of year. Shadow impacts along the alignment will vary with orientation, height of the stations and guideway, and the height of surrounding trees and local development.

Viewpoints not located near the alignment will generally be less affected by changes in the visual environment because they will take in a longer, more expansive landscape. Project elements will be noticeable but not dominant features in these views, and visual effects to significant views and vistas will be low to moderate. Passengers on trains will have enhanced views of these areas compared to passengers in vehicles, whose views are often obstructed by buildings, vehicles, and commercial signage. Public views include views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks (ROH 1978b). The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

DTS will coordinate with DPP regarding the particular needs of each view. The Project will introduce a new linear visual element to the corridor, and changes to some views will be significant and unavoidable. Depending on the degree of view obstruction or blockage, some view changes will be substantial. Viewer response to these changes will vary with exposure and sensitivity and depend on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less noticeable in wider vista or panoramic views where the project elements serve as smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

Significant views and vistas and an assessment of expected changes in visual quality for viewpoints and views along the project alignment are presented below for each landscape unit.

The Project will provide users with expansive views from several portions of the corridor by elevating riders above highway traffic, street trees, and low structures adjacent to the alignment.

East Kapolei to Fort Weaver Road Landscape Unit

The surrounding visual environment consists mostly of scattered residential development and open agricultural land. The area is planned for future development, which will substantially alter the visual environment independent of the Project. The Project will change the visual environment in this area, but these changes are expected to occur in a similar time frame as the planned development.

The potential for the guideway and stations to block mauka-makai views and vistas of features and landmarks will vary throughout this landscape unit. Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they take in a longer, more expansive landscape. Protected views and vistas identified in the East Kapolei to Fort Weaver Road Landscape Unit are listed in Table 4-10. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project's effect

Table 4-10 Visual Effects on Protected Views and Vistas—East Kapolei to Fort Weaver Road

Views/Vistas	Description	Visual Effects
A	Views of Central Honolulu and Diamond Head from `Ewa Plain	Project elements will not be dominant features in these views—low visual effect
B	Views of na pu`u at Kapolei, Pālailai, and Makakilo	Mauka of study area—no visual effect
C	Distant views of the shoreline from the H-1 Freeway above the `Ewa Plain	Project elements will not be dominant features in these views—low visual effect
D	Views of the Wai`anae Mountain Range from the H-1 Freeway between Kunia Road and Kaloi Gulch and from Kunia Road	Mauka of study area—no visual effect

on these views. The locations are identified on Figure 4-17.

The guideway will introduce an elevated linear structure and urban elements (e.g., transit stations, park-and-ride lots, traction power substations, and a maintenance and storage facility) to what is currently an open, rural, and country-like setting. The guideway will range from 30 to 45 feet in height. The top of the stations with a concourse will be about 15 feet higher than the guideway where it enters the station. The guideway and stations will noticeably contrast with the smaller scale buildings nearby, such as the U.S. Navy housing. They will also contrast with the open, undeveloped character that is predominant in this area. However, these areas are expected to be developed or redeveloped under the City's land use plans and zoning and become more urban in character. This is expected to occur in a similar time frame as the transit improvements. As a result, the contrast will become less noticeable.

Panoramas and distant views of the shoreline, Downtown, and Diamond Head will change to include views of the guideway, support columns, and stations. However, panoramic views take in a wider, more expansive landscape and are usually less sensitive to change. Generally, the project elements will not be dominant features in these views. However, the open character of large expanses of pavement will be noticeable at the proposed East Kapolei and UH West O'ahu park-and-ride lots. Views of the 'Ewa Plain from the elevated trains and stations will be enhanced. Overall visual effects, including viewer response to change, will be moderate.

Fort Weaver Road to Aloha Stadium Landscape Unit

Farrington Highway is a major transportation corridor through this area. The West Loch Station and respective transit center will blend well with the bulk and scale of Waipahu Town Center's commercial character. However, the guideway and columns along the alignment will be prominent visual features due in part to the long, straight view down Farrington Highway and because the guideway's height of about 40 feet will be greater than many of the one- and two-story surrounding buildings.

Although the guideway at 30 to 45 feet in height will obstruct some makai and mauka views across the highway, views of businesses from vehicles traveling on Farrington Highway will not be greatly reduced. Panoramic views near the alignment and from Waipahu Cultural Garden Park, Hawai'i's Plantation Village, and Waipahu District Park comprise a wider panoramic scene and, therefore, will not be substantially affected. Mature trees in the Farrington Highway median will be removed to accommodate the guideway, reducing the visual interest and memorability of views.

Visual effects in this area will range from moderate to significant.

The Waipahu Transit Center Station will be farther Koko Head along the alignment. Similar to the West Loch Station, it will blend well with the bulk and scale of the commercial setting that has developed around this section of the Farrington Highway corridor. As the guideway continues Koko Head toward Leeward Community College, it will be a more dominant feature and dramatically contrast with the suburban residential character makai and mauka of the highway. The mass and height of the guideway and columns will block some residents' views over Middle Loch to Pearl Harbor. However, many views in this area comprise a wider panoramic scene and, therefore, will not be substantially affected. Visual effects in this area will range from moderate to significant.

The guideway will shift makai of Farrington Highway at Waipahu High School, which is near the preferred site of a maintenance and storage facility near Leeward Community College. This area is a flat knoll makai of the H-1 Freeway/Farrington Highway Interchange. The Leeward Community College Station will be adjacent to a parking lot on the college campus and will be at ground level. The maintenance and storage facility would be makai of the interchange. These project elements will be highly visible from Waipahu High School, Leeward Community College, low-lying areas along Pearl Harbor, and from residences on the foothills mauka of the interchange. However, most views in these areas comprise a wider panoramic scene and, therefore, will not be substantially affected. Visual effects in this area will be moderate. Visual effects of the maintenance and storage facility are discussed in Section 4.17.

The guideway will cross over the H-1 Freeway Interchange and merge with Kamehameha Highway at Pearl City. The Pearl Highlands Station and park-and-ride structure will be ‘Ewa of the Pearlridge Center and will blend well with the bulk and scale of its commercial character. However, these project elements will be highly visible and dominant features. The guideway will pass by Pacheco Neighborhood Park at Waimano Home Road, where nearby residents mauka and makai of the guideway will experience noticeable changes in their views. Makai views of East Loch and Pearl Harbor from the park and residences near the mauka side of the Waimano Home Road and Kamehameha Highway Intersection will include the guideway and columns, and some views beyond the intersection will be blocked. Visual effects will range from low in the area around the H-1 Freeway Interchange to moderate in the rest of this area.

Koko Head of Pu‘u Poni Street, the guideway will cross over the H-1 Freeway and continue above the Kamehameha Highway median to the vicinity of Aloha Stadium. The H-1 Freeway cross-over will be a dominant feature, visible at great distance. However, this change will be in context with the freeway setting and likely will not be perceived as substantial. Farther Koko Head, the guideway will continue above the Kamehameha Highway median through residential neighborhoods and mauka of Neal S. Blaisdell Park before crossing over Waimalu Stream. The bulk and scale of the guideway and columns will substantially change mauka and makai views from residences, such as panoramic views through the park toward Pearl Harbor and Downtown. Panoramic views will be less sensitive to change because they take in a wider, more expansive landscape. Visual effects will range from moderate to significant in this area.

Continuing to the Pearlridge Station and Transit Center, three historic sites, including Sumida Farm, will be mauka of the guideway and station. The elevated station of about 40 feet above Kamehameha Highway will be a noticeable change, altering views and contrasting with the scale of these resources and the surrounding environment. Some ʻEwa and makai views of the skyline from the Sumida Farm will be blocked by the guideway. However, because the farm is already at a much lower elevation than the highway, these views are already somewhat confined by the surrounding embankments. Overall visual effects near the station will be moderate because the project elements will blend with the surrounding commercial character, which is a heavily used transportation corridor with one- and two-story businesses and warehouses.

From residences on the hillside above Pearlridge, Kamehameha Highway is already a prominent feature in makai views toward the ʻEwa Plain, East Loch, and Downtown. However, the guideway will be a noticeable change. These project elements will also change panoramic views over the ʻAiea Bay State Recreation Area where the guideway will be about 30 feet above the Kamehameha Highway and Honomanu Street Intersection. Most scenic views from this recreational area are makai and will not be affected. Overall visual effects from Pearlridge to the Aloha Stadium area will range from moderate to significant.

Throughout this landscape unit, the potential for the guideway and stations to block protected mauka-makai views and vistas of features and landmarks will vary.

Protected views and vistas identified in the Fort Weaver Road to Aloha Stadium Landscape Unit are listed in Table 4-11. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project's effect on these views. The locations are identified on Figures 4-17 and 4-18. View and Vista H is shown on Figures 4-39 and 4-40. View and Vista K is shown on Figure 4-41.

Viewpoints 1 through 5 illustrate views of the Project within this landscape unit (Figures 4-20 through 4-24). Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer, more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects to significant protected views and vistas will range from moderate to significant, depending on the viewer's position and location.

Aloha Stadium to Kalihi Landscape Unit

The guideway will continue Koko Head of Kamehameha Highway makai past Aloha Stadium and over Hālawa Stream. Pearl Harbor National Historic Landmark (NHL) is makai of the project alignment. Aloha Stadium is at a major freeway interchange and surrounded by parking lots. Views of East Loch and the NHL from residences near Kohomua Street will be partially obstructed by the guideway and columns. However, the Project will not adversely affect the NHL's visual integrity and will barely be visible in mauka views from the harbor (Figure 4-42). The project elements will be dominant visual elements along the mauka edge of the World War II Valor in the Pacific National Monument Visitor Center parking lot (Figure 4-43). The visual effects on the NHL were included in the Draft EIS and the Visual and Aesthetics Resources Technical Report (RTD 2008e). The visual simulations from the Arizona Memorial and the World War II Valor in the Pacific National Monument Visitor Center were prepared based on comments received on the Draft EIS and added to the Final EIS to clarify the analysis.

The Kamehameha Highway Bridge over the Hālawa Stream is historic, and its appearance will be changed by the guideway and support columns. The contrast in the scale and character of the guideway and columns with the existing

Table 4-11 Potential Visual Effects on Protected Views and Vistas—Fort Weaver Road to Aloha Stadium

Views/Vistas	Description	Visual Effects
E	View of the Wai`anae Mountain Range from the Waipahu Cultural Garden	Mauka of study area—no visual effect
F	View of the Waipahu Sugar Mill from Waipahu Depot Road	Mauka of study area—no visual effect
G	Views of Pearl Harbor from Farrington Highway in the vicinity of Waipahu High School	Guideway columns will occasionally disrupt line of sight from highway—low visual effect
H	Waimano Home Road/Kamehameha Highway Intersection	Guideway columns will block some views across the intersection, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-39 and 4-40)—moderate visual effect
I	Ka`ahumanu Street/Kamehameha Highway Intersection	Guideway and columns will obstruct views of the tree canopies in Neal S. Blaisdell Park and substantially change makai views toward the park—significant visual effect (Figure 4-22)
J	Kaonohi Street/Kamehameha Highway Intersection	Guideway and columns will noticeably change views—moderate visual effect (Figure 4-23)
K	Honomanu Street/Kamehameha Highway Intersection	Guideway and columns will noticeably change views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figure 4-41)—moderate visual effect

Figure 4-39 Visual Simulation from Waimano Home Road at Fourth Street, looking Mauka

Figure 4-40 Visual Simulation from Waimano Home Road near Pearl City Elementary School, looking Makai

Figure 4-41 Visual Simulation from Honomanu Street near Nalopaka Place, looking Makai

Figure 4-42 Visual Simulation from Arizona Memorial, looking Mauka

Figure 4-43 Visual Simulation from World War II Valor in the Pacific National Monument Visitor Center Parking Lot, looking Mauka

environment will be a noticeable change. Visual effects in this area are expected to range from moderate to significant.

Between Hālawa Stream and the H-1 Freeway, the guideway will be above the median of Kamehameha Highway. Six historic sites, including the Makalapa U.S. Navy housing and other U.S. Navy facilities, lie along this section of the alignment. The visual effects on these resources are expected to be moderate. Although ʻEwa views of Pearl Harbor from the U.S. Navy housing will change, the project elements will fit within the context of the highway as a transportation corridor, so overall visual effects will be moderate.

The Pearl Harbor Naval Base Station will fit with the scale and character of structures at the intersection of Kamehameha Highway and Radford Drive. However, the guideway and columns will be noticeable changes in the visual environment makai of the H-1 Freeway as it intersects with Nimitz Highway. This area is a major interchange that includes wide paved areas and several elevated ramps. Visual effects will vary from low to moderate.

Project elements, including the Honolulu International Airport Station and Lagoon Drive Station, will fit with the bulk and scale of other structures near the airport, which is surrounded by other transportation elements and industrial buildings. Although the guideway and columns will reduce the open character of parking lots and the streetscape and mature trees will be removed makai of the H-1 Freeway and ʻEwa of the Honolulu International Airport Station, the overall visual effect will be low.

The guideway will connect with Kamehameha Highway and the Middle Street Transit Center after passing over a portion of Keʻehi Lagoon Beach Park and Nimitz Highway. The open spatial quality of the park will be altered by the guideway and columns. This change will be noticeable but not substantial to park users because the alignment will be along the periphery of the park and closely follow Nimitz Highway and the H-1 Freeway. Views of Honolulu Harbor and the park are already obstructed by the interchange and will not be substantially affected by the Project. Although the Middle Street Transit Center will be a dominant element, it will fit with the large scale of the interchange and the surrounding developed urban character of the mostly industrial and commercial uses. The overall visual effects will be moderate.

View obstructions and changes to views will be most noticeable where the guideway and stations are nearby or in the foreground of views, and some viewers may consider this a significant adverse visual effect. Viewpoints that are not located near these project elements will generally be less affected. For example, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape. The guideway and stations will not be dominant elements in views of regional scenic features, such as Pearl Harbor, the Waiʻanae Mountain Range, Diamond Head, and the Koʻolau Mountain Range.

Protected views and vistas and visual effects on these views are listed in Table 4-12. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. The locations are identified on Figure 4-18.

Viewpoints 5 through 8 illustrate views of the Project within this landscape unit (Figures 4-24 through 4-27).

Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer,

Table 4-12 Potential Visual Effects on Protected Views and Vistas—Aloha Stadium to Kalihi

Views/Vistas	Description	Visual Effects
L	Bougainville Drive—mauka/makai	Mauka of study area—no visual effect
M	Maluna Street—mauka/makai	Mauka of study area—no visual effect
N	Wanaka Street—mauka/makai	Mauka of study area—no visual effect
O	Ala Liliko`i Street—mauka/makai	Mauka of study area—no visual effect

more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects will range from low to moderate, depending on the viewer's position and location.

Kalihi to Ala Moana Center Landscape Unit

From Kalihi Koko Head, the guideway will follow Dillingham Boulevard to the vicinity of Ka'aahi Street. The canopies of several mature trees along Dillingham Boulevard will be trimmed to accommodate the guideway, and additional trees will be removed at the Kapālama and Iwilei Station areas. The guideway and columns will be prominent visual features due in part to the long, straight view down the boulevard and because the guideway's height of about 30 to 42 feet above Dillingham Boulevard will be slightly greater than many of the one- and two-story surrounding buildings. Mauka and makai views will be obstructed from various points. Makai-view obstructions will be greatest from residences on the mauka side of Dillingham Boulevard. Overall visual effects in this area will be moderate.

The guideway could come within 10 feet of some facades along Dillingham Boulevard, depending on the setback, and will block views from the upper stories of mixed-use buildings Koko Head of Kalihi Street. The upper-story residences along Dillingham Boulevard will be affected by light and glare from trains traveling on the guideway and from station lighting. Due to the close proximity of the guideway and Kalihi and Kapālama Stations, the visual setting of several nearby historic sites will change and views of their facades will be partially obscured. The visual effects on these resources are expected to be significant. However, the Project will require acquisition of three historic resources—Afuso House, Higa Four-plex, and Teixeira House.

As the guideway turns farther Koko Head to connect to Nimitz Highway near Iwilei Road, it will blend with the bulk and scale of the surrounding one- and two-story commercial buildings, including light industrial warehouses and distribution centers. The Iwilei Station will be a noticeable visual change, and some views of building facades will be blocked. However, many viewers will not notice a blockage of views since the surrounding land is used mostly for light industry and offices or is under-used. Visual effects in this area will be moderate.

The alignment will follow Nimitz Highway Koko Head to Halekauwila Street. This area of Downtown includes several historic districts and other sensitive visual resources, including view corridors. Although the Chinatown Station will generally be centered approximately 30 feet above Nimitz Highway, it will be a dominant visual element, contrasting in scale with the pedestrian environment and substantially changing makai views of Honolulu Harbor. However, the Downtown Station will not block views of Honolulu Harbor. The guideway and columns will reduce the open character of the streetscape, create shade and shadows, and block portions of makai views along the following perpendicular streets: Kekaulike, Maunakea, Nu'uanu, Bethel, Fort, Bishop, and Richards. Views from the fourth- and fifth-story windows of adjacent offices and residences will also be blocked. In addition, trains traveling on the guideway will create light and glare, and the Chinatown and Downtown Stations will increase this effect. The addition of the guideway and columns will change the visual character of the streetscape and substantially affect the visual setting of the Dillingham Transportation Building. Overall visual effects in this area will be significant.

The alignment will leave Downtown Koko Head along Halekauwila Street where it will begin on the makai side of the street and transition to the center near Punchbowl Street. The canopies of several mature monkeypod trees along Halekauwila Street will be trimmed. The guideway and columns will also block views from the fourth- and fifth-story windows of adjacent offices and residences and create additional shade and shadows. Trains traveling on the guideway will increase light and glare at upper-story residences. Overall visual effects in this area will be significant.

The Civic Center Station area is currently in transition from scattered one- and two-story businesses to higher-density taller structures. The guideway and columns will block views from the fourth- and fifth-story windows of adjacent offices and residences and create additional shade and shadows. Trains traveling on the guideway will increase light and glare. Mother Waldron Neighborhood Park is Koko Head at Cooke Street. The proposed station will substantially change views and contrast with the scale and character of the surrounding environment. Overall visual effects will be significant.

Past Ward Avenue and the Kakaʻako Station, the alignment will transition to Queen Street. Kakaʻako Station will be noticeable, but it will blend with the character of nearby big-box stores and smaller industrial and residential buildings. Views from the fourth- and fifth-story windows of adjacent offices and residences will be blocked. Property on the mauka side of Waimanu Street will be acquired to allow the alignment to cross over to Kona Street. Although buildings will be removed to allow the crossover, visual effects will be moderate.

The guideway will run above Kona Street through Ala Moana Center. Mature trees will be removed from Piʻikoi Street through the Ala Moana Center Station area, substantially changing the character of the streetscape. With the exception of the mature trees near Piʻikoi Street, visually sensitive resources will not be affected, and most views of the mountains, Koko Head, and skyline will not be blocked. The Ala Moana Center Station will be at the end of the Project. The station and the guideway will be located between the Ala Moana Center and mid- to high-rise buildings and will not substantially change the view from adjacent offices and residences.

Throughout this landscape unit, the potential will vary for the guideway and stations to block protected mauka-makai views of features and landmarks that are identified in policy documents.

Protected views and vistas identified in the Kalihi to Ala Moana Center Landscape Unit are listed in Table 4-13. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project's effect on these views. The locations are identified on Figure 4-19.

Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer, more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects to significant protected views and vistas will range from moderate

Table 4-13 Potential Visual Effects on Protected Views and Vistas—Kalihi to Ala Moana Center

Views/Vistas	Description	Visual Effects
P	Bishop Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-44 and 4-45)—variable moderate to significant visual effect
Q	Panoramic views—Punchbowl Lookout toward Diamond Head	Mauka of study area—no visual effect
R	Panoramic views—Kaka`ako Waterfront Park toward Punchbowl and the Ko`olau Mountain Range	Makai of study area; the project setting includes mid- to high-rise buildings that already obstruct some panoramic views—no visual effect
S	Cooke Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-37 and 4-46)—variable moderate to significant visual effect
T	Ward Avenue—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-47 and 4-48)—variable moderate to significant visual effect
U	Panoramic views—Kewalo Basin toward the Ko`olau Mountain Range and Punchbowl	Makai of study area—no visual effect
V	Panoramic views—Ala Moana Beach Park toward the Ko`olau Mountain Range	Makai of study area; the project setting includes mid- to high-rise buildings that already obstruct some panoramic views—no visual effect
W	Pi`ikoi Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-49 and 4-50)—variable moderate to significant visual effect
X	Ke`eaumoku Street—mauka/makai	Koko Head of study area—no visual effect
Y	`Āina Moana Park (Magic Island)—mauka/makai	The Project will not be visible behind the Ala Moana Center—no visual effect
Z	Panoramic views—Ala Wai Canal Promenade toward the Ko`olau Mountain Range	Koko Head of study area—no visual effect

to significant depending on the viewer's position and location.

The Project will cross, but not block, views along the following protected mauka-to-makai street view corridors:

- Bishop Street—the guideway and columns will be dominant elements in makai views between Nimitz Highway and Queen Street, and views of the horizon will be partially blocked. The bulk and scale of the guideway and columns will be compatible with Nimitz Highway, which functions as a major transportation corridor. Mauka of Queen Street, these elements will likely appear less dominant because the vista will take in a longer view and be more expansive (Figures 4-44 and 4-45).
- Cooke Street—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Pohukaina Street and Queen Street. Views of the horizon will be partially blocked from viewpoints near the alignment, including mauka views from the park at Halekauwila Street and Cooke Street. The guideway, as viewed from Kakaʻako Park, will serve as a small component of the larger landscape and will not be a dominant feature

Figure 4-44 Visual Simulation from Bishop Street at Aloha Tower Drive, looking Mauka

Figure 4-45 Visual Simulation from Bishop Street at Queen Street, looking Makai

in these views. The bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape (Figure 4-46).

- Ward Avenue—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Auahi Street and Queen Street. Views of the horizon will be partially blocked from viewpoints near the alignment. The bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape. For mauka views from Ala Moana Boulevard and makai views mauka of Queen Street, these elements will likely appear less dominant because the vista will take in a longer view and be more expansive (Figures 4-47 and 4-48).
- Piʻikoi Street—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Waimanu Street and Kapiʻolani Boulevard. Views of the horizon will be partially blocked from viewpoints near the alignment. Although the bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape, the view includes rows of mature trees, which will reduce this effect (Figures 4-49 and 4-50).
- Keʻeaumoku Street—the guideway and columns will run along the mauka side of Ala Moana Center behind surrounding buildings.
- ʻĀina Moana Park (Magic Island)—the guideway will not be visible behind Ala Moana Center in mauka views from Magic Island.

Viewpoints 9 through 19 illustrate views of the Project within this landscape unit (Figures 4-28 through 4-38).

Evaluation of Special Management Area Costal Views

Hawaiʻi's SMA law provides special controls on developments within the SMA. The SMA is determined by the counties and is generally an area along the shoreline extending mauka to the first major highway. Portions of the Project within the SMA are discussed in Appendix J. The SMA permits are administered by DPP and granted by the City Council. Developments within the SMA must address certain criteria under HRS Chapter 205A, which are also codified under the City's ordinances in ROH Chapter 25. This section of the Final EIS discusses the SMA permit criteria related to coastal view effects within the SMA. Other SMA criteria are discussed throughout the Final EIS and specifically addressed in Appendix J. In particular to this discussion, HRS Section 205A-25(3) provides that the Project "shall seek to minimize, where reasonable . . . (D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast [.]"

The intent of the regulation is to minimize, where possible, development that would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast [ROH Section 25-3-2(4)].

The *Coastal View Study* (DLU 1987) supports the goals and objectives of the SMA regulations, which include shaping development along the scenic coastal highways throughout Waiʻanae, North Shore, Windward, and Koko Head areas. The study's guidelines for building orientation and massing, setbacks, parking lot siting, and landscaping may be applicable to some of the structural components of the Project, such as the guideway and stations. The study also provides an inventory of significant coastal views and coastal land forms from public viewpoints and coastal roadways within the SMA.

The Project will pass along coastal roadways identified in the *Coastal View Study* with intermittent and continuous views along parts of Farrington Highway, Kamehameha Highway, and Nimitz Highway. For motorist and passengers traveling along Farrington and Kamehameha Highways, the guideway support columns will intermittently block

Figure 4-46 Visual Simulation from Cooke Street at Ilaniwai Street, looking Makai

Figure 4-47 Visual Simulation from Ward Avenue near Auahi Street, looking Mauka

Figure 4-48 Visual Simulation from Ward Avenue at Queen Street, looking Makai

Figure 4-49 Visual Simulation from Pi`ikoi Street at Ala Moana Center Entrance, looking Mauka

Figure 4-50 Visual Simulation from Pi`ikoi Street at Kapi`olani Boulevard, looking Makai

distant views of the shoreline. However, the roadways are in existing transportation corridors where overhead utilities are already part of the view.

The quality of makai views from Farrington Highway in the vicinity of Waipahu High School vary from low to moderate, with the campus and occasional groupings of shrubs and small trees obstructing most of these views. However, the multistory maintenance and storage facility buildings sited on the slope between Waipahu High School and Leeward Community College (preferred site) will be highly visible and dominant elements of makai views from the highway. Views of Pearl Harbor are of relatively short duration and intermittent while traveling along this section of Farrington Highway, so changes in views of the shoreline and harbor are not expected to be dramatic. Near Aloha Stadium on Kamehameha Highway, makai views from the highway will be intermittently blocked by the guideway support columns. Changes in makai views are not expected to be dramatic or substantial; therefore, impacts on Richardson Field (Figure 4-11) will be low because it is makai of the guideway.

Figure 4-22 shows a view from Kamehameha Highway at Ka‘ahumanu Street looking makai. Although the change in views of the Neal S. Blaisdell Park shown in the middleground of this view will be significant from this viewpoint, distant views of the shoreline from the roadways are less affected. Changes in views of the shoreline are not expected to be dramatic.

The portion of the guideway that will run along the makai side of Nimitz Highway and the mauka side of the SMA boundary is between Lagoon Drive near Honolulu International Airport and Kalihi. In this area, the alignment will be along the mauka edge of Ke‘ehi Lagoon Beach Park and closely follow Nimitz Highway and the H-1 Freeway. Figure 4-27 illustrates where the guideway will be in relationship to the roadway. There will be moderate impacts on makai views of the shoreline from these state highways.

Although they are mauka of the SMA, stationary makai views of the shoreline from Waipahu High School, Leeward Community College, Blaisdell Park, Richardson Park, and Keʻehi Lagoon are also identified in the *Coastal View Study* as important to preserve. Because the guideway will be mauka of these viewpoints and the preferred maintenance and storage facility site is between Waipahu High School and Leeward Community College campuses, no makai view effects are expected. For the view of Honolulu Harbor from Sand Island, the guideway will pass in between existing buildings along Dillingham Boulevard and no effects to views will occur.

The *Coastal View Study* also considers the creation of new views along with the preservation of existing views. Transit users on the elevated guideway will have expansive panoramic views of the shoreline except where disrupted by trains traveling in the opposite direction, station structures, and multi-story buildings. These views will be similar to those from the street below, but better due to the elevated perspective. As discussed in Appendix J, the City will minimize, where reasonable, portions of the Project that will substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast.

Mitigation

As part of the design process, DTS has developed specifications and design criteria to address the City's requirements for the Project. Guideway materials and surface textures will be selected in accordance with generally accepted architectural principles to achieve integration between the guideway and its surrounding environment. Landscape and streetscape improvements will mitigate potential visual impacts, primarily for street-level views.

Other measures to address visual impacts of the Project are being developed through the station design and planning process. The initial station area plans and design guidelines were first developed with coordination between DTS and DPP. The next level of transit station design focuses on integrating individual neighborhood characteristics of the communities served by stations.

The following mitigation framework will be included with the Project to minimize negative visual effects and enhance the visual and aesthetic opportunities that it creates:

- Develop and apply design guidelines that will establish a consistent design framework for the Project with consideration of local context.
- Coordinate the project design with City TOD planning and DPP.
- Consult with the communities surrounding each station for input on station design elements.
- Consider specific sites for landscaping and trees during the final design phase when plans for new plantings will be prepared by a landscape architect. Landscape and streetscape improvements will serve to mitigate potential visual impacts.

Design Principals and Mitigation

The following design principles are identified in the *Honolulu High-Capacity Transit Corridor Project Compendium of Design Criteria* (RTD 2009o) and will be implemented in final design and mitigation measures to minimize visual effects.

Environmental Design Criteria: Aesthetics/Visual (Section 3.15)

- Stations and park-and-ride facilities will be designed in a manner that is compatible with the surroundings.
- Area and guideway lighting fixtures and standards will incorporate directional shielding where needed to avoid the intrusion

of unwanted light and glare into adjacent sensitive land uses.
- Landscaping will be used to screen the traction power substations from sensitive adjacent land uses, such as residential areas.
- Lighting and security equipment will be located so as not to be visible from adjacent sensitive land uses.
- Local ordinances for screening, signage, and materials will be followed.
- Where possible, every effort will be made to integrate a traction power substation into a larger structure in the central business districts.
- Where there is an opportunity, the design will incorporate signage, materials, street furniture, landscaping, etc., to enhance the visual environment.

Architecture Design Criteria: Station Site Design (Section 10.2.2)
- Station sites will be designed to ensure that each station satisfies operational demands and is well integrated into the existing urban fabric and the communities the station serves.

Architecture Design Criteria: Stations (Section 10.3)
- The physical form of the project stations and support facilities will embody Honolulu and Hawai'i's rich cultural heritage.
- Station designs will be context-sensitive, functionally integrated, and culturally expressive of their specific locations.

Architecture Design Criteria: Materials and Finishes (Section 10.8.2)
- Materials used in station construction will be consistent with the cultural and historic guidance and recommendations set forth in the Design Language Pattern Book.

Architecture Design Criteria: Lighting (Sections 10.12.1 and 10.12.3)
- The quality of the lighting design will greatly influence the appearance and attractiveness of stations and will play an important role in enabling the public's acceptance of the system and the stations.
- Glare from transit station lights or reflective surfaces will be reduced to an absolute minimum such that it does not affect the vision of motorists.
- Light spill will be prevented from the stations onto roadways and areas adjacent to stations and station sites.
- Brightness and glare will be reduced to an absolute minimum by:
  - Locating light sources to avoid direct reflection or by selecting anti-reflective finishes.
  - Minimizing or eliminating undesirable reflections in glazed and polished surfaces, glass, walls, and other similar elements.
  - Minimizing or eliminating light spillage onto adjacent properties and eliminating night sky pollution. This will be done using full cut-off luminaries (fixture and lamp design) and low-reflective surfaces.
- Light sources in parking structures will not be visible from outside the structure, particularly those on the upper decks.

Landscape Architecture Design Criteria: General (Section 11.1.1)
- The transit system's place in Hawai'i will be defined by creating an inspired ground plane with landscape planting, paving, and furniture.
- The landscape architectural design components will unify the miles of guideway and stations.
- Design elements will be repeated in all stations while material sections will be varied based on community context.

Landscape Architecture Design Criteria: Design Intent (Sections 11.2.1 and 11.2.2)

- Use of limited shrubs and groundcover palette will unify the stations and approaches and create variation primarily in the paving colors and tree selections. Consistent application of these principals will result in a unified system
- High quality materials will be used in limited amounts to emphasize the station approaches and other important features. The natural shape and character of materials will be the focus.
- Specialty stations will be treated with historic context and careful design to reinforce the uniqueness of context or use (e.g., the Kapālama Station might have a special planting of true kamani trees).
- The mauka-makai relationship of streams and perpendicular crossings will be accentuated to add character, variety, and scale to the alignment.
- Trees displaced by the guideway during construction will be transplanted to other areas of the corridor as feasible. Wood from any trees that are not able to be saved or salvaged and transplanted will be repurposed.

Landscape Architecture Design Criteria: Streetscape (Section 11.3.1)

- Street tree planting or transplanting will occur adjacent to the station area and along the alignment where the existing streetscape is affected. Trees will be placed every 50 feet when adjacent to residential areas and every 40 feet when adjacent to commercial areas. Tree species, sizes, and detail will conform to City standards.
- Trees will be planted a minimum of 3 feet away from curbs and a minimum of 2 feet away from the edge of the walkways.

Landscape Architecture Design Criteria: Station Areas (Section 11.3.2)

- Planting and paving design will play a pivotal role in increasing station visibility and identity, as well as directing patrons to the station entrance. In some locations, planters will be added to soften the station architecture.
- Design of station approaches will link entry plaza to busy drop-off lanes and public walkways in creative ways that allow for pedestrian circulation and seating.
- Low shrubs and ground covers will be used in station areas to increase visibility near bicycle or vehicle traffic.

Landscape Architecture Design Criteria: Traction Power Substations (Section 11.3.5)

- Tall vertical plantings for vines will be used to screen or minimize the impact of the traction power substation structures. Plants or vines will be a minimum of 6 feet high in secure areas while maintaining visibility to the entrances.
- Maintain a minimum access width of 5 feet around all sides of the structure.

Landscape Architecture Design Criteria: Under Guideway (Section 11.3.6)

- Where the guideway columns fall within curbed areas, vines will be trained onto columns to reduce the likelihood of graffiti and to soften the appearance of the structures. Surface texture of the column design may be enhanced to facilitate vine attachment and growth.

Landscape Architecture Design Criteria: Planting Design (Sections 11.5.2 and 11.5.4)

- Plant material will be used to provide human scale elements and soften the elevated fixed-guideway and platform and help integrate the appearance of transit facilities.
- Site-specific designs will be created that provide station identity and respond to site

conditions, including views, trees, sun and wind patterns, and soils that still relate to the design family of other station areas.
- Station designers will make provisions for specific tree relocations in their plans. A certified arborist will be consulted to determine the likelihood of survival for each tree being considered for transplanting.
- Wherever feasible (as determined by a certified arborist), existing trees will be protected in place.
- During construction, the City will maintain all landscaped areas within the construction limits to HDOT standards utilizing HDOT maintenance specifications, including mowing, edging and trimming, weeding, pruning and care of shrubs and trees, fertilizing, pesticide and herbicides, clearing gutters, swales and ditches, invasive plant removal, and rubbish and debris removal and disposal.

Even with mitigation measures, some obstruction and changes to views will result in significant unavoidable adverse effects. These effects will be most noticeable where the guideway and stations are nearby or in the foreground of views. The degree of visual effect will vary with the alignment orientation and the height of the guideway, stations, and surrounding buildings and trees, along with the viewer's expectations of view quality. Although changes in visual resources or view planes and the viewer response will be significant in some areas, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape.

4.9 Air Quality

This section evaluates the quantity of air pollutant emissions that will occur with the Project. *Air pollution* is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. *Air quality* describes the amount of pollution in the air. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Air Quality and Energy Technical Report* (RTD 2008g).

4.9.1 Background and Methodology

Regulatory Requirements

The Clean Air Act Amendments of 1990 (40 CFR 51) and the Final Transportation Conformity Rule (40 CFR 93) direct the EPA to implement environmental policies and regulations that will ensure acceptable air quality levels.

As required by the Clean Air Act, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants. Known as *criteria pollutants*, these are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). The State of Hawai‘i has also established ambient air quality standards that are either the same or more stringent than the corresponding Federal standards. State and Federal standards are summarized in Table 4-14.

In addition to the criteria pollutants addressed in the NAAQS, the EPA regulates air toxics. Toxic air pollutants are those known or suspected to cause cancer or other serious health effects. In 2001, the EPA identified 21 Mobile Source Air Toxics (MSAT) and highlighted six as priority MSATs.

In February 2007, the EPA finalized the *Control of Hazardous Air Pollutants from Mobile Sources: Final Rule to Reduce Mobile Source Air Toxics* (EPA 2007). This rule limits gasoline's benzene content and reduces toxic emissions from passenger vehicles and gas cans.

Table 4-14 National and State Ambient Air Quality Standards

Pollutant	Standards: Hawai`i State Standard	Standards: Federal Primary Standard (Health)
Carbon Monoxide (CO)		
1 hour	9 ppm	35 ppm
8 hour	4.5 ppm	9 ppm
Nitrogen Dioxide (NO_2)		
Annual (arithmetic)	0.04 ppm	0.05 ppm
PM_{10}		
24 hour	150 µg/m^3	150 µg/m^3
Annual (arithmetic)	50 µg/m^3	Revoked
$PM_{2.5}$		
24 hour	No standard	35 µg/m^3
Annual (arithmetic)	No standard	15 µg/m^3
Ozone (O_3)		
8 hour	0.08 ppm	0.08 ppm
Sulfur Dioxide (SO_2)		
3 hour	0.5 ppm	No standard
24 hour	0.14 ppm	0.14 ppm
Annual (arithmetic)	0.03 ppm	0.03 ppm
Lead (Pb)		
3 months (arithmetic)	1.5 µg/m^3	1.5 µg/m^3

µg/m3 = micrograms per cubic meter

ppm = parts per million

Sources: State of Hawai'i, Department of Health, Clean Air Branch—Hawai'i Administrative Rules,11-59;40 CFR Part 50.

Methodology

Air quality effects predicted to result from the Project's operation are based on the anticipated vehicle miles traveled (VMT) and average network speed. A regional mobile source pollutant burdens analysis was completed. It was based on link-by-link VMT and speed for the Project and compared to the No Build Alternative. VMT and the associated traffic simulation network speeds were used.

Emissions factors were obtained through the EPA's mobile source emission model, MOBILE6.2, in accordance with Hawai'i Department of Health Clean Air Branch's recommendation. This analysis compares regional pollutant burdens (the total quantity of each pollutant released in the region) for the Project. Changes in regional emission levels were estimated to describe the potential effect the Project may have on regional air quality.

In 2006, the USDOT issued Interim Guidance regarding MSAT analysis in NEPA documentation. This guidance includes a three-tiered approach to determining potential project-induced MSAT impacts, depending on the nature of the project. A qualitative analysis of MSAT effects was completed because the Project has low potential for increasing MSAT emissions.

4.9.2 Affected Environment

Relevant Pollutants

The Project will affect travel patterns within the study corridor, so pollutants that can be traced principally to motor vehicles are relevant in evaluating project consequences. These pollutants include CO, volatile organic compounds (VOC), nitrogen oxides (NO_x), PM_{10} and $PM_{2.5}$, and MSATs.

Air pollutant levels in Hawai'i are monitored by a network of sampling stations operated under the supervision of the State of Hawai'i Department of Health (HDOH) at various locations around O'ahu. The only NAAQS for which pollution levels have been measured greater than the standard since 2004 is $PM_{2.5}$. $PM_{2.5}$ concentrations exceeded the 24-hour standard on four occasions in Pearl City in 2004 as a result of fireworks.

Regional Compliance with Standards

Section 107 of the 1977 Clean Air Act Amendments requires the EPA to publish a list of all geographic areas that are in compliance with the NAAQS and areas that do not attain the NAAQS. Areas not in compliance are called non-attainment areas. Areas for which insufficient data is available to make a determination are unclassified and treated as being in compliance (attainment areas) until proven otherwise. Designation of an area is made on a pollutant-by-pollutant basis.

The entire State of Hawai‘i is designated as an attainment area for CO, O_3, PM_{10}, and $PM_{2.5}$. This means that the State is in compliance with the NAAQS for these pollutants.

Projects included in Hawai‘i’s regional transportation network are found in the Transportation Improvement Plan. The Honolulu High-Capacity Transit Corridor Project is listed in the area’s Transportation Improvement Plan and complies with the goals set forth in the Statewide Transportation Plan.

4.9.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

The No Build Alternative provides a baseline to which the Project is compared. Under this alternative, the Project would not be built. It is predicted that 6,854 kilograms (kg) of VOCs, 147,464 kg of CO, 4,842 kg of NO_x, 375 kg of PM_{10}, and 174 kg of $PM_{2.5}$ would be generated daily by transportation sources within the study corridor in 2030, including other projects in the ORTP.

Project

Regional Analysis

It is anticipated that the Project will reduce regional pollutant emissions by between 3.9 to 4.6 percent compared to the No Build Alternative (Table 4-15).

Table 4-15 shows the results of the analysis of VOC, CO, NO_x, PM_{10}, and $PM_{2.5}$ for the Project compared to the No Build Alternative. If the electricity used to operate the Project is generated by combustion, this may produce additional emissions. However, these emissions will be offset in whole or part by the reductions generated by reduced VMT, as indicated in Table 4-15. Furthermore, power plant emissions may be more easily controlled than emissions from individual automobiles.

The Project is expected to have a small positive effect on MSAT emissions in the study corridor, compared to the No Build Alternative because of the reduction of VMT. MSAT levels could be higher in some locations in the study corridor than others, but current tools and science are not adequate to quantify these levels. However, EPA’s vehicle and fuel regulations coupled with fleet turnover will result in lower region-wide MSAT levels from current levels.

The Project is predicted to demonstrate a 4-percent reduction in VMT and no change in overall network speed compared to the No Build Alternative. This will result in predicted pollution reductions ranging from 3.9 to 4.6 percent compared to the No Build Alternative.

Greenhouse Gases

The Project will decrease greenhouse gas emissions from transportation sources on O‘ahu. Approximately 70 kg of carbon dioxide is emitted per million British thermal units (BTU) consumed when fuel oil, diesel, or gasoline is combusted

Table 4-15 2030 Mobile Source Regional Transportation Pollutant Burdens (kg/day)

Alternative	Emission Burden (kg/day)					Percent Change from No Build				
	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$
No Build	6,874	147,899	4,856	376	175	n/a	n/a	n/a	n/a	n/a
Project	6,561	142,098	4,661	360	167	-4.6%	-3.9%	-4.0%	-4.3%	-4.6%

n/a = not applicable

(USDOE 2009). As detailed in Section 4.11, total daily transportation energy consumption on Oʻahu would be 94,890 million BTUs for the No Build Alternative and will be 92,450 million BTUs for the Project. Assuming all electricity is generated from combustion of oil, the daily 2,440-million-BTU energy savings will result in a daily reduction in greenhouse gas emissions of approximately 171 metric tons of carbon dioxide.

Local Effects

The study corridor is currently in attainment for CO, and monitored CO values are less than 20 percent of the applicable NAAQS. Therefore, no violations of the applicable NAAQS are likely to occur with the Project. As a result, a microscale CO analysis was not conducted.

Mitigation

Because no substantial air quality impacts are anticipated to result from operation of the Project, mitigation will not be required.

4.10 Noise and Vibration

This section describes the Project's effects on environmental noise and vibration levels in the study corridor. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Noise and Vibration Technical Report* (RTD 2008f) and the *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Noise and Vibration Technical Report* (RTD 2010b).

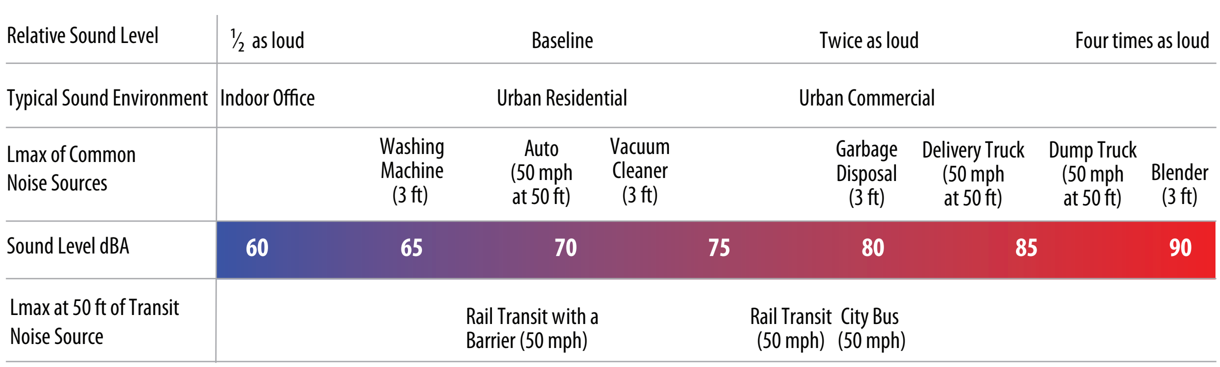
4.10.1 Background and Methodology

Background

Environmental noise is composed of many frequencies, each occurring simultaneously at its own sound pressure level. The range of magnitude, from the faintest to the loudest sound the ear can hear, is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). The commonly used frequency weighting for environmental noise is A-weighting (dBA), which simulates how an average person hears sound.

A common noise descriptor for environmental noise is the equivalent sound level (Leq). Leq is a measure of total noise—a summation of all sounds during a period of time. Leq measured over a one-hour period is the hourly Leq [Leq(h)]. The day/night noise level (Ldn) is a descriptor of the daily noise environment, which incorporates a penalty for high noise levels at night. Lmax is the maximum noise level during an event. Ldn is used by the EPA and FTA to evaluate noise levels in residential areas.

Typical sound levels experienced in urban environments are shown in Figure 4-51.



Sources: EPA 1971, EPA 1974, FTA 2006

Figure 4-51 Typical Sound Levels

Noise from rail transit operations is generated from the interaction of wheels on track, motive power, and the operation of traction power substations. The interaction of steel wheels on rails generates the following three different types of noise, depending on track work: (1) noise generated by pass-by trains operating on tangent track sections, (2) noise generated from wheel squeal on tightly curved track, and (3) noise generated on special trackway sections, such as at crossovers or turnouts.

Noise Criteria for the Project

Noise impacts from transit projects are evaluated using criteria established by the FTA, which are based on community reaction to environmental noise exposure (FTA 2006a). The FTA noise impact criteria group noise-sensitive land uses into the categories shown in Table 4-16.

> **Noise Terminology**
>
> **dBA is an A-weighted decibel, a measure that considers how people hear sound**
>
> **Lmax is the maximum noise level during an event**
>
> **Leq measures the average sound energy over time**
>
> **Ldn is the day/night sound level, a 24-hour average with a penalty that makes sounds at night more important**

The FTA criteria define moderate and severe impacts. The project-generated noise level (project noise exposure) at which an impact will occur depends on the existing noise environment and the category of land use. The noise impact criteria for transit operations are shown on Figure 4-52, with residential noise impacts (measured in Ldn) shown on the left side of the graph and commercial noise impacts (measured in Leq[h]) shown on the right. Reading from the graph, if the existing noise level in a residential area is 60 dBA Ldn, then a project that generates less than 58 dBA Ldn will not have an effect. If it generates between 58 and 63 dBA Ldn, it will cause a moderate impact, and if it generates more than 63 dBA Ldn, it will cause a severe impact. Future noise exposure is the combination of existing noise exposure and the additional noise exposure caused by a project.

Severe noise impacts are usually considered significant within the context of NEPA and HRS Chapter 343. Severe noise impacts require the evaluation of alternative locations/alignments to avoid severe impacts altogether. If it is not practical to avoid severe impacts by changing the location of the Project, mitigation measures must

Table 4-16 FTA Transit Project Noise Impact Criteria—Land Use Categories

Category	Metric	Land Use Description
1	Leq(h) (dBA)	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, land uses such as outdoor amphitheaters and concert pavilions, and National Historic Landmarks with substantial outdoor use.
2	Ldn (dBA)	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Leq(h) (dBA)	Institutional land uses with primary daytime and evening use. This category includes schools, libraries, and churches where it is important to consider interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls, fall into this category. It also includes places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Source: Transit Noise and Vibration Impact Assessment, Final Report (FTA 2006a).

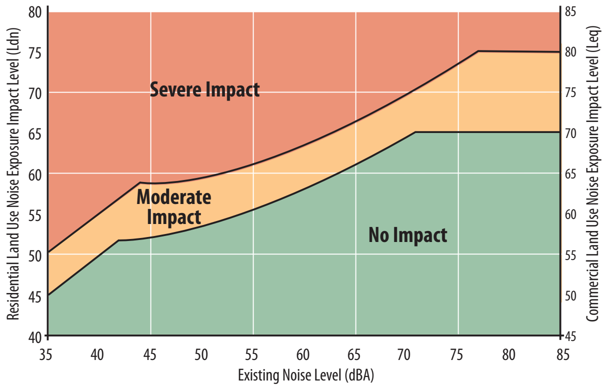


Figure 4-52 FTA Transit Project Noise Exposure Impact Criteria

be considered and incorporated into the Project unless there are truly extenuating circumstances that prevent it. Moderate noise impacts also require consideration and adoption of mitigation measures when it is reasonable. The mitigation of moderate impacts should consider the predicted increase over existing noise levels, the type and number of noise-sensitive land uses affected, existing outdoor/indoor sound insulation, community views, special protection provided by law, and the cost-effectiveness of mitigating noise to more acceptable levels.

The State of Hawaiʻi regulates community noise pollution through HAR Chapter 11-46. The regulations are applicable to stationary noise sources, such as traction power substations and the vehicle maintenance and storage facility.

Vibration Criteria for the Project

Vibration effects from transit operations are generated by motions/actions at the wheel/rail interface. The smoothness of these motions/actions are influenced by wheel and rail roughness, transit vehicle suspension, train speed, track construction (including types of fixation and ballast), location of switches and crossovers, and the geologic strata (layers of rock and soil) underlying the track. Vibration from a passing train has the potential to move through the geologic strata, resulting in vibration transferred through the building foundation. The principal concern is annoyance to building occupants.

Ground-borne vibration is usually characterized in terms of vibration velocity. This is because—over the frequency range relevant to ground-borne vibration (about 1 to 200 hertz)—both human and building response tends to be more proportional to velocity than to displacement or acceleration. Vibration velocity is often reported as vibration decibels (VdB) relative to a reference velocity of 10^{-6} inches/second.

The FTA has developed criteria for acceptable levels of ground-borne vibration (FTA 2006a) as shown in Table 4-17.

Noise and Vibration Assessment Methodology

Project-related noise levels were calculated using FTA reference sound levels for rail transit. Potentially noise-sensitive land uses and vibration-sensitive buildings were identified, as well as appropriate locations for noise monitoring.

Ground-level noise levels were measured at locations along the project alignment and near proposed station locations to establish the most sensitive existing environment (i.e., existing baseline noise levels). Noise levels were also measured on the upper floors of residential buildings that have four or more floors. This is done by performing a series of measurements at representative locations. All noise measurements were made in accordance with American National Standards Institute procedures for community noise measurements.

Noise measurements were taken at 46 noise-sensitive locations along the study corridor. Eight of the noise measurements were taken at sites near the Arizona Memorial and Pearl Harbor Naval Base in response to comments received on the Draft EIS. Measurements for 24-hour periods were conducted

Table 4-17 FTA Ground-borne Vibration Impact Criteria

Land Use Category	Ground-borne Vibration Impact Levels (VdB)	
	Frequent Events[1]	Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB[3]	65 VdB[3]
Category 2: Residences and buildings where people normally sleep	72 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	83 VdB

Source: Transit Noise and Vibration Impact Assessment, Final Report (FTA 2006a).

[1] *Frequent Events* are defined as over 70 vibration events per day.
[2] *Infrequent Events* are defined as less than 70 vibration events per day. This includes most commuter rail systems.

[3] This criterion is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC system and stiffened floors.

at 25 sites that included residences and other buildings where people normally sleep (Category 2 sites). These locations were supplemented with short-term 15-minute measurement sites to determine existing noise levels at typical recreational, institutional, and commercial land uses with primarily daytime and evening activity (Category 3 sites). Eight of the 24-hour measurement sites were located on the upper floors of multi-story residential buildings with open lanais. Potential noise effects from traction powered substations, park-and-ride lots, and maintenance and storage facility operations were also identified.

Noise effects from the Project were determined by comparing the project-generated noise exposure level at each representative receptor in the corridor to the appropriate FTA criterion, given the land use and existing noise levels. If the project-generated noise is below the level for moderate impact, no impact will occur. If the noise level is between the level for moderate impact and severe impact, a moderate impact will occur. If the project noise level is equal to or above the severe impact level, a severe impact will occur.

Vibration effects from the Project were determined using the detailed vibration assessment information and procedures contained in the FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006a). FTA reference levels for a transit vehicle and FTA reference data on ground transmission of vibration energy were used to estimate vibration levels near the fixed guideway.

4.10.2 Affected Environment

This section describes the noise survey used to establish baseline conditions. Ambient vibration levels were not measured as part of this study.

Ambient Noise Conditions in the Study Area

The measurement locations, type of measurement, and existing sound levels are shown in Figures 4-53 through 4-56. These locations represent noise-sensitive land uses along the corridor.

Ambient Vibration Conditions in the Study Area

Ambient vibration levels were not measured as part of this study but are anticipated to be below perceptible levels.

4.10.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and the only source of future noise levels would be traffic movements on local streets and highways. The Project would not generate any new noise impacts. Similarly, no new vibration sources would occur in the absence of the Project. Although the projects in the ORTP will be built,

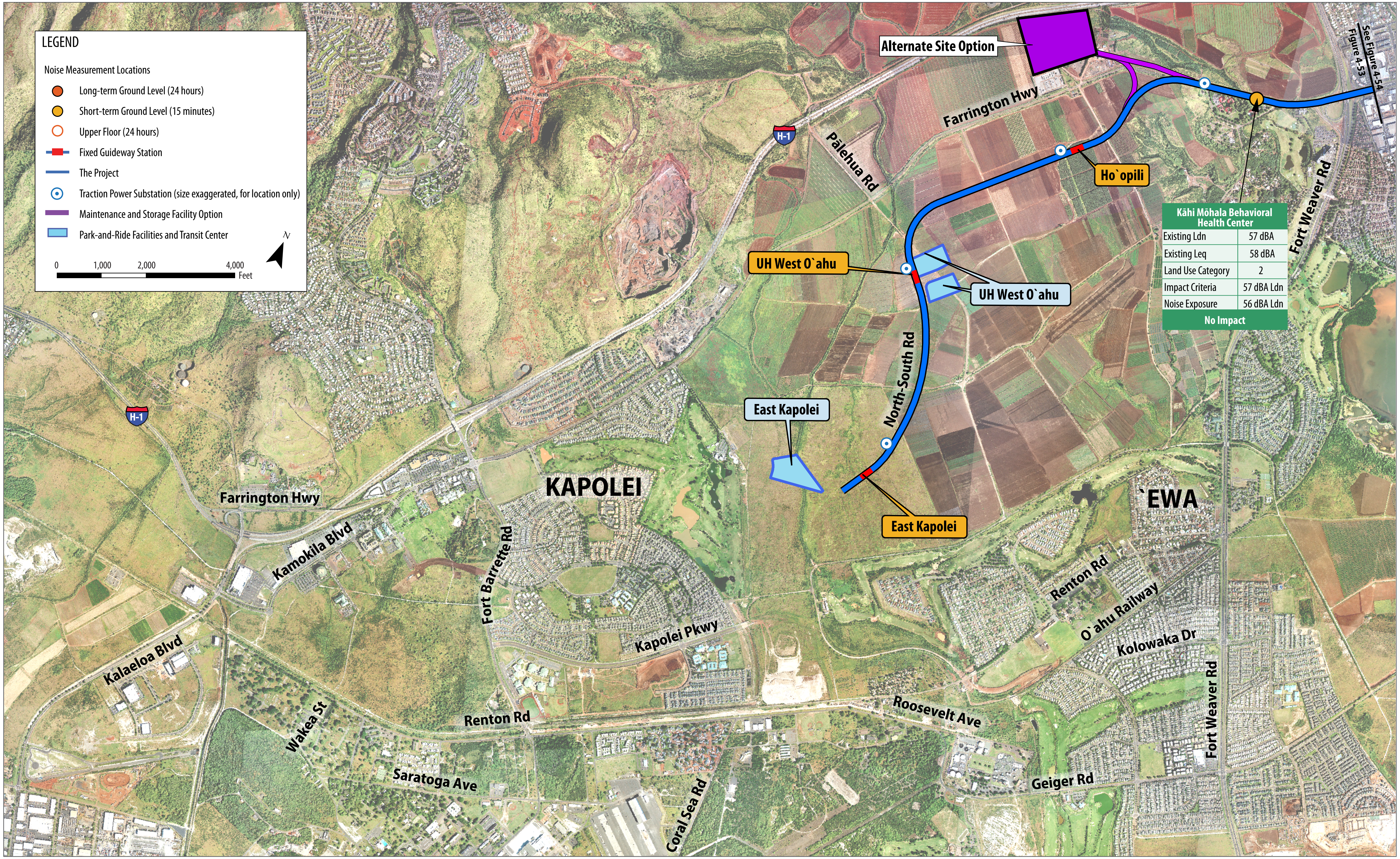


Figure 4-53 Noise Measurement Locations and Results (East Kapolei to Fort Weaver Road)

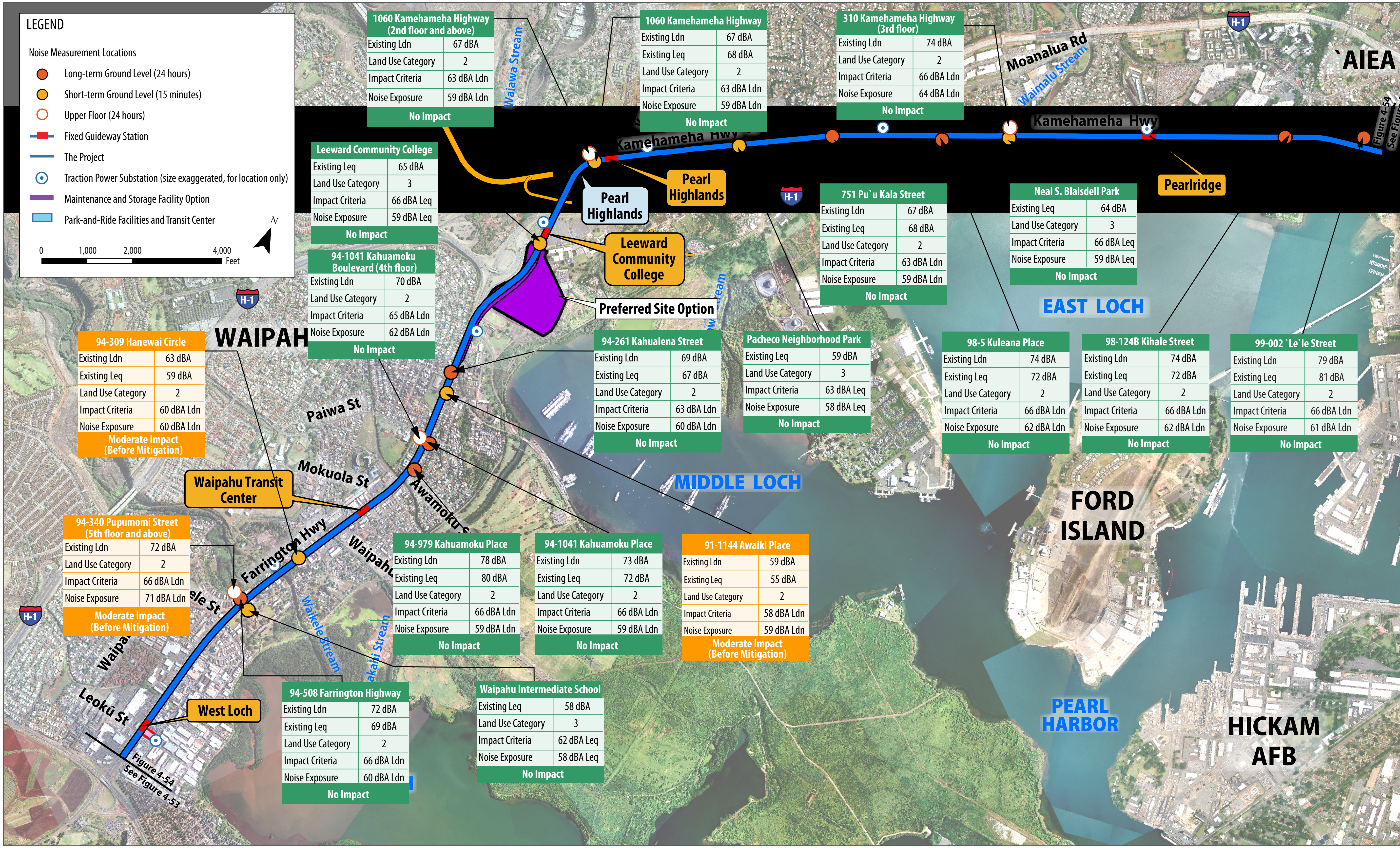


Figure 4-54 Noise Measurement Locations and Results (Fort Weaver Road to Aloha Stadium)

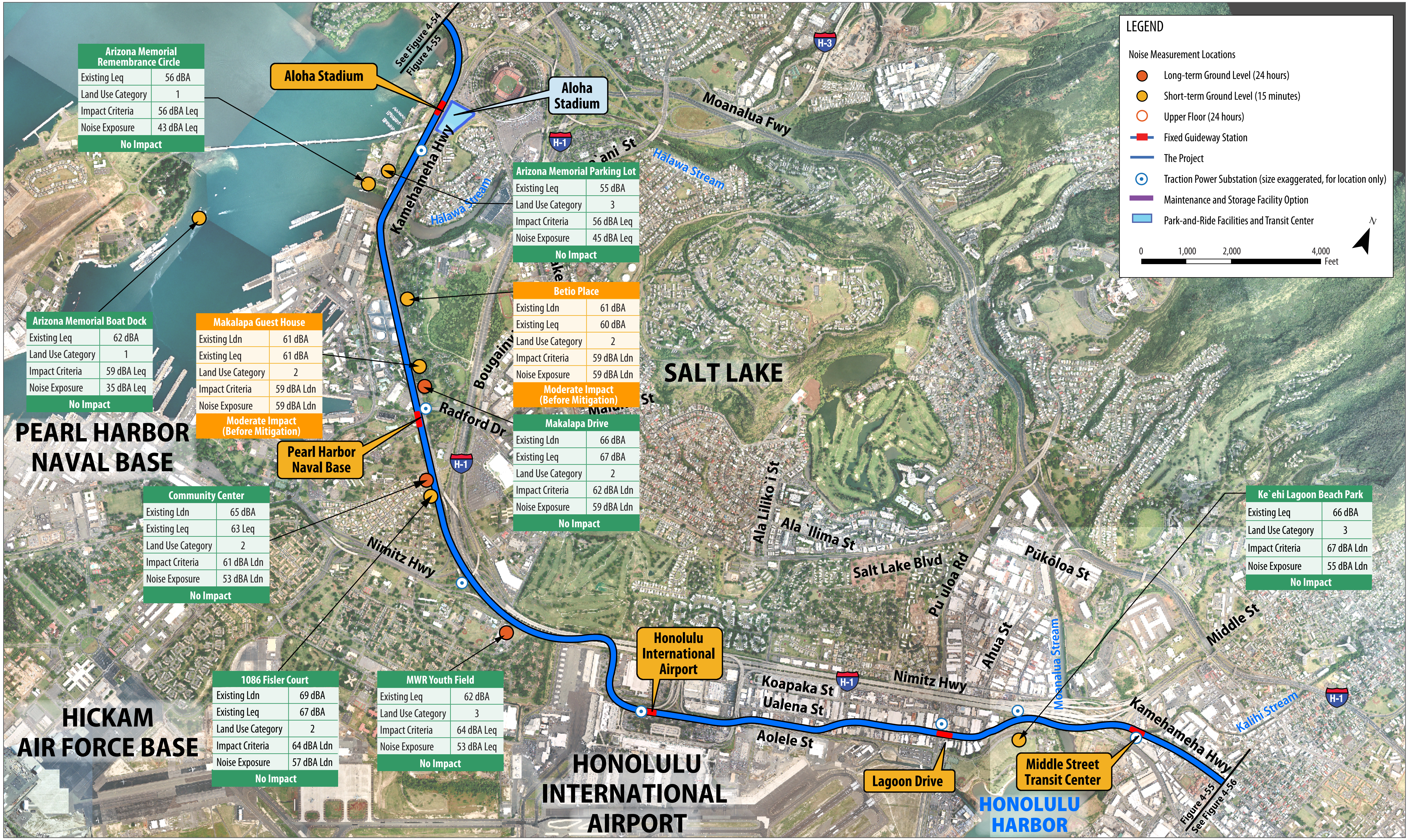


Figure 4-55 Noise Measurement Locations and Results (Aloha Stadium to Kalihi)

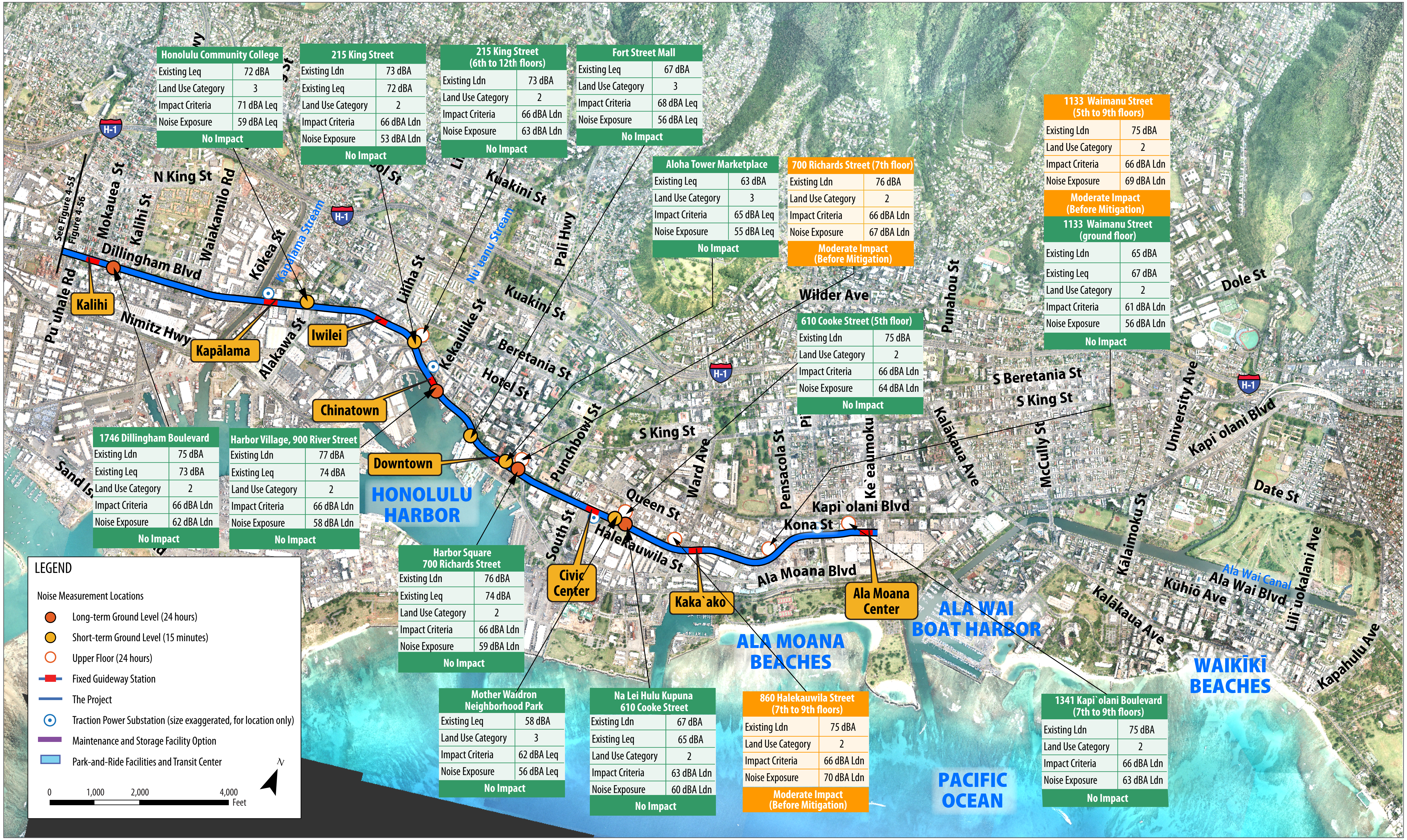


Figure 4-56 Noise Measurement Locations and Results (Kalihi to Ala Moana Center)

their environmental impacts will be studied in separate documents.

Project

Noise

The Project will include an integrated parapet wall at the edge of the guideway structure that extends 3 feet above the top of the rail.

Figures 4-53 through 4-56 show the measured existing noise level and future project noise exposure at each site. The data table included in these figures for each site is labeled “no impact” or “moderate impact” for each site. No noise impacts will occur for schools, public parks, or historic resources as a result of the Project. There will be no noise impacts at the three sites located at the Arizona Memorial (Figure 4-55).

The Project will cause no severe noise impacts. However, moderate impacts would occur at eight areas (Table 4-18). The moderate impacts to these eight areas would occur at the ground level for 50 residences and between the fifth and eleventh floors of four high-rise buildings.

The greatest noise source from the traction power substations will be air-conditioning equipment. All traction power substations will be designed so that the noise generated by the substations measured at the nearest property line will be an hourly Leq of 45 dBA or less in areas zoned single-family residential, conservation, preservation, or similar type and 50 dBA Leq or less in areas zoned multi-family residential, business, resort, or similar type in accordance with HAR Chapter 11-46.

Project park-and-ride lots will be located in undeveloped or commercial areas. The closest proximity from a park-and-ride lot to a residential use will be approximately 300 feet to the nearest point and more than 1,000 feet to the center of the park-and-ride site at Pearl Highlands. At these distances, the park-and-ride lots will not cause noise impacts.

Noise sources at the maintenance and storage facility will include trains operating and switching within the facility and maintenance and cleaning activities. These activities will occur over a 24-hour period. The preferred site option for the maintenance and storage facility is a 44-acre vacant site in Waipahu near Leeward Community College. Noise-sensitive sites within 1,000 feet of the preferred maintenance and storage site include Leeward Community College, Waipahu High School, and the Pearl Harbor Bike Path. These sites

Table 4-18 Noise Impacts

Area	Receptor Description	Buildings Affected	Level of Impact
West Loch to Waipahu Transit Center	94-340 Pupumomi Street	One 9-floor building	Moderate impact to 5th floor and above
West Loch to Waipahu Transit Center	Hanewai Circle	20 single-family residential	Moderate impact
Waipahu Transit Center to Leeward Community College	Awaiki Place	18 single-family residential	Moderate impact
Aloha Stadium to Pearl Harbor Naval Base	Betio Place	8 single-family residential	Moderate impact
Aloha Stadium to Pearl Harbor Naval Base	Makalapa Guest House	4 single-family residential	Moderate impact
Downtown to Civic Center	700 Richards Street	One 26-floor building	Moderate impact to 7th through 11th floors
Civic Center to Kaka`ako	860 Halekauwila	One 30-floor building	Moderate impact to 6th floor and above
Kaka`ako to Ala Moana Center	1133 Waimanu	One 28-floor building	Moderate impact to 5th through 9th floors

are Category 3 (Table 4-17). Maximum daytime operations at the site would occur when vehicles are taken in or out of service to accommodate the change in headways. The maximum noise exposure level at the Waipahu High School football field, the nearest use to the maintenance and storage site, would be 62 dBA Leq(h). That is less than the impact criterion of 67 dBA Leq(h) at that site. The maximum noise exposure level at Leeward Community College would be 55 dBA Leq(h). That is less than the impact criterion of 66 dBA Leq(h) at that site. The maximum noise exposure level at the Pearl Harbor Bike Path would be 52 dBA Leq(h). That is less than the lowest FTA impact criterion of 57 dBA Leq(h) that is applicable to quiet sites. Wheel squeal is not expected within the maintenance and storage facility but could occur, and wheel lubrication devices will be installed at tight-radius curves within the maintenance and storage facility. There are no noise-sensitive uses near the alternative Ho‘opili maintenance and storage facility site option.

Vibration

Vibration levels at adjacent properties will not exceed 65 VdB for the elevated rail transit. This level is less than the FTA criterion of 72 VdB for residential buildings and other structures where people normally sleep (Category 2). No land use along the alignment is identified as having vibration-sensitive equipment that will require the use of lower vibration impact criteria; therefore, no vibration effects are anticipated. No long-term vibration impacts will occur to historic resources.

Mitigation

Noise

Without mitigation, noise exposure levels at eight areas would exceed the noise impact criteria.

For the Project, wheel skirts will reduce noise generated from the Project by 3 dBA or more. Wheel skirts have been added to the vehicle specifications. As a result, noise exposure levels from the Project will be 3 dBA less than shown in Figures 4-53 through 4-56. Wheel skirts will reduce noise exposure levels to below the impact criteria at five of the eight locations where impacts are predicted (Table 4-19). With wheel skirts, three of these residential sites still will experience moderate noise impacts on the fifth through eleventh floors. The moderate noise impact that will occur at the high-rise buildings will only be experienced from units above track level on the fifth through ninth floors.

The use of sound-absorptive materials under the tracks in these three areas will reduce the project noise exposure at upper floors to below the moderate noise impact threshold (Table 4-19). Eight hundred feet of sound-absorptive material will be installed from Pupukahi Street to Pupupuhi Street. For the building at 860 Halekauwila Street, sound-absorptive material will be required from 200 feet ‘Ewa of Kamani Street to 100 feet Koko Head of Kamani Street—a total of 300 feet. The building at 1133 Waimanu will require sound-absortive material to be installed between Kamake‘e Street and Waimanu Street for a total of 920 feet.

Once the Project is operating, field measurements for noise will be conducted at representative sites. Should the Project’s noise impacts exceed the FTA noise impact levels, further mitigation may be implemented on the receivers with the authorization of the property owners.

The elevated guideway will include a parapet wall on both sides of the guideway that extends 3 feet above the top of the rail.

On the track curves between the preferred maintenance and storage facility site and the nearest Leeward Community College building, FTA and the City will commit to installing automatic track lubrication devices capable of eliminating wheel squeal on those curves.

Table 4-19 Mitigated Noise Levels

Area	Receptor Description	Impact Criteria	Noise Level without Mitigation*	Noise Level with Wheel Skirts	Noise Level with Wheel Skirts and Sound Absorptive Material
West Loch to Waipahu Transit Center	94-340 Pupumomi Street, 5th floor and above	66 dBA Ldn	**71 dBA Ldn**	**68 dBA Ldn**	65 dBA Ldn
West Loch to Waipahu Transit Center	Hanewai Circle	60 dBA Ldn	**60 dBA Ldn**	57 dBA Ldn	n/a
Waipahu Transit Center to Leeward Community College	Awaiki Place	58 dBA Ldn	**59 dBA Ldn**	56 dBA Ldn	n/a
Aloha Stadium to Pearl Harbor Naval Base	Betio Place	59 dBA Ldn	**59 dBA Ldn**	56 dBA Ldn	n/a
Aloha Stadium to Pearl Harbor Naval Base	Makalapa Guest House	59 dBA Ldn	**59 dBA Ldn**	56 dBA Ldn	n/a
Downtown to Civic Center	700 Richards Street, 7th through 11th floors	66 dBA Ldn	**67 dBA Ldn**	64 dBA Ldn	n/a
Civic Center to Kaka`ako	860 Halekauwila, 6th floor and above	66 dBA Ldn	**70 dBA Ldn**	**67 dBA Ldn**	64 dBA Ldn
Kaka`ako to Ala Moana Center	1133 Waimanu, 5th through 9th floors	66 dBA Ldn	**69 dBA Ldn**	**66 dBA Ldn**	63 dBA Ldn

Values in **BOLD** represent a noise impact
n/a – Not applicable, Sound Absorptive Material not proposed in this location.
*Includes 3-foot parapet wall

FTA and the City commit to requiring in the specifications for all traction power substations needed for the project that the noise generated by the substations measured at the nearest property line be an hourly Leq of 45 dBA or less in areas zoned single-family residential, conservation, preservation, or similar type and 50 dBA Leq or less in areas zoned multi-family residential, business, resort, or similar type in accordance with Hawai‘i state law (HAR Section 11-46).

Vibration

Because no vibration effects are projected, no mitigation is proposed.

4.11 Energy and Electric and Magnetic Fields

This section describes the energy required for operating the Project and analyzes electric and magnetic fields (EMF) as related to the Project's operation. Energy used during the Project's operation will include fuel consumed by buses, electricity used to power transit vehicles, and a negligible amount of energy for signals, lighting, and maintenance. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Electric and Magnetic Fields Technical Report* (RTD 2008h).

EMFs are a result of the voltage or electric potential of an object. For this Project, the high-capacity transit system will be powered by electricity from a third line located next to the rail tracks. Whenever an electrical current flows, it creates a magnetic field. An analysis of EMFs is included in this Final EIS because of public concern about potential health effects and effects on equipment and machines adjacent to the corridor that may be sensitive to EMFs.

4.11.1 Background and Methodology

Energy

The analysis of operational energy consumption on Oʻahu was based on the transportation analysis prepared for the Project. Changes in overall transportation energy use for vehicles traveling on Oʻahu were assessed using daily VMT and speed values calculated from the transportation demand forecasting model.

The energy consumed by electrically powered transit operations for the high-capacity transit system was also considered. Fixed guideway high-capacity transit systems require energy for propulsion and to account for energy lost during transmission from the energy-generation site to the transit vehicles. The average energy consumption for a rail transit vehicle in the U.S. is 62,700 BTUs per vehicle-mile of service (USDOE 2007).

Electric and Magnetic Fields

EMFs are produced wherever wires distribute electric power and wherever electrical equipment is used. EMFs decrease with the square of distance away from operating equipment or away from current-carrying electric lines. Sensitive equipment that may be affected by changes to the Earth's geomagnetic field caused by operation of the Project may be located at research, manufacturing, medical, and possibly military facilities. Available data on high-voltage power lines, medical and diagnostic facilities, institutional and research facilities, and military operations were assembled. This information was confirmed through field reconnaissance to verify site locations and identify equipment that may be sensitive to the influence of EMFs associated with the Project.

Research into the health effects of EMFs has not established a link between EMFs and any health effects. National Academy of Sciences National Research Center findings "do not support the contention that the use of electricity poses a major unrecognized public-health danger" (NRC 1999). The International Commission on Non-Ionizing Radiation Protection also concluded that data related to cancer do not provide a basis for assessing the health risks of human exposure to power frequency fields (ICNIRP 1998), but it did establish a protective guideline of 830 milligauss magnetic field density for exposure to the general public.

4.11.2 Affected Environment

Energy

In 2006, 291 million gallons of gasoline were consumed on the Island of Oʻahu. Gasoline represents the largest segment of transportation energy consumption, closely followed by aviation fuel, then by diesel.

Transportation modeling results for 2007 show approximately 11.5 million daily VMT on Oʻahu. This results in a daily consumption of approximately 666,000 gallons of fuel with an energy content of 85,600 million BTUs (MBTU).

Electric and Magnetic Fields

Twenty locations were found during a field survey that are within 200 feet of the center line of the project alignment and which could have sensitive electronic equipment that could be affected by operation of the Project. The facility managers were contacted to determine whether sensitive electronic equipment is used, and all but one facility was eliminated (Table 4-20). Honolulu Community College has an electron microscope that is approximately 200 feet from the alignment.

4.11.3 Environmental Consequences and Mitigation

Environmental Consequences

Energy

No Build Alternative

Transportation energy consumption for the No Build Alternative would include motor vehicle fuel consumption islandwide. This is estimated to be 94,890 MBTUs in 2030 (Table 4-21).

Table 4-20 Location of Potential EMF Receptors within 200 Feet of the Project

Address	Building Name	Equipment	Category
874 Dillingham Boulevard	Honolulu Community College	Electron microscope	Institutional—university/research

Table 4-21 2030 Summary of Average Daily Transportation Energy Demand

Alternative	Highway Vehicle Energy Consumption (MBTUs)	Fixed Guideway Vehicle Energy Consumption (MBTUs)	Total Energy Consumption (MBTUs)	Percent Change from No Build
No Build	94,890	0	94,890	n/a
Project	90,760	1,690	92,450	-3%

MBTUs = million British thermal units

Project

The total transportation energy demand for transit and highway vehicles will be lower than for the No Build Alternative. Table 4-21 summarizes the anticipated average daily transportation demand in 2030 for the Project. The Project is anticipated to reduce daily transportation energy demand by approximately 3 percent compared to the No Build Alternative. The values in Table 4-21 changed since the Draft EIS as a result of revisions to travel demand model results.

The Project will consume approximately 1 to 2 percent of the total projected electricity generated on O'ahu in 2030. According to HECO, the planned electricity generation capacity on O'ahu will be sufficient to support the transit system, but the electricity distribution system will require various upgrades to support the system (HECO 2008).

Integration of photo-voltaic cells into stations and other project features could reduce net project electricity demand.

Electric and Magnetic Fields

No Build Alternative

There will be no features generating EMFs.

Project

The magnetic-field disturbance generated by operation of the Project will be low-frequency (0 to 10 hertz) and will occur at intervals determined by passing trains. EMFs produced by the Project will be of such low magnitude that the only potential effects will be to highly sensitive instruments that may be in use within facilities adjacent to the right-of-way. The electron microscope at Honolulu Community College is located approximately 200 feet from the alignment and will not be affected by the Project. A review of the state of the science regarding health effects associated with EMFs found no new evidence linking these fields to biological issues. Project-generated magnetic fields will be less than the International Commission on Non-Ionizing Radiation Protection guideline limit in areas where the public may be regularly exposed.

Because no negative health effects or effects on equipment related to EMFs will occur, mitigation will not be needed.

4.12 Hazardous Waste and Materials

This section analyzes potential contaminant sources that may be present in the study corridor. It also assesses the potential of encountering hazardous waste and chemically impacted soil and/or groundwater adjacent to the project alignment, as well as the Project's potential use of hazardous materials. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Hazardous Materials Technical Report* (RTD 2008i).

4.12.1 Background and Methodology

Regulatory Background

Many Federal and State laws regulate hazardous waste and materials. The primary Federal laws are the *Resource Conservation and Recovery Act of 1976* (USC 1976) and the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) (USC 1980). The *National Priority List* is a listing of the most polluted sites in the nation that are eligible for cleanup funding (Superfund) under CERCLA.

Hazardous waste in the City is primarily regulated by the Solid and Hazardous Waste Branch of HDOH. The Solid and Hazardous Waste Branch is responsible for overseeing the Office of Solid Waste Management, the Underground Storage Tank Program, and the Hazardous Waste Program. The HDOH Office of Hazard Evaluation and Emergency Response is responsible for implementing the *Hawai'i Environmental Response Law* (HRS 128D), the *State Contingency Plan* (HAR 11-451), and *the Hawai'i Emergency Planning and Community Right-to-Know Act* (HRS 128E).

Methodology

An Initial Site Assessment of the study corridor was conducted to identify potential hazardous waste areas. The following steps were performed during this assessment to establish existing conditions, evaluate potential impacts, and determine whether project-related activities have the potential to disturb, generate, use, and/or dispose of hazardous materials:

- Reviewed environmental database records to evaluate potential impacts to the Project. Environmental Database Resources, Inc., prepared a report for the Project on November 2, 2007 (EDR 2007). To generate this report, they conducted a search of all databases relevant to hazardous waste and materials operations in Hawai'i.
- Reviewed previous Honolulu transit project hazardous materials surveys.
- Coordinated with HDOH.
- Reviewed historical land uses using maps and historic aerial photos to identify any past business uses in the immediate project vicinity that could have a negative impact on the Project in terms of hazardous materials and wastes.
- Conducted field reconnaissance to identify land uses that may indicate the presence of hazardous materials or waste. Field reconnaissance was conducted from public access areas and within the study corridor, as feasible.
- Contacted owners of oil and fuel pipelines to establish pipeline locations. Preliminary information was obtained. Coordination with these owners will be ongoing throughout design and construction.

Potential mitigation measures to be employed during further design, planning, and construction of the Project were developed based on the data collected and evaluations conducted.

4.12.2 Affected Environment

The study corridor is currently dominated by commercial and residential developments, with some areas of military activity and localized industrial activity. Information from the database search, field reconnaissance, and the review of historic maps and aerial photographs indicate a more industrial past for certain areas of the study corridor.

Past and present industrial activities along the study corridor are mostly agricultural, food processing, or warehousing. Contaminants associated with these uses are primarily petroleum hydrocarbons, such as gasoline, diesel, and oil. Other contaminants can include pesticides, herbicides, metals, and solvents, but solvents and metals are generally not used in bulk in agriculture, food processing, and warehousing.

Agricultural Uses

Specific areas of past industrial agricultural activity near the Project include the following:

- Former ʻEwa Sugar Mill
- Former Oʻahu Sugar Mill
- Former ʻAiea Sugar Mill
- Former Dole Pineapple Cannery

These industrial agricultural sites appear in the databases searched. However, these sites all ceased operations in the 1990s and were largely remediated and redeveloped in the late 1990s and early 2000s.

Industrial Uses

In some areas along the project alignment, current and historic land uses indicate a more industrial past than other areas, so they have a higher potential of harboring soil or groundwater contamination. These areas include the following:

- **Waipahu (West Loch)**—this neighborhood is dominated by gas stations and car dealerships along Farrington Highway, with warehouse and automobile repair businesses makai of Farrington Highway.
- **Airport Industrial Area**—this neighborhood is dominated by airport/airline support activities (tank farms and maintenance facilities), car dealerships, rental car agencies, warehouses, and light industrial activities.
- **Kapālama-Iwilei**—this area was dominated by the Dole Cannery and supporting businesses in the past but is increasingly becoming commercial. The former Kapālama Incinerator was located in the area along with a number of warehouse and light manufacturing businesses. Warehousing continues along Kapālama Canal.
- **Kakaʻako**—this neighborhood was once dominated by automobile dealerships and repair shops, warehouses, and light industry. However, it is becoming increasingly commercial and residential in character.

Military Uses

Military activities are also present within the study corridor and tend to have a broader array of associated pollutants. Pollutants included in the Pearl Harbor Naval Complex Superfund Record of Decision include petroleum, solvents (perchloroethylene and others), polychlorinated biphenyls, metals (mercury and chromium), and pesticides. Military bases and activities near the Project include the following:

- **Former Naval Air Station Barbers Point**—portions of which are still under the jurisdiction of the Navy, while other portions are now under the Hawaiʻi Community Development Agency's jurisdiction
- **Pearl Harbor Naval Complex**—an active Navy base on the National Priority List (Superfund); the complex formerly included the Navy Drum Site
- **Hickam Air Force Base**—an active Air Force base, but uses near the Project are primarily housing
- **Fort Shafter Flats**—an active military base, but the area near the Project is a relatively undeveloped floodplain

Petroleum Contaminants

Petroleum handling and transportation facilities are frequently associated with releases of oil or hazardous materials to the environment through leaks, spills, maintenance, and other activities. These facilities include gas stations, tank farms, large maintenance base yards, and pipelines and are considered potential sites of contaminants wherever they appear along the project right-of-way. Petroleum contaminants (e.g., gasoline and diesel fuels) have been shown to migrate less than 300 feet from their source once released into a subsurface environment similar to that found in the study corridor. Therefore, only petroleum releases approximately 300 feet from the Project are considered a concern.

A recent utility survey identified a number of petroleum pipelines in the study corridor. These pipelines are owned by a variety of firms, including the military, HECO, Chevron, and Tesoro. Pipeline locations include the following:

- Under Kapolei Parkway
- Along the Oʻahu Railway & Land Company (OR&L) right-of-way in Kapolei, Pearl City, Waimalu, and ʻAiea
- On the mauka side of Farrington Highway through Waipahu
- Under Kamehameha Highway from Pearl City to the airport
- Throughout the airport area, primarily on the makai side of Aolele Street
- Under Nimitz Highway to the HECO's downtown power plant

The fixed guideway will cross or run parallel to these pipelines in many areas of the study corridor. These pipelines have been in place for many years, and releases from them are possible.

Sites of Concern

Individual sites of concern were first identified during environmental database review, and their presence was verified and additional sites were identified during field reconnaissance. Sites of concern were ranked "1" or "2." A "1" ranking means there is a high probability that releases at the site have affected soil or groundwater beneath the Project. A "2" ranking means there is a low probability that releases at the site have impacted soil or groundwater beneath the Project, but further evaluation is needed based on proximity to the Project. The sites ranked "1" or "2" are summarized in Table 4-22. Sites that have been remediated or will not be of concern if the Project were built are identified in the Hazardous Materials Technical Report (RTD 2008i).

Examples of sites ranked "1" include the following:

- Pearl Harbor Naval Complex (a Superfund site)
- Leaking underground storage tank sites that have not been remediated and are within 300 feet of the project alignment

Examples of sites ranked "2" include the following:

- Sites adjacent to the Project that have been remediated (e.g., Pacific Machinery in Waipahu)
- Sites with large releases that are somewhat distant or downgradient from the Project (e.g., BHP Gas Company in Iwilei)
- Sites with institutional controls (e.g., where excavation is restricted due to the presence of contaminants) that are near the Project (e.g., Chuei Shokoh in Kakaʻako, a former dry cleaner)
- Sites observed to have limited hazardous materials issues (e.g., improper waste storage at Hi-Pace Racing in Kakaʻako)

The ground beneath any portion of the Project could be contaminated, most likely by petroleum products. Contamination is most likely to be present in the historically more industrial neighborhoods and near individual sites ranked "1" or "2." In addition, the geology and hydrogeology of the Airport Industrial Area, Māpunapuna, Kapālama-Iwilei, and Kakaʻako areas make them particularly likely to harbor residual pollutants. In these areas there will be a greater likelihood that spilled chemicals will remain in the area and not readily migrate or degrade. Therefore, soil and groundwater in these neighborhoods is frequently found to be degraded by petroleum and other contaminants. The potential for contamination was confirmed by other projects in the industrial areas.

Table 4-22 Sites of Concern near the Project that Could Be Contaminated (continued on next page)

Site Name	TMK	Reason for Listing	Rank	Property Acquisition
East Kapolei to Fort Weaver Road				
East Kapolei pesticide mixing and loading	91017088	Database	2	No
East Kapolei property	91017071, 91017088	Database	1	No
Fort Weaver Road to Leeward Community College				
Pacific Machinery	94048019	Database	2	No
Cutter Mitsubishi Dodge	94048068	Database	2	No
O`ahu Sugar Company Ltd.	94161005 & others	Database	2	No
Waipahu Auto Company	94019050	Database	2	Yes
Leeward Community College to Aloha Stadium				
Pearl Harbor Naval Station (PHNS)	94008010, 96003044, & others	Database	1	Yes
RHS Lee Baseyard (Banana Patch)	96004006	Field observations	1	Yes
Mid Pac Petroleum/ConocoPhillips	97031021	Database	1	No
HECO—Waiau Power Plant	98004003	Database	2	No
Steven's Super Service, Inc.	98018024	Database	1	No
Pearl Auto Service & Supply, Inc.	98010009	Database	1	No
Sears	98016029	Database	2	No
PHNS `Aiea Military Reservation	98019002, 99004004	Database	2	No
PHNS U.S. Navy Exchange `Aiea Laundry	99005005	Database	1	No
Aloha Stadium to Middle Street				
Pearl Harbor Naval Station (PHNS)	99001008	Database	1	No
PHNS Navy PWC—Makalapa Compound	11010011	Database	1	No
Honolulu International Airport	11003001	Database	1	Yes
U.S. Post Office	11002001	Database	1	Yes
Chevron USA Honolulu Airport Terminal	11003011	Database	1	Yes
Honolulu Fueling Corp.	11003010	Database and field observations	1	Yes
Delta Airlines	11003038	Database	1	No
Hawaiian Telecom Base Yard	11014018	Database	1	No
Airport Shell	11004001	Database	2	No
Lagoon Chevron	11016014	Database	2	Yes
Occidental Chemical Company	11016007	Database	2	Yes
ALSCO-American Linen/Young Laundry & Drycleaning	11016025	Database	1	No
Middle Street to Nu`uanu Stream				
Middle Street Intermodal Center	12018009	Database	1	Yes
Foremost Dairies	12013006	Database	1	Yes
BHP Gasco	15012006	Database	2	No

Table 4-22 Sites of Concern near the Project that Could Be Contaminated (continued from previous page)

Site Name	TMK	Reason for Listing	Rank	Property Acquisition
Costco warehouse	15012017	Database	2	No
Costco gas station	15015002	Database	2	No
Sprint lot	15015013	Database	1	Yes
Cutter Dodge Auto Service Center	15015001	Database	1	Yes
Honolulu Gas Products Ltd.	15007016	Database	1	Yes
G. Von Hamm Textiles	15007050	Database	1	No
Ka`aahi Site	15007031	Field observations	2	No
Iwilei Project Site	15007001	Database	1	Yes
Nu`uanu Stream to Ala Moana Center				
Pier 15	21001044	Field observations	2	No
Pier 13/14	21001047	Field observations	2	No
Aloha Tower Development	21001001	Database	2	No
Hawaiian Electric Company	21014006	Database	1	Yes
Melim Building	21026014	Database	1	No
Motor Imports Service Center	21031030	Field observations	2	Yes
Hi-Pace Racing	23007054	Field observations	2	Yes
Chuei Shokoh (former Young's Laundry)	21049065	Database	2	No
420 Ward (Pacific Home)	21050061	Database	2	No
Hakuyosha Hawai`i Inc.	23014011	Database	2	No
Cutter Chevrolet-Geo-Pontiac	23039011	Database	1	No

The Navy Drum site, inactive since the early 1970s, is the preferred location for the maintenance and storage facility near Leeward Community College. In 1971, vandals started a fuel pump, which resulted in the release of motor gasoline to the ground surface. A remedial investigation was completed at the Navy Drum property by the Department of Navy in 2000 (Navy 2000). The investigation concluded that contaminants from the property have not and will not migrate to the deep freshwater aquifer or the artesian well water supply for the watercress ponds. There are no adverse human health or ecological effects that have, or will, result from the 1971 motor gasoline release. The U.S. Department of Health & Human Services and HDOH reviewed the study, concurred with the findings, and considered the case closed. (DHHS 2005).

4.12.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built, and there would be no impacts associated with hazardous materials. It is assumed that the projects defined in the ORTP will be built, and environmental impacts associated with those projects will be studied in separate documents.

Project

In some locations, large or specialized hazardous wastes or materials sites may be acquired for needed right-of-way for the Project. Large or specialized hazardous wastes and materials include underground and above-ground storage tanks (UST and AST), fuel islands, and engineered storage facilities.

In a few cases, the Project may displace hazardous materials operations. This includes relocating gas station fuel islands and USTs and ASTs. Table 4-23 lists sites from which right-of-way will be acquired where the Project will result in potential impacts to ongoing hazardous materials operations.

The operation and maintenance of a fixed guideway transit system will require using some hazardous materials and may generate hazardous waste. Likely hazardous materials include the following:

- Lubricants (both grease and oils) of various weights and viscosities
- Hydraulic fluid for transit vehicles and servicing equipment
- Cleaning products for maintaining equipment, cleaning electronic components and vehicles, and removing graffiti—cleaning solutions can range from acids to alkaline to petroleum-based solvents

Wastes (beyond standard office-type) that will require disposal or recycling could include the following:

- Used oil (not hazardous)
- Cleaning product waste (typically recycled through closed systems)
- Vehicle components that wear out or break, including fluorescent light tubes
- Sediment from vehicle washing

Most of these materials and wastes will be used or generated at the maintenance and storage facility. However, limited use of hazardous materials will be necessary to maintain the guideway, stations, and traction power substations.

Releases at sites ranked “1” or “2” (summarized in Table 4-22), petroleum pipelines, and in industrial areas may have resulted in contaminated soil and/or groundwater beneath the Project. The presence of contaminants will affect project construction. Effects during construction and related mitigation are discussed in Section 4.18.7.

Mitigation

Some properties that will be acquired to obtain required right-of-way for the Project received a rank of “1” or “2” during the Initial Site Assessment

Table 4-23 Sites Where Hazardous Materials Are Used or Stored that Will Be Acquired

Site #	Site Name	Tax Map Key	Address	Type of Right-of-Way Acquisition	Potential Long-term Consequences
1	7-11/Aloha Petroleum	97022006	897 Kamehameha Highway	Partial acquisition	Fuel island is very close to street and may need to be relocated
2	Fuji's Chevron Gas Station	98014012	98-121 Kamehameha Highway	Partial acquisition	One fuel island and USTs are close to street and may need to be relocated
3	7-11/Aloha Petroleum	12010068	1900 Dillingham Boulevard	Full acquisition	Fuel island and USTs affected
4	Motor Imports Service Center	21031030	607 South Street	Partial acquisition	Auto maintenance building and oil AST in acquisition area
5	Hi-Pace Racing	23007054	500 Pi`ikoi Place	Full acquisition	Full acquisition, including drum storage area
6	Lagoon Chevron	11016014	2604 Waiwai Loop	Full acquisition	Fuel island and USTs affected

(Table 4-22) and, therefore, may be polluted. Either a partial or complete Phase I Environmental Site Assessment (ESA) will be performed by the City prior to acquiring portions of these properties to lessen the chance that the City will acquire a degraded piece of real estate or that workers will be exposed to contaminants during construction. ESAs will also be performed for those sites listed in Table 4-23. ESAs will be conducted per the ASTM International's *Standard Practice for Environmental Site Assessments—Phase I Environmental Site Assessments Process (E1527-05)* (ASTM 2005). Site assessments have already begun, are ongoing, and will continue prior to construction of the Project. Depending on the outcome of the Phase I ESAs, a Phase II assessment (including collecting and analyzing samples) may be appropriate. The City will decide whether a partial or complete Phase I ESA is necessary for each property prior to acquisition. If contaminated materials are identified, the property will be remediated in accordance with Federal, State, and Local regulations. The City will coordinate with the HDOT Hazard Evaluation and Environmental Response Office regarding work within HDOT rights-of-way.

The use of hazardous materials for the fixed guideway system's operation and maintenance will be unavoidable. However, the volume of materials used and extent of worker exposure will be limited in the following ways:

- Comply with State and Federal health and safety regulations
- Use non-hazardous alternatives where possible
- Use closed systems designed to limit exposure
- Train employees in the safe use and management of hazardous materials
- Institute waste minimization programs to limit the volume and type of materials used and resulting wastes
- Provide appropriate waste storage locations and receptacles
- Periodically evaluate wastes to establish whether they are hazardous
- Recycle wastes to the maximum extent practicable

4.13 Ecosystems

This section describes vegetation and wildlife within the study corridor. The assessment of vegetation and wildlife was made by reviewing existing studies, consulting with resource agencies, and conducting field surveys. Emphasis was placed on the potential presence of Federal- and/or State-protected species and sensitive habitats. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Ecosystems and Natural Resources Technical Report* (RTD 2008j).

