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 O'ahuMPO EJ Areas (O'ahuMPO 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 O'ahuMPO method for determining O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO 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 'Ewa. Neither the Pearl City nor the Waipahu neighborhoods were identified as EJ Areas using the O'ahuMPO 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

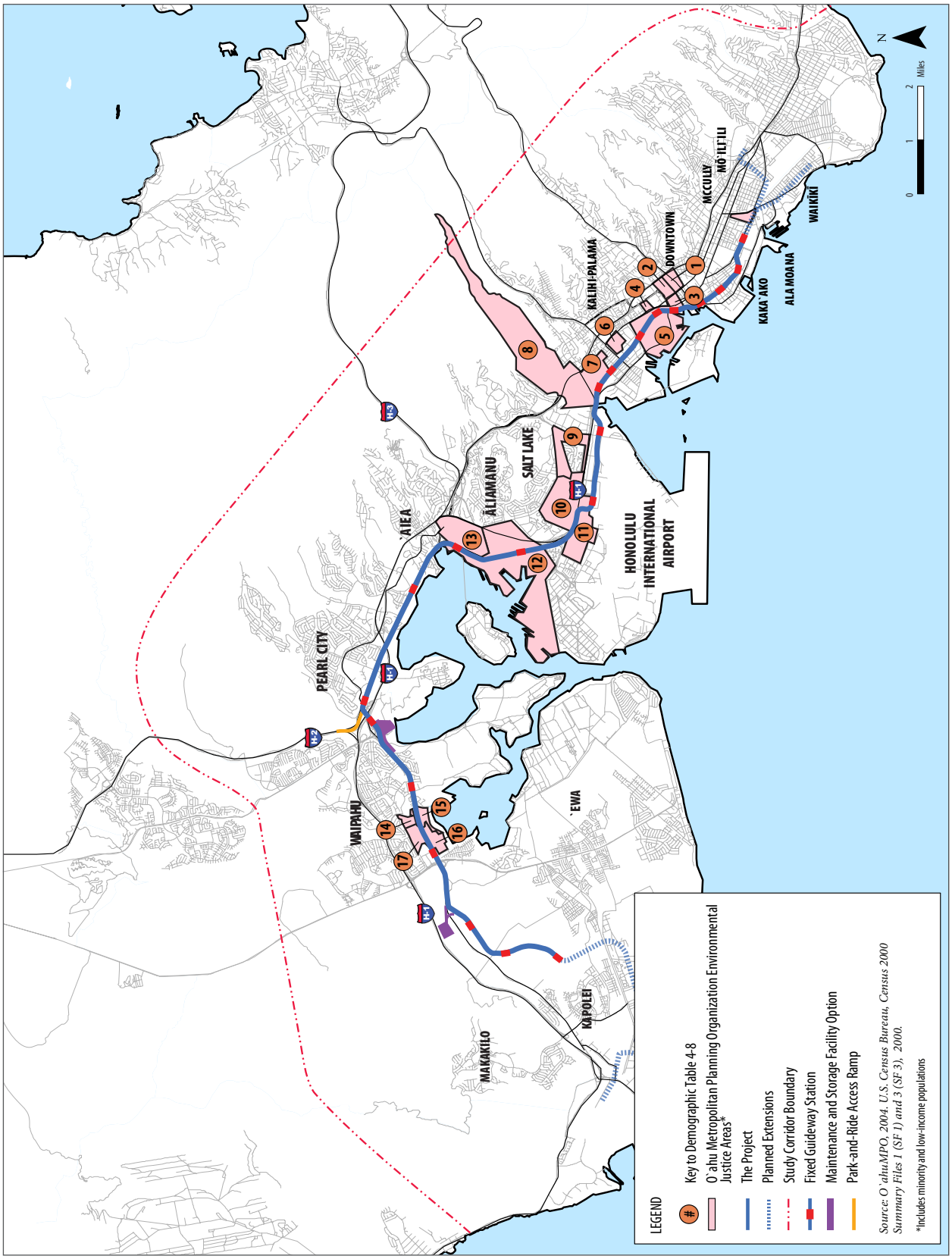

Figure 4-14 Environmental Justice Populations within the Study Corridor

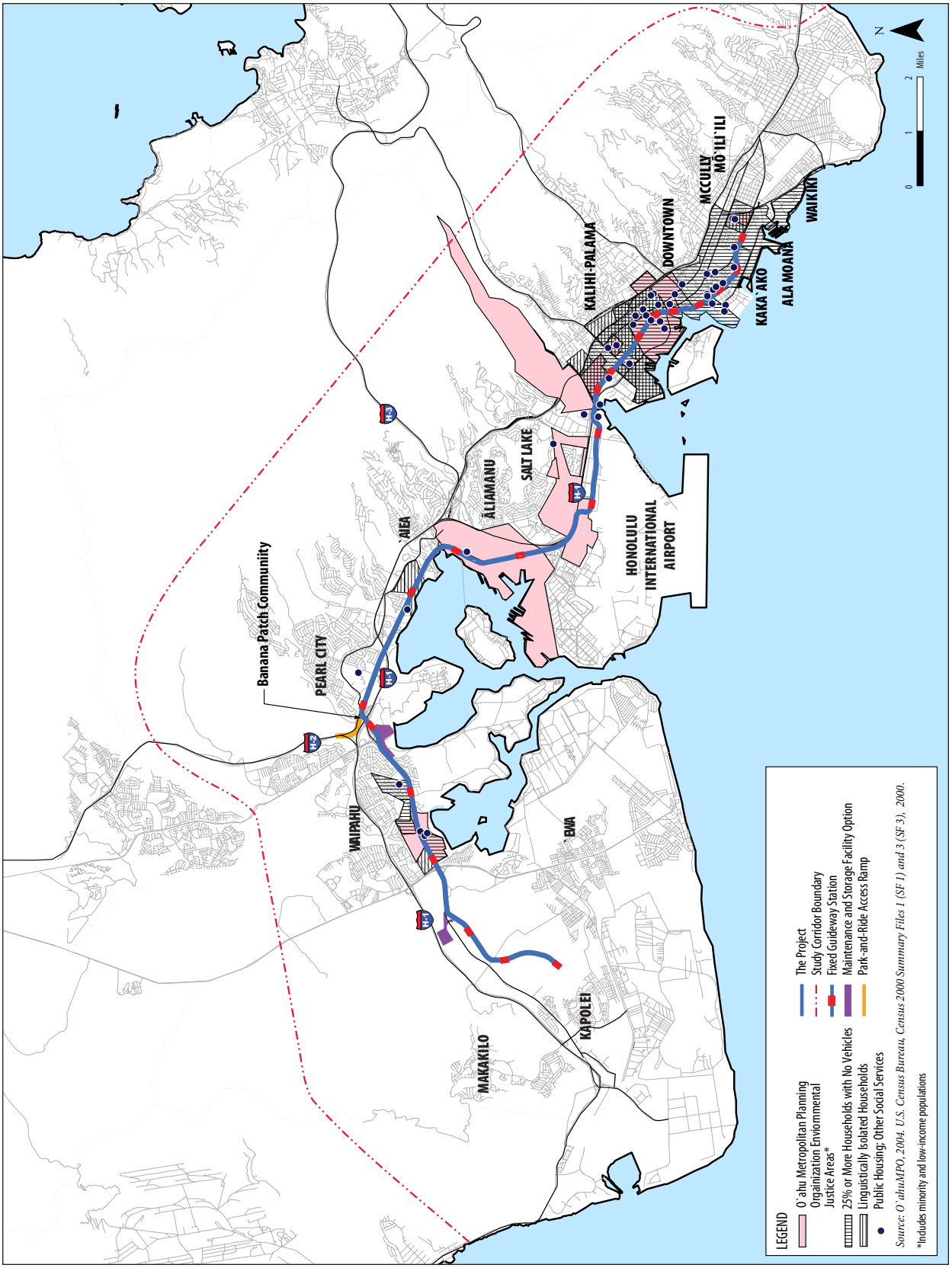

Figure 4-15 Communities of Concern within the Study Corridor

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 Oʻahu MPO EJ Areas is less than the Project as a whole. Therefore, there are no disproportionately high and adverse effects on Oʻahu MPO 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 Oʻahu MPO 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 Oʻahu MPO EJ Areas.

The air quality analysis described in Section 4.9 indicates a net improvement in air quality by 2030. Oʻahu MPO 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 Oʻahu MPO EJ Areas.

Section 4.16 indicates the Project will result in 33 adverse effects on historical resources. None of these occur in Oʻahu MPO EJ Areas. Overall, the Project will have few effects on social or community facilities within Oʻahu MPO 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 Oʻahu MPO 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 O'ahuMPO EJ and non-EJ Areas alike. Therefore, there will be no disproportionately high and adverse impacts on O'ahuMPO 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, O'ahuMPO EJ Areas. Therefore, people living in O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO 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 O'ahuMPO Public Participation Plan (O'ahuMPO 2004). Materials have been prepared in the major languages of O'ahu, 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 O'ahuMPO EJ Areas. Important project notifications were placed in local ethnic and cultural newspapers, including the following:

- *Hawai'i 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 com-

munity 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 O'ahuMPO 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 Oʻahu MPO 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 Oʻahu MPO 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 Oʻahu MPO 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 Oʻahu MPO 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 Oʻahu, 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 Oʻahu. 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 Hawaiʻi 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 Hawaiʻi 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.