4.13.1 Background and Methodology

Regulatory Context

Threatened and Endangered Species Regulations

Section 7 of the Endangered Species Act of 1973, as amended (7 USC 136; 16 USC 1531 et seq.), requires Federal agencies to consider impacts on endangered or threatened species and these species' critical habitat. It requires that Federal agencies consult with USFWS and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA/NMFS), depending on whether terrestrial or marine species may be affected. If effects on protected species are identified, a Biological Assessment (BA) will be required to address a project's effects on a listed or candidate species or on the destruction or adverse modification of designated critical habitat. Subsequently, the USFWS will issue a Biological Opinion (40 CFR 402).

The State of Hawai'i's counterpart law is HRS 195D, under which species are similarly protected under state law. HRS Chapter 195D stipulates that where there may be an incidental take of a listed species, a Habitat Conservation Plan (HCP) must be "designed to result in an overall net gain in the recovery of Hawai'i's threatened and endangered species."

Migratory Bird Treaty Act

The Federal Migratory Bird Treaty Act (MBTA) (16 USC 703-711) protects migratory birds listed in the MBTA by prohibiting the taking of any listed bird, or any part, nest, or egg of any such bird. *Take* is defined as an attempt to "pursue, hunt, shoot, capture, collect, or kill." This act applies to all persons and organizations in the U.S., including Federal and State agencies. The USFWS administers the MBTA, and protection of listed migratory birds is delegated to USFWS staff handling Endangered Species Act Section 7. Regulation of unlisted migratory birds is delegated to the USFWS Migratory Bird Division.

Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 (MMPA) (16 USC 1361-1407) protects marine mammals listed in the act by prohibiting the taking of them in waters of the U.S. and by U.S. citizens on the high seas, as well as importing marine mammals and marine mammal products into the U.S. *Take,* as defined by Congress, is "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal."

Coordination with State and Federal Agencies

Early correspondence with regulatory agencies is included in the Ecosystems and Natural Resources Technical Report (RTD 2008j). Correspondence letters and USFWS species list are included in Appendix F of this Final EIS.

Agencies consulted have indicated no designated critical habitats exist on or within one-third mile of the project alignment. However, the agencies did mention that the species listed in Table 4-24 may be present in the study corridor. The NOAA National Marine Fisheries Service was also contacted and they have indicated that no marine ESA-listed species under their jurisdiction occur in the project area (see Appendix F). Since the publication of the Draft EIS, the City and FTA have continued to consult with USFWS. A meeting was held with the USFWS, the DLNR, and the Division of Forestry and Wildlife on January 8, 2009. At the meeting, the USFWS indicated that the Project would have no effect on federally listed species or critical habitat areas. Subsequent to that meeting, USFWS indicated no further consultation is required. FTA requested further concurrence from USFWS that the Project will have "no effect" on listed species or critical habitat (Appendix F).

Methodology

Literature Review

Previous studies, pertinent literature, and USFWS Critical Habitat maps for O'ahu within the study corridor were reviewed prior to undertaking the field surveys. Topographic maps and aerial photographs were examined to assess terrain and habitat characteristics, access, boundaries, and reference points. The Hawai'i Biodiversity and Mapping Program (HBMP) also provided a database of Federal- and State-protected species (plants and animals) previously observed within one-quarter mile of the project alignment.

The review affirmed that field surveys should focus on assessing the likely presence of the species listed by the agencies (Table 4-24).

Field Surveys

Field surveys were performed for flora in the undeveloped 'Ewa Plain as well as for birds along the entire project alignment. A field survey was not performed for marine mammals and marine turtles because the Project will not approach or directly affect a marine habitat. Surveys of other aquatic environments (estuaries, streams, wetlands, and canals) were undertaken as part of the effort to define impacts on aquatic resources in Section 4.14.

Table 4-24 Threatened, Endangered, and Protected Species Evaluated along the Study Corridor

Common Name	Scientific Name	Status	Identified by	Observed during Survey
Endangered Flora				
Ko`oloa`ula or red `ilima	*Abutilon menziesii*	Endangered (S,F)	USFWS and DLNR-DOFAW	No
`Ewa hinahina	*Achyranthes splendens spp. rotundata*	Endangered (S,F)	DLNR-DOFAW	No
Skottsberg's broomspurge	*Chamaesyce skottsbergii*	Endangered (S,F)	DLNR-DOFAW	No
`Awīwī	*Centaurium sebaeoides*	Endangered (S,F)	HBMP, Bishop Museum website	No
`Ihi`ihi	*Marsilea villosa*	Endangered (S,F)	The *Recovery Plan for Marsilea Villosa* (USFWS 1996)	No
Endangered Terrestrial Fauna				
`Ōpe`ape`a or Hawaiian hoary bat	*Lasiurus cinereus semotus*	Endangered (S,F)	USFWS	No
O`ahu `elepaio	*Chasiempis sandwichensis ibidis*	Endangered (S,F)	Vanderwerf 2001; and others	No
Hawaiian common moorhen or `alae`ula	*Gallinula chloropus sandvicensis*	Endangered (S,F)	USFWS	No
Hawaiian coot or `alae ke`oke`o	*Fulica americana alai*	Endangered (S,F)	*Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision* (USFWS 2005b); and others	No
Hawaiian duck or koloa maoli	*Anas wyvilliana*	Endangered (S,F)	*Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision* (USFWS 2005b); and others	No
Hawaiian stilt or ae`o	*Himantopus mexicanus*	Endangered (S,F)	*Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision* (USFWS 2005b); and others	Yes
Protected Migratory Waterbirds				
Pacific golden-plover	*Pluvialis fulva*	MBTA Protected	*Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005a); and others	Yes
Black-crowned night heron	*Nycticorax nycticorax hoactii*	MBTA Protected	*Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005a); and others	Yes
Ruddy turnstone	*Arenaria interpres*	MBTA Protected	*Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005a); and others	Yes
Wandering tattler	*Heteroscelus incanus*	MBTA Protected	*Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005a); and others	Yes
State Threatened and Endangered Terrestrial Fauna				
Pueo	*Asio flammeus sandwichensis*	Endangered (S)	Various	No
Newell's shearwater	*Puffinus auricularis newelli*	Threatened (S)	Various	No
White tern	*Gygis alba*	Threatened (S)	Miles 1986; Vanderwerf 2003	Yes

F = Federal; S = State

MBTA = Migratory Bird Treaty Act

Flora Survey of Undeveloped ʻEwa Plain

Field surveys of the flora and vegetation present in the undeveloped ʻEwa Plain portion of the project alignment were completed in September 2007 and January 2008. In areas along the study corridor where rare or endangered species were previously reported, an intensive survey was conducted to establish whether these species populations still remained. Encountered populations were photographed and mapped.

Wildlife Survey along the Alignment

Wildlife field surveys and observations along the project alignment were conducted in September 2007, and bird point counts were conducted from December 2007 to January 2008. The point count involved identifying and recording the number of birds seen and heard at all distances from the point-count stations for a period of eight minutes. The Ecosystems and Natural Resources Technical Report (RTD 2008j) documents the results of this survey. Point counts were performed at locations approximately 1 mile apart along the project alignment, except from Kalihi to UH Mānoa and Waikīkī, where point count stations were spaced every one-half mile to improve the possibility of detecting the State-listed white tern. Counts were also performed at the following locations:

- The makai perimeter of the proposed maintenance and storage facility adjacent to Leeward Community College—this bird point-count site was selected because of the proximity of the site to waterbird habitat in and near Pearl Harbor.
- A stand of ironwoods (*Causaurina equistefolia*) along the southern edge of Kapiʻolani Park—this bird point-count site was selected because it historically was an area of known concentrations of white terns in Waikīkī and could be used as a reference site to gauge the level of nesting activity in the population on Oʻahu.

4.13.2 Affected Environment

A distinctive feature of Oʻahu's geomorphology is the broad coastal plain that extends from ʻEwa and Kalaeloa across Pearl Harbor to Diamond Head. It is composed of raised coralline limestone and has natural harbors, a dry leeward climate, and abundant freshwater streams with headwaters in the Koʻolau and Waiʻanae Mountain Ranges. Upland perennial streams are sustained by groundwater from high-level aquifers and, on the coastal plain, perennial flow may be supplemented by springs. Where groundwater is not contributing in a drainage basin, streams exhibit intermittent flow, responding to rainfall and runoff; this pattern is particularly prevalent in the ʻEwa and Kapolei areas. Freshwater streams that enter the marine coastal waters create estuaries at stream mouths and in embayments, such as Pearl Harbor, where nutrients carried by the stream stimulate productivity.

The past century of urbanization on Oʻahu, especially within the areas along much of the project alignment, has resulted in a highly altered environment, and this is reflected in the present state of the vegetation. No intact native vegetation communities remain within the study corridor, and few native plant species are extant near the alignment. The ʻEwa Plain is an area where relatively undeveloped land is present in the study corridor, and vegetation in this area was found to consist of the following:

- Ruderal (weedy) patches in undeveloped areas or abandoned properties
- Plants in abandoned agricultural areas, such as the area makai of the H-1 Freeway near Kapolei
- Plantings in areas reserved for cultivation and diversified agriculture

Beyond the open agriculture (and abandoned agriculture) fields of the ʻEwa Plain, a few relatively undeveloped properties exist where the vegetation present is non-maintained landscaping or ruderal weeds growing on highly disturbed sites. Street trees, the most common ecological element of the maintained urban landscape, are discussed in Section 4.15. The less developed areas are illustrated on Figures 4-57 and 4-58 and include the following:

- Pearl Harbor National Wildlife Refuge, Waiawa and Honouliuli Units
- Waiawa Stream in the area of the Project's Pearl Highlands Station
- Waiau Springs, which is currently used for subsistence farming and gardening
- Kalauao Springs, which is occupied by the Sumida Watercress Farm

Table 4-24 lists threatened, endangered, and protected species and indicates whether the species were observed during surveys performed for this Project.

Endangered Flora

Koʻoloaʻula *(Abutilon menziesii)* (Figure 4-59), an endemic plant species, was not observed during the field surveys; however, the Project is known to be in close proximity to extant plant clusters and within approximately 200 feet of the northern edge of an established contingency reserve (Figure 4-57). Koʻoloaʻula is an endangered Hawaiian hibiscus that grows in dryland forests. An HCP that addresses potential effects on the Koʻoloaʻula population near the corner of North-South Road and Kapolei Parkway is already in place (HDOT 2004). This HCP is being incrementally phased in over a 20-year period. The HCP describes impacts that assume the population will be incrementally taken as development along North-South Road is implemented.

Figure 4-59 Ko`oloa`ula

The ʻEwa hinahina, Skottsberg's spurge, ʻawīwī, and ʻihiʻihi are plants that grow in dryland areas and could be present in the study corridor. They have been reported from the ʻEwa Plain in the past, but were not observed near the project alignment. There are no HCPs related to any of these species.

- The ʻEwa hinahina (*Achyranthes splendens spp. rotundata*), a small shrub, is typically found on talus or rocky slopes and on coralline plains with numerous sinkholes. The project alignment generally traverses farmed or relatively developed areas rather than talus or rocky slopes and is further inland than known populations of this plant on the ʻEwa Plain.
- Skottsberg's spurge or ʻakoko (*Chamaesyce skottsbergii*), a small shrub, is generally found closer to the coast in drier and sandier areas than the project alignment.
- ʻAwīwī *(Centaurium sebaeoides)*, a small herb, is thought to be extinct on Oʻahu. It is generally found on rocky slopes near the coast.
- ʻIhiʻihi *(Marsilea villosa),* a small fern resembling a four-leaf clover, requires periodic flooding for spore release and fertilization, followed by a decrease in water levels for the young plants to establish. It typically occurs in shallow depressions in clay soil or lithified sand dunes overlaid with alluvial clay. This plant is known to occur in areas of Kalaeloa that meet these criteria; however, it does not occur in the more developed portion of Kalaeloa where the project alignment is planned.

Endangered Terrestrial Fauna

A number of endangered terrestrial fauna species are potentially present in the study corridor (birds and fresh/brackish water dwellers). Following is a discussion of these species:

- ʻŌpeʻapeʻa, or the Hawaiian hoary bat (*Lasiurus cinereus semotus),* was not observed during the project survey. Bats have been observed on Oʻahu according to the HBMP; however, the USFWS indicated that those

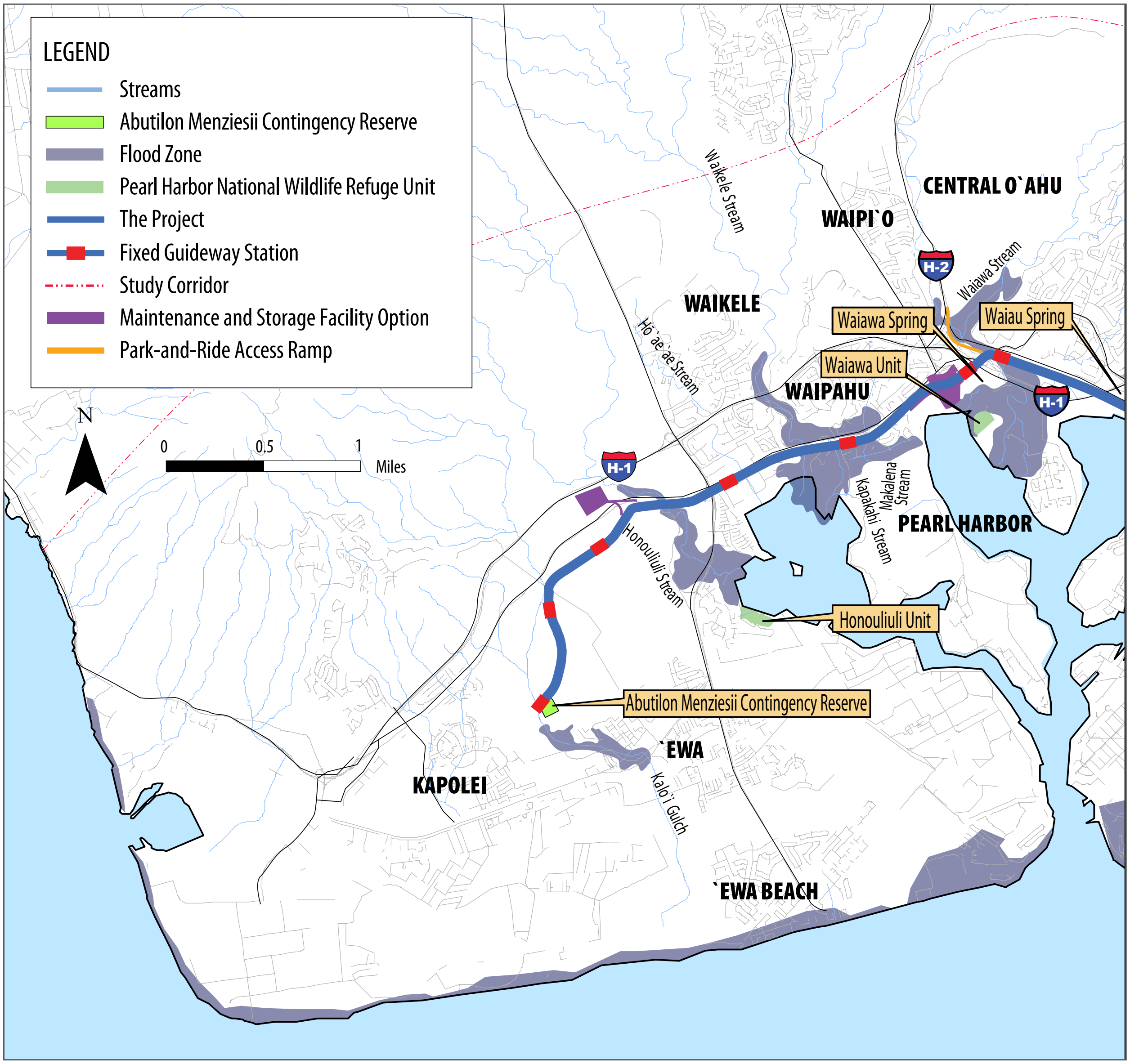


Figure 4-57 Natural Resources (East Kapolei to Aloha Stadium)

reported sightings were "likely incidental occurrences of transient individuals." The *Recovery Plan for the Hawaiian Hoary Bat* (USFWS 1998) indicates that the species is a medium-sized, nocturnal, insectivorous bat most often observed in open areas and river mouths near wet forests on the Islands of Kaua‘i and Hawai‘i.

- O‘ahu ‘elepaio *(Chasiempis sandwichensis ibidis)* is a monarch flycatcher endemic to the forests on O‘ahu and was not observed during the Project's biological survey. Recovery of the O‘ahu ‘elepaio is provided for in the *Revised Recovery Plan for Hawaiian Forest Birds* (USFWS 2006), which indicates there are approximately 2,000 individuals of this species in the wild. The recovery area illustrated in the plan for the O‘ahu ‘elepaio is located well mauka of the project alignment.
- Four waterbirds are listed as endangered—the Hawaiian common moorhen, the Hawaiian coot, the Hawaiian duck, and the Hawaiian

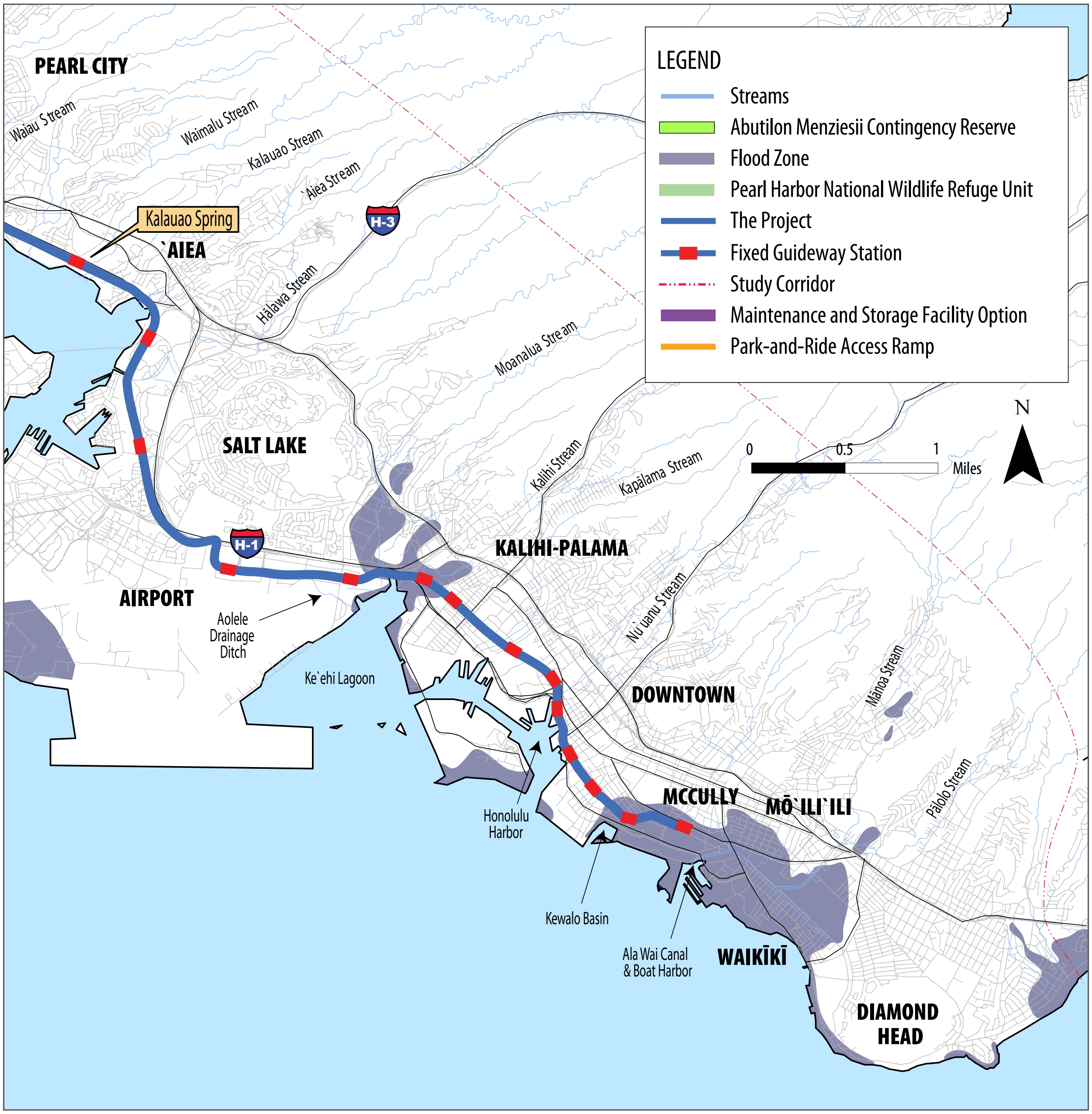


Figure 4-58 Natural Resources (Aloha Stadium to Ala Moana Center)

stilt. These four species are generally restricted to wetlands (and stream and estuarine areas in some cases) but will visit temporarily flooded areas. Environments in the study corridor where some or all of these species have been observed previously include Pearl Harbor National Wildlife Refuge, Waiau Springs, and Kalauao Springs (Sumida Watercress Farm). The *Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005a) provides for these four species and indicates that the only core habitat on the southern coast of O‘ahu is the Pearl Harbor National Wildlife Refuge. The plan lists no supporting habitat on the southern coast of O‘ahu. Observations of these endangered waterbirds during the project survey were limited to the following:

- A pair of ducks was observed at a distance flying over agricultural fields along North-South Road. Since wild ducks on Oʻahu are either mallards or mallard/koloa hybrids, these were not the endangered species *Anas wyvilliana.*
- Five Hawaiian stilts *(Himantopus mexicanus)* were observed at Kalauao Springs (Sumida Watercress Farm) during the survey.

Protected Migratory Waterbirds

Four protected "migratory" waterbirds were observed during the project survey. The MBTA protects these species, although they are not listed as threatened or endangered. The four species are as follows:

- The Pacific golden-plover (*Pluvialis fulva*) breeds on the Arctic tundra in the summer and spends the winter primarily in South Asia and Australia with a few in California and Hawaiʻi. Twenty-seven Pacific golden-plovers were observed in count stations during the survey.
- Black-crowned night heron (*Nycticorax nycticorax hoactii*) is an indigenous species common throughout the world. Individuals were observed during the project survey at the Kalauao Springs (Sumida Watercress Farm), Moanalua Stream, and the drainage channel along Aolele Street. Local colonies are known to roost and nest in mangrove trees within Pearl Harbor and Keʻehi Lagoon; however, nests have not been observed in the mangroves along the east bank of Moanalua Stream.
- Ruddy turnstone (*Arenaria interpres*) is a sandpiper that breeds in the northern parts of Eurasia and North America during the summer and winters on coastlines almost worldwide, including Hawaiʻi. Six individuals were observed at Kalauao Springs (Sumida Watercress Farm) during the survey.
- Wandering tattler (*Heteroscelus incanus*) spend summer and breed in Alaska and northwestern Canada; in winter they are found on rocky islands in the Southwest Pacific, including Hawaiʻi, and on rocky Pacific coasts from California to South America and as far as Australia. They feed on aquatic invertebrates. One wandering tattler was observed at Kalauao Springs (Sumida Watercress Farm) during the survey.

State Threatened and Endangered Terrestrial Fauna

The following three species may be present in the study corridor that are designated as threatened or endangered by the State of Hawaiʻi:

- Pueo *(Asio flammeus sandwichensis)* is a subspecies of short-eared owl endemic to Hawaiʻi that nests on the ground. Its habitat includes wet and dry forests on all the Hawaiian Islands. The Pueo was observed on the ʻEwa Plain, but it is in decline due to habitat loss and was not observed during the survey. There are no recovery plans or designated critical habitat for the Pueo.
- Newell's shearwater *(Puffinus auricularis newelli)* is endemic to the Hawaiian Islands and nests in burrows dug in forested uplands. It is listed as threatened by USFWS. No nesting colonies have been found on Oʻahu (Ainley 1997). Small numbers of fledgling Newell's shearwater have been recovered on Oʻahu following downing incidents and were probably individuals that were attracted to shore from elsewhere by coastal lights (Ainley 1997). No Newell's shearwater were observed during the survey.
- White tern *(Gygis alba)* (Figure 4-60), also known as fairy tern, could only be observed with regularity in the Northwestern Hawaiian Islands prior to the 1960s. Their establishment on Oʻahu may be a result of crowded conditions elsewhere, which have forced the birds to search for other roosting and nesting locations (Miles 1986;

Figure 4-60 White Tern

Vanderwerf 2003). The white tern is Honolulu's official bird and is currently found only along the southeastern coast of Oʻahu, where they breed and roost exclusively in large trees. White terns lay their eggs on bare branches in a small fork or depression, without a nest. The peak nesting period is from February through July. Nine white terns were observed during the project survey, all between Middle Street and UH Mānoa.

Threatened, Endangered, and Protected Marine Fauna

With the exception of a stormwater outfall to Pearl Harbor from the maintenance and storage facility, the nearest marine environment is approximately one-quarter mile from the Project, which is beyond the area that will be affected by the Project.

4.13.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be constructed and would not have any impacts to natural ecosystems. Although it is assumed that the projects in the ORTP will be built, their environmental impacts will be studied and documented in separate environmental documents.

The Project

The Project will result in fewer VMT; therefore, the overall pollutant load in stormwater will be lower than it will be under the No Build Alternative and there will be less threat of surface and marine water contamination. The Project will rely on electric propulsion, which will generate minimal pollutants on the guideway compared to pollutants generated by roadway traffic. This improvement in water quality could benefit downstream environments, including nearby wetlands, streams, and the Pacific Ocean.

As summarized in Table 4-25, the Project will have no effect on any threatened, endangered, or protected species as described in the following sections.

Endangered Flora

The Project will have no effect on endangered flora. The only endangered plant known in the study corridor is koʻoloaʻula *(Abutilon menziesii)*. The presence of this species has previously been documented, and HDOT addressed potential effects on the koʻoloaʻula in the study corridor in an HCP prepared for the North-South Road Project in 2004. Mitigation measures are specified in the HCP related to the construction of a variety of developments in the area. Therefore, the Project will not have an impact on the koʻoloaʻula.

Endangered Terrestrial Fauna

The Project will have no effects on endangered terrestrial fauna. The Project will not affect the hoary bat or the Oʻahu ʻelepaio because neither of these species occur in the study corridor.

The Project will not impact any designated critical, core, or supporting habitat for any listed terrestrial fauna species. The nearest such habitat is the Pearl Harbor National Wildlife Refuge Waiawa Unit (Figure 4-57), which is designated as core habitat for the four endangered waterbirds. The Waiawa Unit is more than 1,000 feet southeast of the preferred maintenance and storage facility option location.

Table 4-25 Summary of the Project's Effects on Threatened, Endangered, and Protected Species

Endangered Flora	Endangered Terrestrial Fauna	Protected Migratory Waterbirds	State Threatened and Endangered Terrestrial Fauna	Threatened, Endangered, and Protected Marine Fauna
No effect, with mitigation for ko`oloa`ula	No effect	No effect	No effect	No effect

As stated in Section 4.14, the Project will not affect other wetlands where the listed waterbirds have been observed, such as Waiau Stream and Kalauao Springs (Sumida Watercress Farm).

Based on the information provided to FTA by USFWS, coordination with USFWS staff, and field observations, there will be "no effect" to threatened and endangered species or designated critical habitat related to this Project (see Appendix F for letter from FTA to USFWS). While some of the listed waterbirds have been observed adjacent to the study corridor, over time, the waterbirds will adjust to new structures built for the Project since the wetlands will not be impacted. These waterbirds have continued to occupy the wetlands despite the construction of nearby buildings and overhead utilities and the construction or widening of adjacent roads and highways. For example, water birds continue to use Sumida Watercress Farm although the wetland is now surrounded by Pearlridge Center.

Protected Migratory Waterbirds

The Project will not result in the taking of any protected migratory birds. The black-crowned night heron is known to nest in mangrove stands in Pearl Harbor and Ke‘ehi Lagoon, which are generally remote from the study corridor. Mangrove stands in these areas are being removed because the mangrove is regarded as an invasive plant species.

State Threatened and Endangered Terrestrial Fauna

The Project will have no effect on state threatened or endangered terrestrial fauna. The only state threatened or endangered species that is present in the study corridor is the white tern, and none of the species have critical habitat in the area. As explained in Section 4.15, some large street trees along the project alignment will require pruning or removal. White terns select the largest high canopy trees for roosting and nesting. The pruning and removal of these trees are not expected to affect the white tern population because there are numerous other large canopy trees in the urban area of Honolulu that will not be affected by the Project and that could be used by the white terns.

Mitigation

Although the Project will have no effect on threatened, endangered, and protected species, mitigation will be implemented for the ko‘oloa‘ula.

A State Incidental Take License for ko‘oloa‘ula was issued on March 18, 2005, to the HDOT. The City will secure a Certificate of Inclusion from the State for the Project. Mitigation measures have already been specified in an HCP for this population of ko‘oloa‘ula, including the establishment of an 18-acre contingency reserve for the plants. Specific measures to protect and offset losses of the ko‘oloa‘ula have been established by the USFWS in the existing HCP. If an HCP is needed, or if the existing HCP needs to be amended, the City will implement the measures outlined by the USFWS in the new or amended HCP. This will offset impacts to the plant, and there will be no unavoidable adverse environmental effect to the ko‘oloa‘ula.

4.14 Water

This section identifies water resources in the study corridor, including surface waters, wetland resources, marine waters, flood zones, stormwater, groundwater, and coastal zone management (CZM) areas. It addresses the potential effects of implementing the Project on these resources and presents mitigation measures that will be incorporated into the Project. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Water Resources Technical Report* (RTD 2008k), the *Honolulu High-Capacity Transit Corridor Project Wetland and Waters of the U.S. Study* (RTD 2009b), the *Honolulu High-Capacity Transit Corridor Project Proposed Compensatory Mitigation Plan for Impacts to Waters of the U.S.* (RTD 2009h), and Floodplain Evaluations at *HHCTCP Stream Crossings* (RTD 2009m).

4.14.1 Background and Methodology

A number of water resources are located in the study corridor. They are regulated by a variety of Federal and State programs summarized below.

Regulatory Context

Surface Waters

The USACE is authorized to regulate certain activities in the Nation's waters pursuant to Section 404 of the Clean Water Act (CWA) (USC 1972b) and Section 10 of the Rivers and Harbors Act of 1899 (USC 1899). Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S., including:

- Traditional navigable waters (TNW) and their adjacent wetlands
- Relatively permanent non-navigable tributaries of traditional navigable waters (RPW) and wetlands with a continuous surface connection with such tributaries
- Intermittent or non-permanent wetlands and tributaries of waters of the U.S. that can materially impact downstream (biological, chemical, or physical) ecology.

A "traditional navigable water" includes all of the navigable waters of the United States, defined in 33 CFR 329, and by numerous decisions of the Federal courts, plus all other waters that are navigable-in-fact. Section 502(7) of the CWA defines the term *navigable waters* as "the waters of the United States, including the territorial seas."

Section 10 of the Rivers and Harbors Act of 1899 requires authorization for the construction of any structure in or over a navigable water of the U.S. Structures or work that occurs outside the defined limits for navigable waters of the U.S. require a Section 10 permit if the structure or work affects the water body's course, location, or condition.

Waters subject to tidal influence and non-tidal streams that carry commercial traffic are generally defined as navigable by the USCG. The Coast Guard's authority comes from Section 9 of the Rivers and Harbors Act of 1899 (USC 1899), the Act of March 23, 1906 (USC 1906), and the General Bridge Act of 1946 (USC 1946). New bridges or causeways, and the reconstruction or modification of existing bridges and causeways, require a Coast Guard bridge permit to protect the right of navigation. Project structures that will cross navigable waterways have been identified, and consultation with the Coast Guard was undertaken.

Under Section 401 of the CWA, the need for a Section 404 permit from the USACE triggers the need for a Section 401 Water Quality Certification. The objective of Section 401 is to ensure that CWA, Section 404, and all other federally permitted activities will not adversely impact existing uses, designated uses, and applicable water quality criteria of the receiving waters. In Hawaiʻi, the Clean Water Branch of HDOH issues the Water Quality Certification.

The State of Hawaiʻi's general policy is to maintain or improve existing water quality in all State waters. Streams that are not expected to meet State water quality standards, even after application of technology-based effluent limitations, are included in the 303(d) List of Impaired Waters (HDOH 2008). HDOH has completed or is in the process of developing waste load allocations and total maximum daily loads (TMDL) for these waters.

Coastal areas and embayments can be listed by the HDOH as “Water Quality-Limited Segments,” as required by the CWA Section 305(b) and defined by 40 CFR 130.8. These segments are water bodies with pollutants in excess of established water quality standards, such that they cannot reasonably be expected to attain or maintain State water quality standards without additional action to control sources of pollution.

Alterations to stream channels are regulated by the State of Hawai‘i Commission on Water Resource Management (Water Commission) through a Stream Channel Alteration Permit.

Wetlands

Under Section 404 of the CWA, the discharge of dredged or fill materials into “waters of the U.S.,” as defined by 33 CFR 328, triggers the need for a permit from the USACE. Wetlands, as defined by the USACE’s *Wetlands Delineation Manual* (USACE 1987), are considered waters of the U.S.

If mitigation is required for fill placed in wetlands, the Project must comply with *Compensatory Mitigation for Losses of Aquatic Resources Final Rule.*

Clean Water Act Section 404(b)(1)

Section 404(b)(1) requires a demonstration that there is no practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. This analysis must include consideration of activities that do not involve the discharge of dredged or fill material into waters of the U.S., discharges at alternative locations, and other geographic project locations. For this Project, the proposed modal options, transit technologies, and alignments that exhibit the least overall adverse environmental harm must be examined in the context of “practicability” prior to elimination from further consideration. An alternative with fewer impacts to aquatic resources than the Preferred Alternative may only be eliminated by demonstrating it has other overriding significant environmental impacts or is not practicable. Practicable is defined as “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” Alternatives evaluation under CWA Section 404(b)(1) is sometimes referred to as the Least Environmentally Damaging Practicable Alternative analysis.

Flood Zones

Protection of floodplains and floodways is required by Presidential Executive Order 11988 (USEO 1977); USDOT Order 5650.2 (USDOT 1979); the F*ederal Aid Highway Program Manual* (FHWA 1992b); and 23 CFR 650 (CFR 1999). These regulations place special importance on floodplains and floodways and require Federal agencies to avoid conducting, allowing, or supporting actions on a floodplain or within a floodway. If a project is located within a floodplain or floodway, results from sufficient analysis must be included in the project’s Final EIS, as specified in USDOT Order 5650.2.

Stormwater

The City is permitted by HDOH to discharge stormwater into State waters around O‘ahu through National Pollutant Discharge Elimination System (NPDES) permit No. HI S000002. The City controls the discharge of stormwater in compliance with this permit through ROH Chapter 14, Article 12 and Article 13. The NPDES permit requires the City to develop, implement, and enforce a Storm Water Management Plan (SWMP) designed to address the requirements of the NPDES permit. HDOH has an approved SWMP from the City, which includes the *Best Management Practices* for

Maintaining Water Quality in Hawaiʻi for construction activities in Honolulu.

Groundwater

The EPA has designated the Southern Oʻahu Basal Aquifer as the sole or principal source of drinking water for southern Oʻahu. Section 1424(e) of the Safe Drinking Water Act, in accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the USDOT (FHWA/EPA 1984), requires projects potentially affecting a sole-source aquifer to coordinate with EPA to evaluate potential impacts.

Methodology

Field investigations for waters of the U.S. were conducted along the project alignment from December 2007 through January 2008 and from January 2009 through July 2009. The study area was defined as a 500-foot-wide buffer centered along the corridor. Thirty-one sites were studied that were either streams or areas where there was the potential for wetlands. The results of this study are documented in the Wetland and Waters of the U.S. Study (RTD 2009b).

At each stream crossing, information was collected to determine whether the stream, at the location crossed, was considered "jurisdictional" (a water of the U.S.), since some types of water features are not regulated by the USACE. Data collected included watershed characteristics; tide information; elevation of ordinary high-water mark (OHWM) and stream cross-sections; some physical, biological, and chemical characteristics; and other information.

The methods used to evaluate potential wetlands along the project alignment followed the *Wetlands Delineation Manual* (USACE 1987). To establish the extent of wetlands, an initial assessment was made based upon the prevalence of wetland plants and obvious hydrology at a site. Soil pits were then dug to establish the presence or absence of hydric soils. If all three wetland indicators (wetland vegetation, hydric soil, and hydrology) occurred, a delineation was undertaken to establish the wetland boundary facing the Project. The routine wetland determination procedures outlined in the *Wetlands Delineation Manual* (USACE 1987) were followed.

The sites surveyed (RTD 2009b) were grouped principally on the nature of the impact of the Project on water resources at each site. Five categories (I through V), ranging from lowest potential impact to greatest potential impact, were defined as follows:

- Category I—no waters of the U.S. present; therefore, no impact on water resources (4 sites).
- Categories II through IV—different types of waters of the U.S. were present, but no structural elements of the Project will be placed in those waters. Categories II through IV represent increasing potential for impacts due to increasing sensitivity of the aquatic environments present at the sites (e.g., wetlands are Category IV and are regarded as more sensitive as adjacent environments than concrete-lined culverts) (18 sites).
- Category V—waters of the U.S. are present, and project elements will require fill in these waters (9 sites)

USACE guidance permits the use of a preliminary jurisdictional determination (JD) approach to satisfy NEPA requirements. The "preliminary JD" approach is being followed for this Project. Under this approach, areas that are potentially waters of the U.S. are considered to be waters of the U.S. For the purposes of this document, all waters (including intermittent and ephemeral streams) are considered waters of the U.S. if they fit the definitions of tidal, wetland, RPW, or non-RPW waters, unless otherwise stated. The Wetland and Waters of the U.S. Study (RTD 2009b) provides additional information on areas being covered under preliminary JDs.

A "functional assessment" was also performed for each location where the Project is adjacent to or crosses a waters of the U.S., as identified in the Wetland and Waters of the U.S. Study (RTD 2009b). Once constructed, the Project will permanently encroach upon 0.02 acre of waters of the U.S. from the linear transportation project. These impacts are from placing structural elements for the guideway in Waiawa Stream and Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream. As discussed in Section 4.18, during construction of the linear transportation features of the Project, it is anticipated that there will also be a temporary effect of up to 0.13 acre of waters of the U.S.

At the Pearl Highlands Station, the existing stormwater culvert at Waiawa Springs will be improved and extended to reduce ponding at the outfall and avoid erosion around the guideway columns. The culvert improvements will result in 0.06 acre of permanent impacts in waters of the U.S. and no additional temporary impact during construction in waters of the U.S.

Although Kaloʻi Gulch is not under the jurisdiction of the USACE and is not listed in the tables summarizing impacts to waters of the U.S. in Sections 4.14.3 and 4.18.10, it was considered in the impacts to waters of the U.S. with the use of the preliminary JD approach. There will be approximately 0.004 acre of permanent impact from placing structural elements of the guideway in Kaloʻi Gulch and 0.07 acre of temporary impact during construction. There will be 0.39 acre of permanent impact from construction of a park and-ride lot, a non-linear feature, at Lower Kaloʻi Gulch, with an additional 0.86 acre of temporary impact during construction.

For all project elements, the Project will permanently encroach upon 0.08 acre of waters of the U.S. and temporarily upon 0.13 acre in waters of the U.S. during construction. Given this level of impact to water resources within Honolulu's urban core, the intent of the functional assessment was to analyze impacts of the aquatic ecosystem to develop mitigation concepts for those waters of the U.S. where impacts could not be avoided and only after impacts were minimized to the extent feasible.

Each site where the Project is adjacent to or crosses a water of the U.S. was visited and rated on a three-point scale for each of 24 function or value categories as suggested by de Groot et al. (2002), modified for this project site. The Natural Resources Conservation Service (NRCS) rapid assessment method used in Hawaiʻi was also undertaken, as was a Hawaiʻi Stream Visual Assessment Protocol (HSVAP). This NRCS method was developed for Hawaiian streams (NRCS 2001) and uses 10 scored elements—including water clarity, plant growth, channel conditions, native species habitats, and riparian conditions—to arrive at a composite score. This method was deemed applicable for two reasons:

- Impacts of the Project are relatively minor, calling for a straightforward approach.
- Methods developed for less urbanized streams in Hawaiʻi and elsewhere are not readily applicable to the urbanized hardened estuarine reaches where project impacts are occurring.

For stream sites where an actual impact is anticipated based upon the design plans, the method and form developed by the Little Rock District of the USACE (USACE 2008b) for stream assessment was completed. The basis of selection of this method is discussed more fully in the Proposed Compensatory Mitigation Plan for Impacts to Waters of the U.S. (RTD 2009h).

Shadow impacts on wetlands were assessed using the Sun Shadow Applet by J. Giesen obtained from the website at http://www.jgiesen.de/sunshadow/.

Existing floodways and floodplain limits within the study corridor were identified using Federal Emergency Management Agency Flood Insurance Rate Maps and other existing data. The Hawai'i National Flood Insurance Program staff was also consulted. Hydraulic assessments for specific locations where the Project crosses flood zones were performed.

In accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the Federal Highway Administration (FHWA/EPA 1984), a Ground Water Impact Assessment was prepared to meet the coordination requirements of Section 1424(e) of the Safe Drinking Water Act. The thickness of surficial sediments above the basalt aquifer was compared to the predicted depth of deep foundations needed to support the Project. The consequences of various construction techniques were evaluated where the foundations might penetrate the basalt. The hydraulic gradient was considered and location of drinking water wells was compared to the project alignment. The location of the HDOH's Underground Injection Control Line, an indication of the boundary between non-drinking water aquifers and underground sources of drinking water, was compared to the project alignment. Best management practices (BMP), required permits, and other controls that affect groundwater recharge and quality were evaluated, and potential mitigation measures to protect the basalt aquifer were proposed.

Agency Coordination

Coordination with Federal, State, and Local agencies with water-resource expertise and responsibilities was ongoing to provide input and guidance on the resources, design, and construction of the Project. Coordination will continue as appropriate with regulatory agencies throughout final design and construction. Since publication of the Draft EIS, several meetings have been held. On December 9, 2008, the USACE, HDOH, Hawai'i's CZM Program, Hawai'i Commission on Water Resource Management, and EPA met with project staff to clarify water resource requirements for the Project. As materials were completed to support this section for the Final EIS, follow-up meetings with the EPA were held on March 10, 2009, and July 10, 2009. Meetings were held with the USACE on January 15, February 25, May 13, July 3, and August 10, 2009. Additional coordination between technical staff and the USACE has occurred. A meeting was also held with the USCG on December 11, 2008. Input from these agencies has directed the analysis included in this Final EIS.

Coordination will continue with Federal, State, and Local agencies to obtain the necessary permits, approvals, and agreements listed in Section 4.21.

4.14.2 Affected Environment

Surface Waters

Surface waters in the study corridor include intermittent and perennial streams, tidal estuaries, and freshwater and tidal wetlands. Descriptions of the surface water environments are discussed in general terms under the Streams, Wetlands, and Marine Waters subsections. Individual sites for which an impact was identified are discussed in more detail under the appropriate subsection.

Streams

Streams within the study corridor are listed in Table 4-26 and their locations are illustrated on Figure 4-61. Table 4-26 describes, in general terms, attributes associated with each of these streams. Twenty streams or conveyance channels are to be crossed by the guideway or other project structures. In 18 cases, where the Project crosses them, these stream channels have been modified within the study corridor, having either a realigned channel of "natural" material or a channel lined with concrete (in many cases including the bed). Natural channels occur only at Honouliuli Stream, Waiawa Stream and Springs, and Pānakauahi Gulch (Sites 4, 12, 13, and 31).

Table 4-26 Streams Crossed by the Project

Stream	Site No.[1]	Type of Water[2]	Tidally Influenced	US Coast Guard Navigable Waters[3]	303(d) Impaired[4]
Kalo`i Gulch	1, 2	Non-RPW	No	No	No
Honouliuli Stream	4	RPW	No	No	Yes
Hō`ae`ae Stream	6	Non-RPW	No	No	No
Waikele Stream	7	RPW	Yes	Yes[3]	Yes
Kapakahi Stream	9	RPW	No	No	Yes
Waipahu Canal Stream	10	RPW/TNW	Yes	Yes[3]	No
Pānakauahi Gulch	31	Non-RPW	No	No	No
Waiawa Stream and Springs	12, 13	RPW	No	No	Yes
Pearl City Stream	14	Non-RPW	No	No	No
Waiau Springs	15	RPW	No	No	No
Waimalu Stream	16	RPW	Yes	Yes[3]	Yes
Kalauao Springs	17	RPW	No	No	Yes
Kalauao Stream	18	RPW	No	No	Yes
`Aiea Stream	19	RPW	Yes	No	Yes
Hālawa Stream	22	TNW	No	No	Yes
Aolele Ditch	25	Non-RPW	No	No	No
Moanalua Stream	27	RPW	Yes	Yes[3]	Yes
Kalihi Stream	28	TNW	Yes	Yes[3]	Yes
Kapālama Canal Stream	29	TNW	Yes	Yes[3]	Yes
Nu`uanu Stream	30	TNW	Yes	Yes[3]	Yes

[1] The site numbers refer to sites studied in the *Honolulu High-Capacity Transit Corridor Project Wetland and Waters of the U.S. Study* (RTD 2009b)
[2] RPW = relatively permanent water; TNW = traditional navigable water
[3] Advanced approval received from U.S. Coast Guard, December 23, 2008
[4] 303(d) Impaired Waterway as defined by HDOH (2008)

Because the guideway follows existing major roadways, the point at which it crosses a stream coincides with an existing bridge where concrete sidewalls are already in place. More importantly, the guideway traverses urban areas where streams have been realigned and otherwise modified for flood control purposes. General water quality in these urban streams tends to be poor, and many are included on the State 303(d) List of Impaired Waters (HDOH 2008).

Table 4-27 summarizes two aspects of the stream environment at each site: (1) typical vegetation in the channel and on or immediately above the banks and (2) the nature of the aquatic fauna present. Because these mostly modified channels are subject to maintenance activities, in-channel and riparian vegetation tends to be grasses and shrubs with a ruderal character (meaning plants adapted to disturbed sites). In some cases with tidally influenced channels, mangroves occur along the margins of the bed. Only in the case of Waiawa Stream (Sites 12 and 13) is the vegetation typical of a lowland O‘ahu stream with a true riparian zone. At Honouliuli Stream (Site 4), the stream is intermittent and deeply incised with concrete

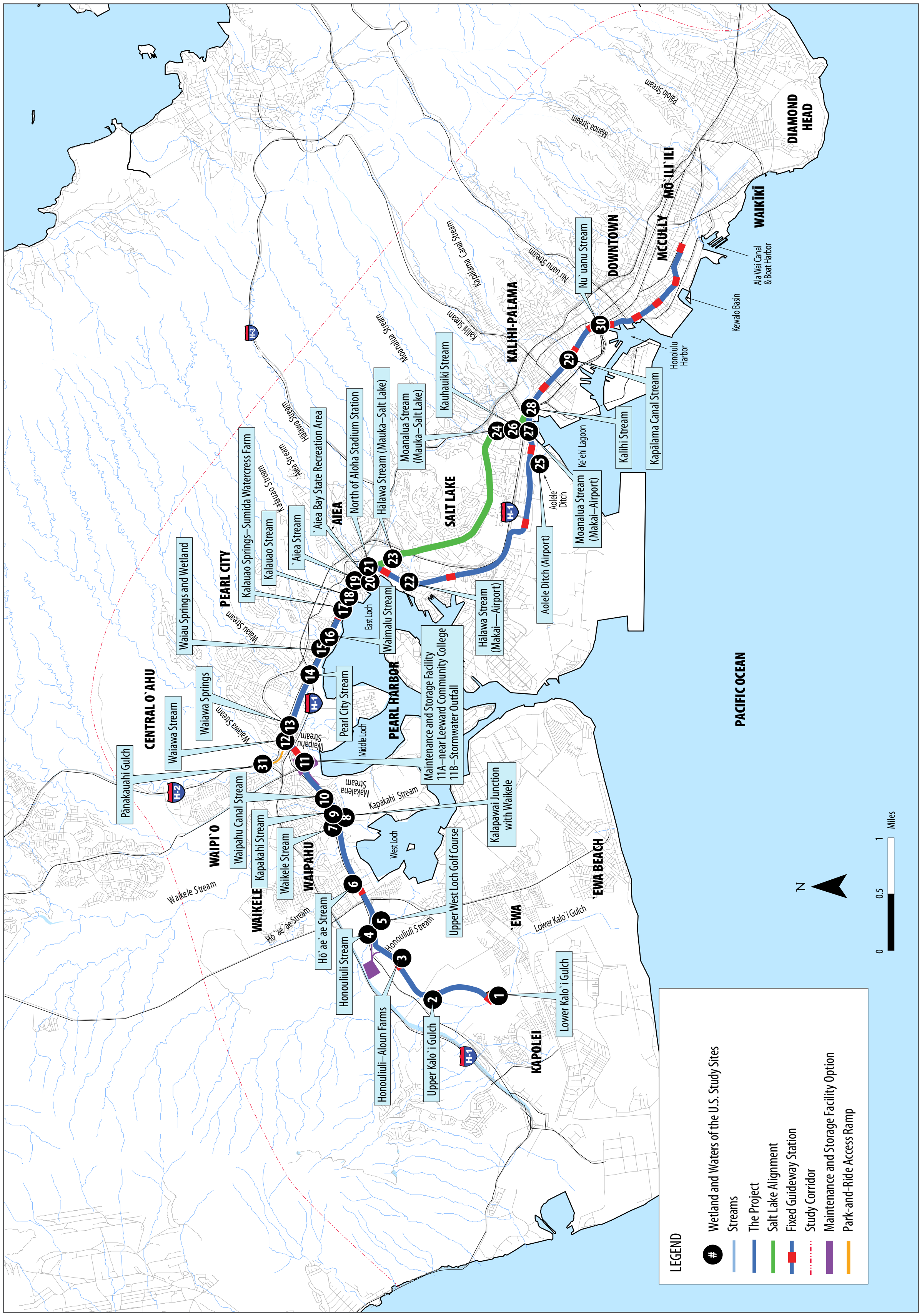


Figure 4-61 Wetland and Waters of the U.S. Study Sites

sidewalls at the crossing point. Upstream, water flow is temporally insufficient to influence much riparian growth. Downstream, the normally dry channel widens through landscaped grounds of Kāhi Mōhala.

Consideration of the kinds of aquatic fauna present at each site (see final column in Table 4-27) can be divided into waters that do not support aquatic animals (intermittent channels, natural or concrete-lined), streams that are perennial and typically harbor introduced fishes and crustaceans (either limited or diverse depending upon habitat complexity among other factors), waters that are tidal (estuarine), and waters that connect the ocean and upland aquatic habitats that support native, amphidromous species. Amphidromous species deserve special consideration because

Table 4-27 Attributes of Streams Crossed by the Project

Stream	Site No.	Watershed	Channel Characteristics [1]	Bank Vegetation	Aquatic Biota
Kalo`i Gulch	1, 2	Kalo`i	Modified	Grasses	None
Honouliuli Stream	4	Honouliuli	Unmodified	Grasses	None
Hō`ae`ae Stream	6	Waikele	Concrete-lined	None	None
Waikele Stream	7	Waikele	Concrete-lined	None	Diverse FW, amphidromous
Kapakahi Stream	9	Kapakahi	Modified	Ruderal and wetland herbs	Limited non-native
Waipahu Canal Stream	10	Kapakahi	Concrete-lined	None	Estuarine
Pānakauahi Gulch	31	Waiawa	Unmodified	Grasses and trees	None
Waiawa Stream and Springs	12, 13	Waiawa	Unmodified	Mature tree canopy with understory	Diverse FW, native amphidromous
Pearl City Stream	14	Waimalu	Concrete-lined	None	None
Waiau Springs	15	Waimalu	Concrete-lined/modified	Trees, shrubs, understory	Diverse FW
Waimalu Stream	16	Waimalu	Concrete-lined/ modified	Mangrove	Estuarine, native amphidromous
Kalauao Springs	17	Kalauao	Concrete-lined	Maintained, grasses	Diverse FW
Kalauao Stream	18	Kalauao	Modified	Trees and ruderal herbs	Diverse FW
`Aiea Stream	19	`Aiea	Concrete-lined	None	Estuarine, native amphidromous
Hālawa Stream	22	Hālawa	Modified	Some mangrove, other trees	Estuarine, native amphidromous
Aolele Ditch	25	Manuwai	Concrete-lined/modified	Maintained grasses and ruderal herbs	None
Moanalua Stream	27	Moanalua	Concrete-lined	Mangrove	Estuarine, native amphidromous
Kalihi Stream	28	Kalihi	Modified	Shrubs	Estuarine, native amphidromous
Kapālama Canal Stream	29	Kapālama	Modified	Shrubs, ruderal herbs	Diverse FW
Nu`uanu Stream	30	Nu`uanu	Concrete-lined	None	Estuarine. native amphidromous

[1] Channel characteristic at study site where Project crosses stream
FW = fresh water

they constitute the native stream macrofauna and require a connection through the lowlands to maintain a viable population in the upper reaches of the stream. These are species that reside as adults in suitable stream habitats but have a larval stage that lives in the ocean. The juveniles develop in the sea and then migrate to a suitable stream habitat to complete their life cycle. In some cases, it is possible to have a dry stream at a site that nonetheless supports an upstream amphidromous fauna where the stream has one or more perennial reaches. Such streams are classified as interrupted because flow in the lowlands occurs only when sufficient runoff feeds the system (as in the wet season). Thus, an activity that interferes with the migration pattern could have an adverse impact on an otherwise healthy upstream population. Concrete-lined channels can have an adverse impact on the migration pattern, although where the channel is tidal (estuarine; for example, Hālawa Stream at Site 22) water depth is typically sufficient and constant so as not to constitute a barrier. In Table 4-27, streams that are known to have a perennial freshwater reach are characterized under Aquatic Fauna as "native amphidromous," although this declaration by no means claims that the stream does in fact support any native macrofauna (only that upstream habitat is potentially present). In all cases, no permanent (or temporary construction) structures are proposed that would interfere with migration by an amphidromous species through the project area. Kalo'i Gulch and Waiawa Stream are discussed in greater detail below because they are both natural streams at the project location, and project-related impacts are anticipated.

Navigability determinations for each affected waterway have been made by the USCG in their letter on December 23, 2008 (Appendix F). The USCG classified these channels as Advanced Approval Waterways because they are only navigated by rowboats, canoes, and small motorboats (Table 4-26). Recreational use of many of the navigable streams in the study corridor is minimal because they are located in urban areas and lined with concrete. Access into concrete-lined non-RPW (intermittently flowing) channels is discouraged, as these are, in essence, storm drains. However, a number of the larger channels are used for fishing and crabbing from shore or from pedestrian accessways on bridges. Recreational and subsistence fishing and crabbing are particularly evident in the larger estuarine waters crossed by the Project. The biological resource value for each stream is largely a factor of the water type. RPW and tidal waters (TNW and tidal), even though confined to a modified channel, may support aquatic life (and therefore have the potential for recreational fishing) and may serve as a conduit through which native amphidromous fauna migrates between the ocean and suitable habitat in upland stream reaches.

Kalo`i Gulch

Kalo'i Gulch is an intermittently flowing stream that historically discharged onto the 'Ewa Plain, lacking an outlet to the ocean owing to the permeability of the ancient reef formation forming the Plain. Water flow occurs only during significant rainfall in this normally dry area. In the project area, the flow has long been directed into man-made channels through former agricultural lands (AECOS 1992, 2005). With the advent of anticipated rapid urbanization of the area, much of the flow from Kalo'i Gulch will soon be directed into the Kalo'i Drainage Channel that parallels North-South Road (under construction; Site 2). A portion of the old channel of lower Kalo'i Gulch will continue to carry runoff from a smaller, tributary gulch named Hunehune (Site 1). USACE has determined that Kalo'i Gulch is not subject to its jurisdiction.

Waiawa Stream and Springs

Waiawa Stream flows within a natural bed and banks within the study corridor, through an area located between Kamehameha and Farrington Highways in Pearl City (Site 12; Figure 4-62).

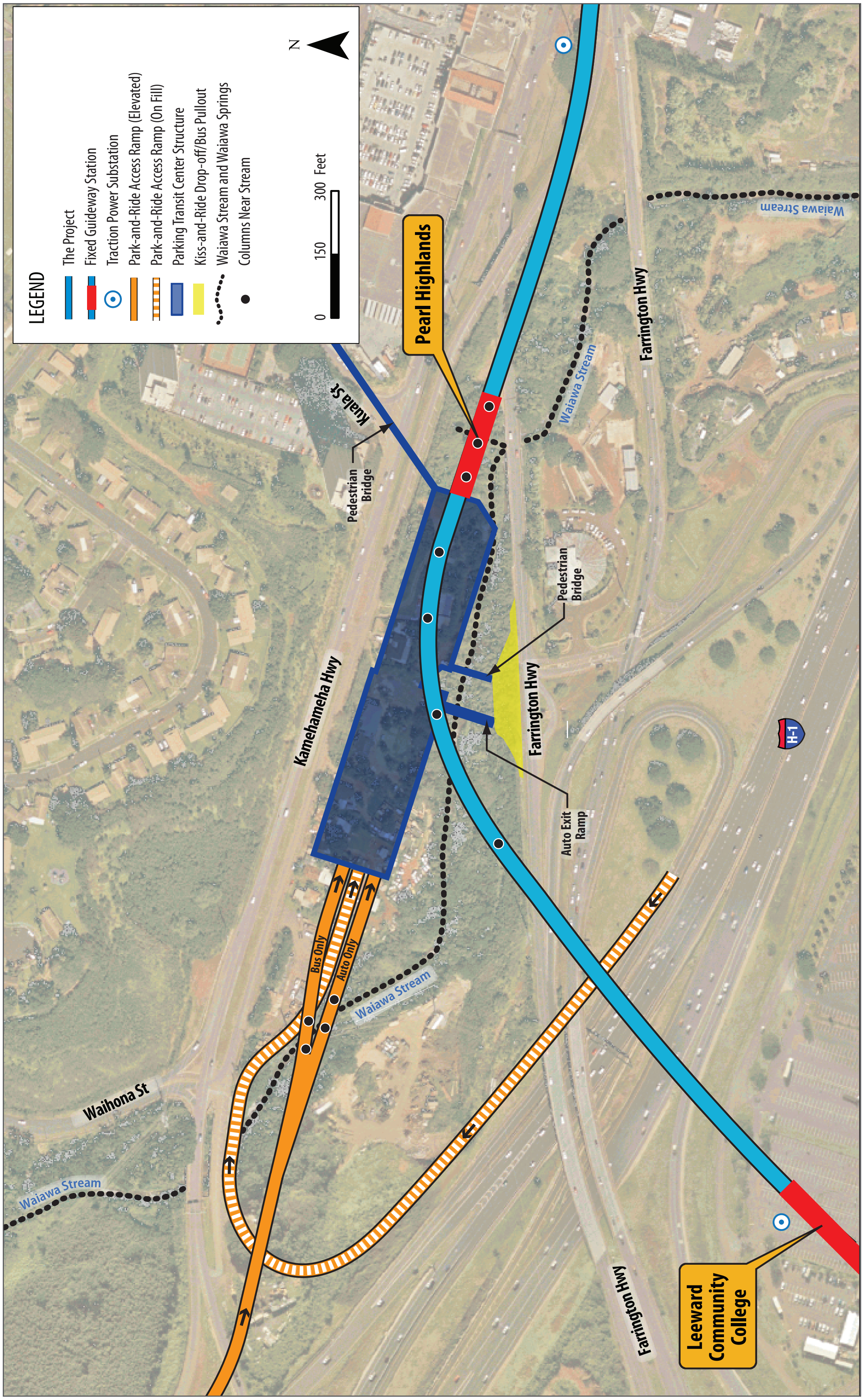


Figure 4-62 Waiawa Stream and Springs

The floodplain in this area was altered, but the stream remains in a natural state, as does most of Waiawa Stream and its tributaries with only about 5 percent of the channel modified (Timbol 1978). Waiawa Stream is classified as an interrupted perennial stream, meaning the stream and tributaries are continuously flowing in the uplands, but stream flow is absent in a lowland segment during the dry season (HCPSU 1990). Waiawa Stream is perennially flowing in the project area, fed by local springs (AECOS 1991).

A 36-inch storm drain culvert daylights at the base of the Kamehameha Highway fill bank at a point directly under the Pearl Highlands Station along the guideway (Site 13). This storm drain appears to be discharging a perennial flow that may be spring water captured from the mauka side of the highway, although the source of the apparently continuous flow has not been verified. This spring is assumed to be a waters of the U.S. and is referred to as Waiawa Springs.

Wetlands

Wetlands near the project alignment are associated with riverine, tidal, and spring-fed water systems. Land development has altered or destroyed many of the historically identified wetlands in the study corridor, leaving only scattered remnants today. In the categorization of waters and impacts developed in the Wetland and Waters of the U.S. Study (RTD 2009b), wetlands adjacent to the Project constitute Category IV. Three sites are freshwater (palustrine) wetlands (Category IVA; Sites 15, 17, and 25) adjacent to the Project (within 250 feet of the alignment or other facilities of the Project). Four sites are littoral or mangrove wetlands (Category IVB; Sites 11B, 16, 20, and 22). No wetlands will be directly affected by structural elements of the Project beyond shading effects. In the cases of Sites 16 (Waimalu Stream) and 22 (Hālawa Stream), the adjacent wetland consists only of a growth of mangrove along the margins of the estuary where the guideway crosses.

Maintenance and Storage Facility Stormwater Outfall

The maintenance and storage facility near Leeward Community College (Site 11A; Figure 4-63) is categorized as a Category I site, having no streams or wetlands present. A stormwater detention basin will be constructed on this site and stormwater will be piped through a 60-inch underground pipe through a concrete box culvert to Pearl Harbor at Middle Loch. This latter area is Site 11B, assigned to Category IVB because nearshore waters supported, until recently, a mangrove forest. The OHWM (taken herein as the mean reach of the higher high tides) at the shore constitutes the upper limit of waters of the U.S., and the outlet structure and riprap will be placed above (inland of) this line. The stormwater discharges to Middle Loch in an area that was a mangrove wetland and is being recolonized by juvenile mangrove plants.

Waiau Wetland

The Project is located along the median of Kamehameha Highway makai of Waiau Springs wetland. The boundary of this freshwater wetland was defined based upon a combination of wetland vegetation, hydric soil characteristics, and the presence of water. The southern border (closest to the Project) of the wetland lies along the base of the fill slope from Kamehameha Highway (Figure 4-64).

Land surrounding the wetland is being used by residents for subsistence vegetable gardening and, in some areas of the wetland, pondfield culture of kalo (*Colocasia esculenta*) and ung-choi (*Ipomoea aquatica*) is carried out at a subsistence level. Waiau Springs stream and wetland supports fish species such as mollies, guppies, koi, and cichlids (including tilapia). A homeowner adjacent to the wetland raises fish, including channel catfish, Asian catfish, koi, and goldfish, in tanks and cages within the wetland. Although no waterfowl were observed during site inspections, the wetland might be conducive as habitat for Hawaiian coot and Hawaiian moorhen, both of which are federally listed species. Black-crowned night heron, a protected species, are likely to visit this wetland.

Sumida Watercress Farm Wetland

Sumida Watercress Farm at Pearlridge is a historic pondfield farm operating within a wetland fed by Kalauao Springs (Figure 4-65). This wetland is extensively developed into rectangular pondfields used for the commercial production of watercress (*Nasturtium officinale*). The closest approach of the Project to the farm is the guideway along the median of Kamehameha Highway, the mauka edge of the highway roadbed slope, which forms a dike along the discharge channel at the lower end of the wetland. The discharge channel feeds a set of pumps used to spray the fields as a preventive against insect damage to the crop and drains via a culvert to a concrete-lined drainage channel

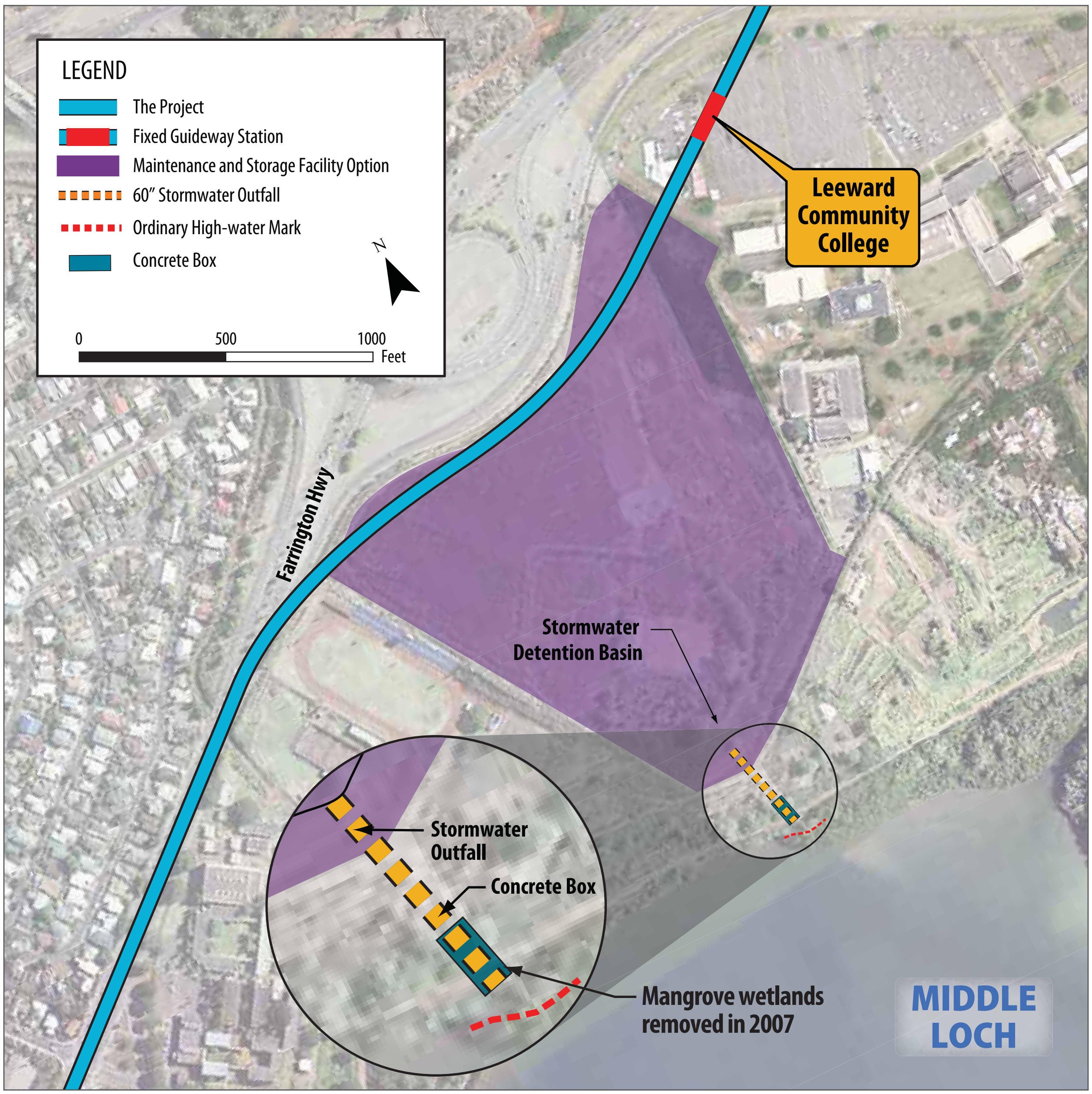


Figure 4-63 Maintenance and Storage Facility Stormwater Outfall near Leeward Community College

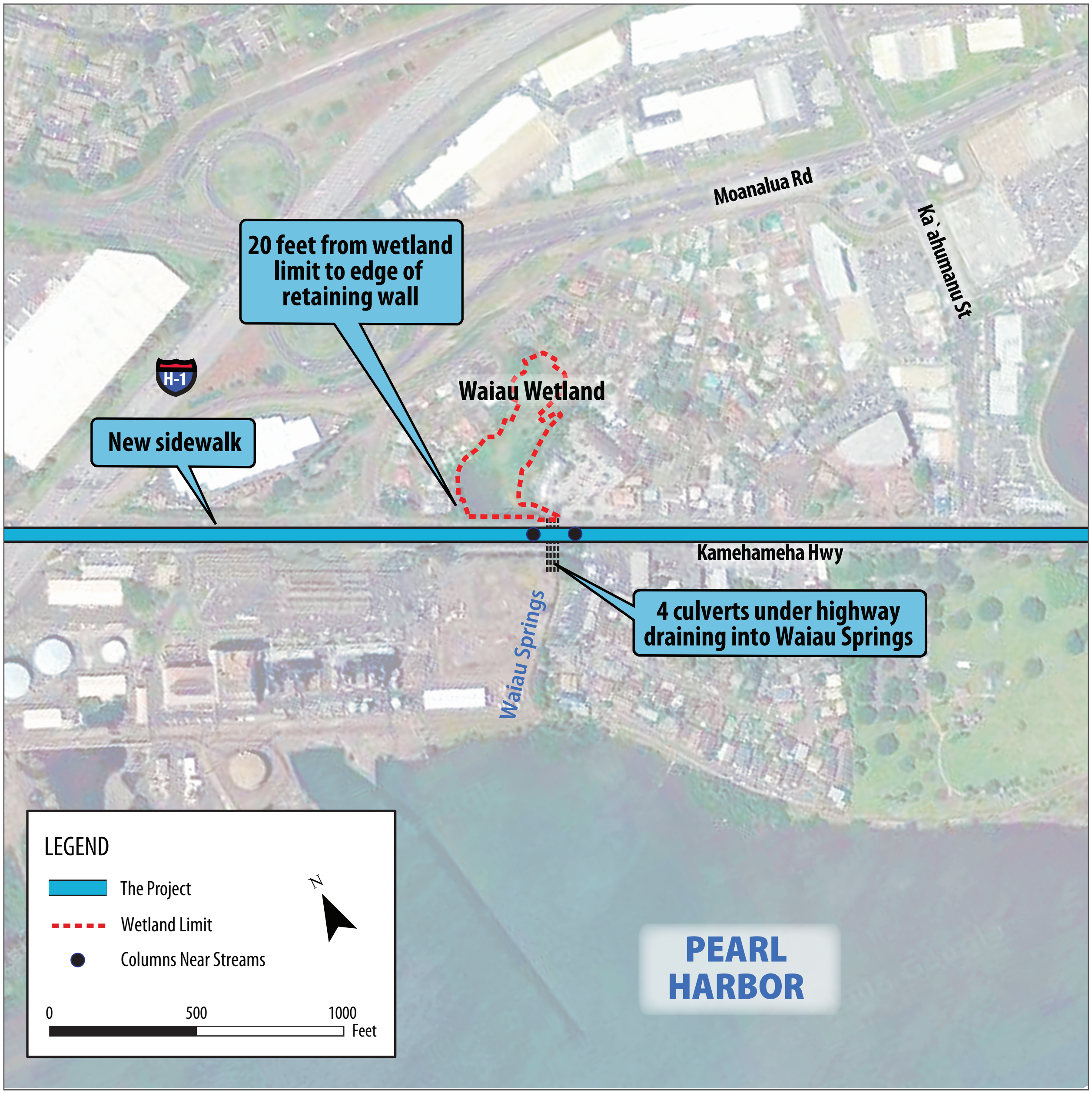


Figure 4-64 Waiau Springs and Wetland

through Pearlridge Center, discharging south into the East Loch of Pearl Harbor.

`Aiea Bay State Recreation Area Wetland

The Project guideway is approximately 200 feet mauka of the tidal wetland (formally a dense mangal forest) fringing ʻAiea Bay (Figure 4-66). ʻAiea Stream has formed a depositional delta off the shore here, on which supports the growth of salt-tolerant plants (mangrove and pickleweed). The sediment is anaerobic. Mud flats in Pearl Harbor, such as this one, are relatively stable, whereas the narrow riparian mudflats along streams are subject to hydraulic scouring. Recovery of the mangrove removed in 2007 is well underway as juvenile mangrove plants colonize the tidal flat.

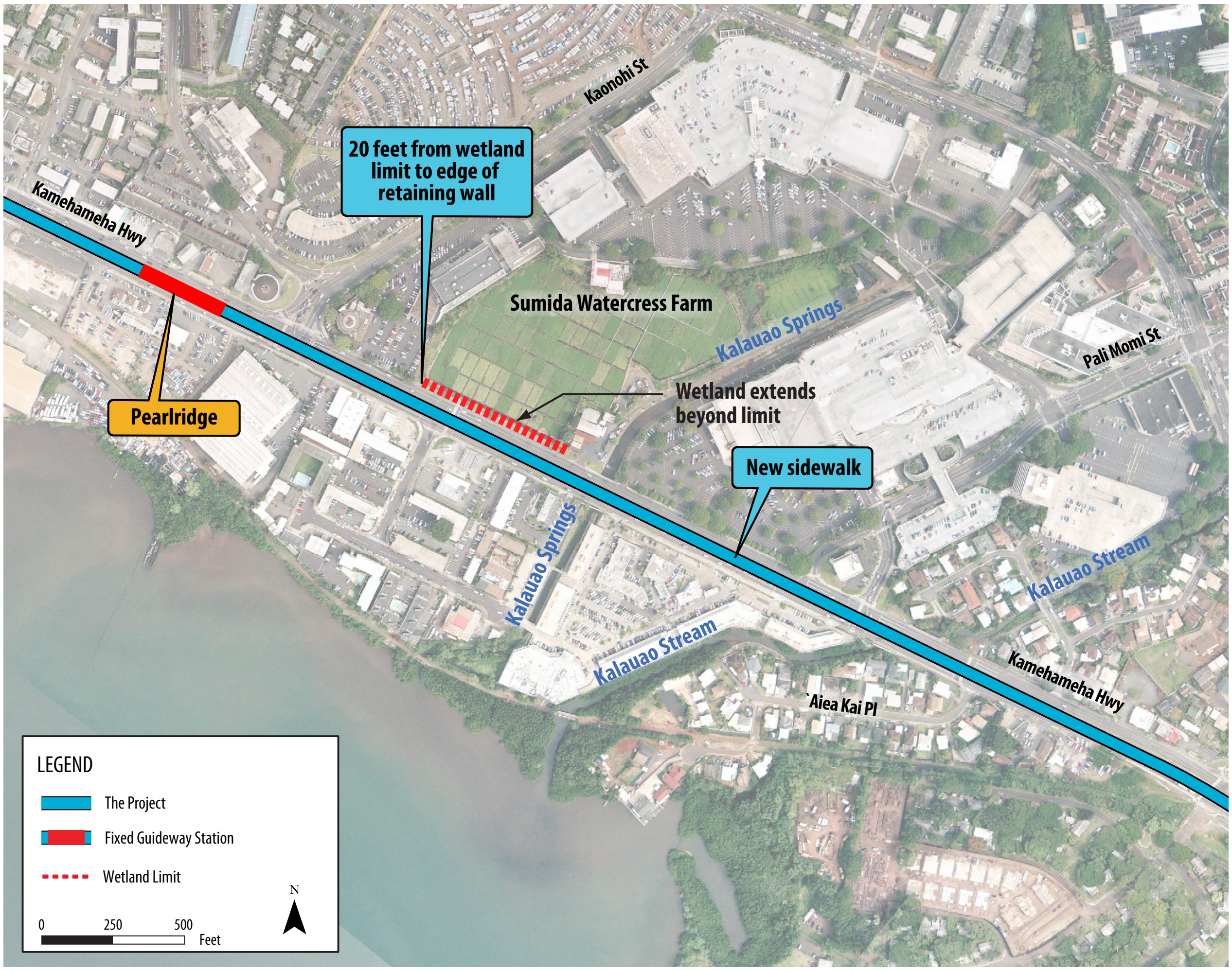


Figure 4-65 Sumida Watercress Farm Wetland

Aolele Ditch

Aolele Ditch is a man-made drainage feature constructed to drain stormwater to Ke‘ehi Lagoon from the northeastern portion of Honolulu International Airport and an adjacent light industrial area. The lower end of the ditch is tidal. However, the part of the ditch crossed by the guideway is an intermittently flowing (non-RPW), unlined, open ditch fed by several small drains from the light industrial area mauka. These drains provide sufficient freshwater to establish three small semi-permanent wet areas along the bottom of the ditch (one under the guideway). These "wetland" features support a variety of wetland plants and aquatic insects, such as dragonflies. The most downstream of the three wetlands connects to the tidal reach of Aolele Ditch and harbors top minnows (poeciliids) and American crayfish, suggesting a permanent fresh or slightly brackish wetland that has developed on a thin layer of sediment over the concrete channel bed in this segment.

Marine Waters

The large coastal surface water bodies within or adjacent to the study corridor are listed in Table 4-28 and illustrated in Figure 4-61. These water bodies are all highly urbanized and/or altered from their natural state. Marine areas near the Project include the Middle and East Lochs of Pearl Harbor (technically an estuarine

Figure 4-66 `Aiea Bay State Recreation Area Wetland

Table 4-28 Marine Waters

Water Body	Class	Associated Inlets	303(d) Impaired[2]
Pearl Harbor[1]	2—Inland water/estuary	Point-source discharges; streams	Yes
Ke`ehi Lagoon	A—Marine embayment	Storm drains; streams	Yes
Honolulu Harbor	A—Marine embayment	Storm drains; streams	Yes

[1] Pearl Harbor includes West Loch, Middle Loch, and East Loch

[2] 303(d) Impaired Waterway as defined by State of Hawai`i Department of Health (2008).

bay), Keʻehi Lagoon (an open embayment), and Honolulu Harbor.

Flood Zones

Flood Insurance Rate Maps show that the project alignment will cross several floodplains and two floodways associated with Waiau and Waiawa Streams (Figures 4-57 and 4-58). Floodplains along the project alignment mostly recharge groundwater levels, convey stormwater toward the ocean, and help moderate floods when they occur (Figure 4-67). These areas also support plants and wildlife within urbanized areas, while maintaining areas for outdoor recreation and enjoyment and preserving the land's natural beauty. The flood zones and their associated waters are listed in Table 4-29.

Stormwater

The existing drainage conditions encountered along the guideway alignment consist of the following: undeveloped or unpaved areas, areas adjacent to paved roadways, landscaped median areas of paved roadways, or a combination of these conditions. Drainage conditions for the Project area west of Hoʻopili Station (west Site 4) are generally undeveloped or unpaved. The drainage conditions for the Project within the City of Waipahu are landscaped median areas of paved roadway. The drainage conditions for the majority of the project alignment are areas adjacent to paved roadways or a combination of various conditions. The existing drainage system consists of drainage pipes/culverts, structures, swales, and outfalls to tributaries adjacent to Pearl Harbor and Honolulu Harbor.

Groundwater

The entire Project overlies the Southern Oʻahu Basal Aquifer and includes two aquifer sectors. The Pearl Harbor Aquifer Sector contains the ʻEwa, Waipahu, Waiawa, and Waimalu Aquifer Systems, and the Honolulu Aquifer Sector contains the Moanalua, Kalihi, and Nuʻuanu Aquifer Systems.

4.14.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to water resources. The projects in the ORTP are assumed to be built, and the consequences of those projects will be studied and documented in separate environmental documents.

Project

The following sections discuss possible effects to surface and marine waters, wetlands, flood zones, stormwater, and groundwater and present coordination activities and mitigation that will occur to address possible effects. Effects during construction are discussed in Section 4.18.

Surface Waters

Project encroachment into waters of the U.S. is summarized in Tables 4-30 and 4-31. The Project will, once constructed, permanently encroach upon 0.08 acre of waters of the U.S. (0.02 acre as listed on Table 4-30 and 0.06 acre as listed on Table 4-31). These impacts are from placing piers in Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream and improving a culvert in Waiawa Springs. Although Kaloʻi Gulch is not under the jurisdiction of the USACE and not included in Tables 4-30 or 4-31, it was considered in the impact quantities with the use of the preliminary JD approach. The Project at Kaloʻi Gulch will add 0.009 acre of permanent impact from the guideway support columns, with 27 cubic yards of impact below OHWM and above the mudline and 1,234 cubic yards below the mudline (linear transportation features). The Project will also add 0.39 acre of permanent impact from a park-and-ride lot, with 953 cubic yards below OHWM and above the mudline and 744 cubic yards below the mudline.

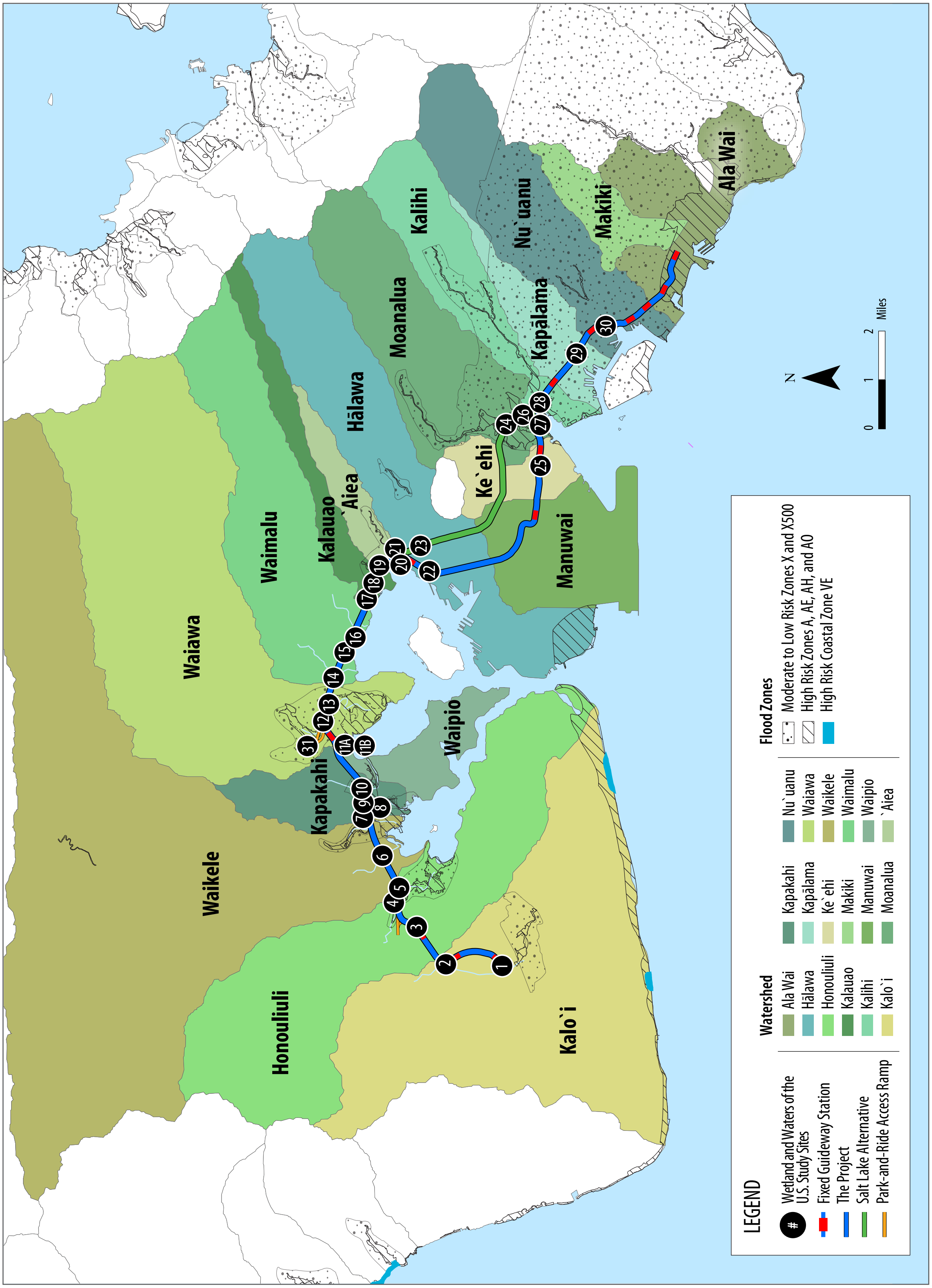


Figure 4-67 Watershed and Flood Zones

Table 4-29 Streams Having FEMA Mapped Flood Zones

Associated Water Body	Developed	Major Functions	Flood Zone(s) Traversed by Fixed Guideway
Kalo`i Gulch	Yes	Groundwater recharge; stormwater conveyance	AE
Honouliuli Stream	No	Groundwater recharge; stormwater conveyance	A
Waikele Stream	Yes	Stormwater conveyance	AEF, AE
Kapakahi Stream[1]	Yes	Stormwater conveyance	AEF, AE
Waipahu Canal Stream[2]	Yes	Stormwater conveyance	AEF, AE
Waiawa Stream	Yes	Stormwater conveyance	AEF, AE
Kalauao Stream	Yes	Stormwater conveyance	AEF
Moanalua Stream	Yes	Stormwater conveyance	AEF, AE, AO
Kalihi Stream	Yes	Stormwater conveyance	AEF, AE, AO

Zone A = the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE = the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AEF = the area within Zone "AE" reserved to pass the base flood.

Zone AO = the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross-section and then along the direction of flow to determine the extent of the zone. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the Flood Insurance Rate Map.

[1]FEMA referes to this canal as "Kapakahi Stream #2" on their FIRM maps (Panel No. 0240F)

[2]FEMA referes to this canal as "Wailani Canal" on their FIRM maps (Panel No. 0240F)

Table 4-30 Permanent Impacts to Waters of the U.S. (Linear Transportation Features)

Total Impact	Waiawa Stream & Springs (Sites 12 & 13)	Moanalua Stream (Site 27)	Kapālama Canal Stream (Site 29)	Nu`uanu Stream (Site 30)	Total Impact of Project
Area (acres)	0.003	0.004	0.01	0.004	0.02
Volume (cubic yards) (below OHWM and above mudline)	10	8	61	27	105
Volume (cubic yards) (below mudline)	873	1,454	60	1,164	3,551

Table 4-31 Permanent Impacts to Waters of the U.S. (Other Project Features)

Total Impact	Waiawa Springs (Existing Stormwater Culvert Extension)
Area (acres)	0.06
Volume (cubic yards) (below OHWM and above mudline)	185
Volume (cubic yards) (below mudline)	0

As discussed in Section 4.18, during construction of the fixed guideway (linear transportation project features), it is anticipated that there will be a temporary effect of up to 0.13 acre of waters of the U.S. Although Kaloʻi Gulch is not under the jurisdiction of the USACE and the impacts are not listed in the tables, temporary impacts include 0.07 acre of impact from the guideway support columns with 948 cubic yards of impact below OHWM and above the mudline. An additional 0.86 acre of temporary impact will result from construction of a park-and-ride lot at Lower Kaloʻi Gulch with an additional 1,238 cubic yards below OHWM and above the mudline.

Of the 20 streams in the study corridor, most will not be directly affected because the Project's elevated guideway will clear-span these streams and there will be no pier or column construction or other construction-related activities within the stream channel below OHWM. In general, the project alignment parallels other bridge crossings of the streams and, in many cases, crosses along the median between bridges carrying opposing lanes of traffic. In these cases (Categories II through IV as outlined in Section 4.14.2), the only potential direct effect of the Project is one of shading of the stream or wetland. Because the guideway is elevated relative to the surrounding roadway crossings, the guideway will only impart minimal, additional shading onto the water as compared to the bridges already present in each location. Shading impacts are addressed in more detail for Sumida Watercress Farm, below.

The streams affected by structural elements of the Project are described below and in Tables 4-30 and 4-31. These are the Category V sites discussed above, most of which are estuarine and confined to highly modified channels with little to no riparian values. An acreage approach to quantifying impacts was followed since functional assessment methods are typically calibrated to non-urban, non-hardened areas. There are no secondary or derivative adverse impacts resulting from the Project that would be overlooked by focusing on acreage or that don't scale to acreage. Kaloʻi Gulch is not under the jurisdiction of the USACE and is, therefore, not listed in Tables 4-30 or 4-31. However, it was considered in the impact quantities with the use of the preliminary JD approach.

Kalo`i Gulch

The lower end of Kaloʻi Gulch on the ʻEwa Plain will be impacted by structural elements of the Project in two respects—a park-and-ride lot is proposed for a parcel crossed by the man-made drainage channel (Site 1); and support columns for the guideway will be located on the banks of the Kaloʻi Drainage Channel (Site 2). Although how the drainage channel at the park-and-ride lot will be designed has yet to be determined, the most likely solution will be to replace the existing man-made ditch with a buried box culvert. Another option would be to redirect the channel elsewhere, for example via a ditch or culvert more directly to the Kaloʻi Drainage Canal nearby to the east. No aquatic resources are associated with this channel, which is normally dry and cut-off from most of its drainage basin by redirection of upper Kaloʻi Gulch into the Kaloʻi Drainage Canal. Future urban development will likely establish runoff conveyances throughout this area. As noted, the Kaloʻi Drainage Canal will take over much of the stormwater runoff contributed by Kaloʻi Gulch. This approximately 160-foot wide channel is presently under construction paralleling North-South Road. Neither this channel nor the existing narrow Kaloʻi Gulch (Site 2) have aquatic resource value. The guideway crosses the "new" channel at a shallow angle on a turn, and the span at this point cannot avoid placing several columns within the banks of the channel. Two columns (approximately 36 square feet constructed on 10-foot drilled shafts) are located near the bottom of the banks (within the 100-year floodway).

Waiawa Stream and Springs

The Project and associated features will have one guideway support column and two station piers below OHWM. There will be some impacts to riparian areas. Moving the station location, parking structure, bus transit center, and other features is the only option to avoid impacts to this area. The Pearl Highlands Station is projected to have the second-highest passenger volume of all stations in the system and will serve as the transfer point for all users in Central Oʻahu, whether they drive to the station or transfer from TheBus. This transit center and park-and-ride facility are designed to provide easy access to the fixed guideway transit system from the H-1 and H-2 Freeways, Kamehameha Highway, and Farrington Highway. This station location provides the most convenient access to the system for residents of Central Oʻahu (i.e., locations mauka and ʻEwa of the station). Therefore, elimination of the station and associated park-and-ride structure does not satisfy the Project's Purpose and Need.

Alternative locations for the Pearl Highlands Station and park-and-ride lot were identified at Leeward Community College and the Hawaiʻi Laborers Training Program site. Both of these sites were evaluated in Section 5.4.2 of the Draft EIS that addressed avoidance alternatives to potential impacts to the historic Solmirin House (since publication of the Draft EIS, the Solmirin House was determined to be not eligible for designation as a historic resource). Locating the park-and-ride facilities at either of the two avoidance alternative sites would cost substantially more and provide less efficient transportation circulation, as access would be less direct. For these reasons, these avoidance alternatives are not considered feasible.

The construction of the high occupancy vehicle (HOV) ramp that will connect inbound H-2 Freeway vehicles with the park-and-ride structure adjacent to the Pearl Highlands Station will result in four columns being constructed close to Waiawa Stream, all above OHWM. These columns were moved away from the stream to avoid impacts. Waiawa Stream in this area flows in a natural bed and banks, although there are multiple existing piers in the stream associated with Farrington Highway and Kamehameha Highway bridges.

The guideway will clear-span this stream makai of the Pearl Highlands Station. The Pearl Highlands parking and transit center will be constructed on circular columns close to Waiawa Stream. In this area, the park-and-ride structure roughly parallels Waiawa Stream (Figure 4-62). This structure will require approximately six support columns (approximately 25 square feet each) to be located in the riparian area outside the OHWM but below the top-of-bank (TOB) line.

Construction of the elevated guideway at Pearl Highlands Station will result in one guideway support column (approximately 36 square feet constructed on a 10-foot drilled shaft foundation) and two station piers (approximately 25 square feet each) being placed close to the OHWM of Waiawa Springs located beneath the station structure. The impact area and fill for these columns are included in Table 4-30 because of their proximity to the springs. The location of the Pearl Highlands Station is designed to be in close proximity to the proposed park-and-ride lot as well as surrounding businesses. The piers near the Pearl Highlands Station cannot be relocated because they are supporting the guideway as it enters the station, as well as supporting a concourse, stairs, and escalators.

The springs (Site 13) in this case is at the end of a street drain passing under Kamehameha Highway. It would best be modified by constructing an extension of the existing pipe culvert to a point beyond the elevated station footprint. This new "outlet" would be located closer to Waiawa Stream where the TOB line and OHWM closely coincide along an erosion face created by the piers of the Farrington Highway bridge forcing the stream flow to the right (thus eroding the left bank). Extending the drain's outlet would have no consequences on spring-water contribution to Waiawa Stream and would reduce potential stream contamination in an area that would be too shaded by the station structure to support plant growth. A cut in the high bank already exists where the spring flow joins Waiawa Stream.

Approximately 5 acres near Waiawa Stream between Kamehameha Highway and Farrington Highway will be shaded by structures (a park-and-ride parking structure, bus transit center, station and guideway, and various pedestrian and vehicle access ramps), roughly one-third of the area (Sites 12 and 13). Direct impacts on the stream (including shading) would be minimal; most of the structures are on the north side of the stream. Waiawa Stream supports some native amphidromous fauna, and no part of the Project is anticipated to interfere with the local population of goby observed or migration through the site required by native macrofauna that may breed upstream.

To maintain floodway hydrology, it will be necessary to remove fill material from along Waiawa Stream in this area. Approximately 100 feet of the small tributary issuing from an existing drain (Site 13) will be confined within an extension of that drain pipe.

Moanalua Stream

To avoid impacts below OHWM in Moanalua Stream (300 feet wide) substantially different bridge types would be needed to clear span this stream. This stream is beyond the practical length limit for precast concrete girders (150 feet). Long spans could add $5 million to total project costs. For this reason, avoiding impacts below OHWM in these streams is not considered feasible.

Because of the 300-foot width of the channel where the guideway crosses Moanalua Stream, two guideway columns (approximately 36 square feet each on 10-foot drilled shaft foundations) will need to be constructed in the estuary (Figure 4-68). This location (Site 27) is makai of the H-1 Freeway ramp to Nimitz Highway. In this area, there exists multiple bridge crossings of Moanalua Stream, including Kamehameha Highway, the H-1 Freeway, Nimitz Highway ramps, and two pedestrian bridges makai of the project guideway crossing. The guideway columns will be aligned with the upstream viaduct piers, as feasible, to minimize obstruction of stream flow. This area is tidal and near the stream mouth at Keʻehi Lagoon. Placement of the piers is not expected to have any consequences on the Moanalua Stream estuarine environment or its fauna beyond a loss of 0.004 acre of sandy mud bottom. Because the guideway lies immediately south of the existing viaducts and will be elevated 50 feet above the water, shading on the estuary will be minimal.

Kapālama Canal Stream

The existing Dillingham Boulevard bridge over Kapālama Canal Stream will be widened makai. This will allow for construction of a new median in line with the guideway to maintain two through lanes and one dedicated left-turn lane for both directions of traffic. This will improve safety and enhance traffic flow. There will be impacts to Kapālama Canal Stream to extend the existing piers and abutments.

A design option was evaluated at this stream crossing to avoid impacts below OHWM that considered construction of the guideway on straddle bents located on each bank of the stream. The straddle bents would have been approximately 100 feet long to completely straddle Dillingham Boulevard. This option was not considered feasible for the following reasons:

- Construction of massive straddle bents would be difficult in this congested corridor
- The large straddle bents would require large and expensive drilled shaft foundations

- Overhead power lines would complicate construction
- The size of the straddle bents would have a considerable visual impact in this area

The Project crosses Kapālama Canal Stream at the Dillingham Boulevard Bridge with the guideway in the median of the Boulevard (Site 29; Figure 4-69). Although the guideway support columns will be located outside of Kapālama Canal behind the existing bridge abutments, the Dillingham Boulevard Bridge will need to be widened approximately 20 feet makai to accommodate a new median. In-water work will involve extending the four existing bridge piers and the two existing bridge abutments makai. Pier extensions will require eight additional piles placed in the stream (approximately 1.36 square feet each). The abutment and retaining

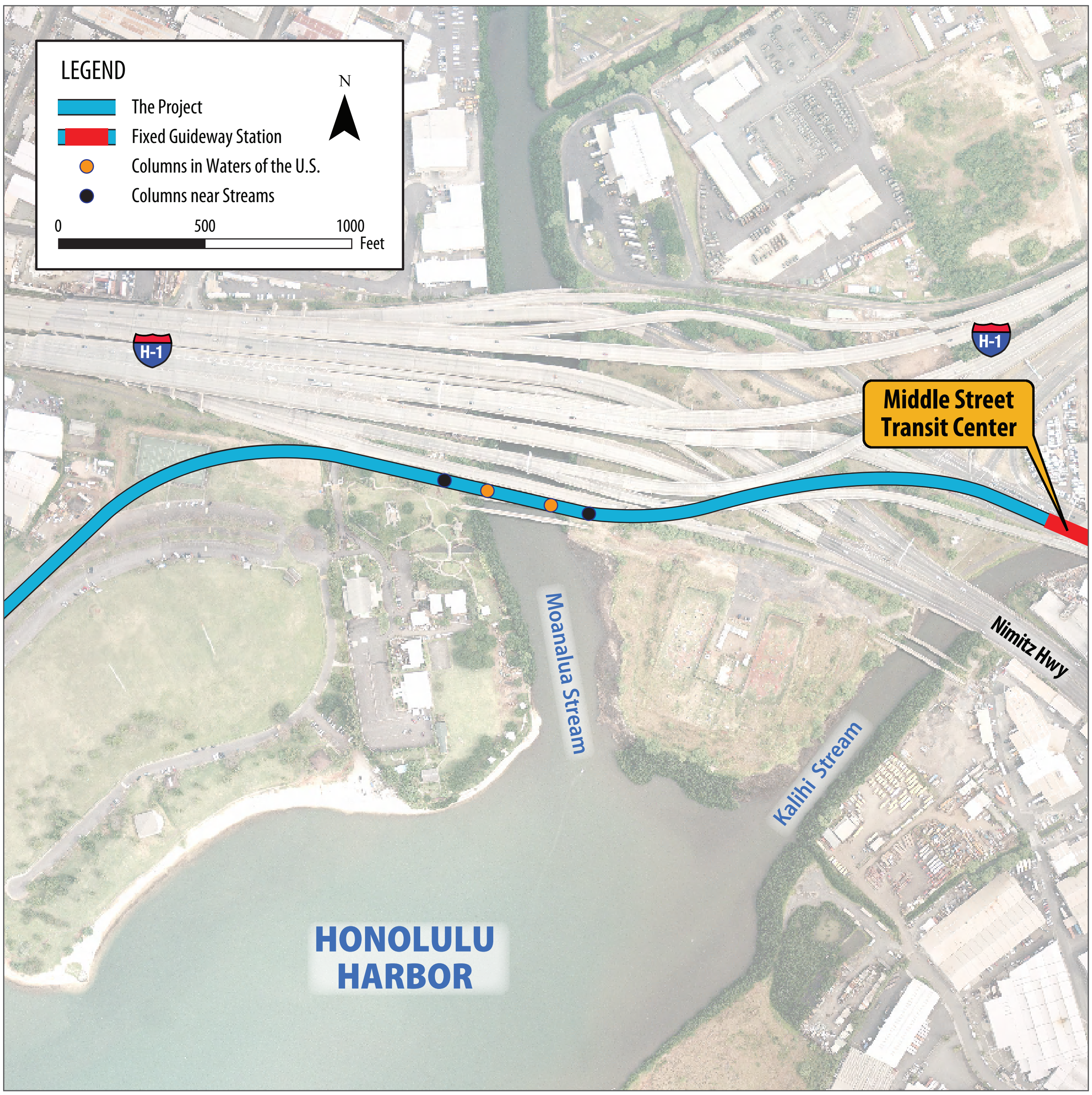


Figure 4-68 Moanalua Stream

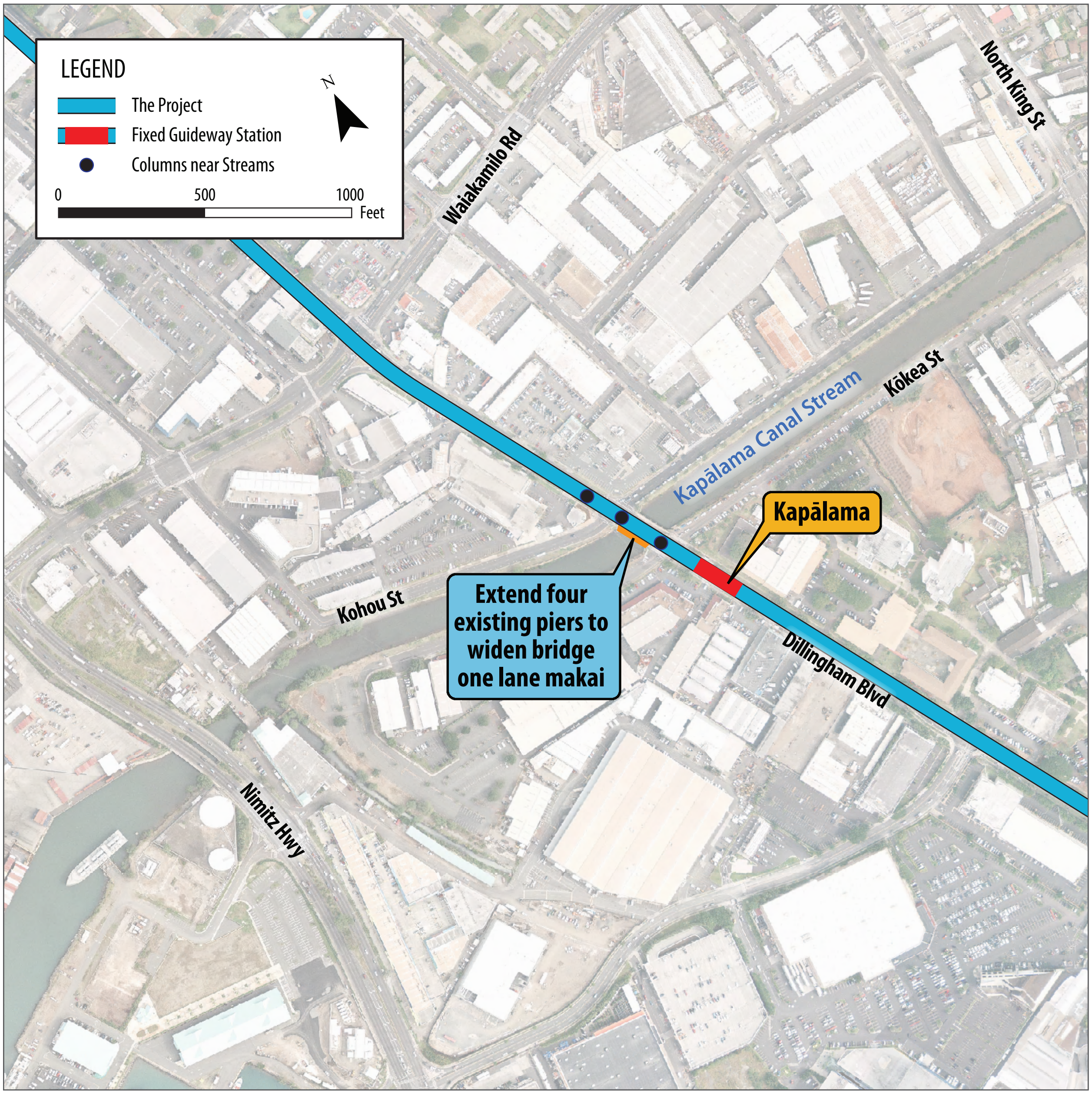


Figure 4-69 Kapālama Canal Stream

walls will require approximately 30 cubic yards of fill below OHWM on each site at the stream. The widening will allow Dillingham Boulevard Bridge to carry two through lanes, one left turn lane, and full-size sidewalks in both directions. Placement of the piers and fill is not expected to have any consequences on the Kapālama Canal Stream estuarine environment or its fauna beyond the loss of 0.01 acre of silty sand bottom. Because the guideway is located over an existing solid bridge surface, shading effects will be minimal, although widening of the bridge makai will increase shading on this part of the canal.

Nu`uanu Stream

The Project will cross the mouth of Nuʻuanu Stream on the ʻEwa side of the Chinatown Station between the inbound and outbound bridges of Nimitz Highway (Site 30; Figure 4-70). Two guideway support columns (approximately

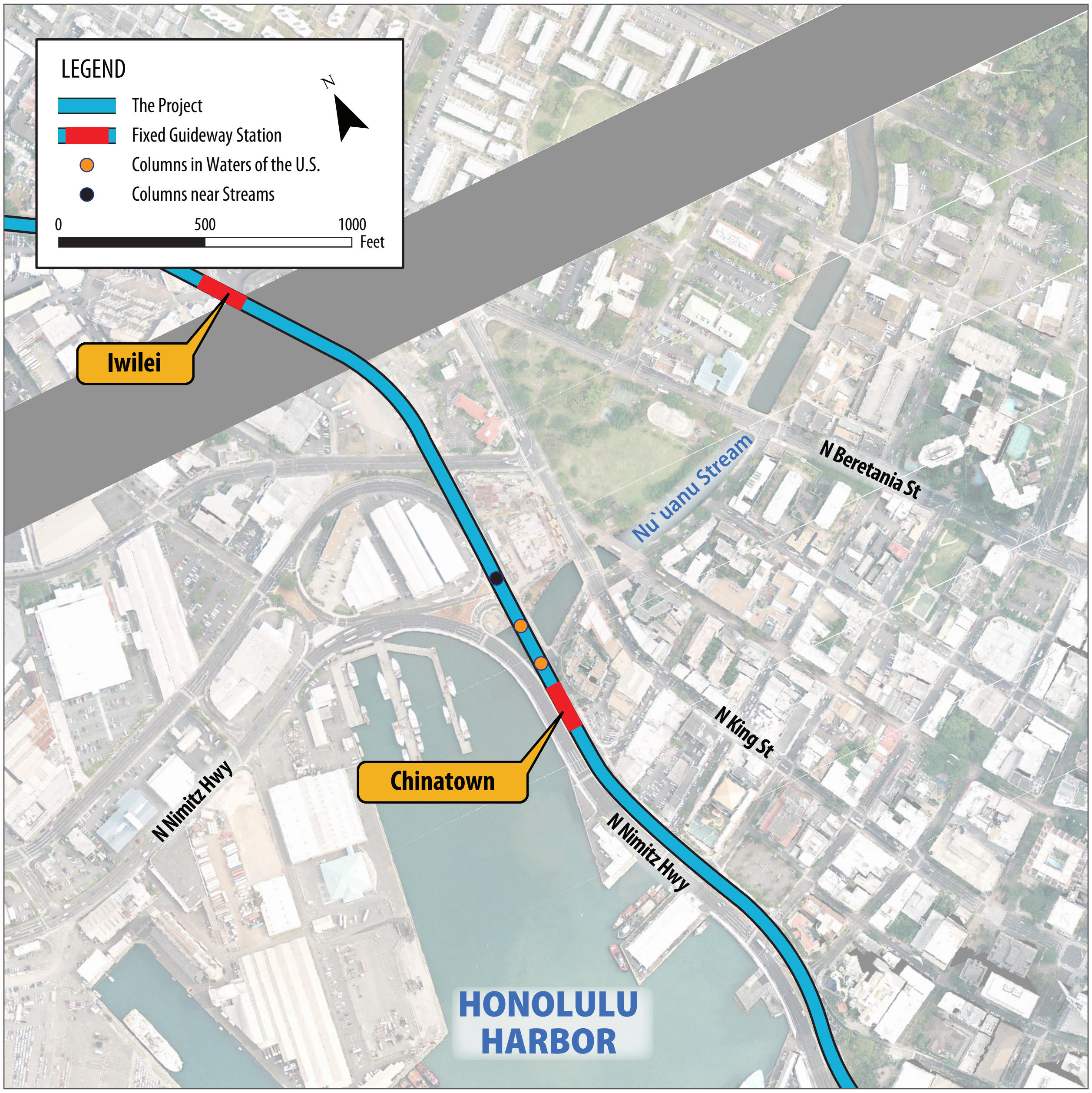


Figure 4-70 Nu`uanu Stream

36 square feet each on 10-foot drilled shaft foundations) will be constructed in the estuary. Columns are needed in this location to span the stream. In Nuʻuanu Stream, because of the presence of the Nimitz Highway lanes and ramps and the sewage treatment plant ʻEwa of Nuʻuanu Stream, the location of guideway columns has already been optimized to avoid the existing roads and facilities in this area while still accommodating a Chinatown Station on the Koko Head side of Nuʻuanu Stream. The columns will be designed to be in line with existing bridge piers in the stream, if feasible. Placement of the piers and fill is not expected to have any consequences on the Nuʻuanu Stream estuarine environment or its fauna beyond a loss of approximately 0.004 acre of silty sand bottom. Because the guideway is located between two existing bridges, shading effects will be minimal as the guideway shadow will be on one or the other of the bridges most of the time.

Wetlands

The project guideway will be built in the middle of Kamehameha Highway and will not place any structural elements in Waiau Springs and Wetland (Site 15) or nearby Sumida Watercress Farm wetland (Site 17). The edge of the deck of the guideway will be approximately 50 to 60 feet from the makai edge of both of these wetlands. The edge of the roadway is approximately 20 feet from these wetlands. The guideway near ʻAiea Bay State Recreation Area (Sites 19 and 20) is approximately 200 feet from the tidal wetland there. The Project will have no impact on this wetland (Figure 4-66).

Maintenance and Storage Facility Stormwater Outfall

The preferred maintenance and storage facility site (Site 11A) will have its own on-site stormwater collection system. This system will control stormwater runoff with on-site catch basins and connecting underground pipes that will drain the stormwater to a detention basin. If there is above-normal rainfall, stormwater from the detention basin will be piped through a 60-inch underground pipe and concrete box culvert to Middle Loch of Pearl Harbor at Site 11B. To meet avoidance and minimization requirements, structural elements of the drain will not be placed in waters of the U.S. The system includes permanent oil/water/sand separators, and any discharge entering Pearl Harbor will meet water quality requirements for the estuary (Figure 4-63). Impacts will be limited to infrequent flows generated by large storms. These treated flows will contribute fresh water to the Loch. However, Pearl Harbor is considered to be an estuary because of the restricted exchange with the Pacific Ocean through a narrow mouth and the substantial freshwater flows from a number of contributing springs and streams draining southern Oʻahu.

Waiau Springs and Wetland

There will be no physical impacts on this small wetland from the nearby guideway beyond shading (Site 15). The shading effect will be similar to the Sumida Watercress Farm Wetland as discussed below.

Sumida Watercress Farm Wetland

There will be no physical impacts on this small wetland from the nearby guideway beyond shading (Site 17). Although equations (and computer programs) exist to quantify shading from structures, the results are not easily simplified for discussion. A primary reason for the complexity is that the shadow created by the guideway in this or any other location will be slightly different each hour of the day and each day of the year. Furthermore, unlike a building or wall of comparable dimensions, the elevated guideway is open underneath. Nonetheless, a general description of the shadow path across the Sumida Wetland site can be offered and assessed on a daily and seasonal basis.

The guideway will be elevated approximately 30 feet above the highway and extend upward roughly another 10 feet. It will be this "wall" at between 30 and 40 feet above Kamehameha Highway that will cast the major shadow on surrounding areas. The horizontal distance from the guideway to the nearest Sumida Watercress pondfield is about 70 feet. Since the guideway will be a continuous structure oriented WNW-ESE, its shadow will be a band across the ground, the size and location of which is a function of the angle of the sun.

This shadow will change throughout the day—a low sun angle in the early morning and late afternoon will generate a broad shadow band distant from the guideway in a direction opposite from the sun's position in the sky. In the summer, the sun angle at all times will generate a shadow either to the south (away from the wetland) or more or less parallel with the guideway. Only in the several months before and after the winter solstice will a shadow be cast to the north, potentially falling on some pondfields. The longest shadows will be cast in the morning and afternoons because at those times the sun is low on the horizon. The longest noon shadow will occur on the winter solstice (December 21); on that date the guideway shadow band will lie between 69 and 92 feet north from the guideway, or just reaching into the nearest pondfield 70 feet distant. Of course, on that date (as on all others), the structure's shortest shadow will occur when the sun is highest in the sky around noon, so perhaps the clearest way to quantify the shadow's extent relative to the watercress growing areas is to consider the time of day that the shadow leaves (in the morning as the sun rises) and enters (in the afternoon as the sun sets) the pondfields closest to the guideway.

Note first that between early March and mid-October of every year, the shadow does not reach the watercress growing areas (except perhaps briefly right after sunrise and just before sunset). From mid-October through late December, the shadow will move back from the pondfields progressively later in the morning and appear progressively earlier in the afternoon, a trend that will reverse after December 21. The impact of shadowing will be greatest during the months of December and January when some pondfields will remain in shadow up to about 9 a.m. and will be in shadow after 4 p.m. For the months of November and February, shadowing should end after about 8:30 a.m. and return around 4:30 p.m.

Consideration of whether such a shadow will measurably reduce primary productivity in plants subjected to shadow complicates the assessment further. A shadow does not represent an area of no light (as is the case at night in the earth's shadow), but an area of reduced light similar to a cloudy day because sunlight is scattered by the atmosphere.

Further the movement of the sun will keep the shadow moving throughout the daylight hours, so no single location or plant will experience continuous shading over an extended period (as would be the case underneath elevated building platforms at Sites 12 and 13). When the shadows from the guideway are longest (at lowest sun angles), the nearest pond fields will receive light coming under the guideway

Flood Zones

As a linear feature, the guideway will cross several floodplains in Waipahu and Pearl Highlands. However, the Project will not cause significant floodplain encroachment as defined by USDOT Order 5650.2. The guideway and many stations will be elevated above the floodplain by piers, but some facilities, such as stairs, elevators, and traction power substations, will have to be built at ground level. These features could have minor effects on floodplains, depending on how and where they are placed within a floodplain (Figures 4-67). However, any such changes caused by the Project will be mitigated through design to comply with current flood zone regulations.

The fixed guideway will provide a safe alternative to surface transportation during storms. No likely future damage associated with floodplain encroachment is anticipated that could be substantial in cost or extent.

There will be no notable adverse impacts on natural and beneficial floodplain values. The major beneficial functions for the floodplains analyzed in the study corridor are the recharge of groundwater and drainage conveyance. There will be no impact to water levels in flood zones.

Stormwater

Pollution prevention BMPs, such as regular inspection and cleaning of the drainage system, will need to be a part of the stormwater management plan that will be developed during Final Design. Permanent BMPs will be needed for the maintenance and storage facility and the park-and-ride facilities. Permanent BMPs will also be installed for stormwater that drains from the guideway at crossings of waterbodies.

In some instances, the discharge of stormwater may increase stormwater inflow to some waters as a result of rainfall collecting on impervious surfaces where infiltration currently occurs. However, because stormwater quality is not expected to be adversely affected, no streams or downstream marine waters are expected to experience negative effects.

Stormwater runoff will be filtered through landscaped median areas and sedimentation collars where possible. Stormwater will be filtered through specially designed bioinfiltration units near water bodies, including those on the HDOH 303(d) list of water quality-limited segments (specifically Sites 4, 12, 18, and 19). In locations where space does not allow for their use, downspout filters will be installed on drains near impaired waters (Sites 7 and 30).

Permanent BMPs will be installed as part of the Project to address stormwater quality before the water is discharged to streams or existing storm drain systems. The BMPs will promote a natural, low-maintenance, sustainable approach to managing and increasing stormwater quality. At a minimum, all stormwater downspouts from the guideway will include erosion control BMPs and energy dissipation devices to prevent any scour of landscaped medians. An integral part of the permanent BMPs will be an inspection and maintenance plan to ensure that the BMPs operate as designed.

Permanent BMPs will be used to reduce typical pollutants associated with runoff from the park-and-ride and the maintenance and storage facilities before it enters State waters to the maximum extent practicable. The permanent storm water BMPs will be designed, installed, and maintained in accordance with the criteria and guidelines described in the respective authority having jurisdiction of the storm water management plan. Types and sizes of permanent storm water BMPs will depend upon the runoff quality and water quality requirements of each receiving water body.

Permanent BMPs, such as bioretention areas, vegetated buffer strips, dry swales, water quality basin, and structural BMPs with oil/water separators, will be considered, as needed, during the park-and-ride site and the maintenance and storage facility design process. Selection of permanent BMPs will be site-specific and may be modified as a result of geotechnical data collection during final design. Proper training, maintenance, and reporting of the permanent BMPs will also be needed for the long-term success of the stormwater pollution reduction efforts.

Groundwater

The Project meets the coordination requirements of Section 1424(e) of the Safe Drinking Water Act, in accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the USDOT (FHWA/EPA 1984). A Water Quality Impact Assessment was reviewed by EPA, and EPA concurred that contamination of the Southern Oʻahu Basal Aquifer will not occur (letter dated March 27, 2009, located in Appendix F). The construction methods and BMPs employed and the presence of an upward hydraulic gradient in much of the study corridor will protect the groundwater, and there will be no adverse effect to groundwater quality.

The Project will increase impermeable surfaces at the maintenance and storage facility and park-and-ride lots and redirect runoff. By installing permanent BMPs, most of the runoff will be directed back into the ground to recharge the groundwater system, resulting in little change in the amount of infiltration. In this way, although runoff from surrounding surfaces may enter the groundwater system along a different path than previously, the groundwater recharge needed to sustain the aquifer system will continue. Therefore, the Project will not result in any long-term changes to groundwater levels. Runoff from the guideway itself is expected to be relatively free of pollutants and will not threaten groundwater quality. Permanent BMPs, such as oil-water separators, will be used in areas where contamination is present to protect groundwater quality. Construction BMPs will be provided to prevent contamination of the aquifer during construction (Section 4.18).

Mitigation

Surface and Marine Waters

Where the Project crosses an estuary reach and placement of support columns below the OHWM cannot be avoided, the columns will align with existing columns, where feasible. As these columns are not anticipated to adversely affect flood flow, fish passage, or long-term water quality, no mitigation is planned (see Section 4.18 for mitigation during construction).

In one instance (Waiawa Stream, Site 12), a relatively natural riparian zone still exists and may be affected by the Project. These impacts include shading from five bridge structures, permanent removal of vegetation underneath raised structures, and the placement of support columns in the riparian area outside the stream channel. These impacts could reduce vegetative cover and lead to increased bank erosion in some areas. Mitigation for these impacts will include restoration of portions of the stream bank and riparian zone where previous land tenants have placed fill material, as well as natural landscaping of riparian areas along the entire stream affected by the Project.

Water resource mitigation is being proposed to compensate for the 0.02-acre permanent encroachment into waters of the U.S from the linear transportation features of the Project and 0.06 acre of impact from other Project elements (culvert improvement at Waiawa Springs). Construction phase mitigation measures are discussed in Section 4.18. The mitigation measures presented here satisfy the requirements established by 33 CFR 325 and 332, and 40 CFR 230 (Subpart J: Compensatory Mitigation for Losses of Aquatic Resources). These mitigation measures are presented only after measures to fully avoid the water feature have failed and only after all measures have been taken to minimize encroachment.

Permanent mitigation features are proposed at Waiawa Stream, within the Pearl Highlands Station (Figure 4-62). This approximately 17-acre site provides sufficient space for mitigation since only approximately 5 acres will be required for the station, leaving the remainder of the site available for mitigation. Regulations suggest, but do not require, mitigation within the same watershed. Impacts from the Project amount to several small impacts in different watersheds. Individually these would be difficult to mitigate separately (i.e., keep within the same watershed as the impact) to achieve lasting compensation. Impacted watersheds could be more broadly defined on the basis of the nearby receiving waterbody for the impacted estuary; these are Pearl and Honolulu Harbors and Keʻehi Lagoon. Of the three, Pearl Harbor has the greatest potential for benefit from a mitigation effort directed at improving function within a contributing stream system. This is because it is the largest of the estuarine environments (i.e., of a type closer to the environments impacted) and is the most enclosed. As a result, it is more sensitive to land impacts than Keʻehi Lagoon or Honolulu Harbor. The proposal is to consolidate mitigation to a single site (Site 12) on Waiawa Stream.

Waiawa Stream was selected over an estuary location because of the availability of land that is part of the Project where enhancement of the stream and potential establishment of a riverine wetland are possible with a high degree of long-term success. The mitigation area would become part of the Project. Although the Project will have minimal effect on the stream at Site 12, it will have a considerable effect on the riparian area at that location.

Waiawa Springs (Site 13) is under the jurisdiction of the USACE. The impact area of constructing a culvert to direct the stormwater outfall and spring flow away from under the Pearl Highlands Station is greater (0.06 acre) than all the permanent impacts from the guideway (0.02 acre). Mitigation in this location can also be used to improve the existing outfall, improve water quality, and enhance the natural setting of the station.

Mitigation for the Waiawa Stream mitigation site includes the following:

- Enhancement of the stream to restore and/or improve ecological and aquatic function
- Establishment of water quality basins
- Enhancement of floodway capacity conveyance to achieve zero rise in flood zone by removal of fill and an increase in stream area
- Extension of existing culvert to Waiawa Stream to correct existing ponding situation
- Ecological restoration with native Hawaiian plantings and use of non-invasive species

Details will be developed during the permitting phase.

Stormwater

Permanent BMPs will be installed on all stormwater outfall structures associated with the Project and incorporated into the design, as discussed in this section and Section 4.17.2 for the maintenance and storage facility. Temporary BMPs for the management of stormwater during construction are discussed in Section 4.18.

Wetlands

Since there are no significant impacts to wetlands, no mitigation is required (see Section 4.18 for mitigation during construction). Although some shading impacts to wetlands are anticipated, these are minimal and limited to increased duration of early morning and late afternoon shadows during several mid-winter months (in the case of Sites 15 and 17).

Flood Zones

As a linear feature, the guideway will cross several floodplains in Waipahu and Pearl Highlands. However, the Project will not cause significant floodplain encroachment as defined by USDOT Order 5650.2. Any changes caused by the Project will be mitigated through design to comply with current flood zone regulations.

Groundwater

Because no impacts to groundwater, artesian resources, or the Southern Oʻahu Basal Aquifer are expected, no mitigation other than the BMPs discussed above and in Section 4.18 will be required.

Approach to USACE Permitting

In consideration of the level of impacts described above, the use of Nationwide Permits is proposed. Water resource impacts are small enough that this permit approach may be suitable to the level of impact requiring regulation. Current Nationwide Permits expire in 2012, so permitted work requiring construction after 2012 will either require coverage under renewed Nationwide Permits or under an individual permit to be obtained at that time. Should future discussions with the USACE indicate that an Individual Permit should be pursued, USACE requirements will be followed.

The City and County will obtain USACE permits for all phases of construction as presented in the Final EIS. Should a contractor propose work beyond the scope of those existing City and County permits, the work will only be allowed after approval from the City and County. If the City and County approves, the contractor will be required to prepare the necessary permit modifications. The City will be responsible for implementing all mitigation measures resulting from this permit modification process.

USACE permits contain legally enforceable conditions. The Record of Decision to be issued that indicates acceptance of the Final EIS also establishes a legally enforceable mechanism to ensure that committed mitigation measures are implemented. Means are available to regulate contractor-proposed changes to issued permits.

4.14.4 404(b)(1) Analysis

The regulatory requirements of the Section 404(b)(1) analysis are stated in Section 4.14.1. For this Project, the proposed modal options, transit technologies, and alignments that exhibit the least overall adverse environmental harm must be examined in the context of "practicability" prior to elimination from further consideration. Practicable is defined as "available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes."

Chapter 2 discusses a wide range of alternatives and documents the basis of those modal options, transit technologies, and alignments that were eliminated from consideration. Many alternatives were eliminated from consideration prior to entering the Alternatives Analysis. Of those alternatives that entered the Alternatives Analysis, neither the Managed Lane Alternative nor the Transportation System Management Alternative would have met the Project's Purpose and Need. As a result, these two alternatives would not have been practicable per Section 404(b)(1) requirements. During this process, aquatic resources were considered qualitatively as there is no substantial difference between alternatives, which all would cross waters of the U.S. throughout the corridor. In addition, their comparative severity of impact to waters of the U.S. was not a differentiating factor among them. The Alternatives Analysis concludes that the Fixed Guideway Alternative meets the Project's Purpose and Need (Chapter 2) and is, therefore, the sole remaining practicable alternative.

Subsequent to the Alternatives Analysis, the differing transit technologies were evaluated on the basis of performance, cost, and reliability (Chapter 2). Steel wheel on steel rail was selected as the Preferred Alternative because it is mature, proven, safe, reliable, economical, and non-proprietary. For these reasons, the other technologies are not considered practicable per the Section 404(b)(1) requirements.

Following the screening of technologies, only four alternatives were evaluated in the Draft EIS, all using steel wheel on steel rail technology. The encroachment into waters of the U.S. of each alternative is summarized below:

- No Build Alternative—no encroachment from the Project
- Fixed Guideway via Salt Lake Boulevard—encroachment during construction: 0.18 acre; permanent encroachment: 0.03 acre
- Fixed Guideway via the Airport—encroachment during construction: 0.13 acre; permanent encroachment: 0.02 acre
- Fixed Guideway via the Airport & Salt Lake—encroachment during construction: 0.19 acre; permanent encroachment: 0.03 acre

The Airport Alternative was identified as the Preferred Alternative (Chapter 2). Of the three fixed guideway alternatives addressed in the Draft EIS, the Airport Alternative encroaches the least into waters of the U.S. during both construction and operation (0.06 acre less and 0.01 acre less than both of the other alternatives, respectively). Consequently, the Airport Alternative is the LEDPA under the Section 404(b)(1) analysis.

Further discussion of the differences between the Airport Alternative and the Salt Lake Alternative with respect to impacts on water resources is provided below.

Each alternative would cross a total of 20 streams, 19 of them the same (although two are at different locations on Hālawa and Moanalua Streams). Seventeen of the 19 streams would be crossed in approximately the same manner with regard to clear-span versus piers below OHWM. The Salt

Lake Alternative would have crossed Kahauiki Stream, and the Airport Alternative will cross Aolele Ditch.

Both alignments would require guideway columns in Moanalua Stream. The Airport Alternative's span over Moanalua Stream (Site 27) will be near the mouth of the stream on the downstream side of the H-1 Freeway ramp to Nimitz Highway. It will require two piers be placed in the stream. As much as feasible, these columns will be aligned with the supports for the many other viaducts supporting the H-1 Freeway and its access ramps to avoid impacts to stream flow. The Salt Lake Alternative would have crossed Moanalua Stream farther inland (Site 24), approximately 500 feet downstream of where Kikowaena Street crosses. No columns would be located in the stream. The guideway would also cross over the tributary Kahauiki Stream (Site 26), spanning it without columns in the channel.

Both alternatives would span Hālawa Stream but at different locations. The Project will cross Hālawa Stream between the Kamehameha Highway bridges (Site 22). The Salt Lake Alternative would cross at Salt Lake Boulevard (Site 23) over a concrete-lined channel. The Project site crossing at Kamehameha Highway spans a tidally influenced waterway.

Aolele Ditch will be spanned by the Project. Aolele Ditch is a man-made trapezoidal flood-control canal that parallels Aolele Street flowing Koko Head under Lagoon Drive into Keʻehi Lagoon. It receives drainage from the commercial district up to Nimitz Highway, as well as runoff conveyed in storm drains from portions of the airport.

4.15 Street Trees

This section describes street trees within the study corridor. A street tree is considered any planting in a street or highway right-of-way that exceeds a height of 8 feet. Street trees are prevalent along many of the corridor's roadways, starting in Waipahu and extending to UH Mānoa and Waikīkī. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Street Trees Technology Report* (RTD 2008l).

4.15.1 Background and Methodology

City and County of Honolulu Street Tree Regulations

Exceptional street trees are regulated by ROH Chapter 41, Article 13. Coordination with the DPR Division of Urban Forestry and community groups, such as the Outdoor Circle and Sierra Club, with regard to street trees was initiated at the start of the NEPA process. This coordination has resulted in the identification of *Exceptional Trees* along the project alignment. Coordination will be ongoing as the Project progresses.

Street Tree Survey

A comprehensive survey of street trees was conducted in the project corridor to identify species, size, maturity, condition, and the Project's probable effect on each tree. Trees were also listed as *Notable* or *Excellent*, if applicable.

Notable Trees are those deemed to be important to the urban landscape character.

Excellent Trees are mature trees, without any other plantings nearby, that have been allowed to expand to their fullest possible canopy and have not been pruned or affected in such a manner to take away from their appearance.

Exceptional Trees are a single tree or grove of trees with historic or cultural value or which, by reason of their age, rarity, location, size, aesthetic quality, or endemic status, have been designated by the City Council as worthy of preservation (ROH 1990).

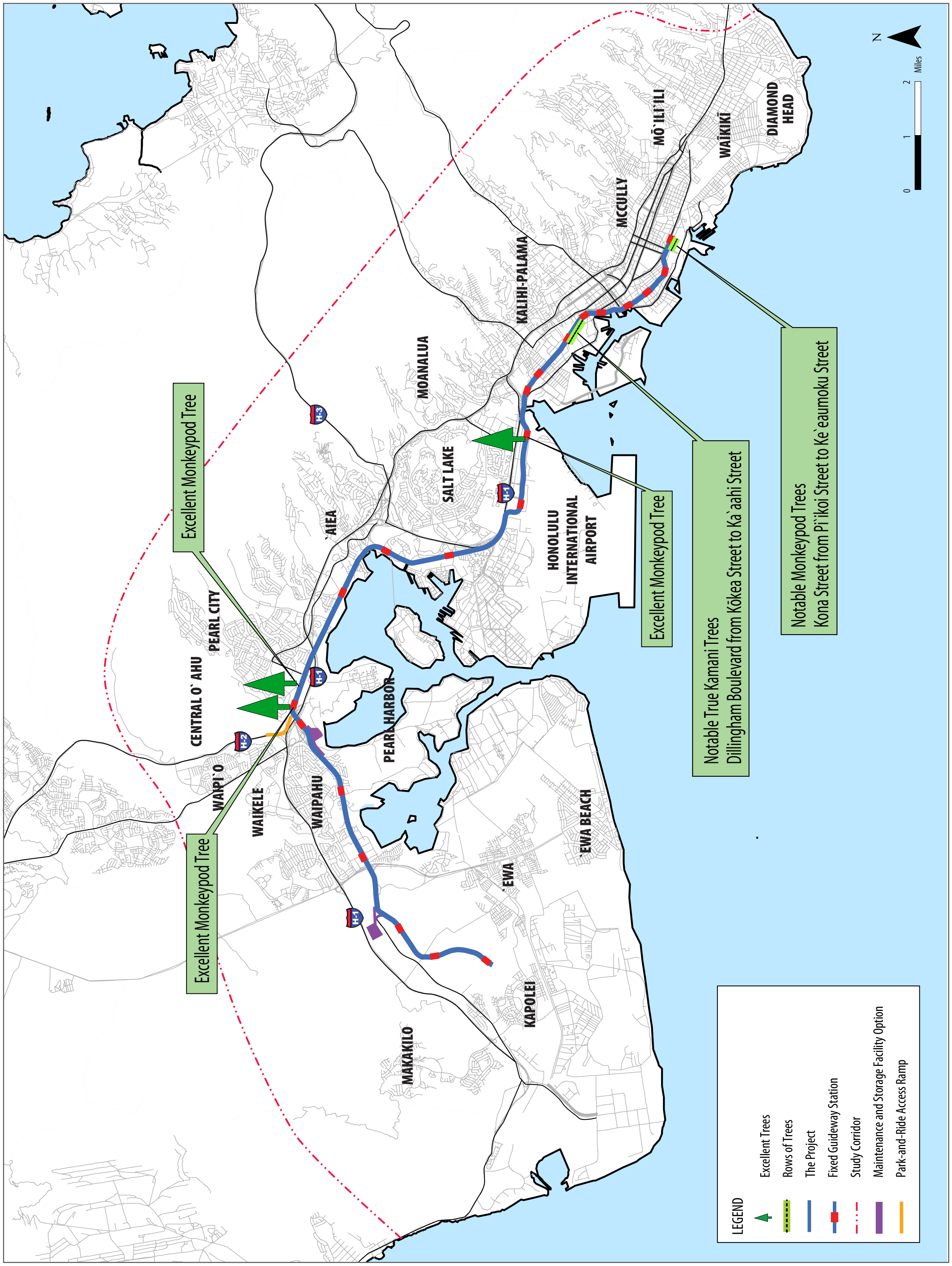


Figure 4-71 Identified Street Trees

4.15.2 Affected Environment

Nearly 50 different tree species were identified during the survey (Figure 4-71). Along most of the alignment, street trees belong to the following species: rainbow shower, be-still, monkeypod, tall fan palm, and coconut palm. Many of the other species present are relatively common in Hawai'i, but some uncommon plantings are present, such as autograph trees (*Clusia rosea*) in Ke'ehi Lagoon Beach Park.

Figure 4-72 True Kamani Trees on Dillingham Boulevard

Notable Trees along the entire route include the following clusters:

- 43 true kamani trees in rows along both sides of Dillingham Boulevard between Kōkea and Ka'aahi Streets (Figure 4-72)
- 10 privately owned monkeypod trees in the median along Kona Street within Ala Moana Center

The following trees were not identified as Exceptional or Notable, but are important to consider:

- Plantings in the median of Farrington Highway between Fort Weaver Road and Waipahu High School helped beautify this roadway approximately five years ago and were nominated for a landscaping/beautification award. These currently juvenile or semi-mature plantings of rainbow shower trees, tall fan palms, and kou trees are important to the community and the Waipahu streetscape.
- Several streets, including Dillingham Boulevard, Kapi'olani Boulevard, Kona Street, Kalākaua Avenue, and portions of Halekauwila Street, contain mature vegetation within the medians and streetscapes.
- At Honolulu International Airport, near the old interisland terminal, there are many relatively newly planted rainbow shower trees.

4.15.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not impact street trees. Although the projects in the ORTP are assumed to be built, their environmental impacts will be studied and documented in separate environmental documents.

Project

Table 4-32 shows the approximate number of street trees that will be pruned, removed, or transplanted as a result of the Project.

The Project will require tree pruning and removal. Tree removal will be minimized to the greatest extent possible, but if a street tree is close to the guideway, it will likely require periodic pruning, if not removal.

The following effects will result from the Project. The fixed guideway will primarily affect street trees in Waipahu and Downtown. Notable effects will include the following:

Table 4-32 Summary of Street Tree Effects/Transplanting Mitigation

	Trees to Be Pruned	Trees to Be Removed	Trees that Could Be Transplanted
Project	100	550	300 (55 percent)

Note: (55 percent) = approximate percent of trees that will be removed that are transplantable.

- Two monkeypods identified as Excellent trees along Kamehameha Highway near Pearlridge Center have very large canopies that are approximately 50 feet from the center of the planned guideway. They may require minimal pruning.
- One monkeypod identified as an Excellent tree located on Lagoon Drive near Keʻehi Lagoon Beach Park has a 70-foot canopy. This tree may require minimal pruning.
- Twenty-eight Notable true kamani trees on the makai side of Dillingham Boulevard will be removed. Trees on the makai side of the street are already periodically pruned because of the presence of utilities. Trees on the mauka side of Dillingham Boulevard are not pruned and will be preserved.
- Most of the relatively newly planted trees along Farrington Highway in Waipahu will be removed.
- Monkeypod trees on Kona Street between Piʻikoi Street and Keʻeaumoku Street will be removed.

Many of the trees that will be affected along the project alignment are relatively small and easily replaceable be-still trees and are considered transplantable. However, the Project will require the removal and possible transplant of 14 newly planted rainbow shower trees near the old interisland terminal. In addition, one Excellent monkeypod in Keʻehi Lagoon Beach Park may require slight pruning. Specific quantities of trees to be pruned, removed, and transplanted are included in the totals in Table 4-32.

Mitigation

Effects to street trees will be mitigated by transplanting existing trees to areas as close to their original location as feasible or planting new ones. Among the trees that require removal but could be transplanted are most of the trees along Farrington Highway. The location where street trees will be transplanted will be selected based on project-specific criteria that could include the following:

- Areas where existing landscaping will be lost along the study corridor
- Areas where opportunities exist for enhancing existing streetscapes near the study corridor
- Areas where stations and parking lots will be constructed
- Areas where shared benefits will be accomplished, such as areas adjacent to parks or historic sites

Street tree pruning, removal, and planting will comply with City ordinances and will require that a certified arborist manage the pruning of any Exceptional trees. Trees suitable for transplanting displaced by construction will be relocated to a City project nursery until they can be transplanted to another part of the project area. The City will coordinate with HDOT's highway landscape architect. The City will coordinate with SHPD for the removal of the group of 28 true kamani trees on the makai side of Dillingham Boulevard in accordance with the draft PA (Appendix H).

In addition to transplanting existing trees, plans for new plantings will be prepared by a landscape architect during final design to further mitigate effects to street trees. To mitigate any substantial effects in areas that require tree removal, special attention will be given to developing landscaping plans so that new plantings will provide similar advantages to the community. If new plantings will not offer equitable mitigation (e.g., older mature trees that are removed), additional younger trees could be planted that will, in time, develop similar benefits.

4.16 Archaeological, Cultural, and Historic Resources

This section provides the regulatory context that governs archaeological and cultural resources, as well as historic resources. It also discusses how the Project will affect resources and historic properties within the area of potential effects (APE) and proposed mitigation to address those effects. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Archaeological Resources Technical Report* (RTD 2008n), the *Honolulu High-Capacity Transit Corridor Project Historic Resources Technical Report* (RTD 2008o), the *Honolulu High-Capacity Transit Corridor Project Cultural Resources Technical Report* (RTD 2008p), the *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Historic Resources Technical Report* (RTD 2009c), and the *Honolulu High-Capacity Transit Corridor Project Historic Effects Report* (RTD 2009d).

The *Area of Potential Effects* (APE) is the geographical area or areas within which an undertaking may directly or indirectly change the character or use of historic properties.

4.16.1 Background and Methodology

Regulations

The Project must comply with Federal and State archaeological, cultural, and historic preservation laws and regulations.

Federal

The Project is subject to compliance with the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.). According to Section 106 of the NHPA, the responsible Federal agency is required to consider the effect of its project on historic properties (consisting of any prehistoric or historic district, site, building, structure, or object) eligible for listing in the National Register of Historic Places (NRHP). The lead Federal agency, in consultation with the SHPO, is responsible for the determinations of eligibility for listing on the NRHP and for the finding of effect. The Federal Advisory Council on Historic Preservation (ACHP) is given the opportunity to participate in the Section 106 consultation process.

Section 106 requires that Federal agencies consider the effects of their actions on traditional cultural properties (TCP). TCPs are places that a community regards as important for association with cultural practices or beliefs that are rooted in a community's history and important in maintaining a community's cultural identity, as well as properties of traditional religious and cultural importance.

The Project may be subject to compliance with the *Native American Graves Protection and Repatriation Act* (NAGPRA) (25 USC 3001) where it crosses lands controlled or owned by the Federal Government. Any human remains found on lands owned or controlled by the Federal government will be addressed in accordance with NAGPRA and 43 CFR 10—the regulations that define the process and procedures of NAGPRA.

This section defines archeological, cultural, and historic (i.e., built) resources separately, although each of them are called "historic properties" when they are determined eligible for the NRHP. If the undertaking is determined to have an adverse effect on historic properties, then mitigation is developed and either a Memorandum of Agreement (MOA) or PA is executed.

Section 4(f) of the U.S. Department of Transportation Act of 1966 also applies to historic properties and is addressed separately in Chapter 5.

State

HRS Chapter 343 includes a cultural component—House Bill H.D.1, referred to as Act 50 (HHB 2000). Act 50 requires an EIS to "include the disclosure of the effects of a proposed action on the cultural practices of the community and State" and "amend(s) the definition of "significant effect" to include adverse effects on cultural practices." The Act defines "significant effects" related to cultural practices as "the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State" (HHB 2000).

The Cultural Resources Technical Report (RTD 2008p) identifies valued cultural, historic, and natural resources affected by the Project and discusses the following:

- The extent to which traditional and customary native Hawaiian rights are exercised in the Project area
- The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed Project
- The feasible action, if any, to be taken by the City to reasonably protect native Hawaiian rights where they are found to exist

The Cultural Resources Technical Report followed guidance provided by

- The Hawai'i Supreme Court's (HSC) ruling in *Ka Pa'akai o Ka 'Āina v. Land Use Commission* (Ka Pa'akai) (HSC 2000)
- HRS Chapter 343
- OEQC *Guidelines for Assessing Cultural Impacts* (OEQC 1997)

HRS Chapter 6E promotes the preservation of significant historic resources of value to the people of Hawai'i. HRS Section 6E-43 and HAR Chapter 13-300 establish provisions pertaining to the discovery of historic burial sites outside of established, maintained cemeteries on non-Federal lands within the State.

Process for Applying Regulations

Under the NHPA, Section 106 requires Federal agencies to consider the effects of their undertakings on historic properties. FTA delegated the authority to coordinate the Section 106 process to the City in 2005. Hawai'i's historic preservation review regulations [HAR Chapter 13-275] includes similar requirements to the Section 106 process. The following steps describe the Section 106 process:

- Identify consulting parties
- Initiate consultation and public involvement
- Identify the APE
- Identify and evaluate the NRHP eligibility of resources within the APE
- Assess effects on historic properties currently listed or eligible for listing in the NRHP
- Mitigate adverse effects with the SHPO and other consulting parties resulting in an MOA or PA
- Implement provisions of the MOA or PA

Area of Potential Effects

After coordination with the SHPO, the FTA and the City defined the APE for above-ground cultural and historic resources to be generally one parcel deep from the project alignment. The APE also includes parcels immediately adjacent to all facilities associated with the fixed guideway system, such as park-and-ride lots, traction power substations, and the maintenance and storage facility. The APE is larger around transit stations and has been defined to include entire blocks (or to extend 500 feet where blocks are not discernible) around the facilities. A copy of correspondence from the SHPO dated February 4, 2008, concurring with the APE is located in Appendix F of this Final EIS. Maps illustrating the APE are attached to the draft PA in Appendix H.

The Project's APE for below-ground archaeological resources is defined as all areas of direct ground disturbance. Confining the archaeological resources' APE to the limits of ground disturbance is warranted because the surrounding built environment is largely developed and becomes progressively more urban as the Project progresses Koko Head.

Methodology

Archaeological Resources

The vast majority of previously identified archaeological resources within the APE have been investigated and recorded as a result of historic preservation and/or environmental compliance efforts of various private-, Municipal-, State-, and Federal-funded projects and undertakings since the 1970s.

To evaluate below-ground effects on archaeological resources within the study corridor, the corridor was divided into 10 different sub-areas. A qualitative rating system describing potential archaeological impacts was developed and applied to each sub-area. This rating system considered existing archaeological documentation, geological and depositional characteristics, and some field inspection within the study corridor. The 10 sub-areas are rated Low, Moderate, or High as defined below:

- A *Low* rating indicates potential effects are possible but not considered likely, or that there is a reasonable expectation of potential effects in no more than 10 percent of a given sub-area.
- A *Moderate* rating indicates a reasonable potential for effects on between 10 and 50 percent of a given sub-area.
- A *High* rating indicates a reasonable expectation of potential effects on more than 50 percent of a given sub-area.

A *High* rating does not mean that at least 50 percent of a sub-area is expected to contain archaeological deposits. Rather, this rating only means that there is a reasonable potential to encounter archaeological deposits within at least 50 percent of the sub-area. The actual percentage of the sub-area where archaeological resources are encountered will undoubtedly be smaller.

Similarly, the rating system says nothing regarding the NRHP eligibility of potential archaeological resources. The Archaeological Resources Technical Report (RTD 2008n) describes the methodology and consultation process in detail.

The primary goal of the Project's ongoing archaeological effort is to provide additional background research and limited field investigation results for those areas that will be disturbed by the Project, as well as cultural consultation to support development of the archaeological portions of the Project's draft PA (Appendix H). The draft PA describes the archaeological historic property and resource identification and evaluation effort, as well as the mitigation procedures for identified archaeological resources.

The City will develop an archaeological inventory survey (AIS) plan for the APE for each construction phase in accordance with 36 CFR 800.4, which allows for phased identification of archaeological resources to limit disturbance of potential resources during the investigation. The City will use Preliminary Engineering plans to focus the investigation in locations where there is the potential to affect archaeological resources by project construction. The AIS plans will follow the requirements of HAR Chapter 13-276. The City will conduct the archaeological fieldwork as presented in the AIS plan for each construction phase. The archaeological fieldwork will be completed in advance of the completion of final design so that measures to avoid and/or minimize adverse effects to the historic properties can be incorporated into the design. The City has consulted and continues to consult with SHPD and OIBC on burial issues. As required under HRS Chapter 6E, the City will ensure that City and State agencies that grant land use entitlements for the Project consult with SHPD prior to the issuance of permits in areas where the Project may affect a burial site. To ensure that OIBC maintains jurisdiction to determine whether preservation in place or relocation of previously identified native Hawaiian burial sites is warranted, the City will complete an AIS prior to construction in each construction phase as follows. To balance the current level of project design, the desire to limit disturbance of native Hawaiian burials and residences in Phase IV of the project area, and the potential transportation benefits that would accrue from the proposed Project, FTA, in consultation with the consulting parties, decided to develop a detailed approach in the Section 106 draft PA for conducting archaeological investigations for Phase IV of the project. The City has committed to conducting archaeological investigations in locations where foundations will be placed. This would limit the area disturbed for archaeological investigations and construction to potentially less than 10 percent of what would be disturbed if archaeological investigations were conducted for 100 percent of the alignment. The City's proposed schedule for the Project would have construction starting in 2013 for Phase IV (in the Kaka‘ako neighborhood). Although, the development of more detailed design and, therefore, archeological investigations for the last construction phase would have typically been delayed until closer to the anticipated construction start date, the City has committed to starting the process much earlier.

Mitigation will be conducted in advance of, and in some cases during, the construction phases in the Project's different geographic areas.

Cultural Resources

Cultural resources include sites or places associated with significant events and/or people important to the native Hawaiian patterns of prehistory in the study corridor. These resources also include sites or places that embody distinctive characteristics or that are likely to yield information important for research on the prehistory of Hawai‘i. Sites that yield resources important for past and present native Hawaiian cultural practices and items that are part of a cultural place-based context are also included.

The analysis of cultural resources was based on compliance requirements for NEPA (USC 1969), HRS Chapter 343 (HRS 2008); Section 106 (USC 1966a), and Act 50 (HHB 2000).

The purpose of Act 50 is to (1) require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) amend the definition of "significant effect" to include adverse effects on cultural practices.

The State of Hawai‘i Office of Environmental Quality Control (OEQC) guidelines recommend that "an environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making."

The OEQC Guidelines for Assessing Cultural Impacts states that "cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements.

A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups" and suggest the following methodology: (1) gather information about traditional cultural practices, ethnic cultural practices, urban cultural practices, and prehistoric and historic cultural resources and practices that may be affected by implementation of a development project; (2) analyze the data; (3) produce an impact assessment; and (4) provide mitigation measures and suggestions.

In accordance with OEQC's guidelines, the cultural impact assessment information-gathering process included:

- Identifying individuals and groups with expertise on cultural resources, practices, and beliefs within the study corridor
- Conducting field surveys by canvassing (ethnographic pedestrian surveys) selected areas of the corridor
- Conducting semi-focused interviews of cultural experts or people familiar with details of cultural practices that would be adversely impacted
- Making site visits
- Reviewing pertinent archival and ethnographic documents.

Most archival and ethnographic research material came from Hawaiian Collections of the UH Hamilton Library (Mānoa Campus); the SHPO library, State Survey Division; Bishop Museum Archives; and the researcher's private library.

Data, including transcripts, surveys, and literature, was obtained and analyzed for concepts, categories, or propositions generated by topic indicators (e.g., medicine, flora, burials). As required by OEQC guidelines, background research included inspecting tax, GIS, and historic maps. Available Land Commission Award parcels within or adjacent to the study area and historic resource and archaeology reports completed within the vicinity of the Project were used to obtain data.

The Hawai'i Supreme Court ruled in *Ka Pa'akai* that native Hawaiian rights are a subset of culture protected by Act 50. To protect the traditional and customary rights of native Hawaiians, *Ka Pa'akai* also requires the State to protect the cultural and natural resources that support these practices. The analytical framework imposed by the court was considered as part of this cultural impact assessments process.

Cultural resource assessment and findings are detailed in the Cultural Resources Technical Report (RTD 2008p).

Historic Resources

The Project's Alternative Analysis phase included an initial assessment of the location of historic resources along each evaluated alignment. This was one of the evaluation criteria used in the selection of alternatives to study in the Draft EIS. Modifications to the Project that could avoid or minimize adverse effects involved making substantial engineering changes (e.g., alignment variations and changes in station designs) and shifting station locations. Further design refinement, such as exact column placement to avoid archaeological resources, will continue during the ongoing design of the Project. Consultation with the SHPO will continue regarding engineering options to minimize adverse effects where feasible.

Previously identified and potentially eligible historic (i.e., built) resources were identified and evaluated, and the Project's effects on them were determined. GIS data were compiled and used to initially identify resources to survey. Properties within the APE were identified as those with construction dates before 1969. In addition, several buildings were surveyed at the request of the SHPO, despite being past the 1969 cut-off date or slightly outside the APE. Field observations were made and photographs were taken of more than 1,000 surveyed properties. Research was conducted at the City and County of Honolulu Real Property Assessment and Treasury Divisions and other research centers. Summary forms were prepared for all surveyed properties. These were reviewed by the SHPO.

NRHP criteria defined in 36 CFR 60.4 were applied to evaluate pre-1969 properties in the APE—which will be 50 years or older at completion of the Project—for eligibility for listing in the NRHP. These regulations state that "the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association." These properties must also meet one or more of the following Significance Criteria (NPS 1991; 36 CFR 60.4):

- Criterion A—resource is associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B—resource is associated with the lives of persons significant in our past.
- Criterion C—resource embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D—resource has yielded or may be likely to yield information important in prehistory or history.

In addition to 36 CFR 60.4, two criteria considerations were applied to resources within the APE. Criteria Consideration D provides guidance on applying NRHP eligibility criteria to cemeteries (Potter 1992). Criterion Consideration G offers guidance on applying the criteria to properties that achieved significance in the last 50 years (Sherfy 1998).

In its review of technical reports prepared for the Project, the SHPO did not have any questions or comments regarding the methodology used to determine National Register eligibility. Appendix F of this Final EIS includes correspondence from the SHPO that includes its review comments on the Historic Resources Technical Report (RTD 2008o) and the Historic Effects Report (RTD 2009d), along with other correspondence related to the Project.

Effects to all identified eligible or listed properties were evaluated within the current context and setting of the property, with regards to the identified historic significance and level of retention of historic integrity, and in relation to changes to the property or within its vicinity that the Project would or may cause. An adverse effect was determined when the Project would alter, directly or indirectly, any of the characteristics of the historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration was given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register.

Using the criteria of adverse effect established in 36 CFR 800.5(a)(1) and guidance found in the National Register Bulletin *How to Apply the National Register Criteria for Evaluation*, each historic property was evaluated to determine if implementation of the Project will alter any historically significant characteristics or features of a historic property by diminishing relevant aspects of that property's historic integrity. For some eligible or listed resources within the Project's APE, certain aspects of integrity are not critical to the reasons that a property was determined to be eligible for listing. For each historic property, one of the following findings was made regarding the Project's potential to affect each aspect of integrity:

- No effect
- No adverse effect
- Adverse effect

The majority of historic properties identified within the APE were not associated with and/or did not retain historic setting. Therefore, when integrity of setting was determined to not be critical to character-defining features and/or National Register eligibility (regardless of whether the individual aspects of integrity were specifically called out in prior documentation) or when integrity of setting was no longer retained, introduction of the rail guideway in a portion of a historic property's setting or viewshed generally resulted in a No Adverse Effect determination.

Traditional Cultural Properties

The City will conduct a study to identify and evaluate the APE for the presence of traditional cultural properties (TCP). If FTA determines that TCPs are eligible for the NRHP, the City will meet with the Section 106 consulting parties to identify measures to avoid, minimize, and mitigate adverse effects (see Appendix H).

Section 106 Consultation

Extensive effort was made to identify, contact, and consult with groups with demonstrated interests relating to archeological, cultural, and historic resources within the APE. The information gathered at that time provided a starting-point for work to support this Final EIS.

The purpose of consultation was to identify archaeological, cultural, and historic resources and to discuss other issues relating to the Project's potential effects on such resources. Information was obtained from individuals and organizations likely to have knowledge of potential resources in the study corridor. A reasonable and good faith effort was made to identify Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the APE, and they were given opportunities to discuss issues and concerns.

In addition to consultation with the SHPO, the City also consulted with organizations and agencies with concerns regarding archaeological, cultural, and historic areas. This consultation included Hawaiian civic clubs that may have an interest in the Project. Letters sent by the FTA initiated an ongoing consultation process with the following groups (Section 106 consulting parties) to identify resources, consider project effects, and develop mitigation to limit the adverse effects of the Project:

- National Trust for Historic Preservation
- Historic Hawaiʻi Foundation
- University of Hawaiʻi Historic Preservation Certificate Program
- American Institute of Architects
- Hawaiʻi Community Development Authority
- U.S. Navy (U.S. Naval Base Pearl Harbor)
- Office of Hawaiian Affairs
- Oʻahu Island Burial Council
- Hui Malama I Na Kupuna O Hawaiʻi Nei
- Royal Order of Kamehameha
- The Ahahui Kaʻahumanu
- The Hale O Na Aliʻi O Hawaiʻi
- The Daughters and Sons of the Hawaiian Warriors
- Association of Hawaiian Civic Clubs—and 15 individual civic clubs
- Department of the Interior, National Park Service (NPS)
- Advisory Council on Historic Preservation

Since publication of the Draft EIS, this Section 106 consultation process has included contacting each consulting party and offering to meet to gather input, distributing all Section 106 related documents to the consulting parties with a request for review and comment, attending meetings as requested to provide project updates, and responding to requests for information. The SHPO concurred on the Project's APE on February 4, 2008, Determination of Eligibility on October 3, 2008, and Effects on July 22, 2009. In June 2010, FTA submitted additional information and a request for SHPO concurrence of eligibility and effect for properties on Ualena Street. The SHPO concurred on the eligibility and effects for the Ualena properties on May 27, 2010. For a copy of the consultation letters, see Appendix F.

Between July 28, 2009, and November 13, 2009, FTA and the City invited all consulting parties to participate in a series of meetings to develop the draft PA. The process considered all adverse effects, including indirect and cumulative, to historic properties, measures undertaken to avoid and minimize harm, and additional evaluations required prior to construction. Appendix F of this Final EIS includes correspondence from the consulting parties received by the City and FTA during the Section 106 process. All comments from consulting parties were considered in the development of the draft PA. The draft PA provides for mitigation for adverse effects to historic properties and also outlines procedures to be followed to protect historic properties, including archeological resources and native Hawaiian burials, as construction proceeds. The draft PA includes stipulations that describe the roles and responsibilities of the signatories, which include FTA, ACHP and invited signatories, which include NPS and the City. Among the stipulations are the commitments to complete traditional cultural properties studies; a phased approach to undertaking archaeological studies that includes initial planning, consultation, fieldwork, treatment and mitigation plans, and curation; following established design standards; recording and documenting adversely affected built resources; completing NRHP and NHL nominations; funding and administering educational and interpretive programs, materials, and signage; mitigating adverse effects to specific resources by funding and supporting preservation and restoration efforts; and implementing measures to address reasonably foreseeable indirect and cumulative effects caused by the Project. The draft PA also describes how post-review discoveries will be handled and commits to providing public information throughout the term of the draft PA. The draft PA was developed in consultation among the consulting parties. The Section 106 process identified historic properties potentially affected by the Project, assessed effects, and sought ways to avoid, minimize, or mitigate any adverse effects on any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The draft PA records the terms and conditions agreed upon to resolve potential adverse effects and is attached to this Final EIS in Appendix H. The Section 106 signatories (FTA, SHPO, and ACHP) clarified the language in the draft PA and, in May 2010, FTA distributed the draft PA to the Section 106 consulting parties for informational purposes. FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize this draft PA prior to the ROD. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signatures as concurring parties to the PA.

4.16.2 Affected Environment

Archaeological Resources in the APE

Archaeological resources already documented within the APE include remnants of fishponds, cultivation terraces, irrigation systems, habitated sites, and subsurface cultural layers related to Native Hawaiians that may include religious or cultural artifacts and resources, including iwi kupuna or Hawaiian burials.

Three general categories of archaeological resources that could be affected are identified: burials, pre-contact archaeology, and post-contact archaeology. They are shown by area and rated by probability of occurrence in Figure 4-73.

A draft archeological inventory survey (AIS) was completed for the first construction phase of the Project. The study area includes an approximate

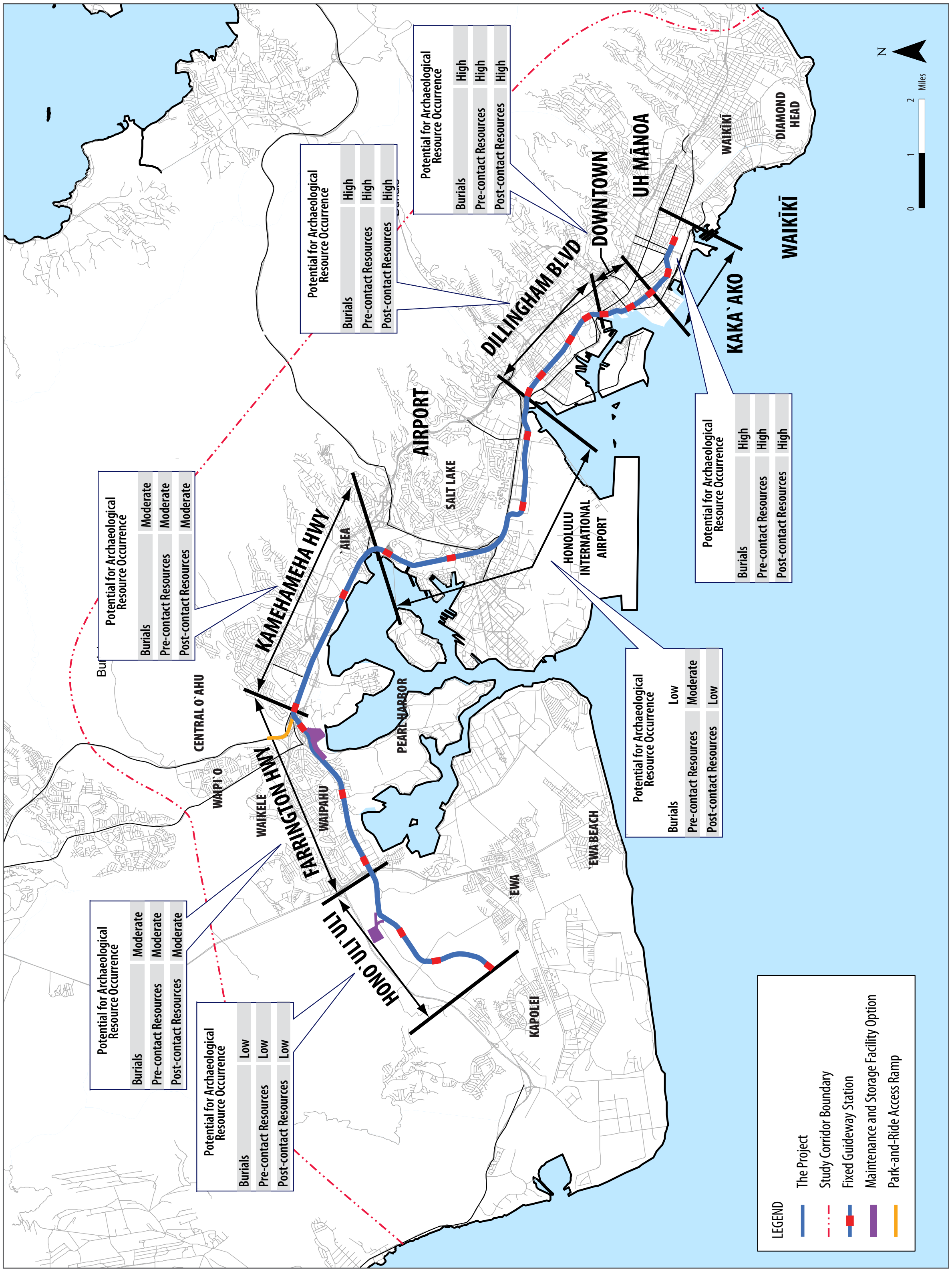


Figure 4-73 Potential to Affect Archaeological Resources

6.8-mile segment extending from North-South Road in East Kapolei to the Pearl Highlands Station and an approximate 0.6 mile segment extending from the Pearl Highlands Station to Waimano Home Road in Pearl City, which is part of the second construction phase.

This AIS investigation for the first construction phase identified one subsurface cultural deposit (loʻi sediments) in the project area near the Waipahu Transit Center that is recommended National/Hawaiʻi Register-eligible under Criterion D.

Cultural Resources in the APE

Because of the level of existing development along the study corridor, many cultural resources have been destroyed or altered beyond repair. The Cultural Resources Technical Report (RTD 2008p) lists cultural resources identified within the Project's APE.

Historic Resources in the APE

The APE contains 81 historic resources (individual or districts). These resources are shown in Figures 4-74 through 4-77. The Historic Resources Technical Report (RTD 2008o) and Addendum 01 to the Historic Resources Technical Report (RTD 2009c) include all historic resources identified within the Project's APE. The SHPO concurred with determinations of eligibility for historic structures on November 14, 2008. A copy of the SHPO correspondence is included in Appendix F of this Final EIS.

Two historic resources identified in the Draft EIS, the Sandobal House and the Solmirin House, are no longer considered eligible following additional consultation with the SHPO. Two additional historic resources, the Two-story (Tsumoto) Shop House and A/C Electric, have been demolished since their identification as historic resources. The OR&L Terminal Building and the OR&L Office/Document Storage Building were individually evaluated on separate survey forms in the Historic Resources Technical Report (RTD 2008o) and individually evaluated in the Historic Effects Report (RTD 2009d); thus, these properties are counted and listed as individual properties in the Final EIS. These changes account for the 81 historic resources listed in this Final EIS compared to 84 historic resources listed in the Draft EIS.

Since publication of the Draft EIS, historic properties in the APE on Ualena Street were surveyed. There were no properties eligible for inclusion on the NRHP register and, therefore, there will be no effect on properties in this area.

4.16.3 Environmental Consequences and Mitigation

Environmental Consequences

Archaeological Resources

Subsurface features and deposits, including iwi kupuna or Hawaiian burials, that have not been previously identified may be affected by the Project. Native Hawaiian testimonies in Land Commission Award claims indicate that there are burials within the study corridor. Other historical accounts related to land use and current understanding of traditional Native Hawaiian burials and mortuary traditions and practices are other indicators that iwi kupuna may be discovered in subsurface burials.

The AIS investigation for the first construction phase identified one archeological resource (SIHP 50-80-09-7751) in the project area that may be affected by the Project. The Project will have an "effect, with proposed mitigation commitments" under State law and "no adverse effect" with mitigation under Federal law.

Cultural Resources

Potential long-term effects on cultural resources include permanent modification, such as displacement, damage, or destruction. Any cultural resources that are uncovered will be assessed

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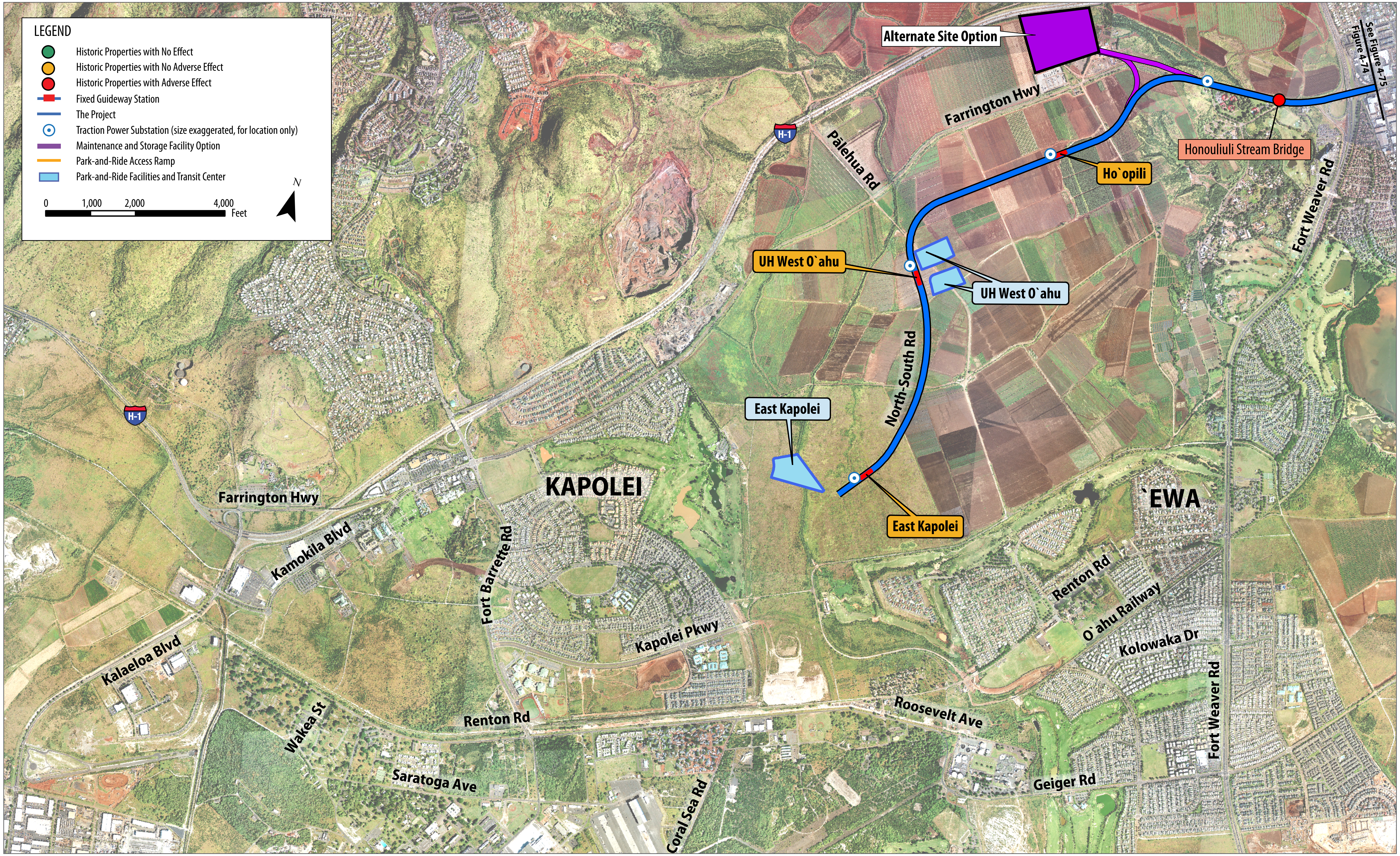


Figure 4-74 Historic Properties in Area of Potential Effects (East Kapolei to Fort Weaver Road)

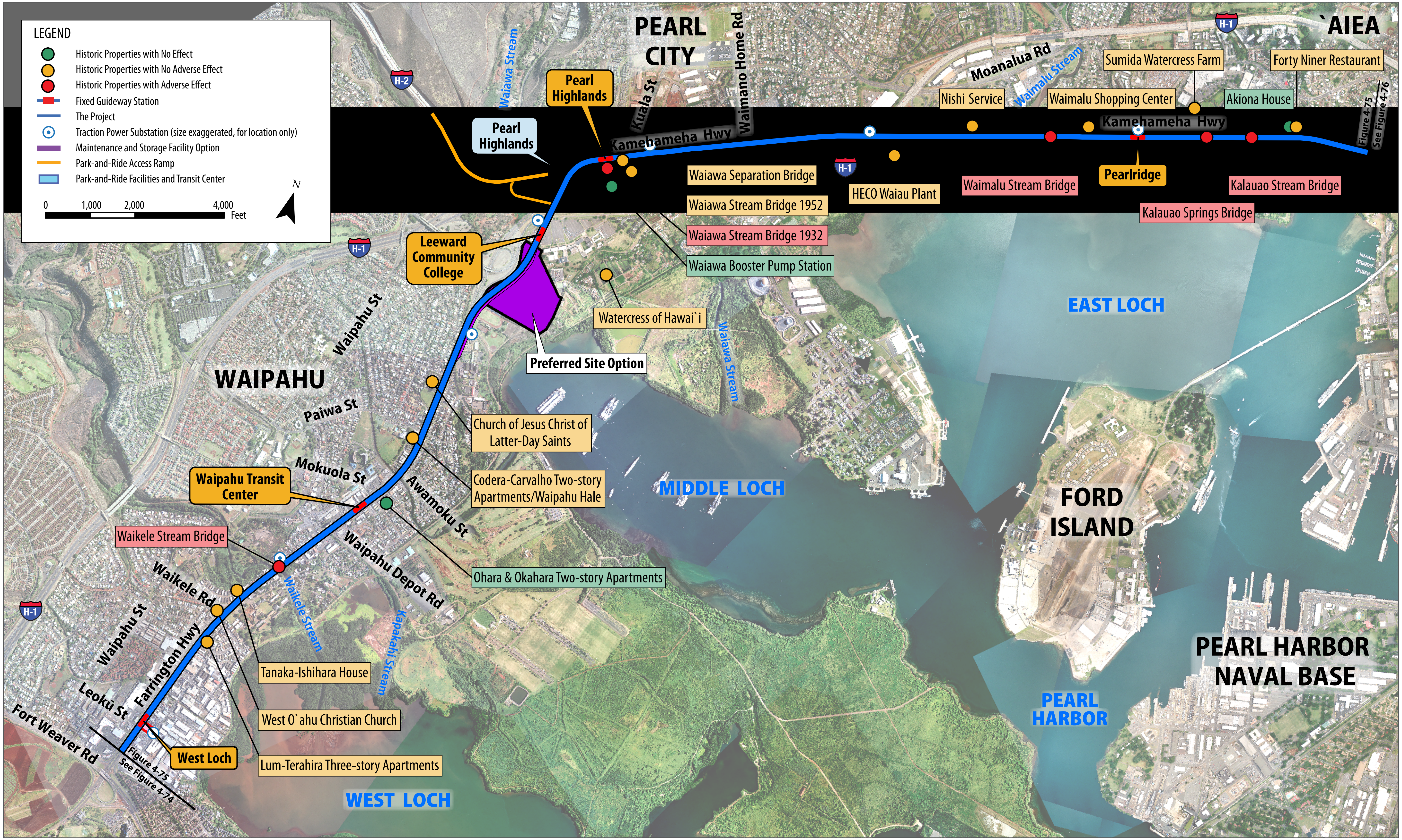


Figure 4-75 Historic Properties in Area of Potential Effects (Fort Weaver Road to Aloha Stadium)

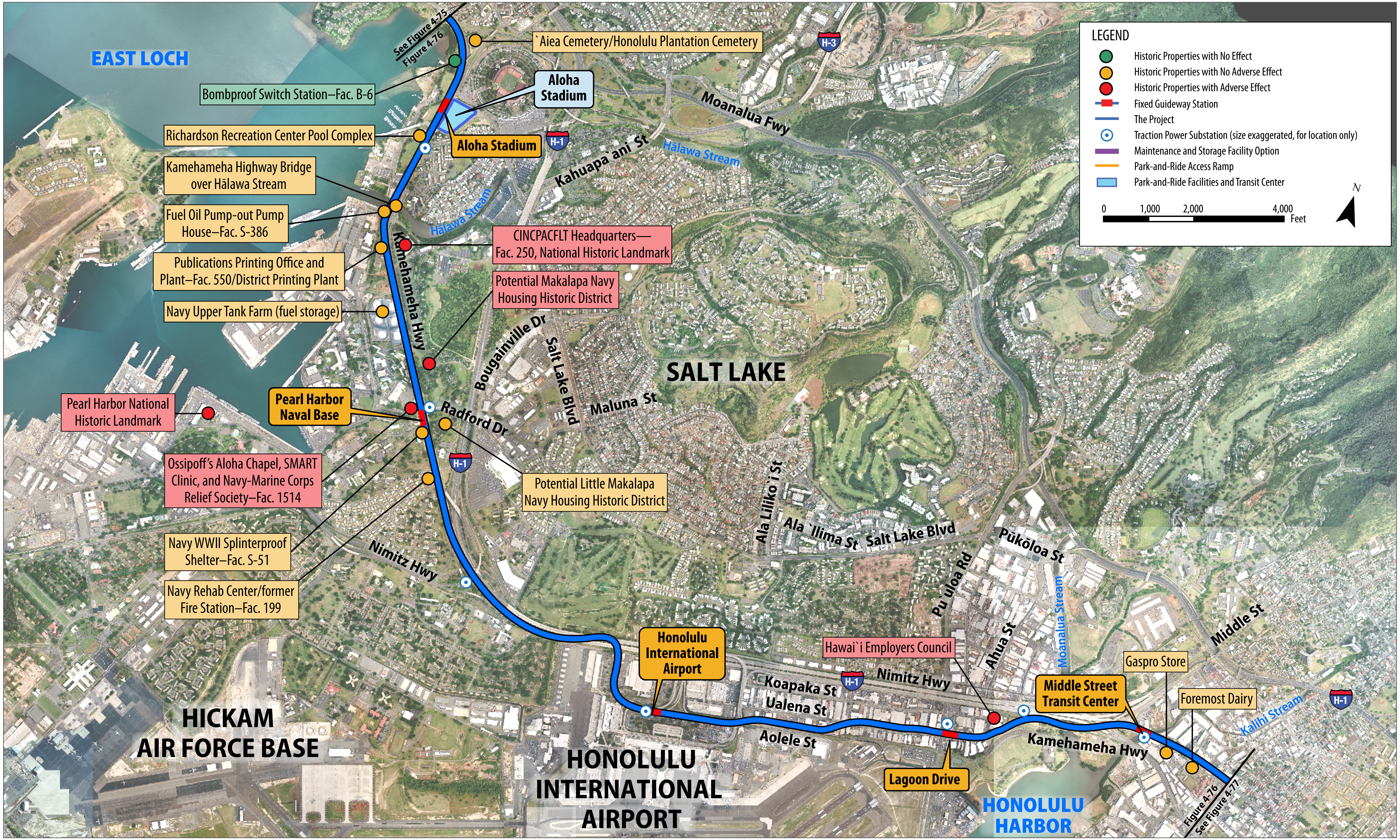


Figure 4-76 Historic Properties in Area of Potential Effects (Aloha Stadium to Kalihi)

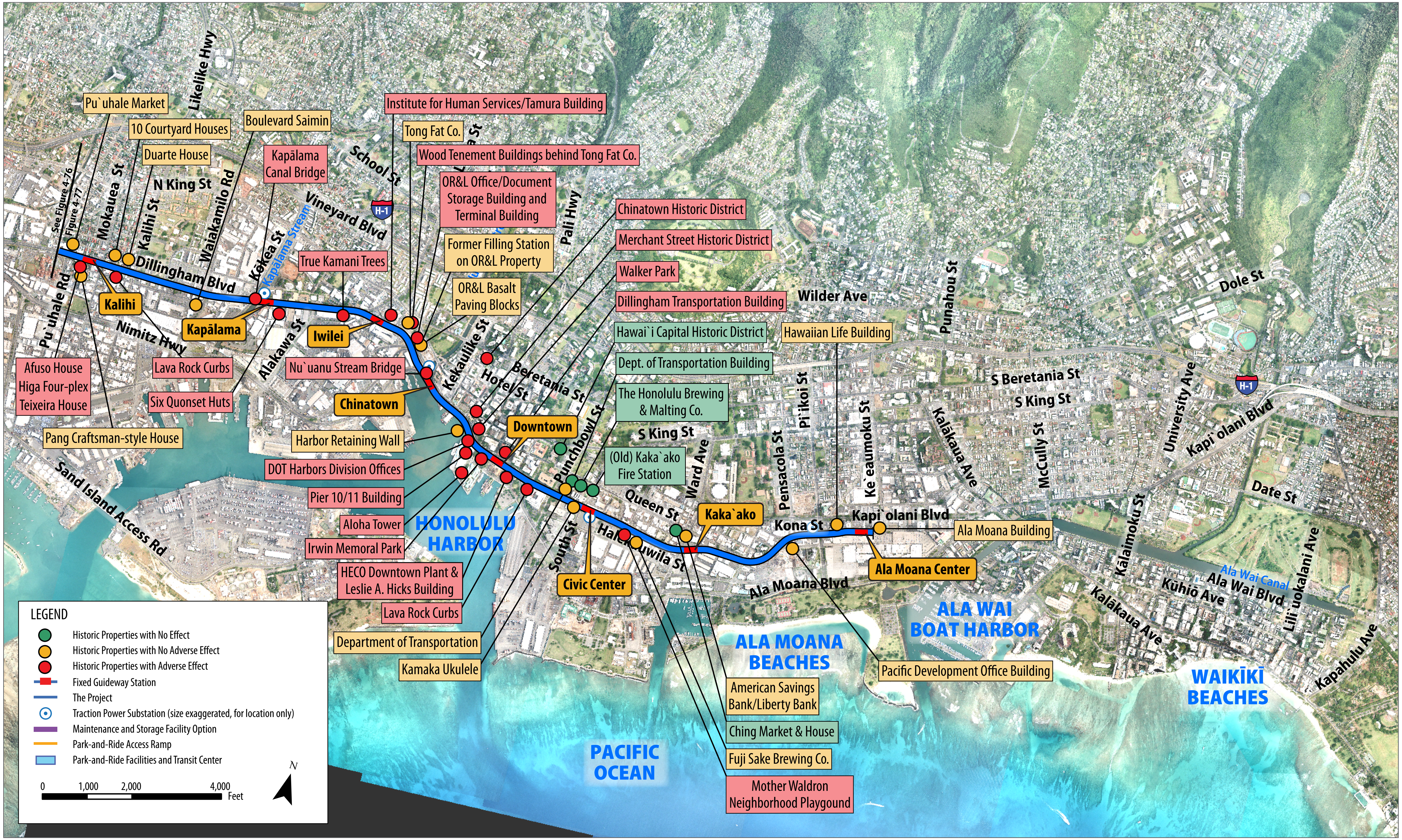


Figure 4-77 Historic Properties in Area of Potential Effects (Kalihi to Ala Moana Center)

through collaborative consultation with appropriate cultural practitioners and/or community groups. Table 4-33 lists resources within the APE that will be affected.

Traditional Cultural Properties

The Chinatown Historic District is listed in the NRHP and is likely a TCP. Further investigation for TCPs is being completed as stipulated in the draft PA, which is included in Appendix H.

Historic Resources

Eighty-one listed or eligible historic resources were identified within the APE. These properties, and potential impacts, are shown on Figures 4-74 through 4-77 and listed in Table 4-34.

> An *adverse effect* is found when an undertaking may alter any of the characteristics that qualify an historic property for inclusion on the National Register [36 CFR 800.5(a)(1)].

At the time of the Draft EIS, the SHPO had reviewed the preliminary Section 106 effects determination but had not yet provided concurrence on the effects. Consultations with the SHPO and Section 106 consulting parties have continued regarding the effect determinations since the Draft EIS. Of the 81 historic resources, FTA has determined that the Project will have adverse effects to 33 historic resources. Included in these 33 are adverse effect determinations recommended by the SHPO and accepted by the FTA. The SHPO did not provide the basis for these determinations. Therefore, general effects to the resource are assumed.

The Project is adjacent to the U.S. Naval Base, Pearl Harbor NHL and near the CINCPACFLT Building NHL, also a part of the Pearl Harbor Naval Base. The FTA accepted the SHPO determination of adverse effect. The Project is not within the boundary of the NHLs and does not have a direct impact on the resources. Therefore, individual, eligible resources located on the Pearl Harbor Naval Base that will be adversely affected by the Project due to changes to setting include Makalapa Navy Housing, Vladimir Ossipoff's Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society–Facility 1514. These resources are not considered contributing elements to the NHL district. The USS Bowfin and the wrecks of the USS Arizona and USS Utah are NHLs located within the Pearl Harbor NHL, but they are not located within the APE for the Project. In addition, some properties within the NHL that also constitute a portion of the newly designated World War II Valor in the Pacific National Monument, including the Arizona Memorial and Visitor Center, were located outside of the APE.

Mitigation

Based on the results of the AIS for the first construction phase area, the City will conduct archaeological data recovery before station construction at the makai entrance building of the

Table 4-33 Adverse Effects on Cultural Resources Related to Act 50

Resource	Type	Effect
Waiawa Stream	Resource (water)	Project crosses stream. Transit center and park-and-ride in vicinity of stream may adversely affect access to stream and resources within stream.
Aku Bone Lounge & Grill	Practice	Displacement
Hawai`i International Child	Practice	Displacement
Makana Esthetics Wellness Academy	Practice	Displacement

Table 4-34 Historic Properties within Project's Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
n/a	Hono`uli`uli Stream Bridge	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
94039582	Lum-Terahira Three-story Apartments	No direct impact to resource	No adverse effect
94027127	West O`ahu Christian Church/former American Security Bank (round plan)	No direct impact to resource	No adverse effect
94025008	Tanaka-Ishihara House	No direct impact to resource	No adverse effect
n/a	Waikele Stream Bridge eastbound span and Bridge over OR&L spur	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
94019020 and 94019021	Ohara & Okahara Two-story Apartments	No effect	No effect
94017043	Codera-Carvalho Two-story Apartments/Waipahu Hale	No direct impact to resource	No adverse effect
94036071	Waipahu Hawai`i Stake, Church of Jesus Christ of Latter-Day Saints	No direct impact to resource	No adverse effect
96003026	Watercress of Hawai`i	No direct impact to resource	No adverse effect
96003045	Waiawa Booster Pump Station		No effect
n/a	Waiawa Stream Bridge 1932 (westbound lanes)	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
n/a	Waiawa Stream Bridge 1952 (eastbound lanes)	No direct impact to resource	No adverse effect
n/a	Waiawa Separation Bridge	No direct impact to resource	No adverse effect
98003010	HECO Waiau Plant	No direct impact to resource	No adverse effect
98006024	Nishi Service	No direct impact to resource	No adverse effect
n/a	Waimalu Stream Bridge	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
98022074, 98022081	Waimalu Shopping Center	No direct impact to resource	No adverse effect
98016047	Sumida Watercress Farm	No direct impact to resource	No adverse effect
n/a	Kalauao Springs Bridge	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
n/a	Kalauao Stream Bridge	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
98018041	Akiona House (Quonset)	No effect	No effect
98018042	Forty-Niner Saimin Restaurant	No direct impact to resource	No adverse effect
	`Aiea Cemetery/Honolulu Plantation Cemetery	No direct impact to resource	No adverse effect
99003038	Bombproof Switch Station – Facility B-6	No effect	No effect

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project's Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
99003029	Richardson Recreation Center Pool Complex (Swimming Pool – Facility S-21; Recreation – Facility 1; Bath House/Locker Room – Facility 2; Handball Court – Facility S-20)	No direct impact to resource	No adverse effect
n/a	Kamehameha Highway Bridge over Halawa Stream (mauka span)	No direct impact to resource	No adverse effect
99001001	Fuel Oil Pump-out Pump House – Facility S-386	No property acquisition, less than adverse effect to attributes	No adverse effect
99002004	Commander-in-Chief Pacific Fleet (CINCPACFLT) Headquarters – Facility 250, National Historic Landmark	***General effects to resource ****	***Adverse effect***
99001008	Publications Printing Office and Plant – Facility 550/ District Printing Plant	No direct impact to resource	No adverse effect
99001008	Navy Upper Tank Farm (fuel storage)	No direct impact to resource	No adverse effect
99002004	Potential Makalapa Navy Housing Historic District	***Effects to setting and feeling***	***Adverse effect***
Various	United States Naval Base, Pearl Harbor National Historic Landmark	***General effects to resource ****	***Adverse effect***
99001008	Ossipoff's Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society – Facility 1514	***Effects to setting only***	***Adverse effect***
99002004	Potential Little Makalapa Navy Housing Historic District	No property acquisition, less than adverse effect to attributes	No adverse effect
99001008	Navy WWII splinterproof shelter – Facility S-51	No property acquisition, less than adverse effect to attributes	No adverse effect
99001008	Navy Rehab Center/former Navy Fire Station – Facility 199	No property acquisition, less than adverse effect to attributes	No adverse effect
11016004	Hawai`i Employers Council	***Effects to setting, feeling, and association***	***Adverse effect***
12013007	Gaspro Store	No direct impact to resource	No adverse effect
12013006	Foremost Dairy	No direct impact to resource	No adverse effect
12012014	Pu`uhale Market	No direct impact to resource	No adverse effect
12009017	Afuso House	***Full acquisition***	***Adverse effect***
12009017	Higa Four-plex	***Full acquisition***	***Adverse effect***
12009018	Teixeira House	***Full acquisition***	***Adverse effect***
12009060	Pang Craftsman-style House	No direct impact to resource	No adverse effect
12002113	10 Courtyard Houses	No direct impact to resource	No adverse effect
n/a	Lava Rock Curbs	***Curb removal; effects to location, design, setting, materials, workmanship, feeling, and association***	***Adverse effect***
12002108	Duarte House	No direct impact to resource	No adverse effect
15029060	Boulevard Saimin	No direct impact to resource	No adverse effect

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project's Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
n/a	Kapālama Canal Bridge	***Effects to setting, feeling, and association***	***Adverse effect***
15015008	Six Quonset Huts	***General effects to resource ****	***Adverse effect***
n/a	True Kamani Trees	***Removal of approximately 28 trees along dillingham boulevard***	***Adverse effect***
15007033	Institute for Human Services/Tamura Building	***Effects to setting, feeling, and association***	***Adverse effect***
15007003	Tong Fat Co.	No direct impact to resource	No adverse effect
15007003	Wood Tenement Buildings behind Tong Fat Co.	***General effects to resource ****	***Adverse effect***
15007001, 15007002	O`ahu Railway & Land Co. Office/Document Storage Building	***Guideway will require 50 feet of right-of-way on property; effects to integrity of location, design, setting, feeling, and association***	***Adverse effect***
15007001, 15007002	O`ahu Railway & Land Co. Terminal Building	***Guideway will require 50 feet of right-of-way on property; effects to integrity of location, design, setting, feeling, and association***	***Adverse effect***
15007001	Former filling station on OR&L Property	No direct impact to resource	No adverse effect
15007001, 15007002	O`ahu Railway & Land Co. basalt paving blocks	No direct impact to resource	No adverse effect
n/a	Nu`uanu Stream Bridge	***Effects to integrity of setting, feeling, and association***	***Adverse effect***
17002, 17003, & 17004 plats	Chinatown Historic District	***Minor parcel acquisition near Chinatown Marketplace (0.3 acre); adverse effects to integrity of design, setting, feeling, and association***	***Adverse effect***
17002 &21002 plats	Merchant Street Historic District (including Walter Murray Gibson Building/Honolulu Police Station)	***General effects to resource ****	***Adverse effect***
21001056	Harbor retaining wall of coral blocks from Honolulu Fort	No direct impact to resource	No effect
n/a	Walker Park	***General effects to resource ****	***Adverse effect***
21001005	DOT Harbors Division Offices	***General effects to resource ****	***Adverse effect***
21001001	Pier 10/11 Building	***General effects to resource ****	***Adverse effect***
21001013	Aloha Tower	***General effects to resource ****	***Adverse effect***
21013007	Irwin Memorial Park	***General effects to resource ****	***Adverse effect***
21014003	Dillingham Transportation Building	***Minor parcel acquisition, no impact to building; adverse effects to integrity of setting, feeling, and association***	***Adverse effect***
21014006	HECO Downtown Plant and Leslie A. Hicks Building	***General effects to resource ****	***Adverse effect***

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project's Area of Potential Effects (continued from previous page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
21026022	Hawai`i Capital Historic District (including Attorney General's Office/Hale Auhau)	No direct impact to resource	No adverse effect
21031012	Department of Transportation Buildings	No direct impact to resource	No adverse effect
21031021	Royal Brewery/The Honolulu Brewing & Malting Co.	No effect	No effect
21030014	Kamaka Ukulele	No direct impact to resource	No adverse effect
21031018	[Old] Kaka`ako Fire Station	No effect	No effect
21051005, 21051006	Mother Waldron Neighborhood Playground	***Effects to setting***	***Adverse effect***
21052008	Fuji Sake Brewing Company	No direct impact to resource	No adverse effect
21050049	Ching Market and House	No effect	No effect
21050052	American Savings Bank/Liberty Bank – Queen-Ward Branch	No direct impact to resource	No adverse effect
23007029	Pacific Development Office Building	No direct impact to resource	No adverse effect
23039023	Hawaiian Life Building	No direct impact to resource	No adverse effect
23039001	Ala Moana Building	No direct impact to resource	No adverse effect

*Basis for effect determination not provided by the SHPO.

Waipahu Transit Center Station for the subsurface cultural deposit (lo'i sediments).

If, in the unlikely event that subsurface cultural deposits or human skeletal remains are encountered during the course of project-related construction activities, all work in the immediate area will stop and the SHPO will be notified in accordance with Federal and State law (see Section 4.18). If archaeological resources are identified during pre-construction design or during construction, the City will avoid or minimize impacts.

Mitigation measures for historic resources adversely affected by the Project were developed in consultation with The SHPO and other Section 106 consulting parties. In addition, Section 106 regulations direct the Federal (or designated) agency to consult with the State Historic Preservation Officer, Chairperson of the Hawai'i Department of Land and Natural Resources, to develop "modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties" (36 CFR 800.6).

While the Project was designed to avoid and minimize effects to historic properties, this was not always possible in meeting the Project's Purpose and Need. Therefore, a draft PA was prepared to outline responsibilities and measures to mitigate or reduce adverse project effects. The draft PA was developed during extensive consultation with Section 106 consulting parties and included mitigation measures suggested by these consulting parties whenever possible.

The draft PA provides for mitigation for adverse effects to historic properties and also outlines procedures to be followed to protect historic properties, including archeological resources and native Hawaiian burials, as construction proceeds. The draft PA includes stipulations that describe the roles and responsibilities of the parties, which include FTA, the SHPO, ACHP, and the City and County of Honolulu. Stipulations are as follows:

- Committing to complete TCP studies
- A phased approach to undertaking archaeological studies that includes initial planning,

consultation, fieldwork, developing treatment and mitigation plans, and curation
- Following established design standards
- Recording and documenting adversely affected built resources
- Completing NRHP and NHL nominations
- Funding and administering educational and interpretive programs, materials, and signage
- Mitigating adverse effects to specific resources by funding and supporting preservation and restoration efforts
- Implementing measures to address reasonably foreseeable indirect and cumulative effects caused by the Project.

The draft PA also describes how post-review discoveries will be handled and commits to providing public information throughout the term of the draft PA. A copy of the draft PA is included in Appendix H of this Final EIS.

State of Hawai`i Act 50 Findings

Based on personal consultations and examination of historic documents and existing archaeological information, the cultural impact assessment concluded that most of the traditional cultural practices associated with cultural resources, such as the gathering of plant and marine resources for subsistence activities within the study corridor, have been heavily damaged or destroyed through previous development. No ongoing practices related to traditional gathering were identified during the assessment.

Effects on traditional cultural practices associated with Waiawa Stream will be mitigated through re-introduction of native planting and habitats in the area near Pearl Highlands Station, as discussed in Section 4.14.

Ethnic and urban cultural practices documented in the Cultural Resources Technical Report (RTD 2008p) would not be adversely affected because they could still exist in other locations. Mitigation measures for the displacement of these cultural practices include relocation compensation for the affected businesses, as described in Section 4.4.

The City will complete an interpretive plan for the project area to include signage of the cultural history of the community in the station design and develop and implement an educational and humanities program to enhance understanding of the history and culture in the project area as described in the draft PA.

The Cultural Resources Technical Report did not identify project impacts associated with cultural practices and beliefs that are associated with Native Hawaiian burials. If cultural practices associated with Native Hawaiian burials are identified, the City will take reasonable measures to mitigate impacts, including consulting with appropriate stakeholders.

4.17 Maintenance and Storage Facility

This section describes the effects of the maintenance and storage facility options on the natural and built environments. The preferred site option for the maintenance and storage facility is a 44-acre vacant site in Waipahu near Leeward Community College. A 41-acre site in the proposed Ho‘opili development in ‘Ewa is the alternative site for the maintenance and storage facility. The maintenance and storage facility is described in Chapter 2, and the site options are illustrated on Figures 2-38 and 2-39. Effects of the maintenance and storage facility on transportation are described in Section 3.4.3 of this Final EIS.

The site will contain several buildings for administration, a system control center, and parking for maintenance employees. It will also include areas for operation and maintenance of the trains, including storage for approximately 100 vehicles, a vehicle-wash area, and storage track. The facility will operate 24 hours a day. Each option will require special track work for trains to access the site from the guideway.

As documented below, the preferred location for the maintenance and storage facility is at the 44-acre vacant site in Waipahu near Leeward Community College. This site will have fewer land use impacts and will not contrast substantially with elements of the surrounding visual character, which include the highway interchanges, community college buildings, and adjacent parking lots. Use of this 44-acre vacant site will decrease the amount of agricultural land designated prime or of statewide importance that will be acquired for the Project from 80 acres to 47 acres.

The construction of the maintenance and storage facility on the 41-acre site in the proposed Hoʻopili development in ʻEwa would result in conversion of land with active agricultural use and would place the facility in an open flat agricultural area that will contrast with the open, rural setting. All other environmental effects between the two locations are equivalent.

4.17.1 No Build Alternative

Under the No Build Alternative, the maintenance and storage facility would not be built and would not affect the natural or built environments.

4.17.2 The Project

Land Use

Option near Leeward Community College (preferred option)

This site is near Middle Loch, between Waipahu and Pearl City. The site is makai of Farrington Highway and the H-1 and H-2 Freeways and is near Waipahu High School and Leeward Community College. The site is vacant but was used by the Navy as a fuel storage and delivery facility during World War II; it is no longer used for fuel storage but remains under caretaker status with the Navy. The site will be converted from vacant land to a transportation facility. If not developed as a maintenance and storage facility, the potential exists that the Department of Hawaiian Home Lands could develop the site. Use of the site for a vehicle maintenance and storage facility is consistent with the past industrial land use of the site.

Ho`opili Option

The Hoʻopili maintenance and storage facility option will be mauka of Farrington Highway, makai of the H-1 Freeway between Pālehua and Fort Weaver Roads. This site is adjacent to a Hawaiian Electric Company (HECO) substation. The site is used for agricultural purposes by Aloun Farms and includes orchards, fields, storage facilities, operations buildings, and plant nursery shade areas. However, the site is near the future Hoʻopili Master Planned Community. The site will be converted from current agricultural use and planned industrial/commercial use to a transportation facility. This option is consistent with planned land use in the area.