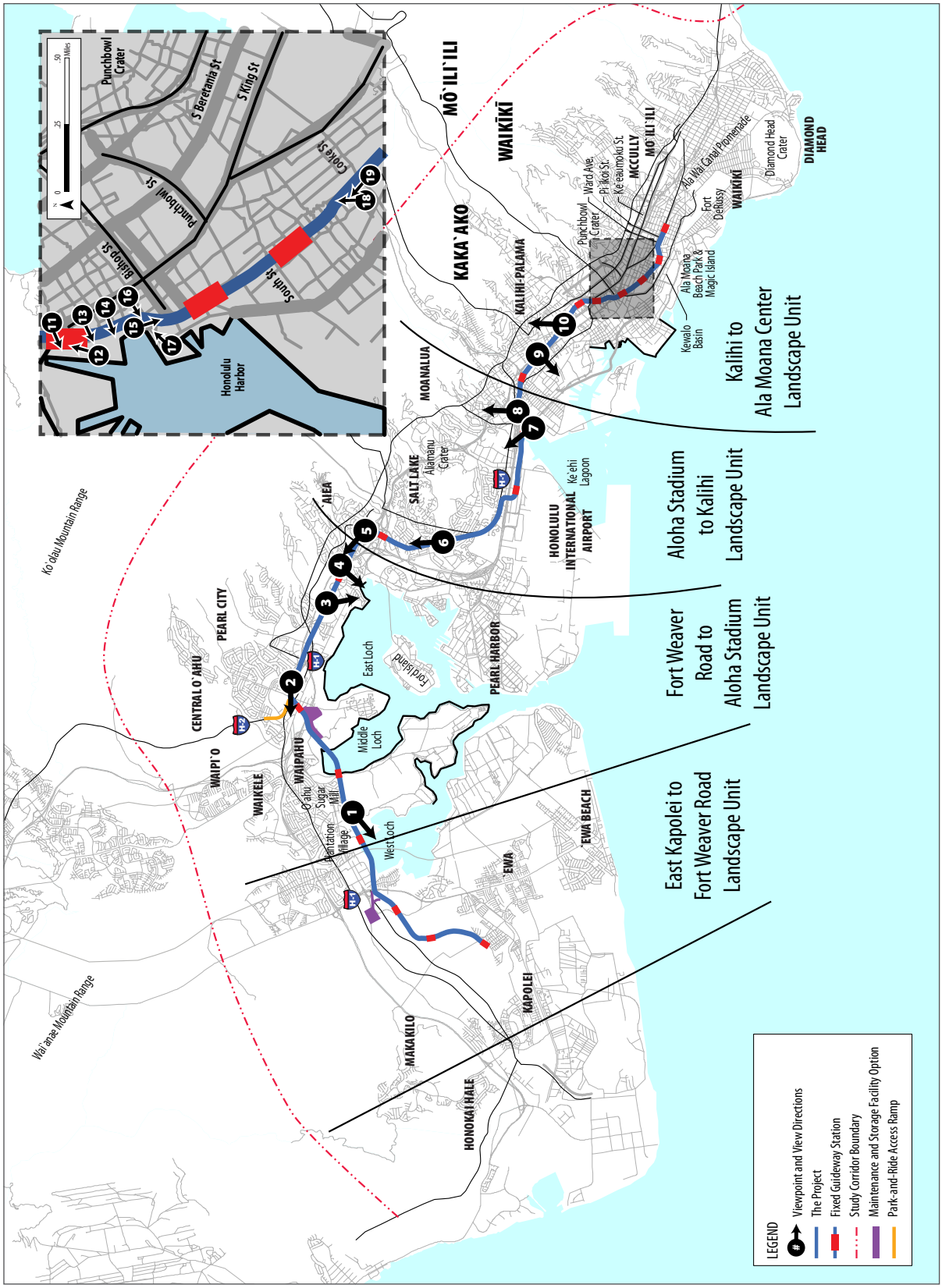

Figure 4-16 Visually Sensitive Resources and Representative Viewpoints within the Project Corridor

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 Hawai'i. 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:

- *'Ewa Development Plan*
- *Central O'ahu 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 Wai'anae 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 'Ewa. Much of O'ahu'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 'Ewa 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 *'Ewa Development Plan* (DPP 2000) and include the following:

- Views of central Honolulu and Diamond Head from the 'Ewa Plain (see View and Vista A)
- Views of na pu'u at Kapolei, Pālailai, and Makakilo (see View and Vista B)
- Distant views of the shoreline from the H-1 Freeway above the 'Ewa Plain (see View and Vista C)
- Views of the Wai'anae Mountain Range from the H-1 Freeway between Kunia Road and Kalo'i 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 Wai'anae and Ko'olau 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 O'ahu 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

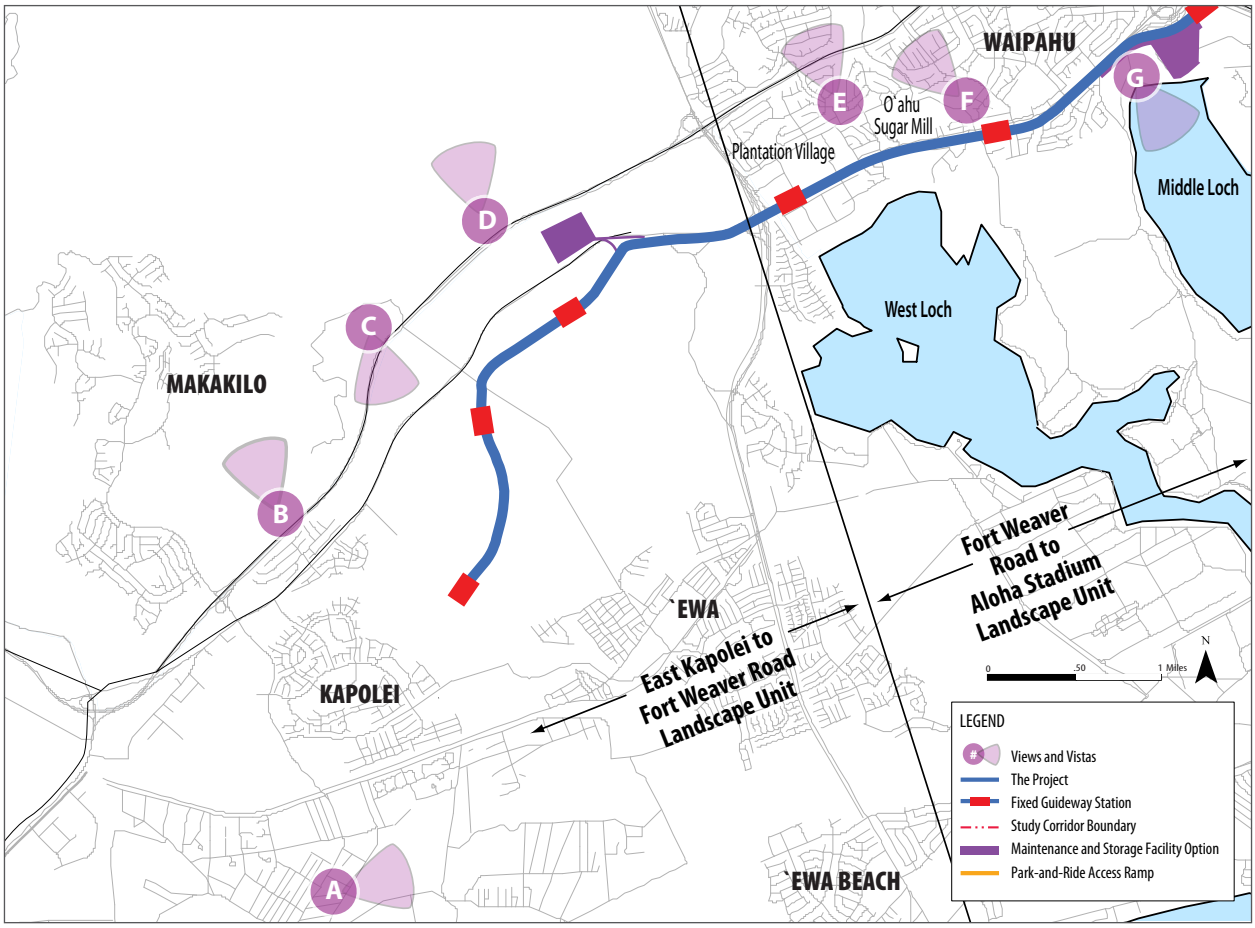

Figure 4-17 Protected Views and Vistas (East Kapolei to Fort Weaver Road)