Noise

Noise generated from operations at the maintenance and storage facility will be similar at both sites. The nearest noise-sensitive use is approximately 700 feet or greater from the center of either site. No noise impacts will occur.

Option near Leeward Community College (preferred option)

This site lies between Waipahu High School in the ʻEwa direction and Leeward Community College Koko Head. Pearl Harbor is makai of the site, and a bike path runs between the site and Pearl Harbor. The two schools and the bike path are susceptible to noise and vibration effects. However, the school properties are approximately 700 feet from the center of the site. The nearest use at Waipahu High School is a sports field. The schools and the bike path will not experience noise impacts.

Ho`opili Option

This site is makai of the H-1 Freeway, which is a substantial noise generator. A HECO transmission station is makai of the site. The HECO site does not generate much noise, nor will it be affected by noise from the maintenance and storage facility. There are no existing noise-sensitive land uses near the site. Planned development adjacent to the site is anticipated to be light industrial and commercial. The Master Planned community will also include residential development that will be susceptible to noise and vibration impacts, but these uses are planned to be makai of Farrington Highway.

Visual

Option near Leeward Community College (preferred option)

This site is vacant and undeveloped property between the Waipahu High School and Leeward Community College campuses. Its topography slopes makai toward Pearl Harbor. Farrington Highway and the Farrington Highway/H-1 Freeway interchange are mauka of the site, with a single-family residential neighborhood farther mauka of the highway.

The maintenance facility will consist of buildings, paved parking areas, a complex of storage tracks and service bays, and site lighting. The multistory maintenance and storage facility buildings will be sited at various locations, with the tallest building (about 62 feet) near the makai end of the property at the base of the slope. A smaller building (about 36 feet high) is located ‘Ewa of the Leeward Community College Station. The train wash facility will be makai of the guideway and Farrington Highway. This building will be about 24 feet high.

Most components of the facility will be highly visible from Pearl Harbor and from residences in the foothills mauka of the Farrington Highway/H-1 Freeway Interchange. For motorists traveling along Farrington Highway, the maintenance facility building will intermittently block distant views of the shoreline and Pearl Harbor. The facility will not contrast substantially with elements of the surrounding visual character, which include the highway interchanges, community college buildings, and adjacent parking lots.

The maintenance and storage facility will be less visible from Waipahu High School and Leeward Community College due to topographic differences and vegetation. To avoid and minimize light spillage onto adjacent properties and night sky pollution, full cut-off luminaries (fixture and lamp design), low-pressure sodium lights, and low-reflective surfaces will be used. Use of low-pressure sodium lights will allow the Leeward Community College observatory to filter out any interfering light during use.

Although Pearl Harbor is in the middleground of most makai views in this area, these views are dominated by other elements in the wider panoramic scene, such as Diamond Head and the horizon at the Pacific Ocean. A maintenance facility at this site will result in moderate visual effects.

Ho`opili Option

This site is currently an open flat agricultural area adjacent to an electrical substation. The maintenance and storage facility will contrast with the open, rural setting. In addition, the facility buildings will be visible from mauka foothill residences. Planned future development near the Ho‘opili option includes light industrial and commercial uses that are expected to occur in a similar time frame as the Project. Development of these uses on surrounding properties will reduce the visual contrast of the maintenance and storage facility. A maintenance and storage facility at this site will result in moderate visual effects.

Other Environmental Effects

Effects on air quality, energy use, and natural resources are not anticipated to result from either site option. Light from either site option is not anticipated to affect wildlife. Cultural and historic resources are not anticipated to be affected by either option; the preferred site near Leeward Community College was formerly used by the military, and the Hoʻopili site has been disturbed by farming activities. Both sites are near or include some flood zones; however, the area that will be developed for the maintenance and storage facility is outside of the flood zone area. Stormwater treatment measures will be installed at either site to prevent the runoff of pollution or polluted stormwater. The option near Leeward Community College will have a stormwater outfall to Pearl Harbor and will require a Shoreline Setback Variance. Section 4.14 discusses impacts to waters of the U.S. associated with this outfall.

An SWMP to address permanent stormwater runoff and water quality will be prepared prior to construction of either option. Stormwater runoff from the developed area of the site will be collected through an on-site system consisting of catch basins, swales, and underground pipe to direct runoff to a stormwater detention basin located on-site. The yard and shops will be designed to minimize stormwater runoff from the operations areas. Drainage from inside buildings will enter an oil/water separator and then be disposed of into the sanitary sewer. Runoff from facilities located outside that are not covered by a roof or shelter will also require the installation of collection and pretreatment facilities. Washing and service areas will drain into a collection system where all discharges will be treated before appropriate disposal. A separating system will be used to remove unwanted or harmful substances, such as oil or sediment, from discharged water. These permanent stormwater BMPs will be designed, installed, and maintained in accordance with the criteria and guidelines described in the State's Storm Water Permanent Best Management Practices Manual.

Hazardous materials, waste, and contamination are not anticipated to be encountered at either site. The preferred option near Leeward Community College was formerly occupied by the military, but a remedial investigation and environmental analysis completed by the Department of the Navy revealed that no adverse human health or ecological effects have resulted, or will result, from the previous petroleum spill on the site. USHHS and HDOH concur with this assessment.

Mitigation

Operation of the maintenance and storage facility will meet Federal, State, and Local regulations related to noise, air quality, wastewater treatment and disposal, and stormwater management typical of light industrial operations. The maintenance and storage facility will pursue Leadership in LEED Certification. This involves the incorporation of proven sustainable materials, methods, and technologies into its facility design to increase life-cycle value, including reduction of energy and resource use, and to enhance the health and comfort of employees and visitors. LEED is a performance-oriented system where credits are earned for satisfying criteria related to specific environmental impacts inherent in the design, construction, and operations and maintenance of buildings. The maintenance and storage facility will be designed to achieve Silver certification.

4.18 Construction Phase Effects

This section of the Final EIS discusses construction effects related to the natural and built environment with regard to the entire Project and mitigation. Section 3.5, Construction-Related Effects on Transportation, of this Final EIS discusses transportation-related construction impacts and mitigation. Construction effects will be temporary and limited in area as construction proceeds along the length of the project alignment. Construction work details will be developed during preliminary and final design. Effects could include dust, noise, and traffic disruption, congestion, and diversion, as well as limited or temporarily lost access and parking to residences and businesses.

Construction-related effects will result primarily during construction of the foundations and columns, superstructure (the elevated guideway structure), and stations. Construction of other system components, such as traction power substations, the maintenance and storage facility, access roadways, and park-and-ride lots, will also have associated effects.

The parcels acquired for the maintenance and storage facility, park-and-ride lots, and stations could be used for construction staging areas. Additional areas will be identified and obtained by the contractor as needed. The contractor is responsible for obtaining and preparing required permits and approvals. The effects of activities in the staging areas known at this time are included in the discussion of construction effects on the natural and built environments. Section 4.21 identifies who is responsible for obtaining anticipated permits, approvals, and agreements.

The City will coordinate with affected residents and businesses prior to construction. A public involvement plan will be developed prior to each construction phase that will detail outreach tailored to the construction phase. The City will maintain the Project website (www.honolulutransit.org) and telephone hotline, which will also provide information to the community regarding construction phasing.

As described in Chapter 2, the Project will open in phases. Stations at the ends of each phase will operate temporarily as terminal stations until the next phase is completed. This operation will temporarily affect access and travel patterns around the stations.

The proposed construction methods, as described in Appendix E, Construction Approach, will minimize potential adverse construction effects. Construction is expected to begin in 2010, and construction is anticipated to be complete in 2018. Because construction will generally be completed sequentially from the UH West Oʻahu to Ala Moana termini, the duration of disruption in any single location will be substantially less than the nine-year total construction period.

The length of time to complete a portion of the guideway in any one location will vary depending on the depth of foundation required for the guideway support column, the span length between adjacent columns, and access and work area constraints. On average, an individual support column will require approximately 20 to 30 working days to construct. Using the gantry system presented in Appendix E, the guideway will be constructed between consecutive support columns within approximately three to five days. Rail, traction power, and control systems will be installed following construction of the guideway. The durations for these system installations will vary but is expected to be several weeks. The stations will be constructed concurrently with the construction of the guideway and are expected to take 14 to 18 months each. The overall project construction schedule is presented in Section 2.5.10.

The City will ensure that the environmental commitments in the Final EIS and the permit conditions are met during the final design and construction of the Project. The City will employ a dedicated environmental compliance manager to oversee construction contractor compliance with all stormwater best management practices, construction noise mitigation measures, utility coordination, business access requirements, and any mitigation plans prepared for the Project, including those presented in permit conditions and the MOT Plan. The City has prepared a *Construction Safety and Security Manual* that requires the contractor to adhere to safe construction practices.

Project construction will not have a substantial effect on some resources discussed in earlier sections of Chapter 4, including electric and magnetic fields, natural hazards, and farmlands. Effects on other resources are discussed in the following sections.

4.18.1 Land Use and Economic Activity

Developed areas Koko Head of Waipahu will experience more land use and community effects during construction than currently undeveloped sections in West Oʻahu. Temporary construction activities, such as detours, may be required in parcels near the project right-of-way. Effects on land use from these activities will be temporary.

Business Access

Access to businesses near construction activities could be temporarily affected but will be maintained. In several locations, left-turn lanes will be closed during construction, requiring drivers to change their approach and make a right-hand turn to businesses. Such closures are expected on Farrington Highway in Waipahu, Kamehameha Highway in Pearl City, and Dillingham Boulevard. Segments of Halekauwila and Queen Streets may be made temporarily one-way or have parking eliminated during construction.

The MOT Plan that is described in Chapter 3 will address temporary effects on access to businesses during construction. Proposed mitigation to reduce adverse economic hardships for existing businesses along the project alignment during construction activities may include the following:

- Coordinate construction planning and phasing with nearby property owners and businesses
- Develop a public involvement plan prior to construction to inform business owners of the construction schedule and activities
- Initiate public information campaigns, including signs and lighting, to reassure people that businesses are open during construction and to encourage their continued patronage
- Minimize the extent and number of businesses, jobs, and access affected during construction
- To the extent practicable, coordinate the timing of temporary facility closures to minimize impacts to business activities—especially those related to seasonal or high sales periods
- Minimize, as practical, the duration of modified or lost access to businesses
- Provide public information (e.g., press releases or newsletters) regarding construction activities and ongoing business activities, including advertisements in print and on television and radio
- Phase construction in each area so as to maintain access to individual businesses for pedestrians, bicyclists, passenger vehicles, and trucks during business hours and important business seasons
- Provide advance notice if utilities will be disrupted and scheduling major utility shutoffs during non-business hours

Employment

Based on construction cost estimates and state-specific employment multipliers, construction-related employment was estimated for direct, indirect, and induced employment. Direct employment refers to all new jobs created within the heavy civil engineering and construction sector. Indirect employment is created when jobs are created in other sectors as a result of construction (i.e., increases in the food service sector to support increases in construction employment). Induced employment results from an overall expansion of the regional economy (and thus new jobs) as a result of the proposed construction.

The yearly estimate for the total direct, indirect, and induced jobs over the nine-year construction period is shown in Table 4-35.

Table 4-35 Employment Effects during Construction

	Number of Jobs per Year									
Alternative	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
No Build	0	0	0	0	0	0	0	0	0	0
Project	3,183	8,209	11,680	17,270	15,020	10,902	6,229	3,872	3,091	1,719

4.18.2 Communities and Neighborhoods

During construction, automobile, pedestrian, and transit access to communities and neighborhoods surrounding the project alignment will be affected. These effects are discussed further in the following sections. Site-specific Construction Safety and Security Plans will be developed and implemented by the construction contractors to mitigate effects on community services, such as fire prevention and emergency preparedness and response, as well as to protect the general public, private property, and workers from construction risks. The FTA requires that such plans be prepared to address these potential construction effects.

The following emergency services departments will be consulted in preparing the Construction Safety and Security Plans and will have some responsibility for the Project's safety hazards and security risks:

- The Honolulu Police Department
- The Honolulu Fire Department
- The Department of Emergency Management
- The Honolulu Emergency Services Department

During development of the Construction Safety and Security Plans, measures will be identified to minimize effects on communities and their resources that address specific consequences anticipated at each location within the various communities, as well as ensure the safety of the public and the environment.

In cases where traffic rerouting or delays are expected to affect access to public facilities or the functioning of public and emergency services, alternate access routes will be maintained during construction. Construction in high-volume traffic and pedestrian areas could employ police support to direct and control traffic and pedestrian movements to lessen effects on mobility. To maintain the functionality of public facilities, social resources, and transportation routes during construction, mitigation will include relocating and rearranging certain facilities, noise mitigation, and other efforts deemed necessary to maintain full functionality. In cases where project placement will restrict existing vehicular or pedestrian access routes to public service buildings, alternate access points will be included in mitigation efforts.

Schools, Parklands, and Recreational Resources

Schools adjacent to the project alignment may be affected by a variety of construction issues, such as noise, vibration, air quality, and visual intrusion, depending on a school's distance from the Project. The various parks and recreational resources directly along the project alignment are expected to be affected by temporary nuisances associated with construction, such as noise, dust, and visual intrusion.

In instances where any school, parkland, or recreational resource will experience a disruption in access, the effects will be mitigated as necessary and appropriate using applicable practices similar to those outlined in Business Access in Section 4.18.1. Temporary barrier walls or fences will be placed around any school, parkland, or recreational resource to clearly delimit a construction area, to avoid public exposure to any possible construction hazards.

Utilities

Utilities comprise facilities owned by public utility agencies and private utility companies and include service lines to adjoining properties. Utilities include sanitary sewers; storm drains; water, gas, electric power, telephone, and oil pipelines; street lights; and traffic signals. Communication and coordination have been initiated with the affected utility agencies and companies and will continue throughout design and construction. HDOT will be involved with utility coordination for utility work in the state roadways and roadway rights-of-way.

Design criteria will govern all new utility construction outside of buildings, as well as the support, maintenance, relocation, and restoration of utilities encountered or affected by project construction. Utility service to abutting properties may be temporarily interrupted for short periods. Property owners will be contacted prior to interruption of utility services. If facilities are temporarily relocated, the area will be restored as close as possible to its original condition. Replacements for existing utilities will provide service or capacity equal to that currently offered.

Utility rearrangements will ensure that construction of transit facilities may proceed without affecting utility service. Utilities that penetrate through or cross over transit structures will be designed so as to prevent damage. The vertical and lateral clearances of overhead and underground utility lines shall comply with the rules and regulations of the appropriate utility agency and Hawaiʻi Administrative Rules during final design and approved by the utility agencies. Existing underground utilities that are in the way of structural foundations and overhead utilities in the way of the aerial guideway will be relocated. Along several roadway corridors, most existing overhead utilities are in conflict with the guideway and safety clearance requirements and will be relocated underground. Existing overhead utilities not in conflict with the aerial guideway and safety clearance requirements will remain overhead. Coordination will occur with emergency services and utility companies to ensure that utility relocations meet their needs and that sufficient clearance is provided.

Environmental Justice

Construction activities will occur along the entire project alignment and will affect all population groups equally.

4.18.3 Visual and Aesthetic Conditions

During construction, visual quality may be altered for all viewer groups. Construction-related signage and heavy equipment will be visible at and near construction sites. The removal or pruning of mature vegetation, including trees, to accommodate construction of the guideway, stations, and park-and-ride lots will degrade or partially obstruct views or vistas. Short-term changes to the visual character of areas adjacent to the alignment could result from introducing the following construction elements:

- Construction vehicles and equipment
- Clearing and grading activities that result in exposed soils until replanting or repaving occurs
- Erosion-control devices, such as silt fences, plastic ground cover, and straw bales
- Dust, exhaust, and airborne debris in areas of active construction
- Stockpiling of excavated material
- Staging areas for equipment storage and construction materials

These short-term changes will be greatest at station locations, park-and-ride lots, elevated guideway, and maintenance and storage facility sites.

Temporary lighting may be necessary for nighttime construction of certain project elements or in existing highway rights-of-way to minimize disruption to daytime traffic. Temporary lighting could affect residential areas by exposing residents to glare from unshielded light sources or increasing ambient nighttime light levels.

The contractor will incorporate construction management practices as practical to minimize visual impacts during construction, including:

- Remove visibly obtrusive erosion-control devices, such as silt fences, plastic ground cover, and straw bales, as soon as an area is stabilized
- Locate stockpile areas in less visibly sensitive areas whenever possible so they are not visible from the road or to residents and businesses
- Shield temporary lighting and direct it downward to the extent possible
- Limit the times construction lighting could be used in residential areas
- Replace removed street trees and other vegetation with appropriately sized vegetation as soon as practical after construction is completed in the same location or another location in accordance with City and State requirements

4.18.4 Air Quality

Air pollution from construction activities will be limited to short-term increased fugitive dust or airborne particulate matter (generally of a relatively large particulate size) and mobile-source emissions. Fugitive dust primarily results from particulate matter being "kicked up" by vehicle movement around a construction site and material being blown from uncovered haul trucks. The State regulates fugitive air pollutant emissions (HAR Section 11-60.1). The Project will comply with these regulations. Mobile-source pollution is generated from the operation of construction equipment near construction sites and from traffic disruption and congestion during construction.

The contractor will select appropriate measures to comply with fugitive dust requirements. The following control measures can substantially reduce fugitive dust:

- Minimize land disturbance
- Use watering trucks to moisten disturbed soil
- Use low emission equipment when feasible
- Cover loads when hauling dirt
- Cover soil stock piles if exposed for long periods of time
- Use windbreaks to prevent accidental dust pollution
- Limit the number of vehicular paths and stabilize temporary roads
- Maintain stabilized construction area ingress/egress areas
- Wash or clean trucks prior to leaving construction sites
- Minimize unnecessary vehicular activities

Mobile-source pollution can be reduced by minimizing unnecessary vehicular and machinery activities and limiting traffic disruptions, particularly during peak travel hours (see Section 3.5 for more detail). All State and Local regulations for dust control and other air quality emission reduction controls will be followed.

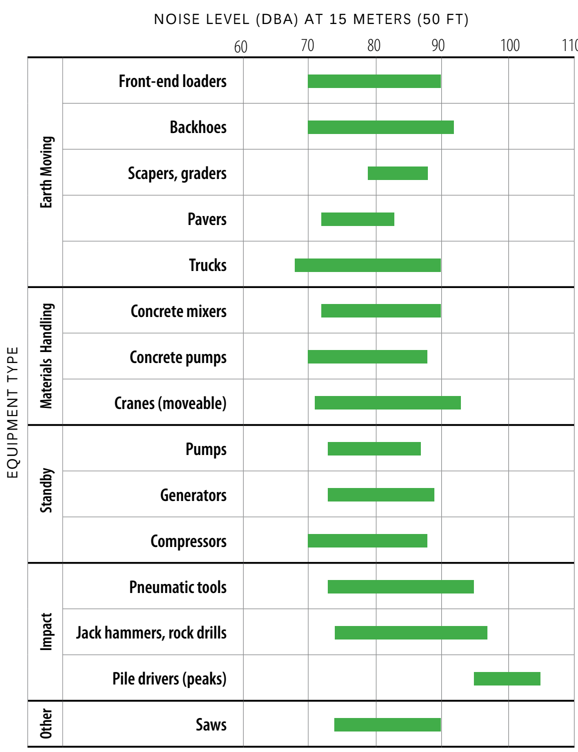
4.18.5 Noise and Vibration

Noise

Noise during construction could be bothersome and annoying to nearby residents, visitors, tourists, and businesses. Project construction will generate noise, which will occur sporadically in different locations throughout the nine-year construction period.

The most common noise source in construction areas will be engine-powered machinery, such as earth-moving equipment (bulldozers), materials handling equipment (cranes), and stationary equipment (generators). Mobile equipment (e.g., trucks and excavators) operate in a cyclic manner, and stationary equipment (generators and compressors) generate noise at fairly constant levels. The loudest and most disruptive construction activities could be impact pile-driving followed by demolition, jackhammers, and hoe rams. Impact pile-driving, if used as a method for pile placement, will result in the loudest and most disruptive construction work. Impact pile-driving will only be used where less disruptive foundation placement methods cannot be used. Vibration or hydraulic insertion could be used where appropriate to replace impact pile-driving to reduce noise.

Figure 4-78 shows the range of noise levels that can be expected from different types of construction equipment. Construction noise at locations more than 50 feet away decreases at a rate of 6 to 8 dBA per doubling of the distance from the source. For example, if the noise level is 90 dBA at 50 feet from a jackhammer, it will decrease to approximately 83 dBA at 100 feet and 76 dBA at 200 feet. Doubling the number of noise sources will increase the noise level by 3 dBA. In the above example, two jackhammers operating together will generate a noise level of 93 dBA at 50 feet from the activity.



Source: EPA 1971 and WSDOT 1991.

Figure 4-78 Typical Construction Equipment Noise Levels

The mitigation discussed in this section is meant to be a guideline for developing project-specific measures to reduce construction noise. Prior to construction, an approved Community Noise Variance will be obtained from HDOH for the Project. Noise permits will be obtained prior to the construction of each phase of the Project. The permits will regulate construction times and activities and include mitigation commitments. The following measures are examples of what could be included in the permits:

- Develop a monitoring plan with noise limits
- Construct temporary noise barriers or curtains
- Equip construction equipment engines with adequate mufflers and intake silencers
- Strategically place stationary equipment, such as compressors and generators

The noise and vibration construction mitigation plan will be prepared to establish a protocol to monitor noise during construction and a plan to mitigate for impacts as required. The City will implement the mitigation measures defined in this Final EIS, construction plan, and HDOH noise permit requirements.

The contractor will comply with standard specifications and all applicable local sound control and noise level rules, as well as regulations set by HDOH. Construction noise from some activities (e.g., pile-driving in certain sections of the alignment) could exceed levels set in the State noise regulations for work between 6 p.m. and 7 a.m. A permit will be required for such nighttime work. Permit requirements will specify mitigation measures to minimize effects by limiting the time of day that certain activities could occur.

Vibration

Common sources of vibration during construction activities include jackhammers, pavement breakers, hoe rams, bulldozers, and backhoes. Pavement breaking and soil compaction will likely produce the highest levels of vibration. Depending on soil conditions in an area, activities such as pile-driving can generate enough vibration to result in substantial short-term noise impacts. Pile-driving, where required, will cause the highest vibration levels of the proposed construction activities. Pile-driving activities more than 75 feet from newer, non-historic buildings will not exceed risk criteria for those buildings. For buildings closer than 75 feet to pile-driving activities, the contractor will be required to provide mitigation for vibration levels during these activities. Contractors will be required to perform a video survey of the immediate area prior to the start of any construction activity where vibration levels may be high enough to affect surrounding structures. Drilled shafts or auger-cast piles, which are cast in-place rather than driven into the ground, will be used by the Project wherever possible. By using these types of foundations, impact driving will be eliminated and drilling will generate lower vibration levels.

Construction vibration will have less of an effect on underground and buried utilities than on buildings. Pile-driving is the only proposed construction activity that will generate vibration levels that could damage utilities. Utilities less than 25 feet from pile-driving locations may need to be further evaluated during final design to determine whether mitigation is needed.

Mitigation

Prior to construction, the City, in cooperation with its contractors, will develop a noise and vibration construction mitigation plan. The plan will follow FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006a) and meet HDOH noise permit requirements. The plan will be updated as needed to include the results of the construction noise and vibration assessment that will be completed to identify potential impacts at sensitive receptor locations. The vibration element of the noise and vibration construction mitigation plan will identify sensitive receptors and establish a protocol to monitor vibration effects during construction.

4.18.6 Construction Energy Consumption

Construction of at-grade high-capacity transit systems generally requires 20,000 MBTUs of energy per track mile (Caltrans 1983), including track and power systems. Because the guideway is elevated, an additional 150,000 MBTUs of energy per track mile will be required to construct the elevated structure. Table 4-36 summarizes the energy that will be required to construct the Project.

Measures that maintain roadway speeds and construction practices that reduce energy consumption could reduce energy demand during construction. Any transportation-control measures that reduce traffic volumes and congestion will also decrease energy consumption. Mitigation of traffic impacts during construction are discussed in Chapter 3.

Table 4-36 Total Construction Energy Required

Alternative	Project Construction Energy (MBTUs)
Project	7,480,000

MBTUs = million British thermal units

4.18.7 Contaminated Media and Solid Waste

Contaminated Media

Subsurface conditions are highly variable throughout the construction area where earthwork will occur. Excavation will primarily occur during installation of guideway foundations and relocation of utilities. Other ground disturbance and grading will occur at the maintenance and storage facility, park-and-ride lots, and construction baseyards.

Earthwork could uncover contaminated soil. The Initial Site Assessment prepared for the Project identified a number of sites and neighborhoods of concern where contaminated soil and groundwater may be present (Section 4.12). The presence of unanticipated contamination could threaten worker health and safety and affect the Project's schedule and cost. Contaminated media can also negatively impact water quality as a result of stormwater runoff and drainage.

To identify soil and groundwater conditions along the project alignment, in-depth assessments of the sites and neighborhoods identified as concerns in the Initial Site Assessment are being performed by the City during the Project's design phase. It is appropriate to perform additional studies during the design or construction phase because subsurface conditions can change dramatically between the time a project is planned and constructed. Additional studies could include a complete Phase I Environmental Site Assessment, or portions of an Environmental Site Assessment, as well as soil and groundwater sampling. Future study will vary by area or site and will depend on the level of concern in each area as identified during the initial site assessment.

If hazardous materials are identified during construction, the City will follow notification procedures in accordance with regulations (as described in Section 4.12).

Solid Waste

Large volumes of solid waste are often generated at construction sites. Solid waste, ranging from unused construction materials to soda containers, can blow around causing a general nuisance in addition to degrading the quality of stormwater runoff.

BMPs will be used to minimize impacts related to borrow and waste disposal activities. The location of borrow and waste disposal sites will be identified by the contractors. Solid waste generated by clearing and grubbing, demolition, or other construction practices will be removed from the location and properly disposed. Contractors must comply with all permitting requirements for borrow locations and follow other applicable contract specifications.

In addition to and/or in support of NPDES permits, the contractor will prepare the following plans to mitigate construction impacts related to wastes:

- **Construction Safety and Security Plan—** this plan will meet the FTA requirement in 49 CFR 633 and address fire prevention, emergency preparedness and response, and protection of the general public and private property from construction activities, including exposure to toxic materials.
- **Construction Health and Safety Plan—** this plan will meet the requirements of 29 CFR 1910 and 1926 and all other applicable Federal, State, and Local regulations and requirements. It will also include provisions for identifying asbestos and lead-based paint that will be disturbed by the Project.
- **Construction Contaminant Management Plan—**this plan will identify procedures for contaminant monitoring and identification and the temporary storage, handling, treatment, and disposal of waste and materials in accordance with applicable Federal, State, and Local regulations and requirements.
- **Construction Contingency Plan—**this plan will identify provisions for responding to events, such as discovery of unidentified underground storage tanks, hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes, during construction.
- **Solid Waste Management Plan—**this plan will identify procedures for recycling green waste during clearing and grubbing activities; maximizing the recycling of construction and demolition wastes, if appropriate; and properly containing solid waste generated during construction and disposing of it at solid waste disposal or recycling facilities permitted by the

HDOH. Every effort will be made to recycle all appropriate demolished material.

4.18.8 Natural Resources

Construction activities could affect wildlife, vegetation, wetlands, and streams near the Project.

Vegetation

During construction, impacts to vegetation will result from the following:

- Footprints cleared for cranes and other equipment
- General clearing and grubbing activities
- Accidental fires resulting from the operation of construction equipment
- Dust generated from construction equipment and from moving and grading earth

To mitigate impacts to vegetation, cranes and other equipment will be sited on previously disturbed areas to the extent possible, and clearing and grubbing will be kept to a minimum. Accidental fires and excessive dust could directly and adversely impact the endangered koʻoloaʻula (*Abutilon menziesii, red ʻilima)*, a native Hawaiian dryland shrub that is present in an 18-acre contingency reserve located within 200 feet of the East Kapolei Station and associated guideway. No other endangered or threatened species or critical habitat will be affected by project construction.

Construction impacts to the endangered koʻoloaʻula will be mitigated by following a Habitat Conservation Plan, using high-visibility construction barriers, having all contractors create fire mitigation plans, educating site workers, maintaining emergency site access, and establishing appropriate buffers. A Construction Safety and Security Plan addressing fire prevention, including worker education, access maintenance, designated smoking areas, identification of fire-fighting resources, and other requirements, is being reviewed for other projects in the area and will be incorporated into the Project as appropriate. Additionally, prior to clearing and grubbing near the koʻoloaʻula contingency reserve, the area will be surveyed. If any koʻoloaʻula are found, a horticulturist approved by DLNR will be given an opportunity to remove the plants and transplant them to the contingency reserve (see Section 4.13 for a discussion on abutilon plants).

Street Trees

Street trees that require pruning for construction activities will be pruned more extensively than they will later for system operation. For street trees that will not be affected by system operation, a tree protection zone will be established during construction. The protection zone will be delineated by protective fencing.

Wildlife

Construction activities near wetlands and other wildlife habitat that do not permanently alter the habitat are likely to only temporarily disturb wildlife in these areas, including endangered waterbirds. It is anticipated that, over time, wildlife in nearby habitats will adjust to the new structures.

Although noise and activity associated with construction may cause stilts and other shore and water birds to temporarily vacate the two open wetlands near the Project, there remains adequate like habitat within relatively close proximity to the Project to provide feeding and loafing areas for any potentially displaced birds. Water and shore birds use of these wetlands will return to preconstruction levels once construction along the adjacent highway is completed.

The white tern uses large canopy trees for roosting and nesting. The pruning of large canopy trees prior to construction could affect the nests of this species. The City will survey all large canopy trees to be pruned prior to construction to ensure that no trees have white tern chicks. If any are found, pruning will be delayed until chicks fledge.

4.18.9 Invasive Species

Construction equipment and materials and landscaping plants that will be imported to the island may harbor species that do not currently occur on Oʻahu and may become invasive. Dirty construction equipment is a known pathway for plant and animal invasive species. Seeds, vegetative matter, insects, and even small animals can be accidentally transported to Oʻahu on vehicles and harm its watersheds, local agriculture, environment, and way of life.

Construction equipment or material imported to Oʻahu from the mainland, neighbor islands, or foreign countries must be free of dirt, vegetative matter, and animals. Construction equipment will be cleaned and inspected before being brought to the project site. On-site workers will be trained to recognize common invasive species growing in the construction area. Site surveys to assess the construction area for invasive species will be conducted before, during, and after construction. When fill is imported to or exported from the job site, care will be taken to avoid spreading invasive species, and location records will be kept. Criteria for cleaning, inspection, and treatment of plants that are at risk of harboring pests will be part of the landscaping requirements. Species that can be harmful invaders will not be used for project plantings.

4.18.10 Water Resources

There are several types of temporary construction-phase impacts from the Project on water resources, as follows:

- **Placement of Fill in Waters of the U.S.—**the Project will encroach into a maximum of 0.13 acre of waters of the U.S. temporarily during construction of the guideway (Table 4-37) in Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream. There will be temporary construction impacts in Kaloʻi Gulch, which is not under the jurisdiction of the USACE. Construction in Kaloʻi Gulch will encroach into 0.86 acre of temporary impact during construction of a park-and-ride lot and 0.07 acre during construction of the guideway.
- **Stormwater Drainage from Construction Sites—**an NPDES permit for construction stormwater will be obtained. Project and site-specific BMPs will be prepared and submitted with the NPDES permit. BMPs include methods to mitigate possible pollution, soil erosion, and turbidity caused by stormwater runoff from all sources during construction. Agency reviews conducted as part of the NPDES permit process ensure that proper control techniques are identified in the permit and implemented during construction. Possible stormwater BMPs are discussed in more detail below.

Table 4-37 Construction Impacts to Waters of the U.S. (Linear Transportation Features)

	Waiawa Stream & Springs (Sites 12 and 13)	Moanalua Stream (Site 27)	Kapālama Canal Stream (Site 29)	Nu`uanu Stream (Site 30)	Total Impact of Project
Total impact area (acres)	0.06	0.005	0.06	0.00	0.13
Total impact volume (cubic yards) (below OHWM and above mudline)	300	26	513	35	874
Total impact volume (cubic yards) (below mudline)	0	698	58	276	1,032

- **Wastewater Discharges—**discharges, such as concrete truck wash down water, dust control sprays, and drilling fluids, will be collected and managed in accordance with NPDES requirements.
- **Groundwater Impacts—**a range of measures will be employed to ensure there are no adverse impacts to groundwater resources.

Placement of Fill

Stream channel alterations will be necessary during construction. Section 4.14 discusses the measures taken to avoid and minimize impact on water resources. The activities described here have been determined to be necessary only after all reasonable and feasible means are employed to avoid and minimize encroachment. Columns, foundations, diversions, and other temporary and permanent structures will be placed in or on the banks of Kaloʻi Gulch, Waiawa Stream, Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream.

Work in these waters is highly regulated and will require permits from Federal and State agencies. Through the permitting process, details of BMPs will be developed to mitigate potential impacts to streams due to placement of fill. BMPs used may include, but not be limited to:

- Isolate the column construction area from the water through the use of cofferdams, sandbags, or other temporary water-diversion structures
- Prohibit fueling of equipment while in the stream channel
- Prevent wet or green concrete from coming into contact with flowing water
- Maintain fish passage—consider migration of native fish (e.g., ʻoʻopu) and avoid work in streams during spawning
- Minimize removal of riparian vegetation
- Monitor for turbidity both upstream and downstream of the work area
- When demolition of preexisting structures is required, such as the retaining walls at Kapālama Canal Stream, enclose the work area during demolition to contain airborne dust and debris and keep it from entering the stream
- To mitigate potential impacts to streams or wetlands where there is no inwater work, establish a construction buffer during work in the area
- Prohibit the contractor from entering wetlands during construction
- Secure netting below guideway superstructure construction to prevent construction debris from falling into streams
- Secure tight-woven netting under joints to catch excess epoxy when segments are post-tensioned
- Install toe boards along edge of the guideway deck to prevent loose material from being knocked off the deck into streams
- Air-test post-tensioning ducts before grouting to ensure no grout seepage
- Use silt fence and casing between foundation construction and stream to contain soil and construction debris
- Collect and handle drilling spoils to eliminate uncontrolled releases into surface waters
- Construct columns during the dry season, where feasible
- Place silt fencing around temporary construction platforms or structures to contain disturbed sediment
- Provide sheet piling around abutment extensions at Kapālama Canal Stream to prevent soil and sediment from entering the stream during abutment and wall construction

Wetlands

The contractor will be prohibited from entering the wetlands during construction. The wetlands will be designated as a no-work area on the plan sheets and 3-foot-high orange fencing will be installed around the wetland to designate the no-work area. The orange fencing will be inspected routinely to ensure that it is maintained.

Groundwater

Shallow excavations for utility work, support structure foundations, and pile caps may encounter groundwater along parts of the alignment. Typical groundwater management practices for shallow excavations include dewatering by shallow well points or dewatering wells, cutoff walls in combination with sumps from within the stabilized excavation, ground treatment, such as soil amendment or possibly even ground freezing, or a combination of these methods to enable construction in dry conditions. Actual dewatering methods will be determined during the final design and construction stage, depending on actual conditions encountered, size/depth of excavations, and site-specific considerations.

Dewatering operations are required to comply with NPDES permit requirements when they discharge into State waters. A variety of methods can be used to treat water during dewatering operations. The size of particles present in the sediment and NPDES permit or receiving water limitations on sediment will be key considerations for selecting sediment treatment options. In some cases, such as where contamination may occur, use of multiple devices may be appropriate to manage sediments and any chemical contaminants. Typical dewatering BMPs include sediment traps or a larger basin, dewatering tank with filter or baffled weir tank, gravity bag filter, and various mechanical filtering systems. In addition, oil-water separators, specialty media filters, and bio-filters can be used in conjunction with the sediment filters to mitigate groundwater contaminants.

Dewatering alters groundwater's natural level and flow characteristics. Depression of the natural groundwater table in soft ground areas can induce consolidation of subsoils and subsequent ground settlement. Excessive or differential settlement can cause cracking and other damage to structures. Settlement is expected to be minimal because the level of the groundwater depression is expected to be localized and generally not greater than about 5 feet below static groundwater levels. Where dewatering produces a drawdown in excess of 5 feet, construction monitoring will be required to monitor for dewatering-induced settlement.

Deep excavations, exceeding more than about 10 feet below grade, are limited to drilled foundations for support of the aerial guideway and possibly some stations. These deep foundations will likely extend below groundwater levels along a substantial portion of the alignment. Dewatering of drilled foundation excavations is typically not practicable except under special circumstances where the groundwater inflow quantity is minimal over a finite period and the seepage forces do not destabilize the completed excavation before concreting. Generally, when groundwater is encountered in the drilled foundations, the contractor will employ construction methods where the fluid within the excavation is allowed to remain as it is displaced by the concrete. Uncontrolled releases of drilling fluids are not permitted. The displaced fluid will be collected and treated as necessary for either reuse or disposal in accordance with permit requirements.

In localized areas, drilled foundations will likely penetrate caprock and extend into the deep-seated artesian conditions associated with the Southern Oʻahu Basal Aquifer basalts. At locations where the level of the groundwater pressure head exceeds existing ground surface, casing will likely be used to extend the work zone sufficiently above existing ground surface to counterbalance the excess water column. Another alternative is to use special additives in the drilling fluid to substantially increase the unit weight of the medium to counterbalance the artesian pressure head with a column of fluid. Another alternative may be to locally grout the water bearing stratum to reduce the excess pressure head through the work zone. The contractor may have other methods for construction in these conditions, but any methods used will consider the vulnerability of the sole source aquifer.

Drilled foundations that penetrate into the underlying basalt bedrock will only remain open long enough to insert a waiting, premade rebar cage support system. The project standard specifications for reinforcing steel require that it be clean and free of deleterious substances, which is anything that would hinder the bonding of the concrete to the rebar (e.g., require that the rebar is not sprayed or coated with any petroleum or other potentially contaminating product). Surface water will be prevented from draining into the open hole. No hazardous materials will be stored within the drilling area. Standard construction BMPs, such as regular inspections of equipment to ensure there are no leaks, will be employed. Drilling spoils will be collected and managed in accordance with applicable regulations.

Stormwater

The City will obtain an NPDES permit for construction stormwater. Stormwater BMPs may include, but not be limited to:

- Minimize land disturbance
- Stabilize or cover the surface of soil piles
- Revegetate all cleaned and grubbed areas to the extent possible
- Maintain stabilized construction area ingress/egress areas
- Wash or clean trucks prior to leaving the construction site
- Install silt fences and storm drain inlet filters
- Prevent off-site stormwater from entering the construction site
- Implement other stormwater management techniques

4.18.11 Archaeological, Cultural, and Historic Resources

Archaeological Resources

Three general categories of archaeological resources (burials, pre-contact archaeology, and post-contact archaeology) could be affected during construction of the Project. With few exceptions, the resources that could be affected are subsurface features and deposits that have not been previously identified. Prior to construction, additional archaeological work will be completed to investigate the potential for sub-surface deposits. This additional archaeological work will focus on the following work locations once they are known: locations of columns, foundations for buildings and structures, utility installation, grading to provide parking, or other construction-related ground disturbance, including preparation of construction staging areas. This additional work will also focus on the new location of any utilities that will be relocated by the Project. This archaeological work will be completed in advance of the completion of final design so that the presence of any sensitive archaeological sites/burials discovered during fieldwork can be addressed during final design.

The draft PA pertaining to archaeological resources has been developed in consultation with the SHPO, ACHP, FTA, the City, and other Section 106 consulting parties to address the identification and treatment of traditional cultural properties (TCP), the identification and protection of archaeological sites and burials, and the identification and treatment of historic buildings and structures within the Project's APE. The following sections describe the draft PA components that will be employed during construction to mitigate potential impacts to archaeological resources (including burials).

Archaeological Sampling

Prior to construction, an archaeological sampling plan will be developed for each construction phase in coordination with the O'ahu Island

Burial Council and the SHPO, as discussed in Section 4.16.1. The sampling will be completed in advance of final design completion so that the presence of any sensitive archaeological sites/burials discovered during fieldwork can be addressed during final design.

Archaeological Monitoring

Consultation with the SHPO will assess the need for archaeological monitoring during construction. The archaeological monitoring program will follow the draft PA. A monitoring report will be prepared to document all results at the completion of construction.

In the vicinity of the Waipahu Transit Center, archaeological monitoring will include the recovery of data from the identified subsurface cultural deposit (Lo‘i sediments) described in Section 4.16.

Preserving Archaeological Resources

In advance of construction, archaeological resources deemed worthy of preservation in place may be identified. If this occurs and the Project is modified to avoid such resources, construction activities will also avoid those resources. Protection zones will be established around these resources to avoid disturbance during construction.

Burial Treatment

During the archaeological sampling, burials will be identified and managed in compliance with applicable laws. This will include consulting with project proponents, the O‘ahu Island Burial Council, The SHPO, and recognized lineal and/or cultural descendants to develop burial treatment plans. Although the goal of the archaeological sampling will be to identify all burials and treat them appropriately prior to the start of construction in a particular area, the chance exists that additional previously undiscovered burials will be encountered during construction.

In each geographic area, the parties consulted regarding burials during the Project’s archaeological sampling phase will be consulted if a find is made during construction. The draft PA outlines the treatment of burials discovered during preliminary archaeological work, prior to final design, as well as burials found during project construction.

Cultural Resources

Adverse impacts related to cultural resources resulting from construction of the Project will likely be short-term and consist of affecting access to areas where cultural resources exist or cultural activities are practiced. The impact to cultural resources or areas will be mitigated using the same maintenance of access policies outlined for businesses.

Historic Resources

Historic resources could be inadvertently affected during construction. Any potential construction impacts will be mitigated using measures outlined in previous construction sections related to noise, vibration, air quality, and water quality and as described in the draft PA. In addition, to avoid collision with or damage to historic resources during construction, protection zones will be established around such resources to avoid disturbance during construction activities.

4.18.12 Relationship between Short-term Uses of the Environment and Long-term Productivity

Construction of the Project will have short-term effects on the environment during construction, as described in this section. These effects will end with the completion of construction. The Project will provide the following improvements in productivity, which are identified as the Purpose of the Project in Chapter 1 of this Final EIS:

- Provide faster, more reliable public transportation service

- Provide reliable mobility in areas of the corridor with limited income and aging populations
- Serve rapidly developing areas
- Provide an alternative to the private automobile
- Moderate anticipated growth in traffic congestion

The long-term benefit that will be provided by the Project will be greater than the short-term adverse effects to the human environment.

The Project is consistent with the land use and transportation elements of plans, policies, and controls within the study corridor. The Project does not exclude future options, narrow the range of beneficial uses of the environment, or pose long-term risks to health and safety.

4.19 Indirect and Cumulative Effects

The CEQ regulations at 40 CFR 1500 et seq. and HRS Chapter 343 (HAR Section 11-200) require an assessment of indirect and cumulative impacts. This section describes and analyzes these impacts. For more information on land use impacts associated with TOD, see *the Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b). For more information on study corridor and regional economics, see the *Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c).

The cumulative effects analysis includes evaluation of the planned extensions to the Project and the effects of past, present, and reasonably foreseeable future projects in the study corridor. Additional details about the anticipated effects of the planned extensions may be found by topic in the Honolulu High-Capacity Transit Corridor Project Technical Reports; however, because the planned extensions are not being constructed at this time and will require further planning and design, information about the extensions is less specific than information about the Project. For more information on existing and future land use development in the study corridor, see the *City and County of Honolulu General Plan* (DPP 2002a) and the other planning information provided in Section 4.2.

4.19.1 Background and Methodology

Regulatory Requirements

Indirect impacts are defined by CEQ as "effects which are caused by the [proposed] action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to changes in the pattern of land use, population density, or growth rate…"

Cumulative impacts are defined by CEQ as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Methodology

A qualitative assessment of indirect and cumulative effects, including growth, was based on available information on historical, present, and foreseeable future development. Information was obtained from DPP, planning officials in the areas, and plans and studies prepared by others related to future development, including land developers active in the study area. Quantitative analysis is included for resources where data was available and for the resource areas. Federal guidance was used in evaluating the Project's cumulative effects, specifically CEQ's Considering Cumulative Effects under the National Environmental Policy Act (CEQ 1997a).

Time Frame for the Analysis

The time frame for the cumulative impacts analysis included both past actions and reasonably foreseeable future actions. The time period of the past analysis was determined by the information available for the resources studied, in broad terms, the time since the start of Oʻahu's rapid population growth in 1920. Generally, the time for future effect analysis extends from the present day to 2030. This is the time frame for which the City has plans and projections and anything beyond that is speculation and not reasonably foreseeable.

Geographic Areas of the Analysis

Indirect effects of the Project are likely to occur within the station areas and within the area of the ʻEwa Development Plan (DPP 2000), which is in the process of converting from an agricultural area into an urban area. The ʻEwa area and the station areas are where the greatest changes in access to the transit system will occur; these are likely to be the areas where development and change in development densities can be reasonably expected in response to the Project.

The cumulative effects analysis considers many of the planned and reasonably foreseeable projects within three major planning areas (ʻEwa, Central Oʻahu, and the PUC) within the study corridor. The cumulative effects analysis compares the amount of land required for planned and reasonably foreseeable developments with the amount of developable land within the study corridor.

For the ʻEwa and Central Oʻahu planning areas, estimates of the amount of developable land within the study corridor were made based on GIS analysis of existing undeveloped land. Because the PUC currently lacks undeveloped land, estimates of the amount of land available for redevelopment were used for the comparative analysis described above.

Planned development within the study corridor was used to qualitatively analyze the cumulative effects on the visual environment and impervious surfaces and changes to the hydrology for water resources. Other resources were analyzed for the cumulative effect based on past, present, and future development.

4.19.2 Indirect Effects

Large infrastructure projects play an important role in determining the amount, density, and pace of land use development. However, other factors also determine the amount and type of additional growth in the study corridor, including market demand, local planning policies, land availability, and the availability of other infrastructure (roads, wastewater treatment, schools, etc.). Future development will be greatly influenced by factors outside the control of the project sponsor or any of the other planned projects. U.S. and Asian economic trends can affect the economy of Hawaiʻi as well as how, when, and to what degree land is developed on Oʻahu. The growth projections in the City and State plans are predicated on current information. Actual growth may be more or less than projected.

The City has adopted plans that direct future development to occur within the study corridor and away from less developed portions of Oʻahu. City policies and plans for areas outside the study corridor allow for limited growth and development. The Project is consistent with the City's policies to direct growth on Oʻahu to the study corridor.

The study corridor has the highest population and employment area in Hawaiʻi. It is a center of Hawaiʻi's tourism and trade industries. The study corridor is served by substantial existing transportation and other infrastructure that tends to encourage continued growth.

According to the 2000 census, 63 percent of Oʻahu's population of 876,200 was located within the study corridor. By 2030, the total island population will increase by 28 percent, with 91 percent of that increase occurring within the study corridor. This level and concentration of growth within the study corridor are consistent with public policy and plans.

Effects of the Project on Growth

After completion of construction, the Project will not decrease or increase regional population or the number of jobs; however, it will influence the distribution, rate, density, and intensity of development in the study corridor. Without the Project, growth is more likely to be dispersed outside of the study corridor, including in undeveloped areas of Central and North Oʻahu. Development in these areas will affect environmental resources as would be expected of dispersed development patterns. Planned and reasonably foreseeable actions presented in Section 4.19.3 will occur with or without the construction of the Project and constitute the basis for the No Build Alternative in this document.

The Project is a major element of the ORTP. The ORTP is intended to provide a transportation system to support existing and planned growth in accordance with Local and State land use policies. These policies and the presence of a transit system can also have an indirect effect on property values in station areas (increases have been demonstrated in other cities with transit systems). At the study corridor level, the Project will support the development programmed in the *ʻEwa Development Plan* (DPP 2000), *Central Oʻahu Sustainable Communities Plan* (DPP 2002b), and *Primary Urban Center Development Plan* (DPP 2004a).

Development in `Ewa

The *ʻEwa Development Plan* supports development in concert with a transit system. Although the construction of a transit system does not directly cause development to occur, land use plans and policies will encourage new development to be located near transit stations to take advantage of the transportation infrastructure and increased accessibility with the Project. The Project may also increase the rate of development in the ʻEwa Plain.

Transportation from the ʻEwa area to the employment centers in the study corridor is constrained by traffic congestion and increasing commute times to employment centers in the study corridor. As shown in Table 3-14 (in Chapter 3), the Project will reduce traffic congestion and improve mobility in the corridor by providing an alternative to the automobile.

The State is constructing a major new north-south highway in the ʻEwa Plain that is intended to serve planned growth in this area (North-South Road and Kapolei Parkway Final Environmental Assessment Finding of No Significant Impact [September 2004]). The State and the City have concluded that the highway study corridor will continue to grow and that this growth is likely to occur regardless of whether the highway project is built.

Station Area Development

Within station areas, the Project combined with land use policies and favorable real estate market conditions will likely attract TSD and TOD. TSD supports the development of uses such as office space and multi-story residential buildings near transit stations. For example, offices generate more transit riders per square foot of space than any other land use. TOD integrates land use and transportation elements. The intent is to plan development to combine transit with land use that may include retail, high-density residential, mixed use, and pedestrian-oriented communities.

The City has adopted plans that direct future development to occur within the study corridor and away from less developed portions of Oʻahu. The TOD policy will focus the growth into patterns that will increase the viability of a number of travel options available to corridor residents and employees, including transit, walking, and bicycling.

The City passed this TOD ordinance in March 2009 in anticipation of the Project. Development in the study corridor, whether highway-oriented or TOD, will be based on market demands. Pursuant to the policy, TOD may occur in project station areas as an indirect effect of the Project. The increased mobility and accessibility that the Project will provide may also increase the desirability and value of land near the stations, attracting new real estate investment nearby. Therefore, the Project's primary indirect effect will be to alter development near the stations, bringing higher densities than presently planned or could otherwise be developed near transit stations. These land use effects could take the form of TOD or TSD. If development occurs around stations, it is anticipated that City infrastructure will be improved in these areas.
It is not expected that the Project will lead to an increase in the overall level of growth allowed or expected in the study corridor. Rather, it will focus the growth into patterns that will increase the number of viable travel options available to corridor residents and employees, including transit, walking, and bicycling. As an additional benefit, compact TOD development will reduce the cost of providing utilities, facilities, and services to new residential and commercial developments. The potential for TOD will differ at each station site. Factors that could spur TOD development, beyond the addition of a transit station, include available and undeveloped land, adoption of TOD zoning and policies, other real estate investment in the area, and market demand for new and additional floor space. The following sections generally discuss TOD potential at stations.

East Kapolei, UH West O`ahu, and Ho`opili

The undeveloped ʻEwa Plain area has potential for TOD because of the availability of vacant parcels (Figure 4-3). The undeveloped nature of this area and the fact that fixed guideway construction will occur during or prior to many of the surrounding developments make this area ideal for TOD. The specific stations and planned developments in the station areas that could incorporate TOD elements are as follows:

- East Kapolei—developments by the Department of Hawaiian Home Lands (DHHL) and the Salvation Army (Kroc Center) are planned in this area. In addition, a regional shopping center is being planned by DHHL.
- UH West Oʻahu—developments are planned for the campus as well as the surrounding area on the ʻEwa side of North-South Road.
- Hoʻopili—the proposed Hoʻopili development surrounds this station.

West Loch and Waipahu Transit Center

Due to a lack of undeveloped land, TOD in Waipahu and the West Loch Station areas will primarily be the result of redevelopment of existing land uses rather than greenfields development. The same factors that spur TOD in undeveloped areas will apply in these areas but, instead of the availability of undeveloped land, the presence of outdated buildings and uses could spur redevelopment and, hence, TOD.

Leeward Community College and Aloha Stadium

These two stations differ from the other project stations. Both are fairly remote from other developments and not likely to have any indirect TOD effects. The Leeward Community College Station area is difficult to access by vehicle, and the little available land in the area will most likely be used as a maintenance and storage facility. The maintenance and storage facility is not expected to have any indirect land use effects. The primary land use near the Aloha Stadium Station is the stadium and Pearl Harbor Navy facilities, neither of which is likely to be redeveloped before 2030.

Pearl Highlands and Pearlridge

The commercial uses near the stations in Pearl City and ʻAiea are well established and draw regional customers. These include big-box retail stores near the Pearl Highlands Station and Pearlridge Center near the Pearlridge Station. The volume of traffic through the area and recent investments indicate that development will continue; however, the lack of open space and the relative newness of surrounding development suggest TOD will likely be limited in the near term.

Pearl Harbor Naval Base, Honolulu International Airport, and Lagoon Drive

The Pearl Harbor Naval Base, Honolulu International Airport, and Lagoon Drive Stations are largely industrial, airport-operation related, or military in character (Figure 4-5). TOD is not considered likely in these areas given their military industrial use. Development is limited by the proximity of the airport due to development and height limitations.

Middle Street Transit Center, Kalihi, Kapālama, and Iwilei

These stations will be in relatively urban areas where existing land uses differ parcel to parcel, generally becoming more commercial approaching Downtown (Figures 4-5 and 4-6). Parcel size may limit TOD in some areas; parcels near the Kalihi Station tend to be small, but some parcels near the other three stations are of sufficient size to support TOD. Parcel ownership may also affect redevelopment potential; the smaller parcels are owned by individuals unlikely to substantially change land use, but Kamehameha Schools has substantial holdings in the area and has suggested it is planning redevelopment. Public housing in the area could also be redeveloped to take advantage of the transit system. Considerable investments have been made in the area Koko Head of Kapālama Stream in the last 10 years. These investments suggest redevelopment in the area is possible and could be further spurred by the Project.

Chinatown and Downtown

Chinatown and Downtown already have TOD or TOD-like developments. Redevelopment in the area has taken place with recent condominium towers being built Downtown. Further redevelopment could occur, particularly around the port, and incorporate more TOD elements in the future. The historic districts restrict redevelopment to a degree. The Project is unlikely to substantially alter existing development plans in the Chinatown and Downtown areas.

Civic Center, Kaka`ako, and Ala Moana Center

Land use in much of this area is overseen by the Hawaiʻi Community Development Authority, and new developments already include some TOD features. Considerable investments in both condominium high-rises and commercial developments have been made in this area recently. Continued redevelopment is planned and is expected to continue. Parcel size and ownership is likely to play a role; the smaller parcels in the mauka area are less likely to undergo TOD, while the larger underused parcels owned by Kamehameha Schools and General Growth Properties, among others, will be more likely to redevelop and incorporate TOD elements.

Property Values

Changes in property values that will result from construction of the transit system are an indirect effect. Research based on New York and other cities has shown that residential property values can increase close to a transit station (Table 4-38). While most studies of transit's impact on real estate values show increases, they cannot explicitly isolate transit benefits from other market forces.

Property-value increases near a transit station are realized in sales prices or rents. For residential properties, these increases probably reflect better access to the transit system and associated reductions in vehicle costs. For commercial properties, transit proximity potentially broadens the customer base, increases foot traffic near the business, and contributes to employee accessibility.

In some cases, transit may have a negative effect on real estate values due to what are often called "nuisance" effects—noise, increased foot traffic,

Table 4-38 Rail System Benefits on Real Estate Values

Rail System	Rail Technology	Increase in Home Sales Price	Source
BART–San Francisco	Rapid rail	$1,578 increase for every 100 feet closer to a station	Lewis-Workman 1997
MTA–New York City	Rapid rail	$2,300 increase for every 100 feet closer to a station	Lewis-Workman 1997
San Diego	Light rail transit	$82.90 increase for every 100 feet closer to a station	Landis 1995
San Jose	Light rail transit	$60 increase for every 100 feet closer to a station	Landis 1995
MAX–Portland	Light rail transit	$202 increase for every 100 feet closer to a station	Al-Mosaind 1993
Metro–Washington, D.C.	Rapid rail	$0.23 increase in per square foot rent for every 100 feet closer to a station	FTA 2000

visible infrastructure, transit-associated parking lots, and increased bus traffic. These factors can reduce the desirability of properties in the immediate vicinity of the fixed guideway. Such nuisance effects will most likely occur in areas where value is attributable to the remoteness of the location. Because the Project is forecast to result in travel time savings and will be placed on already busy roadways, the likelihood of negative effects on real estate value is minimal.

4.19.3 Cumulative Effects

This section describes the cumulative effects of the Project with other past, present, and reasonably foreseeable actions.

Past Actions

Oʻahu experienced major population growth (between 42 and 64 percent per decade) between 1920 and 1950 (Figure 1-2 in Chapter 1). Much of this growth can be attributed to a military buildup before, during, and after World War II, as well as rapid increases in the tourism industry as air travel became more available. Growth rates decreased steadily in subsequent decades and fell to only 5 percent during the 1990s.

The study corridor has been extensively modified by land reclamation, sugar cane production, military construction, and urban development. The most notable past action was the urban and suburban development of Oʻahu beginning in the 1940s. This development pressure has continued as Waipahu, the Pearl Harbor area, Salt Lake, Kalihi, and Downtown Honolulu became built-out and in-filled in the post-World War II years. By 1960, the study corridor was virtually built out between Downtown and Waipahu. Since then, ʻEwa and Kapolei have been developing. The latter is the only section of the study corridor with vast amounts of land available for new development. However, even in ʻEwa and Kapolei, these areas have been drastically altered by historic and modern land use, including intensive sugar cane cultivation, large-scale limestone quarrying operations, and residential and commercial development.

The development of the OR&L's route across ʻEwa also established the first urban development at Pearl City in the late-19th century. By 1920, urban development had begun at ʻAiea, followed by further development at Waimalu and Pearl City in the 1950s. Construction of the H-1 and H-2 Freeways further supported this western push into Central and West Oʻahu. The construction of other highways, such as Farrington, Kamehameha, and Nimitz, helped improve accessibility between West Oʻahu and Downtown and reinforced growth and development.

Present and Reasonably Foreseeable Actions

The 2030 population within one-half mile of the project alignment will range from 229,000 to 252,000, which will be approximately a 10-percent increase from 2007. Employment in 2030 within the same area will range from 299,000 to 317,000, an approximate 6-percent increase from 2007.

In addition to the Project, other transportation improvements are anticipated to be completed on O'ahu by 2030. Table 2-3 (in Chapter 2) lists major roadway projects that are anticipated to be completed. The planned extensions to West Kapolei, Salt Lake Boulevard, UH Mānoa, and Waikīkī also are included in the ORTP. The planned extensions will be evaluated through a separate NEPA and HRS Chapter 343 environmental review process.

O'ahuMPO updates and revises the ORTP every five years in accordance with Federal regulations. It is an essential part of the continuing, cooperative, and comprehensive statewide multimodal transportation planning efforts conducted in Hawai'i. It focuses on improving mobility with a series of strategies and programs to address future transportation needs.

Table 4-39 summarizes planned and foreseeable development within the 'Ewa Development Plan, Central O'ahu Sustainable Community Plan, and PUC Development Plan areas in the study corridor. The development areas within the study corridor are illustrated in Figure 4-2. The Project will not change the effects of development in the vicinity of the Project. The current 'Ewa Development Plan anticipates extensive development of the 'Ewa Plain whether or not the Project is built. Although the Project may have the effect of intensifying land use in the areas near the planned station (as discussed in Section 4.19.2), the overall development plan will not be substantially altered by the Project. Planned development is occurring independent of the Project; consequently, the Project will not cumulatively affect the resources described below beyond what will occur due to these planned and reasonably foreseeable developments.

The State of Hawai'i prepared an Environmental Assessment (EA) of the effects of two major transportation projects (North-South Road and Kapolei Parkway) in the 'Ewa area. The EA evaluated the growth-inducing and cumulative impacts of these transportation projects under the Hawai'i Environmental Policy Act. These transportation projects and others under construction, such as the widening of Fort Weaver Road, will facilitate the planned and foreseeable developments within the 'Ewa plain, even in the absence of this Project.

The City, other State and Local agencies, and private developers also prepared EIS/EAs under NEPA and HRS Chapter 343 with regard to several of the planned development projects in the 'Ewa area. (See Table 4-39 and specific EIS/EAs, including Ho'opili Final Environmental Impact Statement [Horton 2008], Kapolei Sustainable Energy Park Final Environmental Impact Statement [Hoku 2007], Ocean Pointe Final Supplemental Environmental Assessment [Haseko 2001], and Kapolei Village Final Environmental Impact Statement [HHFDC 1988]).

Land Use

At a regional level, land use changes associated with past projects have included transformation of the land from undeveloped to urban, suburban, and rural farm uses. This has coincided with the population growth in the City and County of Honolulu from 490,000 in 1959 to 905,600 in 2007. The bulk of future regional land use changes are expected in the study corridor. Most undeveloped land within the study corridor is likely to become urban or suburban. Many developed lands within the study corridor also are likely to be redeveloped to higher-density uses. Expansion of public services and facilities will be associated with future growth. Such growth will be consistent with community plans.

Much of the cumulative effect of development on resources in the 'Ewa Plain and West Kapolei in West O'ahu is on transformation of rural and currently undeveloped lands. These areas are rapidly urbanizing due to development in Kapolei, 'Ewa Villages, and elsewhere. Alternatively, the cumulative effect of development on resources in the

Table 4-39 Planned and Foreseeable Actions in the Study Corridor (continued on next page)

Plan Areas in the Project Study Corridor		
Name of Project	**Development Characteristics**	**Development Status**
O`ahu Regional Transportation Plan 2030 (ORTP) (O`ahuMPO 2007)	The O`ahuMPO updates and revises the ORTP every five years in accordance with Federal regulations. It is an essential part of the continuing, cooperative, and comprehensive statewide multimodal transportation planning efforts conducted in Hawai`i. It focuses on improving mobility with a series of strategies and programs to address future transportation needs.	The ORTP (2030), as of Amendment #1, was endorsed by the O`ahuMPO Policy Committee in April 2006. ORTP (2035) began in early 2009.
**`Ewa Development Plan Area**—this plan area includes Kapolei, `Ewa, and Makakilo		
West Kapolei future extension (RTD 2008u)	Provides direct connection with the Project to West Kapolei communities and the Kapolei Transit Center.	Future planning effort
North-South Road (ORTP 2030) (DPP 2000)	A 4-mile Federal-aid, limited-access, principal arterial highway that would connect the H-1 Freeway to the proposed Kapolei Parkway. This is the connection between the East Kapolei and UH West O`ahu Stations.	Final EA, September 2004 Construction completed early 2010
Kroc Center (Salvation Army) (TSA 2007)	Recreation and community center on 10 acres with 100,000 square feet.	Planned project
DHHL property (DHHL 2006)	Located in East Kapolei on 67 acres with 1.5 million square feet, of which some property is planned to be leased for the Ka Makana Ali`i project.	Planned project
Disney resort (Disney 2008)	Hotel and timeshare with 800 units on 21 acres. Expansion of existing Ko `Olina Resort & Marina development.	Construction started 2009 Opening anticipated 2011
Kapolei Commons (TMG/TKG 2009)	Located on Kalaeloa Boulevard. This is a 610,000-square-foot shopping center on 50 acres.	Completed project Opened 2009
University of Hawai`i at West O`ahu (UH 2002b)	A new campus on less than 70 acres.	Planned project Ground breaking 2009 Opening anticipated 2010
Ho`opili (Horton 2008)	Mixed-use community with up to 15,000 dwellings on 1,554 acres. Features a traditional neighborhood design with a grid street pattern and neighborhood facilities.	Planned project Final EIS, July 2008 (HRS Chapter 343)
Ocean Pointe (Haseko 2001)	1,100-acre residential, retail, harbor, and golf course development.	Final EA completed April 1998 Final Supplemental EA, June 2001 Under construction
Makaiwa Hills residential development (DPP 2006)	Located `Ewa of Makakilo. This is a mixed-use community on 1,781 acres with 4,100 homes with commercial and retail elements, recreational facilities, and a school. Affordable housing will be provided in accordance with City standards.	Planned project Final EIS for Makaiwa Hills accepted by the County Department of General Planning, April 1991 EIS Preparation Notice, October 2006
Mehana subdivision (Horton 2009)	Residential community on 135 acres with 1,000 square feet and multi-family residences in eight communities. Nanala, one of eight communities within the Mehana Subdivision, will have 78 townhomes including 20 "Live-Work" units and a community park. This is an expansion of an existing development.	Planned project Conceptual Master Plan completed by Helber Hastert & Fee

Table 4-39 Planned and Foreseeable Actions in the Study Corridor (continued on next page)

Plan Areas in the Project Study Corridor		
Name of Projects	**Development Characteristics**	**Development Status**
Kaupe`a—Villages of Kapolei (HHFDC 1988)	Located on the `Ewa Plain. The Villages of Kapolei is an 888-acre mixed-use community made up of eight villages. It features affordable and market-priced single-family and multi-family residences. It includes schools, religious facilities, parks, recreational centers, retail centers, and a golf course. Seven of eight villages are complete. The eighth village, Kaupe`a, is 52 acres. Affordable housing will be available. This is an expansion of an existing development.	Planned project Kapolei Village Final EIS, February 1988
Kānehili (East Kapolei 1) and East Kapolei 2 (DHHL 2005)	A DHHL affordable sustainable housing community on a 92-acre parcel with 403 residences located on the `Ewa Plain. It is adjacent to the UH West O`ahu campus and between the existing Kapolei Golf Course and the future North-South Road.	Under construction as of April 2009
Kapolei Sustainable Energy Park—solar farm (Campbell Industrial Park) (Hoku 2007)	New electric power plant supplying biodiesel energy.	Planned project Final EIS, July 2007
O`ahu Commercial Harbors 2020 Master Plan (HDOT 1995)	Located about 19 nautical miles `Ewa of Honolulu Harbor near the southwestern tip of O`ahu, Kalaeloa Barbers Point Harbor is the State's second busiest commercial harbor.	Final EIS for the O`ahu Commercial Harbors 2020 Master Plan Immediate Phase, September 1999
Kalaeloa Master Plan (HCDA 2006)	The Master Plan serves as an amendment to the existing Kalaeloa Community Redevelopment Plan, prepared as part of the U.S. Navy's Base Realignment and Closure process. Kalaeloa, the former site of the Barbers Point Naval Air Station, consists of approximately 3,700 acres. The goal of the plan is to create a Wahi Ho`okela (center of excellence), by increasing opportunities for new employment, educational institutions, mass transit, regional connectivity, recreation, affordable housing, resource protection, new industries, economic growth, and national defense in Kalaeloa.	Kalaeloa Master Plan, 2006
Central O`ahu Sustainable Communities Plan Area—this plan area includes Waipahu, Waikele, and Waiawa		
Salt Lake future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments on and in the vicinity of Salt Lake Boulevard.	Future planning efforts
Koa Ridge (C&C 2009)	Koa Ridge is a 578-acre mixed use community in Central O`ahu that includes more than 3,100 residences, a mixed-use village center, and town center to serve regional shopping needs.	Planned project EIS Preparation Notice, May 2008
Waipahu Neighborhood Transit-oriented Development (TOD) Plan (includes two community plans for future urban redevelopment) (DPP 2009) Leokū TOD, also known as the future West Loch Station Mokuola TOD, also known as the future Waipahu Transit Center	Leokū TOD will be the retail and employment center of Waipahu with infill and mixed-use developments. Development intensity will be adjacent to the station. Mokuola TOD within the Waipahu Transit Center Station development will reflect the historic plantation town once located at this site. It will use both infill and mixed-use developments. Development intensity will be within one-quarter mile creating a pedestrian-friendly environment.	Planned projects Waipahu Neighborhood TOD Plan (Public Review Draft), March 2009

Table 4-39 Planned and Foreseeable Actions in the Study Corridors (continued from previous page)

Plan Areas in the Project Study Corridor		
Name of Projects	**Development Characteristics**	**Development Status**
Wahiawā Transit Center (DTS 2009)	The purpose of this project is to develop a transit center/park-and-ride facility to accommodate express, trunk, and circulator bus services. It will provide connections to the Project.	Planned project Final EA, February 2009
Primary Urban Center (PUC) Development Plan—this area includes Pearl City-`Aiea, Salt Lake-Āliamanu, Airport-Pearl Harbor, Kalihi-Iwilei, Palama-Liliha, Downtown, Kaka`ako, Makiki-Mānoa, and Mō`ili`ili-Ala Moana		
UH Mānoa future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments in areas near UH Mānoa and Waikīkī.	Future planning efforts
Waikīkī future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments in Waikīkī.	Future planning efforts
Redevelopment of Kalihi properties (DPP 2004c)	Mixed-use developments, including residential and retail.	Kalihi Palama Action Plan, September 2004 Planned projects Projects under construction Constructed projects
Kamehameha Schools Kaiāulu `o Kaka`ako Master Plan (KKMP) (HCDA 2008)	This Master Plan proposes a mixed-use urban village that will add more than 2 million square feet for commercial uses, more than 4 million square feet for residential uses, and more than 125,000 square feet for industrial uses. It includes redevelopment of 29 acres in Kaka`ako, including 2,750 residential units in seven high rises and commercial/retail development.	Planned projects Kaiāulu `o Kaka`ako Master Plan, November 2008
Ward Village Shops project (HCDA 2009b)	Includes a 17-story structure with 165 rental residential units, 224,000 square feet of commercial space, 34,000 square feet of open space, and 1,010 parking spaces. Expansion of the existing Ward Village development.	Planned project
Halekauwila Place (MVE 2009)	A 1.25-acre, 14- to 17-story proposed affordable housing mixed-use complex with street-level commercial development. It will contain approximately 202 units.	Planned project
Vanguard Lofts (HCDA 2009c)	It involves the renovation and conversion of the old National Cash Register office building into a modern mixed-use urban loft project with 32 residential lofts and 3,470 square feet of ground floor retail.	Project under construction
Hawai`i Airports Modernization Program (HAMP 2006)	Part of the Hawai`i Airports Modernization Program is the Terminal Modernization Program at Honolulu International Airport (HNL). This planned project at HNL includes the construction of a new mauka concourse, relocation of commuter airline facilities, and a new consolidated rental car facility.	Planned project Hawai`i Airports Modernization Program, 2006
University of Hawai`i John A. Burns School of Medicine (JABSOM) (HCDA 2009a)	Medical research facilities on 9.1 acres strategically located in the Kaka`ako Waterfront area. Phase Two will include a research center and parking structure containing 363 spaces. Expansion of existing JABSOM development.	Planned project EA for the JABSOM campus in 2002 New Proposed EA for the Pacific Regional Biosafety Lab, December 2008

Sources: DPP, DHHL, DBEDT, HCDA

Central O'ahu and PUC areas is the redevelopment of existing urbanized areas. The direct effect of the Project on land use is the conversion of approximately 1 percent (161 acres) of total land within the study corridor to a transportation use. Many of the planned and foreseeable actions presented in Table 4-39 will have a larger direct effect than the Project. Therefore, the Project will not cumulatively affect land use resources beyond what will occur due to these planned developments.

The Salt Lake Boulevard, UH Mānoa, and Waikīkī planned extensions will not substantially affect land use because those areas are already highly urbanized.

`*Ewa Development Plan Area*

By 2020, the 'Ewa Development Plan area, which covers approximately 10,000 acres, will have experienced growth and will have made progress toward providing a secondary urban center for O'ahu. At the heart of the secondary urban center will be the City of Kapolei, with an urban mix of commercial, office, and residential uses. It is projected that the City of Kapolei will house over 7,000 residents and provide work sites for about 25,000 private jobs and 5,000 City and State jobs (located at the City's Civic Center).

Many of the jobs in the City of Kapolei will be supported by development of the UH West O'ahu campus, which is expected to have approximately 7,600 students and 800 staff and faculty by 2020. Continued expansion of industrial uses at Campbell Industrial Park, Barbers Point Deep Draft Harbor, and Kapolei Business Park and growth of the Ko'olina Resort and 'Ewa Marina, to include over 3,700 visitor units, will also provide jobs in the City of Kapolei.

Open space will be preserved in parks, golf courses, and agricultural areas, which will also help to protect significant views. Wildlife habitats will be located at the former Barbers Point Naval Air Station (now known as Kalaeloa), 'Ewa Marina, and West Loch. Many of the 'Ewa Development Plan projects listed in Table 4-39 and all of the developable acreage are within the study corridor. This table shows about 6.0 acres (60 percent) of the developable acreage in the 'Ewa Development Plan area is proposed for future development. Less than 1 percent of the planned development is outside the study corridor. Within the study corridor, approximately 90 acres within this plan area will be developed by the Project, including land associated with the optional maintenance and storage facility at Ho'opili, proposed park-and-ride facilities, and other guideway infrastructure. If the maintenance and storage facility is not constructed at Ho'opili, approximately 50 acres will be used by the Project within the 'Ewa Development Plan area.

Moreover, future development in East Kapolei has spurred opportunities for roadway connectivity. The completion of North-South Road and Kapolei Parkway, between Renton Road and the Kapolei Middle School area, will significantly enhance roadway connectivity in the area. As the area builds out, Farrington Highway will be widened between North-South Road and Fort Weaver Road.

A key roadway in this area is a new east-west arterial roadway through the Ho'opili and UH West O'ahu projects that would facilitate mobility within this area. This new roadway would provide relief for Farrington Highway and would help to preserve the collector status of Renton Road. Without the new east-west roadway, Renton Road could easily become the east-west arterial by default.

The extension of North-South Road makai into Kalaeloa would facilitate access to future planned development in Kalaeloa as described in the *Kalaeloa Master Plan* (HCDA 2006) and provide an alternative path to new developments, such as Ocean Pointe, as well as to the Project. Additionally, a supportive collector roadway system would relieve the pressure on North-South Road, Farrington Highway, and the proposed East-West Arterial. These roadway projects are supporting future growth and development in the ‘Ewa Development Plan area independent of the Project.

The North-South Road EA and the environmental analyses of the development projects in the ‘Ewa Plain identified the following impacts of growth:

- Conversion of agricultural land-to-urban uses
- Short-term adverse air quality impacts from construction
- Increased long-term air emissions flood plain and water quality impacts from urban runoff to wetlands streams and coastal surface waters
- Impacts to several cultural and historic sites
- Increased noise from urban uses
- Visual impacts from conversion of agricultural to urban uses
- Impacts to vegetation and wildlife.

Many of the waters in the Project area are degraded with several listed as impaired or water quality limited segments by the State of Hawai‘i. In the absence of measures to offset these impacts, the increased urbanization of the Project area will increase the existing adverse condition of the water quality in the Project area.

The 2002 Census of Agriculture (USDA 2004) reported that there are more than 70,000 acres of agricultural land in cultivation on O‘ahu, including those designated as prime, unique, or of statewide importance. The past, proposed, and reasonably foreseeable developments in the ‘Ewa Plain will eliminate approximately 6,000 acres from agricultural uses, or 8.6 percent of the remaining agricultural lands in O‘ahu and 3.8 percent of the approximately 160,000 acres of agricultural lands in the State of Hawai‘i. This includes the conversion of approximately 20 additional acres of farmland from the planned Kapolei extension, none of which is actively cultivated. The estimate of the loss of agricultural land use is based on the assumption that all land in the ‘Ewa Development Plan area is agricultural, which was the historical use of this land.

As described in Section 4.2.3, the Project will only contribute to the displacement of less than one tenth of one (<0.1) percent of available agricultural land. The projected reduction in agricultural lands in the ‘Ewa area is not substantial. The current ‘Ewa Development Plan preserves 3,000 acres of the highest value prime agricultural land for protection from development. By protecting agricultural lands from urban development, an opportunity is created for retention and development of diversified agriculture on small farms and agricultural parks. Agriculture within the ‘Ewa Plain would likely change in character over time from intensive monoculture farming of export crops to diversified crops for consumption on the islands in the State of Hawai‘i. The loss of agricultural production from the Project and other reasonably foreseeable projects throughout the State of Hawai‘i are expected to be offset by:

- Hawai‘i Agriculture Research Center (HARC) conducting studies on vegetable crops and forage to help diversify agricultural activities in the area
- Agricultural businesses maintaining their current levels of operation and production by leasing replacement lands in Kunia and/or the North Shore and possibly cultivating their remaining lands more intensively

Statewide agricultural production, revenues, employment, or payroll are not anticipated to be adversely affected but may change as the agricultural industry changes.

Central O‘ahu Sustainable Communities Plan Area

The Central O‘ahu Sustainable Communities Plan area, which covers approximately 3,000 acres, is expected to experience moderate growth as existing areas zoned for residential development are built out by 2025. Over 11,000 new housing units will have been built in master-planned communities, and substantial job growth is also expected to be over 65,000 new jobs (almost 10 percent of Oʻahu total projected). The bulk of the private non-construction job growth is projected to be in services, retail, or transportation/communications/utilities (about 70 percent) with another 20 percent in industrial occupations.

Urban growth will be contained within a boundary which will protect prime agricultural lands for diversified agriculture. Preservation of these lands will help retain open space, in addition to supporting economic diversification. A regional system of open space and greenways will give Central Oʻahu the feel of a network of communities "within a garden." Open space will be preserved in parks, golf courses, agricultural areas, deep ravines, and wildlife habitats.

A Shoreline Park and Preservation Area developed along the entire shoreline in Pearl Harbor's West Loch and Middle Loch will restore the shoreline in Waipahu to public use, provide active and passive recreational facilities, and help create the Pearl Harbor Historic Trail, a pedestrian path, bikeway, and restored historic train system running from Rainbow Marina near Aloha Stadium to the Waiʻanae Coast.

Special area plans prepared in partnership with the Waipahu and Wahiawā communities will guide redevelopment of these gateway towns. To support the revitalization of these towns, commercial and industrial development outside of Waipahu and Wahiawā will be limited to completing the Mililani Technology Park development and building new commercial centers designed to meet the demand from their surrounding residential communities, rather than for a regional or islandwide market.

Central Oʻahu will be developed with a transportation system that will provide easy access to transit, use of traffic calming design, and encouragement of people to walk and bike, reducing the need for use of automobiles. Moderate density housing and commercial development will be built along the Project stretching from the City of Kapolei through Waipahu to Pearl City in the PUC.

Many of the projects in the Central Oʻahu Sustainable Communities Plan area listed in Table 4-39 and about 450 acres (15 percent) of developable acreage are within the study corridor. Approximately 70 acres will be used for the Project, including for the preferred site option of 44 acres for the maintenance and storage facility near Leeward Community College, proposed park-and-ride facilities, and other guideway infrastructure. If the maintenance and storage facility is not constructed near Leeward Community College, then approximately 26 acres will be used by the Project within the Central Oʻahu Plan area.

A roadway project located in Central Oʻahu includes Central Mauka Road, a new four-lane road from Mililani mauka to Waiawa as shown in the ORTP, is further evidence of growth in Central Oʻahu independent of the Project. The road connects Meheula Parkway to Kamehameha Highway in Pearl City. It is parallel to and mauka of the H-2 Freeway. The new four-lane North-South Road includes connections to H-2 Freeway interchanges. Another project is a new two-lane second access road to Waiʻanae. It runs from Farrington Highway in the vicinity of Maili, over the Waiʻanae Mountain Range, to Kunia Road. Both projects would provide improved mobility options in areas close to future planned development in Central Oʻahu.

Primary Urban Center Area

The PUC is an interconnected network of vibrant, distinct neighborhoods. Each has qualities that make it a livable and enjoyable place to live, work, and play. The City supports an ongoing program of neighborhood planning and improvement with the redevelopment of existing urban land. Livable neighborhoods include business and community services as well as residences. Key to livability is convenient access to work and to the many services and attractions found in an urban center.

Mauka residential neighborhoods primarily consist of single-family homes and townhouses on the edges of the central city. They retain their historically residential character, with mostly one- and two-story buildings and plenty of yard space and trees. Shops, parks, and schools are located within walking or bicycling distance of most residents. Churches, schools, and other uses coexist harmoniously. In-town residential neighborhoods offer the greatest amenities for urban living. Consisting mostly of apartment dwellings, these neighborhoods are closest to employment centers, educational facilities, and cultural institutions. They are also close to grocery stores, shopping districts, and other government, health, and commercial services. Proximity to the Project will give residents mobility and make it possible to live with fewer automobiles. Newer apartment buildings are typically four to six stories tall, with shops and services on the ground floor. Small parks, plazas and "green streets" provide places for people to meet and for small children to play.

The PUC Plan covers approximately 24,000 acres. All of the PUC Plan, including several PUC projects, approximately 45 acres listed in Table 4-39, are within the study corridor. Less than 45 acres will be developed by the Project for proposed park-and-ride facilities and other guideway infrastructure. According to the PUC Plan, there are no large areas of developable land. Therefore, the majority of development in the PUC will be redevelopment of existing urban land.

Future roadway projects in the PUC would be enhancements or maintenance of existing infrastructure. For example, a new two-lane elevated and reversible HOV flyover above Nimitz Highway will be constructed from the Ke'ehi Interchange to Pacific Street, as shown in the ORTP.

Economy

Economic changes have come with transitions to and from agricultural, military, and tourism economies. In 1958, military defense operations and sugar and pineapple production were the State's primary economic activities, accounting for 40 percent of the gross state product (GSP). In 2007, the GSP reached $61.69 billion. Honolulu County's gross metropolitan product in 2005 was $41.11 billion. Hawai'i's retail sales revenue has been in excess of $21.5 billion, partially driven by its tourism industry. In 2007, Hawai'i's visitor expenditures were more than $12.2 billion. "Finance, insurance, and real estate" and "services" are the biggest private sector industry contributors, contributing 22 percent and 29 percent of the State's 2006 output, respectively. Retail and wholesale trade together account for 11 percent of the GSP.

The economic forecast is for continued steady growth. Planned projects are intended to continue to encourage and enable economic growth in the region. Continued focus on tourism is anticipated. To the extent that the Project will reduce travel times and decrease the growth of congestion, the Project is expected to generate an atmosphere conducive to future economic development. Completion of the planned extensions and other planned projects will include additional land conversion to public transportation use, decreasing the taxable land and associated property tax revenues.

The Project also will require hiring additional workers to support the expanded system.

In general, the Project is not a major long-term economic driver for O'ahu's economy.

Displacements

Past projects, such as the H-1 Freeway construction project, have resulted in a number of relocations of residents and businesses.

Planned projects, including transportation projects listed in the ORTP, will result in some level of displacement of a variety of land uses. Projects likely to result in displacements include widening of the H-1 Freeway in Kalihi and Pearl City. The planned extensions to the fixed guideway system are anticipated to require additional acquisitions and displacements of residential units and businesses.

Community Facilities and Public Services

As growth proceeds, community facilities and public services will need to expand to meet increasing demand as has historically occurred with past development. Public policy requires that large developments provide land and develop such facilities, including schools. As development proceeds, the tax base also will grow to fund the expansion of such facilities.

The network of utilities will grow and be upgraded as a result of continued development. Water, sewer, and electrical upgrades will be a benefit to the community as they will improve availability and reliability of services. Additional electrical generation will be required to support the increase in population and employment as well as to provide energy for propulsion for the Project. Since the majority of the electricity generated on O'ahu is through the combustion of fuel oil, increased fuel oil consumption and air emissions would be expected. However, this will be partially offset by the Hawai'i Clean Energy Initiative, which has as its goal that 40 percent of the electrical-generating capacity will be from clean sources by 2030.

Potable water is currently limited on the Island of O'ahu and is delivered by the City and County of Honolulu Board of Water Supply. Since 1990, demand for potable water supplies on O'ahu has remained constant at 155 million gallons per day, even with significant urban residential and commercial development growth occurring within the water supply system area of service. This has been accomplished through conservation, loss prevention, and growth in the use of recycled water for industrial and irrigation activities.

Additional potable water supplies will be required to support the increase in population and employment as well as at the stations and at the maintenance and storage facility for the Project, although the Project is not anticipated to be a major water consumer. Since all of the potable water on O'ahu is from sole source aquifers, it is imperative that O'ahu residents embrace water conservation measures and that the Board of Water Supply continue to upgrade their facilities in order to minimize system loss through upgrades to their aging water delivery system. To the extent that recycled water supplies are available, the Project will use recycled water at their maintenance and storage facilities, at their stations, and through irrigation of landscaped areas.

Planned development, including the planned extensions, will affect existing parks and recreational resources. They also may affect, but not displace, some existing community resources through partial acquisition of properties where they operate.

Neighborhoods

Past projects, such as construction of the H-1 Freeway, have affected neighborhoods by cutting through and separating communities in the urban area and changing the character of communities. Continued development and increased density in the study corridor will affect the character of neighborhoods; however, effects as extensive as those caused by the construction of a new freeway will not occur. Future projects will likely have less severe effects than previous H-1 Freeway construction. Those effects will be gradual as individual projects are implemented.

Redevelopment, and specifically TOD, will occur in neighborhoods and communities where stations are planned. However, in areas such as Chinatown, Downtown, and Waikīkī, TOD will not likely change neighborhood character. In other areas, TOD could have an effect. The principles of TOD, such as pedestrian-orientation and mixed uses, are generally credited with reviving neighborhoods or making them more vibrant.

The planned extensions will serve additional neighborhoods with transit stations, such as Makakilo-Kapolei-Honokai Hale, Ala Liliko‘i, McCully-Mō‘ili‘ili, and Waikīkī. No substantial effects to those neighborhoods are expected. This is primarily because the extensions will follow already busy thoroughfares or pass through undeveloped areas. The increase in mobility resulting from the extensions will generally improve the quality of life for neighborhood residents, especially for those with limited financial resources and those who may be transit-dependent.

Environmental Justice

Environmental Justice communities and communities of concern are expected to benefit from the Project, planned extensions, and related development. The planned extensions will expand the extent of the fixed guideway transit system, which will improve travel options for transit-dependent groups and improve mobility in the corridor by providing an alternative to the automobile. An affordable and reliable means of transportation throughout the study corridor will provide more opportunity for low-income groups to live and work throughout the study corridor.

Visual

In general, the visual environmental has been transformed from rural to urban over the past 70 years. The visual environment has been affected by past changes in land use and by the increasing height of buildings in the Downtown, Kaka‘ako, and Waikīkī areas. Similar effects are expected to gradually continue throughout the study corridor. In the ‘Ewa area, visual resources will be affected more rapidly than other areas in the study corridor by the replacement of undeveloped land and farmland with housing, commercial, and public facility developments in accordance with development plans. Currently, when traveling from the Wai‘anae direction of the H-1 Freeway near Exit 5 (East) Kunia Road/‘Ewa/Waipahu, drivers have an unobstructed panoramic view towards the Ko‘olau Mountain Range, Pearl City, Pearl Harbor, ‘Ewa, and the Pacific Ocean. The planned developments in the ‘Ewa Plain, which will be located at a lower elevation than the freeway, will be visible from the freeway; and the visual character will change from open space to urban development.

Modification of height limit and/or setback distances near transit stations could change the aesthetic character and design in transit station areas. More views and open areas outside the study corridor may be preserved as a result of concentrating development within station areas and away from more rural portions of O‘ahu.

Views of the planned extensions will be similar to those of the Project shown in Section 4.8. Figures 4-79 and 4-80 show simulated views of the planned UH Mānoa and Waikīkī extensions.

Noise

Noise has been steadily increasing in the region as it has become more urban and suburban as traffic has increased. As the study corridor becomes more densely developed, ambient noise levels will continue to increase. The planned extensions and other future development will create additional noise impacts in the vicinity of the alignment, which are similar to those discussed for the Project in Section 4.10. With existing land uses, no noise impacts will occur at ground level, but users of outdoor lanais located above the height of the guideway and facing the planned extensions would experience moderate noise impacts at some

Figure 4-79 Visual Simulation of UH Mānoa Planned Extension at Convention Center, looking Mauka

Figure 4-80 Visual Simulation of Waikīkī Planned Extension at Kālaimoku, looking Mauka

locations between the Ala Moana Center Station and the end of the Waikīkī extension and along the Salt Lake extension.

Hazardous Materials

Industrial and military land uses in the past have resulted in the release of hazardous materials, such as fuels and solvents, into the environment. Several brownfield sites are located in the study corridor. As a result of laws enacted since the 1970s, new developments and industrial activities are not expected to result in the release of hazardous materials. Redevelopment of previously contaminated properties offers the potential to remove some of the legacy chemicals in the soil and groundwater that resulted from waste discharge practices occurring before the current regulatory framework was established. This would be an overall benefit to the environment.

Planned future development, including the planned extensions to the fixed guideway system, are anticipated to affect additional sites of concern for hazardous materials contamination.

Ecosystems

Past development of suburban areas and farms has replaced undeveloped lands throughout the region. Even in the 1920s, there was almost no undeveloped land in the study corridor due primarily to sugar cane plantations. The former sugar cane lands do not provide significant habitat. The few wetland areas that were not used for sugar cane production were mostly developed for post-war housing, such as in the Salt Lake area. The Project is in a disturbed urban environment and will remain urbanized in the future. Continued development will not likely affect bird species that adapt well to urbanization. The Project could result in the preservation of a larger volume of vacant and undeveloped land outside the study corridor by supporting development within the corridor. This will have a commensurate benefit to ecosystems.

Threatened and Endangered Flora

The City will mitigate for potential impacts to koʻoloaʻula. An 18-acre koʻoloaʻula (Abutilon menziesii) contingency reserve lies within the ʻEwa Development Plan area. Mitigation measures, including the reserve, have already been specified in the HCP for this population by the USFWS. The City will secure a Certificate of Inclusion from the State for the Project as described in Section 4.13.3 of this Final EIS.

Impacts to other threatened and endangered flora are unlikely because few species are present within the area and, if any are encountered, they will be protected by existing regulations; all future developments will be responsible for complying with the Federal Endangered Species Act for their own projects.

Threatened and Endangered Wildlife

There is no habitat for threatened and endangered wildlife species in the ʻEwa area even though it is relatively undeveloped. No cumulative impacts to these species are likely. All endangered species are currently protected by existing regulations; all future developments will be responsible for complying with the Federal Endangered Species Act for their own projects.

Water Resources

Water resources have been degraded by past residential, industrial, military, and farm developments. The most substantial effects of past actions include the following:

- The channelization of most streams in urban and suburban areas
- The draining and filling of wetlands in Waikīkī, Salt Lake, and Pearl Harbor
- The pollution of surface water and groundwater with agricultural (herbicide and insecticide) and other chemicals

Future projects, including the incremental effect of the Project, will modify surface-water resources in the ʻEwa Development Plan Area by the incremental conversion of pervious surface to impervious surface. The loss of pervious surface increases the pollutant load that is discharged to surface-water resources, increases peak flow due to the loss of infiltration, and decreases base flow due to the loss of infiltration. There is the potential for loss of flood storage capacity due to encroachments into regulated flood zones. However, infrastructure, such as the Kaloʻi Gulch Drainage Canal being constructed as part of the North-South Road project, will be constructed as part of future development as required by regulations to accommodate flood storage capacity. Landscapes in the Central Oʻahu Sustainable Communities Plan area and the PUC Development Plan area are already altered by past loss of pervious surfaces, altered flow conditions, and conversion to a built environment. The future projects for Central Oʻahu and the PUC listed in Table 4-39 would have less cumulative impact on water resources compared to developments in the ʻEwa area because conversion to urbanization has already occurred. The additive effects of the Project, in combination with other actions, could further degrade surface-water resources. However, mitigation measures that will be part of Federal, State, and Local permitting requirements will help offset negative effects to surface-water resources. In addition, future projects in the ʻEwa Plain will not affect wetlands because the developable upland area is dry and has permeable soil that does not contain any wetlands.

The current and reasonably foreseeable actions described in Table 4-39 will also be required to follow City, County, State, and Federal environmental regulations and mitigation measures; therefore, the additional cumulative effects to water resources as a result of the planned extensions are the same as described above.

Street Trees

The planned extensions would affect street trees along those alignments, including monkeypod trees on Kapiʻolani Boulevard and mahogany trees along Kalākaua Avenue. Some of the monkeypod trees would require removal, while the mahogany trees could be preserved with pruning. All street trees are currently protected by existing regulations; future development is also subject to these regulations to protect street trees.

Archaeological, Cultural, and Historic Resources

Archaeological, cultural, and historic resources have previously been affected during prior development within the study corridor.

Future development may occur near pre-contact and post-contact archaeological and burial sites. Future development also could affect historic resources, churches, cemeteries, schools, parks, recreational facilities, and other urban cultural entities. Such resources are located throughout the corridor.

The planned extensions could affect additional archaeological, cultural, and historic resources. The likelihood of encountering burials will be high for the Waikīkī extension. Any future development or future extensions to this Project will be required to comply with appropriate Federal and State laws to protect archaeological, cultural, and historic resources.

Future development will be subject to review in accordance with Federal, State, and Local regulations and approval processes applicable to archaeological, cultural, and historic resources.

4.19.4 Effects of No Build Alternative on Growth

The effects on growth with the No Build Alternative would be more severe than the impacts of the Project. If the Project is not built, Oʻahu will experience continued growth, but the growth likely would be more dispersed and less dense. Under the No Build Alternative, there would be increasing pressure to develop in the undeveloped areas of

Central and North O‘ahu. Development in these areas would have greater impacts on agricultural and natural resources, including to threatened and endangered plant and animal species.

Those portions of the island do not have sufficient infrastructure to support growth; expenditure of funds for infrastructure development in these undeveloped areas would impact the ability to meet the infrastructure needs of the rest of the island. The central and northern areas would undergo a dramatic change in community character with the transformation from rural to suburban in areas that have been fairly rural since Hawai‘i entered statehood.

The No Build Alternative would have more adverse impacts on growth in the ‘Ewa Plain. The No Build Alternative would likely displace more farmland than the Project because lower density development patterns would be anticipated. There would be increased traffic congestion and air quality emissions because of the absence of a rapid transit system to service the Project corridor.

The No Build Alternative would have greater greenhouse gas emission than the Project because the development pattern would be less dense and would require greater reliance on the use of private automobiles. The No Build Alternative would result in higher VMT with a corresponding higher level of greenhouse gas emissions. On a daily basis, the Project will reduce greenhouse gas emissions by approximately 171 metric tons of carbon dioxide.

The No Build Alternative does not include the Project; it does incorporate transportation improvements identified in the ORTP. Under the 2030 No Build Alternative, approximately 13.6 million VMT per day are projected in the transportation system, including major freeways, highways, arterials, and collectors. This would be an increase of approximately 21 percent (or over 2 million miles) over 2007 conditions. VHT would increase by 28 percent by 2030 compared to 2007 levels. VHD would increase by 46 percent. VHT and VHD would increase at a higher rate than VMT because as roadway facilities become oversaturated, travel times through the affected sections would increase dramatically. The increase in congestion within the study corridor would have a ripple effect on the following resources, facilities, and services:

- Increase in emergency response times
- Underserve transit-dependent and low income populations
- Increase in air pollutant burdens for the air basin
- Increase in pollutant load in stormwater runoff

VMT, VHT, and VHD are projected to decrease under the Project compared to the No Build Alternative. Daily VMT will decrease by 4 percent and VHT will decrease by 8 percent. VHD will experience the greatest decrease—18 percent. This reflects that even moderate decreases in traffic volumes under congested conditions can result in relatively large decreases in travel delay.

4.20 Irreversible and Irretrievable Commitments of Resources

As described in Chapter 4 of this Final EIS, the Project will convert land to transportation use and consume energy, construction materials, and labor and impact natural and cultural resources. These resources will not be available for other projects.

4.21 Anticipated Permits, Approvals, and Agreements

Table 4-40 summarizes permits, certificates, and/or approvals anticipated to be required for implementation of the Project. When it states that permits, approvals, and agreements are required, it is anticipated that they will be received prior to commencing the activity that triggers the permit, approval, or agreement.