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

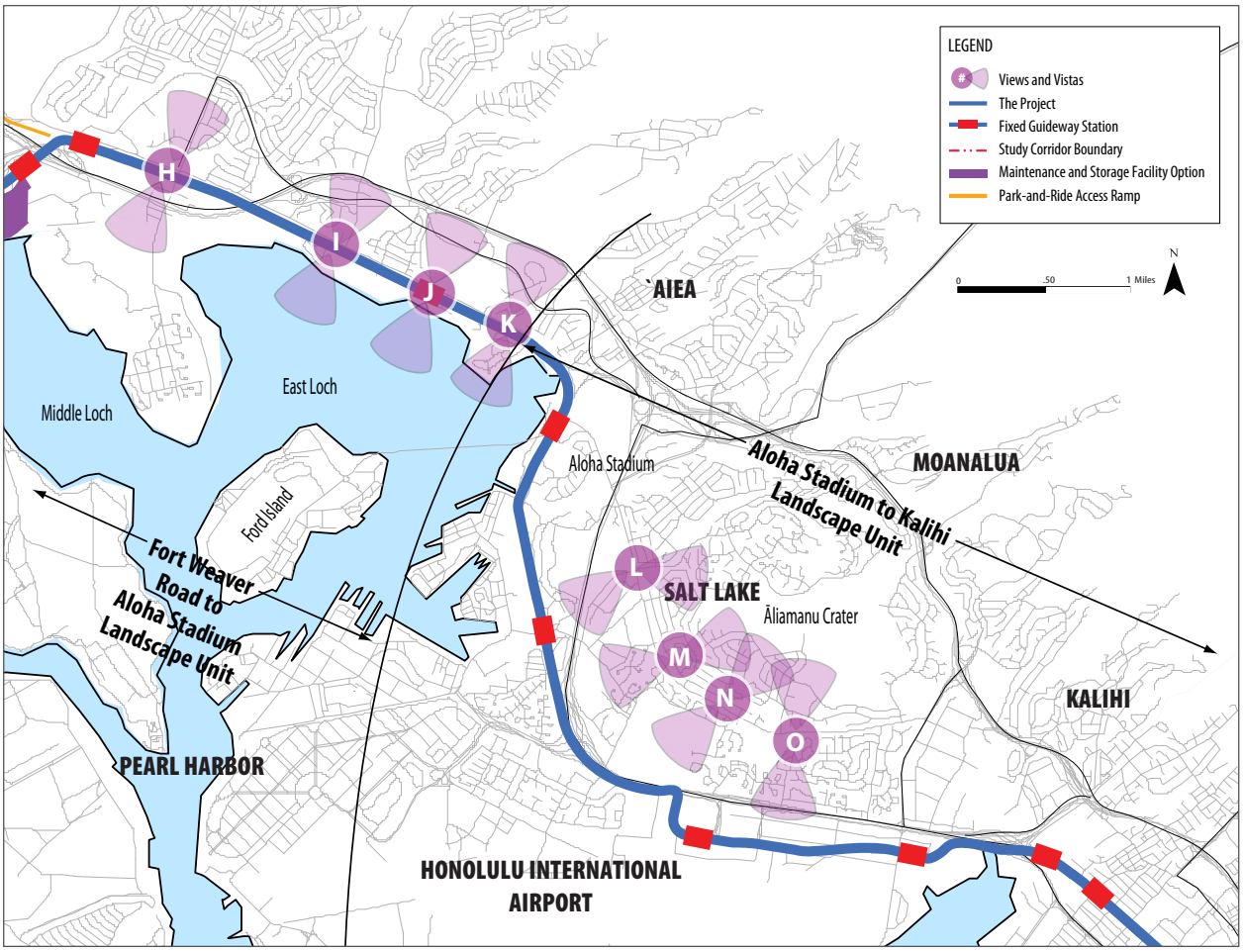

Figure 4-18 Protected Views and Vistas (Fort Weaver Road to Aloha Stadium)

districts with major wholesale and distribution facilities line King Street and Nimitz Highway. Farther Koko Head, this landscape unit encompasses Downtown, Kakaʻako, 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 Koʻolau 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—Kakaʻako Waterfront Park toward Punchbowl and the Koʻolau 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 Koʻolau Mountain Range and Punchbowl (see View and Vista U)

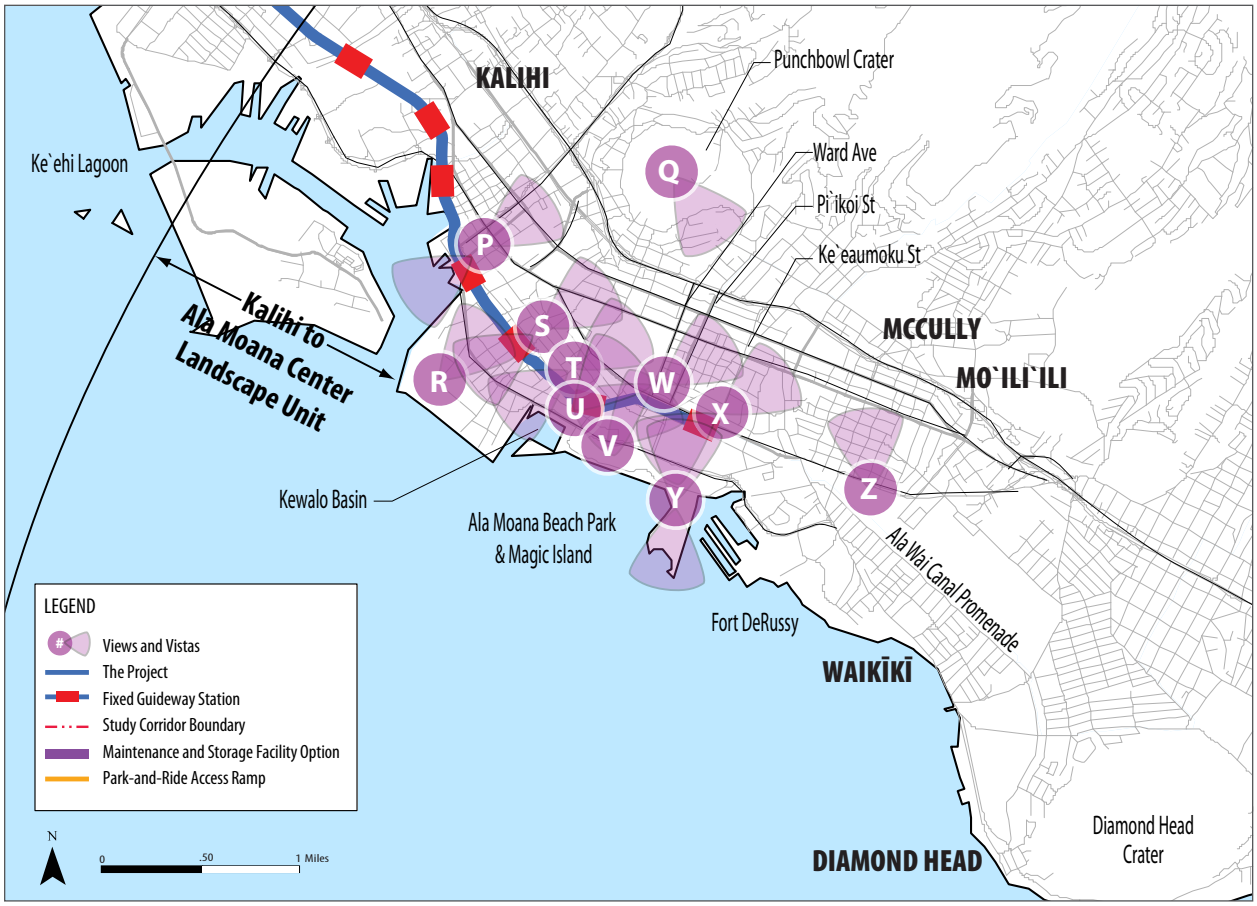

Figure 4-19 Protected Views and Vistas (Kalihi to Ala Moana Center)

- 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 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. 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.

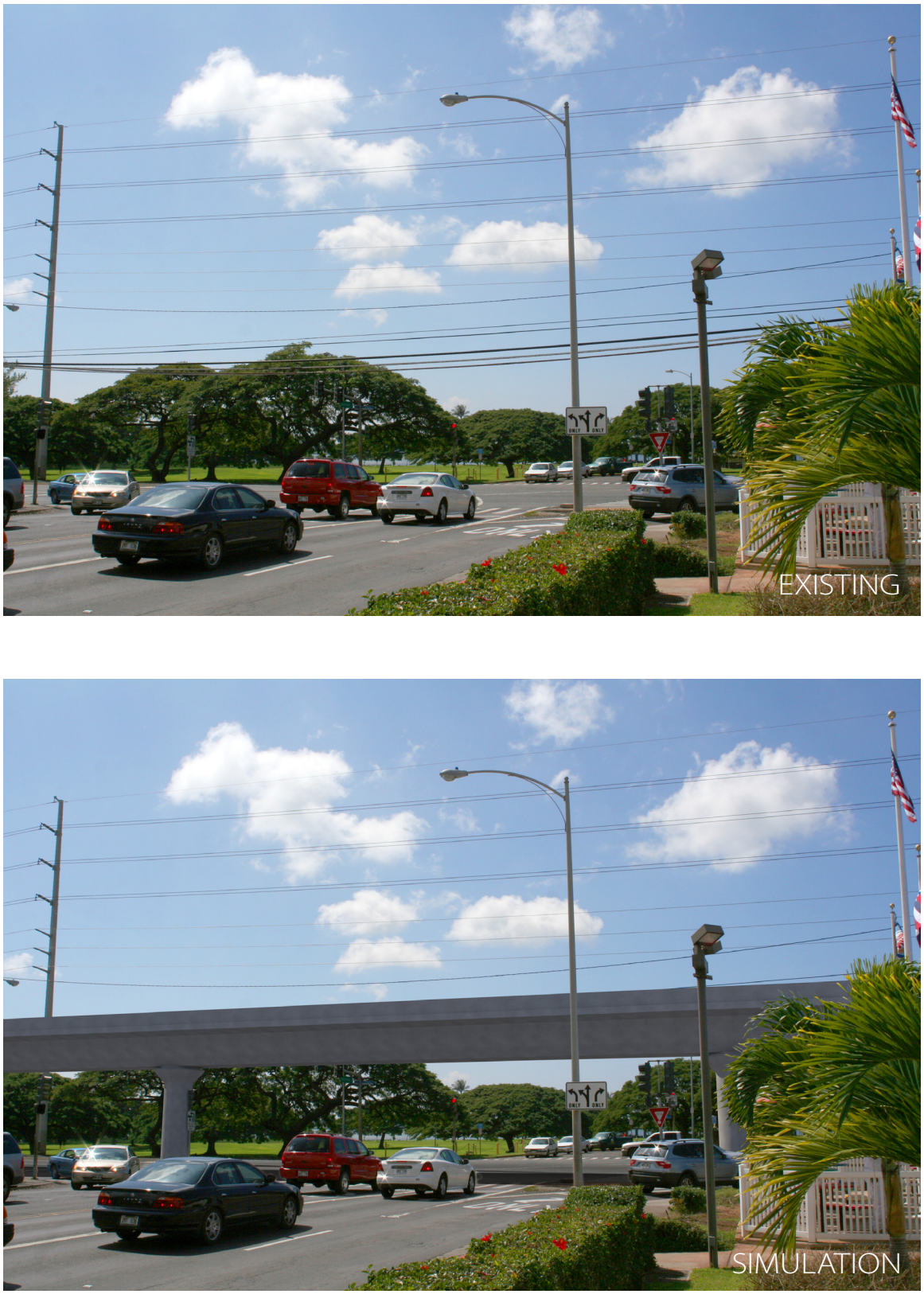

Figure 4-22 Viewpoint 3—Kamehameha Highway at Ka`ahumanu Street, looking Makai

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 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.