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued on next page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Preliminary Engineering Phase		
CWA Section 404—Department of the Army Permit; various nationwide permits and/or Section 10 of the Rivers and Harbors Act.	USACE, Regulatory Branch; EPA	City will submit application prior to construction of the Project in waters of the U.S.
CWA Section 401—Water quality certification	HDOH–CWB	City will submit application prior to construction of the Project in State waters
Stream channel alteration permit	DLNR–WC	City will submit application prior to construction of the Project in stream channels
Section 9 of the Rivers and Harbors Act	USCG	USCG has provided advanced approval (December 23, 2008)
CWA Section 402—NPDES for stormwater associated with construction activity	HDOH–CWB	Notice of General Permit Coverage received December 3, 2009
Community noise permit	HDOH–IRHB	Application for first segment submitted by City Public meeting held on October 5, 2009
Community noise variance	HDOH–IRHB	Application for first segment submitted by City
CZM Program consistency determination—Section 404	DBEDT–OP	City will submit application prior to construction of the Project in waters of the U.S.
CZM Program consistency determination—FTA funds	DBEDT–OP	Application will be submitted by City following submittal of FTA New Starts FFGA application
Special management area (Figure 4-81)	DPP–LUPD	Application will be submitted by City; public hearing to take place after Final EIS is available
Shoreline Setback Variance	DPP-LUPD	Application will be submitted by City for stormwater outfall at maintenance and storage facility near Leeward Community College site option concurrently with the Special Management Area permit
Special district permit	DPP–LUPD	Application will be submitted by the City when project design in vicinity of Chinatown and Capital Special Districts matures
Project eligibility permit and development permit	HCDA	Application will be submitted by the City when project design in vicinity of Kaka`ako matures
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way access to construct Project (use and occupancy)	HDOT–Highways; Airport	City and HDOT working on master agreement to be completed prior to construction in highway and airport property
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way access to construct Project	University of Hawai`i	City working with University to obtain easement

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued on next page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Unconditional approval of the ALP showing project alignment	FAA	HDOT–Airports and FAA, included in Appendix K of this Final EIS
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way to construct Project	U.S. Navy	City will seek an easement on Navy property
Utility engineering agreement	Private and public utility companies	Submitted by the City as segment designs become available
Archaeological inventory survey	SHPO	Submitted by the City as segment designs become available
Plan Review Use	DPP-LUPD	DTS will submit review as project design is available for the project area near Leeward Community College and Honolulu Community College
Final Design Phase		
City one-time review of construction plans	Various City agencies	To be submitted by contractor by construction segment as designs become available
Sewer connection	DPP–SDD/Wastewater	To be submitted by contractor by construction segment as designs become available
Permit for storm drain connection	DES; DPP–SDD/Civil Engineering	To be submitted by contractor by construction segment as designs become available
Interstate airspace use approval for crossing: H-1 Freeway in Pearl City; H-1 Freeway in `Aiea; H-2 Freeway in Pearl City; H-1 Freeway Koko Head-bound lanes near Honolulu Airport; H-1 Freeway access ramps near Pearl Harbor Naval Base; and H-1 Freeway access ramps at Ke`ehi Interchange	FHWA, through HDOT	To be submitted by City to HDOT, which then sends to FHWA for concurrence and approval prior to construction
Form 7460.1—Notice of Proposed Construction or Alteration of Impacts to the Airport and FAA Facilities	FAA	To be submitted by City at a minimum of 45 days prior to construction at Honolulu International Airport
Interstate access modification	FHWA, through HDOT	To be submitted by City to HDOT, which then sends to FHWA for concurrence and approval prior to construction
Waiver to construct in runway protection zone	HDOT–Airport (submitted to FAA)	To be submitted by contractor within two years of intended construction of airport portion of the Project
Utility construction agreement	Private and public utility companies	Submitted by the City as segment designs become available
Final design subdivision/easement	DPP–SDD/Subdivision	City to submit subdivisions and easements for each construction segment when final design is complete and before construction of segment begins
Flood hazard district compliance	DPP–SDD/Subdivision	City to submit documents as required to comply with Flood Hazard District Regulation (Article 9. Special District Regulations, Section 21-9.10) before construction of segment begins
Building permit—for work outside of right-of-way	DPP–BD	To be submitted by contractor by construction segment as designs become available

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued from previous page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Construction Phase		
CWA Section 402—NPDES for dewatering discharges	HDOH–CWB; DPP–SDD/Civil Engineering	To be prepared and submitted by contractors as needed
CWA Section 402—NPDES for hydrotesting discharges	HDOH–CWB	To be prepared and submitted by contractors as needed
Underground injection control	HDOH–SDWB	To be prepared by the contractors and submitted as required by project designs
Permit to perform work upon state highways	HDOT–Highways	To be prepared and submitted by contractors
Street usage permit—for city streets	DTS	To be prepared and submitted by contractors
Grading, grubbing, stockpiling, trenching	DPP–SDD/Civil Engineering	To be prepared and submitted by contractors
Construction to cross or enter the state energy corridor requires coordination	HDOT–Harbors	To be prepared and submitted by designers and contractors as needed
Landscape plans affecting HDOT roadways	HDOT	To be prepared and submitted by contractors as needed
Operation Phase		
Agreement for operation phase stormwater discharge	DES	DTS and DES will submit MS4 to HDOH prior to initiation of operation of the Project

ALP	Airport Layout Plan
CWA	Clean Water Act
CZM	Hawai`i Coastal Zone Management
DBEDT–OP	State of Hawai`i Department of Business, Economic Development and Tourism, Office of Planning
DES	City and County of Honolulu, Department of Environmental Services
DLNR–WC	State of Hawai`i Department of Land and Natural Resources, Commission on Water Resource Management
DPP–BD	City and County of Honolulu, Department of Planning and Permitting, Building Division
DPP–LUPD	City and County of Honolulu, Department of Planning and Permitting, Land Use Permits Division
DPP–SDD/Civil Engineering	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Civil Engineering Branch
DPP–SDD/Subdivision	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Subdivision Branch
DPP–SDD/Wastewater	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Wastewater Branch
DTS	City and County of Honolulu, Department of Transportation Services
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FFGA	Full Funding Grant Agreement
FHWA	Federal Highway Administration
HCDA	State of Hawai`i, Hawai`i Community Development Authority
HDOH–CWB	State of Hawai`i Department of Health, Environmental Management Division, Clean Water Branch
HDOH–IRHB	State of Hawai`i Department of Health, Environmental Health Services Division, Indoor and Radiological Health Branch
HDOH–SDWB	State of Hawai`i Department of Health, Environmental Management Division, Safe Drinking Water Branch
HDOT–Airport	State of Hawai`i Department of Transportation, Airport Division
HDOT–Harbors	State of Hawai`i Department of Transportation, Harbors Division
HDOT–Highways	State of Hawai`i Department of Transportation, Highways Division
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
SHPO	State Historic Preservation Officer
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDHS	U.S. Department of Homeland Security

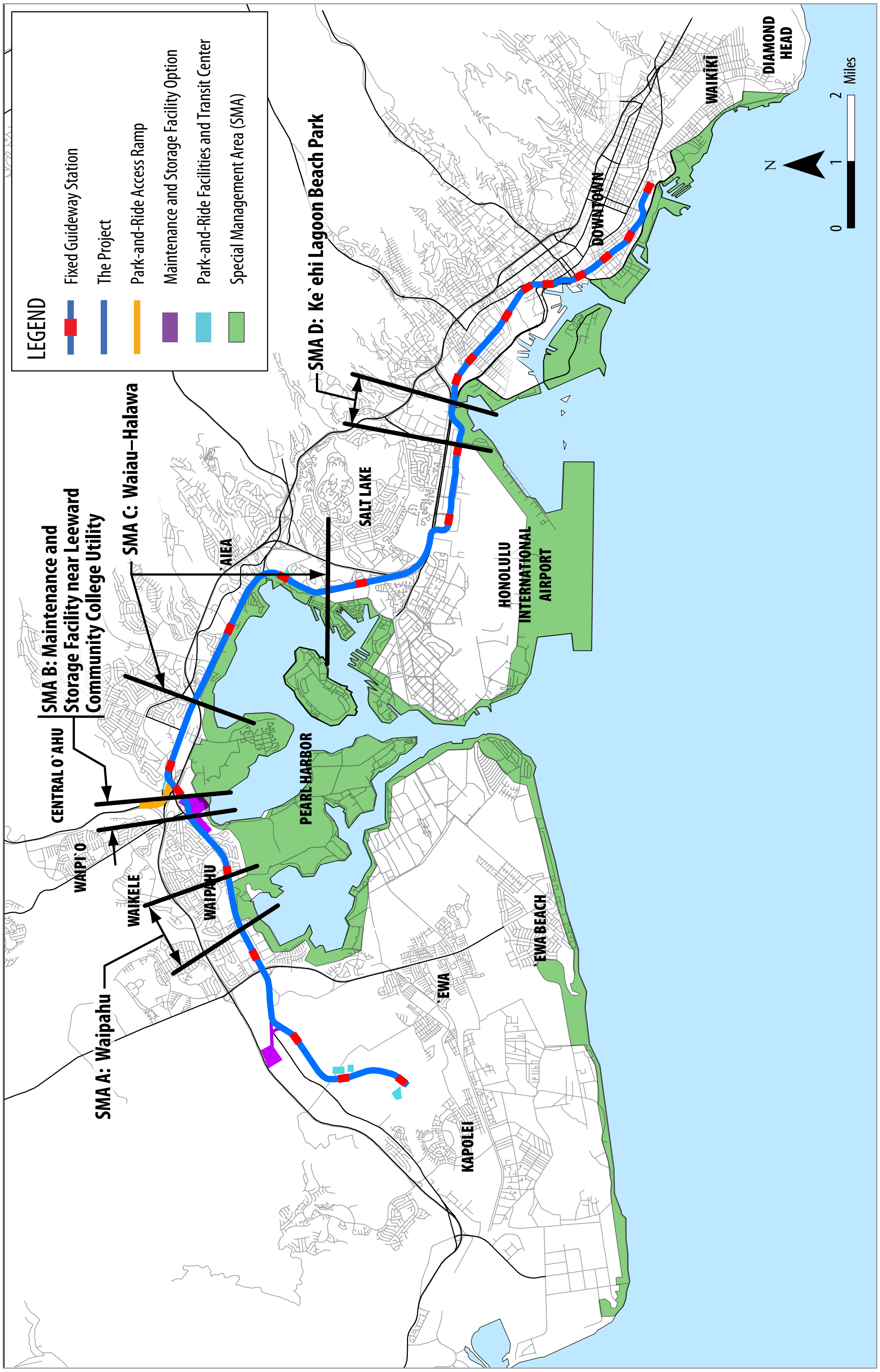


Figure 4-81 Special Management Area

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05

CHAPTER

Section 4(f) Evaluation

This chapter provides documentation necessary to support determinations required to comply with the provisions of 23 USC 138 and 49 USC 303 (hereinafter referred to as "Section 4(f)") and its implementing regulations codified at 23 CFR 774.

5.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been revised since the Draft Environmental Impact Statement (EIS) to respond to public comments; to reflect the identification of the Airport Alternative as the Preferred Alternative—herein identified as the "Project"; and to address changes resulting from continued consultation between the U.S. Department of Transportation (USDOT) Federal Transit Administration (FTA), the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), and the agencies having jurisdiction over Section 4(f) park properties. A more comprehensive constructive use evaluation was conducted for this Final EIS that analyzed historic properties determined to have an adverse effect under Section 106 (16 USC 470) and no direct use of the property.

While this Final EIS evaluates the effects of the Airport Alternative and the No Build Alternative, this chapter also assesses the Salt Lake Alternative as a potentially prudent and feasible alternative to avoiding use of Section 4(f) properties in the portion of the study corridor where the two alignments diverge (Section 5.8, Least Overall Harm). In addition, ongoing agency consultation resulted in the refinement of measures to minimize harm and mitigation for the use of public recreation and historic properties. Further consultation with the SHPO subsequent to the Draft EIS resulted in revised Section 106 effects determinations for several historic properties (see Section 4.16, Archaeological, Cultural, and Historic Resources), which then influenced the number of Section 4(f) properties evaluated and the use determinations made in this chapter. The SHPO determined that one historic property identified in the Draft EIS (Solmirin House) was not eligible for inclusion in the National Register of Historic Places (NRHP). Consequently, it was removed from consideration in the Final EIS and this Section 4(f) evaluation. Note: In the State of Hawai‘i, the governor appoints the SHPO. The SHPO is the Chairperson of the Department of Land and Natural Resources (DLNR). The State Historic Preservation Division (SHPD) is a division within DLNR, and it is also where the deputy SHPO is located. In fulfilling Federal and State historic preservation requirements, the Project consulted with the SHPO through the SHPD. SHPD and SHPO are used interchangeably throughout this chapter unless otherwise indicated.

In the Draft EIS, it was determined that the Airport Alternative would result in a direct use of six historic properties and one park property (Ke‘ehi Lagoon Beach Park), *de minimis* impacts to four historic properties and two park properties (Aloha Stadium and the future Queen Street Park), and no temporary occupancy of Section 4(f) properties. Consultation with the SHPO subsequent to the Draft EIS resulted in revised Section 106 effects determinations to four properties from no adverse effect to adverse effect—United States Naval Base Pearl Harbor National Historic Landmark (NHL), Six Quonset Huts, Chinatown Historic District, and HECO Downtown Plant and Leslie A. Hicks Building. The Draft EIS stated that the impact to these properties would be *de minimis*. Since *de minimis* impact applies to historic properties that have a no adverse effect determination under Section 106, avoidance alternatives are included in this Final EIS for these properties, except for the United States Naval Base Pearl Harbor NHL. For this historic property, the makai station entrance of the Pearl Harbor Naval Base Station was eliminated from the Project to avoid the direct use of this property. Similarly, the makai station entrance of the Aloha Stadium Station was also eliminated from the Project to minimize use of the property. Therefore, there is no direct use of the Pearl Harbor NHL, as documented in this Final EIS Section 4(f) Evaluation.

In this Final EIS, the Section 4(f) evaluation concludes that the Project will result in direct use to 11 historic properties, *de minimis* impacts to 2 historic properties, and *de minimis* impacts to 2 park and recreational properties (Aloha Stadium and Ke‘ehi Lagoon Beach Park). The Pacific War Memorial Site is a multi-use property on which the Project is expected to have *de minimis* impact.

Pursuant to 23 CFR 774.5(b)(1), FTA has notified ACHP and the SHPO of its intent to make a *de minimis* impact determination on the two historic properties that were determined to have a no adverse effect under Section 106 (Boulevard Saimin and O‘ahu Railway & Land Company Basalt Paving Blocks and Former Filling Station).

Following publication of the Draft EIS, the Hawai‘i Community Development Authority (HCDA) expressed concern about the Project’s direct use of the future Queen Street Park. In response, to avoid direct use of the park, the design of the guideway was shifted away from the park and will be constructed in the median of Queen Street. As a result, there will be no use of the park, as documented in this Final EIS Section 4(f) evaluation.

Since publication of the Draft EIS, the City has furthered its preliminary design of the preferred site for the maintenance and storage facility near Leeward Community College, which includes the construction of an underground stormwater outfall drainage pipe. The Project will result in the temporary occupancy of two recreational properties during installation of this underground pipe through the future Middle Loch Park and the Pearl Harbor Bike Path (Section 5.7, Temporary Occupancy of Section 4(f) Properties). Additionally, to avoid impacts to airport operations within the runway protection zone, the project alignment was refined to transition from Aolele Street to Ualena Street to Waiwai Loop, where it enters Ke‘ehi Lagoon Beach Park mauka of the main entrance. There will be less use of this recreational property than was presented in the Draft EIS but the refined alignment is closer to one historic property (Hawaiʻi Employers Council). This Final EIS Section 4(f) evaluation includes the refined alignment in the discussion of least overall harm in Section 5.8.

Following the public comment period on the Draft EIS, FTA subsequently determined that the use of Keʻehi Lagoon Beach Park, along with the City's commitment to measures to minimize harm and mitigation of impacts as discussed in Section 5.5.1, will have a *de minimis* impact to the park. The City and County of Honolulu (City) Department of Parks and Recreation (DPR), the agency with jurisdiction over this property, has been informed of FTA's intent to make a *de minimis* impact finding. DPR concurs that after mitigation, the Project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Based on Draft EIS comments from DLNR, the City reevaluated the use of the Pacific War Memorial Site. The DLNR Division of State Parks (DLNR-Parks) oversees the Keʻehi Memorial Organization and the Hawaii Disabled American Veterans (KMO-DAV) who maintain the property. KMO-DAV manages the property for multiple uses, including memorial and recreational uses. The Project will be constructed on the mauka edge of this property. FTA determined that the use of the Pacific War Memorial Site along with the City's commitments to measures to minimize harm and mitigation of impacts as discussed in Section 5.5.1, will have a *de minimis* impact to the property. DLNR-Parks, the agency with jurisdiction over this property, has been informed of FTA's intent to make a *de minimis* impact finding. DLNR-Parks concurs that after mitigation, the Project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Notice is hereby provided for public review and comment concerning the effects of the Project on the activities, features, and attributes of Keʻehi Lagoon Beach Park and Pacific War Memorial Site. Section 4(f) *de minimis* comments may be submitted to FTA and the City Department of Transportation Services (DTS) during the 30 days following the Federal Register Notice of Availability for this Final EIS. FTA will make a final determination in the Record of Decision after reviewing the public comments submitted.

5.2 Introduction

The Project, as described in Chapter 2, Alternatives Considered, is a transit project that may receive Federal funding and/or discretionary approvals through the FTA; therefore, compliance with Section 4(f) is required. Section 4(f) protects publicly owned land of parks, recreational areas, and wildlife refuges. Section 4(f) also protects historic sites of National, State, or Local significance located on public or private land. These are commonly referred to as Section 4(f) properties. Federal regulations that implement Section 4(f) are found in 23 CFR 774.

5.2.1 Section 4(f) Determinations

FTA may not approve the use of a Section 4(f) property, as defined in 23 CFR 774.17, unless it determines the following:

- There is no feasible and prudent avoidance alternative, as defined in Section 774.17, to the use of land from the property.
- The action includes all possible planning, as defined in Section 774.17, to minimize harm to the property resulting from such use.

Section 4(f) regulations further require consultation with the Department of the Interior and, as appropriate, the involved offices of the Department of Agriculture (USDA) and the Department of Housing and Urban Development (HUD), as well as relevant State and Local officials, in developing transportation projects and programs that use lands protected by Section 4(f). Consultation with the USDA would occur whenever a project uses Section 4(f) land from the National Forest System. Consultation with HUD would occur whenever a project uses Section 4(f) land for/on which certain HUD funding had been used. Since neither of these conditions apply to the Project, consultation with the USDA and HUD is not required.

5.2.2 *De minimis* Impact Determinations

Alternatively, FTA may determine that the use of a Section 4(f) property is *de minimis*.

Section 4(f) regulations are satisfied if it is determined that a transportation project would have a "*de minimis* impact" on the Section 4(f) property. The provision allows avoidance, minimization, mitigation, and enhancement measures to be considered in making the *de minimis* determination. The agencies with jurisdiction must concur in writing with the determination. *De minimis* impact is defined in 23 CFR 774.17 as follows:

- For historic sites, *de minimis* impact means that the FTA has determined, in accordance with 36 CFR 800, that no historic property is affected by the project or the project would have "no adverse effect" on the property in question. The SHPO and Advisory Council on Historic Preservation (ACHP), if involved, must be notified that the FTA intends to enter a *de minimis* finding for properties where the project results in "no adverse effect."
- For parks, recreational areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

For historic sites, consultation with the SHPO is required. For recreational properties, consultation with the agency having jurisdiction over the properties is required. For sites that are part of a National Historic Landmark, consultation with the Department of the Interior's National Park Service (NPS) is required. This Section 4(f) evaluation has been prepared in accordance with 49 USC 303 and the joint Federal Highway Administration (FHWA)/FTA regulations for Section 4(f) compliance codified as 23 CFR 774. Additional guidance has been obtained from FHWA Technical Advisory T6640.8A (FHWA 1987b) and the revised *FHWA Section 4(f) Policy Paper* (FHWA 2005).

5.2.3 Section 4(f) "Use" Definitions

As defined in 23 CFR 774.17, the "use" of a protected Section 4(f) property occurs when any of the conditions discussed below are met.

Direct Use

A direct use of a Section 4(f) property occurs when property is permanently incorporated into a proposed transportation project. This may occur as a result of partial or full acquisition of a fee simple interest, permanent easement, or temporary easement that exceed regulatory limits noted below.

Constructive Use

A constructive use of a Section 4(f) property occurs when a transportation project does not permanently incorporate land from the property, but the proximity of the project results in impacts (e.g., noise, vibration, visual, and property access) so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only if the protected activities, features, or attributes of the property are substantially diminished (23 CFR 774.15).

Temporary Occupancy

A temporary use of a Section 4(f) property occurs when there is a temporary occupancy of property that is considered adverse in terms of the preservationist purpose of the Section 4(f) statute. Under the FHWA/FTA regulations (23 CFR 774.13), a temporary occupancy of property does not constitute a use of a Section 4(f) property when all the following conditions are satisfied:

- Duration is temporary (i.e., less than the time needed for construction of the project), and there is no change in ownership of the land
- Scope of work is minor (i.e., both the nature and magnitude of the changes to the Section 4(f) property are minimal)
- There are no anticipated permanent adverse physical impacts, nor is there interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis
- The land being used will be fully restored (i.e., the property must be returned to a condition that is at least as good as that which existed prior to the project)
- There is a documented agreement of the official(s) having jurisdiction over the Section 4(f) property regarding the above conditions

5.3 Alternatives Evaluation and Description of the Project

5.3.1 Alternatives Evaluation

Chapter 2 of this Final EIS documents how alternatives were developed, evaluated, and refined. During the Alternatives Analysis process, alternative corridors and modal alternatives were considered to identify transportation solutions to meet the Project's Purpose and Need. No alternative was identified that would completely avoid Section 4(f) properties while meeting the Project's Purpose and Need. As discussed in Chapter 2, while the No Build and Transportation System Management Alternatives would not use any Section 4(f) properties, these Alternatives would compromise the Project to the degree that it would not meet the Project's Purpose and Need. Therefore, these Alternatives would not be prudent as defined under 23 CFR 774.17.

As discussed in Section 2.2, Alternatives Screening and Selection Process, of this Final EIS, a range of modal options, transit technologies, and alternative alignments were considered and eliminated during the Alternatives Analysis phase for a variety of transportation, operational, cost, and environmental reasons. The Alternatives Analysis concluded that only the Fixed Guideway Alternative met the Project's Purpose and Need and, therefore, the Build Alternatives for this alternative were further evaluated in the Draft EIS and this Final EIS.

In the Alternatives Analysis, the project was divided into five sections. Within each section, several alternative alignments were considered. In addition to transportation operations, the evaluation criteria included consideration of potential environmental consequences, including an evaluation of impacts to archaeological, cultural, historic resources; parklands; displacements of businesses and residences; and impacts to waters of the United States.

As described in Section 5.8, both the Salt Lake Alternative and the Airport Alternative would result in use of Section 4(f) properties. Based on an assessment of the transportation benefits, public comments, and environmental analysis, this Section 4(f) evaluation documents that the Airport Alternative would result in the least overall harm and greatest improvement to corridor mobility. This chapter documents that there is no prudent and feasible alternative, as defined in 23 CFR 774.17, to the use of land from Section 4(f) properties, and the Project includes all possible planning, as defined in 23 CFR 774.17, to minimize harm to the use of Section 4(f) properties.

The avoidance of Section 4(f) properties was an important consideration in designing and screening the alternatives under consideration. As a result of this approach, the majority of public parks, recreational properties, and historic properties identified within the study corridor are avoided by the Project's design and location.

In the Draft EIS and this Final EIS, the Build Alternatives were refined as the design phase evolved, with site-specific shifts occurring in the alignment or placement of individual station elements to avoid, where feasible, Section 4(f) properties. Through this iterative process, the number of Section 4(f) properties affected by the Project includes all possible measures to reduce harm and minimize the use of Section 4(f) properties (see Appendix B, Preliminary Alignment Plans and Profiles).

5.3.2 Description of the Project

The Project is the construction and operation of a 20-mile, elevated fixed guideway transit system along the Airport Alignment, extending from East Kapolei to Ala Moana Center. The Project will begin in East Kapolei by following North-South Road and other future roadways to Farrington Highway. The guideway will follow Farrington Highway Koko Head on an elevated structure and continue along Kamehameha Highway to the vicinity of Aloha Stadium.

The Project will continue along Kamehameha Highway makai past Aloha Stadium to Nimitz Highway and turn makai onto Aolele Street and then follow Aolele Street, Ualena Street, and Waiwai Loop Koko Head to reconnect to Nimitz Highway near Moanalua Stream and continue to the Middle Street Transit Center. From Middle Street, the guideway will follow Dillingham Boulevard Koko Head to the vicinity of Ka'aahi Street and then turn makai to connect to Nimitz Highway in the vicinity of Iwilei Road.

The alignment will follow Nimitz Highway Koko Head to Halekauwila Street and then proceed along Halekauwila Street past Ward Avenue, where it will transition to Queen Street and Kona Street. The guideway will run above Kona Street through Ala Moana Center.

The Project includes 21 stations and supporting facilities, including a maintenance and storage facility (preferred site option near Leeward Community College), transit centers, park-and-ride lots, a parking structure, and traction power substations.

5.4 Description of Section 4(f) Properties

Properties subject to Section 4(f) evaluation include publicly owned parks; recreational areas; wildlife refuges of National, State, or Local significance; and historic properties of National, State, or Local significance, either privately or publicly owned. Figures 5-1 through 5-4 show the location of Section 4(f) and historic properties along the project alignment and the Salt Lake Alternative alignment that are discussed in this evaluation in the analysis of least overall harm (Section 5.8).

As described in Section 4.5, Community Services and Facilities, 11 public parks and recreational properties and the Pacific War Memorial Site, which is a multi-use property that is being considered a park for this Section 4(f) evaluation, are adjacent to the project alignment (Table 5-1).

Public school playgrounds, ball fields, and recreational areas are potential Section 4(f) properties if they are open to the public for recreational use. The nine public school recreational areas adjacent to the Project are not open to the public for general recreational use and, therefore, have not been included in this Section 4(f) evaluation.

FTA, in consultation with SHPO, has determined the Area of Potential Effects (APE) and effect of the Project on historic properties listed in the NRHP or eligible for listing in the NRHP for the purposes of compliance with Section 106 of the National

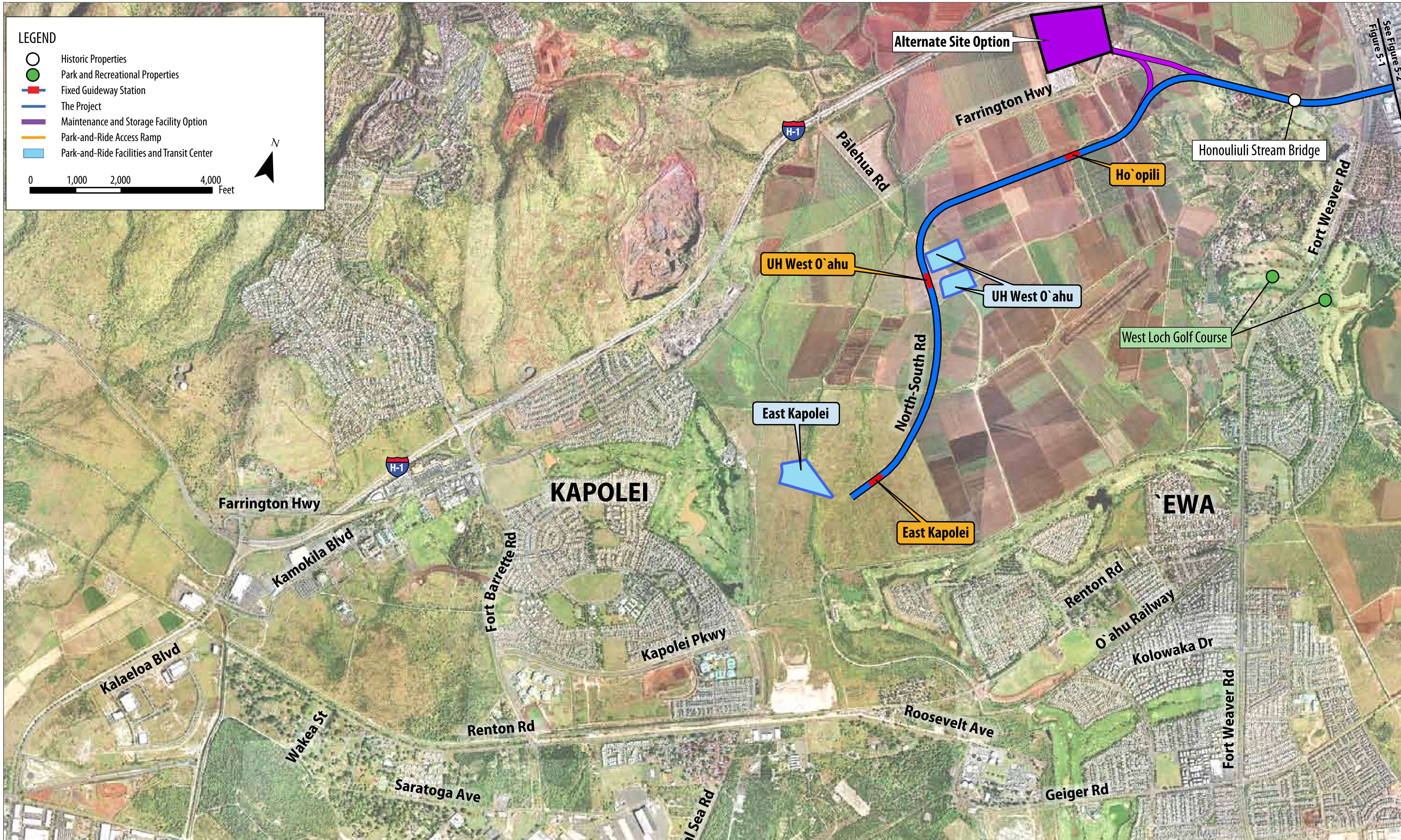

Figure 5-1 Historic, Park and Recreational Properties (East Kapolei to Fort Weaver Road)

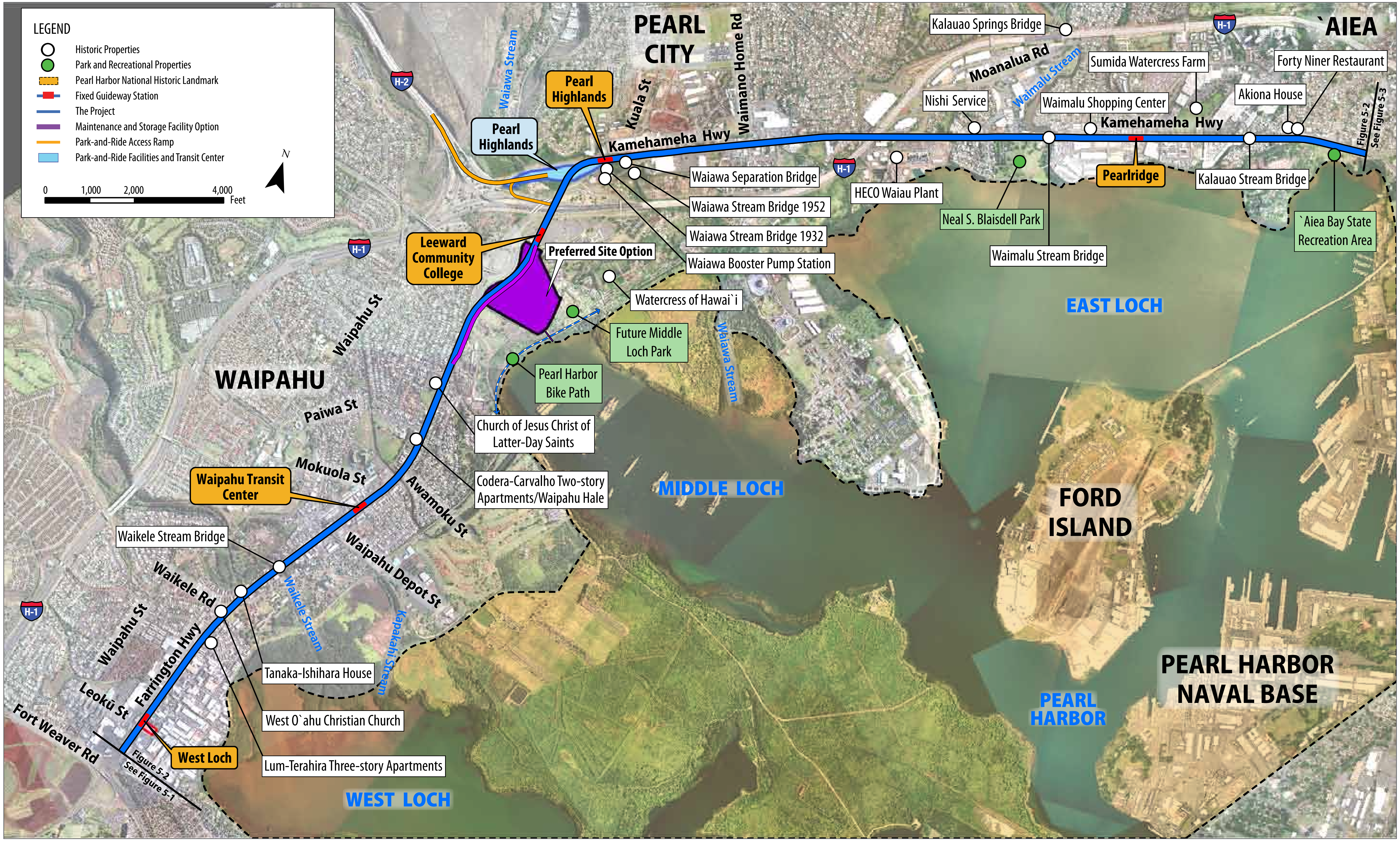

Figure 5-2 Historic, Park and Recreational Properties (Fort Weaver Road to Aloha Stadium)

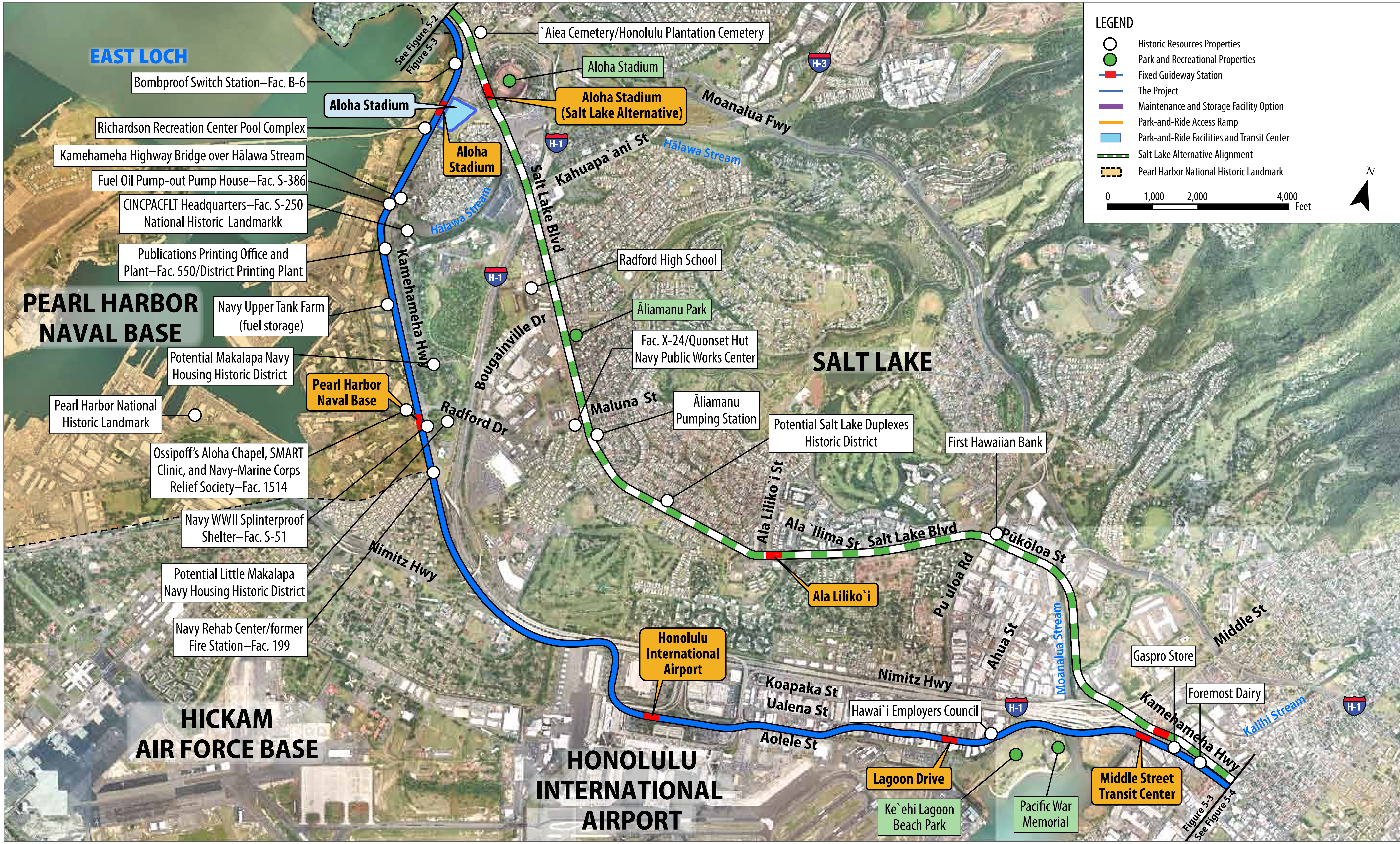

Figure 5-3 Historic, Park and Recreational Properties (Aloha Stadium to Kalihi)

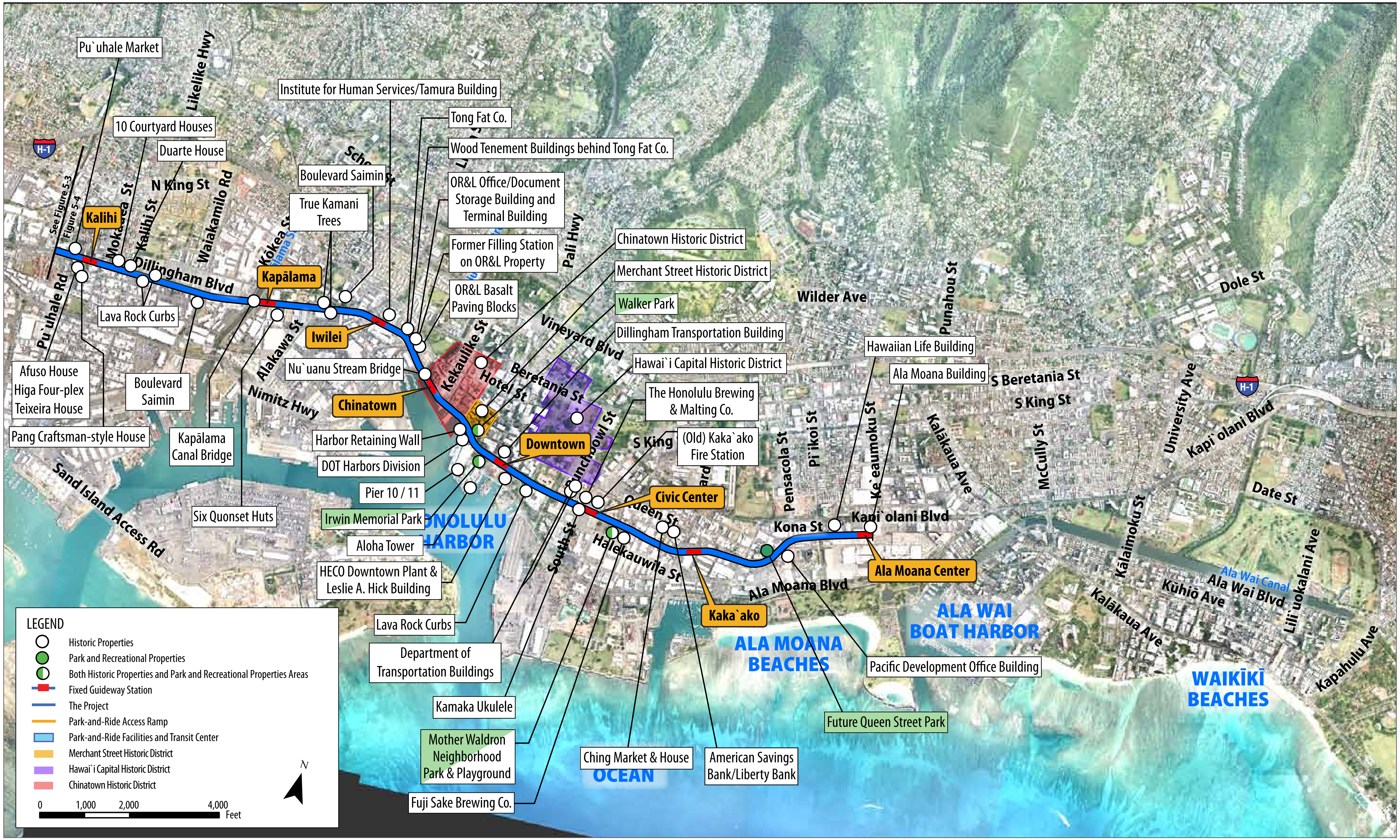

Figure 5-4 Historic, Park and Recreational Properties (Kalihi to Ala Moana Center)

Table 5-1 Publicly Owned Park and Recreational Properties Adjacent to the Project (continued on next page)

Property	Description	Section 4(f) Use
West Loch Golf Course	West Loch Golf Course is located off Fort Weaver Road. The parcel is a 94-acre municipal golf course owned by the City and County of Honolulu. It extends across Fort Weaver Road, Honouliuli (Village), and Hawai`i Medical Center. The golf course is generally a quiet setting but bounded on one end by Farrington Highway, a major transportation corridor. Scenic views are in the background, mauka toward the mountains.	No use
Pearl Harbor Bike Path	The Pearl Harbor Bike Path is approximately 40 feet wide and is under the jurisdiction of the City Department of Transportation Services. It extends from the Admiral's Boat House in `Aiea to Waipi`o Point Access Road.	Temporary occupancy
Future Middle Loch Park	The City and County of Honolulu has set aside land for a new 12.8-acre park mauka of Middle Loch, adjacent to the Pearl Harbor Bike Path. The future Middle Loch Park is planned as a passive recreational area with benches and restrooms.	Temporary occupancy
Neal S. Blaisdell Park	The park is approximately 26 acres and is owned by the City and County of Honolulu. The park consists primarily of open space but also supports amenities, such as trails and exercise areas. It is located immediately makai of Kamehameha Highway, a major transportation corridor. The most scenic views are makai, toward the ocean.	No use
`Aiea Bay State Recreation Area	`Aiea Bay State Recreation Area encompasses approximately 8 acres. The recreational area is owned by the State and is under the jurisdiction of the Hawai`i Department of Land and Natural Resources. The area is used for general recreation and picnicking. It is located immediately makai of Kamehameha Highway, a major transportation corridor. All views are makai, toward the ocean.	No use
Walker Park	This small urban park provides shade in a busy downtown area. It is primarily used by pedestrians walking through downtown. It does not provide any benches, picnic tables, or other amenities.	No use
Irwin Memorial Park	Irwin Memorial Park is at the `Ewa-makai corner of the Bishop Street and Nimitz Highway intersection. The park is approximately 2 acres and can be accessed from Aloha Tower Drive. Irwin Memorial Park is primarily used as a parking lot for surrounding office buildings. Amenities include sitting areas and tables near the corner of Bishop Street and Nimitz Highway. The property is owned by the State Department of Transportation Harbors Division and is part of the Aloha Tower Project administered by the Aloha Tower Development Corporation. The most scenic views are makai, toward the harbor and Aloha Tower.	No use
Mother Waldron Neighborhood Park	This 1-acre park is located at 525 Coral Street in a predominantly commercial/industrial area; one side is bordered by a residential area in Kaka`ako. It features a children's play structure and unlit basketball courts. The park also hosts the People's Open Market Program, which offers local agriculture and aquaculture products. The park is owned by the State.	No use
Aloha Stadium	This 50,000-seat stadium occupies a 99-acre property owned by the State, under the jurisdiction of the State of Hawai`i Department of Accounting and General Services, in the `Aiea neighborhood. It is situated between two major arterials—Kamehameha Highway and the H-1 Freeway. Aloha Stadium is primarily used for major athletic competitions, such as professional football and University of Hawai`i football games. Other recreational uses include hosting various concerts and family-oriented fairs.	Direct use *(de minimis)*
Ke`ehi Lagoon Beach Park	Ke`ehi Lagoon Beach Park is an approximately 70-acre community park located near Lagoon Drive and Aolele and Ualena Streets Koko Head of the airport. Recreational amenities include boating facilities, 12 tennis courts, 1 baseball diamond, walking trails, and picnic areas. The park is operated and maintained by the City and County of Honolulu Department of Parks and Recreation. The most scenic views are makai, toward the lagoon.	Direct use *(de minimis)*

Table 5-1 Publicly Owned Park and Recreational Properties Adjacent to the Project (continued from previous page)

Property	Description	Section 4(f) Use
Pacific War Memorial Site	Pacific War Memorial Site property is approximately 11 acres Koko Head of Ke`ehi Lagoon Beach Park. The property is a multi-use area, including memorial and recreational uses and a rehabilitation center. The property is under the jurisdiction of Department of Land and Natural Resources Division of State Parks and managed by Ke`ehi Memorial Organization and Hawaii Disabled American Veterans.	Direct use (*de minimis*)
Future Queen Street Park	Queen Street Park is a proposed 2-acre passive recreational area. It will feature a children's playground and other limited amenities. The land is owned by Hawai`i Community Development Authority and is surrounded by mixed-use commercial and high-rise residential development.	No use

Historic Preservation Act (Appendix F, Record of Agency Correspondence and Coordination). Section 4.16 describes effects to these 81 historic properties, as established through consultation. Section 4.16 of this Final EIS documents the effects to these properties under Section 106. The historic properties included in this Section 4(f) evaluation include those where there is a direct use of the property and/or where there is an adverse effect determination under Section 106. Each NRHP-eligible historic property that was evaluated for Section 4(f) use is listed in Table 5-2 with its Section 4(f) use determination.

The Project's APE was reviewed to identify potential archaeological Section 4(f) resources. The APE was divided into subareas and evaluated for potential archaeological impacts based upon a rating system of Low, Moderate, and High, as discussed in Section 4.16. Based on this review, the subareas of Dillingham, Downtown, and Kaka'ako have a High potential for effects on potential burials, pre-contact resources, and post-contact resources.

An archaeological inventory survey (AIS) will be completed for each construction phase prior to final design and construction, as stipulated in the Project's Section 106 draft Programmatic Agreement (PA). An AIS completed for the first construction phase area between East Kapolei and Pearl Highlands identified a subsurface deposit. The AIS concluded that SIHP 50-80-9-7751, subsurface cultural deposit (lo'i sediments), has integrity of location and materials but not integrity of design, setting, workmanship, feeling, or association. Based on the AIS, the FTA concludes that this archaeological resource is important chiefly because of what can be learned by data recovery and has minimal value for preservation in place. Therefore, SIHP 50-80-9-7751 is exempt from Section 4(f) approval under 23 CFR 774.13(b). The SHPO has been consulted, and DTS has received no objections to the findings. Therefore, the property is exempt from Section 4(f) approval under 23 CFR 774.13(b). AIS plans for the remainder of the corridor are being developed using preliminary engineering design as discussed in the draft PA. By using preliminary engineering plans, the area of investigation is being constrained to locations that would be affected by project construction.

If archaeological resources either are encountered during the AIS or inadvertently during construction and are determined to be eligible for the NRHP and warrant preservation in place, the City will prepare separate Section 4(f) evaluations for such resources. State laws specific to Native Hawaiian burials are discussed in Section 4-16.

The following sections describe use of Section 4(f) properties. An assessment has been made as to whether any permanent or temporary occupancy of a property will occur and whether the proximity of the Project will cause any access disruption or noise, vibration, or aesthetic impacts that will

Table 5-2 Historic Properties Evaluated for Section 4(f) Use

Tax Map Key	Resource Name	Section 4(f) Use
12009017	Afuso House	Direct use
12009017	Higa Four-Plex	Direct use
12009018	Teixeira House	Direct use
None	Lava Rock Curbs	Direct use
15029060	Boulevard Saimin	Direct use (*de minimis*)
None	Kapālama Canal Bridge	Direct use
15015008	Six Quonset Huts	Direct use
None	True Kamani Trees	Direct use
15007001 & 15007002	O`ahu Railway & Land Company Terminal Building O`ahu Railway & Land Company Office/Document Storage Building	Direct use
15007001 & 15007002	O`ahu Railway & Land Company basalt paving blocks O`ahu Railway & Land Company former filling station	Direct use (*de minimis*)
17002, 17003, & 17004 plats	Chinatown Historic District	Direct use
21014003	Dillingham Transportation Building	Direct use
21014006	HECO Downtown Plant and Leslie A. Hicks Building	Direct use
None	Honouliuli Stream Bridge	No use
None	Waikele Stream Bridge, eastbound span and bridge over OR&L spur	No use
None	Waiawa Stream Bridge 1932 (westbound lanes)	No use
None	Waimalu Stream Bridge	No use
None	Kalauao Springs Bridge	No use
None	Kalauao Stream Bridge	No use
various	United States Naval Base Pearl Harbor National Historic Landmark	No use
	CINCPACFLT Headquarters, Facility 250, National Historic Landmark	No use
99002004	Potential Makalapa Navy Housing Historic District	No use
99001008	Ossipoff's Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society, Facility 1514	No use
11016004	Hawai`i Employers Council	No use
15007033	Institute for Human Services/Tamura Building	No use
15007003	Tong Fat Co.	No use
15007003	Wood Tenement Buildings behind Tong Fat Co.	No use
None	Nu`uanu Stream Bridge	No use
	Merchant Street Historic District	No use
	Walker Park	No use
	DOT Harbors Division Building	No use
	Pier 10/11	No use
	Aloha Tower	No use
	Irwin Memorial Park	No use
21051006 & 21051005	Mother Waldron Neighborhood Playground	No use

substantially impair the features or attributes that qualify the property for protection under Section 4(f).

5.5 Direct Use of Section 4(f) Properties

Sections 5.5.1 and 5.5.2 describe the Section 4(f) properties that will have direct uses as a result of the Project. Properties having *de minimis* impacts are noted in these sections as well.

Figure 5-5 Aloha Stadium

5.5.1 Park and Recreational Properties

As described in Section 4.5, 11 public park and recreational properties are adjacent to the Project. Table 5-1 lists these publicly owned parks and their Section 4(f) use. The Project will use property at Ke‘ehi Lagoon Beach Park and Aloha Stadium, as well as the Pacific War Memorial Site, which is a multi-use property that is being considered a park for this Section 4(f) evaluation, all of which will result in a de minimis impact. The Project will also require temporary occupancy at the future Middle Loch Park and Pearl Harbor Bike Path to construct an underground stormwater outfall drainage pipe (Section 5.7).

In most cases, the alignment runs within or near major highways and thoroughfares. Since substantial elements of urban development already exist, the Project will not impair or diminish the activities, features, or attributes that qualify properties in these areas for protection under Section 4(f). Potential proximity-related use is discussed in Section 5.6, Evaluation of Constructive Use of Section 4(f) Properties.

Aloha Stadium (De minimis Impact)

Description and Significance of Property

Aloha Stadium is situated between Salt Lake Boulevard, the H-1 Freeway, and Kamehameha Highway, (Figures 5-5 and 5-6). The 50,000-seat stadium is situated on 99 acres, most of which are used for event parking. It is owned by the State but is under the jurisdiction of the Department of Accounting and General Services (DAGS). Land use for the Aloha Stadium property is designated as a General Preservation District (P2) under the City’s land use ordinance. Aloha Stadium is primarily used for athletic competitions, such as professional football and University of Hawai‘i football games. Other recreational uses include hosting various concerts and family-oriented events.

Section 4(f) Evaluation

The use of Aloha Stadium involves construction of an elevated guideway through a portion of its parking lot along the ‘Ewa edge of the property for a rail transit station and bus transit center, as well as a paved and striped shared-use parking lot. The elevated guideway will be about 28 to 30 feet wide and supported by columns that are about 6 to 8 feet in diameter, placed about 120 feet apart.

The base of each of the columns will use approximately 100 square feet. The guideway will carry electrically powered trains and will be about 35 to 40 feet aboveground through this area. The amount of area that will be used by the Project is approximately 2 acres, including land under the guideway that may continue to be used for parking. In addition, the area for the shared park-and-ride lot and bus transit center will use approximately 4.2 additional acres (Figure 5-6).

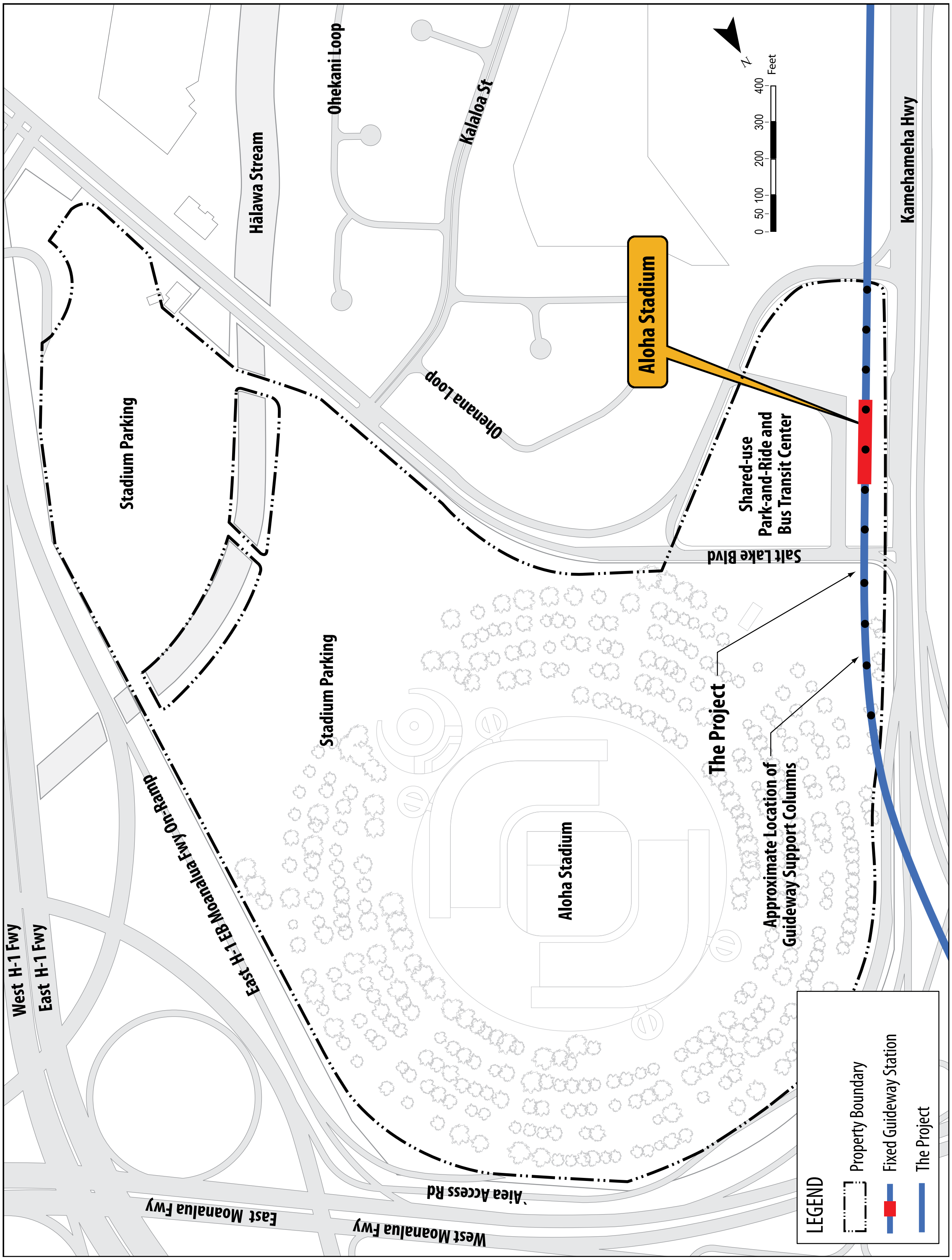

Figure 5-6 Aloha Stadium—Project and Features

The elevated guideway will pass over a small portion of the main parking lot next to Kamehameha Highway. Approximately four columns will be placed in the main parking lot to support the guideway, requiring removal of approximately four parking spaces. The guideway will cross over Salt Lake Boulevard at Kamehameha Highway, continuing above the existing gravel overflow parking lot, supported by six columns. In the overflow lot, the City will construct a rail station and bus transit center to serve the stadium and will pave and stripe the gravel lot creating about 600 parking spaces that also will be used by patrons during stadium events. Approximately six guideway support columns will be located on Aloha Stadium property south of the overflow parking lot next to Kamehameha Highway. The guideway in this area will be wider than 30 feet to accommodate a third track for additional trains during stadium events. Because the Project will permanently incorporate land from the Aloha Stadium parcel into a transportation facility, this will be a direct use.

The Project will provide transportation benefits to Aloha Stadium that will enhance its ability to provide recreational opportunities to users, offering a choice of transportation modes, greater capacity, and improved service. The use of the site will not change with the Project. However, it will provide an additional form of access to Aloha Stadium via the new fixed guideway system. The operation of the Project will not interfere with the features, attributes, or activities of the property.

Minimization of Harm and Mitigation

The direct use of the Aloha Stadium property will be due to the guideway, station, bus transit center, park-and-ride lot, and support columns within the stadium parking lots. The support columns have been designed to minimize the use of the property and maintain safety and access to the parking lots. The Project will provide additional access to events at Aloha Stadium. Measures to minimize harm were considered in the Project's design in coordination with DAGS. To minimize the Project's use of the stadium property, the guideway and supporting columns were designed to be as close to Kamehameha Highway as possible and still be consistent with operational and engineering constraints.

During Final Design, the City will coordinate with DAGS regarding the design of the guideway, station, bus transit center, and the area's parking lots. Access to the main parking lots will be maintained during construction in accordance with the Project's maintenance of traffic and safety plans developed in coordination with DAGS. There will be areas closed to the public temporarily during construction, primarily in the overflow parking area. The City will coordinate with DAGS to minimize construction during major events as practicable. If major events occur during construction, the City will temporarily provide additional bus service and/or shuttle bus service to the stadium from existing City transit centers or parking lots. After construction, the main parking lot will be restored and a new shared-use paved parking lot will be created.

Agency Coordination and Consultation

The Aloha Stadium Authority, Aloha Stadium Manager, and DAGS have participated in the planning of the alignment, the station location, and the park-and-ride lot within the boundaries of Aloha Stadium. Coordination included meetings on March 14, March 25, and October 20, 2008, and February 24, May 1, and May 15, 2009, as well as telephone discussions about the Project in January, February, and June 2010. Coordination will continue during Final Design and construction to ensure that the Project will result in a net benefit, in terms of both enhanced access and parking.

Preliminary Section 4(f) Finding

Therefore, a preliminary finding has been made, and it is anticipated the Project will have a *de minimis* impact as defined in 23 CFR 774.17. DAGS, the agency with jurisdiction over Aloha Stadium, has concurred with the *de minimis* impact finding (Appendix F).

Ke`ehi Lagoon Beach Park (De minimis Impact)

Description and Significance of Property

Ke`ehi Lagoon Beach Park is an approximately 70-acre community park at Lagoon Drive and Aolele Street (Figures 5-7 and 5-8). It is bounded on the makai side by Ke`ehi Lagoon and on the mauka side by mixed industrial developments and the H-1 Freeway, which at that point is on a viaduct above the park just outside its mauka border. The park is Koko Head of Lagoon Drive and `Ewa of the Disabled American Veterans Ke'ehi Lagoon Memorial. It is operated and maintained by DPR. There are two parking areas—the smaller one (53 spaces) is near the lagoon, and the larger one (421 spaces) is adjacent to the park's access road near the mauka border of the park. The recreational use of the park is primarily for daytime activity, with limited use of four lighted tennis courts in the evening.

Recreational amenities include 12 tennis courts, 1 baseball diamond, an open field, a paved walking path, picnic areas, a pavilion, and access to the water. Cultural events are held in the picnic area and the field. The baseball diamond is makai of the Project and mauka of Ke'ehi Lagoon. Eight of the tennis courts are near Lagoon Drive and the entrance of the park, while the other four mauka courts are near Nimitz Highway. The four mauka courts near Nimitz Highway are the only courts with lighting to facilitate nighttime use. The open field is makai of the access road. Primarily local residents use the field for cricket, soccer, and softball practice and games, as well as other team and individual sports. Canoe clubs engage in active practice sessions and events at the park, including the State Canoe Regatta. The beach area is primarily used for boating or outrigger canoes.

Figure 5-7 Ke`ehi Lagoon Beach Park

Section 4(f) Evaluation

All of the recreational features, attributes, and activities of the park, other than the four lighted mauka tennis courts, are located makai and away from the Project. The Project will traverse the park near its mauka property line, generally following the alignment of the park's access road until it leaves the park, where it continues on an elevated guideway within the right-of-way of Nimitz Highway. In the park, the Project guideway will be approximately 30 feet wide, between 30 to 35 feet high, and will be elevated above approximately 1 acre of land within the park, primarily in the parking lot and the park access road. Within the park, the guideway will be constructed on approximately 10 columns that will be about 6 feet in diameter, which will result in the use of approximately 280 square feet of park land for the placement of columns.

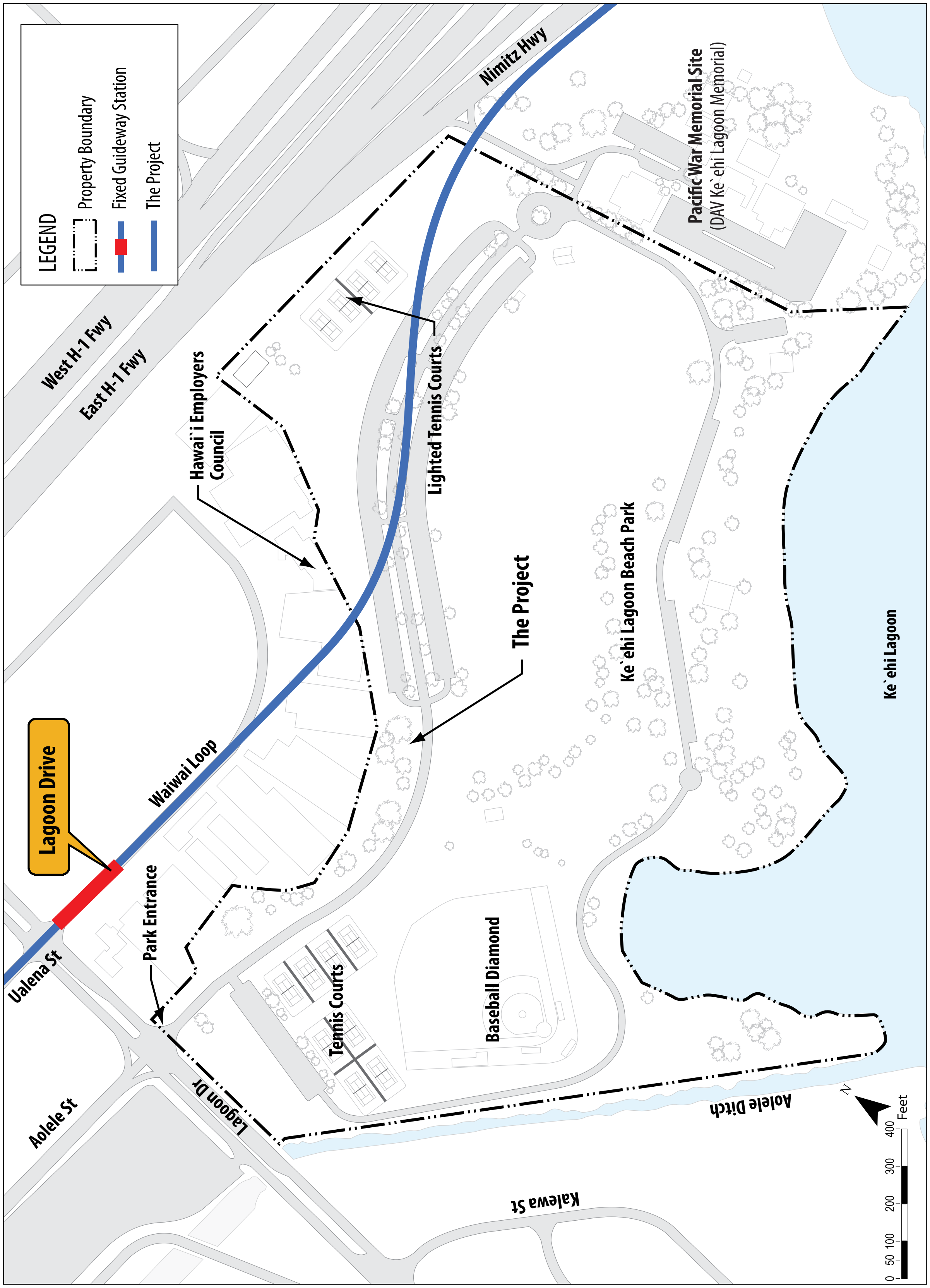

Figure 5-8 Ke`ehi Lagoon Beach Park

Lagoon Drive Station will be located outside the park, approximately 350 feet `Ewa and one block mauka of the park entrance on Lagoon Drive and Ualena Street. The Project will provide transportation benefits to park users since the station will be located within walking distance. Hence, the Project will offer another transportation option for recreation users and spectators of events to access the park.

Minimization of Harm and Mitigation

Measures to minimize harm were considered in the Project's design in coordination with DPR. To minimize project use of the park, the project guideway was designed as close to the mauka boundary as possible, consistent with operational and engineering constraints, and to be away from the recreational activities and facilities, including the baseball diamond, open field, paved walking path, picnic areas, pavilion, and access to the water where canoeing events occur and most of the tennis courts are located. The views of the water by park users will not change with the Project. Looking mauka, near the water, the Project will be slightly more visible than the H-1 Freeway in the background and will not noticeably change the character of the landscape (Figure 4-27 in Chapter 4 of this Final EIS).

The Project guideway was designed with the minimal curve radius needed to maintain efficient system operation to serve the Lagoon Drive Station, while minimizing impacts to the park. The support columns have been designed to use as little park land as practicable, be located in areas away from recreational activities, and accommodate access to the park by recreational users. The alignment is designed to be elevated above the parking area, and there will be no net loss of parking spaces.

None of the 12 tennis courts will be permanently used by the Project. The guideway will cross above the park, just makai of the four lighted mauka tennis courts near Nimitz Highway, as shown in Figure 5-8. Given their proximity to the guideway, these tennis courts will be closed during construction and reopened as unlighted tennis courts when this portion of the Project is completed. DPR's desire is to have lighted tennis courts available for evening use. To accomplish this and mitigate temporary impacts to these lighted mauka tennis courts, DTS will coordinate with DPR during Final Design to provide lighting and associated resurfacing for four of the tennis courts near the park entrance prior to construction so that nighttime tennis court use will be maintained during construction and after project completion. The lighting will be designed and constructed in accordance with regulatory requirements.

During Final Design, DTS will coordinate with DPR to restore the area around the four mauka tennis courts to provide recreational benefit to park users including, but not limited to, restoring the four mauka tennis courts to their original condition for daytime use, planting grass, and installing landscaping and picnic tables.

DTS will coordinate with DPR to develop a planting plan for trees that will be removed during construction and a landscaping plan within the park. DTS will replant new trees in accordance with the City's requirements for street tree planting. DPR will maintain new landscaping as part of its regular park operation and maintenance.

Access to the park will be maintained during construction in accordance with project maintenance of traffic and safety plans. During construction, there will be a temporary loss of approximately 10 percent of the parking spaces. DTS will coordinate with DPR to identify and implement alternate access to the park to mitigate for parking that will be temporarily closed during construction. For major events held during construction of the Project, park users may park on streets near the park. Based on park user demand during major events, DTS will temporarily provide additional bus service and/or shuttle bus service to the park from existing City transit centers or parking lots. After construction, the parking area will be restored and there will be no net loss of parking.

Agency Coordination and Consultation

DPR officials who operate and maintain Ke'ehi Lagoon Beach Park have been involved in the project planning and design process within the boundaries of the park. Meetings were held with DPR in May 2008, September 2009, and December 2009 to discuss use of the park to ensure that the Project will result in a net benefit with regard to recreational use. DPR provided a letter to DTS on September 25, 2008, stating that the Project's use of the park is considered a *de minimis* impact (Appendix F). DPR concurs that after mitigation, the Project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection. Notice is hereby provided for public review and comment concerning the effects of the Project on the activities, features, and attributes of Ke'ehi Lagoon Beach Park. Section 4(f) *de minimis* comments may be submitted to FTA and DTS 30 days following the Federal Register Notice of Availability for this Final EIS. FTA will make a final determination in the Record of Decision after reviewing the public comments submitted. Coordination will continue during Final Design and construction.

Preliminary Section 4(f) Finding

With the measures to minimize harm and mitigation described above, DPR has reiterated its concurrence at its meeting with DTS in December 2009 that the Project's use of the park would have a *de minimis* impact on the park since it would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Pacific War Memorial Site (DAV Ke`ehi Lagoon Memorial) (De minimis Impact)

Description and Significance of Property

Although loosely referred to as a park in various planning documents prepared by the Ke'ehi Memorial Organization and Hawai'i Disabled American Veterans (KMO-DAV), which manage the property for DLNR-Parks, the Pacific War Memorial Site property has not been designated for park or recreational uses by the governor of the State of Hawai'i, nor is it listed on the State's inventory of parks. In addition, the Project does not use portions of the property currently used or planned for memorial or recreational uses. Although the property could be viewed as a non-Section 4(f) property, the property is evaluated below as if it were a Section 4(f) property using a *de minimis* analysis.

The property comprises approximately 11 acres and is located between Ke'ehi Lagoon Beach Park ('Ewa boundary), Moanalua Stream (Koko Head boundary), Nimitz Highway (mauka boundary), and Ke'ehi Lagoon (makai boundary) (Figure 5-9).

Pursuant to Governor's Executive Order (GEO) 3967, February 19, 2003, the property was "set aside for the following public purposes: FOR PACIFIC WAR MEMORIAL PROPERTY PURPOSES[.]" GEO 3967 cancelled GEOs 1534 and 1550 and transferred jurisdiction from the abolished Pacific War Memorial Commission of Hawaii to DLNR-Parks. DLNR-Parks oversees the KMO-DAV, which has been maintaining the property.

KMO-DAV manages the property for multiple uses, including memorial and recreational uses. Facilities on the property include a rental office, memorial obelisk, several community centers and meeting rooms, Disabled American Veterans Headquarters, a storage building, a rehabilitation facility, and two chapels. The property also has a basketball/volleyball court, a grass field with a baseball backstop, small pavilions, and a picnic

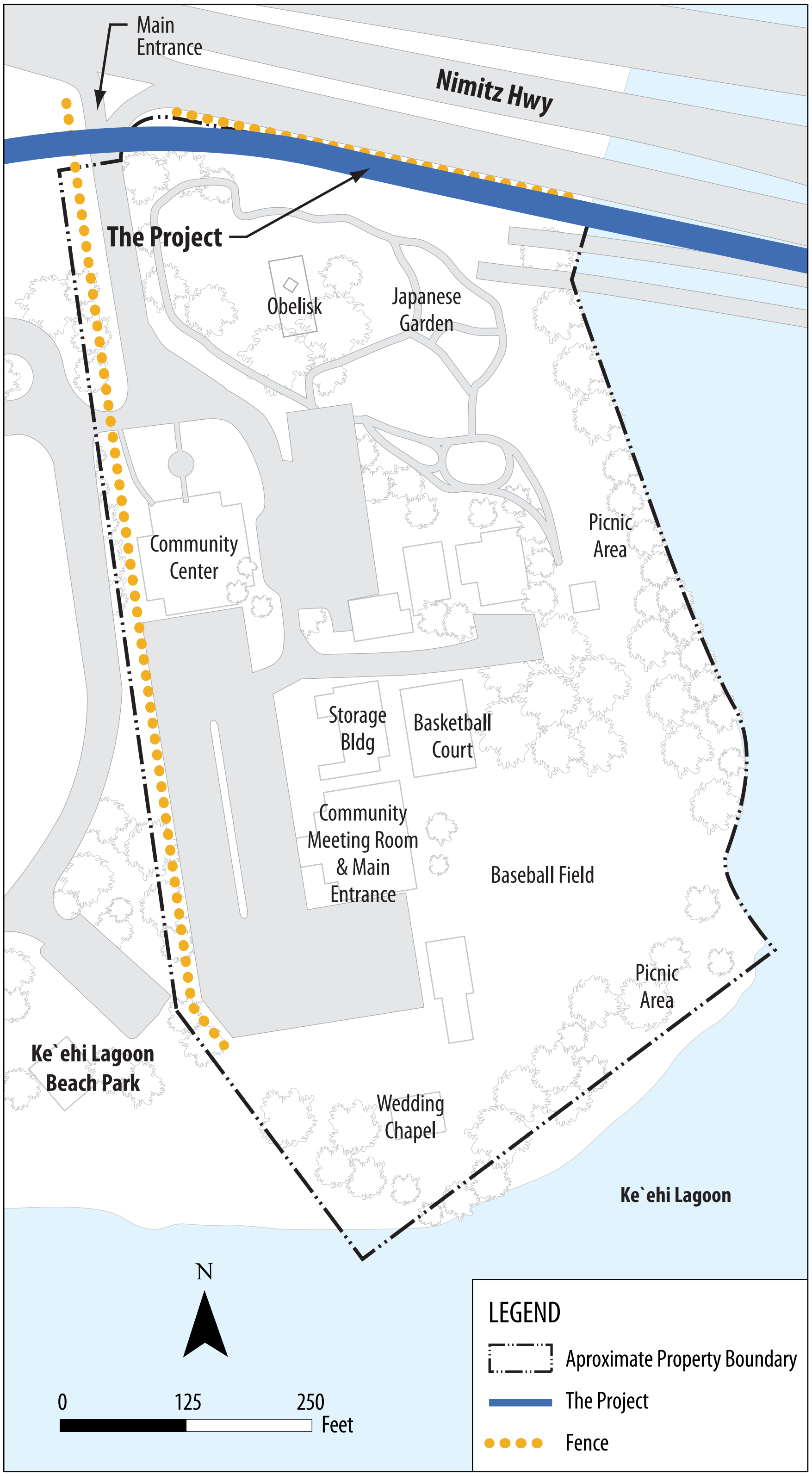

Figure 5-9 Pacific War Memorial Site (DAV Ke`ehi Lagoon Memorial)

area. It is fenced-in along its perimeter and has a lockable gate at its entrance for security at night. The property is closed between the hours of 10:00 p.m. and 6:00 a.m., except by permit.

In 2005, KMO-DAV prepared the *Keʻehi Lagoon Memorial Master Plan Update*. The Plan included four goals: (1) Maintain the park for use by veterans and their families, youth groups, and the community and complement Keʻehi Lagoon Beach Park; (2) maintain the integrity of the obelisk; (3) provide a rehabilitation center for disabled veterans; and (4) maintain the park property "as self-sustaining so that the public may not be asked constantly for support."

Section 4(f) Evaluation

As shown in Figure 5-9, all of the memorial and recreational features, attributes, and activities of the property are located makai of the Project. The Project will traverse the property near the mauka property line next to Nimitz Highway and grade-separated ramps for the H-1 Freeway. On the property, the Project guideway will be approximately 30 feet wide, between 30 to 35 feet high, and will be elevated above approximately 0.5 acre of land. The guideway will be constructed on approximately three columns that will be about 6 feet in diameter each, which will result in the use of approximately 150 square feet of the property. The area where the three guideway columns will be constructed is generally where the elevated guideway will pass over the property. This area is not used for memorial or recreational activities and is in an area where there are existing utility easements.

The views of the water by property users will not change with the Project. Looking mauka from the area of the property near the water, the Project will be slightly more visible than Nimitz Highway and H-1 Freeway ramps in the background and will not noticeably change the character of the landscape (Figure 4-22 in Chapter 4 of this Final EIS shows a visual simulation of the guideway from a similar view point within Keʻehi Lagoon Beach Park).

Since most of the recreational features are on the portion of the property near the water, the Project will not change them or the use of these recreational areas. Closer to the Project are the obelisk, Japanese Garden, and gazebo. Because the guideway is located adjacent to Nimitz Highway and grade-separated ramps for the H-1 Freeway, which is already a prominent feature when looking mauka, views will not change. The noise analysis at Keʻehi Lagoon Beach Park is also representative of the memorial and demonstrates that the Project will not result in a noise impact on this property, as discussed in Section 4.10 of this Final EIS. The Project will not adversely affect the activities, features, or attributes of the memorial or recreational areas on this property.

Minimization of Harm and Mitigation

Measures to minimize harm were considered in the Project's design in coordination with DLNR-Parks and KMO-DAV. To minimize Project use of the property, the Project's guideway was located as close to the mauka boundary as possible, consistent with operational and engineering constraints, and to be away from the memorial and recreational activities and facilities, such as the memorial obelisk, rehabilitation center, chapels, basketball/volleyball court, small pavilions, and picnic area. The guideway support columns have been designed to use as little of the property as practicable, be located in areas away from memorial and recreational activities, and accommodate access to the property by users. Based on the existing use of the property, the area where the three guideway columns will be constructed and where the elevated guideway will pass over the property is not used for memorials or recreational activities and is in an area where there are utility easements.

During final design, DTS will coordinate with KMO-DAV to replant and relocate any affected trees and to landscape the area near the columns. In addition, the fence will be replaced with "security fencing" on the mauka property line and the utility bridges, as feasible. The area where the columns will be constructed is not in an area that would change KMO-DAV's future plans for the property.

Access to the property will be maintained during construction in accordance with the Project's maintenance of traffic and safety plans. During construction, the work area generally will be limited to the area under the guideway. After construction, the property will be restored in consultation with KMO-DAV. DTS will coordinate with KMO-DAV to develop a landscaping and planting plan to replace vegetation and trees disturbed during construction. KMO-DAV agrees with the mitigation measures. Coordination with KMO-DAV will continue during final design and construction.

Agency Coordination and Consultation

KMO-DAV officials who operate and maintain the property have been involved in the planning and design process for the portion of the Project within the boundaries of the property. Meetings were held with KMO-DAV on November 21, 2009, and June 4, 2010, to discuss the use of the property and to ensure that the Project will result in a net benefit regarding access to this multi-use memorial and recreational property. On June 2, 2010, DTS met with DLNR-Parks, the agency that owns the property. DLNR provided correspondence to DTS stating that the Project's use of the property is considered a *de minimis* impact since it will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f). Notice is hereby provided for public review and comment concerning the effects of the Project on the activities, features, and attributes of the property. Section 4(f) *de minimis* comments may be submitted to FTA and DTS 30 days following the Federal Register Notice of Availability for this Final EIS. FTA will make a final determination in the Record of Decision after reviewing the public comments submitted.

Preliminary Section 4(f) Finding

With the measures to minimize harm and mitigation described above, DLNR/KMO-DAV has stated its concurrence that the Project's use of the property would have a *de minimis* impact on the property since it would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

5.5.2 Historic Sites

The historic sites considered in the Section 4(f) evaluation include the 81 historic properties identified near the project alignment in Section 4.16.

The Project will have a direct use of 13 historic properties with 2 of those considered a *de minimis* impact. The use of the properties with a *de minimis* impact will be small enough that the historic properties will not be adversely affected, as described in 36 CFR 800.5. Avoidance alternatives and measures to minimize harm are described for groups of geographically proximate Section 4(f) properties that will be used by the Project.

Agency Coordination and Consultation

Since consultation and coordination throughout the Section 106 process was common for all historic properties, the process described here is applicable to all the historic properties discussed in the Section 4(f) evaluation and, therefore, are not repeated individually under each historic property evaluation.

Consultation among FTA, ACHP, the SHPO, and other Section 106 consulting parties is described in Section 4.16 of this Final EIS. The historic properties evaluated in this Section 4(f) evaluation were determined to be eligible for listing on the NRHP with the concurrence of the SHPO. To mitigate adverse effects on historic properties identified during the Section 106 review, a draft PA was developed with input from all of the Section 106 consulting parties. The draft PA stipulates a variety of actions to be taken prior to Final Design and construction activities.

FTA, the City, ACHP, and the SHPO have agreed to the stipulations described in the draft PA to mitigate adverse effects to historic properties along the project alignment, including preparation of the Historic American Building Survey and the Historic American Landscape Survey documentation, professional photography of affected properties, professional videography of the study corridor, and digital photography that documents affected properties and viewsheds within the APE.

Additional measures within the draft PA highlight specific actions to be taken by the City and include preservation of lava rock curbstones along Dillingham Boulevard and Halekauwila Street; completion of Cultural Landscape Reports, Historic Context Studies, NRHP Multiple Property Submissions, and NRHP nominations; and development of an interpretive plan for the project area with interpretive signage to be installed. Appendix H, Section 106 of the National Historic Preservation Act Draft Programmatic Agreement, details the mitigation, consultation, and review process for use of historic properties impacted by the Project.

Dillingham Boulevard Houses (Direct Use)

The Afuso House, Higa Four-plex, and Teixeira House, located along Dillingham Boulevard between Puʻuhale Road and Waiakamilo Road, will experience the same direct use by the Project as a result of the widening of Dillingham Boulevard. Since they are on the same side of the street (makai), avoidance alternatives and measures to minimize harm are common to these three properties. Other Section 4(f) properties located on Dillingham Boulevard are discussed separately due to their unique characteristics.

Description and Significance of Property

Afuso House (Direct Use)

Fronting Dillingham Boulevard, this single-story plantation-style privately owned residence is associated with the residential development of the Kalihi Kai neighborhood in the early 1900s. This structure embodies the distinctive characteristics of a type and period of construction and retains a high degree of integrity of location, design, materials, workmanship, feeling, and association. The integrity of its original setting has changed substantially, as there are now adjacent vacant lots on one side and a convenience store across the street. Several other historic residential buildings are present in the immediate area, also on Dillingham Boulevard. The added carport and jalousie windows are apparent non-historic alterations; most of the other features are historic and part of the design history of the house (Figure 5-10).

Higa Four-plex (Direct Use)

This two-story plantation-style privately owned four-plex residence (Figure 5-10) is associated with intense residential development around Dillingham Boulevard in the early 1940s. This structure is also associated with Dillingham Boulevard's historic development and its effect on the Kalihi Kai neighborhood, which originally consisted of mostly single-family residences. The building has a high degree of integrity, and all alterations

Figure 5-10 Higa Four-plex (left) and Afuso House (right)

appear to be historic and are considered part of the building's design history.

Teixeira House (Direct Use)

This single-story plantation-style privately owned residence is associated with the residential development of the Kalihi Kai neighborhood in the first half of the 20th century, before North Queen Street was renamed Dillingham Boulevard. This structure embodies the distinctive characteristics of a type, period, and method of construction and is a good example of a 1940s, single-wall, plantation-style house. There have been some changes made to the structure, but it retains sufficient integrity to qualify for the NRHP. Integrity of setting is compromised from its historic dense residential character due to a new, large commercial building on the adjacent lot; historic setting remains apparent due to the presence of other historic residential buildings in the immediate area. There have been some non-historic design changes made to the structure, including installation of jalousies and removal of a rock wall fronting the lot (Figure 5-11).

Section 4(f) Evaluation for Afuso House, Higa Four-plex, and Teixeira House

As a result of the 10-foot widening of Dillingham Boulevard to accommodate the fixed guideway, the Project will require acquisition of the properties (including demolition of the buildings on these properties).

Figure 5-11 Teixeira House

Avoidance Alternatives for Afuso House, Higa Four-plex, and Teixeira House

To avoid use of these Section 4(f) historic properties on Dillingham Boulevard in this area, several alternatives were evaluated to determine if any were feasible and prudent, as defined under 23 CFR 774.17.

Dillingham Boulevard—Maintain Existing Width

One avoidance alternative considered would be to accommodate the guideway within Dillingham Boulevard's existing right-of-way and not widen the roadway. While this alternative would avoid all Section 4(f) properties on both sides of the street in this area of Dillingham Boulevard, it would not be prudent, since one travel lane would need to be eliminated to accommodate the Project. Removal of a travel lane on Dillingham Boulevard would result in highly congested conditions for vehicles, which is inconsistent with the Project's Purpose and Need to improve mobility. (Chapter 3, Transportation, of this Final EIS documents the travel demand information for Dillingham Boulevard).

Dillingham Boulevard is a critical link in Honolulu's street and highway network. Where Dillingham Boulevard crosses Kapālama Canal (Koko Head of these properties), the existing and future traffic conditions show that the road carries up to 10 percent of the vehicles crossing the Kapālama Canal in the ʻEwa-bound direction during the p.m. peak hours. Redistributing traffic to parallel roadways, including the H-1 Freeway, King Street, and Nimitz Highway, is also inconsistent with the Project's Purpose and Need to improve mobility, since these roadways are already highly congested and currently operate above capacity during peak times of travel during the day. Traffic on these roadways is anticipated to worsen in the future.

In addition, Dillingham Boulevard is a primary bus route with a direct connection to the Middle Street bus facility. Four bus routes currently operate on Dillingham Boulevard. If Dillingham Boulevard were not widened, there would be limited space for bus pullouts within the current right-of-way. Therefore, under this alternative, vehicles would be required to follow buses and stop at regular intervals along Dillingham Boulevard from Middle Street to Iwilei. Removal of a lane to avoid widening the street (and avoid use of these properties) would not meet the Project's stated goal of improving mobility. This avoidance alternative is not prudent since it would compromise the Project to such a degree that it would be unreasonable to proceed with the Project in light of its stated Purpose and Need and would result in unacceptable operational problems for the reasons stated above, as defined under 23 CFR 774.17.

Dillingham Boulevard—Extend the Downtown Tunnel

Another alternative to avoid the use of Section 4(f) properties on Dillingham Boulevard is to extend the Downtown tunnel option that is discussed as an avoidance alternative to the use of Section 4(f) properties in Chinatown and Downtown between Nuʻuanu Stream and South Street farther ʻEwa. As documented in the Alternatives Analysis, a tunnel in the Downtown area alone would have increased the cost of the Project by an extraordinary magnitude of more than $650 million (2006 dollars). Extending the tunnel `Ewa to include Dillingham Boulevard to avoid these Section 4(f) properties would increase the cost of the tunnel to more than $1 billion (2006 dollars), which would result in additional construction costs of an extraordinary magnitude beyond what could be funded within the Project's financial plan. This avoidance alternative is not prudent because of its extraordinary cost.

Minimization of Harm and Mitigation

Afuso House, Higa Four-plex, and Teixeira House

Dillingham Boulevard—Shift Alignment

Shifting the alignment from one side of Dillingham Boulevard to the other was also considered to avoid the use of Section 4(f) properties. While this alternative would eliminate use of some Section 4(f) properties, it would result in the use of other Section 4(f) properties on the other side of the street. Shifting the guideway to the mauka side of Dillingham Boulevard (Figure 5-12) would use more historic Section 4(f) properties, specifically, the Duarte House, 10 Courtyard Houses, Puʻuhale Market, and additional true kamani trees. This alternative would also require relocation of approximately 8,000 feet of an aboveground 138-kilovolt (kV) high-voltage electrical line and 20 steel poles underground (found on both sides of the street), which would cost over $12 million. In addition, trees on the makai side of the street have been severely trimmed to avoid the low voltage power lines, while the trees on the mauka side have been pruned less severely and retain more of their original shape and quality (because the power lines are much taller on the mauka side of the street). Therefore, a mauka shift would not avoid the use of Section 4(f) properties and would more severely impact trees that are in better condition. This alternative is not prudent since it would result in an extraordinary cost to relocate the power lines and would cause environmental impact to true kamani trees and other historic properties.

Dillingham Boulevard—Straddle Bents

Another option considered was to construct the Project on straddle bents instead of columns, which would avoid the use of the Afuso House, Higa Four-plex, and Teixeira House properties. Straddle bent columns would be placed on properties ʻEwa and Koko Head of these Section 4(f) properties and would not require widening of Dillingham Boulevard. This alternative would require the placement of a straddle bent column on the Section 4(f) property containing the 10 Courtyard Houses on the mauka side of Dillingham Boulevard. In addition to use of this Section 4(f) property, straddle bents would have greater right-of-way use of other Section 4(f) properties on the mauka side of Dillingham Boulevard and result in greater visual impacts as the straddle

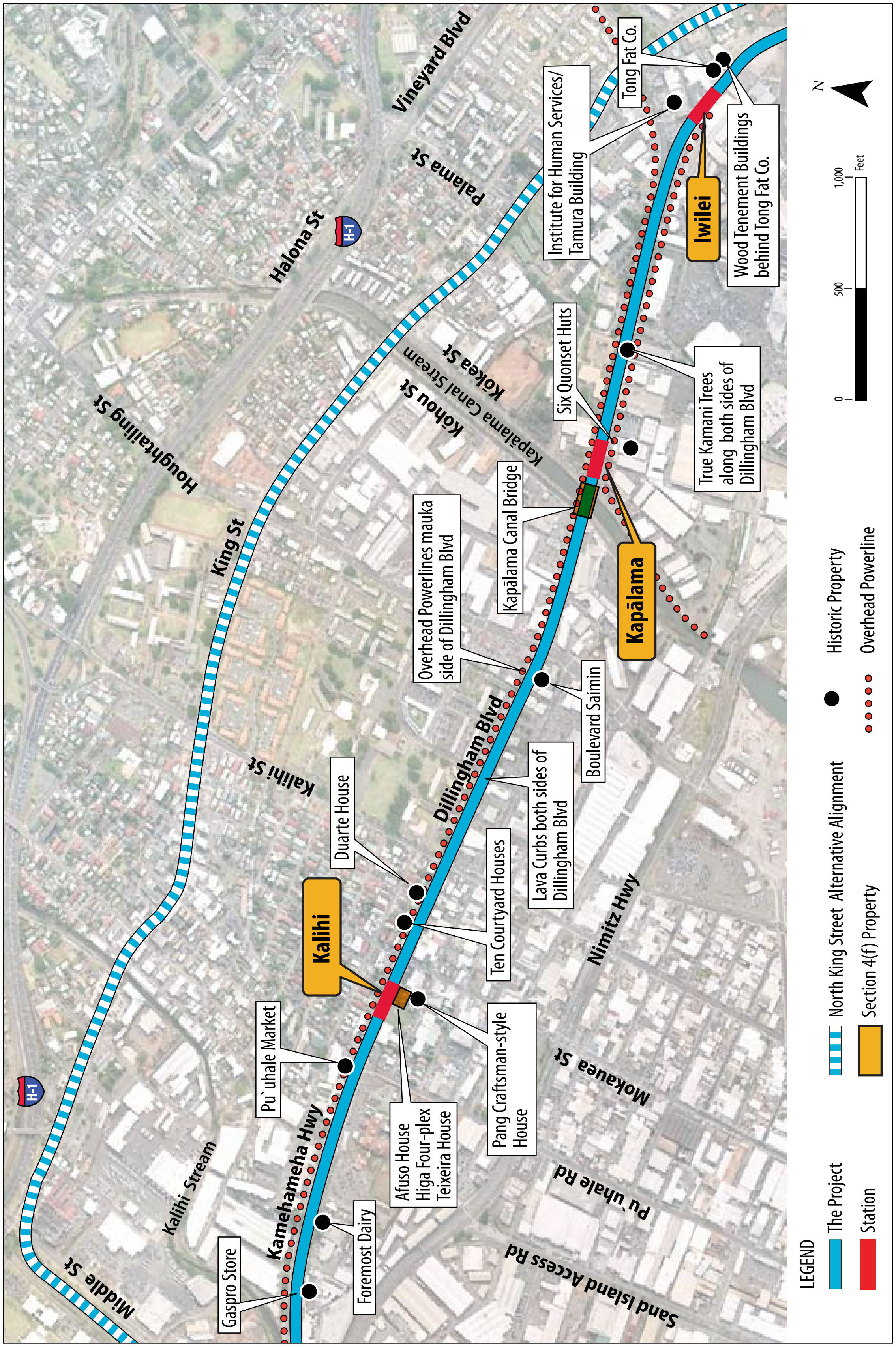

Figure 5-12 Dillingham Boulevard Historic Properties Alternative

bent beams structure would straddle Dillingham Boulevard and result in a "tunnel like roadway." In addition, this alternative would require the relocation of Kalihi Station in order to avoid any 4(f) properties.

Dillingham Boulevard/North King Street Alignment

Several alternative alignments were considered during the Alternatives Analysis process to avoid use of these Section 4(f) properties, but given the dense and historic nature of this section of Honolulu, none of the alternatives avoids all Section 4(f) properties.

An alternative alignment on North King Street (Figure 5-12) was considered since it would avoid Dillingham Boulevard and its historic properties. This alternative would have had a substantially greater potential to adversely affect historic architectural properties and would not have avoided the use of Section 4(f) properties since many more were identified along that route. It would have caused greater harm on properties of equivalent value and was not considered a prudent alternative, as defined under 23 CFR 774.17. It also would result in a greater number of residential relocations, and the potential for noise impacts on the remaining properties would be greater because of more noise-sensitive uses. It also could affect the greatest number of hazardous materials sites. This alternative would not be prudent as it still would cause severe social, economic, or environmental impacts; severe disruption to established communities; and severe impacts to environmental properties protected under other Federal statutes.

Since the North King Street alignment would also serve fewer transit trips than the Dillingham Boulevard alignment, it would be less effective at meeting the stated Purpose and Need of improved mobility and improved transit service. Each of the above-described factors alone is sufficient to establish that this alternative is not prudent. However, even if the above factors were individually minor, cumulatively, they would cause unique problems and impacts of extraordinary magnitude.

Afuso House, Higa Four-plex, and Teixeira House Summary

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize disturbance of historic properties. Nevertheless, the Project will still require demolition of the Afuso, Higa Four-plex, and Teixiera Houses.

A draft PA has been prepared, in accordance with Section 106, with detailed stipulations that mitigate adverse effects from the Project on these historic properties. After review of alternative measures to minimize harm, the project alignment on Dillingham Boulevard includes all possible planning to minimize harm.

Lava Rock Curbs (Direct Use)

Description and Significance of Property

Lava rock curbstones consist of dense pieces of basalt that are rough-hewn below grade but squared at their exposed surfaces. Lava rock curbs are an important and labor-intensive element in the history of Honolulu's street and road infrastructure. Some of the lava rock used for curbstones are from the Mōʻiliʻili quarry, which operated from 1889 to 1949 and produced high-quality stones.

The lava rock curbs are eligible as a single property under Criterion A for their association with roadway infrastructure development in Honolulu. They also are eligible under Criterion C as examples of the distinctive method of street construction in Honolulu during the late 1800s and early 1900s. Although they are considered together in this analysis, curbs are located at various places along Dillingham Boulevard and Halekauwila Street (Figures 5-12 and 5-13).

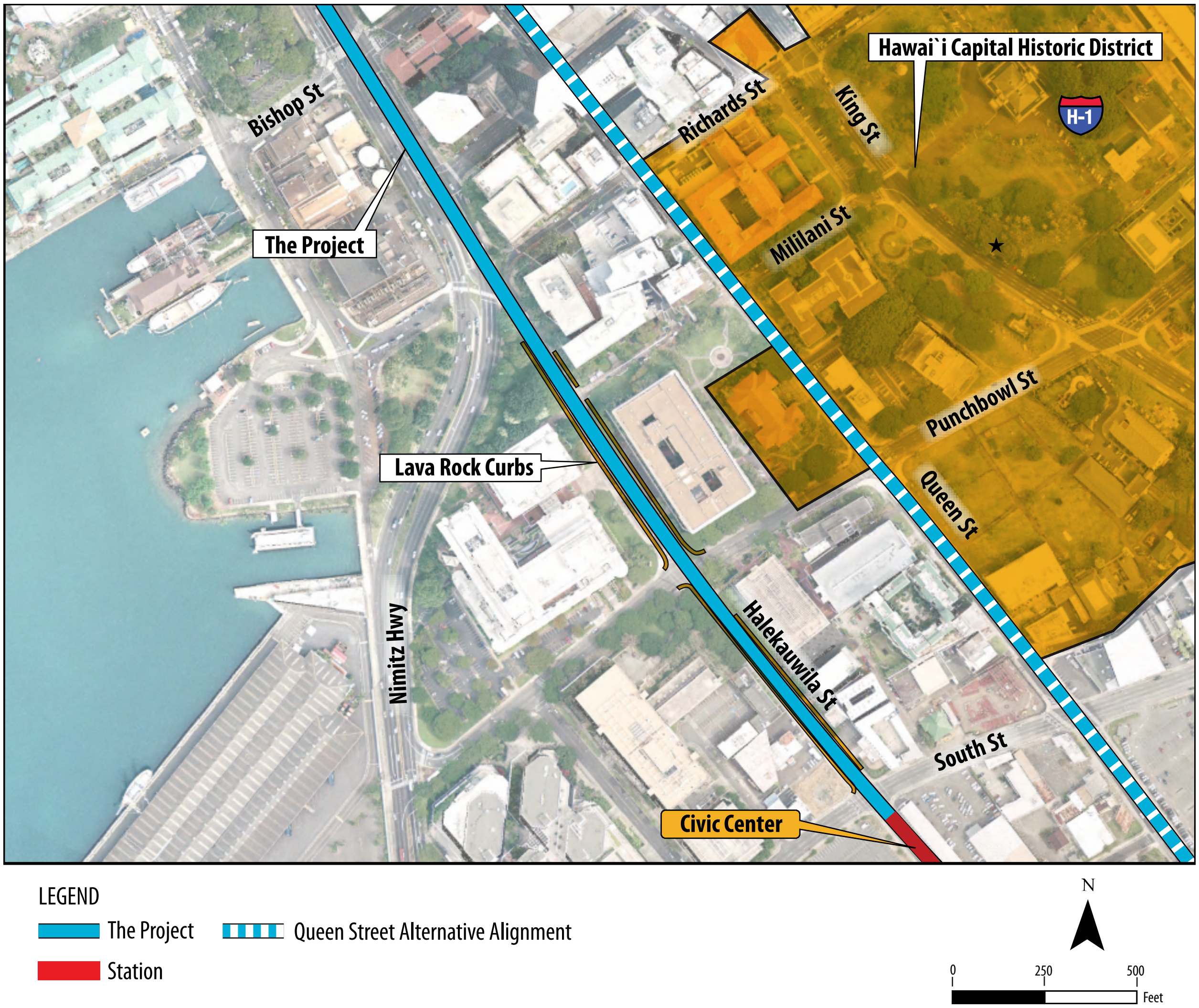

Figure 5-13 Lava Rock Curbs on Halekauwila Street Alternative

Section 4(f) Evaluation

The Project will require the use of lava rock curbs in two locations—on Dillingham Boulevard and Halekauwila Street. The widening of Dillingham Boulevard 10 feet to the makai side of the Kapālama Canal Bridge and the widening of Halekauwila Street will require the removal of curbs during construction, which constitutes use of a Section 4(f) property. After construction, the lava rock curbs will be replaced as practicable.

Avoidance Alternatives

Dillingham Boulevard Lava Rock Curbs

Extension of the tunnel that would extend from Downtown, as described above for the Dillingham Boulevard houses, would avoid the use of the Dillingham Boulevard Lava Rock Curbs. This alternative would not be prudent for the reasons described above.

Minimization of Harm and Mitigation

Dillingham Boulevard Lava Rock Curbs

If Dillingham Boulevard was not widened, the lava rock curbs still would be used since overhead utility lines would have to be relocated underground. Another alternative discussed above considered widening Dillingham Boulevard on the mauka side of the street. However, this would not avoid use of the historic lava rock curbs since they are present on both sides of the street.