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 Oʻahu park-and-ride lots. Views of the ʻEwa 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, Hawaiʻi'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

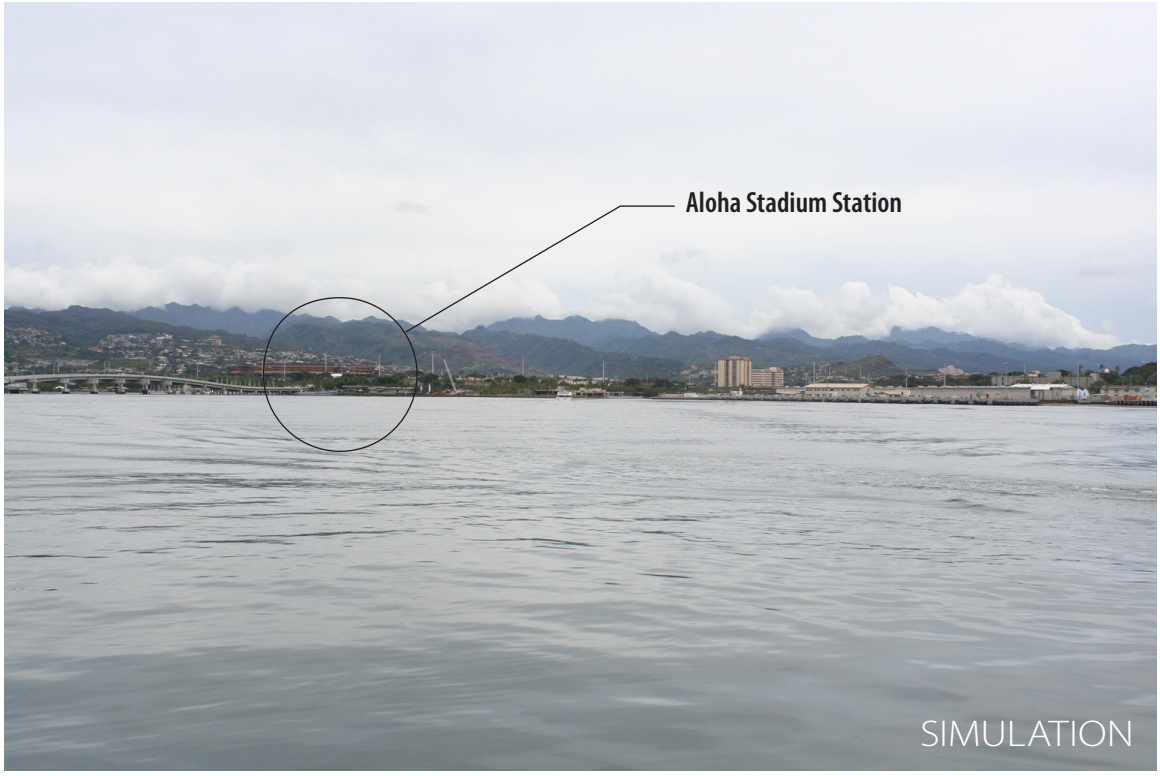

Figure 4-42 Visual Simulation from Arizona Memorial, looking Mauka

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	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 O'ahu 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.

Relative Sound Level	½ as loud		Baseline		Twice as loud		Four times as loud
Typical Sound Environment	Indoor Office		Urban Residential		Urban Commercial		
Lmax of Common Noise Sources		Washing Machine (3 ft)	Auto (50 mph at 50 ft)	Vacuum Cleaner (3 ft)	Garbage Disposal (3 ft)	Delivery Truck (50 mph at 50 ft)	Dump Truck (50 mph at 50 ft) / Blender (3 ft)
Sound Level dBA	60	65	70	75	80	85	90
Lmax at 50 ft of Transit Noise Source			Rail Transit with a Barrier (50 mph)		Rail Transit (50 mph) / City Bus (50 mph)		

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).

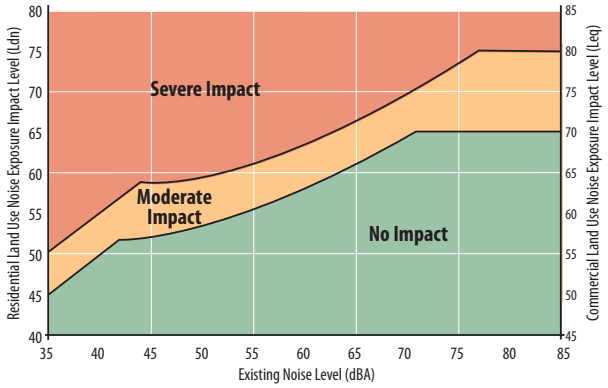

Figure 4-52 FTA Transit Project Noise Exposure Impact Criteria

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 Hawai‘i 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,

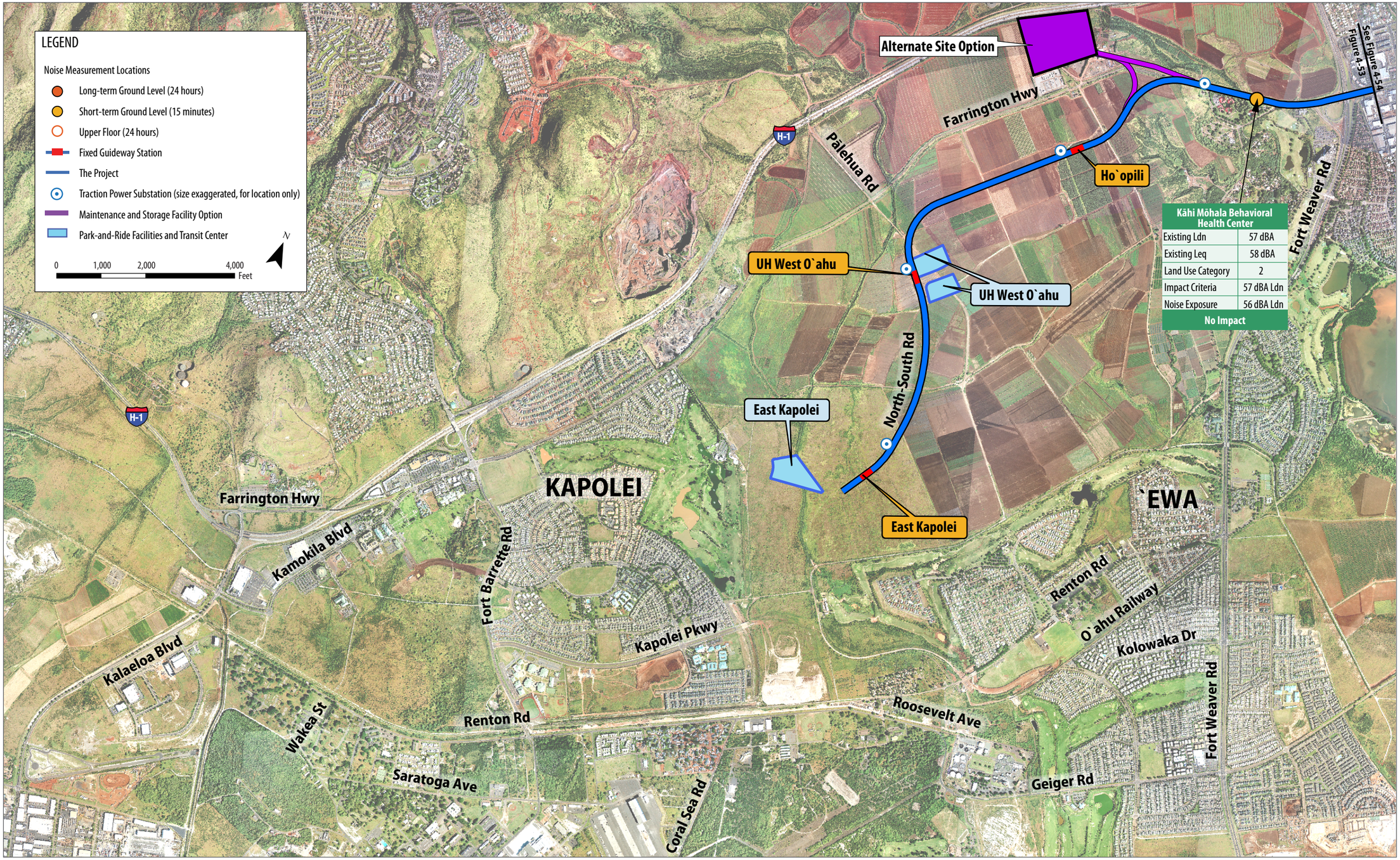

Figure 4-53 Noise Measurement Locations and Results (East Kapolei to Fort Weaver Road)

Figure 4-54 Noise Measurement Locations and Results (Fort Weaver Road to Aloha Stadium)