Dillingham Boulevard Lava Rock Curbs Summary
After review of alternative measures to minimize harm, there are no prudent alternatives to the Project's Dillingham Boulevard alignment, as defined under 23 CFR 774.17. The Dillingham Boulevard alignment in this segment was found to result in the least overall harm among the alternatives considered.

Avoidance, Minimization of Harm, and Mitigation
Halekauwila Street Lava Rock Curbs
Several alternative alignments were analyzed for the section of the Project in the Alternatives Analysis that includes the area along Halekauwila Street. Three alignments ranked poorly with regard to transportation benefits, environmental consequences, and cost. The Beretania Street/King Street alignment would provide poor transit benefits; the Hotel Street/Kawaiahaʻo Street/Kapiʻolani Boulevard alignment would create substantial environmental impacts compared to the other alignments (regarding the number of known hazardous waste/materials sites potentially affected, a greater number of residential displacements, and a greater potential to disturb Native Hawaiian burials than any other alignment); and the King Street/Waimanu Street/Kapiʻolani Boulevard Tunnel alignment would cost over $500 million more than the other alignments. An elevated system on either Beretania or King Street would run in front of either the historic State Capitol or Iolani Palace and would require removal of traffic lanes in the area of the Civic Center.

Two similar alignments studied in the Alternatives Analysis included the Nimitz Highway/Queen Street/Kapiʻolani Boulevard alignment and the Nimitz Highway/Halekauwila Street/Kapiʻolani Boulevard alignment, which would have similar transportation benefits. The Queen Street alignment would have somewhat greater environmental impacts due to the narrow available right-of-way. It would use a greater area of lava rock curbs than the Halekauwila alignment. It would also be located between Hale Auhau and the rest of the Hawaiʻi Capital Historic District and, therefore, potentially use another Section 4(f) property (Figure 5-13).

Two alternatives on Halekauwila Street were considered for reconstruction of the roadway to minimize harm. The first would require paving over the historic curbs and the second would modify the location and structure of guideway support columns to avoid disturbing the lava rock curbs.

While paving over the curbs would preserve most of the curbs in-place on Halekauwila Street, it would require reconstruction of the stormwater drainage system to accommodate the higher roadway profile. As a result, this alternative would still require removal of lava rock curbs in several locations. There is a high potential for curb stones to be damaged during construction of the new roadway above, although measures would be taken to minimize this occurrence. In addition, the lava rock curbs would not be able to be seen by the public.

Relocating support columns would require eliminating parking on Halekauwila Street, altering the alignment of travel lanes, and relocating additional utilities. Altering the alignment of travel lanes would also require the removal of lava rock curbs in those locations to accommodate the alteration of return radii at intersections. Relocation of additional utilities would require removal of curbs in areas where utilities cross the roadway into sidewalk areas.

Halekauwila Street Lava Rock Curbs Summary
The alternatives evaluated for this section of the Project cannot avoid other Section 4(f) properties. Therefore, there is no avoidance alternative. They would not be prudent options since they would not meet the Project's Purpose and Need to improve mobility and would result in greater impacts to environmental resources protected under other

Federal statutes, additional costs of an extraordinary magnitude, and additional adverse effects to other historic properties.

Lava Rock Curbs Summary

Neither of these options (paving over the lava rock curbs or relocating the guideway support columns) entirely avoids disturbance to the lava rock curbs. While fewer curbs may be affected, these options would not be considered prudent due to the high potential for damage to the properties. These alternatives would not completely avoid the use of Section 4(f) properties and, therefore, would not be considered prudent as defined in 23 CFR 774.17. Each of the above-described factors alone is sufficient to establish that the alternatives considered are not prudent. However, even if the above factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize disturbance of historic properties. Nevertheless, the Project will still require removal of lava rock curbs along the edges of the pavement of Dillingham Boulevard and Halekauwila Street.

In accordance with Section 106, a draft PA has been prepared that details measures to mitigate adverse effects to cultural properties, such as the lava rock curbs. All affected lava rock curbs will be marked prior to removal, stored securely, and replaced at their approximate original milepoint locations. Any stones that are damaged or destroyed during extraction or re-installation will be replaced with in-kind materials.

After review of alternative measures to minimize harm, the project alignment on Dillingham Boulevard and Halekauwila Street includes all possible planning to minimize harm.

Boulevard Saimin (De minimis Impact)

Description and Significance of Property

This two-story building fronting Dillingham Boulevard was built in 1960 and is of masonry construction with a stucco finish and flat roof. This building has a full-height section of decorative concrete grille on the side facing Dillingham Boulevard and contains multiple storefronts. This structure is associated with the commercialization of saimin (a noodle soup unique to Hawai‘i). Boulevard Saimin has been in operation since 1956 and has since become an important and popular purveyor of saimin on O‘ahu. This structure appears unaltered and retains a high level of integrity.

Section 4(f) Evaluation

The Boulevard Saimin parcel would be affected by the widening of Dillingham Boulevard (Figure 5-14) to accommodate the fixed guideway in the median, as common to all Build Alternatives. A total of 700 square feet of the property would be necessary. However, Section 106 consultation determined that the Project will have no adverse effect on this historic property. Therefore, while there will be a direct use, the impact will be *de minimis* and development of avoidance alternatives is not required.

Figure 5-14 Boulevard Saimin

Kapālama Canal Bridge (Direct Use)

Description and Significance of Property

This 1930 bridge was an important transportation link between Kalihi and Downtown Honolulu and an important aspect of the construction of Dillingham Boulevard between Waiakamilo Road and King Street in the early 1930s. The bridge is eligible for nomination to the NRHP under Criterion A for its association with the transportation history of the area and the extension of Dillingham Boulevard. It is also eligible for nomination under Criterion C as an example of concrete bridge engineering and design in Hawaiʻi (Figure 5-15).

Figure 5-15 Kapālama Canal Bridge

Section 4(f) Evaluation

The Project will require construction of an elevated fixed guideway over the bridge. Consistent with the necessary widening of Dillingham Boulevard, the Project will require widening of the bridge on its makai side to accommodate a new median within which the guideway will be built. Two support columns will be placed in the roadway median beyond the bridge. The bridge will need to be upgraded to current standards, although it has previously been seismically retrofitted. Because widening of the bridge will permanently incorporate land into the transportation facility, this qualifies as a direct use that adversely affects the qualities of the bridge's design that make it eligible for listing on the NRHP.

Avoidance Alternatives

Similar to the other Dillingham Boulevard properties, there are two alternatives that avoid use of Section 4(f) properties on Dillingham Boulevard, including the Kapālama Canal Bridge—one that would not widen the roadway and one that tunnels underneath Dillingham Boulevard. Neither would be a prudent option for the reasons described above.

An alternative was considered that would not widen the Kapālama Canal Bridge. With this alternative, the guideway would be supported on straddle bents spanning Dillingham Boulevard adjacent to the bank's stream. The crossbeams that span between the straddle bent columns would be more than 100 feet long and approximately 10 feet deep. In addition to the visual impact of such large crossbeams, these straddle bents would result in extraordinary costs. The straddle bents would require two additional columns and drilled shafts beyond the traditional single-column substructures, and the larger loads from the crossbeams would require larger and deeper foundations. The additional cost of the two straddle bents would be approximately $750,000. In addition, the deep crossbeams would also require raising the guideway's vertical alignment to maintain the required vertical clearance over Dillingham Boulevard. At Kapālama Station, just east of the Kapālama Canal Bridge, the raised alignment would move the platform canopies within the safety envelope of the 138-kV electrical lines above the station on both sides of Dillingham Boulevard. To avoid violating the Hawaiian Electric Company (HECO) safety requirements, the electrical lines would need to be relocated underground at a minimum cost of $10 million. In addition, not widening the Kapālama Canal Bridge would require Koko Head-bound drivers to shift lanes quickly at each end of the bridge. This alternative is not prudent because it results in an unacceptable safety problem since it would require an unsafe lane shift for traffic that would be hazardous to drivers and result in additional construction costs of an extraordinary magnitude. Each of the above-described factors alone is sufficient to establish that the alternatives considered are not prudent. However, even if the above factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Minimization of Harm and Mitigation

In accordance with Section 106, a draft PA has been prepared that details measures to mitigate adverse effects to the Kapālama Canal Bridge. The City will maintain or replace the bridge rails to match the appearance of the historic rails. The City will consider the Secretary of Interior Standards for the Treatment of Historic Properties in developing these design plans and provide them to the SHPO for review, as stated in the draft PA.

Kapalama Canal Bridge Summary

After review of alternative measures to minimize harm, the project alignment on Dillingham Boulevard that requires the widening of Kapālama Canal Bridge includes all possible planning to minimize harm.

Six Quonset Huts (Direct Use)

Description and Significance of Property

This property is eligible for nomination to the NRHP under Criterion A for its association with the re-use of former military buildings by small businesses and other uses, as well as Criterion C because it embodies the distinctive characteristics of this Quonset building type (Figure 5-16). This is a relocated grouping of military Quonset huts, which were originally erected by the military on another site during WWII. According to aerial photos, they were re-erected on this site sometime between January 1953 and January 1963.

Section 4(f) Evaluation

The Project will require acquisition of an approximately 10-foot-wide strip of land within the Six Quonset Huts property boundary (but

Figure 5-16 Six Quonset Huts

not touching the huts) along the makai edge of Dillingham Boulevard. In addition, a small area will also be acquired at the ‘Ewa corner of the property, extending makai approximately 25 feet. A portion of this acquisition will be converted to roadway and sidewalk use to accommodate installation of the median and guideway on Dillingham Boulevard.

Avoidance Alternatives

The avoidance alternatives discussed above for other historic properties on Dillingham Boulevard and Lava Rock Curbs also apply to the Six Quonset Huts (Figure 5-12).

Minimization of Harm and Mitigation

The use of straddle bents to avoid the Six Quonset Huts would have similar consequences to the other Dillingham Boulevard properties. Instead of a direct use of 10 Courtyard Houses (as described with the Dillingham Boulevard Houses), additional true kamani trees on the mauka side of Dillingham Boulevard would be used and the Kapālama Station would need to be relocated if straddle bents were constructed to avoid the historic Quonset huts.

As discussed above for the other properties on Dillingham Boulevard, the use of straddle bents would not reduce the overall harm to Section 4(f) properties and would require acquisition of additional right-of-way, cause visual impacts, and result in unacceptable safety problems. Each of the above-described factors alone is sufficient to establish that the alternatives considered are not prudent. However, even if the above factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize the need for removal of any historic buildings. Nevertheless, the Project will still require removal of a small amount of land on the same parcel as the Six Quonset Huts.

Six Quonset Huts Summary

In accordance with Section 106, a draft PA has been prepared that details a variety of stipulations that must be followed to mitigate anticipated adverse effects on historic properties. One of these stipulations is the preparation of a Cultural Landscape Report for the Dillingham Boulevard corridor, which includes the Quonset Huts. After review of alternative measures to minimize harm, the project alignment on Dillingham Boulevard that requires the use of the Six Quonset Huts includes all possible planning to minimize harm.

True Kamani Trees (Direct Use)

Description and Significance of Property

Mature true kamani trees, planted in the mid-1930s, still line both sides of Dillingham Boulevard. They stand approximately 30 feet tall and are spaced about 55 to 75 feet apart. Many have asymmetrical canopies as a result of pruning to avoid nearby utility lines. The trees are associated with the 1930s roadway infrastructure development of Dillingham Boulevard and the history of street tree plantings in Honolulu. They remain unaltered, except for necessary maintenance pruning (Figure 5-17).

Figure 5-17 True Kamani Trees on Dillingham Boulevard

Section 4(f) Evaluation

The Project requires that Dillingham Boulevard be widened by 10 feet to accommodate a median within which the fixed guideway will be placed. As a result, approximately 28 true kamani trees will be removed from the makai side of the street, which constitutes a direct use pursuant to Section 4(f).

Avoidance Alternatives

The avoidance alternatives evaluated for the Dillingham Boulevard houses and lava rock curbs also apply to the true kamani trees (Figure 5-12). For the same reasons that they would not be prudent alternatives to avoid other Dillingham Boulevard Section 4(f) properties, they would not be prudent avoidance alternatives for the true kamani trees. Each of the factors described above under the other Dillingham Boulevard properties is sufficient to establish that the alternatives considered are not prudent. However, even if the factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Minimization of Harm and Mitigation

The Project will require removal of 28 true kamani trees. During Final Design and construction, the City landscape architect will develop a planting plan to mitigate effects to these and other street trees affected by the Project on Dillingham Boulevard. The City will replace the true kamani trees within the corridor as close as feasible to the current location of the trees to be removed on the makai side of Dillingham Boulevard. At that time, it may be determined that some can be transplanted.

True Kamani Trees Summary

A draft PA has been prepared in accordance with Section 106 that contains detailed stipulations that mitigate adverse effects from the Project on cultural properties. After review of alternative measures to minimize harm, the project alignment on Dillingham Boulevard that requires the removal of true kamani trees includes all possible planning to minimize harm.

O`ahu Railway & Land Company Terminal Building and Office/Document Storage Building (Direct Use)

Description and Significance of Properties

The 1925 two-story terminal building is located on North King Street near Iwilei Road. It was designed by Honolulu architect Guy N. Rothwell and embodies the distinctive characteristics of public buildings during the 1920s in Honolulu.

The Oʻahu Railway & Land Company (OR&L) Office and Document Storage Building is a two-story, Colonial Revival-style building constructed in 1914. It is set back from North King Street, about 75 feet mauka of the Terminal Building. Both buildings are associated with OR&L, which was an important transportation network serving the sugar and pineapple plantations, the military, and residents of Oʻahu until it discontinued service in December 1947. These properties are eligible under Criterion A for their association with the railway.

The terminal building is also eligible under Criterion C as an example of Spanish Mission Revival Style with high artistic value. Both are now office buildings with associated parking lots and open areas in back (Figure 5-18).

Figure 5-18 O`ahu Railway & Land Company Terminal Building

Section 4(f) Evaluation

The Project includes construction of an elevated guideway on a planned access easement that crosses the back section of this large parcel. The alignment is on the site of the former OR&L rail yard, an area behind the buildings and their associated parking lots that has been cleared and paved. The City Department of Planning and Permitting (DPP) approved an easement for utility and access purposes through this property. The Project will use approximately 0.75 acre within this easement. The alignment will be approximately 150 feet makai from the Office and Document Storage Building, 100 to 150 feet makai from the Terminal Building, and approximately 45 feet aboveground. Approximately five guideway support columns will be located in this segment of the alignment. The structure will be taller than both buildings, and the visibility and connection to the former rail yard area will be maintained.

Avoidance Alternatives, Minimization of Harm, and Mitigation

North King Street Alignment

The guideway follows this access easement to connect Dillingham Boulevard to Nimitz Highway. The North King Street alignment would avoid this property but would have resulted in the use of as many as 36 historic Section 4(f) properties, a greater number of residential relocations, and more noise-sensitive properties compared to the

Project alignment. It is also adjacent to the A'ala International Park, which is a public park. This park (Section 4(f) property) would be used for the Project by the North King Street alternative as well as the alternative that shifts the alignment from King Street to Beretania Street mauka of the OR&L property. It also would serve fewer transit trips than the Project alignment and would not satisfy the stated Purpose and Need of improved mobility. For these reasons, it would not be considered prudent since it would compromise the Project in such a way that it would be unreasonable to proceed with it in light of its stated Purpose and Need and cause social, economic, and environmental impacts (Figure 5-19).

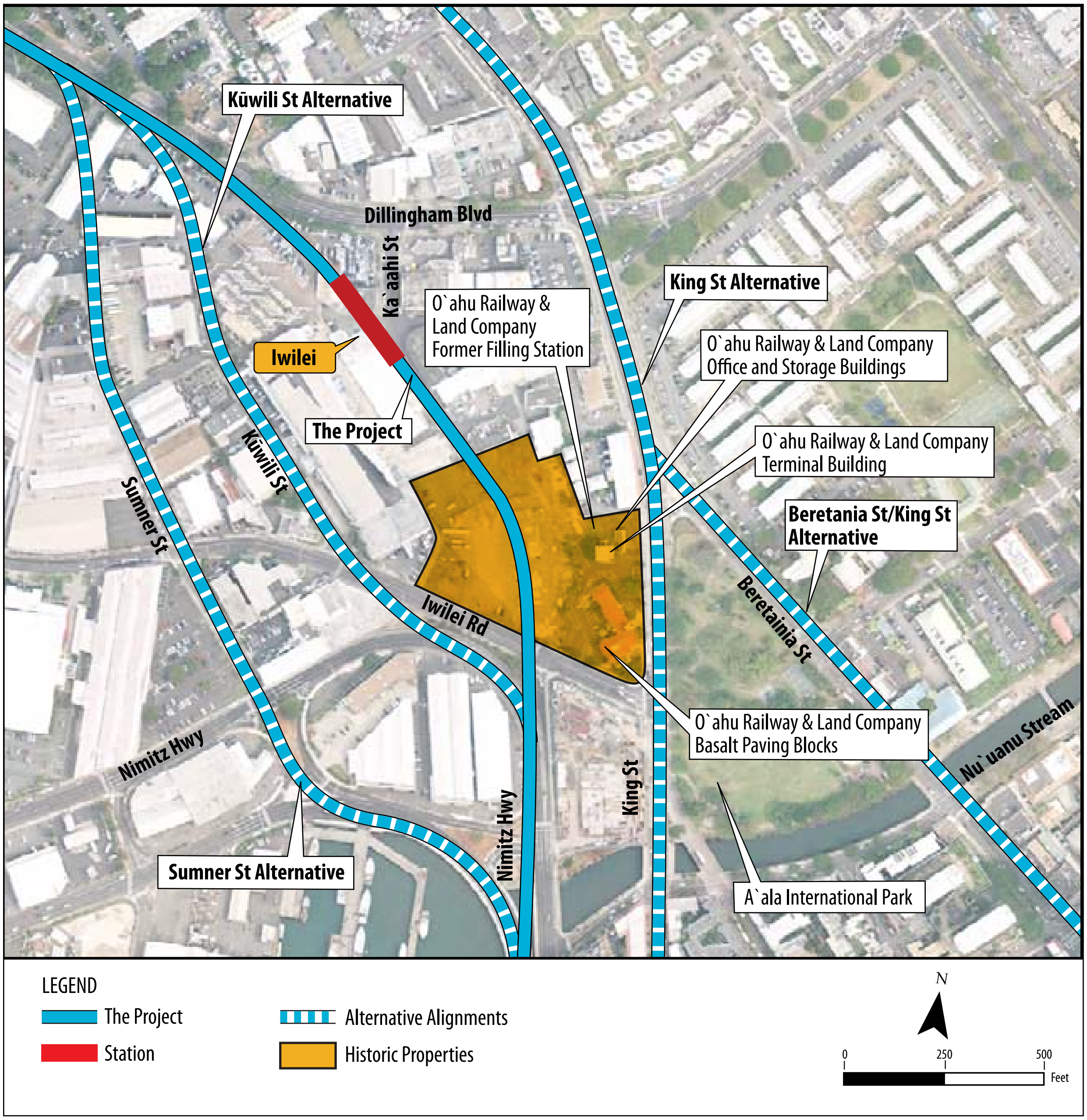

Figure 5-19 O`ahu Railway & Land Company Alternative

Kūwili and Sumner Streets Alignment

Other alternatives were considered to avoid the OR&L property that included different alignment connections between Dillingham Boulevard and Nimitz Highway instead of Ka‘aahi Street. An alignment that follows Kūwili or Sumner Streets and then crosses private property would require additional acquisitions and business displacements. Given that the Project uses an existing transportation access easement through the historic OR&L parcel, acquisition and displacement is minimized, although some properties will be displaced in the vicinity of Iwilei Station.

Right-of-way along Kūwili Street is narrower than Ka‘aahi Street, and large buildings are located on both sides of the street. In addition, two separate electric substations are located on both sides of Kūwili Street making this alignment difficult to construct without relocating some electrical equipment. An alignment running along Kūwili Street would be positioned on the makai side of the street since the electrical substation on the mauka side is large. Right-of-way would be acquired from six parcels on the makai side, and it is likely that four buildings on these parcels would need to be modified to accommodate the guideway. In addition, Kūwili Street does not connect to Dillingham Boulevard, and right-of-way would also be needed from three additional parcels, all of which are owned by the same owner. One building would need to be demolished and another reconstructed on one of these parcels. The transition from Kūwili Street to Nimitz Highway would also require the renovation of an additional building on the mauka side of Kūwili Street. Overall, the alignment between Dillingham Boulevard and Nimitz Highway would require two sets of reverse curves within a segment about 2,300 feet long, require right-of-way from 10 parcels and reconstruction of five buildings. According to 23 CFR 774.17, this alternative would not be considered prudent since it would cause severe economic impacts after mitigation.

Sumner Street is also narrow and contains buildings on both sides of the street. As with Kūwili Street, Sumner Street does not connect to Dillingham Boulevard. An alignment on Sumner Street that connects to northbound Nimitz Highway would have greater right-of-way impacts than a Kūwili Street alignment and would require demolition of four fairly large buildings and the renovation of three additional buildings. A Sumner Street alignment that connects to the southbound lanes of Nimitz Highway would have fewer impacts but would still require demolition of a fairly large building and the renovation of four additional buildings. The Chinatown Station would need to be relocated farther Koko Head with this alignment to a location that would displace contributing properties to the Chinatown Historic District. Similarly, this alternative would cause even more severe economic impacts given the greater number of property takings.

The alignments for both the Kūwili Street and the Sumner Street alternatives have closely spaced horizontal curves that would preclude construction of Iwilei Station. If the alignment were straightened to provide sufficient tangent for a station, then the right-of-way impacts (economic impacts) would be even greater. With either alternative, the location of the station would be at least 400 feet farther from where most walking patrons would originate (the mauka side of King Street). The bus interface would also be more cumbersome and would add an addition 3 to 5 minutes of travel time to each bus route to access this station. The increased distance from where pedestrians would access the station in addition to the longer bus route will discourage ridership at this station. For all of the reasons noted above, these alternatives would not meet the Project's stated Purpose and Need of improving transit mobility and access to transit.

The alternatives evaluated for this section of the Project cannot avoid other Section 4(f) resources. Therefore, there is no avoidance alternative.

O`ahu Railway & Land Company Terminal Building and Office/Document Storage Building Summary

As described above, there are no prudent alternatives to the alignment location through the OR&L property. The alternatives would require acquisition of additional right-of-way and result in unacceptable operational changes associated with moving and/or eliminating stations. Each of the factors described above under the rest of the Dillingham Boulevard properties is sufficient to establish that the alternatives considered are not prudent. However, even if the factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize disturbance of historic properties. Since the Project is located on an existing access easement through the OR&L property, the Terminal and Office/Storage Buildings will not be physically altered. The Project was designed to minimize its footprint on the property by reducing column size and maximizing column spacing.

A draft PA has been prepared in accordance with Section 106 with detailed stipulations that mitigate adverse effects from the Project on historic properties. After review of alternative measures to minimize harm, the project alignment through the OR&L property includes all possible planning to minimize harm.

O`ahu Railway & Land Company Basalt Paving Blocks and Former Filling Station (De minimis Impact)

Description and Significance of Property

The former filling station on the OR&L property is a one-story, flat-roofed masonry building constructed in 1940. It is set back from North King Street, just Koko Head of the Document Storage Building. It is significant for its association with the development of the ʻAʻala neighborhood. Although it is on the OR&L property, it is not believed to be related to the other OR&L buildings and is not part of that historic complex (Figure 5-20).

The historic basalt paving stones are set within Iwilei Road at the makai edge of the OR&L property boundary. They date from 1914 and represent a rare example of extant basalt street paving remaining in situ on Oʻahu. The paving stones are historically significant for their association with roadway infrastructure development in the early 20th century (Criterion A), the distinctive method of using basalt in road construction in Honolulu (Criterion C), and as a rare source of information on the technology of street paving in early Honolulu (Criterion D) (Figure 5-21).

Figure 5-20 O`ahu Railway & Land Company Former Filling Station

Figure 5-21 O`ahu Railway & Land Company Basalt Paving Blocks

Section 4(f) Evaluation

The Project includes construction of an elevated guideway on a planned access easement through this large OR&L parcel as it extends from Dillingham Boulevard to Nimitz Highway (Figure 5-19). While the Project will require the permanent incorporation of 0.75 acre of the site for columns and easement, these two properties will not be affected by this acquisition, given their distance and non-relation to this portion of the property and because the alignment will completely span and not touch the basalt paving blocks. Section 106 consultation determined that the Project will have no adverse effect on these historic properties. Therefore, while there will be a direct use, the impact will be *de minimis* and development of avoidance alternatives is not required.

Chinatown Historic District (Direct Use)

Description and Significance of Property

This 36-acre historic district was listed on the NRHP on January 17, 1973. Its boundaries run in a line 50 feet ʻEwa of Nuʻuanu Stream, along the mauka side of Beretania Street, 50 feet Koko Head of Nuʻuanu Avenue, and extend into the waters of Honolulu Harbor 50 feet makai of the longest pier. The makai boundary of the district expresses the importance of Chinatown's connection with the harbor and its historic ties to the waterfront, a factor of great importance in its origin and evolution. It is recognized as a place of cultural importance to the City's Asian community since the early 20th century, which retains its distinctive cultural surroundings and architectural character (Figure 5-22).

Figure 5-22 Chinatown Historic District

Section 4(f) Evaluation

The Project includes construction of an elevated guideway within a reconstructed median on Nimitz Highway and a station Koko Head of Nuʻuanu Stream at the ʻEwa edge of the district. The station entrance will touch down in a parking lot that is on a parcel containing properties that are contributing elements to the Chinatown Historic District associated with the non-historic Chinatown Marketplace. The Project will require acquisition of 0.3 acre, which will result in a direct use.

The Chinatown Station is set in the least sensitive location on the ʻEwa edge of the district, beside non-contributing modern buildings in a parking lot. The 30- to 42-foot-high guideway will pass between contributing pier buildings along the waterfront (Figure 5-23) and the harbor. The primary view of these structures is from a ground-level perspective from the mauka side of Nimitz Highway, three lanes removed from the structures. Thus, the guideway and station will be behind and above the viewer and will not block or obstruct primary views of any architecturally significant buildings or substantially impair the characteristics of its National Register eligibility. Predicted noise levels do not exceed FTA criteria.

The district's NRHP eligibility includes the relationship between the district's elements, including architecture, and Honolulu Harbor within the district. The Project will not substantially impair the physical connection to the waterfront. The Project will be a dominant visual element that contrasts in scale with the pedestrian environment and substantially changes makai views of Honolulu Harbor from Chinatown.

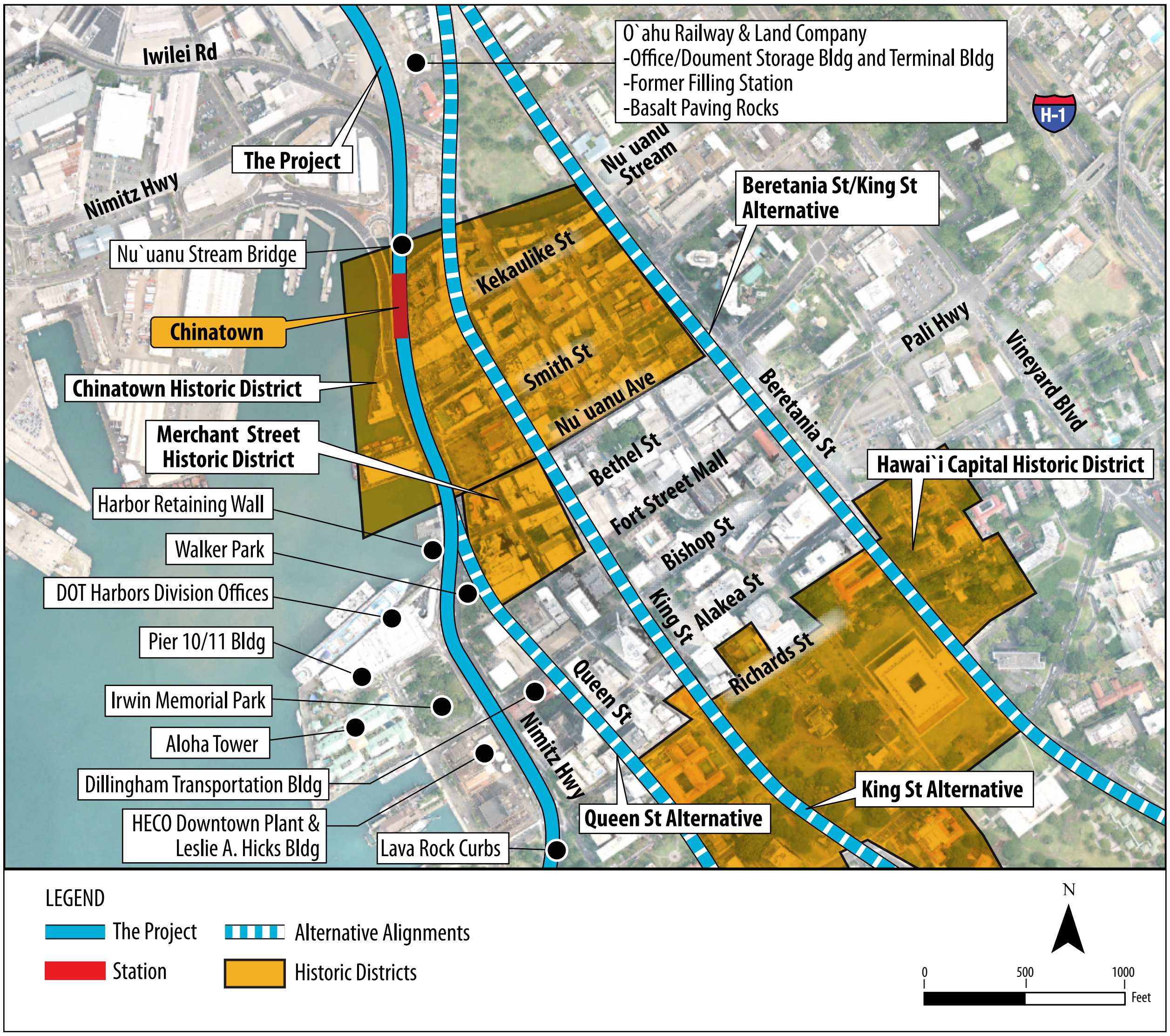

Figure 5-23 Chinatown/Downtown Area Alternatives

Avoidance Alternatives, Minimization of Harm, and Mitigation

As described above, there are no prudent or feasible avoidance alternatives to the Nimitz Highway alignment that passes through the edge of the Chinatown Historic District. The only alternatives that would completely avoid the Chinatown Historic District would be the Downtown area tunnel alternatives (Figure 5-24). A tunnel would increase the cost of the Project by more than $650 million (2006 dollars), which is beyond the funding provided in the financial plan. Therefore, this would not be considered a prudent alternative as defined under 23 CFR 774.17, as it would result in additional construction cost of an extraordinary magnitude.

Chinatown Historic District Summary

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize potential use of the Chinatown Historic District. The guideway will follow Nimitz Highway along the makai edge of Chinatown, and a station entrance will be placed on a parking lot on the edge of the historic district. The public, including the Section 106 consulting

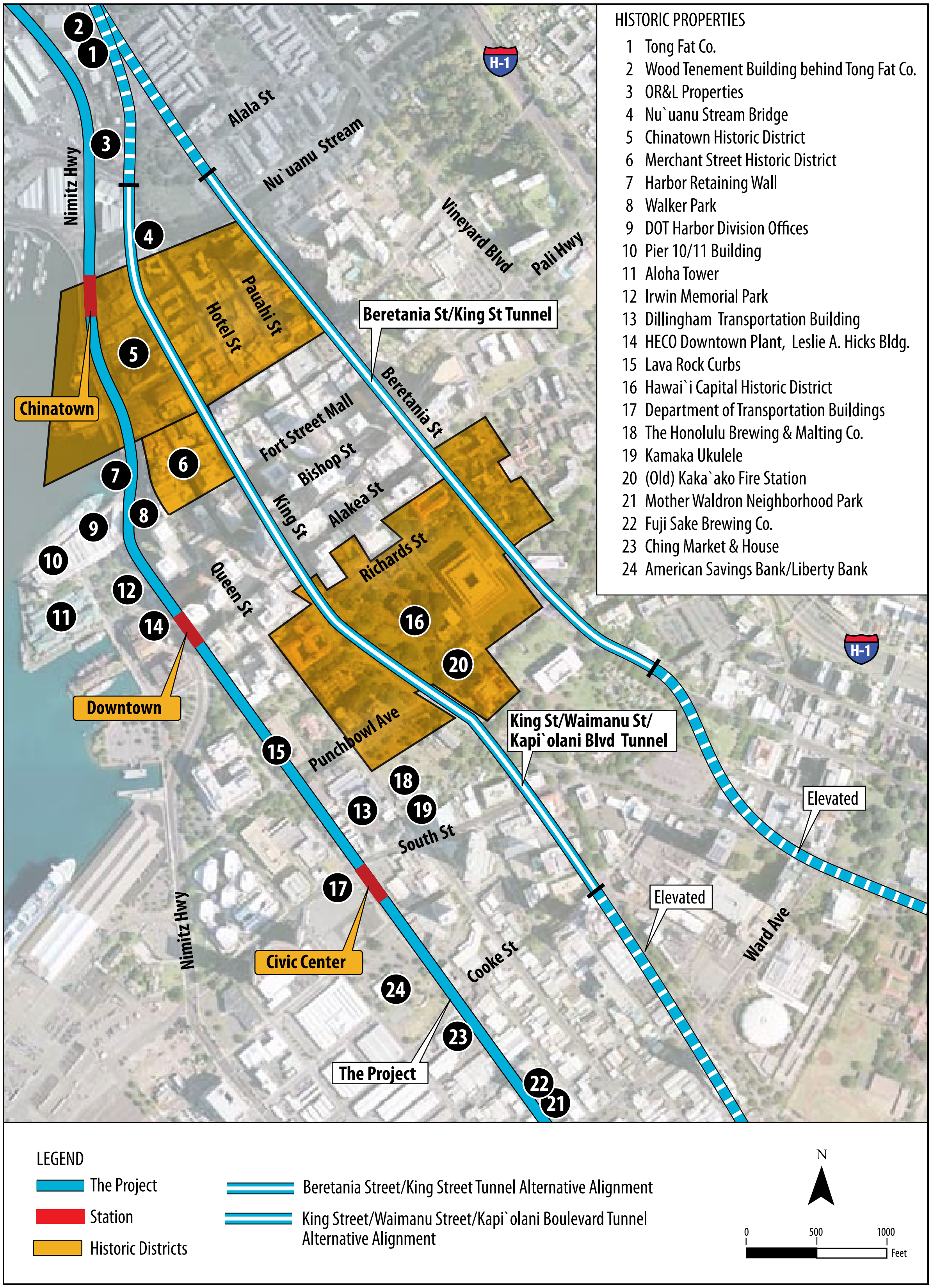

Figure 5-24 Downtown Area Tunnel Alternatives

parties, will be offered the opportunity to provide comments on station design at neighborhood design workshops during the Final Design process.

A draft PA has been prepared in accordance with Section 106, with detailed stipulations that mitigate adverse effects from the Project on cultural properties. Specific measures are outlined related to station design proposed within, or adjacent to, the boundaries of properties eligible for or listed on the NRHP, such as this property. The City will consider *The Secretary of Interior's Standards for the Treatment of Historic Properties* (USDOI 1995) in developing these designs, and the Section 106 consulting parties will be provided with the opportunity to comment on the design plans for stations. After review of alternative measures to minimize harm, the project alignment through the Chinatown Historic District property includes all possible planning to minimize harm.

Dillingham Transportation Building (Direct Use)

Description and Significance of Property

This monumental four-story Italian Renaissance Revival-style building was constructed in 1930 when the territory was developing quickly and Bishop Street was becoming the main commercial street in Honolulu. It fronts Bishop Street the entire block between Nimitz Highway and Queen Street, one block mauka of the harbor. The NRHP-listed building is significant for its association with commercial development of the time and the Dillingham family's business empire (which included the OR&L and various agricultural and industrial ventures), as well as for its architectural design. While changes have been made to the structure, particularly on the ground floor, to create storefronts and an arcade, the building maintains much of its original integrity (Figure 5-25).

Section 4(f) Evaluation

The elevated guideway will run down Nimitz Highway, approximately 40 feet makai of the building. The Downtown Station entrance will be

Figure 5-25 Dillingham Transportation Building, looking Mauka from Nimitz Highway

sited on a modern plaza next to the Dillingham Transportation Building on the same parcel. The Downtown Station is projected to be the second highest volume station in the system and will be the only station to serve the Central Business District.

Approximately 3,000 square feet of the plaza will be used by the Project for the station entrance. This landscaped plaza is not a contributing element to the NRHP-listed building but is part of the parcel listed on the NRHP, which extends into the Nimitz Highway roadbed. The plaza is privately owned and currently used as an open space for neighboring office buildings, featuring tables, chairs, and walkways (Figure 5-26). The station entrance will be situated at the makai end of the plaza in the area where the existing fountain and trash dumpster storage area are located. It will not eliminate the open space or alter its use. The station entrance will be designed to be compatible with the use of the open space. Because the Project will permanently incorporate land from within the boundaries of a historic property into the transportation facility, it will result in a Section 4(f) use.

Avoidance Alternatives

Downtown Tunnel

The Downtown area tunnel alternative discussed for Chinatown would also avoid the Dillingham

Figure 5-26 Plaza at Planned Downtown Station Entrance; Dillingham Transportation Building on right

Transportation Building. For the reasons discussed under the Chinatown Avoidance Alternatives section, this alternative is not prudent.

Dillingham Transportation Building Alakea Street Alternative

An alternative was evaluated that moved the station Koko Head shifting the entrance to Alakea Street (Figure 5-27). To avoid the historic Dillingham Transportation Building property, two options exist for the station entrance on Alakea Street. One option would locate the entrance on the ʻEwa side of the street, adjacent to the Pacific Guardian Center. The other would place the entrance on the Koko Head side of Alakea Street, adjacent to the Harbor Square Building. Neither alternative is considered prudent for the reasons discussed below.

To accommodate a new station entrance building on either side of Alakea Street and maintain adequate sidewalk space for pedestrians and building code requirements for distance between the buildings and station entrances and features, two of the street's five traffic lanes would require removal (Figure 5-28). Narrowing Alakea Street would have a detrimental effect on traffic conditions that would affect traffic flow on Ala Moana Boulevard, as the high volume of traffic would back up trying to enter Alakea Street. This would result in an unacceptable safety and congestion problem and, therefore, is not a prudent alternative.

In addition, a station entrance adjacent to the Pacific Guardian Center on the ʻEwa side of the street would force pedestrians to walk past the entrance to the office building's 760-space garage (Figure 5-29). The 760-space garage is a busy facility for downtown commuters. This alternative would create an unsafe conflict between pedestrians and automobiles, which currently sees an average of 16 pedestrians crossing and 4 automobiles using the entrance each minute of the peak hour. A station entrance in this location would generate an additional 28 pedestrians every minute during the two-hour peak travel period, almost tripling current pedestrian activity. Moving the Pacific Guardian Center garage entrance off Alakea Street is not possible without reconstructing the high-rise building. Therefore, a station entrance adjacent to the Pacific Guardian Center is not considered prudent because of the unacceptable safety problems from pedestrian and automobile conflicts and the additional construction cost to reconstruct the building to move the parking entrance from Alakea Street.

Placing the station entrance on the Koko Head side of Alakea Street presents the same problem (Figures 5-27 and 5-28). The Harbor Square building is a residential high-rise with a parking garage below (Figure 5-30). As with the ʻEwa side of the street, a station entrance at this location would create an unsafe conflict between pedestrians and automobiles using the parking garage. The intersection of Nimitz Highway and Alakea Street carries high traffic volumes. Turning movements from Nimitz Highway are high with over 1,300 turning vehicles (450 right turns and 850 left turns) in the AM peak hour and over 1,000 (325 right turns and 700 left turns) in the PM peak hour. The high number of vehicles traveling from Nimitz Highway to Alakea Street, the narrow sidewalk, and driveway access to the parking garage create an undesirable condition

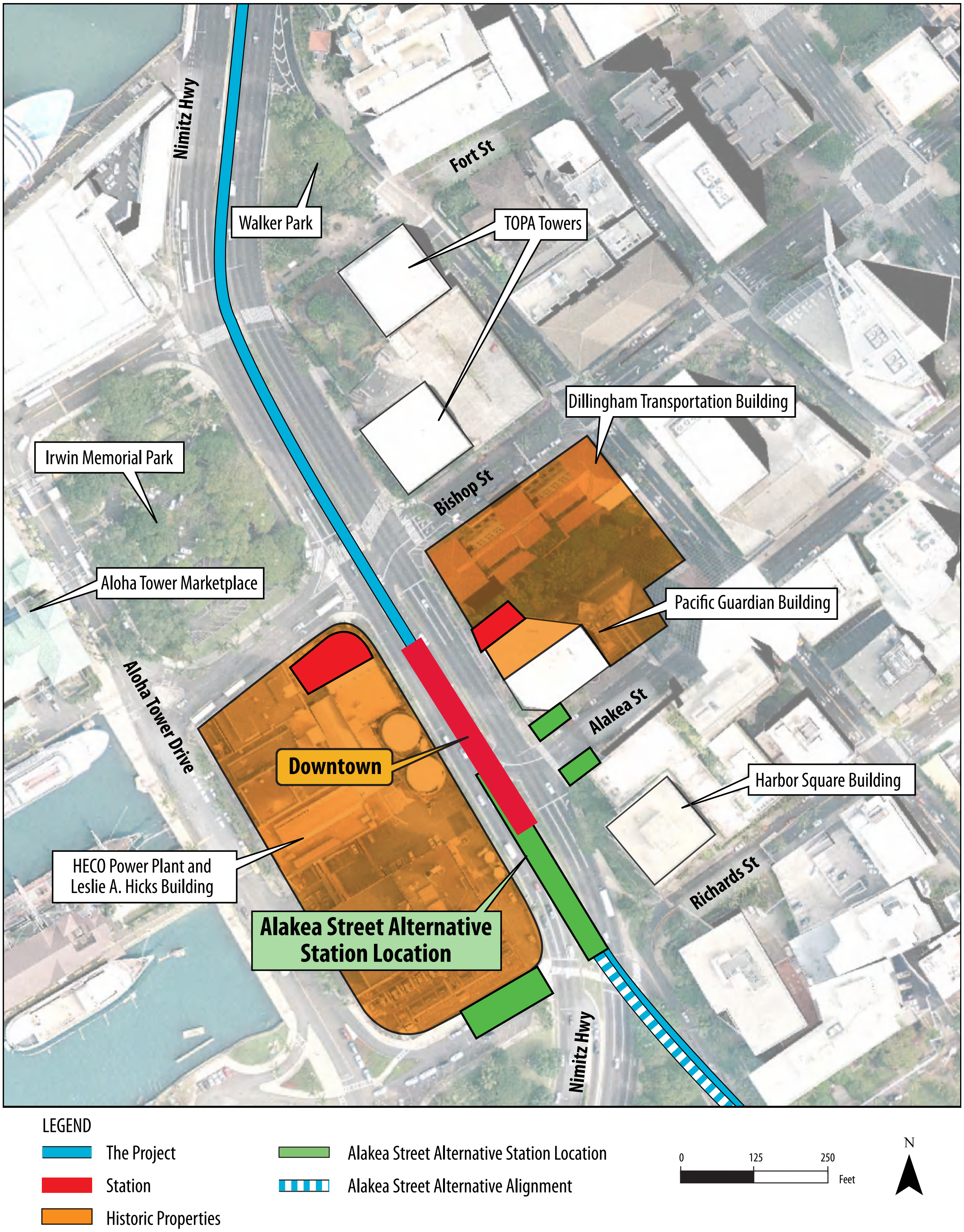

Figure 5-27 Dillingham Transportation Building, HECO Power Plant, and Leslie A. Hicks Building and Alternatives—Alakea Street Alternative Alignment

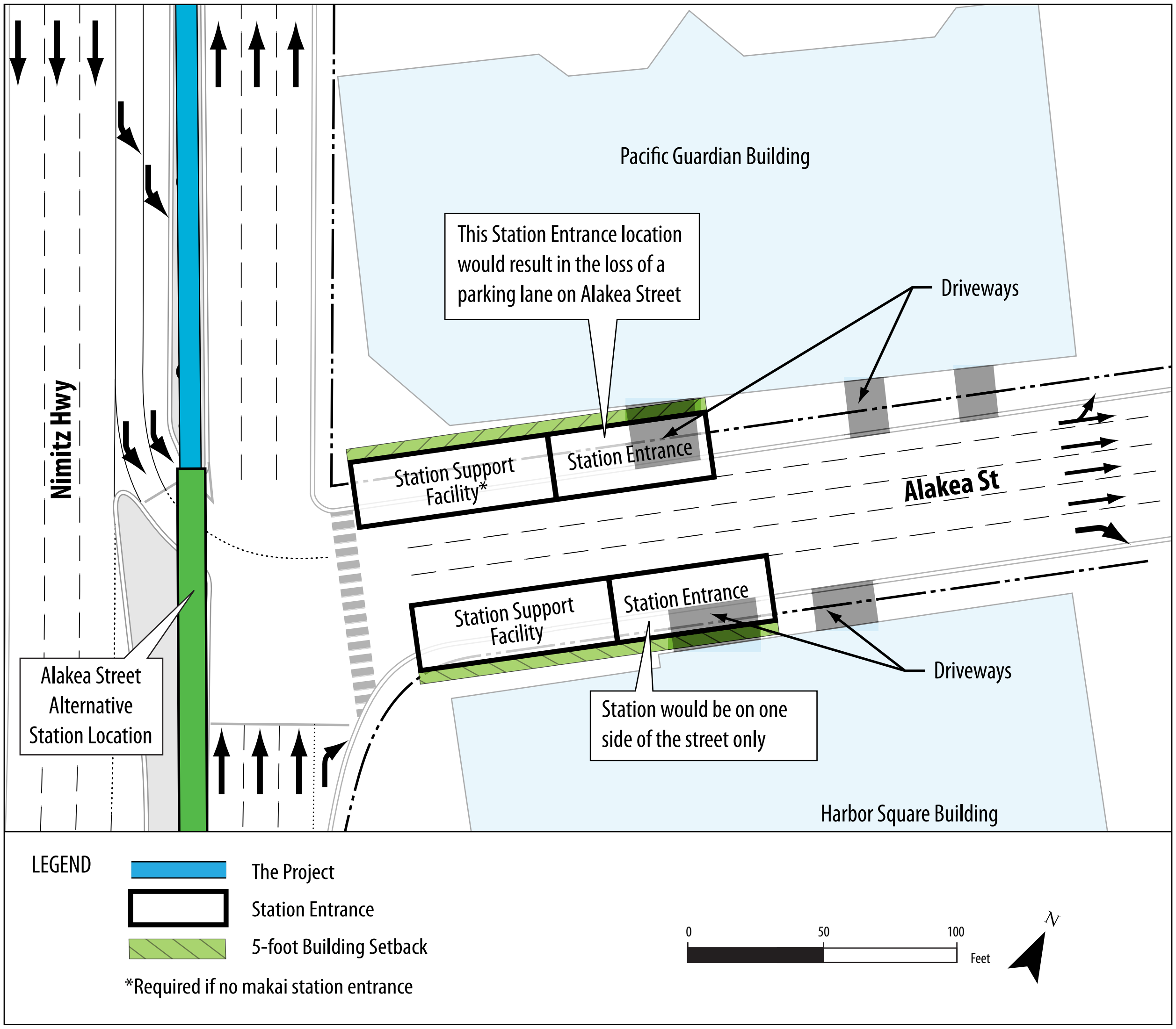

Figure 5-28 Alakea Street/Dillingham Boulevard Alternative

Figure 5-29 Entrance to Pacific Guardian Center

Figure 5-30 Parking Entrance at Harbor Square Building

for pedestrians that would be exacerbated with a station touchdown for the heavily used Downtown Station. Therefore, this option is also not prudent for the reasons discussed above for the station entrance on the ʻEwa side of Alakea Street.

If the Downtown Station were located on Alakea Street, it could be constructed with or without a makai station entrance. A makai station entrance would enable the station support features to be located on the makai side of Nimitz Highway and not next to either of the station entrances on Alakea Street. This would shorten the length of the station and its features on Alakea Street. If the station support features were located on Alakea Street on either side of the street, they would block the parking garage entrances. The construction costs associated with relocating the parking-structure entrances would result in an impact of extraordinary magnitude. In addition, the makai station entrance would place transit users farther from the primary destinations of the Waterfront and Aloha Tower Marketplace and would result in higher pedestrian traffic along Nimitz Highway, which is currently not a pedestrian-friendly environment due to the high-speed, high-volume traffic and inadequate pedestrian facilities. This location does not meet the Project's stated Purpose and Need of improving transit mobility.

Minimization of Harm and Mitigation

Several alternative alignments were considered during the Alternatives Analysis phase, one of which included Queen Street. While this alternative would avoid this historic property, it was determined that it would also result in a direct use of properties within the Hawaiʻi Capital Historic District, including the Post Office, Aliʻiōlani Hale, and Hale Auhau. It would also result in a direct use of three properties on the NRHP along Queen Street (the C. Brewer, Alexander and Baldwin, and Royal Brewery Buildings). Therefore, it does not represent a prudent Section 4(f) avoidance alternative because it does not avoid using other Section 4(f) properties.

Dillingham Transportation Building Fort Street Alternative

An alternative was considered that would move the station ʻEwa to Fort Street (Figure 5-31). Under this alternative, the station entrances would be located in Irwin Memorial Park on the makai side and either Walker Park or the Fort Street Mall on the mauka side. This station location would require a 250-foot-curve radius to maintain a minimum distance between the edge of the station platform and the end of the horizontal curve. A 250-foot-curve radius is substantially less than the Project's design criteria of a minimum of 500 feet. Such a tight radius would necessitate reducing speeds to 5 to 10 miles per hour, which is substantially below the Project's minimum design speed of 30 miles per hour. This would result in increased travel time and noise. Additionally, placing an entrance makai of Nimitz Highway would impact Irwin Memorial Park, a Section 4(f) property, and a mauka entrance would block either the Fort Street Mall or Walker Park, other Section 4(f) properties.

Each of the factors described above is sufficient to establish that the alternatives considered are not prudent. However, even if the factors were individually minor, cumulatively they cause unique problems and impacts of extraordinary magnitude.

Dillingham Transportation Building Summary

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize the need for removal of any historic buildings. The station has been placed Koko Head of the Dillingham Transportation Building façade to minimize the guideway structure in front of the building. As a result, the Project will not physically alter the building. A draft PA, in accordance with Section 106, has been prepared that details mitigation measures. The City will research, photograph, and record the history of this property. After review of alternative measures

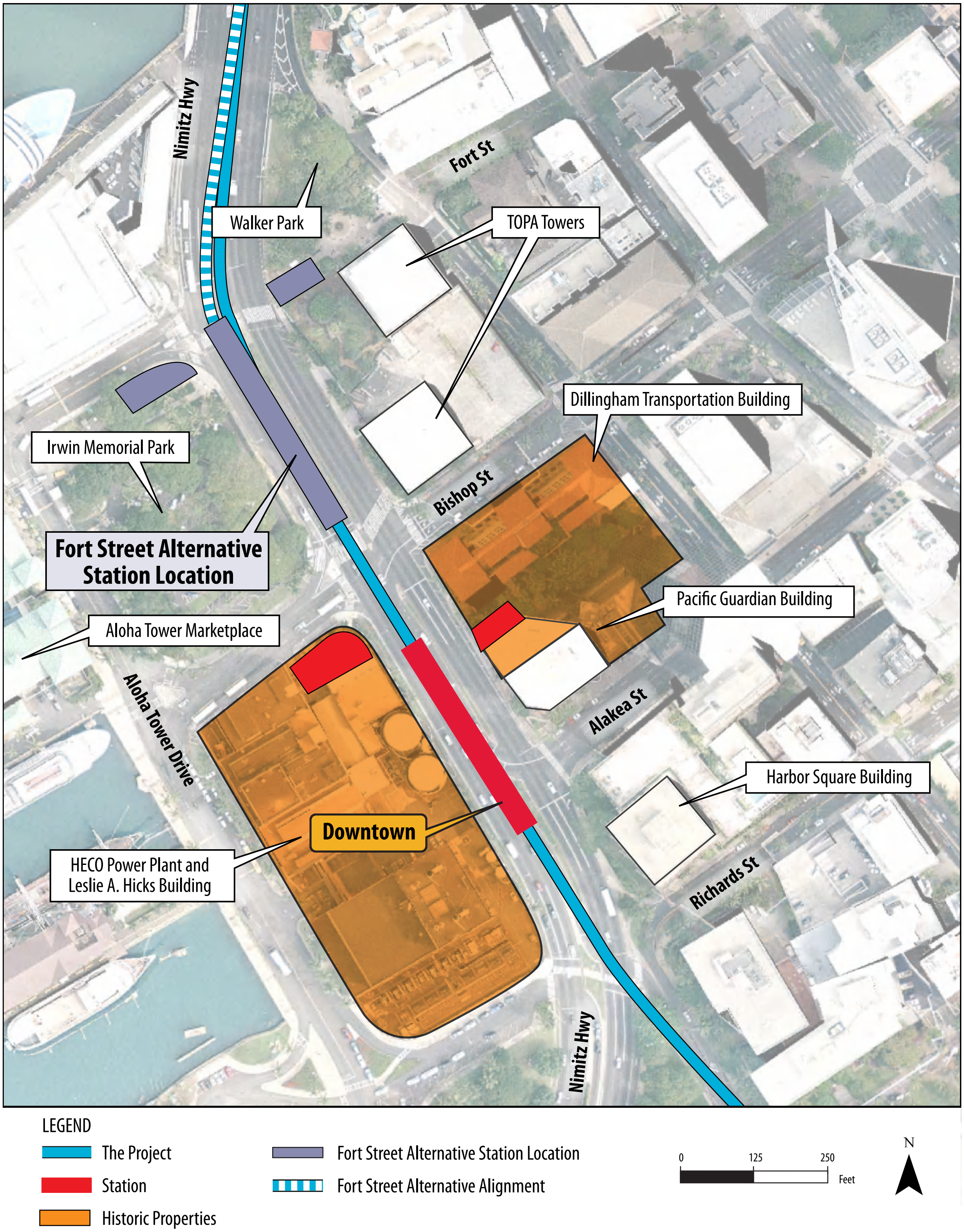

Figure 5-31 Dillingham Transportation Building, HECO Power Plant, and Leslie A. Hicks Building Alternatives—Fort Street Alternative Alignment

to minimize harm, the project alignment through the Dillingham Transportation Building property includes all possible planning to minimize harm.

HECO Downtown Plant and Leslie A. Hicks Building (Direct Use)

Description and Significance of Property

This two-building property is eligible for nomination to the NRHP under Criterion A for its association with the history of electric power in Honolulu. The power plants built in 1929 (designed by Dwight P. Robinson Co. of New York) and 1955 (designed by Merrill, Simms & Roehrig of Honolulu) are important for their associations with the history of electric power generation and the development of Honolulu (Figure 5-32).

Figure 5-32 HECO Downtown Plant and Leslie A. Hicks Building

Section 4(f) Evaluation

Associated features of the transit station, including an at-grade-level entry, escalator, and elevator shaft, as well as electrical, mechanical, and security components, will be located immediately mauka of and in the location of a small addition to the 1929 building at its ʻEwa/mauka corner and within its NRHP boundary. These features require that approximately 7,900 square feet of area within the NRHP boundary be acquired and that the metal roof of this extension be demolished. This extension is not a contributing element that makes this property eligible for the NRHP; however, it is a use of land from a Section 4(f) property and, therefore, evaluation of avoidance alternatives is required.

Avoidance, Minimization of Harm, and Mitigation

The Downtown Station entrance and support features were designed to be located on the HECO property to minimize harm to the Dillingham Transportation Building. The station support features were located on the HECO property because the relative value of the HECO property in the area where the station entrance and support features will be located is not as valuable as the area next to the Dillingham Transportation Building with regard to preservation of historic resources. Therefore, with the current location of the Downtown Station, it is not prudent to avoid the HECO property.

The same avoidance alternatives described for the Dillingham Transportation Building to shift the station entrances to Fort Street or Alakea Street would apply to this property as well (Figure 5-31).

HECO Downtown Plant Summary

Throughout the planning and design of the Project, the guideway has been designed to be as narrow as possible to minimize the need for removal of any historic buildings. The station entrance and other station components have been placed ʻEwa of the historic power plant building near Bishop Street and require only demolition of an extension to the building (HECO Downtown Plant and Leslie A. Hicks Building). This location will also avoid the use of Irwin Memorial Park (a recreational property and a historic property).

In accordance with Section 106, a draft PA has been prepared that details a variety of stipulations that must be followed to mitigate projected adverse effects on historic properties. One of these stipulations is the preparation of historic context studies, including the history of Honolulu's infrastructure, which would likely include the history of power generation and document this historic property.

Other types of measures to mitigate or minimize harm are described in Section 5.5.2 under Agency Coordination and Consultation. After review of alternative measures to minimize harm, the project alignment on HECO property includes all possible planning to minimize harm.

5.6 Evaluation of Constructive Use of Section 4(f) Properties

23 CFR 774.15(a) states that "A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the Project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished."

NRHP eligibility criteria discussed in this Chapter refer to 36 CFR 60.4. The *National Historic Preservation Act* (NHPA) is an entirely separate statute from Section 4(f) with its own implementing regulation promulgated by another Federal agency. Therefore, a finding of "adverse effect" under Section 106 of the NHPA does not automatically equate to constructive use under Section 4(f). Moreover, an adverse effect finding does not create a presumption of constructive use.

The FHWA Section 4(f) Policy Paper states: "If a project does not physically take (permanently incorporate) historic property but causes an adverse effect, one must assess the proximity impacts of the Project in terms of the potential for 'constructive use.' This analysis must determine if the proximity impact(s) will substantially impair the features or attributes that contribute to the National Register eligibility of the historic site or district. If there is no substantial impairment, not withstanding an adverse effect determination, there is no constructive use and Section 4(f) requirements do not apply."

23 CFR 774.15 provides the following direction for considering constructive use: "(a) A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished."

> "(d) When a constructive use determination is made, it will be based upon the following:
>
> (1) Identification of the current activities, features, or attributes of the property which qualify for protection under Section 4(f) and which may be sensitive to proximity impacts;
>
> (2) An analysis of the proximity impacts of the proposed project on the Section 4(f) property. If any of the proximity impacts will be mitigated, only the net impact need be considered in this analysis. The analysis should also describe and consider the impacts which could reasonably be expected if the proposed project were not implemented, since such impacts should not be attributed to the proposed project; and
>
> (3) Consultation, on the foregoing identification and analysis, with the official(s) with jurisdiction over the Section 4(f) property."

The Section 4(f) regulations provide additional guidance for analyzing constructive use of historic properties under 23 CFR 774.15(e) as follows:

- The projected noise-level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a property protected by Section 4(f), such as enjoyment of a historic site where a quiet setting is a generally recognized feature or attribute of the site.

- The proximity of the proposed project substantially impairs esthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the property. Examples of substantial impairment to visual or esthetic qualities would be the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally significant historical building, or substantially detracts from the setting of a Section 4(f) property which derives its value in substantial part due to its setting.
- The Project results in a restriction of access which substantially diminishes the utility of a significant publicly owned park, recreational area, or historic site.
- The vibration impact from construction or operation of the Project substantially impairs the use of a Section 4(f) property, such as projected vibration levels that are great enough to physically damage a historic building or substantially diminish the utility of the building, unless the damage is repaired and fully restored consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (USDOI 1995), i.e., the integrity of the contributing features must be returned to a condition which is substantially similar to that which existed prior to the Project.
- The ecological intrusion of the project substantially diminishes the value of wildlife habitat in a wildlife and waterfowl refuge adjacent to the project, substantially interferes with the access to a wildlife and waterfowl refuge when such access is necessary for established wildlife migration or critical life cycle processes, or substantially reduces the wildlife use of a wildlife and waterfowl refuge.

None of the Section 4(f) properties discussed below that are within proximity to the Project were determined to have a constructive use after a constructive use evaluation was completed. As documented in Chapter 4, Environmental Analysis, Consequences, and Mitigation, of this Final EIS, the Project will not restrict access to historic properties, will have no adverse noise and vibration impacts in accordance with FTA standards, and will result in no ecological intrusions at these Section 4(f) properties. Therefore, the discussion below focuses on whether visual impacts are so severe as to substantially impair the historic value of the sites.

5.6.1 Parks and Recreational Properties

Table 5-1 lists the 12 publicly owned parks and recreational areas adjacent to the alignment considered for Section 4(f) use and identifies the current activities, features, and attributes that qualify them for protection under Section 4(f).

The Project will have a *de minimis* impact on two of these properties—Keʻehi Lagoon Beach Park and Aloha Stadium. The Pacific War Memorial Site is discussed in Section 5.5, Direct Use of Section 4(f) Properties, and evaluated for *de minimis* impacts. Two park and recreational areas (future Middle Loch Park and Pearl Harbor Bike Path) are discussed in Section 5.7, Temporary Occupancy. The remaining seven park and recreational areas are evaluated in this section for constructive use.

These park properties are located within urban or semi-urban settings where major transportation facilities or commercial/industrial developments are dominant visual features. Visual quality is not generally high, though makai views from the waterfront properties are. While setting has some importance to these properties, they do not substantially derive their value from their setting.

Because many of these properties are located within developing urban or commercial areas, it is reasonable to expect intensifying development will alter the existing visual setting of many of these properties by 2030. In particular, the HCDA's *Kakaʻako Community Development District Mauka Area Plan* (HCDA 2005) calls for redevelopment of the Kakaʻako neighborhood surrounding Mother Waldron Neighborhood Park into a mid- and high-rise mixed-use district.

West Loch Golf Course

West Loch Golf Course is a 94-acre municipal golf course located in the ʻEwa district, extending from Farrington Highway to the West Loch of Pearl Harbor (Figure 5-33). The Project will be constructed approximately 160 feet from the edge of the 18-hole golf course, in the median of Farrington Highway. Due to its distance from the Project, and topography that slopes makai, golfing activities and panoramic views from or across the golf course will not be affected. There will be no noise or vibration impacts from the Project. Therefore, the Project will not substantially impair any of the activities, features, or attributes of the property that qualify it for protection under Section 4(f) and will not result in a constructive use of the property.

Figure 5-33 West Loch Golf Course

Neal S. Blaisdell Park

Neal S. Blaisdell Park is a 26-acre park on the East Loch of Pearl Harbor, about 60 feet makai of Kamehameha Highway (Figure 5-34). It is owned by the City and features primarily passive open space and trails and unobstructed views of the harbor. The elevated guideway will be located mauka of the park, within the median of the adjacent highway. Mature trees provide a visual buffer between the mauka border of the park and the highway. The Project will not substantially impair park activities or makai views of the open lawn areas that comprise its setting. There also will be no noise or vibration impacts from the Project. Since the park is already bordered by a busy highway and its significant attributes (makai views), recreational activities, and features will not be substantially impaired, the Project will not result in a constructive use of the property.

Figure 5-34 Neal S. Blaisdell Park

`Aiea Bay State Recreation Area

ʻAiea Bay State Recreation Area is a 7.75-acre park also situated on the East Loch of Pearl Harbor, about 130 feet makai of Kamehameha Highway (Figure 5-35). It is owned by the State, under the jurisdiction of DLNR. It features primarily passive recreational activities and unobstructed views of the harbor. The park is at a lower elevation than the tree-lined highway, so park activities, such as picnicking, will be separated from the Project by topography and existing vegetation. The guideway

Figure 5-35 `Aiea Bay State Recreation Area

Figure 5-36 Walker Park

will be about 260 feet away from the picnic area. The elevated guideway will be located mauka of the park, within the median of the adjacent highway and, as a result, will not obstruct the makai views. There will be no noise or vibration impacts from the Project. Since the park is already bordered by a busy highway and its attributes (makai views), recreational activities, and features will not be substantially impaired, the Project will not result in a constructive use of the property.

Walker Park

Walker Park is a small triangular urban park located in Downtown Honolulu, about 150 feet mauka of Nimitz Highway at Fort Street (Figure 5-36). It is surrounded by high-rise buildings and the highway. The park provides shade in a busy downtown district and is primarily used by pedestrians walking through the area.

It does not derive a substantial part of its value from its visual setting. However, a fountain and seating area are at its core, and the area is surrounded by mature palm trees. The trees will soften views of the guideway and provide a visual buffer. While the elevated guideway will be located in the median of the highway makai of the park, the Project will not change the views from within the park, given its location beside the highway in Downtown's dense urban core. The Project will not substantially impair the park's features that qualify the property for protection under Section 4(f). Therefore, the Project will not result in a constructive use of this property.

Irwin Memorial Park

Irwin Memorial Park is a 2-acre park (owned by the Hawai'i Department of Transportation-Harbors Division) located south of Nimitz Highway in Downtown Honolulu (Figure 5-37). It is primarily used as a parking lot for nearby office buildings and the Aloha Tower Marketplace but also features seating and tables that are heavily used at lunchtime by workers. Parking areas comprise most of the park, with seating and tables oriented mauka-makai along the 'Ewa periphery. This area is buffered visually from the highway by mature trees. The park provides visitors with high-quality makai views toward Honolulu Harbor and

Figure 5-37 Irwin Memorial Park

the Aloha Tower. The elevated guideway will be located within the median of the adjacent highway, which is about 70 feet makai of the park and about 200 feet mauka of the park's main seating area. As as a result, the excellent makai views will not be obstructed (Figure 5-38). There will be no noise or vibration impacts from the Project. Views mauka toward the office buildings will be partially obstructed by the guideway, although these are not particularly sensitive. Since the park is already bordered by the busy highway and its attributes (makai views), activities, and features will not be substantially impaired, the Project will not result in a constructive use of the property.

Mother Waldron Neighborhood Park

Mother Waldron Neighborhood Park is in a mixed commercial and industrial area and not a residential neighborhood, as its name implies. The park is surrounded by vacant lots, warehouses, commercial buildings, and an apartment building. It does not derive a substantial part of its value from its visual setting (Figure 5-39). The guideway will be about 20 feet makai of the park, about 70 feet from the playground, and about 290 feet from the volleyball court. The Project will not substantially impair any visual or aesthetic features that contribute to the park's use and enjoyment. Therefore, the Project will not result in a constructive use of this property.

Queen Street Park

The HCDA has set aside public funding for a new 2-acre park on the Queen Street extension near the Kaka'ako Station. It is planned as a passive recreational area with a children's playground and other amenities, on both the mauka and makai sides of the street (Figure 5-40). The elevated guideway

Figure 5-38 Nimitz Highway/Fort Street Intersection `Ewa of Irwin Memorial Park and Aloha Tower Marketplace, looking Koko Head

Figure 5-39 Halekauwila Street/Cooke Street Intersection, looking Mauka past Mother Waldron Neighborhood Park

Figure 5-40 Future Queen Street Park Site

will be constructed in the median of Queen Street about 30 feet from the park's boundaries. While the guideway will be located in Queen Street, the Project will have nominal impact on views from this property given its location in the urban area of Kaka'ako, which includes an array of multistory buildings, commerical signage, and overhead utility lines. The Project will not substantially impair the park's features that qualify the property for protection under Section 4(f). Therefore, the Project will not result in a constructive use of this property.

5.6.2 Historic Section 4(f) Properties

This section evaluates historic sites on or eligible for inclusion on the National Register near the Project for potential treatment as a constructive use under Section 4(f). As noted above, the FHWA Section 4(f) Policy Paper states constructive use of an historic site occurs when "the proximity impact(s) will substantially impair the features or attributes that contribute to the National Register eligibility of the historic site or district." Eligibility for the National Register is based on specific criteria, and not every proximity effect substantially impairs these feature and attributes. Near proximity to a resource is not enough for a constructive use to be present; there must be a showing that any protected land or resources will be substantially impaired as a result of the Project. For example, several bridges discussed below are eligible for the National Register based on their long association with Farrington Highway and their structural features. While the Project would alter views from these bridges and may also change their surroundings to some extent, the association with Farrington Highway and the structural features of the bridges are not affected by the Project. Thus, while there are environmental impacts, which are described in Chapter 4, and to a more limited extent here, these impacts do not result in a constructive use. Because impacts resulting in constructive use must be both "substantial" and focused on "impairing" a specific set of features or attributes, the FHWA Section 4(f) Policy Paper notes that constructive uses are rare and different from generalized environmental impacts.

Honouliuli Stream Bridge

This bridge was built in 1939 to carry Farrington Highway across Honouliuli Stream, thereby improving transportation for the entire Leeward community. It is a single-span, reinforced-concrete T-beam structure with a span length of 54 feet and a width of 32 feet (Thompson 1983). It stands about 10 feet above the stream bed (Figure 5-41).

Under Section 106 of the NHPA, the decorative railings, with elongated Greek-cross voids, are typical of the period and qualify the bridge as eligible under Criterion C. This bridge is also eligible for the NRHP under Criterion A because

Figure 5-41 Honouliuli Stream Bridge

of its association with construction of Farrington Highway, which straightened this part of Wai'anae Road and provided a new transportation corridor through Waipahu. The current activities, features, or attributes of the bridge that qualify for protection under Section 4(f) are its design elements and historic association.

The Project entails the construction of an elevated guideway mauka and about 40 feet above the existing bridge. The guideway support columns will be on each side of the stream.

The elevated guideway will not eliminate primary views of the architectural features of this historic bridge nor alter its relationship to the existing transportation corridor. Farrington Highway is a major transportation corridor, and the Project's visual elements will be in character with the surrounding area.

The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the bridge's relationship to the existing transportation corridor or views of its design elements, which are the features and attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Waikele Stream Bridge Eastbound Span and Bridge over OR&L Spur

This pair of vehicular bridges is a good example of a late 1930s continuous deck girder bridge design. The span's relatively long length indicates the importance of this transportation link in the circle-island main road system (Figure 5-42).

The Waikele Stream Bridge is eligible for nomination to the NRHP under Criterion A, for its association with the development of the Waipahu community and the transportation history of the

Figure 5-42 Waikele Stream Bridge, Koko Head Span

area and Criterion C for its design. The current activities, features, or attributes of the property that qualify for protection under Section 4(f) are its design elements and historic association.

The Project entails the construction of an elevated guideway along Farrington Highway, which is between the two bridges and in the median area 10 feet mauka of the Koko Head-bound span. It will be approximately 40 feet above the roadway, and there will be no use of the bridges.

The elevated guideway will not eliminate primary views of the design elements or alter their relationship to the existing transportation corridor. Farrington Highway is a major transportation corridor, and the Project's visual elements will be in character with the surrounding area.

The bridge is eligible for inclusion in the NRHP for its design elements and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Waiawa Stream Bridge 1932 (westbound lanes)

This bridge was built during a road straightening project that replaced an earlier road segment and smaller bridge across Waiawa Stream. The Waiawa

Stream Bridge is considered eligible for nomination to the NRHP for its association with the history of transportation in the area (Criterion A). The bridge is also an example of concrete bridge engineering and design in Hawai'i, designed by Merritt A. Trease (Criterion C). The current activities, features, or attributes of the property that qualify it for protection under Section 4(f) are its historic associations and design (Figure 5-43).

Figure 5-43 Waiawa Stream Bridge

The Project entails the construction of an elevated guideway and station (Pearl Highlands) about 20 feet mauka and 65 feet above the Koko Head bridge approach.

The elevated guideway will not eliminate primary views of the bridge's design elements nor alter its relationship to the existing transportation corridor since Farrington Highway is a major transportation corridor and the Project's visual elements will be in character with the surrounding area. Appearances of the bridge design elements will not be substantially impaired.

The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Waimalu Stream Bridge

The Waimalu Stream Bridge (originally built in 1936 and modified in 1945) is considered eligible for nomination to the NRHP for its association with the roadway infrastructure development of Kamehameha Highway in the Pearl City and 'Aiea areas (Criterion A). Kamehameha Highway is a six-lane highway in this location and has been a major transportation route through the area since the early 20th century. The crossing was integral to the development of this transportation route and has contributed to the development of the area. It also is representative of important public works projects initiated by the Territorial and State governments. The current activities, features, or attributes of the bridge that qualify it for protection under Section 4(f) are its historic associations (Figure 5-44).

The Project entails the construction of an elevated guideway in the median of Kamehameha Highway over Waimalu Stream, whose supports would be placed on both sides of the bridge approaches, not within the bridge structure. The guideway will be approximately 30 feet above the bridge and overhang portions of each interior lane.

The elevated guideway will not eliminate primary views of the bridge nor alter its relationship to the existing transportation corridor. Farrington Highway is a major transportation corridor and the Project's visual elements will be in character with the surrounding area.

Figure 5-44 Waimalu Stream Bridge

The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Kalauao Springs Bridge

The Kalauao Springs Bridge is considered eligible for nomination to the NRHP for its association with the roadway infrastructure development of Kamehameha Highway in the Pearl City and ʻAiea areas (Criterion A). Kamehameha Highway has been a major transportation route through the area since the early 20th century. This crossing at Kalauao Springs was integral to developing the highway as an effective transportation route and has contributed to the development of this area. It is representative of important public works projects initiated by the Territorial and State governments. The current activities, features, or attributes of the bridge that qualify for protection under Section 4(f) are its historic associations (Figure 5-45).

The Project entails the construction of an elevated guideway in the median of Kamehameha Highway whose supports will be beyond each side of the stream and not within the bridge structure. The guideway will be approximately 30 feet above the bridge. The area is surrounded by shopping malls and other urban development.

Figure 5-45 Kalauao Springs Bridge

The elevated guideway will not eliminate primary views of this bridge nor alter its relationship to the existing transportation corridor.

Kamehameha Highway is a major transportation corridor, and the Project's visual elements will be in character with the surrounding area.

The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930's. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Kalauao Stream Bridge

The Kalauao Stream Bridge is considered eligible for nomination to the NRHP for its association with the roadway infrastructure development of Kamehameha Highway in the Pearl City and ʻAiea area (Criterion A). Kamehameha Highway has been a major transportation route through the area since the early 20th century. This crossing at Kalauao Stream was integral to developing the highway as an effective transportation route and has contributed to the development of this area. It is representative of important public works projects initiated by the Territorial and State governments. The current activities, features, or attributes of the bridge that qualify for protection under Section 4(f) are its historic association (Figure 5-46).

Figure 5-46 Kalauao Stream Bridge

The Project entails the construction of an elevated guideway in the median of Kamehameha Highway whose supports will be beyond each side of the stream and not within the bridge structure. The guideway will be approximately 30 feet above the bridge. The area is surrounded by shopping malls and other urban development.

The elevated guideway will not alter its relationship to the existing transportation corridor.

Farrington Highway is a major transportation corridor, and the Project's visual elements will be in character with the surrounding area. The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

United States Naval Base Pearl Harbor National Historic Landmark

The U.S. Naval Base Pearl Harbor NHL was listed in the NRHP in 1974 (with boundaries accepted in 1978) and designated as an NHL in 1964. This property includes the USS Arizona Memorial and the USS Bowfin. Portions of Pearl Harbor were designated as part of the World War II Valor in the Pacific National Monument in 2008. These designations attest to Pearl Harbor's national significance, its critical support of the U.S. Navy fleet, and establishment of the United States as a major power in the Pacific (Figure 5-47).

Figure 5-47 U.S. Naval Base Pearl Harbor National Historic Landmark

The NRHP Inventory–Nomination Form for the U.S. Naval Base Pearl Harbor NHL defines the boundary of the national historic landmark. The boundaries of the landmark include those water and land areas historically, intimately, and directly associated with the property's use as a historic naval base, with mission to support the U.S. fleet, and the attack on December 7, 1941. The boundary excludes much of the land areas added during World War II. Portions of land areas added during World War II are now being diverted piecemeal to civilian or non-governmental uses, but all or parts of these land areas may lie within the setting of the landmark. All of the water areas of Pearl Harbor are included within the boundaries along with certain adjacent lands.

The Project will be located on Kamehameha Highway, which is adjacent to the U.S. Naval Base Pearl Harbor NHL. The Pearl Harbor NHL is primarily in and surrounding the South Channel area of Pearl Harbor. The guideway will be a minimum of 30 feet from the mauka edge of the property's boundary. The entrances to the elevated Aloha Stadium Station and the Pearl Harbor Naval Base Station (Figure 5-48) were designed to touch down on the mauka side of the highway to avoid taking any of the Pearl Harbor NHL property.

At the request of NPS, additional noise analyses were conducted and visual simulations were created for the Pearl Harbor sites to further clarify potential impacts from the Project. The noise analysis found that there would be no adverse noise impacts at the World War II Valor in the Pacific National Monument, per FTA impact criteria (see Section 4.10 for more information). The visual

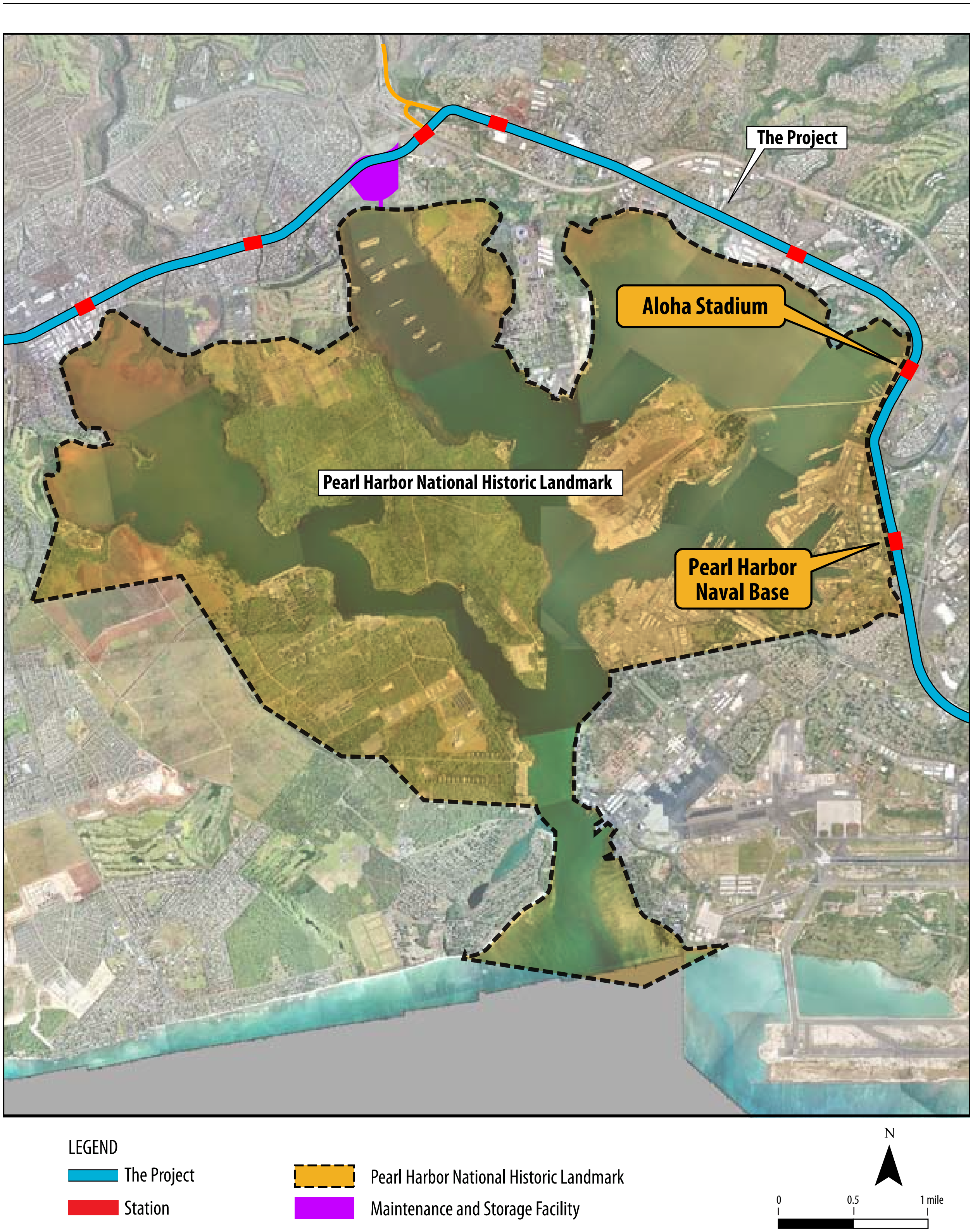

Figure 5-48 U.S. Naval Base Pearl Harbor National Historic Landmark—Project and Features

simulations illustrated that the Project will be barely visible in mauka views from the harbor (Section 4.8, Visual and Aesthetic Conditions). As a result, the Project will not adversely affect Pearl Harbor NHL's visual integrity.

In addition, the elevated guideway will not eliminate primary views of this historic district nor alter its relationship to the water since the guideway and stations will be on the mauka side of the busy highway. This analysis addresses Pearl Harbor NHL as a whole and any buildings individually listed on or eligible for inclusion in the NRHP. The Project will not substantially impair the visual and aesthetic qualities of the Pearl Harbor NHL property that qualify it for protection under Section 4(f). As a result, there will be no constructive use of this property.

CINCPACFLT Headquarters National Historic Landmark

The Commander-in-Chief of the Pacific Fleet (CINCPACFLT) Headquarters was built in 1942 on Makalapa Hill (mauka of the potential Makalapa Navy Housing Historic District). Originally constructed of reinforced concrete, a third story was added in 1945. The building is individually listed in the NRHP, although the NRHP documentation does not address eligibility criteria. It is also individually designated as an NHL. The features and attributes of this property that qualify for protection under Section 4(f) are assumed to be its historic association with the nearby Pearl Harbor Naval Base.

The elevated guideway will be approximately 650 feet makai from the building and approximately 40 to 45 feet above grade. Due to topography and vegetation, the Project will be minimally visible from select vantage points from within the property boundary. The historic setting of the property consists of its immediate surroundings, which include the drive from Kamehameha Highway (which is not part of the NHL) and the surrounding plantings. The rather dense vegetation will screen the Project from the CINCPACFLT Headquarters.

The elevated guideway will be a substantial distance away, the Project will not eliminate primary views of this historically significant building. The building is eligible for inclusion in the NRHP for its association with the development of Pearl Harbor Naval Base. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Potential Makalapa Navy Housing Historic District

In 1939, the Navy purchased the Makalapa Crater land and designated the site for officers' quarters, complete with recreational facilities overlooking the naval base. Most of the 89 houses were completed in 1941 and constructed of prefabricated units. Admiral Chester Nimitz lived at 37 Makalapa Drive, which is at the highest point of the crater rim. He and the other officers were within walking distance of the CINCPACFLT administration buildings (Figure 5-49).

This housing area is significant under several National Register criteria—under Criterion A for its association with the build up of officers' housing

Figure 5-49 Potential Makalapa Navy Housing Historic District

just prior to World War II; under Criterion B for its association with Admiral Chester Nimitz, CINCPACFLT, who lived in the neighborhood for most of the war; and under Criterion C, both for its association with the firm of master architect C.W. Dickey, designer of the houses and the neighborhood, and as an example of military residential planning in Hawaiʻi, which followed the "Garden City" concept prevalent at the time. This district is eligible for nomination to the NRHP under Criteria A, B, and C. The current activities, features, or attributes of the property that qualify for protection under Section 4(f) are its architectural elements and historic associations.

This analysis addresses the potential district as a whole and any buildings individually listed in or eligible for inclusion in the NRHP.

The Project entails the construction of an elevated guideway along the median of the multiple-lane Kamehameha Highway approximately 10 to 25 feet makai from the district. The elevated guideway will be approximately 30 to 45 feet above grade, and the Pearl Harbor Naval Base Station will be located at the intersection of the highway with Radford Drive. The station entrance will be approximately 25 feet Koko Head from the district boundary on the mauka side of the highway.

The elevated guideway will not substantially affect primary views of this architectural features complex. The property is eligible for inclusion in the NRHP for its design and its historic association.

The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Ossipoff's Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society, Facility 1514

Facility 1514 was built in 1975 and is constructed of split concrete and brick. It is an excellent example of architect Vladimir Ossipoff's modern architecture. It consists of three roughly rectangular single-story sections, two of which include courtyards. These sections have flat roofs except for the northernmost portion of their roofs where two sections incorporate a row of 12 barrel vaults that are visible from Kamehameha Highway and Radford Drive. The six northernmost vaults cover the Aloha Jewish Chapel, which is believed to be the first chapel built on a military base specifically as a Jewish place of worship. The flat-roofed southern section houses the Navy-Marine Corps Relief Society, which shares the second courtyard with the clinic (Figure 5-50).

Figure 5-50 Ossipoff's Aloha Chapel

The building is a landmark at Makalapa Gate. Although this building is less than 50 years old, it meets National Register Criteria Consideration G (Sherfy 1998) for properties of exceptional importance built within the last 50 years. The current activities, features, or attributes of the property that qualify for protection under Section 4(f) are its architectural elements and associations with Vladimir Ossipoff.

The Project entails construction of an elevated guideway in the median of Kamehameha Highway. The guideway will be approximately 100 feet makai from the structure (approximately 45 feet above grade), and the station will be about 40 feet away (on the mauka side of the highway). Facility 1514 was built out-of-period for the Pearl Harbor NHL, is not associated with the historic events there, and is not considered a contributing element. It is located within the Pearl Harbor Naval Base, diagonally at the corner of Kamehameha Highway and Radford Drive.

The elevated guideway will not eliminate primary views of the architectural features of this historic building.

The building is eligible for inclusion in the NRHP for its design and its association with a prominent local architect. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Hawai`i Employers Council

The Hawai'i Employers Council building on Waiwai Loop, adjacent to Ke'ehi Lagoon Beach Park, was built in 1961. While it fronts the loop, it is set back and separated from it by auxiliary parking. The council was founded in 1943 in response to the National Labor Relations Act of 1935, which guaranteed the rights of workers to organize. The council was formed to organize employers, bring unions to the table, and stabilize relations between the groups through wages and working conditions fair to both sides. By February 1962, when the Council moved to its new offices, it had more than 300 members (Figure 5-51).

This property is eligible for nomination to the NRHP and is significant under Criterion A for its association with the history of labor relations in Hawai'i and under Criterion C for its association with the architectural firm of Wimberly and Cook. In addition, its successor firm, Wimberly, Allison, Tong & Goo, had a major influence on Hawaiian architecture in this period. The current activities, features, or attributes of this property that qualify it for protection under Section 4(f) are its

Figure 5-51 Hawai`i Employers Council

architectural elements and historic associations. While it was not evaluated under Criterion G, which indicates it is not considered exceptionally important, it is considered eligible because it will be 50 years old before project completion.

The two-story building is oriented makai toward Ke'ehi Lagoon Beach Park, and other industrial and light industrial type properties surround the other building sides. The Project entails construction of an elevated guideway and support columns though the mauka perimeter of Ke'ehi Lagoon Beach Park. These elements will be about 40 feet makai of the building, with the bottom of the guideway about 22 feet above ground level. Views of the architectural elements and historic associations that qualify the building for protection under Section 4(f) will not be substantially impaired. As a result, there will be no constructive use of this property.

Institute for Human Services /Tamura Building

This three-story concrete International-Style building was built in 1968. It features a prominent rounded corner where its two street-facing sides join at Ka'aahi Street and Ka'amahu Place. Given the angle of Ka'aahi Street, the distinctive curved front facade is primarily visible from the intersection at which it sits. The privately owned building is currently occupied by 10 stores on the ground floor and 13 apartment units on each of the second and third floors. This property is eligible for nomination to the NRHP as an example of an International-Style building (Criterion C). The features and attributes of the property that qualify for protection under Section 4(f) are its architectural elements (Figure 5-52).

Figure 5-52 Institute for Human Services/Tamura Building

The Project entails the construction of an elevated guideway that will run on a diagonal at this point between Dillingham Boulevard and Nimitz Highway, and the Iwilei Station is 20 feet makai from the building at Ka'amahu Place. The station will be the most prominent feature of the Project for this property, although it will not substantially affect views.

The Project entails construction of an elevated guideway and the Iwilei Station makai of Ka'aahi Place and about 50 feet makai of the building and 35 to 40 feet above grade. Since the surrounding area is an urban environment with many other buildings that block longer range views. Project will not substantially impair the visual and architectural elements of the building that qualify it for protection under Section 4(f). As a result, there will be no constructive use of this property.

Tong Fat Co. Wood Tenement Buildings

The Wood Tenement Buildings behind the Tong Fat Co. are a group of three two-story four-plex residential buildings and one single-story duplex constructed in 1914. The property was determined eligible for the NRHP under Criterion A for its association with the development of the 'A'ala neighborhood and under Criterion C as an example of the typical grouping and construction of early 20th-century tenement buildings in Honolulu. The buildings overlook the cleared, former OR&L rail yard on a parcel immediately mauka of the former filling station. The features and attributes of these properties that qualify for protection under Section 4(f) are their design elements and historic associations (Figure 5-53).

Figure 5-53 Wood Tenement Buildings behind Tong Fat Co.

The Project entails the construction of an elevated guideway that will run behind this parcel on a planned access easement through the OR&L property, 190 feet 'Ewa of the buildings. The alignment will cross through this block diagonally and connect with Nimitz Highway at Iwilei Road.

No significant viewsheds were identified from this property since non-historic industrial buildings are located 'Ewa of the cleared area and constitute the buildings' viewshed. Therefore, the guideway will have no impact to existing views of or from the historic tenement grouping. Primary views of the buildings are from behind the Tong Fat Co. building, and the elevated guideway will not interfere with these since it is 'Ewa of the tenement buildings. The Project will not substantially impair the architectural elements and historic associations that qualify them for protection under Section 4(f). As a result, there will be no constructive use of this property.

Nu`uanu Stream Bridge

Nuʻuanu Stream Bridge is eligible for nomination to the NRHP for its association with the history of transportation along the Honolulu waterfront and Queen Street before it was renamed Nimitz Highway (Criterion A). This bridge carries the ʻEwa-bound traffic of Ala Moana Boulevard/ Nimitz Highway out of Downtown and is an important transportation link between Iwilei and Downtown. It is also significant as a late example of a concrete bridge with solid parapet design, incorporating unusual molded detailing and a rounded top rail (Criterion C). The solid parapet is somewhat unusual for its 1932 construction date since most bridges constructed in that period by the Territory had balustrades pierced with vertically oriented openings. The features and attributes of this property that qualify for protection under Section 4(f) are its design elements and its historic associations (Figure 5-54).

The Project entails the construction of an elevated guideway in the median of Nimitz Highway makai of the Chinatown Station, 250 feet Koko Head of the bridge. The bridge is in Downtown Honolulu and is surrounded by major urban highways. The guideway elevation at about 35 feet above the bridge will not eliminate the appearance of its design elements nor alter its relationship to the existing transportation corridor (Figure 5-55).

Figure 5-55 Nimitz Highway at Maunakea Street, looking `Ewa and Makai toward Chinatown

Figure 5-54 Nu`uanu Stream Bridge

Nimitz Highway is a major transportation corridor, and the Project's visual elements will be in character with the surrounding area.

The bridge is eligible for inclusion in the NRHP for its design and its historic association with the development of an important transportation corridor in the late 1930s. The Project will not substantially impair the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Merchant Street Historic District

The Merchant Street Historic District covers a four-block area in Downtown Honolulu directly Koko

Head of Chinatown. The only contributing property in this commercial district within the Project's APE is the Walter Murray Gibson Building/ Honolulu Police Station (on Merchant Street near Nuʻuanu Avenue). The building is approximately 150 feet mauka from the Project, which runs down the center of Nimitz Highway.

While the historic district extends to Nimitz Highway, these buildings are non-historic and do not contribute to the district's significance. The four-story Gibson Building/Honolulu Police Station was built in 1930 and 1939. It was individually evaluated and found to be eligible for the NRHP under Criterion A for its association with the history of the City's police department and under Criterion C as an excellent example of Hawaiian Mediterranean-style architecture of the 1930s. The features and attributes of this property that qualify for protection under Section 4(f) are its design elements and its historic association (Figure 5-56).

Figure 5-56 Merchant Street Historic District

The Project entails the construction of an elevated guideway (40 feet above grade) in the median of the six-lane Nimitz Highway approximately 150 feet makai of the Gibson/Honolulu Police Station Building. As the primary views of the building are from Merchant Street, Nuʻuanu Avenue, and North Bethel Street, the elevated guideway will not affect them. The contemporary high-rise buildings on the mauka side of Nimitz Highway stand between the historic building and the Project; therefore, the alignment will be visible from the building only in the distance from North Bethel Street and Nuʻuanu Avenue. The Project will not substantially impair the historic associations and architectural elements, which are the features or attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Walker Park

Walker Park is a small park set among tall office buildings. It was developed circa 1951 and is eligible for listing on the NRHP under Criterion A for its association with the development of the Downtown Honolulu waterfront and Central Business District and under Criterion C as an "early example of a created greenspace in the Central Business District." The park is also a recreational facility and subject to Section 4(f) protection independent of this evaluation (see Section 5.6.1 and Figure 5-36).

The Project will entail construction of an elevated guideway about 50 feet makai of the park within the median of Nimitz Highway. As a result, the Project will nominally affect makai views from the park but not views of the park from the Central Business District it serves.

Walker Park is eligible for inclusion in the NRHP for its historic associations and as an early example of greenspace in the Central Business District. The Project will not substantially impair the park's historic associations, which are the features and attributes that contribute to its NRHP eligibility; therefore, there will be no constructive use of Walker Park.

DOT Harbors Division Building

The DOT Harbors Division Building is a three-story structure set on Pier 10/11, built in 1952 (Figure 5-57). It is an example of the streamlined International Style of architecture common in that period. The building is eligible for the NRHP

Figure 5-57 DOT Harbors Division Building

Figure 5-58 Pier 10/11

under Criterion A for its association with the Harbor Commission of the Territory of Hawaiʻi and for its primary relationship with the water. The features and attributes of this property that qualify for protection under Section 4(f) is its historic association.

The Project entails the construction of an elevated guideway in the median of the six-lane Nimitz Highway approximately 70 feet mauka of the building. Views of the building from Nimitz Highway and farther mauka will be partially obstructed by the 40-foot-tall alignment; the building will still be visible from the makai side of the highway and through the columns farther mauka.

Most importantly, the property's historically important ʻEwa/makai viewshed toward Honolulu Harbor will not be affected. The Project will not substantially impair its association with the Harbor Commission of the Territory of Hawaiʻi and for its primary relationship with the water, which are the features and attributes that contribute to its NRHP eligibility and protection under Section 4(f). Therefore, there will be no constructive use of this property.

Pier 10/11

The Pier 10/11 building is a single-story passenger terminal, built in 1926, that covers most of the pier structure and is approximately 550 feet long (Figure 5-58). The building is eligible for the NRHP under Criterion A for its association with the maritime passenger industry and under Criterion C as an example of neo-classical architecture of the 1920s in Honolulu. This building derives its significance from its relationship to the harbor. The features and attributes of this property that qualify for protection under Section 4(f) are its design elements and its historic association.

The Project entails the construction of an elevated guideway (40 feet above grade) in the median of the six-lane Nimitz Highway approximately 140 feet mauka of the building (at its closest).

Since the triangular DOT Harbors Division Building is adjacent (makai) to the passenger terminal building, largely obscuring it from mauka views, the only view that will be partially affected as a result of the Project will be the view from Fort Street Mall. Views from Irwin Park, across the street, will not be affected nor will the building's visual and physical connection to the harbor. The Project will not substantially impair views of the building's design elements and historic associations, which are the features and attributes that contribute to its NRHP eligibility. Therefore, there will be no constructive use of this property.

Aloha Tower

Aloha Tower is a 184-foot-tall Art Deco tower constructed in 1926 (Figure 5-59). The tower is eligible for the NRHP under Criterion A for its association

Figure 5-59 Aloha Tower

with the development of Hawai'i as a tourist destination for travelers from the mainland and for its role as a harbor-control tower during World War II. It is also eligible under Criterion C as an example of 1920s Art Deco architecture in Hawai'i. As planned, Aloha Tower was intended to serve as a landmark for those arriving by boat; therefore, its connection to the harbor is historically important. The features and attributes of this property that qualify for protection under Section 4(f) are its design elements and its historic associations.

The Project entails the construction of an elevated guideway in the median of the six-lane Nimitz Highway approximately 420 feet mauka of the tower. While the tower is a local landmark from the inland area, the Project will not block views, although some will be altered. Aloha Tower has only marginal integrity of setting, with downtown high-rises, proximate recently constructed buildings, and a modern shopping mall surrounding it. Although certain important buildings can be viewed from Aloha Tower, there are no identified viewsheds with integrity from the tower, as Downtown Honolulu has become densely built up with tall buildings and busy roadways. Aloha Tower will still be able to be viewed from many vantage points without seeing the Project. The tower's visual setting is dominated by the surrounding marketplace and less by the highway, which is already a major transportation corridor. The Project will be visible in views from the observation deck, but it will not substantially impair views of the tower's design elements nor alter its historic setting, which are the features and attributes that qualify the property for protection under Section 4(f). There will be no constructive use of this property.

Irwin Memorial Park

Irwin Memorial Park is a 2-acre park, located south of Nimitz Highway in Downtown Honolulu. It was originally developed around 1930 (Figures 5-37 and 5-38). The park is eligible for listing on the NRHP under Criterion A for its association with the history of beautification efforts in the Honolulu waterfront passenger terminal area; under Criterion B for its association with William G. Irwin, a noted Hawaiian businessman and philanthropist; and under Criterion C for representing the work of leading Honolulu landscape architect Robert O. Thompson. The park is also a recreational facility and subject to Section 4(f) protection independent of this evaluation (Section 5.6.1). The Project will entail construction of an elevated guideway mauka of the park, within the median of the adjacent highway. As a result, the Project will not obstruct the excellent makai views from the park or views of the park from the harbor and Aloha Tower. The Project will also have no adverse noise or vibration impacts at the park.