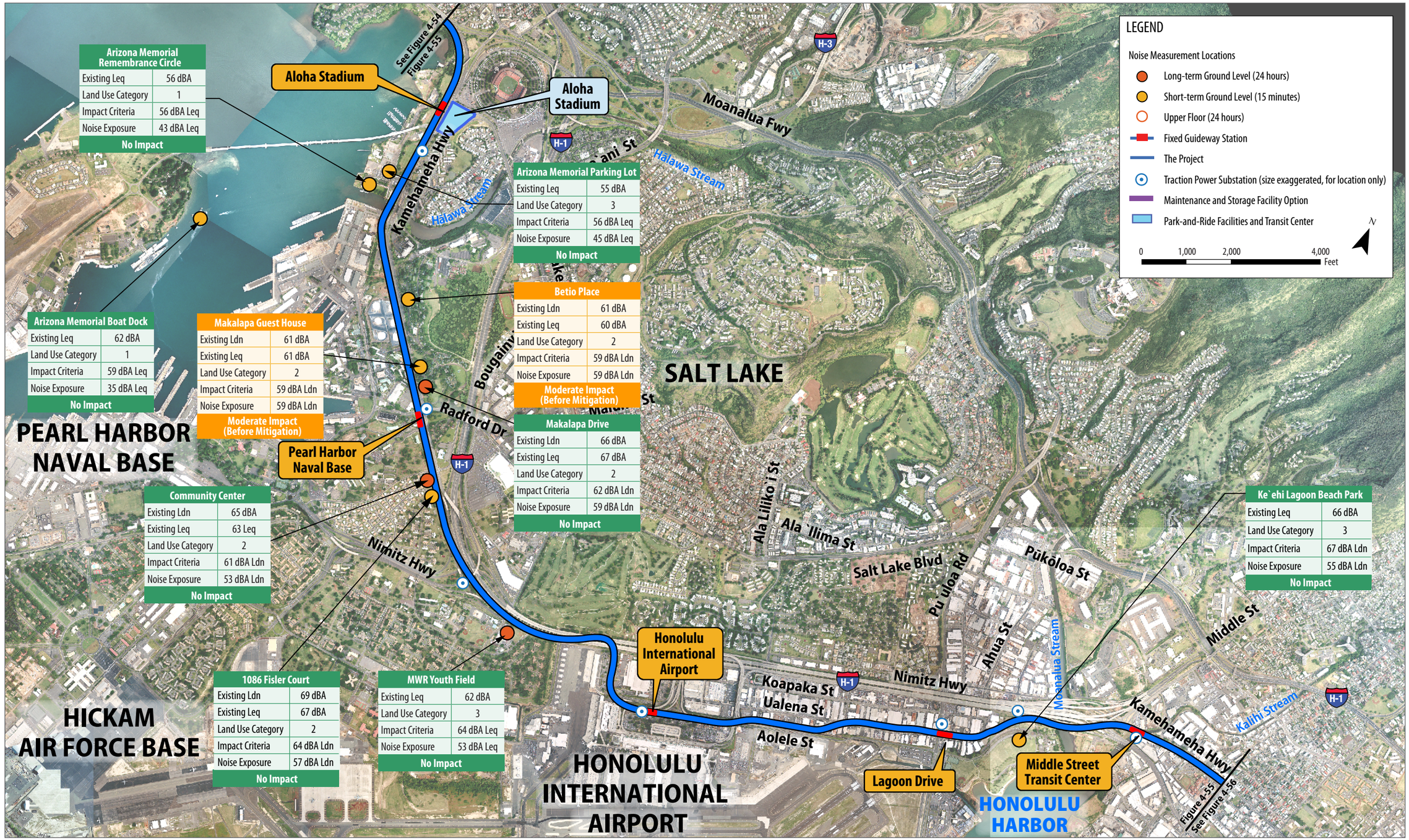

Figure 4-55 Noise Measurement Locations and Results (Aloha Stadium to Kalihi)

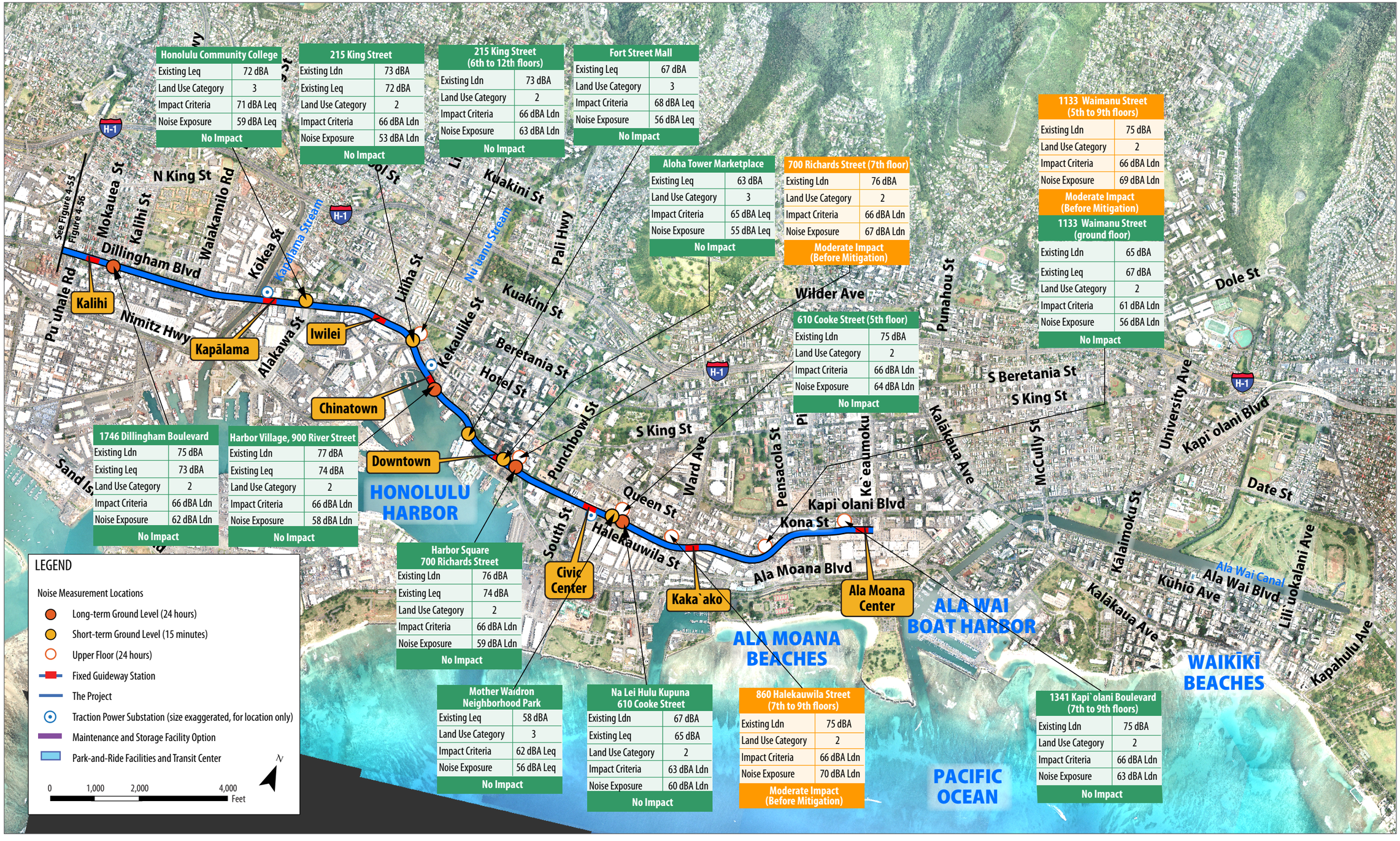

Figure 4-56 Noise Measurement Locations and Results (Kalihi to Ala Moana Center)

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 Hoʻopili 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 ʻEwa 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 Kamakeʻe 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.