Irwin Memorial Park is eligible for inclusion in the NRHP for its various historic associations with the beautification of the waterfront in the 1930s, with the noted local philanthropist for whom it is named, and as an example of the work of a leading local landscape architect. The Project will not substantially impair these features or attributes, which contribute to its NRHP eligibility; therefore, there will be no constructive use of Irwin Memorial Park.

Mother Waldron Neighborhood Playground

Mother Waldron Neighborhood Playground is located in Mother Waldron Neighborhood Park, a 1-acre park located in the mixed-use area of Kakaʻako. It is surrounded by open lots, a large surface parking lot, warehouses, and taller apartment buildings. It was listed on the Hawaiʻi Register of Historic Places on June 9, 1988, as an element of the thematic group "City & County of Honolulu Art Deco Parks." It is also significant for its associations with the playground movement, both nationally and locally, as well as its architectural and landscape design by Harry Sims Bent (Criterion A of the NRHP). This park is considered one of Bent's best playground designs and a good example of Art Deco/Art Moderne styles in hardscape (Criterion C). The park is also a recreational facility and subject to Section 4(f) protection independent of this evaluation (Section 5.6.1) (Figure 5-39).

The Project entails the construction of an elevated guideway along Halekauwila Street approximately 10 feet mauka of the park's edge and will be approximately 35 to 40 feet high. The park's Art Deco/Art Moderne-style comfort station is more than 150 feet makai of the alignment.

The Project will not eliminate primary views of the historic playground, but it will introduce a new visual element to this corridor, and there will be changes to some makai views of the playground. Views of the playground from the apartment buildings on the mauka side of Halekauwila Street will be partially obstructed.

Mother Waldron Neighborhood Playground is eligible for inclusion in the NRHP for its design. The Project will not substantially impair the park's design elements, which are the features or attributes that contribute to NRHP eligibility and protection under Section 4(f). As a result, there will be no constructive use of Mother Waldron Neighborhood Playground.

5.6.3 Summary of Evaluation of Constructive Use of Section 4(f) Properties

In summary, there will be no constructive use of Section 4(f) properties. The constructive use analysis considers all historic properties with an adverse effect Section 106 finding, where the Project will not directly use the property. The Project will not substantially impair the features or attributes of the historic properties that contribute to NRHP eligibility. There are no wildlife or waterfowl refuges along the study corridor and, therefore, there will be no proximity impacts from ecological intrusion.

Vibration and noise impacts along the corridor range from negligible to moderate and do not rise to the level of "substantial impairment." Few, if any, of the Section 4(f) parks and recreational areas derive a substantial part of their value through their visual setting. Rather, they are used for games and sports, picnics, and parking, and the Project will not substantially impair those activities. While visual impacts will occur, the Project's proximity impacts are not so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

In conclusion, the Project will not result in a constructive use of any Section 4(f) park, recreational, or historic property.

5.7 Temporary Occupancy of Section 4(f) Properties

Two properties will experience a temporary occupancy under Section 4(f) (23 CFR 774.13) during construction of the Project—the future Middle Loch Park and the Pearl Harbor Bike Path. The maintenance and storage facility near Leeward Community College (preferred site option) will be located mauka of the Middle Loch of Pearl Harbor and will require construction of a new 280-foot-long stormwater outfall that will drain into Pearl Harbor. This pipe will be laid in a trench and buried under the future Middle Loch Park (DPR is the official with jurisdiction) and the existing Pearl Harbor Bike Path (under the jurisdiction of DTS). The agencies with jurisdiction (DPR and DTS) agree that the City's use of the property is temporary; the scope of the work on the property is minor; there are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis; and the City will fully restore the property.

The City will maintain public access to and use of the bike path during construction, and once construction is complete, the bike path will be repaved in the affected area and any plantings disturbed by construction will be restored. The future Middle Loch Park is currently vacant land. The area disturbed during construction of the underground pipe will be restored and vegetated similar to existing conditions.

As defined in 23 CFR 774.13, this would constitute a temporary occupancy of the two Section 4(f) properties and does not constitute a use of a Section 4(f) property since all the following conditions will be satisfied:

- Duration is temporary (i.e., less than the time needed for construction of the project), and there is no change in ownership of the land
- Scope of work is minor (i.e., both the nature and magnitude of the changes to the Section 4(f) property are minimal)
- There are no anticipated permanent adverse physical impacts, nor is there interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis
- The land being used will be fully restored (i.e., the property must be returned to a condition that is at least as good as that which existed prior to the project)
- There is a documented agreement of the official(s) having jurisdiction over the Section 4(f) property regarding the above conditions

In addition, the Project will not result in permanent proximity impacts (e.g., noise, vibration, visual, and property access) so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) will be substantially impaired. Noise analysis conducted at Leeward Community College, adjacent to the alignment and maintenance storage facility, found that project-generated noise levels (59 dBA Leq) will not exceed the applicable FTA impact threshold of 65 dBA Leq at that site; therefore, noise from the Project will not affect the two Section 4(f) resources since they are located more than 1,000 feet makai of the alignment. Noise generated by the maintenance and storage facility operations will also not result in impacts; therefore, noise will not substantially diminish the future park or bike path's features and attributes that are protected under Section 4(f). The maximum noise exposure level from the maintenance and storage facility at the Pearl Harbor Bike Path will be 52 dBA Leq and between 52 and 55dBA Leq at the park, which is less than the lowest FTA impact criteria of 57 dBA Leq (applicable to quiet sites). There will be no vibration impacts on the park and bike path from any of the Project elements.

The visual character and quality of both Section 4(f) resources is defined by their location along the shoreline with unobstructed harbor views. Given that, the location of the Project elements are mauka of the future park and bike path, they would not change makai views nor cause adverse visual impacts or diminish the Section 4(f) resources' features or attributes. Use of and access to the future park and bike path will be maintained during construction of the maintenance and storage facility. Therefore, temporary impacts during construction will be minimal, no permanent adverse physical impact will occur, and there will be no use under Section 4(f).

5.8 Least Overall Harm

The FTA may approve only the feasible and prudent alternative that causes the least overall harm in light of the statute's preservation purpose. Two feasible and prudent alternatives (Airport Alternative alignment and Salt Lake Alternative alignment) that were evaluated in the Draft EIS are assessed in this section to determine which one results in least overall harm. The least overall harm is determined by balancing the following factors:

- Ability to mitigate adverse impacts to each Section 4(f) property
- Relative severity of harm, after reasonable mitigation to the Section 4(f) qualities
- Relative significance of each Section 4(f) property
- Views of officials with jurisdiction of each Section 4(f) property
- Degree that Purpose and Need is met
- Magnitude of adverse impacts, after reasonable mitigation, to non-Section 4(f) properties
- Substantial differences in costs

5.8.1 Least Overall Harm Evaluation of the Airport and Salt Lake Alternative Alignments

Through analysis presented in the Draft EIS and Section 4(f) evaluation, it was found that there were few differences between the Airport Alternative and the Salt Lake Alternative alignments in terms of uses of Section 4(f) properties (after mitigation measures were identified and incorporated into the preliminary design). Section 4(f) use would be identical, except where the two alignments diverge in the center of the corridor between Aloha Stadium and Kalihi. In this segment of the corridor, it was determined that the Airport Alternative will result in the least overall harm in light of the statute's preservation purpose. It will result in a *de minimis* impact at two recreational properties—Ke'ehi Lagoon Beach Park and Aloha Stadium. The Pacific War Memorial Site is a multi-use property that is being considered as a park with ***de minimis*** impact, and there will be no other uses of Section 4(f) historic, park, or recreational properties. The Salt Lake Alternative would require substantially more land at Aloha Stadium, resulting in a direct use (not *de minimis* impact) and either direct or *de minimis* impact use at Radford High School.

The constructive use evaluation for the Airport Alternative, described in Section 5.6, determined that none of the other Section 4(f) properties in this segment will experience impairment severe enough to constitute constructive use from the Project.

Aloha Stadium

The Salt Lake Alternative would more severely affect Aloha Stadium. This alternative would use approximately 4.8 acres within two of the stadium's parking lots as well as adjacent land for the elevated guideway's easement, the station plaza, and the connective concourse. Even with mitigation measures in place to reduce the size of the easement and station areas, this design would result in more than twice the amount of property taken than will result with the *de minimis* impact of the Airport Alternative. Under the Airport Alternative, approximately 2 acres will be required for the station and guideway on the 'Ewa edge of the parking areas, as well as a strip of land along Kamehameha Highway. This will use less of the stadium's parking facilities. In accordance with 23 CFR 774.3(c)(1), the Salt Lake Alternative would not be considered to have least overall harm.

The views of officials with jurisdiction over the Section 4(f) property were also considered. In a letter dated September 8, 2008, DAGS, the agency with jurisdiction over Aloha Stadium, considered both alignments and indicated a preference for the Airport Alternative, noting that "the impact on the stadium would be further mitigated if the system ran past the airport…"

Ke`ehi Lagoon Beach Park

While the Airport Alternative will require the use of a small area of Keʻehi Lagoon Beach Park, the value of the park will be enhanced through mitigation proposed by the City and approved by DPR, the agency with jurisdiction over the property.

The Project will pass above approximately 1 acre of park land. As described in Section 5.5.1, DTS has designed the Project to minimize use and with mitigation there will be a *de minimis* impact on this park. After mitigation, the Project will not harm the attributes and features that qualify the park for protection under Section 4(f) 23 CFR 774.3.

Pacific War Memorial Site

The Airport Alternative will require the use of a small area of this multi-use property, considered a park in this Section 4(f) evaluation. The Project will pass above approximately 0.5 acre of parkland. As described in Section 5.5.1, the City has designed the Project to minimize use, and with mitigation there will be a *de minimis* impact on this property. With mitigation, the Project will not harm the attributes and features that qualify the park for protection under Section 4(f) 23 CFR 774.3.

Historic Properties on the Salt Lake Alternative

The Salt Lake Alternative would also require minor property acquisition (0.01 acre) along the edge of the NRHP-eligible Radford High School property (from an existing parking lot) to accommodate widening of Salt Lake Boulevard for the guideway median. The school complex consists of several one- and two-story masonry buildings constructed between 1957 and 1968, some of which are oriented toward Salt Lake Boulevard and others that face inward toward the campus. The alignment would be located approximately 25 feet mauka of the property boundary and would be approximately 20 to 25 feet high.

The Salt Lake Alternative in this segment would likely have an adverse effect under Section 106 based on impacts to the setting and feeling of the potential Salt Lake Duplexes Historic District on the mauka side of the roadway. The wood-frame houses were built in the 1950s as military residences, and many feature hipped roofs. The district is eligible for NRHP listing under Criterion A (for its role in the early development of Title IX housing and subsequent real estate development on Oʻahu) and Criterion C (as the largest concentration of duplexes in Honolulu). Since the alignment would be approximately 75 feet makai of the district and be elevated 35 to 50 feet, visibility of the low-scale buildings would be maintained at ground level under the guideway structure. The guideway would be higher than most of the nearby trees and about as tall as the utility poles lining the street. This would not be considered a constructive use of this property as the features that qualify for protection under Section 4(f) would not be substantially impaired.

The other historic properties along this segment of the Salt Lake Alternative were found to have no adverse effect as a result of this alignment (ʻAiea Cemetery, Āliamanu Pumping Station–Facility X-24/Quonset Hut Navy Public Works Center, and

First Hawaiian Bank). As a result, they were not evaluated for Section 4(f) use.

5.8.2 Differences in Environmental Impacts between Airport and Salt Lake Alternatives

According to 23 CFR 774.3, the alternative having the least overall harm includes balancing the magnitude of any adverse impacts to properties not protected by Section 4(f). The Draft EIS had previously determined that adverse impacts to other sensitive non-Section 4(f) properties would be slightly greater with the Salt Lake Alternative than with the Airport Alternative with respect to hazardous materials and noise.

The Airport Alternative, as documented in this Final EIS, will have slightly more displacements and acquisitions than the Airport Alternative discussed in the Draft EIS. Some of these are the result of the refined alignment near the airport as described above. Overall, for the entire Project there are two additional business displacements. There will be slightly less air pollution, energy consumption, and water pollution because it will have the greatest reduction in vehicle miles traveled than the Salt Lake Alternative.

The Salt Lake Alternative would block protected views and vistas along Bougainville Drive, Maluna Street, Wanaka Street, and Ala Liliko‘i Street where they intersect with Salt Lake Boulevard. From the Ala Liliko‘i Station to Pu‘uloa Road, the guideway would also block views from fourth- and fifth-floor windows of businesses and multi-story apartments and condominiums mauka of Salt Lake Boulevard. The locations of the protected views and vistas in the Salt Lake neighborhood area are shown on Figure 4-18 (in Chapter 4 of this Final EIS).

With the Airport Alternative, views of East Loch and the Pearl Harbor NHL makai of the alignment will be partially obstructed by the guideway and columns in the residential area near Kohomua Street. The visual integrity of the NHL will not be adversely affected, and the project elements will barely be visible in mauka views from the harbor (Figure 4-42 in Chapter 4 of this Final EIS). The Kamehameha Highway Bridge over Hālawa Stream is historic, and its appearance will be changed by the guideway and support columns. The contrast in scale and character of the guideway and columns will be a noticeable change, and visual effects are expected to range from moderate to significant (noted as a “high” level of visual impact in the Draft EIS). In the area of Ke‘ehi Lagoon Beach Park, the alignment will run along the periphery of the park and closely follow the elevated Nimitz Highway and the H-1 Freeway. Views of Honolulu Harbor and the park are already obstructed by these elevated highways and will not be substantially affected. The Airport Alternative will not block any protected views or vistas, although the Project will be visible in distant views of Pearl Harbor, the Wai‘anae Mountain Range, and Downtown. The overall visual effects for the Airport Alternative are expected to be of a lower magnitude than with the Salt Lake Alternative.

5.8.3 Purpose and Need

The Draft EIS documented that of the three Build Alternatives evaluated, the Airport Alternative will carry the most passengers, with 95,000 daily passengers and 249,200 daily transit trips in 2030, and provide the greatest transit-user benefits (Table 2-6 in Chapter 2 of this Final EIS). While these numbers have increased since the Draft EIS was published, the relative differences among the alternatives would remain similar. The Airport Alternative also will result in the fewest vehicle miles traveled and vehicle hours of delay. It will provide access to employment centers at Pearl Harbor Naval Base and Honolulu International Airport and will have substantially greater ridership to those areas than the Salt Lake Alternative. Therefore, the Airport Alternative better meets the Purpose and Need for the Project than the Salt Lake Alternative [23 CFR 774.3 (c)(1)].

5.9 Determination of Section 4(f) Use

Considering the foregoing discussion of the Project's use of Section 4(f) properties, there is no prudent avoidance alternative to the use of land from 12 historic properties. As described, the Project includes all possible planning to minimize harm to Section 4(f) properties resulting from use.

In addition, the Project will have a *de minimis* impact on two historic and three recreational Section 4(f) properties. Measures to minimize harm, such as avoidance, minimization, mitigation, and enhancement measures, were committed to by the agencies with jurisdiction over these properties. FTA has coordinated with these agencies prior to making its *de minimis* determination.

Finally, balancing all the factors discussed in Section 5.8, the Airport Alternative has been determined to cause the least overall harm in light of Section 4(f)'s preservation purpose.

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06

CHAPTER

Cost and Financial Analysis

This chapter presents estimates for capital and operating and maintenance (O&M) costs for the Project. These cost estimates are based on engineering and operations analysis performed since the Draft EIS. This chapter, although not specifically required by the National Environmental Policy Act (NEPA) or Hawai'i Chapter 343, presents a financing plan for the Project, as required for all New Starts projects.

Year-of-expenditure dollar (YOE $) cost estimates include assumed inflation between today and the expected date of the expenditure.

2009 dollar cost estimates reflect prices in fiscal year (FY) 2009.

This financial analysis only considers costs, resources, and funding strategies associated with public transit services provided by the City and County of Honolulu (City). Unless otherwise stated, costs and revenues in this chapter are presented in fiscal year (FY) 2009 dollars and year-of-expenditure dollars (YOE $). The forecast period referred to is between 2009 and 2030. For the City, the fiscal year begins on July 1 and ends on June 30 (e.g., FY2009 is from July 1, 2008, to June 30, 2009). In this chapter, all year references are to fiscal years.

6.1 Changes to this Chapter since the Draft Environmental Impact Statement

The financial information in the Final EIS has been updated to reflect comments received during the Draft EIS review period, a 2009 base year, and the latest data available, including changes in economic conditions and project revenues and costs. In the case of project revenues, the general excise and use tax (GET) surcharge amounts applied to the Project reflect a worsening of economic conditions since the Draft EIS was released. Federal formula funds have been reallocated to take advantage of increased amounts projected to be apportioned to the City as a result of the Project. Costs have been adjusted to reflect more refined levels of engineering, changing costs of materials, and escalation rates that have been differentially applied to the key cost drivers of the Project, such as cement, steel, and labor. Costs have also been revised to include the refinement of the alignment along Ualena Street as a result of conflicts with runway clearances at Honolulu International Airport. The costs do not, however, reflect favorable actual bids received for early phases of work.

6.2 Cost Estimate Methodology

6.2.1 Capital Cost Methodology

The capital cost estimate is the total cost of implementing the Project. It is based on standard cost categories the Federal Transit Administration (FTA) created in establishing a consistent format for reporting, estimating, and managing capital costs for New Starts projects. The cost categories are used to show project costs in Table 6-1. This method allows for the summary of costs to be tracked during the Project's follow-on phases (i.e., Preliminary Engineering (PE), Final Design, and Construction).

In this chapter, the cost estimates for specific items are based on typical construction practices and procedures on similar projects. Quantities are estimated based on anticipated operating service plans (i.e., size and frequency of trains) and engineering performed to date. Estimated costs for each standard cost category were increased in accordance with FTA guidance for estimates developed prior to PE, to account for unknown but expected additional expenses.

Inflation was applied to the cost estimate based on the Project's implementation schedule. The specific critical construction cost driver (e.g., cement, steel, labor) inflation rates were applied based on the local construction market conditions and recent global trends in the price of each key commodity. The derivation of the escalation rates is presented in the Cost Escalation Report prepared for the Project and included as an appendix to the Financial Plan (RTD 2009n).

Table 6-1 Capital Cost Estimate for the Project by Cost Category

Cost Categories (2009–2030)	Airport Alignment	
	2009 $M	YOE $M
Guideway construction	1,409	1,678
Station construction	306	389
Yard, shops, and support facilities	122	138
Sitework and special conditions	757	895
Systems	254	311
Right-of-way	157	159
Vehicles	341	399
Professional services	810	996
Unallocated contingency (project reserve)	125	149
Total Costs Excluding Finance Charges	4,281	5,115
Finance charges	302	398
Total Costs	4,583	5,513
Project cost (construction, vehicles, right-of-way, soft costs)	3,283	3,791
Contingency (allocated and unallocated)	998	1,329

6.2.2 Operating and Maintenance Cost Methodology

Fixed Guideway Operating and Maintenance

O&M costs for the Project were estimated using the rail transit system in Washington, D.C., and making adjustments to reflect the Project's proposed operating system characteristics. A sensitivity analysis was conducted using similar transit operations to confirm the results. Among the systems used in the sensitivity comparison were Miami and Los Angeles. All costs were adjusted to reflect O'ahu's higher costs of goods and services, where appropriate.

TheBus and TheHandi-Van Operating and Maintenance

TheBus O&M costs were developed using existing bus operations as the baseline, as well as the anticipated service levels once the Project becomes fully operational. TheBus O&M costing methodology is also consistent with Section 4 of the FTA's *Procedures and Technical Methods for Transit Project Planning* (FTA 2008).

6.3 Capital Plan

The capital plan presents project capital revenues and costs for the Project and the ongoing public transportation system.

6.3.1 Capital Costs

The capital cost estimate of implementing the Project is presented in Table 6-1. The capital cost estimate, excluding finance charges, is $4.3 billion in FY2009 dollars and $5.1 billion in YOE $. These cost estimates exclude amounts already incurred during FY2007 and FY2008, which are not included in the New Starts cost estimate.

The estimates for system-wide, ongoing capital expenditures, shown in Table 6-2, include ongoing costs for replacing, rehabilitating, and maintaining capital assets (e.g., buses, rail vehicles, and TheHandi-Van) in a state of good repair throughout the forecast period (2009 to 2030). Rail rehabilitation and replacement costs are expected to begin in 2028, 16 years after initial construction activities are completed.

Table 6-2 Overview of Transit Capital Expenditures through 2030 (excluding finance charges)

	2009 $M	YOE $M
Project implementation	4,281	5,115
Rail rehabilitation, replacement, and purchase of railcars	121	124
TheBus and TheHandi-Van expansion and replacement	1,014	1,258
Total	5,416	6,497

Current bus service will be restructured and expanded to support general growth in service. To support this, the number of buses operating during peak periods is expected to grow from 439 in FY2009 to 465 in FY2030. To comply with FTA's 20-percent spare ratio policy, the total bus fleet will increase from the current 531 buses to about 558 by FY2030. TheHandi-Van fleet is expected to grow from 166 vehicles in FY2009 to 185 in FY2030.

Figure 6-1 summarizes capital costs for all transit travel modes through the forecast period. It includes an expenditure for bus facilities that are not part of the Project, as programmed in the O'ahu Metropolitan Planning Organization's (O'ahuMPO) *FYs 2008–2011 Transportation Improvement Program* (O'ahuMPO 2008) and *O'ahu Regional Transportation Plan 2030* (O'ahuMPO 2007).

6.3.2 Proposed Capital Funding Sources for the Project

This section describes the various funding sources assumed for implementation of the Project and for the system's ongoing capital needs. These sources include GET surcharge funds, FTA New Starts revenues, and other Federal-assistance programs for capital needs, complemented by local assistance.

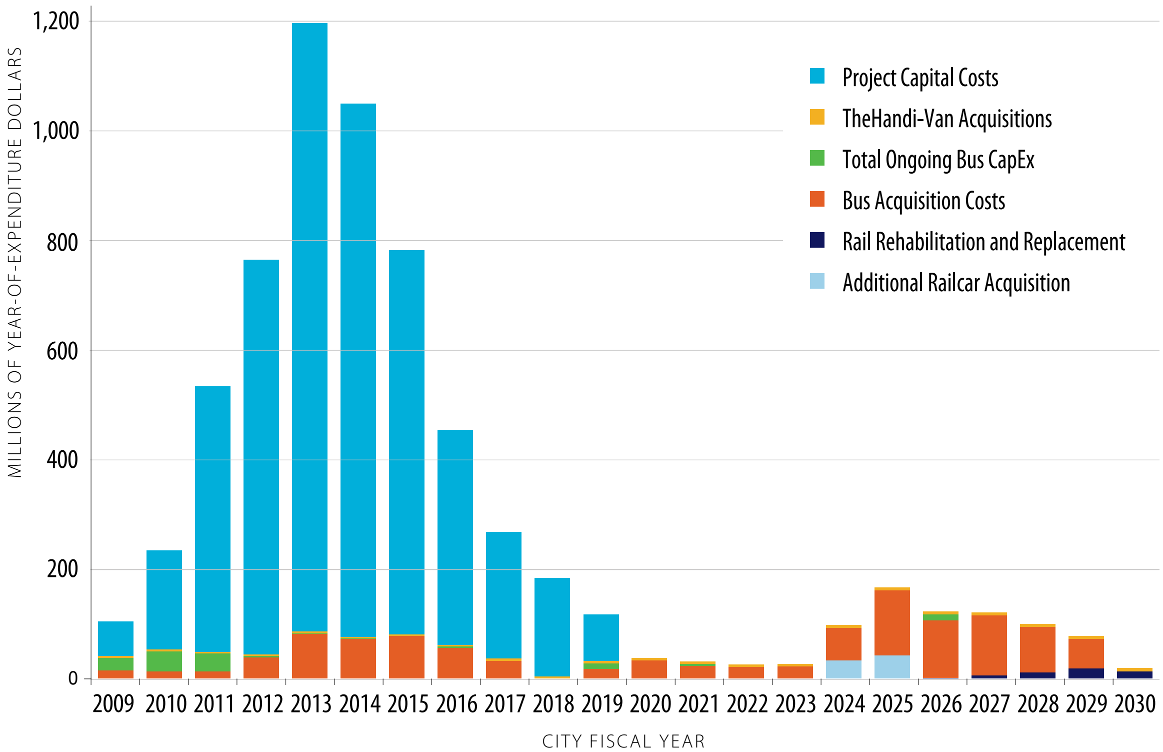

Figure 6-1 Total Agency-wide Capital Costs

General Excise and Use Tax Surcharge

The local funding source for the Project is a dedicated 0.5-percent surcharge on the State of Hawai‘i's GET. In 2005, the Hawai‘i State Legislature authorized counties to adopt this surcharge for public transportation projects. Following this authorization, the City enacted Ordinance 05-027 establishing a 0.5-percent County surcharge on the GET for business transactions on O‘ahu to be levied through December 31, 2022. This revenue is to be exclusively used for the Project's capital and/or operating expenditures and could be used to back General Obligation (GO) Bonds as needed for the Project. GET surcharge revenues are estimated to be $3,524 million (YOE $) through FY2023.

FTA Section 5309 New Starts Program (49 USC 5309)

The City is seeking capital funds from FTA's New Starts program, which provides funding for fixed guideway transit projects and extensions. Under current authorizing legislation, an annual appropriation is available nationwide on a discretionary basis for projects that have completed the program's procedural requirements and that meet certain criteria specified in law and regulation. The program is highly competitive. At this point, the City is in the process of addressing FTA requirements, and indications are that the Project will meet FTA criteria. However, FTA cannot make a final commitment to fund the Project until a Full Funding Grant Agreement has been approved after NEPA requirements have been met, the Project is approved for Final Design, and the New Starts Program is reauthorized by Congress as part of the Federal Surface Transportation Funding Program. Current authorizing legislation expired but has been extended in anticipation of a new authorization in 2010, following which there could be changes in statute, regulations, policy, and funding availability.

The City's financial analysis assumes that the Project will receive $1.55 billion from this program between 2010 and 2019. To date, $35 million has been appropriated by Congress for the Project. An additional $55 million appropriation has been proposed in the Federal budget for 2011.

FTA Section 5307 Urbanized Area Formula Program (49 USC 5307)

These funds are distributed to the Honolulu and Kailua-Kāne‘ohe urbanized areas using a formula set by law. The total amount of Section 5307 funds received by the City through FY2030, including funds from the American Recovery and Reinvestment Act (ARRA), will amount to approximately $900 million (YOE $) of which approximately $305 million is proposed to be used for the Project if other project funding sources or cost savings do not cover the full capital cost. A portion of the $900 million is attributable to the increased Section 5307 amount that will be distributed to the Honolulu urbanized area as a result of the Project’s fixed guideway route miles and other operating data. The statutory basis for Section 5307, as for New Starts, expired at the end of the previous Federal fiscal year (September 30, 2009) but has been extended in anticipation of a new authorization in 2010; the formula and eligibility requirements could change depending on this future reauthorization.

City General Obligation Bonds

The financial analysis assumes that GO Bonds will be the main financial instrument used by the City to provide financial support for the Project. This funding source will be required to bridge funding gaps in any given year and will be repaid by the revenue sources described in previous sections. GO Bonds are direct obligations of the City, for which its full faith and credit are pledged. City GO debt will be issued from 2013 through 2019 and repaid by 2023. Section 6.5, Cash Flow Analysis, provides further details on financing assumptions for the Project.

No private source of capital revenue was assumed to fund the Project. Opportunities for joint development or other forms of public-private partnerships could reduce City contributions or could help fund construction of future extensions of the Project.

6.3.3 Funding Sources for Ongoing Capital Expenditures

Federal Assistance

The City receives Federal assistance for ongoing transit capital investments through various funding programs from the FTA. One of the conditions for receiving most of these funds is that at least 20 percent of eligible expenses be paid with local funds. The three main sources of Federal funds for ongoing capital expenses are as follows:

- **FTA Urbanized Area Formula Program (49 USC 5307)**— of the $900 million available from Section 5307 funds, another approximately $325 million, including $20 million in ARRA funds, will continue to be used for ongoing capital needs. Activities eligible for Section 5307 funds include capital investments in rail and rail related areas, bus and bus-related activities (e.g., the replacement of rail vehicles and buses, overhaul of rail vehicles and buses, rebuilding of rail vehicles and buses, crime prevention and security equipment, and construction of maintenance and passenger facilities).
- **FTA Capital Investment Grants (49 USC 5309): Fixed Guideway Modernization Program**—these funds are distributed using a formula specified by law. Implementation of the Project will increase Fixed Guideway Modernization funds for Honolulu because the formula is largely based on the number of fixed guideway miles. Total Section 5309 Fixed Guideway Modernization funding is expected to be approximately $102 million (YOE $) through FY2030.

- **FTA Capital Investment Grants (49 USC 5309): Bus and Bus-related Equipment and Facilities Capital Program**—these funds are distributed on a discretionary 80/20 (Federal/Local) matching basis. All bus-related elements of the Project are eligible for bus capital funds. It is assumed that Honolulu's bus capital local allocations between 2009 and 2030 will equal 35 percent of annual bus and bus-related capital needs, well over the local match required to qualify for the funds. Total Section 5309 bus funding is expected to be $419 million (YOE $) through FY2030.

City General Obligation Bonds

The City currently issues GO Bonds to finance ongoing transit capital expenses. This includes TheBus and TheHandi-Van purchases, construction of facilities and transit centers, and other public transportation capital improvements. The financial analysis assumes that the City will continue to use GO Bond proceeds to match Federal contributions and fund ongoing systemwide capital expenditures. This will correspond to approximately $571 million (YOE $) in GO Bond proceeds through FY2030.

Other Potential Capital Sources

Based on the forecast GET surcharge revenues and the assumed Federal funding level, the Project is not expected to require any other source of funds; however, at this stage in the Project's development, numerous risks and uncertainties exist that can affect the Project's funding. These risks are discussed in Section 6.6, Risks and Uncertainties. Accordingly, the City recognizes the need to identify potential additional capital funding sources to enhance the strength and robustness of this financial analysis.

The City has identified three potential sources of added capital funding to actively pursue as the Project moves forward:

1. **Private Funds**—the City will look to the private sector to supplement project funds. A variety of mechanisms are potentially available. This might include donations of right-of-way, contributions toward the cost of building stations and other project components that directly benefit private entities through transit-oriented development, or the creation of benefit assessment districts or other value capture mechanisms around one or more stations.
2. **Airport Funds**—the decision to route the Project to directly serve Honolulu International Airport will benefit both airport passengers and employees, but adds more than $200 million to the Project's capital cost. In similar situations elsewhere in the U.S. (e.g., San Francisco, Portland, Minneapolis, and Northern Virginia), the responsible airport authorities have contributed sizable amounts toward the construction of rail projects. Funds have come from Passenger Facility Charges, Airport Improvement Program (AIP) Funds, and general airport revenues. In addition, the Federal Aviation Administration reauthorization bill now being considered by Congress could expand opportunities to use Passenger Facility Charges for transit projects serving airports.
3. **Reduction in State Retention of GET Surcharge**—the State has retained 10 percent of the GET Surcharge collected on Oʻahu since 2007. This amount is substantially more than required for administration of the program. If the retained portion can be reduced, additional funds will flow to the rail program. A reduction of the retention percentage to 5 percent would generate about $187 million in additional revenue over the time the surcharge is in effect. This change would be subject to action by the State Legislature.

6.4 Operating and Maintenance Plan

This section discusses the data and unit costs used to calculate O&M needs and the sources and uses of operating funds through FY2030.

6.4.1 Operating and Maintenance Costs

Figure 6-2 presents the projected O&M costs for the City's transit system, including the Project, from FY2009 to FY2030. In the year FY2030 YOE $, total O&M costs are projected to be approximately $117 million or 31 percent higher with the Project than with the No Build Alternative, as shown in Table 6-3.

The fixed guideway system's operating costs are anticipated to be about 26 percent of total O&M costs for the public transportation system in FY2030. O&M costs will increase in a step-like manner as operable segments are opened for revenue service, until the entire alignment is completed in FY2019.

6.4.2 Operating and Maintenance Funding Sources

This section describes the range of O&M funding sources anticipated. These sources include FTA Section 5307 funds for preventive maintenance, fare revenues, and contributions from the City's General and Highway Funds.

Fare Revenues

Systemwide ridership is forecast to be approximately 282,500 linked trips per day in 2030. The fare structure for the fixed guideway is assumed to follow the current bus fare structure, with free transfers between modes. This will yield farebox revenues ranging from $45 million in FY2009 to $151 million (YOE $) in FY2030.

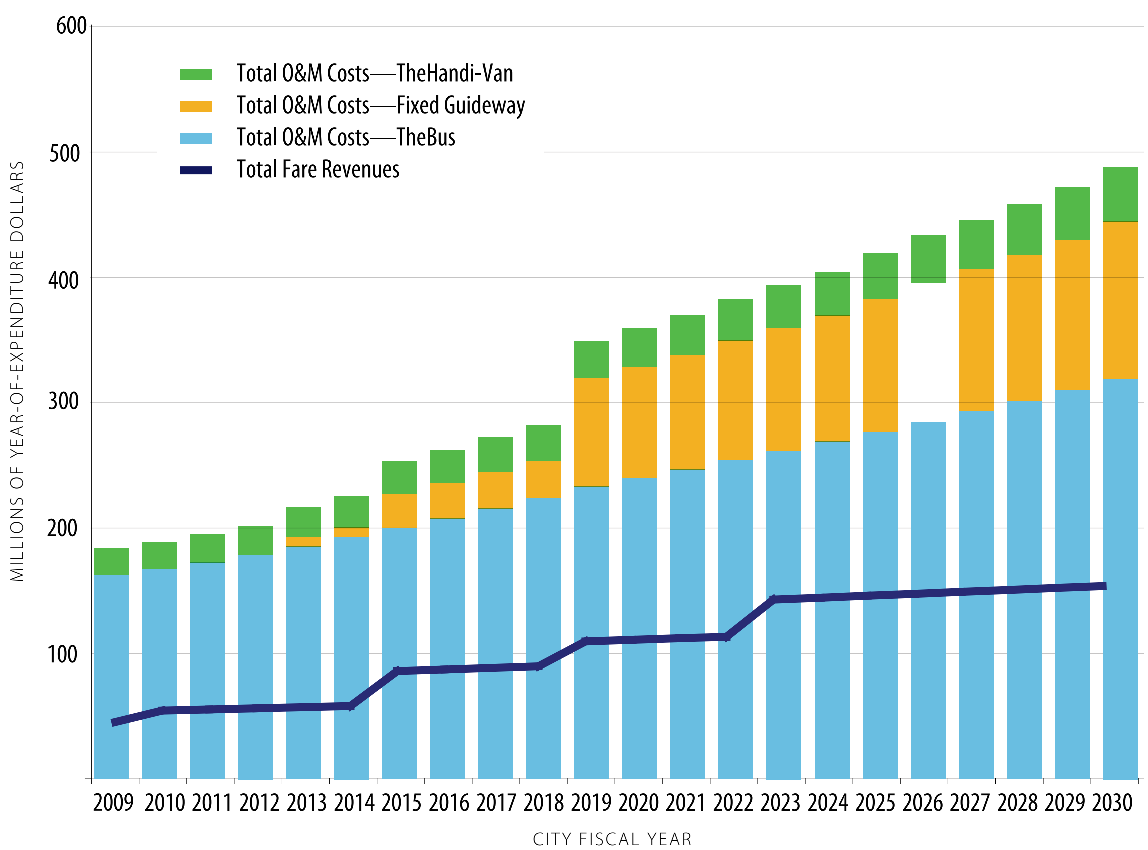

Figure 6-2 Systemwide Operating and Maintenance Costs

Table 6-3 2030 Operating and Maintenance Costs by Alternative

O&M Costs (FY2030)	TheBus		TheHandi-Van		Fixed Guideway		Total		Difference from No Build	
	2009 $M	YOE $M	2009 $M	YOE $M	2009 $M	YOE $M	2009 $M	YOE $M	2009 $M	YOE $M
No Build Alternative	200	328	27	44	–	–	227	372	–	–
Project	195	320	27	44	77	126	298	489	72	117

The average fare incorporated into the financial analysis starts at $0.95, which includes the proposed fare increase for FY2010. The growth in average fare from this point is shown as a "step function" with increases of approximately $0.33 in FY2015 and FY2023, which are based on the City's historical fare increases. Figure 6-2 shows the projected annual fare revenues (in YOE $). In 2001, the City Council adopted a resolution to adjust fare levels so that the farebox recovery ratio (the ratio of annual fare revenues to annual O&M costs) for TheBus will be maintained between 27 and 33 percent in any given year. The assumed average fare discussed previously will result in a farebox recovery ratio for the combined bus and fixed guideway systems that follows the City's resolution in most years, including 2030 when the ratio is expected to equal about 30 percent.

Federal Funding

Section 5307 funds were first applied to capital needs, with the remainder used for preventive maintenance. Based on historical trends, it is assumed that a maximum of 20 percent of annual O&M expenditures will be associated with preventive maintenance, and thus could be covered by Section 5307 funds.

In FY2009, the Honolulu and Kailua-Kāne‘ohe urbanized areas were apportioned a combined $31 million in Section 5307 formula funds by FTA. As noted earlier, over the longer term, the City's financial analysis assumes that it will receive approximately $900 million (YOE $) through FY2030 from this funding program and ARRA funds, $630 million (including ARRA) of which is assumed to be used for capital needs (for rail capital and ongoing capital needs for both bus and rail) and about $270 million of that going to preventive maintenance.

City Contribution

The City's contribution to transit O&M is currently funded using revenues from the General and Highway Funds. The General Fund mainly comprises real property tax revenues, but also includes revenues from a transient accommodations tax (transferred from the State), motor vehicle annual registration fees, and a public service company tax. The Highway Fund consists of revenues from the City fuel tax, the vehicle weight tax, and a public utility franchise tax. General and Highway Fund revenues were assumed to increase at an average rate of 2.7 percent per year by the State's Department of Business, Economic Development and Tourism's inflation forecast between 2009 and 2012. Inflation in subsequent years is assumed to be constant at 2.5 percent. In addition, a real growth component is assumed based on historical experience. Based on these assumptions, the total amount of General and Highway Funds is forecast to total approximately $33 billion between 2009 and 2030.

Between FY1994 and FY2008, the transit subsidy has averaged 11 percent of the total Highway and General Fund revenues. Immediately after 2003, City revenues increased as a result of large increases in real estate values on O‘ahu, more quickly than O&M costs for TheBus. This had resulted in a transit subsidy below 10 percent for 2004 and 2005. Figure 6-3 shows that given

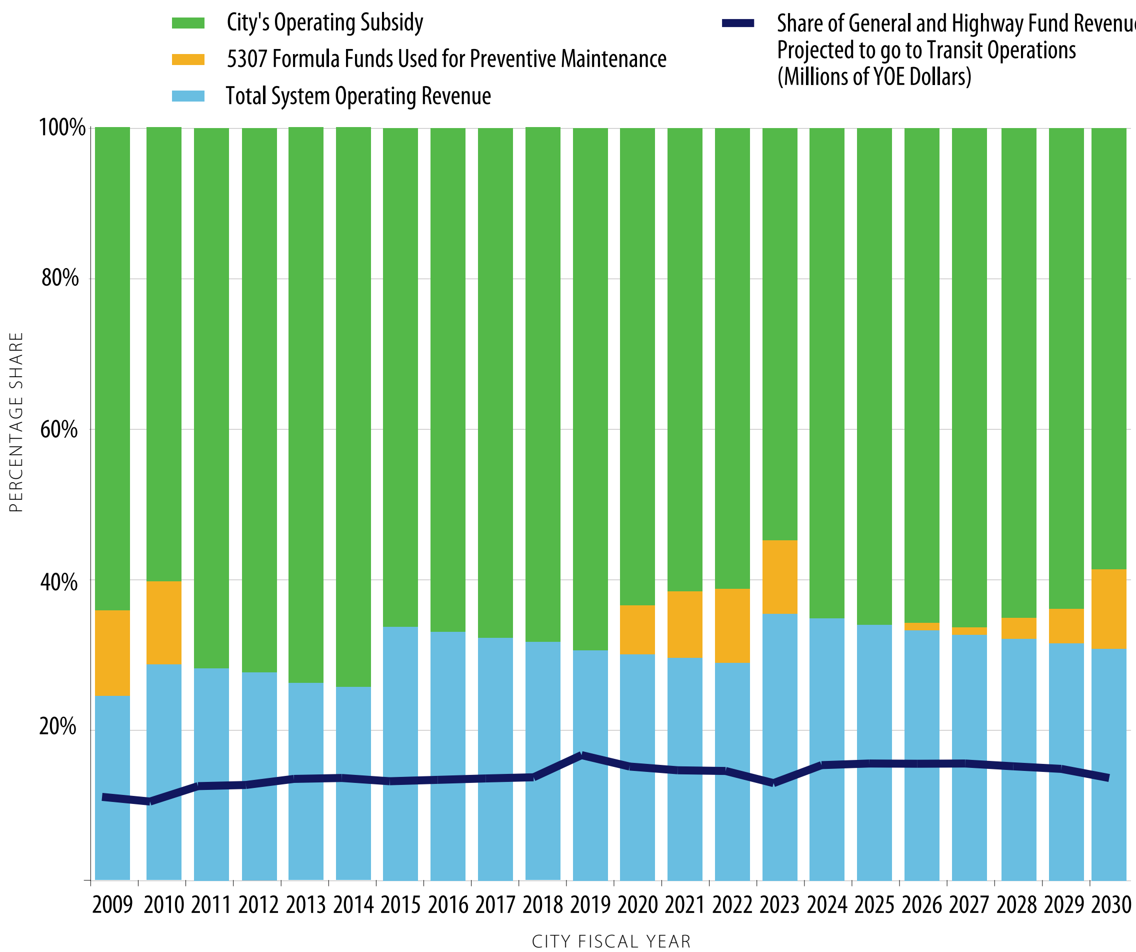

Figure 6-3 Transit System Operating Revenues and City Subsidy

present economic conditions, this percentage is likely to increase through FY2030, averaging 13.9 percent over the entire forecast period with the Project. While higher than the historical average, this increase is not unprecedented. In 2001, the City spent approximately 15 percent of its General and Highway Fund revenues on transit (although property taxes were not increased to pay for the higher percentage), and the Project affords substantially more overall service than what was provided at that time.

6.5 Cash Flow Analysis

The cash flow analysis compares costs with revenues on a year-by-year basis, factoring in financing as necessary. Table 6-4 summarizes funding sources and the use of funds for the Project over the forecast period. The *Honolulu High-Capacity Transit Corridor Project Summary Cash Flow Tables* (RTD 2009g) presents the year-by-year cash flow for the Project.

6.5.1 Financing Assumptions for the Project

This financial analysis assumes that GET surcharge revenues will be the only source of funding through FY2010 adding Federal Section 5307 formula funds and Section 5309 New Starts funds beginning in 2010.

In years when GET surcharge revenues and/or Federal funding are not sufficient to meet the cash flow requirement to cover capital expenditures, a mix of City GO Bonds and short-term construction

Table 6-4 Project Sources and Uses of Capital Funds (millions of YOE $)

Sources of Funds	FY2009–2030
Project beginning cash balance (FY2009)	154
Net GET surcharge revenues	3,524
FTA Section 5309 New Starts	1,550
FTA Section 5307 Formula Funds (including $4m ARRA)	305
Interest income on cash balance	11
Total Sources Funds	**5,544**
Uses of Funds	**FY2009–2030**
Capital cost	5,115
Interest payment on long-term debt	359
Finance charges on short-term construction financing	20
Other finance charges	19
Project ending cash balance	31
Total Uses Funds	**5,544**

Source: Honolulu High-Capacity Transit Corridor Project Financial Plan

borrowing will be used to bridge the funding gap. The weighted average interest rate on long-term debt is assumed to be 3.27 percent, which is consistent with the City's current Standard & Poor's AA financial rating and based on rates as of April 8, 2009. All GO debt is assumed to mature in FY2023, corresponding to the last fiscal year of receipt of GET revenues.

The total finance charges incurred for the Project will be $398 million. Most of these finance charges will correspond to interest payments on GO Bonds. The remainder will include finance charges related to the cost of issuance of GO Bonds and short-term borrowing and the interest expense on short-term borrowing.

Interest will be earned on any positive year-end cash balances, which has been calculated at a conservative 1 percent per year. Interest income is expected to generate $11 million for the Project (YOE $).

6.5.2 Ongoing Capital Expenditure Cash Flow

Systemwide ongoing capital expenditures include all necessary replacement, rehabilitation, and improvements to the existing system (TheBus and TheHandi-Van) as well as the Project. Funding sources used to pay for these capital expenses consist of discretionary and formula-based Federal funding programs (see Section 6.3.3 for descriptions of these programs). Any resulting funding gap is assumed to be bridged on an annual basis with City GO Bonds, as is currently the case with transit-related budgets. Therefore, the resulting ongoing capital sources and uses will balance in any given year.

6.5.3 Operating and Maintenance Expenditure Cash Flow

O&M funds will be used for TheBus and TheHandi-Van as well as for the Project. Sources of O&M funds include farebox revenues and Federal assistance for preventive maintenance; any remaining funding requirements are assumed to be funded through City contributions from its General and Highway Funds. The resulting operating sources and use of funds will balance in any given year. The Summary Cash Flow Tables (RTD 2009g) includes year-by-year ongoing operating expenditure cash flows.

6.6 Risks and Uncertainties

The financial analysis described in this chapter and the sources and uses of funds are subject to a number of risks and uncertainties. Some risks are project-specific and others are related to macro-level uncertainties affected by the local and global economies. Although this analysis has defined a set of most likely scenarios based on the cost, revenue, funding, and financing assumptions described, several operating and capital risks could materially affect the final financial results. Uncertainties can be organized into the following major categories.

6.6.1 Project Cost Risks

Changes in Project Scope

Most projects, especially large infrastructure projects such as this one, have uncertainties associated with the definition of the project. At this stage of project planning, there are often numerous decisions and project refinements that will be made as the project design progresses. Assumptions may be revisited and confirmed or modified during New Starts Preliminary Engineering and Final Design. Scope changes may also result from the following:

- Physical barriers, such as unexpected utility locations or groundwater
- Community involvement
- Changes in political leadership
- Budget constraints that lead to scope reductions

Changes in Project Schedule

Scheduling delays, the availability of skilled labor, vehicle delivery, and unforeseen construction challenges can all lead to cost increases that may affect the financial plan for a project. Schedule changes might result from project changes, local decision-making processes, equipment malfunctions, and construction delays. As a project becomes more complex, tasks become larger and they often have more dependencies. Every task's duration is dependent on factors that can be outside of an agency's control.

The choice between different procurement mechanisms may affect phasing of the Project, as well as the timing of capital outlays. Some efficiencies may be gained from using an innovative procurement approach, such as design-build or design-build-operate-maintain. Depending on the general approach that the City pursues, this procurement method could change at various milestones throughout the Project.

6.6.2 Economic and Financial Risks

Inflation

Inflation is applied to both costs and revenues. Project construction costs have been escalated using individual cost component rates that vary according to demand and supply at a global, regional, and local level, as well as the overall local economic environment. Commodity components (cement, steel, and other critical construction materials) may be subject to similar fluctuations in prices that could affect project costs. Right-of-way costs are closely related to property values, and labor rates will depend on the results of periodic contract negotiations.

Interest Rates and Municipal Market Uncertainties

As in any capital project requiring the issuance of debt, the Project is subject to uncertainty around fluctuations in interest rates. Variations in interest rates could affect the interest earnings rate on cash balances and the interest paid on any outstanding debt, as well as the size of the debt requirements to finance the Project. Fluctuations in interest rates are influenced by a number of factors, including the credit rating of the bond issuer (the City) and market risks associated with local or global financial conditions. Variations in interest rates could also influence the level of working capital and the ability to both operate existing service and undertake new initiatives.

Credit Rating

This financial analysis assumes that the City's credit quality will remain at its current Standard & Poor's AA rating. Adverse economic conditions or shifts in the City's debt policies could affect its credit rating and increase the cost of borrowing accordingly. Most importantly, the credit quality of the City is likely to be influenced by the size of the City's capital program and its ability to remain below the current affordability guidelines set by the City Council.

Market Uncertainty

As with any interest rate, the yield curves on debt assumed in the financial analysis are subject to global market conditions. Recent turmoil in the credit markets is a case in point and has prompted the Federal Reserve to react with a series of interest rate cuts that influence the market in general and the finance cost for the Project in particular. This uncertainty is further enhanced by the fact that, given baseline assumptions, the first debt issuance for the Project capital expenditures is not expected to occur before 2012. Because it is assumed that the City will continue to be able to issue bonds in the tax-exempt municipal marketplace, uncertainties about market factors must be evaluated.

Based on the assumptions and analysis presented in this Financial Plan, a 1.0 percent increase in interest rates is estimated to correspond to an increase in interest costs of approximately $130 million over the forecast period.

6.6.3 Capital Revenues

GET—Scenario Based on Council on Revenues Growth Rates (Downside Risk)

In the short term, GET surcharge revenues are subject to uncertainties related to the magnitude and timing of the economic recovery on O‘ahu. Over the longer term, GET surcharge revenues on O‘ahu depend on a variety of underlying economic factors outside of the City’s control that may result in a higher or lower projection than the one used in this Final EIS.

Federal Funding: New Starts, 5307, 5309 Fixed Guideway Modernization—Reauthorization and Appropriation Risk

The Project assumes Federal funding participation through the Section 5307 Urbanized Area Program and the Section 5309 New Starts Program. Federal legislation that authorizes these programs (SAFETEA-LU) expired at the end of September 2009 but has been extended in anticipation of a new authorization in 2010. While these programs have been in place for many years, through several authorization cycles, there is a possibility that Congress will change direction in the next authorization cycle. They could increase or decrease the amount of funds available, impose new rules on project eligibility, or revise the criteria that are used to evaluate potential projects. The timing of new authorization legislation is also uncertain.

The amount of the FTA contribution will be spelled out in a Full Funding Grant Agreement (FFGA) between FTA and the City. The FFGA will also identify the amount to be made available each year. Although history has shown that Congress ultimately honors and appropriates the full amount identified in an FFGA, Congress could delay funding for the Project by reducing or delaying the annual appropriations. Any delay could necessitate additional borrowing or schedule delays, potentially delaying funding authority or increasing the Project’s capital cost.

Other Federal Funding Opportunities

A number of proposals for increased funding for transit are being considered, either as part of the reauthorization of SAFETEA-LU or other legislation. For example:

- The National Surface Transportation Policy and Revenue Study Commission recommended a significant increase in funding and a restructuring of the FTA and FHWA programs. Its recommendations included creation of a new Metropolitan Mobility Program, which would place increased emphasis on public transportation.
- The ARRA of 2009 created new funding opportunities for transit, including $100 million in funding for Transit Investments for Greenhouse Gas and Energy Reduction Grants, as well as a new $1.5 billion multimodal discretionary program. These new programs may be precursors to the next reauthorization of the surface transportation programs. Grants under the multimodal discretionary

program will go to projects with a significant impact on the nation, a metropolitan area, or a region and may range up to $300 million. Priority will be given to projects that can be completed within three years, and funds must be obligated by September 30, 2011.

- Congress is considering comprehensive climate and energy legislation that would fund the expansion of environmentally friendly modes of transportation, including transit. Funding could be provided through new cap-and-trade legislation designed to reduce greenhouse gas emissions.

Lower Amount of GET Surcharge Revenues Retained by the State

The enabling legislation for the County GET surcharge specifies that 10 percent of GET surcharge revenues be retained by the State for administrative and collection purposes. A decrease of this percentage from 10 to 5 percent would increase GET revenues by $183 million from FY2009 to FY2023.

6.6.4 Operating Revenues

Fare Policy and Ridership

Growth in transit ridership is subject to uncertainties because the availability of alternate modes and riders' price sensitivity could affect ridership, at least in the short-term. For purposes of this Final EIS, the assumption is made that there will be free transfers to and from the fixed guideway service. Upside risks also exist and demand could be higher than expected. Although this would affect fare revenues positively, it could also increase the system's level-of-service requirements.

Other Potential Operating Sources

- **Advertising and Other Nonfare Operating Revenues—**expanding the advertising program could generate significantly more than the approximately $400,000 received by the City for bus advertisements. With the introduction of rail service, not only will there be an ability to advertise within each railcar, but the stations could present viable advertising locations. Based on FTA's 2007 *National Transit Database* data, Honolulu receives approximately $0.006 per boarding, while some larger transit systems in the U.S. receive 10 to 40 times that amount.
- **Parking Revenues—**demand for park-and-ride stations is forecast to be strong with the Project. Charging even a nominal amount for daily parking could generate a significant amount of revenue. Collected parking funds could be used for capital and operating costs as parking fees could be bonded to offset the construction costs of the parking lots and structure or revenues could be used to offset operating costs of the parking facilities, such as those incurred to pay for garage attendants and security personnel.
- **Reduced Service Redundancies between Bus and Rail Operations—**the addition of the Project to existing bus service will likely result in some overlap of service between bus and rail. While some bus service and route modifications are planned as the Project is implemented, there is a possibility to further modify existing bus service as rail ridership increases. This would affect ongoing bus fleet replacement cycles since fewer buses may need to be replaced as more are removed from service, thus affecting O&M costs for the bus fleet.
- **Adjust City Highway Fund Revenues (Vehicle Registration Fees, City Gas Tax)—**the financial analysis assumes revenues from the City's General and Highway Funds will grow at historical real growth rates plus general inflation. As a general purpose local government, the City has the authority to raise other local tax revenues over and beyond the baseline growth rate assumed for the General and Highway Fund revenues in this financial analysis. Both funds consist of a variety of tax revenues, including property taxes, but also include fuel tax and motor

- vehicle weight tax, which are the two largest sources of revenues for the Highway Fund.
- **FTA Formula Funds**—Section 5307 funds could become available following reauthorization or if GET revenues are higher than expected (which would allow for a reduction in the use of 5307 funds for the Project's capital needs). While Section 5307 funds are used for capital purposes in priority, any remaining amount is allocated to operations for preventive maintenance purposes. Uncertainties in the Capital Plan could also affect the amount of Section 5307 funds used for operations and decrease the local amount of operating subsidy required.

6.6.5 Operating Costs

Operating Cost Escalation—Labor Cost, Energy Prices

The financial analysis assumes that operating expenditures will increase following general inflation. However, certain operating cost components may increase at a faster or slower rate depending on local conditions. Increases in labor costs are subject to local union bargaining agreements. This includes transit employee health care costs and fringe and other benefits. Energy costs in Honolulu are highly driven by oil prices and, therefore, subject to the same volatility. The operating cost estimate in the financial analysis assumes a 3 percent upward adjustment to electricity prices as compared to the Washington Metropolitan Area Transit Authority (WMATA), but this may be a conservative assumption if oil prices remain at their current relatively low levels.

System Operations—Drivers, Station and Train Attendants

The O&M cost methodology used the WMATA as a base for forecasting operating costs per station since this agency had the most relevant and available data set. However, once the system is built and operational, there may be a number of uncertainties in station operations that could affect operating costs, both negative and positive. These include station managers, labor productivity, fare collection systems, security, and salaries. These costs are all accounted for in the operating cost estimates, but are elements of the system that could result in uncertainties over time.

A change in the bus vehicle fleet allocation may also reduce operating costs as well as affect bus replacements costs. The City is reconsidering a policy to move toward a fleet in which all articulated buses are hybrids in favor of more economical, yet still environmentally friendly, clean diesel vehicles. Changes to that policy may significantly affect system operating costs as well as ongoing capital costs. A hybrid bus costs approximately $1 million to replace, while a diesel bus costs approximately $650,000. However, hybrid buses are less expensive to operate and have operating cost savings of approximately $5,000 per peak vehicle over similar diesel buses.

07

CHAPTER

Evaluation of the Project

This chapter compares the Honolulu High-Capacity Transit Corridor Project to the No Build Alternative from several perspectives. Section 7.1, Changes to this Chapter since the Draft Environmental Impact Statement, summarizes how this chapter has changed since the Draft Environmental Impact Statement (EIS). Section 7.2, Effectiveness in Meeting Project Purpose and Need, draws on information in prior chapters and summarizes how well the Project meets its Purpose and Need. Section 7.3, Transportation and Environmental Consequences, discusses the Project's potential effect on transportation and the environment. Section 7.4, Cost-effectiveness, adds a cost perspective to the effectiveness comparison, to consider the Project's benefits in justifying its capital and operating costs. Section 7.5, Financial Feasibility, looks at affordability given available funding sources. Section 7.6, New Starts Program, summarizes the Project's ratings in the Federal Transit Administration (FTA) New Starts Program. Section 7.7, Important Trade-offs, is a discussion of trade-offs to be made in implementing the Project. The chapter concludes with Section 7.8, Unresolved Issues.

The evaluation measures used in this chapter reflect local goals for the Project (described in Chapter 1, Background, Purpose and Need) as well as FTA criteria for evaluating projects proposed for funding under the Section 5309 New Starts program. FTA criteria that are meaningful to an analysis of the Project include user benefits and development potential (both measures of effectiveness) and the FTA's cost-effectiveness index. By including these criteria, this chapter fulfills Council on Environmental Quality regulations (40 CFR 1502.23), which require that an EIS "indicate those considerations, including factors not related to environmental quality, which are likely to be relevant and important to a decision."

7.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been updated to reflect the identification of the Airport Alternative as the Project and to reflect updated and additional analysis presented in the other chapters of this Final EIS. Transportation data have been updated, as described in Chapter 3, Transportation. Section 7.6 has been added to document FTA's approval of the Project to enter the Preliminary Engineering phase of the New Starts process. Section 7.7 has been modified to compare the Project to the No Build Alternative. Section 7.8 has been added to address unresolved issues related to the Project.

7.2 Effectiveness in Meeting Project Purpose and Need

Section 1.8, Need for Transit Improvements, of this Final EIS describes four needs that the Project is intended to meet. This section evaluates how well each alternative meets these needs, based on the variety of measures of effectiveness shown in Table 7-1. Several of these measures are primarily intended to address local goals, while others are also factors considered in FTA New Starts evaluations.

7.2.1 Improve Corridor Mobility

Just as mobility and congestion have worsened over the years, conditions in 2030 will be worse than today. Despite implementation of the planned $3 billion in roadway improvements identified in the *O'ahu Regional Transportation Plan 2030* (ORTP), the No Build Alternative still would not relieve traffic congestion for drivers or improve mobility for transit riders compared to today. Average travel times along major corridors would increase. Locations farthest from employment centers would experience the largest increase in congestion, decline in mobility, and constrained access. The Project will substantially improve corridor mobility compared to the No Build Alternative.

As shown in Table 7-2, vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD) would increase under the No Build Alternative compared to today. Vehicular traffic volumes on major roadways would grow substantially between now and 2030. Increases in a.m. peak-hour traffic across screenlines would range from approximately 10 to 50 percent (Table 3-9 in Chapter 3).

For TheBus and TheHandi-Van riders, these increases in highway congestion would directly affect their mobility because travel times on buses would increase. For the No Build Alternative, transit would continue to operate in mixed traffic, except on several short bus-only segments and in high-occupancy vehicle lanes on freeways. As shown in Figure 3-6 in Chapter 3, average transit speed has dropped by approximately 10 percent

Table 7-1 Project Goals and Objectives

Goal	Measure of Objective
Improve corridor mobility	• Transit ridership (daily linked trips) • Transit user benefits • Corridor travel time • Vehicle miles of travel (VMT) • Vehicle hours of travel (VHT) • Vehicle hours of delay (VHD)
Improve corridor travel reliability	• Percent of transit trips using fixed guideway • Percent of transit passenger miles in exclusive right-of-way
Improve access to planned development to support City policy to develop a second urban center	• Development within station area compared to existing amount of development
Improve transportation equity	• User benefits to transit-dependent communities • Percent of project costs borne by communities of concern

Table 7-2 Effectiveness of Alternatives in Improving Corridor Mobility

Measure	2007 Existing Conditions	Alternative (2030)	
		No Build	Project
Transit Travel Time (minutes)			
Wai`anae to UH Mānoa	128 minutes	121 minutes (1 transfer)	93 minutes (2 transfers)
Kapolei to Ala Moana Center	101 minutes	105 minutes	59 minutes
Transit Performance			
Transit ridership (daily linked trips)	184,700	226,300	282,500
Transit user benefits (hours per year)	n/a	n/a	20,775,000
Highway Performance			
Daily islandwide vehicle miles traveled (VMT)	11,232,400	13,623,100	13,049,000
Daily islandwide vehicle hours traveled (VHT)	325,700	415,600	383,800
Daily islandwide vehicle hours of delay (VHD)	71,800	104,700	85,800

since 1984 (from 14.6 to 13.2 mph) and would continue to decline through 2030 to approximately 12.7 mph under the No Build Alternative.

The Project will increase average transit speeds by approximately 25 percent compared to the 2030 No Build Alternative (Figure 3-6 in Chapter 3), leading to higher transit ridership and travel time savings for existing and new transit users. Transit travel times between major destinations will decrease up to 60 percent compared to the No Build Alternative (Table 7-2). As transit becomes a faster, and thus more attractive, travel choice, ridership will increase. As shown in Table 7-2, transit ridership will increase by approximately 56,200 trips per day (25 percent) by 2030 with the Project compared to the No Build Alternative, and transit users will save more than 20 million equivalent hours of travel time per year by 2030.

Increases in transit ridership will benefit highway users as well by removing drivers from the roadways through better transit service. The Project will reduce traffic congestion and improve mobility compared to the No Build Alternative (Table 7-2). Daily VMT will decrease by 4 percent; VHT will decrease by 8 percent; and VHD will decrease by 18 percent.

7.2.2 Improve Corridor Travel Reliability

With the No Build Alternative, travel reliability for both drivers and transit riders would decrease by 2030. Because delay on the system is not predictable from one day to another, reliability for drivers would worsen. The large increase (46 percent) in VHD that would occur with the No Build Alternative includes an element of unpredictability that requires special accommodations in travel planning. Average travel times would increase somewhat under the No Build Alternative, but the impact on reliability would be more dramatic, especially in the morning. The reason is that drivers are forced to allocate more time to account for the possibility that unexpected delays will occur. These unknowns make it difficult to estimate a trip's duration when scheduling appointments.

All transit riders would experience similar decreases in reliability under the No Build Alternative. Problems with turnbacks and schedule adherence already plague the transit system. These reliability factors are expected to get worse in the future as the highway system becomes more congested.

With the Project, reliability for transit riders will increase substantially as trips are moved from buses operating on streets in mixed traffic and congested freeways to the fixed guideway, which will provide a predictable travel time. Forty-three percent of transit trips and transit passenger miles will be carried on an exclusive fixed guideway that is not subject to traffic delay (Table 7-3).

With the Project, bus passengers will also realize service reliability as a result of route restructuring that replaces long-haul bus routes with shorter local routes integrated with the fixed guideway system. Driver and bus transit reliability will also improve as a result of reduced congestion and delay on the highway.

Table 7-3 Effectiveness of Alternatives in Improving Corridor Travel Reliability

Measure	2007 Existing Conditions	Alternative (2030)	
		No Build	Project
Percent of transit trips carried on fixed guideway	0%	0%	43%
Percent of transit passenger miles in exclusive right-of-way	1%	1%	43%

7.2.3 Improve Access to Planned Development to Support City Policy to Develop a Second Urban Center

A goal of the Project is to support urban development consistent with the City General Plan (DPP 2002a), which is the blueprint for future population and employment growth. By providing improved mobility and access, a fixed guideway transit facility can serve as a catalyst for shaping development patterns in a corridor.

Although both of the alternatives are generally consistent with Local, District, and State plans, the Project best serves the areas of O‘ahu designated for future growth and development.

Compared to the No Build Alternative, the Project will support a greater amount of development and redevelopment around stations by enhancing access and supplying a daily influx of transit riders and potential customers for businesses.

With the Project, approximately 60,000 additional residents and 27,000 new jobs will be located within walking distance to project stations in 2030. As shown in Table 7-2, the “second city” planned for Kapolei will experience transit travel times to Ala Moana Center that are reduced by 44 percent compared to the No Build Alternative. The improved transit conditions are further illustrated in Figure 7-1, which shows travel time savings for the majority of transit users in ‘Ewa and Central O‘ahu, which are areas planned for future development. Section 3.4.2 describes the travel time savings calculation. By providing better transit access, the Kapolei area will be better able to grow and develop than it would be if it remained isolated from the rest of the region by congested roadways.

7.2.4 Improve Transportation Equity

Equity relates to the fair distribution of a project’s benefits and impacts, so that no group would carry an unfair burden of a project’s negative environmental, social, or economic impacts or receive less than a fair share of a project’s benefits. This section focuses on considering the following evaluation criteria:

- Population segments benefiting from alternative investments
- Population segments paying for alternative investments
- Net benefits by population segment, compared to needs

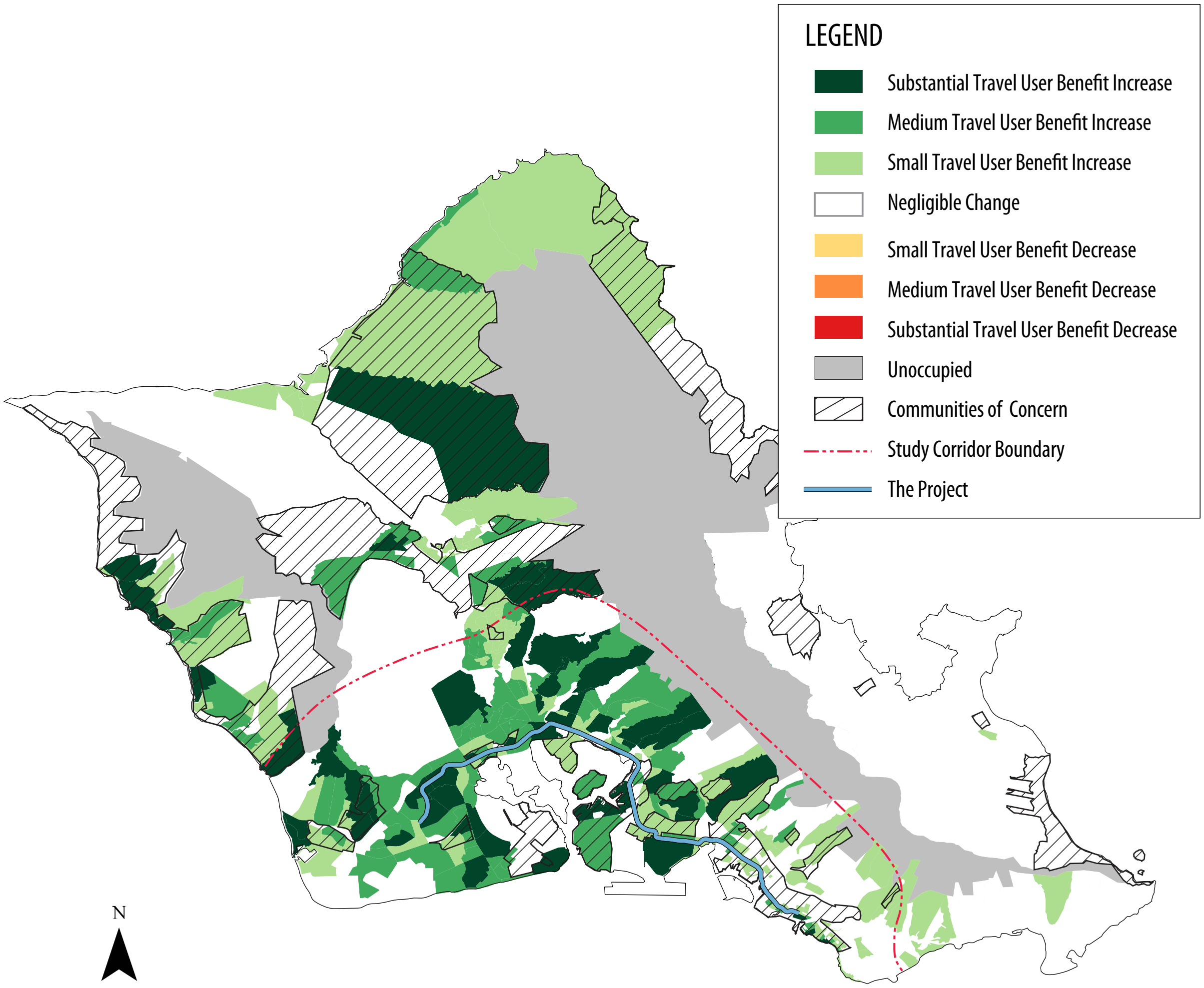

Figure 7-1 Communities of Concern and User Benefits for the Project Compared to the No Build Alternative

- Travel-time savings for transit-dependent populations

Approximately 35 percent of Oʻahu's population currently lives in areas that have concentrations of communities of concern. Communities of concern are defined as concentrations of minority, low-income, transit-dependent, and linguistically isolated households (Figure 7-1).

The Project will provide service where the transit need is greatest, connecting areas that have the highest transit dependency, which includes communities of concern. Thirty-six percent of the population within communities of concern will be located within one-half mile of a transit station in 2030.

The Project will provide transit travel-time savings to approximately 61 percent of the islandwide population in 2030 compared to the No Build Alternative (Table 7-4). Of the 35 percent of the island's population that resides in areas containing concentrations of communities of concern, over half would realize a substantial transit travel-time savings. The rest of the island's population that resides in areas with concentrations of communities of concern will experience little change in transit travel time as a result of the

Table 7-4 Equity Comparison of 2030 Transit Travel-time Savings for the Project Compared to the No Build Alternative

Percent of Islandwide Population	That will experience	Percent of Population within Category	
		Within Communities of Concern	Outside Communities of Concern
61%	Travel-time savings compared to the No Build Alternative	34%	66%
39%	Negligible travel-time change compared to the No Build Alternative	36%	64%
0%	Travel-time increase compared to the No Build Alternative	0%	0%

Project. None of the population will experience an increase in travel times.

Tourists pay approximately 30 percent of the General Excise and Use Tax (GET) surcharge collected, which is the Project's local funding source. The remaining local transit investment costs are distributed throughout the island in proportion to how much each individual expends on goods and services.

The Project will substantially improve transportation equity compared to the No Build Alternative. Based on demographics within the study corridor, the demand and need for public transit on O'ahu is greatest within the areas served by the Project (Figure 1-8 in Chapter 1).

7.3 Transportation and Environmental Consequences

The Project's effect on transportation and the environment would differ substantially from the No Build Alternative.

7.3.1 Transportation

The Project will have a positive effect on transit use within the study corridor, which will help reduce delay in the transportation system as a whole, regardless of travel mode (Table 7-2).

The Project will affect parking availability, both during construction and permanently, once the Project is complete and in operation. The Project will remove approximately 865 parking spaces, most of which will not be replaced. Landowners will be paid fair market value for the land, including lost parking spaces, which is consistent with the requirements of the U.S. Uniform Relocation Assistance and Real Property Acquisition Policies Act. On-street parking spaces will generally not be replaced; however, there is available parking nearby to accommodate drivers currently using these spaces. The City will conduct surveys to determine the extent of spillover parking near stations and implement mitigation strategies as needed. Potential strategies include the addition of parking supply, parking restrictions, and shared parking arrangements.

During the construction period, lanes will be closed for construction of the overhead guideway located in the median of existing roadways. Although the time to build these improvements will be kept as short as possible, one or more lanes in sections of major highways will be closed while columns are placed and the guideway erected.

7.3.2 Environmental Consequences

The Project will convert 160 acres of land to transportation use. This includes approximately 88 acres of currently prime, unique, or important farmland. However, all of this land is already planned for conversion to non-farm use by other projects, including the Ho'opili Development. The Project will acquire land from 204 properties (Table 4-4 in Chapter 4, Environmental Analysis, Consequences, and Mitigation).

With mitigation, Project-generated noise will not exceed the FTA impact criteria at any location.

Construction of the Project could encounter contaminated soils. Six potentially contaminated sites will be acquired by the Project and other sites are near the Project. Any contamination encountered during construction will be treated in accordance with Federal and State regulations.

The Project will require removal of approximately 550 street trees and pruning of approximately 100 additional street trees. Approximately 55 percent of the removed trees are anticipated to be able to be transplanted.

Archaeological resources and burials are anticipated to be encountered. The area Koko Head of Moanalua Stream has the highest potential for effects to archaeological resources and burials. The Project will adversely affect 33 historic resources.

The Project will reduce air pollution, energy consumption, and water pollution compared to the No Build Alternative.

7.4 Cost-effectiveness

The cost-effectiveness analysis considers whether the Project's benefit would justify its capital and operating costs.

Cost-effectiveness is one of the key criteria that FTA uses to evaluate projects proposed for Section 5309 New Starts funding. The FTA's cost-effectiveness index is a ratio formed by adding an alternative's annualized capital cost to its year 2030 operating and maintenance cost and dividing the total by user benefits. Costs and benefits were both calculated compared to a New Starts baseline alternative that represents the best that can be done to improve transit service in the study corridor without building a fixed guideway transit facility. The baseline alternative includes all projects in the ORTP.

The cost-effectiveness indices for the Project compared to the baseline is within the "medium" range established by FTA for its New Starts ratings, which, along with other considerations, is currently required to qualify for New Starts funding (Table 7-5).

Table 7-5 2030 Cost-effectiveness of the Project

Measure	Project
Cost per hour of transportation system user benefits	$16.24

7.5 Financial Feasibility

7.5.1 Measure of Capital Financial Feasibility

The primary source of capital for the Project is the GET surcharge revenue. This source will fund more than 70 percent of the cost of the Project. The remainder of project funding will be from Federal transit sources, primarily from the Section 5309 New Starts program, supplemented as necessary by formula Section 5307 funds. While the financial plan is balanced, any capital funding shortfalls, including any shortfall on debt repayment incurred from the issuance of bonds, would need to be covered using additional revenues from other as-yet-unidentified sources. Possible sources are listed in Section 6.3.3 of this Final EIS. The amount of other revenues required over and above GET surcharge and New Starts revenues provides a measure of the relative financial feasibility of the Project. Operating costs for the transit system as a whole represent an average of 13.8 percent of the City's annual operating budget between 2019 and 2030 (Table 7-6). The Project represents approximately 25 percent of that amount.

Table 7-6 2030 Financial Feasibility

Measure	No Build Alternative	Project
Other City revenues required for capital (million year-of-expenditure dollars)	n/a	$0
Average percentage of City General and Highway Funds needed for operating and maintenance	12%	14%

The Project is financially feasible based on this measure because it would not require additional funding sources beyond the GET surcharge revenues and Federal funds.

7.5.2 Measure of City Financial Contribution for Operating and Maintenance

Fare revenues will need to be supplemented to cover total future operating and maintenance costs. As with the current bus transit system, additional funding will be obtained through an allocation from the City's General and Highway Funds. Between fiscal years 1994 and 2007, an average of 11 percent of the total revenue from General and Highway Funds revenues was spent on transit (the maximum was 15 percent in 2001). A measure of the relative operating financial feasibility for the Project is the City's contribution to transit operations as a percentage of total forecast General and Highway Funds revenues.

7.5.3 Comparison of Alternatives

The Project will be financially feasible with the currently identified capital revenue sources. It will increase the total operating and maintenance subsidy from the City's General and Highway Funds by about 2 percent.

7.6 New Starts Program

The Section 5309 "New Starts" program is the Federal government's primary program for providing financial support to locally planned, implemented, and operated fixed-guideway transit major capital investments. FTA documents the New Starts evaluation as part of the National Environmental Policy Act process, for which this EIS is being prepared. This section describes how FTA evaluates projects for its New Starts funding recommendations and provides the ratings for this Project. Section 5307 formula allocation funds have been used for repair and replacement of buses. A portion of these funds will be dedicated to the Project to cover any shortfall after the GET surcharge and New Starts funding have been applied. Section 5307 funds will increase as a result of implementation of the Project, which makes it a reasonable project funding option.

7.6.1 Background

Each year, FTA submits its Annual Report on New Starts to Congress as a companion document to the annual budget submitted by the President. The report provides recommendations for the allocation of New Starts funds under Section 5309 of Title 49 of the United States Code. As required by the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (PL 2005), FTA uses the following project justification criteria to evaluate New Starts projects: mobility improvements, cost-effectiveness, operating efficiencies, land use and economic development, environmental factors, and other factors. FTA must also consider the local financial commitment for the proposed project.

FTA reviews the project justification and local financial commitment criteria for each candidate project and assigns a rating for each criterion. For some of the project justification criteria, the proposed project is compared against a baseline alternative. A candidate project is given an overall rating of "High," "Medium-High," "Medium," "Medium-Low," or "Low" based on ratings assigned by FTA to each of the project justification and local financial commitment criteria described above. FTA will not recommend funding for projects that are rated "Medium-Low" or "Low."

A rating of "High," "Medium-High," or "Medium" does not automatically translate into a funding recommendation, although the potential for receiving New Starts funding is much greater.

Project evaluation is an on-going process. FTA evaluation and rating occurs annually in support of budget recommendations presented in the *Annual Report on New Starts* and when projects request FTA approval to enter into Preliminary Engineering or Final Design. Consequently, as proposed New Starts projects proceed through the project development process, information concerning costs, benefits, and impacts is refined and the ratings updated to reflect new information.

7.6.2 Ratings for the Project

FTA approved the Project's entry into Preliminary Engineering on October 16, 2009, giving the Project an overall rating of "Medium," which is sufficient for the Project to be advanced in the Federal project development process and for the Project to be recommended for Federal funding. If these results hold up through subsequent phases of project development, along with other FTA considerations, the Project will be in the competitive range for funding consideration. Funding recommendations are made each year from among the projects that have completed the planning and project development process, including the National Environmental Policy Act process. These recommendations reflect the merits of the projects competing for available Federal funds at the time, as well as the availability of New Starts funding authorization.

Mobility Improvements

The mobility improvement rating considers the number of transit trips using the Project; user benefits per project passenger mile; number of trips by transit-dependent riders using the Project; transit-dependent user benefits per project passenger mile; and share of user benefits received by transit-dependent riders compared to share of transit-dependent individuals in the region (Table 7-7).

Table 7-7 Mobility Improvements (2030)

Measure	Project
Number of transit trips using the Project	116,300
Increase in transit ridership	20%
User benefits per project passenger mile	3.6
Number of trips by transit-dependent riders using the Project	18,600
Transit-dependent user benefits per project passenger mile	3.1
Share of user benefits received by transit-dependent riders compared to share of transit-dependent individuals in the region	12.4%

Cost-effectiveness

The Project is rated "Medium" for cost-effectiveness. The cost-effectiveness rating considers the incremental cost per hour of user benefits and the incremental cost per incremental passenger in 2030 (Table 7-8).

Table 7-8 Cost-effectiveness (2030)

Measure	Project
Incremental cost per hour of user benefits	$16.24
Incremental cost per incremental passenger in 2030	$16.17

Operating Efficiencies

The Project is rated "Medium" for operating efficiency. The operating efficiencies rating considers the ratio between the increase in passenger miles and the increase in operating and maintenance costs (Table 7-9).

Table 7-9 Operating Efficiencies (2030)

Measure	Project
Cost per passenger mile (New Starts baseline)	$0.41
Cost per passenger mile (Project)	$0.34
Difference in cost per passenger mile	$0.07 cost savings

Land Use and Economic Development

The Project is rated "Medium" for Land Use and "Medium-High" for Economic Development. The land use rating considers existing land use, transit-supportive plans and policies and performance and impacts of policies (Table 7-10).

Table 7-10 Land Use and Economic Development (2030)

Measure	Project
Population in corridor	764,640
Employment in corridor	524,240
Corridor population as percentage of metropolitan area	68%
Corridor employment as percentage of metropolitan area	83%
Corridor population density (persons per square mile)	5,054
Corridor employment density (persons per square mile)	3,465

Environmental Benefits

The Project is rated "Medium" for environmental benefits because O'ahu is in attainment for all transportation-related air pollutants.

Local Financial Commitment

Overall the Project is rated "Medium" for local financial commitment. The GET surcharge that was enacted in 2005 provides a local funding source that will cover more than 70 percent of total project costs. The combination of local tax revenue and Federal Section 5309 and 5307 funds will provide a stable capital financing plan for the entire transit system. Fares and property and gas taxes support the system's operating financial plan (Table 7-6).

7.7 Important Trade-offs

In selecting the Airport Alternative for the Project, DTS considered the evaluation results presented in the Draft EIS, comments from agencies and the public, and City Council Resolution 08-261.

This Final EIS evaluates the Project in comparison to the No Build Alternative. This trade-off analysis highlights the areas that are distinctly different between the No Build Alternative and the Project (Table 7-11). The Project will meet the project goals and objectives identified in Chapter 1 of this Final EIS. The Project will improve corridor mobility, corridor travel reliability, access to planned development to support City policy to develop a second urban center, and transportation equity. The Project will achieve the Purpose and Need in a cost-effective manner. Although implementation of the Project will require a substantial investment, it is financially feasible.

7.8 Unresolved Issues

As identified in Section 4.21, Anticipated Permits, Approvals, and Agreements, of this Final EIS, several permits are still required for construction of the Project. Many of the permits will be sought in the Final Design phase after the Federal Record of Decision has been issued. The permits may place additional conditions on the Project.

Federal funds from the Section 5309 New Starts program have not been committed. They will be committed by FTA at completion of the Full-funding Grant Agreement.

Table 7-11 Trade-offs

Measure	No Build Alternative	Project
Goals and Objectives		
Improve corridor mobility		✓
Improve corridor travel reliability		✓
Improve access to planned development to support City policy to develop a second urban center		✓
Improve transportation equity		✓
Transportation		
Transit travel time		✓
Transit ridership		✓
Systemwide traffic congestion		✓
Environmental		
Displacements	✓	
Visual and aesthetic conditions	✓	
Air quality		✓
Noise	–	–
Energy		✓
Water quality		✓
Historic resources	✓	
Cultural resources	✓	
Financial		
Financial feasibility	–	–
Cost-effectiveness		✓

✓ = Causes least damage or best protects, preserves, or enhances resource.

– = No difference between alternatives.

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08

CHAPTER

Comments and Coordination

Agencies, non-governmental groups, and the public have been engaged throughout the planning process for the Honolulu High-Capacity Transit Corridor Project, as required by Federal and State law. The *National Environmental Policy Act* (NEPA) (USC 1969) mandates agency and public participation in defining and evaluating the impacts of the project alternatives. The Project has followed Section 6002 of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) (PL 2005) guidance for federally funded projects. It has also followed U.S. Department of Transportation guidelines for public participation, including Title VI of *The Civil Rights Act of 1964* (USC 1964c) and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (USEO 1994).

Coordination activities required under the implementing regulations of Section 106 of 36 CFR 800, *Protection of Historic and Cultural Properties,* have also been implemented during the course of the Project.

The requirements of Chapter 343 of the Hawaiʻi Revised Statutes (HRS) (HRS 2008) and implementing regulations contained in Title 11, Chapter 200 (HAR 1996a) of the Hawaiʻi Administrative Rules (HAR) also include consultation with agencies, citizen groups, and concerned individuals during the Project.

NEPA and HRS Chapter 343 require that a Draft Environmental Impact Statement (EIS) provide full disclosure of the environmental impacts associated with a proposed action. The agencies and the public were given a reasonable opportunity to comment on project planning documents. In accordance with Federal and State regulations, this Final EIS includes the comments received on the Draft EIS and responses to those comments (Appendix A, Comments Received on the Draft Environmental Impact Statement and Responses).

8.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter was updated to reflect the current list of cooperating agencies and Section 106 consulting parties. Section 8.2, Public and Community Outreach, was expanded to detail NEPA coordination. Section 8.5, Public Hearings, was updated, and a new Section 8.6, Draft EIS Comments, was added to summarize the public comment period on the Draft EIS. Section 8.7, Continuing Public Involvement through Construction, was added to address that public involvement will be ongoing through construction of the Project.

Since the publication of the Draft EIS, the U. S. Department of Defense (U.S. Army Corps of Engineers) and the U.S. Department of Homeland Security (U.S. Coast Guard—14th Coast Guard District) have each requested their status be changed from cooperating agency to participating agency. The U.S. Department of Defense (U.S. Naval Base Pearl Harbor) and the U.S. Department of Transportation Federal Aviation Administration (FAA) have requested status as cooperating agencies. The FAA had been initially invited and was involved in the Project as a participating agency.

8.2 Public and Community Outreach

The Project's public involvement efforts began with the Project's Alternatives Analysis phase in December 2005. Opportunities for public comment and information sharing will continue throughout the remainder of the Project, using the now well-established network of existing civic and community groups.

The Public Involvement Plan (PIP) developed for the Alternatives Analysis and Draft EIS phase details public involvement strategies to be used throughout the Project. Its fundamental goal is to engage, inform, and respond to the public. As the Project progresses, the PIP will be updated and revised to reflect changes in the Project and ensure that coordination is thorough, effective, and relevant.

8.2.1 Public Outreach Techniques

To reach as many community members as possible, a wide variety of public involvement tools have been used throughout the Project. Informational materials produced on an ongoing basis include newsletters, fact sheets, brochures, media releases, public meeting announcements, and other relevant project handouts. At the conclusion of the Alternatives Analysis and Draft EIS phases, videos were produced highlighting the findings. Complementing information sources include the project website (honolulutransit.org), telephone information line (808-566-2299), radio programs, and a monthly show on public access television.

Islandwide community updates were held during the course of the Project to share information and gather input on significant milestone decisions. The Project maintains an active Speakers Bureau to provide informational presentations to community groups, agencies, and organizations. A full list of Speakers Bureau presentations is included in Appendix G, Record of Public and Stakeholder Correspondence and Coordination. To date, more than 2,500 comments on the Project have been submitted through the website and more than 600 have been received via the telephone information line.

8.2.2 Government and Other Agency Coordination

Government agencies that have an interest in and/or regulatory authority regarding the Project have been actively engaged. These agencies were sent scoping information and requests to become participating or cooperating agencies during the environmental process.

Feedback was solicited from the following government and other agencies through direct contact:

- Elected officials
- Neighborhood boards
- The Transit Solutions Advisory Committee during the Alternatives Analysis phase
- Governmental agencies and stakeholders
- Interested organizations

Appendix F, Record of Agency Correspondence and Coordination, includes a list of government agencies and organizations contacted.

Lead, Cooperating, and Participating Agencies

The Council on Environmental Quality defines *lead agency* as the agency or agencies preparing or taking primary responsibility for preparing an EIS. Lead agencies for the Project include the City and County of Honolulu Department of Transportation Services (DTS) and the Federal Transit Administration (FTA). DTS is the local transit agency, the designated recipient of project funds, and a co-lead agency with the FTA. The DTS Rapid Transit Division (RTD) is the entity tasked with development and implementation of the Project.

The Council on Environmental Quality defines a *cooperating agency* as any Federal agency (other than a lead agency) with jurisdiction by law or special expertise with respect to any environmental impacts that may be involved in a proposed project or project alternative (40 CFR 1508.5). A State or Local agency with similar qualifications may, with agreement from the lead agencies, also become a cooperating agency.

Also, pursuant to 40 CFR 1506.3, "a cooperating agency may adopt without recirculating the EIS of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied."

Cooperating agencies for the Project include the following:

- U.S. Department of Defense (U.S. Army Garrison–Hawai‘i)
- U.S. Department of Defense (U.S. Naval Base Pearl Harbor)—the Project will require the U.S. Navy's approval related to a station on U.S. Navy property
- U.S. Department of Transportation Federal Aviation Administration—the Federal Aviation Administration has regulatory oversight jurisdiction at Honolulu International Airport and will need to approve the Airport Layout Plan changes as a result of the Project, use of airport revenue for the airport portion of the Project, and for the right-of-way request for use of airport property.
- U.S. Department of Transportation, Federal Highway Administration—the Project will require the Federal Highway Administration's approval related to crossing and accessing the interstate highway system
- State of Hawai‘i Department of Transportation—the Project will require the State of Hawai‘i Department of Transportation's approval related to using state rights-of-way

The FAA is a cooperating agency on this EIS, in accordance with 40 CFR Part 1501.6(a)(1), since it has special expertise and jurisdiction by law to approve proposed development at Honolulu International Airport. The FAA is assigned responsibilities pursuant to 49 USC 40101 et seq., for civil aviation and regulation of air commerce in the interests of aviation safety and efficiency. As a cooperating agency on this EIS, FAA will use the EIS documentation to comply with its own requirements under NEPA for Federal actions. The FAA will also use the EIS to support subsequent decisions and Federal actions, including unconditional approval of the portion of the Airport Layout Plan that depicts the Project, determination of eligibility for Federal assistance under the Federal grant-in-aid program, approval of an application to use Passenger Facility

Charges, and approval to grant right-of-way at the airport to carry out the Project.

Participating agencies are those with an interest in the Project. The standard for participating agency status is broader than for cooperating agency status. According to SAFETEA-LU regulations, "any Federal, State, regional, and local government agency that may have an interest in the project should be invited to serve as participating agencies. Nongovernmental organizations and private entities cannot serve as participating agencies."

For this Project, participating agencies include the following:

- U.S. Department of Defense (U.S. Army Corps of Engineers)
- U.S. Department of Agriculture (Natural Resource Conservation Service)
- U.S. Department of Homeland Security (U.S. Coast Guard—14th Coast Guard District)
- U.S. Department of the Interior (Fish and Wildlife Service)
- U.S. Department of the Interior (National Park Service)
- U.S. Department of the Interior (U.S. Geological Survey Pacific Island Ecosystems Research Center)
- U.S. Environmental Protection Agency
- U.S. Federal Emergency Management Agency
- State of Hawaiʻi Department of Accounting and General Services
- State of Hawaiʻi Department of Business, Economic Development and Tourism
- State of Hawaiʻi Department of Defense
- State of Hawaiʻi Department of Education
- State of Hawaiʻi Department of Hawaiian Home Lands
- State of Hawaiʻi Department of Health
- State of Hawaiʻi Department of Land and Natural Resources
- State of Hawaiʻi Department of Land and Natural Resources (State Historic Preservation Division)
- State of Hawaiʻi, Hawaiʻi Community Development Authority
- State of Hawaiʻi Office of Environmental Quality Control
- State of Hawaiʻi Office of Hawaiian Affairs
- University of Hawaiʻi
- Oʻahu Metropolitan Planning Organization

Participating agencies were identified and invited to participate at the start of the NEPA process. Their participation includes providing input to scoping, development of the Purpose and Need, and identification of potential effects. Project scoping and issuance of the Draft EIS provided official comment periods for the public and participating and cooperating agencies.

The lead, cooperating, and participating agencies have worked cooperatively throughout the Project's environmental process, as required by the SAFETEA-LU regulations described in this chapter. During this process, their main goal is to ensure that all agency concerns are satisfactorily addressed and that the permit review and approval process proceeds smoothly and expeditiously.

Table 8-1 summarizes the roles and responsibilities of the Project's lead, cooperating, and participating agencies. Appendix F includes agency correspondence.

8.2.3 Section 106 and Consulting Party Coordination

The lead agency is responsible for complying with Section 106 of the *National Historic Preservation Act*. Section 106 requires the lead agency to "accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties..." [36 CFR 800.1(a)]. Although other parties are consulted for their input, the Federal agency has the authority to make all decisions.

Table 8-1 Summary of Agency Roles and Responsibilities

Agency Designation	Role	Responsibility
Lead	Primary responsibility: ensuring compliance with NEPA and preparing the environmental document.	Requests participation from other agencies; provides project information; conducts field reviews; holds scoping meetings; provides pre-draft and pre-final documents; ensures documentation is adequate for project and related decisions; and makes final decisions on key milestones.
Cooperating	Any Federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative (may also be a State agency).	Participates early in the NEPA process; participates in developing the Purpose and Need and alternatives and in the scoping process; develops information and analysis; provides staff support; attends joint field reviews; participates in public involvement activities; reviews draft environmental documents; and provides comments.
Participating	Any Federal, State, Regional, or Local government agency that may have an interest in a proposed project. Nongovernmental organizations and private entities cannot serve as participating agencies.	Participates in developing the Purpose and Need and alternatives and identifying potential impacts during scoping and the Draft EIS. Briefed on the Project before issuance of the Draft EIS.

Extensive effort was made to identify, contact, and consult with groups entitled to be consulting parties relating to archaeological, cultural, and historic resources within the Area of Potential Effect (APE). The purpose of consultation was to identify archaeological, cultural, and historic resources and to discuss other issues relating to the Project's potential effects on such resources. Information was obtained from individuals and organizations likely to have knowledge of potential resources in the study corridor. A reasonable and good faith effort was made to identify Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the APE, and they were given opportunities to discuss issues and concerns.

In addition to consultation with the State Historic Preservation Officer (SHPO), the City also consulted with organizations and agencies with concerns regarding archaeological, cultural, and historic areas. This consultation included Hawaiian civic clubs that may have an interest in the Project. Letters sent by the FTA initiated an ongoing consultation process with the following groups (Section 106 consulting parties) to identify resources, consider project effects, and develop mitigation to limit the adverse effects of the Project:

- Advisory Council on Historic Preservation
- U.S. Navy (U.S. Naval Base Pearl Harbor)
- Historic Hawai‘i Foundation
- National Park Service
- National Trust for Historic Preservation
- University of Hawai‘i Historic Preservation Certificate Program
- American Institute of Architects
- Hawai‘i Community Development Authority
- Office of Hawaiian Affairs
- O‘ahu Island Burial Council
- Hui Mālama I Nā Kupuna O Hawai‘i Nei
- Royal Order of Kamehameha
- The Ahahui Ka‘ahumanu
- The Hale O Nā Ali‘i O Hawai‘i
- The Daughters and Sons of Hawaiian Warriors
- Association of Hawaiian Civic Clubs—and 15 individual civic clubs

Between July 28, 2009, and November 13, 2009, FTA and the City invited all consulting parties to participate in a series of meetings to develop a Programmatic Agreement (PA) (see Section 4.16, Archaeological, Cultural, and Historic, and Appendix H, Section 106 of the National Historic Preservation Act draft Programmatic Agreement). The Section 106 signatories FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize the draft PA. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signature as concurring parties to the PA. Appendix F includes Section 106 correspondence.

8.2.4 HRS Chapter 343 Coordination

The EIS preparation notice for this Project was published in the Hawai‘i Office of Environmental Quality Control's (OEQC) Environmental Notice on December 8, 2005, thus beginning the 30-day comment period under HRS Chapter 343 for the Project. Comments received are contained in the *Honolulu High Capacity Transit Corridor Project Scoping Report* (DTS 2006c) located in Appendix G. Written responses were prepared and sent to all commenters who provided either a mailing address or an e-mail address for responses. The Draft EIS addressed comments and issues raised during the EIS preparation notice comment period and issues noted during the NEPA scoping process in 2007.

HRS Chapter 343, and its implementing regulations contained in HAR Section 11-200, require that agencies, citizen groups, and concerned individuals be consulted for input. Interested parties may request consulted party status to receive ongoing project and coordination information. Downtown Neighborhood Board No. 13 and the Outdoor Circle requested and were granted consulted party status under HRS Chapter 343. Both parties have received periodic updates on the Project.

8.2.5 NEPA Coordination

The Notice of Intent to prepare the EIS appeared in the *Federal Register* on March 15, 2007. The scoping comment period under NEPA officially began on the date of the *Federal Register* publication and closed on April 12, 2007. All interested individuals and organizations and Federal, State, and Local agencies were invited to comment on the Purpose of and Needs to be addressed by the Project; the alternatives, including the modes and technologies to be evaluated and the alignments and termination points to be considered; and the environmental, social, and economic impacts to be analyzed. An opportunity to express a preference for a particular alternative was available after the Draft EIS was released. Comments received are contained in the *Honolulu High Capacity Transit Corridor Project National Environmental Policy Act Scoping Report* (DTS 2007) located in Appendix G.

A Notice of Availability of the Draft EIS was published in the *Federal Register* on November 21, 2008. Notice also appeared in the *Environmental* Notice issued by OEQC in its November 23, 2008, edition. The Draft EIS was circulated for a 45-day review and comment period, which was later extended until February 6, 2009, in response to requests by members of the public. Information about cooperating and participating agencies under NEPA are included earlier in this chapter. A Notice of Availability of the Final EIS will be published in the *Federal Register*.

8.3 Community Outreach during the Alternatives Analysis Phase

Federal regulations (40 CFR 1501) require scoping to follow publication of a Notice of Intent to prepare an EIS and take place before the Draft EIS is prepared. A public meeting was held during the scoping process. Notice of this meeting was published in the *Federal Register,* in local newspapers, and through other means of announcing public meetings.

An initial Notice of Intent was published for the Project on December 5, 2005. Two public scoping meetings and one agency scoping meeting were held in December 2005. The first public meeting was on December 13, 2005, at the Neal S. Blaisdell Center Pīkake Room at 777 Ward Avenue in Downtown Honolulu from 5:00 to 8:00 p.m. The second public meeting was on December 14, 2005, at the Kapolei Middle School Cafeteria at 91-5335 Kapolei Parkway in Kapolei, from 7:00 to 9:00 p.m. Agencies, non-governmental groups, and the general public were given the opportunity to comment on the Project's Purpose and Need, alternatives, and other project issues.

The comment period for these scoping meetings ended on January 9, 2006. In all, 528 comments were received via mail, website, telephone, and at the meetings (requests to be placed on the mailing list were not included in this total). Comments were grouped into three categories: Purpose and Need, alternatives, and scope of analysis.

The agency scoping meeting was on December 13, 2005, at the Neal S. Blaisdell Center Pīkake Room at 777 Ward Avenue from 2:00 to 4:00 p.m. Invitation letters were mailed between December 5 and 7, 2005, to 87 Federal, State, and County agencies and to utility companies. This meeting was attended by 20 agencies and utility companies. Comments were received from the following agencies and utilities:

- U.S. Department of Transportation, Federal Aviation Administration
- U.S. Environmental Protection Agency
- U.S. National Park Service
- Hawai'i Community Development Authority
- State of Hawai'i Department of Accounting and General Services
- State of Hawai'i Department of Education
- State of Hawai'i Department of Hawaiian Home Lands
- State of Hawai'i Department of Land and Natural Resources
- State of Hawai'i Office of Environmental Quality Control
- Office of Hawaiian Affairs
- University of Hawai'i
- City and County of Honolulu Department of Design and Construction
- City and County of Honolulu Fire Department
- Downtown Neighborhood Board No. 13
- Hawaiian Electric Company

Project personnel attended 104 neighborhood board meetings and 204 Speakers Bureau events during the Project's Alternatives Analysis phase.

The Alternatives Analysis was completed in October 2006 and submitted to the City Council for use in its selection of a Locally Preferred Alternative. Agency and public comments on the Alternatives Analysis were generally categorized as either supporting a specific alternative or opposing the Project. Numerous other general comments or questions did not directly support or oppose specific options.

8.4 Community Outreach during the Project's Preliminary Engineering/EIS Phase

Another series of public and agency scoping meetings was held prior to beginning the Project's Preliminary Engineering (PE)/EIS phase. A Notice of Intent was published on March 15, 2007, stating that this notice superseded the previous Notice of Intent published on December 5, 2005.

Agencies, non-governmental groups, and the general public were again given the opportunity to comment on the Project's Purpose and Need, alternatives, or other project issues. Coordination is currently continuing with cooperating and participating agencies. Meetings with individual agencies have been held to discuss and finalize evaluation methods and project issues and to collect project data.

Three public scoping meetings were held in March and April 2007. The first was on March 28, 2007, at Kapolei Hale at 1000 Uluohia Street from 6 to 9 p.m. The second was on March 29, 2007, at McKinley High School at 1039 South King Street from 5 to 8 p.m. The third was on April 3, 2007, at Salt Lake Elementary School at 1131 Ala Liliko‘i Street from 5 to 8 p.m.

There were 104 comments received via mail, website, and telephone, and at scoping meetings. The following types of comments were not included in this total: requests to be placed on the mailing list, comments on alternatives already considered and/or eliminated from further consideration, comments on new alternatives considered previously and eliminated, Council hearing comments from the Alternatives Analysis phase, and taxation comments.

An agency scoping meeting was held on March 28, 2007, at Honolulu Hale, Mission Memorial Auditorium, 550 King Street from 10 a.m. to 12 p.m. Twenty agencies attended.

The public involvement techniques used during the Alternatives Analysis phase continued throughout the PE/EIS phase. In addition to updating groups and organizations on the Project's progress, additional presentations were made to new groups and organizations. Project information was disseminated throughout the study corridor in the form of community updates, participation in Town Hall meetings, and informational displays. Project personnel have also attended neighborhood board meetings and have been available via radio call-in shows. The Project website and hotline continue to be updated and maintained. Approximately 20 half-hour information shows about the Project have been produced and broadcast on local ‘Ōlelo television. The Project also produced an interactive DVD containing the Draft EIS, a 28-minute movie summarizing important points of the Draft EIS, and a flythrough of the Airport and Salt Lake Alternatives that was sent to all recipients of the Draft EIS.

8.4.1 Community Station Design Workshops

The City is conducting a series of station design workshops to solicit community and Section 106 consulting party input and ideas about station design elements and the interface between each station and the surrounding community. Each station, or group of stations, is the topic of a series of meetings. Comments received during the first meeting or meetings are incorporated into a draft design for presentation at the final meeting.

Station design workshops began in April 2009 and have been completed for the following stations: \`Ewa (East Kapolei and UH West O\`ahu), Waipahu (Ho‘opili, West Loch, and Waipahu Transit Center), Leeward Community College, Pearlridge, and Pearl Highlands. Workshops will continue throughout the project corridor to support the completion of PE.

8.4.2 Agency Coordination

Cooperating agencies were offered the opportunity to be briefed on the Project and given an opportunity to comment on a preliminary copy of the Draft EIS. Cooperating agencies were invited to attend the Draft EIS public hearings. Participating agencies received a copy of the Draft EIS for review and comment and were invited to attend the Draft EIS public hearings.

All cooperating agencies received a preliminary copy of the Final EIS for review and comment prior to its distribution. Cooperating agency comments have been addressed in this Final EIS. All participating agencies will receive a copy of the Final EIS and will receive notification when the Record of Decision is issued. The Final EIS is being distributed to everyone who was on the list of recipients for the Draft EIS, along with all those who provided comments on the Draft EIS.

Agencies with permitting authority will continue to be consulted during the permit application process. Permit applications will be submitted, and data will be developed to support the needs identified by permitting agencies.

8.5 Public Hearings

As part of the NEPA and HRS Chapter 343 process, the Draft EIS was circulated for a 45-day review and comment period, which was later extended. A Notice of Availability of the Draft EIS was published in the *Federal Register* on November 23, 2008. Notice also appeared in the *Environmental Notice* issued by OEQC in its November 23, 2008, edition. In December 2008, the review and comment period was extended until February 6, 2009, in response to requests by members of the public. During this period, the document was made available to interested and concerned parties, including residents, property owners, community groups, the business community, elected officials, and public agencies, for public and agency comment.

A series of five public hearings was held during the initial 45-day period to give interested parties an opportunity to submit comments on the Project and the analysis contained in the Draft EIS. Attendance at the hearings was not required to submit comments. All of the public hearings were held in ADA-compliant locations, and the ability to request special needs materials or personnel was provided. Attendees were provided handouts, including a schedule of the times and locations for all hearings and a project information sheet. The comments received are addressed in this Final EIS.

Public hearings were held at the following times and locations:

- Saturday, December 6, 2008, at Kapolei Hale, 1000 Uluohia Street in Kapolei from 9 to 11 a.m. This hearing was attended by 33 individuals; 11 testimonies were given and 2 comment forms were placed into comment boxes. A written letter was also handed to a court reporter as a comment.
- Monday, December 8, 2008, at Neal S. Blaisdell Center, Hawaiʻi Suite, 777 Ward Avenue in Honolulu from 6 to 8 p.m. This hearing was attended by 79 individuals; 26 testimonies were given and 10 comment forms were placed into comment boxes.
- Tuesday, December 9, 2008, at Salt Lake District Park, 1159 Ala Lilikoʻi Place in Honolulu from 6 to 8 p.m. This hearing was attended by 59 individuals; 25 testimonies were given and 5 comment forms were placed into comment boxes.
- Wednesday, December 10, 2008, at the Filipino Community Center, 94-428 Mokuola Street in Waipahu from 6 to 8 p.m. This hearing was attended by 45 individuals; 8 testimonies were given. No comment forms were placed into the comment boxes.
- Thursday, December 11, 2008, at Bishop Museum, 1525 Bernice Street in Honolulu from 6 to 8 p.m. This hearing was attended by 11 individuals; 3 testimonies were given. No comment forms were placed into the comment boxes.

Two rooms were used for all public hearings. One room contained project information on display boards, multi-media displays, copies of the Draft EIS, and comment boxes. Project staff were on hand to interact with the public. Two secured comment boxes were provided for those who wished to submit written comments. A court reporter was also available in this area to transcribe comments from the public.

The other room was the public hearing room where the public was invited to comment on the Project. Stationed in this room were the Public Hearing Officer and a court reporter for transcriptions. Transcripts from all five public hearings are included in Appendix A. Individuals who wished to comment were provided three minutes to make their statements.

All hearings were open to the public for the two-hour time for which they were advertised. After the Public Hearing Officer closed the formal comment portion of the public hearing, individuals were able to provide verbal comments to the court reporter stationed in the project information area or to place written comments into comment boxes. The Public Hearing Officer remained on-site throughout the hearing in case a need arose to reconvene formal testimony.

Public hearings were advertised in major local newspapers, on local radio and television, and in ethnic and cultural newspapers in several languages. The hearings were also announced through the Project's website, hotline, newsletters, and a postcard mailed to area residents.

8.6 Draft EIS Comments

The Draft EIS was placed on the Project's website on November 1, 2008. Comments received between this date and the issuance of the notice of availability of the Draft EIS in the *Federal Register* on November 21, 2008, were included as Draft EIS comments. In total, 586 comment submissions were received via the following means:

- Project website—276
- Letter—175
- Public hearing testimony—73
- Public hearing comment form—20 (including two that were mailed in)
- E-mail—41
- Fax—1

The majority of the comments received were related to the following topics: alternatives considered, planned extensions, ridership and travel forecasting, parking, traffic analysis, visual, noise, cost and financing, construction phasing, construction effects, and acquisition and relocation (Table 8-2).

Table 8-2 Common Comment Topics on the Draft EIS

Topic	Issues
Alternatives considered	Re-evaluation of alternatives Grade-separation requirement Steel-wheel technology Selection of the Airport Alternative
Planned extensions	Evaluation of phasing
Ridership and travel forecasting	Modeling process Ridership forecast uncertainty
Parking	Loss of parking Spillover parking
Traffic analysis	Calculations Future conditions
Visual	Visual character Visual integration
Noise	Noise generated by Project
Cost and financing	Capital costs Operating costs Funding
Construction phasing	Order of construction
Construction effects	Traffic Access to businesses
Acquisition and relocation	Residences Businesses

A discussion of the comments received for each of these topics follows in the subsections below.

Postcards were mailed to everyone on the Project's mailing list, and advertisements were placed in local newspapers and on City buses concerning the availability of the Draft EIS and how to comment. Individuals were able to provide comments through the Project's website at www.honolulutransit.org, by attending a public hearing, or by mailing them to DTS or FTA. Copies of all comments received, as well as copies of all response letters, are included in Appendix A.

8.6.1 Alternatives Considered

Several individuals commented on various aspects of the alternatives considered. The most common comments were related to re-evaluating alternatives that were previously considered, specifically that the system be grade-separated; selection of steel-wheel-on-steel-rail technology; and selection of the Airport Alternative as the Project.

Reevaluation of Alternatives

Bus-based transit and the Managed Lane Alternative were the topics of a number of comments. Both were evaluated during the Alternatives Analysis process as part of the Transportation System Management (TSM) Alternative and the Managed Lane Alternative. Additional information was added to Section 2.2.2 of this Final EIS to clarify why these alternatives performed poorly and were eliminated from further consideration.

The TSM Alternative, which was essentially the bus-based alternative, did not perform at a level comparable to the Fixed Guideway Alternative. This is because it would be subject to the same roadway congestion as automobiles and would not improve travel reliability. The analyses found that the TSM Alternative would have improved transit travel times somewhat by reducing the amount of time riders would have to wait for a bus to arrive at a bus stop; however, the TSM Alternative would have generated fewer hours of transit-user benefits than the Managed Lane and Fixed Guideway Alternatives because most buses would still operate in mixed traffic.

The Managed Lane Alternative was fully evaluated in the *Honolulu High Capacity Transit Corridor Project Alternatives Analysis Report* (DTS 2006b) and demonstrated to be less effective than a Fixed Guideway Alternative. The Managed Lane facility would have cost $2.6 billion in 2006 dollars (higher now). Transit reliability would not have been improved except for express bus service operation in the managed lanes. While this alternative would have slightly reduced congestion on parallel highways, systemwide traffic congestion would have been similar to the No Build Alternative as a result of increased traffic on arterials trying to access the facility. As noted in Table 2-2 of Chapter 2, Alternatives Considered, of this Final EIS, total islandwide congestion as measured by vehicle hours of delay (VHD) would have increased with the Managed Lane Alternative as compared to the No Build Alternative. A more detailed response related to the Managed Lane Alternative is provided in Section 8.6.12.

Grade-separation Requirement

At-grade light-rail transit was suggested as an alternative to the Project in several comments. As explained in Section 2.2.2 of this Final EIS, at-grade light-rail transit was considered during the Alternatives Analysis process. An at-grade light-rail transit option did not meet the Project's Purpose and Need. Although the at-grade light-rail system could have reduced the visual impact of the Project and, in some locations, could reduce the cost, it would have reduced the reliability, speed, safety, and expandability of the system. Also, it would have increased the cost of right-of-way acquisition because more land would have been needed to maintain functioning roadways. An at-grade light-rail system would have increased congestion by removing at least two lanes of traffic to place tracks at-grade and most likely would have had a broader effect on sensitive cultural resources and burial sites along the corridor. More detail in response to questions about at-grade operation is presented in Section 8.6.13.

Steel-wheel Technology

The selection of steel-wheel technology was questioned in several comments. The majority of individuals recommended magnetic levitation technology as an option. As explained in Section 2.2.3 of this Final EIS, technologies other than steel wheel were eliminated because they are proprietary technologies, meaning that selecting one of those technologies would have required all future purchases of vehicles or equipment to be from that same manufacturer. These were eliminated because none of the proprietary technologies offered substantial proven performance, cost, and reliability benefits compared to steel wheel operating on steel rail, which is a technology that has been in revenue operation around the world for many decades.

Commenters suggested that there are less impacts associated with noise, safety, and visual with magnetic levitation relative to steel-wheel technology. However, High Speed Surface Transport, a Japanese magnetic levitation technology, is unproven in general use. There is only a single operating urban High Speed Surface Transport system in the world, with less than five years of operations. The single operating system has a maximum speed of 100 kilometers per hour (62 miles per hour), which is similar to the maximum operating speeds of 50 to 60 miles per hour common for steel-wheel systems. While the system may be quieter, steel-wheel systems can be designed to match the noise level of magnetic levitation when in operation. There is no specific safety improvement from the traction design. The assumed visual benefits for beam-track vehicles would not apply in the United States because of requirements to include an emergency egress walkway. Also, the smaller structures proposed in the comments would result in shorter span-lengths, which increases the number of columns required and the number of views blocked by support structures. This would result in higher costs. More details about the elimination of magnetic levitation technologies as an option is presented in Section 2.2.3 of this Final EIS.

Selection of the Airport Alternative

Section 2.3, Alternatives Considered in the Draft Environmental Impact Statement, of this Final EIS summarizes the alternatives that were evaluated in the Draft EIS, and Section 2.4, Preferred Alternative Identification Process, describes the City's identification of the Airport Alternative as the Preferred Alternative for the Project, which was based on consideration of the benefits of each alternative, public input on the Draft EIS, and City Council Resolution 08-261 (City 2008).

8.6.2 Planned Extensions

Comments were received suggesting that the fixed guideway extensions, which are part of the Locally Preferred Alternative selected by the City Council, also should be examined in the EIS. There were also comments asking that the Project be extended to the University of Hawaiʻi at Mānoa.

The planned extensions are discussed as future foreseeable projects in the cumulative impacts sections of Chapter 3, Transportation, and Chapter 4, Environmental Analysis, Consequences, and Mitigation, of this Final EIS. The extensions are not part of the Project as evaluated in this Final EIS because no funding has been identified for these portions of the Locally Preferred Alternative. Because there is no identified funding, no engineering design or environmental evaluation could be completed at this time. The FTA will not be granting any New Starts approvals for the extensions of the elevated rail system under the current project.

If funding is identified in the future, engineering design and environmental analysis of the extensions and the appropriate alternatives analysis will be undertaken. The Project, as evaluated in this Final EIS, has logical termini and independent utility from any extensions that may be constructed in the future.

8.6.3 Ridership/Travel Forecasting

Various comments were received concerning the Project's travel forecasting model. Among the concerns was the uncertainty of the results given the nature of the modeling process, the type of model used in generating ridership information upon which the EIS information is based, and experience with modeling results on other projects around the country.

Modeling Process

In response to the comments, more information about the modeling process was included in this Final EIS. Regarding the model used for the

Project, FTA determines the type of model, the modeling process, and the manner in which travel forecasting is conducted for large transit projects. The structure and process used in modeling were established by the FTA to ensure all projects submitted for funding consideration under the Federal New Starts Program are presented on an equal footing. The FTA also defines the way travel forecasting is conducted to ensure ridership figures are realistic and to avoid past errors by other projects where, in some cases, forecasts exceeded actual ridership performance by a substantial margin in the early years of some systems' operations.

Ridership forecasting today is much better than it was just 10 years ago. Recent forecasts for new systems using the improved modeling techniques set forth by the FTA have been very accurate (e.g., Phoenix, Salt Lake City). Still, there is also recognition within FTA that forecasting by its nature contains an element of uncertainty. The acknowledgment of uncertainty is presented in Section 3.2, Methodology, of this Final EIS with a reference to the more detailed information available in the *Honolulu High-Capacity Transit Corridor Project Travel Forecasting Results and Uncertainties Report* (RTD 2009l).

Regarding the modeling process for the Project, ridership projections for the forecast year of 2030 have been developed using a travel demand model that is calibrated and validated to current year conditions based on actual traffic counts and bus ridership. The model is based upon a set of realistic input assumptions regarding land use and demographic changes (City policy regarding where growth will be oriented over time and trends based on economic factors and population changes) between now and 2030. The model is also based on expected transportation levels of service on both the highway and public transit systems (based on current conditions and how they are likely to change over time given plans for highway and transit improvement between now and 2030). Based upon the model and these key input assumptions, approximately 116,300 trips per day are expected on the rapid transit system on an average weekday in 2030. Since the Draft EIS was published, the travel demand model was refined by adding an updated air passenger model and, through coordination with the FTA, defining more realistic drive access modes to project stations and including a more comprehensive off-peak non-home-based direct demand element based on travel surveys in Honolulu.

Ridership Forecast Uncertainty

Honolulu is the first project in the country to design and undertake such a detailed uncertainty analysis of this type of forecast. FTA has worked closely with the Project's travel forecasters and provided extensive guidance during this effort. A variety of factors were considered in the uncertainty analysis, including the following variables:

- Variations in assumptions regarding the magnitude and distribution patterns of future growth in the ʻEwa end of the corridor
- The impact of various levels of investment in highway infrastructure
- Expected frequency of service provided by the rapid transit system
- Park-and-ride behavior with the new system in place
- Implications on ridership of vehicle and passenger amenities provided by the new guideway vehicles

The anticipated range for rapid transit system ridership in 2030 is expected to be between 105,000 to 130,000 trips per day bracketing the official forecast of 116,300 trips a day used for all calculations. Even at the low end, the cost-effectiveness of the Project is within New Starts funding thresholds requirements.

8.6.4 Parking

A number of comments addressed the Project's effects on parking, including the loss of existing on-street and off-street parking supply, removal of freight and/or passenger loading zones, and effects relating to spillover parking near stations.

Loss of Parking

Approximately 690 off-street and 175 on-street parking spaces will be removed to accommodate the Project. Off-street parking supply affected by the Project is scattered throughout the corridor and is exclusively on private property. These parking spaces will be acquired to provide additional rights-of-way needed to construct the guideway or stations. Compensation to the affected property owners will comply with the requirements of the Federal *Uniform Relocation Assistance and Real Property Acquisition Polici*es Act (CFR 1989a). The City does not plan to generally replace all private, off-street parking removed for construction of the Project. However, the City will work with landowners to replace parking as appropriate.

On-street parking affected by the Project is concentrated in three areas: near the Lagoon Drive and Iwilei Stations and in Kakaʻako along Halekauwila Street. Based on the results of parking utilization surveys conducted in June 2008, April 2009, and March 2010 for the Project, there is available parking nearby to accommodate motorists currently using the 175 on-street parking spaces that will be removed by the Project. Therefore, these on-street parking spaces will generally not be replaced by the City. However, some new on-street parking spaces will be created by construction of the Project in the general locations of lost spaces as streets are rebuilt following construction.

One freight loading zone and two passenger loading zones will be affected by the Project. The loading zones will be temporarily removed or relocated, and new loading zones will be installed once construction is complete.

Spillover Parking

Regarding the potential for spillover parking near stations, ridership forecasts indicate that a small number of passengers will park near stations without designated park-and-ride facilities. Analysis found that spillover parking will not affect traffic in the area. However the existing parking supply could be affected. To address the effects of spillover parking on supply, the City will conduct surveys prior to and again within six months after station opening to determine the extent of spillover parking and then implement mitigation strategies as needed. Mitigation strategies include, but are not limited to, implementation of parking restrictions and development of shared-parking arrangements. Follow-up surveys will be conducted by the City to determine if the mitigation strategies are effective, and additional mitigation measures will be implemented by the City as needed.

8.6.5 Traffic Analysis

Comments were received questioning the use of the *Highway Capacity Manual* (HCM) methodology in evaluating traffic conditions under the No Build Alternative or the Project. The concern was that the HCM technique does not perform well under saturated conditions. There were also multiple comments about traffic conditions becoming worse in the future, even with the Project.

Calculations

In response to these comments, the information provided regarding the use of the HCM methodology was expanded and more comprehensively explained. Despite the cited limitations of the HCM methodology, it works well under the conditions present in the Honolulu corridor. The HCM methodology is used as a basic measure of the quality of service on the highway system and as a gauge for where additional analysis is needed. There are few traffic impacts from the Project itself because traffic conditions are already difficult in some areas. For those locations that presented an identifiable effect based on the Project's implementation, further analysis was completed using more sophisticated modeling tools, such as VISSIM, to develop micro-simulation models of these critical areas. The application of this modeling effort provided insight into a broader area of impact and allowed testing of mitigation options.

Future Conditions

The Alternatives Analysis Report (DTS 2006b) concludes that traffic conditions will worsen in 2030 as a result of planned growth in the future no matter which alternative is built. On the other hand, based on the Alternatives Analysis, the only alternative that improves future traffic conditions to a measurable degree compared to the No Build Alternative is the Fixed Guideway Alternative. It clearly shows superior results in terms of congestion reduction in comparison with other touted alternatives analyzed in the Alternatives Analysis.

The information about the alternatives is presented in more detail in Section 2.2, Alternatives Screening and Selection Process, in this Final EIS. More information about the performance of the Draft EIS alternatives is presented in Section 2.3 and in Chapter 3.

8.6.6 Visual

Throughout the Draft EIS review and comment period, many commented that visual changes associated with the project elements will result in substantial visual effects. Many comments received expressed concern that the elevated fixed guideway transit system will adversely affect O‘ahu’s unique visual character by creating blight and degrading views. In addition, commenters requested more information on how the project elements will be integrated with their communities, especially in the areas around stations.

These commenters on view effects are representative of the various viewer groups that have been considered in the visual and aesthetic conditions analysis presented in the Draft EIS and this Final EIS. In response to the viewer group’s responses, received during the Draft EIS comment period, further analysis of views and vistas was done and the visual effects of several key views have been reevaluated. The refinement resulted in revised ratings from moderate to significant for Views 12, 14, and 15 (Table 4-9 in Chapter 4) in the Downtown area. The analysis of protected views and vistas was provided in earlier technical documents; however, this Final EIS more clearly describes the visual effects on these resources.

The overall conclusions of the Draft EIS have not changed, but, through these refinements, the following clarifications have been made:

- Viewpoint 12—visual impact rating refined to reflect that some views would be blocked and to expressly point out the contrast of project elements with Chinatown’s historic character
- Viewpoint 14—visual impact rating refined to reflect the bulk and scale of the guideway and columns being out of character with the pedestrian-oriented environment at this viewpoint
- Viewpoint 15—visual impact rating refined to reflect the bulk and scale of the station as well as the other elements noted in the Draft EIS

The Draft EIS described several types of visual effects, and the refinements reflect the same type of visual effects identified in the Draft EIS and shown in these viewpoints in the Draft EIS. The Draft EIS concluded that changes to some views, including protected views and vistas, would be unavoidable, and the refinements confirmed this conclusion.

Although mitigation measures will minimize many adverse visual effects by providing visual buffers and reducing visual contrasts between the project elements and their surroundings, the Final EIS acknowledges, as concluded in the Draft EIS, that probable unavoidable adverse effects, such as view blockage, cannot be mitigated and will be significant (noted as a “high” level of visual impact in the Draft EIS) in some areas.

Visual Character

The island’s unique visual character and scenic beauty are essential components of the visual and aesthetic assessment presented in the Draft EIS. This Final EIS includes more details on protected views and vistas, as well as potential visual effects and mitigation. This analysis is included in the *Honolulu High-Capacity Transit Corridor Project* Visual and Aesthetics Resources Technical Report (RTD 2008e); visual effects in the Draft EIS were based on this analysis, and it was added into the Final EIS based on comments on the Draft EIS to expand and clarify the information.

As described in the Draft EIS, the Project will introduce a new linear visual element to the corridor, and changes to some views will be significant and unavoidable. Some adverse visual effects, such as view blockage, cannot be mitigated and will result in unavoidable adverse environmental effects. These effects will be most noticeable where the guideway and stations are nearby or in the foreground of views.

Although changes in visual resources or view planes and the viewer response will be significant in some areas, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape.

Visual Quality

A viewer’s response to changes in view may vary with exposure and sensitivity and depend on the alignment orientation and the height of the guideway, stations, surrounding trees, and buildings. Overall, the Project will be set in an urban context where visual change is expected and differences in scales of structures are typical. However, through the Draft EIS review and comment processes, many reviewers commented that the visual changes associated with the Project will be substantial. These comments have been acknowledged in this Final EIS. Even with mitigation measures, some obstruction and changes to views will result in significant unavoidable adverse effects. These effects will be most noticeable where the guideway and stations are nearby or in the foreground of views.

Protected views and vistas are view planes that the City has determined are important to protect because of their scenic quality, scale, and prominence within the visual environment. These views are developed through the City’s general, development, and community plans. These plans guide the adoption of zoning ordinances that regulate the use of land within demarcated zones and set detailed standards for the height, bulk, size, and location of buildings.

Protected views and vistas, including mauka and makai views and views of prominent landmarks in the study corridor, are identified in City development plans, including the ‘Ewa Development Plan (DPP 2000), the Central O‘ahu Sustainable Communities Plan (DPP 2002b), and the Primary Urban Center Development Plan (DPP 2004a). The Project is supportive of the land use objectives included in these plans (Appendix J, Relationship to Land Use Plans, Policies, and Controls). Appendix J summarizes the Project’s relationship to State and City land use plans, polices, and controls for the study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions.

The City’s general urban design principles protect public views based on the type of view and are applicable to both public streets and public and private structures. Some protected views and vistas will change as a result of the Project, including public views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks. The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. Viewers' responses to these changes will vary with their exposure and sensitivity and depend on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

8.6.7 Noise

Operational noise from the Project was a concern to several commenters. The most common concern was operating noise from the rail vehicles.

Section 4.10, Noise and Vibration, of this Final EIS provides a detailed noise analysis for the Project, including additional evaluation completed in response to comments on the Draft EIS and implementation of recommended mitigation measures in portions of the corridor that would experience noise impacts in the absence of such mitigation.

The noise analysis follows current FTA guidance to use Ldn or Leq to evaluate noise impacts. Figure 4-51 in Chapter 4 of this Final EIS, however, does generally compare the Lmax noise levels. The project design includes a parapet wall that will reduce noise along the guideway. No noise impacts are predicted for any schools along the study corridor. Wheel skirts will reduce noise levels to below impact criteria in several locations. In three locations in the corridor, sound-absorptive material will be placed in the track bed to reduce noise levels at nearby high-rise buildings.

8.6.8 Project Cost and Financing

Many comments questioned the cost of the Project (both capital and operating costs) and the City's ability to fund the Project and obtain the anticipated Federal share of the funding. There were concerns about the economy and the drop in the 0.5-percent general excise and use tax (GET) surcharge collections that are dedicated to fund the Project.

The funding of the Project relies on a combination of Federal and Local funds. Costs have held relatively steady over the past year as the economy has slowed the rate of inflation of some of the key cost drivers, such as steel and cement. The overall cost of the Project has not changed substantially in year-of-expenditure (inflation-adjusted) dollars since the Draft EIS was published.

While there has been a reduction in the rate of GET surcharge collections, the financial plan continues to be balanced despite the reduction in revenues. This has been accomplished using a higher Section 5309 New Starts allocation than shown in the Draft EIS (from $1.4 billion to $1.55 billion) and allocating to the Project some of the anticipated increases in Section 5307 formula funds that will come to the City as a result of the Project. Section 6.3, Capital Plan, of this Final EIS addresses the way capital costs have been covered in the Project's financial analysis.

The responses also reference how the financial analysis addresses the uncertainties of the funding forecast and provides for alternative funding options should they be needed to offset any additional shortfall in the primary revenue sources. These uncertainties and alternative funding options are presented in more detail in Section 6.6, Risks and Uncertainties, of this Final EIS.

Regarding operating and maintenance costs, the daily operation of the rapid transit system will come from the same City sources currently used to pay for TheBus and other elements of the public transportation system. The rapid transit system will represent about 25 percent of the total transit system's annual cost and will add between 2 and 3 percent to the City's annual operating budget. This amount is within annual variability in budgeting and will not, by itself, cause a need to increase property taxes or other fees.

8.6.9 Construction Phasing

Many comments were received that questioned the phasing plan to begin construction toward the ʻEwa end of the line when most of the ridership is likely to be closer to Downtown. There was also a concern that if the Project began in Kapolei and funding was insufficient, the Project would never realize the anticipated benefit or would require an increase in local funding to reach Downtown. Downtown is the primary activity center in the study corridor and getting to Downtown is of great interest among those who commented.

There are a number of reasons for starting construction at the ʻEwa end of the line even though it is acknowledged that ridership will not achieve its full potential until the Project reaches Downtown. The Project starts at the ʻEwa end for the following key reasons: access to the maintenance and storage facility, the ability to start the Project sooner saving on costs, and improved ability to obtain the needed rights-of-way.

As described in Chapter 2, the Project will be constructed in four phases over a nine-year period. To support phased openings, the first construction phase must have access to the maintenance and storage facility, which requires more than 40 acres of dedicated space. In addition to maintenance and storage of vehicles, the facility will serve as the location of the main operations center for the entire system. No location was identified closer to Downtown with sufficient available space to construct a maintenance and storage facility.

The Project is not a series of individual projects, but a single project that consists of a series of construction phases that will accomplish the following:

- Match the anticipated schedule for right-of-way acquisition and utility relocations
- Reduce the time that each area will experience traffic and community disturbances
- Allow for multiple construction contracts with smaller contract size to promote more competitive bidding
- Match the rate of construction to what can be maintained with the local workforce and available financial resources
- Balance expenditure of funds to minimize borrowing

The portion of the corridor in the ʻEwa direction of Pearl Highlands is less developed than the areas in the Koko Head direction. Right-of-way can be obtained more quickly at the ʻEwa end of the Project; therefore, overall project construction can begin earlier, resulting in lower total construction costs. Construction is planned to continue uninterrupted in the Koko Head direction from Pearl Highlands to Aloha Stadium, Kalihi, and finally to Ala Moana Center.

8.6.10 Construction

A number of comments addressed the effects of construction on traffic and access to businesses.

Construction-phase Traffic

Construction of the Project will affect traffic with temporary lane closures occurring throughout the day, including peak periods and at night. Both through lanes and turning lanes will be affected by these closures. In some cases, up to two travel lanes will be closed at a time. Construction-related effects on transportation will be mitigated through the implementation of a Maintenance of Traffic (MOT) Plan and a Transit Mitigation Program to be prepared prior to construction. The construction contractor will develop the MOT Plan using parameters developed by, and with approval of, the City or State of Hawaiʻi Department of Transportation. The MOT Plan will address all phases of construction, and the construction contractor will submit any proposed changes to the MOT Plan to the City for approval.

Access to Businesses

Access to businesses in the Project area will be maintained throughout construction, although there could be temporary changes to access and movement during construction. In some locations, left-turn lanes will be closed during construction, restricting access to right-turns only. Other streets may temporarily become one-way movements or eliminate parking altogether during construction. Existing passenger or freight loading zones could be relocated for the duration of construction.

The MOT Plan will address temporary effects on access to businesses during construction. Mitigation to reduce adverse economic hardships for existing businesses may include, but is not limited to, the following:

- Coordinate with nearby property owners and businesses
- Develop a public involvement plan prior to construction
- Provide public information to inform customers that businesses are open during construction
- Minimize extent and duration of effects to business access
- Provide signage, lighting, and information to indicate businesses are open
- Provide public information on construction activity using print, television, and radio media
- Phase construction to minimize traffic disruption and maintain access to businesses
- Provide advance notice of utility relocation

8.6.11 Acquisitions and Relocations

Various commenters inquired about acquisition of individual property or the acquisition and relocation process in general. Appendix C, Preliminary Right-of-Way Plans, of this Final EIS includes a map and tables of all parcels from which the Project would acquire property.

The City has been coordinating with potentially affected property owners since October 2008. The City will continue to work with individual property owners to provide relocation services. As stated in Section 4.4.3 of this Final EIS, relocation services will be provided to all affected business and residential property owners and tenants without discrimination; and persons, businesses, or organizations that are displaced as part of the Project will be treated fairly and equitably.

Those from whom property is to be acquired will be treated according to the requirements of the Federal *Uniform Relocation Assistance and Real Property Acquisition P*olicies Act (CFR 1989a). It provides for purchase at fair market value and includes relocation assistance to those affected. The Act requires that those in need of relocation must be placed in comparable quarters.

8.6.12 Managed Lane Alternative

A number of commenters stated that the alternatives studied did not properly address other options for the corridor. In particular, there was a concern that the Managed Lane Alternative was not included in the Draft EIS as an alternative.

The process of alternatives screening and selection is discussed in Chapter 2 and in Section 8.6.1. As discussed, alternatives were developed through three general phases: (1) the FTA Alternatives Analysis process; (2) the selection of a Locally Preferred Alternative; and (3) the NEPA scoping and Draft EIS process. The initial screening of alternatives is documented in the *Honolulu High-Capacity Transit Corridor Project Alternatives Screening*

Memorandum (DTS 2006a) (Screening Memorandum). The subsequent FTA Alternatives Analysis process is provided in the *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Report* (DTS 2006b) (Alternatives Analysis Report).

The initial screening process considered a wide range of alternatives, including "construction of a 'managed' two-lane elevated structure for transit vehicles and potentially carpools, as well as single occupant vehicles willing to pay a congestion-based toll," as described on page S-2 of the Screening Memorandum. The screening results for the Managed Lane Alternative are discussed on pages C-4 through C-5 of this report. The analysis found that the transit mode share under the Managed Lane Alternative would hold constant with the No Build Alternative; the automobile mode share would increase; and the bike and walk mode share would decrease. Vehicle hours traveled would decrease, while vehicle miles traveled would increase slightly.

This initial screening process identified four alternatives that were presented at scoping meetings held to obtain public input. As described on page 5-2 of the Screening Memorandum, one of the alternatives recommended for further evaluation was the Managed Lane Alternative. The Managed Lane Alternative originally was described as follows:

"The Managed Lane Alternative would include construction of a two-lane grade-separated facility between Waiawa Interchange and Iwilei for use by buses, para-transit vehicles and vanpool vehicles (see Figure 5-1). The lanes would be managed to maintain free-flow speeds for buses, while simultaneously allowing High-Occupancy Vehicles (HOVs) and variable pricing for toll-paying single-occupant vehicles. Intermediate bus access points would be provided in the vicinity of Aloha Stadium and Middle Street. Bus operations utilizing the managed lanes would be restructured to use the Managed Lane and enhanced to provide additional service between Kapolei and other points ʻEwa of Downtown, through to the University of Hawaiʻi at Mānoa."

The scoping process resulted in the revision of this proposed alternative. As discussed on page 6-1 of the Screening Memorandum:

"Based on scoping comments, a second operational option was included under the Managed Lane Alternative. The initial option proposed a two-lane grade-separated facility between Waiawa Interchange and Iwilei which would operate as one lane in each direction at all times of the day. The second option proposes similar infrastructure, but it would operate as a reversible facility with two lanes traveling Koko Head during the morning peak period, and then reversing to travel ʻEwa in the PM peak period. Both operational options would include restructured and enhanced bus operations by utilizing the managed lanes to provide additional service between Kapolei and other points ʻEwa of Downtown, and both would be managed to maintain free-flow speeds for buses. Provided enough capacity exists, High-Occupancy Vehicles (HOVs) and toll-paying single-occupant vehicles would also be allowed to use the facility under either scenario; however, it is possible that under the initial option (one lane in each direction), there would not be enough excess capacity to allow toll-paying single occupant vehicles and still maintain reasonable speeds. Intermediate access points would be provided in the vicinity of Aloha Stadium and the Keʻehi Interchange."

This alternative was further developed in the Alternatives Analysis Report, with additional features added to maximize the performance of the alternative, as discussed on page 2-4:

"The Two-direction Option would serve express buses operating in both directions during the entire day. The Reversible Option would serve peak-direction bus service, while reverse-direction service would use H-1. Twenty-nine bus routes, with approximately 93 buses per hour, would use the managed lane facility during peak hours for either option. One limited-stop route and one local route would continually operate in the managed lane. A total of 27 peak-period express routes would operate in the peak direction using the managed lane facility. Of these, three are new express routes serving developing areas and nine are new routes developed for exclusive use of the managed lane. The nine new managed lane express bus system routes originate from Kalaeloa, Kapolei, or Central Oʻahu and terminate at the Alapaʻi Transit Center, Waikīkī, or UH Mānoa. Other peak-period, local and limited-stop routes follow a route similar to the current structure but will use the managed lane for the line-haul portion of the route.

"A toll structure has been developed that ensures that the managed lane facility would operate to maintain free-flow speeds for buses. To maintain free-flow speeds in the Two-direction Option, it may be necessary to charge tolls to manage the number of HOVs using the facility. For the Reversible Option, three-person HOVs would be allowed to use the facility for free, while single-occupant and two-person HOVs would have to pay a toll."

As discussed on page 3-8 of the Alternatives Analysis Report, the enhanced bus system would include an increased fleet size, estimated at 321 buses beyond the existing fleet for the two-direction managed lane facility and 381 buses for the reversible managed lane facility, to provide a sufficient fleet to ensure that the alternative would function as planned.

The Alternatives Analysis Report estimated total capital and operating costs for the Managed Lane Alternative. As discussed on page 2-16, capital costs for the Managed Lane Alternative were estimated to range between $3.6 and $4.7 billion, of which $2.6 to $3.8 billion would be for construction of the managed lanes. Transit operating costs for the Managed Lane Alternative would range between approximately $251 and $261 million as a result of additional buses that would be put in service under that alternative. These costs do not include the cost of maintaining the managed lane facility. Capital costs for the Fixed Guideway Alternative, including bus system costs, would range between $5.2 and $6.1 billion for the Full-corridor Alignments, of which $4.6 to $5.5 billion would be for the fixed guideway system. The costs would be $4.2 billion for the 20-mile Alignment, of which $3.6 billion would be for the fixed guideway system. Operating costs for the Fixed Guideway Alternative in 2030, in 2006 dollars, would be approximately $192 million. The total operating costs for the Fixed Guideway Alternative, including the bus and fixed guideway, would range between approximately $248 and $256 million.

The capital cost of the Managed Lane Alternative thus is potentially somewhat lower than the 20-mile Fixed Guideway Alternative and significantly lower than the Full-corridor Alternative. Operating costs would be slightly higher. These cost factors were considered in conjunction with other project goals in evaluating the alternatives.

With respect to transit travel time benefit, the Managed Lane Alternative options would improve some trips that were particularly well-served by the managed lanes. In general, the Managed Lane Alternative would increase transit travel times by increasing traffic on the overall roadway system and creating more delay for buses. The H-1 Freeway leading up to the managed lanes would become more congested because cars accessing the managed lanes would increase traffic volumes. Significant congestion would occur where the managed lanes connect to Nimitz Highway at Pacific Street near Downtown. Much of the time saved in the managed lane itself would be negated by the time spent in congestion leading up to the managed lane, as well as exiting the lanes at their Downtown terminus. Furthermore, areas that are not directly served by the managed lane would not experience much positive change from the No Build Alternative. As discussed on page 3-14, the Alternatives Analysis Report found that, "although the Managed Lane Alternative would provide some travel-time improvement for certain areas, it has significant limitations with regard to improving travel times or transit service for a broader customer base."

As discussed on page 3-17, transit ridership would increase only 5.3 to 6.4 percent over the No Build Alternative, a small increase compared both to the cost of the Managed Lane Alternative and the increase that would result from the Fixed Guideway Alternative, which would increase transit ridership by 21 percent for the 20-mile alignment.

The volume of peak-hour vehicles in key areas would actually increase under the Managed Lane Alternative compared to the No Build Alternative. As discussed on page 3-27, the Fixed Guideway Alternative would reduce the number of vehicles by 3 to 12 percent.

With respect to the goal of providing equitable transportation solutions that meet the needs of lower-income transit-dependent communities, the Alternatives Analysis Report observed that the Managed Lane Alternative, "would not substantially improve service or access to transit for transit-dependent communities, as buses that use existing HOV facilities would be routed to the managed lane facility but would continue to be affected by congestion in other parts of their routes. Arterial congestion would increase in the study corridor with the Managed Lane Alternative, making bus access to the managed lanes less reliable" (page 6-8).

The Alternatives Analysis Report also considered consistency with existing land use planning and regional transportation planning. On page 6-13, the report concluded that the Fixed Guideway Alternative, "best serves the areas of O‘ahu that are designated for future growth and development. It is also the only alternative that is consistent with regional transportation system planning defined in the 2030 O‘ahu Regional Transportation Plan (OMPO 2006a)."

The evaluation of alternatives inevitably involves trade-offs. As stated on page 6-13 of the Alternatives Analysis Report, the "greatest trade-off among the alternatives is between the transportation benefit provided and the cost to implement alternatives. . . . The Managed Lane Alternative provides slightly more benefit [than the Transportation System Management (TSM) alternative, which had little effect on traffic], but at a substantial cost. While the Fixed Guideway Alternative would have the highest cost, it is also the only alternative that would provide a substantial transportation benefit, measured both by the benefit to transit users and in the reduction in congestion compared to the No Build Alternative."

The Alternatives Analysis findings are summarized in Table 2-2 in Chapter 2 of this Final EIS. The Managed Lane Alternative is discussed in Section 2.2.2 of this Final EIS. As stated in the Final EIS and supported by the lengthy analysis that preceded the preparation of the Draft EIS, the Managed Lane Alternative was not pursued because the Managed Lane Alternative would not have achieved project goals and objectives, would not result in substantially fewer environmental impacts, and would not be financially feasible. For all of these reasons, it was not advanced to consideration in the Draft EIS.

Comments received about the Managed Lane Alternative referenced in the Draft EIS suggested there were significant differences between the alternative studied in the Alternatives Analysis and an ideal managed lane option. However, there was no substantial difference between the alternatives proposed in comments and those studied in the Alternatives Analysis that would have resulted in a different outcome. The primary concern raised about the Alternatives Analysis alternatives was that they did not allow access other than at the beginning and end of the facility. That is a misunderstanding of the Alternatives Analysis alternatives. Both provided access at Aloha Stadium and Middle Street to allow connections to intermediate points along the corridor. Any additional access points would substantially increase the cost of the facility because of right-of-way and structure costs and would affect the level-of-service provided by the investment.

Also questioned in the comments was the provision of a congestion pricing system that would make the facility available to single occupant vehicles or those with two occupants at a cost that would rise during periods of high demand. In both cases, the Managed Lane Alternative evaluated a pricing option, and the two-lane reversible alternative description stated that, "A toll structure has been developed that ensures that the managed lane facility would operate to maintain free-flow speeds for buses" (Alternatives Analysis Report, page 2-4). While there may be some minor details of the proposed alternatives that differ from the Alternatives Analysis alternatives, the evaluation assesses the concept fairly in the context of the Project's Purpose and Need.

8.6.13 At-grade Alternatives

Several comments have suggested that an at-grade alternative could reduce visual impacts, particularly Downtown. This response addresses the reasons why an at-grade alternative was not included in the EIS. It may also be helpful to refer to Section 2.2 of this Final EIS.

The Screening Memorandum (DTS 2006a) recognized the visually sensitive areas in Kaka'ako and Downtown, including the Chinatown, Hawai'i Capital, and Thomas Square/Academy of Arts Special Design Districts. To minimize impacts on historic resources, visual aesthetics, and surface traffic, the screening process considered 15 combinations of tunnel, at-grade, and elevated alignments between Iwilei and Ward Avenue. Five different alignments through Downtown were advanced for further analysis in the Alternatives Analysis, including an at-grade portion along Hotel Street, a tunnel under King Street, and elevated guideways along Nimitz Highway and Queen Street.

The Alternatives Analysis Report evaluated the alignment alternatives based on transportation benefits, environmental and social impacts, and overall benefits and cost considerations. The report found that an at-grade alignment along Hotel Street would require the acquisition of more parcels and could affect more burial sites than any of the other alternatives. The alignment with an at-grade operation Downtown and a tunnel through the Hawai'i Capital Historic District (under King Street) was not selected because of the environmental effects, such as impacts to cultural resources, reduction of street capacity, and property acquisition requirements of the at-grade and tunnel sections, would cost an additional $300 million. Of the remaining elevated alignments that were studied, the Alternatives Analysis concluded that an elevated alignment along Nimitz Highway would have less visual impacts than one along Queen Street because of its much wider right-of-way and location along the edge of the Hawai'i Capital Historic District.

The Project's purpose is "to provide high-capacity rapid transit" in the congested east-west travel corridor. The need for the Project includes improving corridor transit mobility and reliability. The at-grade alignment would not meet the Project's Purpose and Need because it could not satisfy the mobility and reliability objectives of the Project. Some of the technical considerations associated with an at-grade versus elevated alignment through Downtown include the following:

- **System Capacity and Speed**—The short, 200-foot (or less) blocks in Downtown Honolulu would permanently limit the system to two-car trains to prevent stopped trains from blocking vehicular traffic on cross-streets. Under ideal operational circumstances, the capacity of an at-grade system could reach 4,000 passengers per hour per direction, assuming optimistic five-minute headways. Based on travel forecasts, the Project should support approximately 8,000 passengers in the peak hour per direction by 2030. Moreover, the Project can be readily expanded to carry over 25,000 in each direction by reducing the interval between trains (headway) to 90 seconds during the peak period. To reach a comparable system capacity, speed and reliability, an at-grade alignment would require a fenced, segregated right-of-way that would eliminate all obstacles to the train's passage, such as vehicular, pedestrian, or bicycle crossings throughout Downtown. Even with transit signal priority, at-grade speeds would be slower and less reliable than an elevated guideway. An at-grade system would travel at slower speeds due to the shorter blocks, the tight and short radius curves in places within the constrained and congested Downtown street network, the need to obey traffic regulations (e.g., traffic signals), and potential conflicts with other at-grade activity, including cars, bicyclists, and pedestrians. These effects mean longer travel times and far less reliability than a fully grade-separated system. None of these factors affect an elevated rail system. The elevated rail can travel at its own speed any time of the day regardless of weather, traffic, or the need to let cross traffic proceed at intersections.
- **Mixed-Traffic Conflicts**—An at-grade system operating with three-minute headways would prevent effective coordination of traffic signals in the delicately balanced signal network in Downtown Honolulu. A three-minute cycle of traffic lights would affect traffic flow and capacity of cross-streets. Furthermore, there would be no option to increase the capacity of the rail system by reducing the headway to 90 seconds, which would only exacerbate the signalization problem. An at-grade system would require removal of two or more existing traffic lanes on affected streets. This effect is significant and would exacerbate congestion. Congestion would not be isolated to streets that cross the at-grade alignment but instead would spread throughout Downtown. The Final EIS shows that the Project's impact on traffic will be isolated and minimal with the elevated guideway, and in fact will reduce system-wide traffic delay by 18 percent compared to the No Build Alternative (Table 3-14 in Chapter 3). That is because the elevated guideway will not require removal of existing travel lanes, and will provide an attractive, reliable travel alternative. When traffic slows, or even stops due to congestion or incidents, the elevated system will continue to operate without delay or interruption.

An at-grade light rail system with continuous tracks in-street would create major impediments to turning movements, many of which would have to be closed to eliminate a crash hazard. Even where turning movements are designed to be accommodated, at-grade systems experience potential collision problems. In addition, mixing at-grade fixed guideway vehicles with cars, bicyclists, and pedestrians presents a much higher potential for conflicts compared to grade-separated conditions. Where pedestrian and automobiles cross the tracks in the street network, particularly in areas of high activity (e.g., station areas or intersections), there is a risk of collisions involving trains that does not exist with an elevated system. There is evidence of crashes between trains and cars and trains and pedestrians on other at-grade systems throughout the country. This potential would be high in the Chinatown and Downtown neighborhoods, where the number of pedestrians is high and the aging population presents a particular risk.

- **Construction Impacts and Cost**—Constructing an at-grade rail system could have more effects than an elevated system in a number of ways. The wider and continuous footprint of an at-grade rail system compared to an elevated rail system (which touches the ground only at discrete column foundations, power substations, and station accessways) increases the potential of utility conflicts and impacts to sensitive cultural resources. In addition, the extra roadway lanes used by an at-grade system would increase congestion or require that additional businesses or homes be taken to widen the roadway through Downtown. Additionally, the duration of short-term construction impacts to the community and environment with an at-grade system would be considerably greater than with an elevated system. Because of differing construction techniques, more lanes would need to be continuously closed for at-grade construction and the closures would last longer than with elevated construction. This would result in a greater disruption to business and residential access, prolonged exposure to construction noise, and traffic impacts.

Because it is not feasible for an at-grade system through Downtown to move passengers rapidly and reliably without a significant detrimental effect on other elements of the transportation system (e.g., highway and pedestrian systems, safety, reliability), an at-grade system would have a negative system-wide impact that would reduce ridership throughout the system. The at-grade system would not meet the Project's Purpose and Need and does not, therefore, require additional analysis.

8.7 Continuing Public Involvement through Construction

Public involvement activities will continue throughout the construction period. The City will work with businesses and residents prior to and during construction to provide information and address concerns about the construction process. The City will also continue the use of the Speakers Bureau, the project website (www.honolulutransit.org), and the hotline. The City will also work with the community throughout the acquisition and relocation process.

The City will continue educational outreach to all segments of the island. Cultural and ethnic groups, youth, elderly, special needs, and the accessibility challenged will be specially targeted. Lastly, the City will actively engage the public in areas where community input could shape the rail system, including station design where appropriate.

8.8 Accommodations for Minority, Low-income, and Persons with Disabilities

All meetings were held in handicapped-accessible facilities in compliance with the Americans with Disabilities Act. Every effort was made to respond to members of the public who require a sign language interpreter, an assisted learning system, a translator, or any other accommodations to facilitate participation in the transit planning process. Every reasonable effort was made to accommodate individuals requiring assistance.

Executive Order 12898 requires that, as part of the environmental evaluation of the alternatives, the Project must address environmental justice issues. To comply with this requirement, community demographics and socioeconomic impacts were carefully considered in analyzing the alternatives. The public participation process ensures "full and fair participation by potentially affected communities" throughout the duration of the Project.

Particular attention was paid to reaching low-income and minority populations that are traditionally underserved and underrepresented in the public involvement process. Materials have been prepared in the major languages used on O'ahu, and translators have been available upon request at meetings. Information was distributed through cultural organizations, ethnic associations, housing associations, community development groups, and similar organizations. Community issues brought forth in community meetings, during stakeholder interviews, and at public workshops have been addressed as part of evaluating the project alternatives.

The use of public involvement techniques to engage communities of concern consists of public information materials offered via the project website, handed out at meetings or other community events, and provided through the Speakers Bureau program. To reach populations who do not speak and/or read English, information on how to obtain reading materials in their native languages was provided. An informational flyer was developed in 11 languages (English, Chinese, Japanese, Korean, Vietnamese, Tagalog, Ilocano, Samoan, Spanish, Hawaiian, and Chuukese) and is updated as new project information is available. For these translated materials, the major languages spoken on the island were selected. These flyers have been mailed to potential environmental justice neighborhoods, handed out in person, and provided to churches and community service organizations.

As the Project has progressed, over 100 community service organizations have been included on the project mailing list. These organizations have also been provided with appropriate translated flyers to distribute to their communities.

Through the Speakers Bureau and literature deliveries, a concerted effort was made to reach out to local churches, elderly care facilities, and community organizations that cater to these populations. All organizations that previously received presentations were contacted with requests to conduct new presentations to provide updates on the Project's progress. This effort will continue throughout construction of the Project.

References

AECOS 1991 — AECOS, Inc. 1991. AECOS No. 661A. *Survey of lower Waiawa Stream and impacts assessment for flood retention basis at the Waiawa Ridge development project.* Prepared for Environmental Communications, Inc.

AECOS 1992 — AECOS, Inc. 1992. AECOS No. 722. Untitled report for 401 certification application for The Ewa Villages Development, City and County of Honolulu, Department of Housing and Community Development. Prepared for R. M. Towill Corp.

AECOS 2005 — AECOS, Inc. 2005. AECOS No. 1099. *Reconnaissance survey of drainages at the proposed University of Hawai'i West O'ahu Campus, Kapolei, 'Ewa District, O'ahu.* Prepared for Engineering Concepts, Inc.

ADA 1990 — One Hundred First Congress of the United States of America at the Second Session. 1990. *Americans with disabilities act of 1990* (ADA).

Ainley 1997 — Ainley, D.G., T.C. Telfer, and M.H. Reynolds. 1997. *Townsend's and Newell's Shearwater (Puffinus Auricularis). The birds of North America* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. http://bna.birds.cornell.edu/bna/species/297

Al-Mosaind 1993 — Al-Mosaind, M.A., K.J. Dueker, and J.G. Strathman. 1993. *Light rail transit stations and property values: A hedonic price approach.* Portland, Oregon Center for Urban Studies. Preprint, *Transportation Research Board.* 72nd Annual Meeting.

ASTM 2005 — ASTM International. 2005. E1527-05. *Standard practice for environmental site assessments—Phase I environmental site assessments process.*

C&C 2009 — Castle & Cooke Hawai'i. 2009. *Koa Ridge.* www.koaridge.com/

Caltrans 1983 — California Department of Transportation Division of Engineering Services. 1983. *Energy and transportation systems.*

CEQ 1997a — Council on Environmental Quality, Executive Office of the President. 1997. *Considering cumulative effects under the National Environmental Policy Act.*

CEQ 1997b — Council on Environmental Quality, Executive Office of the President. 1997. *Environmental justice guidance under the National Environmental Policy Act.*

CFR 1978 — Code of Federal Regulations. 1978. 40 CFR 1500 et seq. *Council on environmental quality.*

CFR 1986a — Code of Federal Regulations. 1986. 33 CFR 328. *Definition of waters of the United States.*

CFR 1986b — Code of Federal Regulations. 1986. 33 CFR 329. *Definition of navigable waters of the US.*

CFR 1986c — Code of Federal Regulations. 1986. 33 CFR 325. *Processing of Department of the Army permits.*

CFR 1987 — Code of Federal Regulations. 1987. 23 CFR 771. *Environmental impact and related procedures.*

CFR 1989a — Code of Federal Regulations. 1989. 49 CFR 24. *Uniform relocation assistance and real property acquisition for federal and federally assisted programs* (Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970).

CFR 1989b — Code of Federal Regulations. 1989. 36 CFR 800. *Protection of historic and cultural properties.*

CFR 1989c — Code of Federal Regulations. 1989. 36 CFR 1190. *Minimum guidelines and requirements for accessible design.*

CFR 1992 — Code of Federal Regulations. 1992. 40 CFR 130.8. *Water quality report,* as amended.

CFR 1994 — Code of Federal Regulations. 1990 (revised 1994). 28 CFR 36. *ADA standards for accessible design.*

CFR 1995 — Code of Frederal Regulations. 1995. 43 CFR 10. *Native American graves protection and repatriation regulations.*

CFR 1996a — Code of Federal Regulations. 1996. 40 CFR 51. *Requirements for preparation, adoption, and submittal of implementation plans.*

CFR 1996b — Code of Federal Regulations. 1996. 40 CFR 230. *Section 404(b)(1) guidelines for specification of disposal sites for dredged or fill material.*

CFR 1996c — Code of Federal Regulations. 1996. 40 CFR 402. *Effluent guidelines and standards.*

CFR 1996d — Code of Federal Regulations. 1996. 49 CFR 21. *Nondiscrimination in federally-assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964.*

CFR 1999 — Code of Federal Regulations. 1999. 23 CFR 650. *Bridges, structures, and hydraulics.*

CFR 2000a — Code of Federal Regulations. 2000. 29 CFR 1910. *Occupational safety and health standards for general industry.*

CFR 2000b — Code of Federal Regulations. 2000. 15 CFR 930. *Federal consistency with approved coastal management programs.*

CFR 2003 — Code of Federal Regulations. 2003. 29 CFR 1926. *Safety and health regulations for construction.*

CFR 2004a — Code of Federal Regulations. 2004. 36 CFR 800. *Protection of historic properties.*

CFR 2004b	Code of Federal Regulations. 2004. 36 CFR 1191. *Americans with disabilities act (ADA) accessibility guidelines for buildings and facilities; architectural barriers act (ABA) accessibility guidelines.*
CFR 2005a	Code of Federal Regulations. 2005. 49 CFR 633. *Project management oversight.*
CFR 2005b	Code of Federal Regulations. 2005. 40 CFR 93. *Determining conformity of federal actions to state or federal implementation plans* (Final Transportation Conformity Rule).
CFR 2007	Code of Federal Regulations. Revised 2007. 36 CFR 60.4. *National register of historic places: Criteria for evaluation.*
CFR 2008a	Code of Federal Regulations. 2008. 23 CFR 774 et seq. *Parks, recreation areas, wildlife and waterfowl refuges, and historic sites* [Section 4(f)].
CFR 2008b	Code of Federal Regulations. 2008. 33 CFR 332. *Compensatory mitigation for losses of aquatic resources.*
Char 2003	Char, W.P. 2003. *Botanical survey, University of Hawai'i West O'ahu, East Kapolei, 'Ewa District, O'ahu.* Prepared for PBR Hawai'i.
Chiddix 2004	Chiddix, J., and M. Simpson. 2004. *Next stop Honolulu! The story of the O'ahu Railway and Land Company.* Sugar Cane Press, Ltd., Honolulu, Hawai'i.
City 2001	City and County of Honolulu. 2001. *Pearl Harbor historic trail master plan.* Prepared by Belt Collins Hawai'i.
City 2007	City and County of Honolulu, City Council. 2007. Resolution 07-039, FD1(c). *Approving the minimum operable segment (MOS) for the Honolulu High-Capacity Transit Corridor Project.*
City 2008	City and County of Honolulu. 2008. Resolution 08-261. *Amending the minimum operable segment for the Honolulu High-Capacity Transit Corridor Project.*
Colliers 2008	Colliers International. 2008. *North America CBD parking rate survey.*
Cowardin 1979	Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States.* Prepared for U.S. Department of the Interior, Fish and Wildlife Service.
Eng 2008	Eng, H. April 9, 2008. *Revision to the 'Ewa, Central O'ahu, and Primary Urban Center public infrastructure maps for the Honolulu high-capacity transit corridor project (2008/PIM-1).* Letter from Department of Planning and Permitting City and County of Honolulu.
Dadey 1996	Dadey, K.A. March 31, 1996. *North-south road corridor project, 'Ewa, O'ahu, Hawai'i.* Letter from operations branch, U.S. Army Engineer District, Honolulu.
DBEDT 2003	State of Hawai'i Department of Business, Economic Development and Tourism. 2003. *The economic contribution of Waikīkī.*
DBEDT 2007	State of Hawai'i Department of Business, Economic Development and Tourism. 2007. *2006 the State of Hawai'i data book: A statistical abstract.*

DBEDT 2008	State of Hawai'i Department of Business, Economic Development and Tourism. 2008. http://hawaii.gov/dbedt
DBFS 1990	City and County of Honolulu Department of Budget and Fiscal Services. 1990. *Revised Ordinances of Honolulu Chapter 8, Article 4, Section 8-4.2. Remission of taxes in cases of natural disasters.*
DBFS 2008	City and County of Honolulu Department of Budget and Fiscal Services Real Estate Property Division. 2008. *Real estate tax rate tables.* www.honolulu.gov/rpa/staterpt/2007_staterpt.htm
DeBartolo 2009	DeBartolo Development. 2009. *Ka Makana Ali'i project.* www.debartolodevelopment.com/
de Groot 2002	de Groot, R.S., M.A. Wilson, and R.M.J. Boumans. 2002. "A typology for the classification, description and valuation of ecosystem functions, goods, and services." *Ecological Economics 41.*
DHHL 2005	State of Hawai'i Department of Hawaiian Home Lands. 2006. *DHHL East Kapolei development, Kānehili.* http://hawaii.gov/dhhl/publications/news-releases/2009-news-releases/Kanehili_Blessing_NR_1-27-09.pdf/?searchterm=kanehili
DHHL 2006	State of Hawai'i Department of Hawaiian Home Lands. 2006. *DHHL shopping center, City of Kapolei.* http://the.honoluluadvertiser.com/article/2006/Sep/29/bz/FP609290358.html
DHHS 2005	State of Hawai'i Department of Health and Human Services. December 2005. *Public health assessment: Pearl Harbor Naval Complex, Pearl Harbor, Hawai'i, EPA facility ID: HI4170090076.*
Disney 2008	Disney Vacation Club. 2008. *Disney resort on O'ahu.* http://dvc.disney.go.com/dvc/guest/about/pressRelease?id=HawaiianGroundBlessingGuestPressReleaseDetailPage&bhcp=1
DLU 1987	City and County of Honolulu Department of Land Utilization. 1987. *Coastal view study.*
DPP 1995	City and County of Honolulu Department of Planning and Permitting. 1995. *Waipahu town plan.*
DPP 1998a	City and County of Honolulu Department of Planning and Permitting. 1998. *Waipahu livable communities initiative.*
DPP 1998b	City and County of Honolulu Department of Planning and Permitting. 1998. *Waipahu town plan.*
DPP 2000	City and County of Honolulu Department of Planning and Permitting. 1997 (revised 2000). *'Ewa development plan.*
DPP 2002a	City and County of Honolulu Department of Planning and Permitting. 1997 (amended 2002). *City and County of Honolulu general plan (as amended).*

DPP 2002b — City and County of Honolulu Department of Planning and Permitting. 2002. *Central Oʻahu sustainable communities plan.*

DPP 2004a — City and County of Honolulu Department of Planning and Permitting. 2004. *Primary urban center development plan.*

DPP 2004b — City and County of Honolulu Department of Planning and Permitting. 2004. *ʻAiea-Pearl City livable communities plan.*

DPP 2004c — City and County of Honolulu Department of Planning and Permitting. 2004. *ʻKalihi-Pālama action plan.*

DPP 2006 — City and County of Honolulu Department of Planning and Permitting. 2006. *Makaīwa Hills environmental impact statement preparation notice.*

DPP 2009 — City and County of Honolulu Department of Planning and Permitting. 2009. *Waipahu neighborhood transit oriented development plan.*

DTS 1992 — City and County of Honolulu Department of Transportation Services. 1992. *Honolulu rapid transit development project FEIS.*

DTS 1998 — City and County of Honolulu Department of Transportation Services. 1998. *Oʻahu trans 2K islandwide mobility concept plan.*

DTS 1999 — City and County of Honolulu Department of Transportation Services. 1999. *Honolulu bicycle master plan.*

DTS 2003 — City and County of Honolulu Department of Transportation Services. 2003. *Final environmental impact statement primary corridor transportation project.* In conjunction with the U.S. Federal Transit Administration.

DTS 2006a — City and County of Honolulu Department of Transportation Services. 2006. *Honolulu high-capacity transit corridor project alternatives screening memorandum.*

DTS 2006b — City and County of Honolulu Department of Transportation Services. 2006. *Honolulu high-capacity transit corridor project alternatives analysis report.*

DTS 2006c — City and County of Honolulu Department of Transportation Services. 2006. *Honolulu high-capacity transit corridor project scoping report.*

DTS 2006d — City and County of Honolulu Department of Transportation Services. 2006. *Honolulu high-capacity transit corridor project revised final operations and maintenance costing methodology report.*

DTS 2007 — City and County of Honolulu Department of Transportation Services. 2007. *Honolulu high-capacity transit corridor project National Environmental Policy Act scoping report.*

DTS 2009 — City and County of Honolulu Department of Transportation Services. 2009. *Wahiawa transit center & park and ride final environmental assessment.*

EDR 2007 — Environmental Data Resources, Inc. 2007. *EDR data map environmental atlas.*

EPA 1971 — Environmental Protection Agency. 1971. NTID 300.1. *Noise from construction equipment and operations, building equipment and home appliances.*

EPA 2007	Environmental Protection Agency. 2007. EPA420-F-07-017. *Control of hazardous air pollutants from mobile sources: final rule to reduce mobile source air toxics.*
Erickson 2006	Erickson, T.A., and C.F. Puttock. 2006. *Hawaiʻi wetland field guide. An ecological and identification guide to wetlands and wetland plants of the Hawaiian Islands.* ISBN 1-57306-268-5 GAP Analyses: http://gapanalysis.nbii.gov/portal/server.pt
FHWA 1987a	U.S. Department of Transportation, Federal Highway Administration. 1987. *FHWA Section 4(f) policy paper.*
FHWA 1987b	U.S. Department of Transportation, Federal Highway Administration. 1987. *Technical advisory guidance for preparing and processing environmental and Section 4(f) document T6640.8A.*
FHWA 1992a	U.S. Department of Transportation, Federal Highway Administration. 1992. *Position paper: Secondary and cumulative impact assessment in the highway project development process.*
FHWA 1992b	U.S. Department of Transportation, Federal Highway Administration. 1992. Volume 6, Chapter 7, Section 3, Subsection 2. F*ederal aid highway program manual.*
FHWA 1998	U.S. Department of Transportation, Federal Highway Administration. 1998. *Order 6640.23: FHWA actions to address environmental justice in minority populations and low-income populations.*
FHWA 2003	U.S. Department of Transportation, Federal Highway Administration. 2003. *Questions and answers regarding the consideration of indirect and cumulative impacts in the NEPA process.*
FHWA 2005	U.S. Department of Transportation, Federal Highway Administration. 2005. *FHWA Section 4(f) policy paper.*
FHWA/EPA 1984	Federal Highway Administration and Environmental Protection Agency. 1984. *Sole source aquifer memorandum of understanding.*
Foote 1972	Foote, D.E., E.L. Hill, S. Nakamura, and F. Stevens. 1972. *Soil survey of Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi, and Lānaʻi, State of Hawaiʻi.* U.S. Department of Agriculture, Soil Conservation Service.
FR 2008	Federal Register. April 2008. FR Doc. E8-6918. "Compensation mitigation for losses of aquatic resources; final rule." *Federal Register,* Vol. 73, No. 70, pp. 19594–19705.
FTA 2000	U.S. Department of Transportation, Federal Transit Administration. 2000. *Transit benefits 2000 working papers: a public choice policy analysis.*
FTA 2003	U.S. Department of Transportation, Federal Transit Administration. 2003. *Advancing major transit investments through planning and project development.*

FTA 2005	U.S. Department of Transportation, Federal Transit Administration, and Federal Highway Administration. 2005. *Linking the transportation planning and national environmental policy act (NEPA) process.*
FTA 2006a	U.S. Department of Transportation, Federal Transit Administration. 2006. FTA-VA-90-1003-06. *Transit noise and vibration impact assessment.*
FTA 2006b	U.S. Department of Transportation, Federal Transit Administration. 2006. *SAFETEA-LU environmental review process final guidance.*
FTA 2007	U.S. Department of Transportation, Federal Transit Administration. 2007. *National transit database.* www.ntdprogram.gov/ntdprogram/
FTA 2008	U.S. Department of Transportation, Federal Transit Administration. 2008. *Procedures and technical methods for transit project planning* (draft version 3).
HAMP 2006	State of Hawaiʻi. 2006 (accessed 2009). *Hawaiʻi airports modernization program.* www.hawaiiairportsmodernization.com
HAR 1996	Hawaiʻi Administrative Rules. 1996. Title 13 Subtitle 13 Chapter 300 (HAR Chapter 13-13-300). *Historic Preservation Division, rules of practice and procedure relating to burial sites and human remains.*
HAR 1996a	Hawaiʻi Administrative Rules. 1996. Title 11, Chapter 200 (HAR Chapter 11-200). *Environmental impact statement rules.*
HAR 1996b	Hawaiʻi Administrative Rules. 1996. Title 11, Chapter 46 (HAR Chapter 11-46). *Community noise control.*
HAR 1997	Hawaiʻi Administrative Rules. 1997. Title 11, Chapter 451 (HAR Chapter 11-451). *State contingency plan.* State of Hawaiʻi Office of Hazard Evaluation and Emergency Response.
HAR 2002	Hawaiʻi Administrative Rules. 2002. Title 13, Chapter 275 (HAR Chapter 13-275). *Rules governing procedures for historic preservation review for governmental projects covered under Sections 6E-7 and 6E-8, Hawaiʻi Revised Statutes.*
HAR 2003	Hawaiʻi Administrative Rules. 2003. Title 11, Chapter 60.1 (HAR Chapter 11-60.1). *Air pollution control.*
Haseko 2001	HASEKO (Ewa), Inc. 2001. *Ocean Pointe final supplemental environmental assessment.*
HCDA 2005	Hawaiʻi Community Development Authority. 2005. *Kakaʻako community development district mauka area plan.*
HCDA 2006	Hawaiʻi Community Development Authority. 2006. *Kalaeloa master plan.*
HCDA 2008	Hawaiʻi Community Development Authority. 2008. *Kaiāulu ʻo Kakaʻako master plan.*
HCDA 2009a	Hawaiʻi Community Development Authority. 2009. *University of Hawaiʻi John A. Burns school of medicine.* http://hcdaweb.org/kakaako/projects/other/university-of-hawaii-john-a-burns-school-of-medicine

HCDA 2009b	Hawaiʻi Community Development Authority. 2009. *Ward Village shops project*. http://hcdaweb.org/kakaako/projects/private-sector-projects/ward-village-shops-project-1
HCDA 2009c	Hawaiʻi Community Development Authority. 2009. *Vanguard lofts project*. http://hcdaweb.org/kakaako/projects/private-sector-projects/vanguard-lofts-720-kapiolani-boulevard-project
HCPSU 1990	Hawaiʻi Cooperative Park Service Unit. 1990. R84. *Hawaii stream assessment. A preliminary appraisal of Hawaii's stream resources.* Prepared for the State of Hawaiʻi Commission on Water Resources Management.
HDOA 2005	State of Hawaiʻi Department of Agriculture. 2005. Act 183. *Important agricultural lands* (Farmland Preservation Act).
HDOH 2004	State of Hawaiʻi Department of Health, Environmental Planning Office. 2004. *Final 2004 list of impaired waters in Hawaiʻi.*
HDOH 2008	State of Hawaiʻi Department of Health. 2008. *2006 State of Hawaiʻi water quality monitoring and assessment report: Integrated report to the U.S. Environmental Protection Agency and the U.S. Congress pursuant to Sections 303(d) and 305(b), Clean Water Act (PL 97-117).*
HDOT 1995a	State of Hawaiʻi Department of Transportation. 1995. *The Oʻahu commercial harbors 2020 master plan.*
HDOT 1995b	State of Hawaiʻi Department of Transportation. 1995. *Honolulu international airport layout plan.*
HDOT 1999	State of Hawaiʻi Department of Transportation. 1999. *Kalaeloa harbor 2020 master plan.*
HDOT 2002	State of Hawaiʻi Department of Transportation. 2002. *Hawaiʻi statewide transportation plan.*
HDOT 2003	State of Hawaiʻi Department of Transportation. 2003. *Bike plan Hawaiʻi master plan.*
HDOT 2004	State of Hawaiʻi Department of Transportation. 2004. *Habitat conservation plan for abutilon menziesii at Kapolei.*
HDOT 2009	State of Hawaiʻi Department of Transportation. 2009. *Honolulu international airport master plan update.*
HEC 2008	State of Hawaiʻi Environmental Council. 2008. *Hawaiʻi environmental justic initiative report.*
HECO 2008	Personal Communication. February 5, 2008. Between Earlynne Oshiro, Hawaiian Electric Company, Inc., and Lawrence Spurgeon, Parsons Brinckerhoff.
HHB 2000	State of Hawaiʻi. House Bill No. 2895, H.D.1, passed by the 20th Legislature and approved by the Governor on April 26, 2000. *National Environmental Policy Act: Section 106 and Act 50.*

HHFDC 1988	State of Hawai'i Housing Finance and Development Corporation. 1988. *Kapolei Village environmental impact statement.*
Hoku 2007	Hoku Scientific, Inc. 2007. *Kapolei sustainable energy park final environmental impact statement.*
Horton 2008	D.R. Horton-Schuler Division. 2008. *Ho'opili final environmental impact statement.*
Horton 2009	D.R. Horton-Schuler Division. 2009. *Nanala at Mehana.* http://drhorton.com/corp/GetCommunity.do?dv=Y8&pr=42982
HRS 1971	Hawai'i Revised Statutes. 1971. Chapter 113. *Land acquisition policies for federally assisted programs.*
HRS 1977	Hawai'i Revised Statutes. 1977. Chapter 205A. *Coastal zone management.*
HRS 1983	Hawai'i Revised Statutes. 1983. Chapter 195D. *Conservation of aquatic life, wildlife, and land plants.*
HRS 1988	Hawai'i Revised Statutes. 1988. Chapter 6E-43. *Prehistoric and historic burial sites.*
HRS 1989	Hawai'i Revised Statutes. 1989. Chapter 368. *Hawai'i civil rights commission.*
HRS 1993a	Hawai'i Revised Statutes. 1993. Chapter 128E. *Hawai'i emergency planning and community right-to-know act.*
HRS 1993b	Hawai'i Revised Statutes. 1993. Chapter 101. *Eminent domain.*
HRS 2003	Hawai'i Revised Statutes. 2003. Section 201G-113. *Housing and community development corporation of Hawai'i.*
HRS 2002	Hawai'i Revised Statutes. 2002. Section 103-50. *Building design to consider needs of persons with disabilities.*
HRS 2005	Hawai'i Revised Statutes. 2005. Chapter 247. *County surcharge on state tax.*
HRS 2007	Hawai'i Revised Statutes. 2007. Chapter 128D. *Hawai'i environmental response law.* State of Hawai'i Office of Hazard Evaluation and Emergency Response.
HRS 2008	Hawai'i Revised Statutes. 2008. Chapter 343. *Environmental impact statements.*
HSC 2000	The Supreme Court of the State of Hawai'i (HSC). *Ka Pa'akai o Ka 'Āina v. Land Use Commission,* 7 P.3d 1068 (Haw. 2000).
HWJV 2006	Hawai'i Wetlands Joint Venture, Adonia Henry, personal communication concerning wetland sites: Joint Ventures wetland GIS database shapefile. The data was compiled from multiple sources, including the draft waterbird recovery plan, Shallenburger's 1970s report, Miller et al publications on ecologically important sites for groundwater, and input from managers, biologists, and other interested parties throughout the state. It is a compilation of existing knowledge, but was not ground-truthed.

ICNIRP 1998	International Commission on Non-Ionizing Radiation Protection. 1998. "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)." *Health Physics*. 74(4):494-522.
INRIX 2008	INRIX, Inc. 2008. *INRIX® national traffic scorecard #38: Honolulu metropolitan area*. http://scorecard.inrix.com
IPCC 2007	Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of working group II to the fourth assessment report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge, NY.
Jovanis 1986	Jovanis, P., and H. Chang. 1986. "Modeling the relationship of accidents to miles traveled." *Transportation Research Record 1068.*
Landis 1995	Landis, J., R. Cervero, S. Guhathukurta, D. Loutzenheiser, and M. Zhang. 1995. *Rail transit investments, real estate values, and land use change: A comparative analysis of five California rail transit systems.* Monograph 48, Institute of Urban and Regional Studies, University of California at Berkeley.
Lewis-Workman 1997	Lewis-Workman, S., and D. Brod. 1997. "Measuring the neighborhood benefits of rail transit accessibility." *Transportation Research Record* 1576:147-153.
Miles 1986	Miles, D.H. 1986. "White terns breeding on O`ahu, Hawai'i." *'Elepaio: journal of the Hawai'i Audubon Society.* 46:171-175.
MVE 2009	MVE Pacific. 2009. *Halekauwila place.* www.mve-pacific.com
Navy 2000	Department of the Navy Pacific Division. 2000. *Phase II remedial investigation: Ewa junction fuel drumming facility.*
NCHRP 1998	National Cooperative Highway Research Program. 1998. *Report 403: Estimating the indirect effects of proposed transportation projects.*
NPS 1991	U.S. Department of the Interior, National Park Service. 1991. National Register Bulletin 16. *Guidelines for completing National Register of Historic Places forms.* Interagency Resources Division, National Park Service.
NRC 1999	National Academy of Sciences National Research Center. 1999. *Final report of the committee to review the research activities completed under the Energy Policy Act of 1992.*
NRCS 2001	U.S. Department of Agriculture National Resources Conservation Service (NRCS). 2001. *Hawaii stream visual assessment protocol (version 1.0).*
NRCS 2009	U.S. Department of Agriculture National Resources Conservation Service (NRCS). 2009. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
O'ahuMPO 2004	O'ahu Metropolitan Planning Organization. 2004. *Environmental justice in the OMPO planning process: Defining environmental justice populations.*
O'ahuMPO 2007	O'ahu Metropolitan Planning Organization. 2006 (Amendment #1, 2007). *O'ahu regional transportation plan 2030.*

Oʻahu MPO 2008	Oʻahu Metropolitan Planning Organization. 2008. *FYs 2008–2011 transportation improvement program.*
OEQC 1997	State of Hawaiʻi Office of Environmental Quality Control. 1997. *Guidelines for assessing cultural impacts.*
Oshiro 2008	Oshiro, Earlynne, Hawaiian Electric Company, Inc., and Lawrence Spurgeon, PB Americas, Inc. February 2008. Personal communication.
OTPP 1967	Oʻahu Transportation Planning Program. 1967. *Oʻahu transportation study.*
OTS 2006	Oahu Transit Services, Inc. 2006. *Monthly schedule adherence reports.*
PL 1990	U.S. Public Law 101-549. 1990. *Clean Air Act amendments of 1990.*
PL 2005	U.S. Public Law 109-59. 2005. 119 Stat 1144. *Safe, accountable, flexible, efficient transportation equity act: A legacy for users (SAFETEA-LU).*
PL 2009	U.S. Public Law 111-5. 2009. *American recovery and reinvestment act of 2009 public transportation apportionments, allocations and grant program information* (ARRA).
Potter 1992	Potter, E.W., and B. Boland. 1992. *Guidelines for evaluating and registering cemeteries and burial places.* Prepared for U.S. Department of the Interior, National Park Service.
Reed 1988	Reed, P.B.J. 1988. "National list of plant species that occur in wetlands: Hawaii (Region H)." USFWS, *Biological Report 88*(26.13).
ROH 1978a	Revised Ordinances of Honolulu. 1978. Chapter 21. *Land use ordinance.*
ROH 1978b	Revised Ordinances of Honolulu. 1978. Chapter 24. *Development plans.*
ROH 1978c	Revised Ordinances of Honolulu. 1978. Chapter 14, Article 12. *Drainage, flood and pollution control.*
ROH 1978d	Revised Ordinances of Honolulu. 1978. Chapter 14, Article 13. *General provisions for grading, soil erosion and sediment control.*
ROH 1978e	Revised Ordinances of Honolulu. 1978. Chapter 25, Article 3. *Objectives and policies, review and procedural guidelines.*
ROH 1978f	Revised Ordinances of Honolulu. 1978. Chapter 24, Section 1.4. *General urban design principles and controls.*
ROH 1990	Revised Ordinances of Honolulu. 1990. Chapter 41, Article 13. *Protective regulations for exceptional trees.*
ROH 2005	Revised Ordinances of Honolulu. 2005. Section 6-60, Ordinance 05-027. *Transportation surcharge—use of funds.*
ROH 2007	Revised Ordinances of Honolulu. 2007. Section 6-60, Ordinance 07-001. *Transportation surcharge—use of funds.*
ROH 2009	Revised Ordinances of Honolulu. 2009. Ordinance 09-4. *Relating to transit-oriented development.*

RPA 2008	City and County of Honolulu Department of Budget and Fiscal Services, Real Property Assessment Division. February 2008. www.honolulu.gov/rpa/staterpt/2007_staterpt.htm
RTD 2008a	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project transportation technical report.*
RTD 2008b	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project land use technical report.*
RTD 2008c	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project economics technical report.*
RTD 2008d	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project neighborhoods and communities technical report.*
RTD 2008e	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project visual and aesthetics resources technical report.*
RTD 2008f	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project noise and vibration technical report.*
RTD 2008g	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project air quality and energy technical report.*
RTD 2008h	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project electric and magnetic fields technical report.*
RTD 2008i	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project hazardous materials technical report.*
RTD 2008j	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project ecosystems and natural resources technical report.*
RTD 2008k	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project water resources technical report.*
RTD 2008l	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project street trees technical report.*

RTD 2008m	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project geology, soils, farmlands, and natural hazards technical report.*
RTD 2008n	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project archaeological resources technical report.*
RTD 2008o	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project historic resources technical report.*
RTD 2008p	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project cultural resources technical report.*
RTD 2008q	Not used in Final EIS.
RTD 2008r	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Bus fleet maintenance plans.*
RTD 2008s	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project summary cash flow tables.*
RTD 2008t	City and County of Honolulu Department of Transportation Services Rapid Transit Division. 2008. *Honolulu High-capacity transit corridor project travel forecasting results report.*
RTD 2008u	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project draft environmental impact statement/section 4(f) evaluation.*
RTD 2009a	Not used in Final EIS.
RTD 2009b	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. July 10, 2009. *Honolulu high-capacity transit corridor project wetland and waters of the U.S. study.*
RTD 2009c	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project addendum 01 to the historic resources technical report.*
RTD 2009d	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project historic effects report.*
RTD 2009e	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project addendum 01 to the cultural resources technical report.*
RTD 2009f	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project addendum 01 to the transportation technical report.*

RTD 2009g	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project summary cash flow tables.*
RTD 2009h	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project ecosystem function and values of wetland and waters of the U.S.*
RTD 2009i	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project addendum 02 to the transportation technical report.*
RTD 2009j	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project addendum 01 to the travel forecasting results report.*
RTD 2009k	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project model development, calibration, and validation report.*
RTD 2009l	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project travel forecasting results and uncertainties report.*
RTD 2009m	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Floodplain evaluations at HHCTCP stream crossings.*
RTD 2009n	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project cost escalation forecast FY 2009-2019.*
RTD 2009o	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2009. *Honolulu high-capacity transit corridor project compendium of design criteria.*
RTD 2010a	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2010. *Honolulu high-capacity transit corridor project addendum 03 to the transportation technical report.*
RTD 2010b	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2010. *Honolulu high-capacity transit corridor project addendum 01 to the noise and vibration technical report.*
RTD 2010c	City and County of Honolulu Department of Transportation Services, Rapid Transit Division. June 1, 2010. *Honolulu high-capacity transit corridor project wetland and waters of the U.S. study.*
Sherfy 1998	Sherfy, M., and W.R. Luce. 1998. *Guidelines for evlauating and nominating properties that have achieved significance within the last fifty years.* Prepared for U.S. Department of the Interior, National Park Service.

Stokes 2008	Stokes, R.J., J. MacDonald, G. Ridgeway. March 2008. "Estimating the effects of light rail transit on health care costs." *Health & Place,* Volume 14, Issue 1, 45-58.
Thompson 1983	Thompson, B. June 1983. *Historic bridge inventory, Island of O'ahu.* Prepared for the State of Hawai'i Department of Transportation Highways Division.
Timbol 1978	Timbol, A.S., and J.A. Maciolek. 1978. *Stream channel modification in Hawaii. Part A: Statewide inventory of streams, habitat factors and associated biota.* Prepared for U.S. Fish and Wildlife Service.
TMG/TKG	The MacNaughton Group & The Kobayashi Group. 2009. *Kapolei Commons.* www.thekapoleicommons.com/
TRB 2000	Transportation Research Board. 2000. *Highway capacity manual.*
TRB 2003	Transportation Research Board (Transit Cooperative Research Program). 2003. *Transit capacity and quality of service manual, 2nd edition.*
TSA 2007	The Salvation Army. 2007 (accessed 2009). *The Salvation Army Ray and Joan Kroc corps community center.* www1.usw.salvationarmy.org/usw/www_usw_hawaii.nsf
UH 2002a	University of Hawai'i. 2002. *Enrollment data.*
UH 2002b	University of Hawai'i. 2002. *University of Hawai'i system strategic plan: Entering the university's second century, 2002-2010.*
UH 2005	University of Hawai'i. 2005. *Campus commuting data.*
USACE 1987	U.S. Army Corps of Engineers. 1987. Technical Report Y-87-1. *Wetlands delineation manual.*
USACE 1999	U.S. Army Corps of Engineers. 1999. *Wetlands of Pearl Harbor.*
USACE 2007	U.S. Army Corps of Engineers. 2007. *Jurisdictional determination form instructional guidebook.*
USACE 2008	U.S. Army Corps of Engineers. 2008. *Little Rock District stream method.* www.swl.usace.army.mil/regulatory/permits/littlerockstreammitigation 03212008.doc (last visited August 7, 2009).
USC 1899	United States Code. 1899. 33 USC 403 et seq. *Navigation and navigable waters: Obstruction of navigable waters generally; wharves; piers, etc.; excavations and filling in* (the Rivers and Harbors Act of 1899).
USC 1906	United States Code. 1906. 33 USC 1401 et seq. *Navigation and navigable waters: Congressional finding, policy, and declaration of purpose* (Bridge Act of 1906 [or] Act of March 23, 1906).
USC 1918	United States Code. 1918. 16 USC 703-711. *Migratory bird treaty act of 1918.*
USC 1946	United States Code. 1946. 33 USC 491-535. *Navigation and navigable waters: Bridges over navigable waters* (General Bridge Act of 1946).

USC 1948a — United States Code. 1948. 33 USC 1251-1387. *Navigation and navigable waters: Water pollution prevention and control* (Clean Water Act).

USC 1948b — United States Code. 1948. 33 USC 1344. *Navigation and navigable waters: Permits for dredged or fill material.*

USC 1949 — United States Code. 1949. 40 USC 484. *Federal property and administrative services act of 1949*, as amended (Federal Lands to Parks Program).

USC 1964a — United States Code. 1964. 49 USC 5307. *Transportation: Urbanized area formula grants.*

USC 1964b — United States Code. 1964. 49 USC 5309. *Transportation: Capital investment grants.*

USC 1964c — United States Code. 1964. 42 USC 2000e-16. *The civil rights act of 1964.*

USC 1964d — United States Code. 1964. 49 USC 1601 et seq. *The urban mass transportation act of 1964.*

USC 1966a — United States Code. 1966. 16 USC 470. *National historic preservation act of 1966* (NHPA) (Section 106).

USC 1966b — United States Code. 1966. 49 USC 303. *Department of Transportation Act—Policy on lands, wildlife and waterfowl refuges, and historic sites* [Section 4(f)].

USC 1966c — United States Code. 1966. 23 USC 138. *Preservation of parklands.*

USC 1969 — United States Code. 1969. 42 USC 4321-4347. *The national environmental policy act of 1969* (NEPA).

USC 1972a — United States Code. 1972. 16 USC 1361-1407. *The marine mammal protection act of 1972* (MMPA).

USC 1972b — United States Code. 1972. 33 USC 1251 et seq (revised). *Navigation and navigable waters: Water pollution prevention and control* (Clean Water Act).

USC 1972c — United States Code. 1972. 16 USC 1451 et seq. *Coastal zone management act of 1972* (CZMA).

USC 1973 — United States Code. 1973. 16 USC 1531-1544. *The endangered species act of 1973.*

USC 1974 — United States Code. 1974. 42 USC 300f et seq. *The safe drinking water act of 1974* (SDWA).

USC 1976 — United States Code. 1976. 42 USC 6901 et seq. *The resource conservation and recovery act of 1976.*

USC 1980 — United States Code. 1980. 42 USC 103. *Comprehensive environmental response—The compensation and liability act of 1980* (CERCLA).

USC 1981 — United States Code. 1981. 7 USC 4201-4209. *Farmland protection policy act* (FPPA).

USC 1983 — United States Code. 1983. 49 USC 303. *Policy on lands, wildlife and waterfowl refuges, and historic sites.*

USC 1986	United States Code. 1986. 42 USC 300 et seq. *The emergency planning and community right to know act of 1986.*
USC 1990a	United States Code. 1990. 16 USC 4601. *Take pride in America program* (TPIA).
USC 1990b	United States Code. 1990. 25 USC 3001 et seq. *Native American graves protection and repatriation act* (NAGPRA).
USC 1994	United States Code. 1994. 49 USC 5332. *Mass transportation.*
USC 1995	United States Code. 1995. 16 USC 1531 et seq. *Endangered species act, U.S. Fish and Wildlife Service.*
USC 2002	United States Code. 2002. 7 USC 136. *Environmental pesticide control.*
USDA 1972	U.S. Department of Agriculture, Natural Resources Conservation Service. 1972. *Hawai'i soil surveys geographic.* http://.soils.usda.gov
USDA 2004	U.S. Department of Agriculture, National Agricultural Statistics Service. 2004. *2002 census of agriculture.*
USDOE 2007	U.S. Department of Energy. 2007. ORNL-6978. *Transportation energy data book: Edition 26.*
USDOI 1992	U.S. Department of the Interior, National Park Service. 2009. *Federal lands to parks program website.* www.nps.gov/flp/
USDOI 1995	U.S. Department of the Interior. 1995. *The Secretary of the Interior's standards for the treatment of historic properties, 1995.* www.nps.gov/history/local-law/arch_stnds_8_2.htm
USDOT 1979	U.S. Department of Transportation. 1979. Order 5650.2. *Flood management and protection.*
USDOT 1997	U.S. Department of Transportation. 1997. Order 5610.2. *USDOT order to address environmental justice in minority populations and low-income populations.*
USDOT 1998	U.S. Department of Transportation Federal Highway Administration. 1998. Order 6640.23. *FHWA actions to address environmental justice in minority populations and low-income populations.*
USEO 1977	U.S. Presidential Executive Order 11988. 1977. *Floodplain management.*
USEO 1994	U.S. Presidential Executive Order 12898. 1994. *Federal actions to address environmental justice in minority populations and low-income populations.*
USEO 2000	U.S. Presidential Executive Order 13166. 2000. *Improving access to services for persons with limited English proficiency.*
USFWS 1978	U.S. Department of the Interior, Fish and Wildlife Service. 1978. *National wetlands inventory maps.* http://hawaii.gov/dbedt/gis/wetlnds.htm
USFWS 1996	U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1996. *Recovery plan for marsilea villosa.*

USFWS 1998	U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1998. *Recovery plan for the Hawaiian hoary bat.*
USFWS 2005a	U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2005. *Draft revised recovery plan for Hawaiian waterbirds.*
USFWS 2005b	U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2005. *Draft revised recovery plan for Hawaiian waterbirds. Second draft of second revision.*
USFWS 2006	U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2006. *Revised recovery plan for Hawaiian forest birds.*
USFWS 2009	U.S. Department of the Interior, Fish and Wildlife Service. 2009. *National Wetland Inventory (NWI) maps.* www.fws.gov/wetlands/Data/mapper.html
USGS 2009	U.S. Geological Survey. 2009. *Surface water data for Hawai'i.* http://waterdata.usgs.gov/hi/nwis/sw
VanderWerf 2001	VanderWerf, E.A., J.L. Rohrer, D.G. Smith, and M.D. Burt. 2001. "Current distribution and abundance of the O'ahu 'Elepaio." *The Wilson Bulletin.* 113:10-16.
VanderWerf 2003	Vanderwerf, E.A. 2003. "Distribution, abundance, and breeding biology of white terns on O'ahu, Hawai'i." *The Wilson Bulletin.* 115:258-262.
WCP 2007	Wil Chee Planning, Inc., and AECOS. 2007. U.S. AECOS No. 1126B. *Pearl Harbor wetlands inventory.* Prepared for the U.S. Navy.

Government Regulation Naming Conventions

Example	**Full Designation**
40 CFR 4.1(a)	Code of Federal Regulations Title 40 Part 4 Section 1 Paragraph (a)
42 USC 4321 et seq.	United States Code Title 42 Section 4321 and following section(s)
52 FR 8912	Federal Register Volume 52 Page 8912
PL 101-548	U.S. Public Law 101-548
USEO 12898	U.S. Presidential Executive Order 12898
HRS Chapter 368	Hawai'i Revised Statute Chapter 368
HAR Section 11-200-1	Hawai'i Administrative Rule Title 11 Chapter 200 Section 1
ROH Section 24-1.4	Revised Ordinances of Honolulu Chapter 24 Article 1 Section 4

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	Department of Business, Economic Development & Tourism, Land Use Commission
	Department of Business, Economic Development & Tourism, Office of Planning
	Department of Defense
	Department of Education
	Department of Hawaiian Home Lands
	Department of Health, Disability and Communication Access Board
	Department of Health, Environmental Planning Office
	Department of Health, Office of Environmental Quality Control
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	Department of Land & Natural Resources, Commission on Water Resource Management
	Department of Land & Natural Resources, O`ahu Island Burial Council
	Department of Land & Natural Resources, State Historic Preservation Division
	Department of Transportation
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	Hawai`i State Civil Defense
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	Office of Hawaiian Affairs
Commission on Transportation	
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City Departments	Board of Water Supply[1] Department of Community Services Department of Customer Services, Municipal Library Department of Design and Construction Department of Environmental Services Department of Facility Maintenance Department of Parks and Recreation Department of Planning and Permitting[1] Department of Transportation Services Honolulu Fire Department Honolulu Police Department Managing Director Office Municipal Reference and Records Center
Neighborhood Boards	Hawai`i Kai Neighborhood Board No. 1 Kuli`ou`ou/Kalani Iki Neighborhood Board No. 2 Wai`alae/Kahala Neighborhood Board No. 3 Kaimukī Neighborhood Board No. 4 Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board No. 5 Pālolo Neighborhood Board No. 6 Mānoa Neighborhood Board No. 7 McCully/Mō`ili`ili Neighborhood Board No. 8 Waikīkī Neighborhood Board No. 9 Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10 Ala Moana/Kaka`ako Neighborhood Board No. 11 Nu`uanu/Punchbowl Neighborhood Board No. 12 Downtown Neighborhood Board No. 13 Liliha/Pu`unui/Al`Ewa/Kamehameha Heights Neighborhood Board No. 14 Kālihi/Pālama Neighborhood Board No. 15 Kālihi Valley Neighborhood Board No. 16 Āliamanu/Salt Lake 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

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Other	
Colleges	Hawai`i Pacific University Honolulu Community College Kapiolani Community College Leeward Community College University of Hawai`i–West O`ahu University of Hawai`i–Mānoa
Libraries	Hawai`i State Library, Hawai`i Documents Center Honolulu Municipal Reference and Records Center Legislative Reference Bureau University of Hawai`i at Mānoa, Hamilton Library, Hawaiian Collection  `Aiea Public Library[1] `Āina Haina Public Library Bond Memorial Public Library Department of Business, Economic Development and Tourism Library `Ewa Beach Public and School Library Hana Public and School Library Hanapēpē Public Library Hawai`i Kai Public Library Hilo Public Library Hōlualoa Public Library Honoka`a Public Library Kāhili-Palama Public Library Kahuku Pubic and School Library Kahului Public Library (Maui Regional Library) Kailua Public Library Kailua-Kona Public Library Kaimukī Public Library Kalihi Public Library[1] Kāne`ohe Public library Kapa`a Public Library Kapolei Public Library[1] Kauai Community College Library Kea`au Public and School Library Kealakekua Public Library

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Utilities	Hawaiian Electric Co.[1] Hawaiian Telcom[1] The Gas Co.[1] Oceanic Time Warner Cable[1]

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	American Planning Association
	Association of Flight Attendants
	Association of Hawaiian Civic Clubs
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	Bricklayers and Allied Craftworkers, Local 1
	Carpet Linoleum & Soft Tile Union, Local 1926
	Cement and Concrete Products Industry of Hawai`i
	Conservation Council of Hawai`i
	Convention Center Authority
	District Council 50
	Drywall Tapers Finishers LU 1944
	EAH Housing
	Fil Am Courier Editorial Board
	Filipino Chamber of Commerce of Hawai`i
	Glaziers, Architectural Metal & Glassworkers, Local 188
	Go Rail Go, Committee for Balanced Transportation
	Hawai`i Business Roundtable
	Hawai`i Government Employees Association
	Hawai`i State AFL-CIO
	Hawai`i State Teachers Association
	Hawaiian Civic Club of `Ewa-Pu`uloa
	Hawaiian Civic Club of Honolulu
	Hawaiian Civic Club of Wahiawa
	Hawai`i's Thousand Friends
	International Brotherhood of Electrical Workers, Local Union 1186
	International Longshore & Warehouse Union, Local 142
	International Union of Elevator Constructors, Local 126
	Iron Workers, Local 625
	Kālihi-Palama Hawaiian Civic Club
	Ke`ehi Lagoon Memorial Organization
	King Kamehameha Hawaiian Civic Club
	Ko`olaupoko Hawaiian Civic Club
	Laborers' International Union of North America, Local 368
	Laird Christianson Advertising
	National Trust for Historic Preservation
	O`ahu Filipino Community Council
	Operative Plasterers' & Cement Masons' IA, Local 630
	Pacific Business News Editorial Board
	Painters Union, Local 1791
	Pearl City Shopping Center
	Pearl Harbor Hawaiian Civic Club
	Pearlridge Center Management Office
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	Prince Kūhiō Hawaiian Civic Club
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Groups/Organizations (continued)	Royal Order of Kamehameha I Sheet Metal Workers IA, Local 293 The Garden Club of Honolulu United Public Workers United Union of Roofers, Waterproofers and Allied Workers, Local 221 Urban Land Institute Hawai`i Wai`anae Hawaiian Civic Club Waldron Steamship Company Ward Centers

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