

Before and After Milestone 1 Report Honolulu High-Capacity Transit Corridor Project

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**Prepared for:
City and County of Honolulu
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Before and After Study HHCTCP—Airport Alignment Milestone Report I (DRAFT)

1. Introduction

The City and County of Honolulu (City) is in the planning and environmental clearance stages of the Honolulu High-Capacity Transit Corridor Project (the Project). The Project is consistent with the planning and project development process defined by the Federal Transit Administration (FTA) under the New Starts funding program. As part of the eligibility requirements to obtain a full-funding grant agreement, and in compliance with the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU), the Project must prepare a Before and After Study Plan (the Plan). The Plan describes the collection and analysis of selected data and information elements of the fixed guideway project.

The Plan will include reports completed at various phases of the Project, called milestones. Milestone reports in the Plan will be prepared at three points in the process: entry into Preliminary Engineering; prior to the start of construction; and two years after opening of revenue service. The estimated timing for submittal of the milestone reports is shown in the Plan.

This report represents Milestone I: Planning and Project Development Predictions and is the first milestone of the Before and After Study process. It is timed to coincide with the Preliminary Engineering phase and includes data and information of the forecasted project characteristics based on information from the *Honolulu High-Capacity Transit Corridor Project Environmental Impact Statement/Section 4(f) Evaluation* (RTD 2009), *relatable Honolulu High-Capacity Transit Corridor Technical Reports* (RTD 2008), and other project related technical documents and plans.

2. Project Description

The Project would provide a fixed guideway transit system from East Kapolei to Ala Moana Center. The system would use electrically propelled steel-wheeled vehicles running on steel rails and could be either automated or employ drivers. The alignment will be elevated with the exception of approximately 3,700 feet (0.7 mile) that will be at-grade at the Leeward Community College. Station platforms would be at the same height as the floor of the cars, which would be level throughout. In addition to the guideway, the Project would require construction of 21 transit stations and a supporting facilities. The supporting facilities would include a vehicle maintenance and storage facility, four transit centers, four park-and-ride facilities, and 23 traction power substations. Some bus service would be reconfigured to bring riders on local buses to nearby fixed guideway transit stations. The bus fleet would be increased to support this system.

The study corridor for the Project extends from Kapolei in the west to the University of Hawaii at Mānoa (UH Mānoa) in the east. It is confined by the Waiʻanae and Koʻolau Mountain Ranges in the mauka direction (toward the mountains, generally to the north within the study corridor) and the Pacific Ocean in the makai direction (toward the sea, generally to the south within the study

corridor). From Pearl City to 'Aiea, the study corridor's width is less than one mile between Pearl Harbor and the base of the Ko'olau Mountain Range.

From west to east, the fixed guideway alignment would start in East Kapolei and continue Koko Head (east) following North-South Road and other future roadways to Farrington Highway. The guideway would follow Farrington Highway Koko Head and continue along Kamehameha Highway to the vicinity of Aloha Stadium. It would continue past Aloha Stadium along Kamehameha Highway to Nimitz Highway and turn makai onto Aolele Street. It would follow Aolele Street Koko Head to reconnect to Nimitz Highway near Moanalua Stream and continue to Middle Street Transit Center. The guideway would follow Dillingham Boulevard to the vicinity of Ka'aahi Street and then turn Koko Head to connect to Nimitz Highway near Iwilei Road. The guideway would follow Nimitz Highway Koko Head to Halekauwila Street and then proceed along Halekauwila Street past Ward Avenue where it would transition to Queen Street. The guideway would cross from Waimanu Street to Kona Street in the vicinity of Pensacola Street. The guideway would then run above Kona Street to Ala Moana Center.

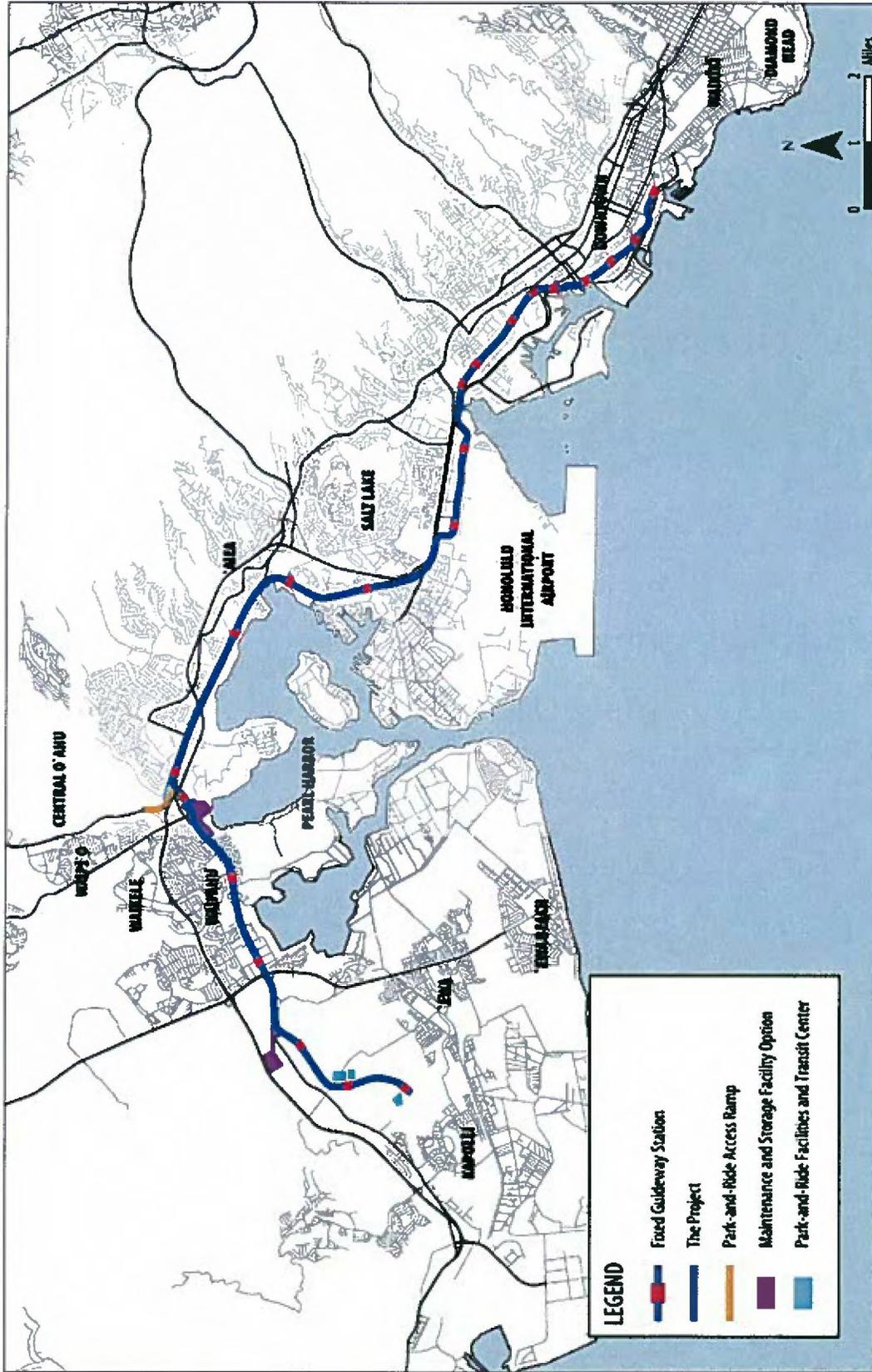


Figure 1: Honolulu High-Capacity Transit Project Overview
 Source: EIS, Chapter 2

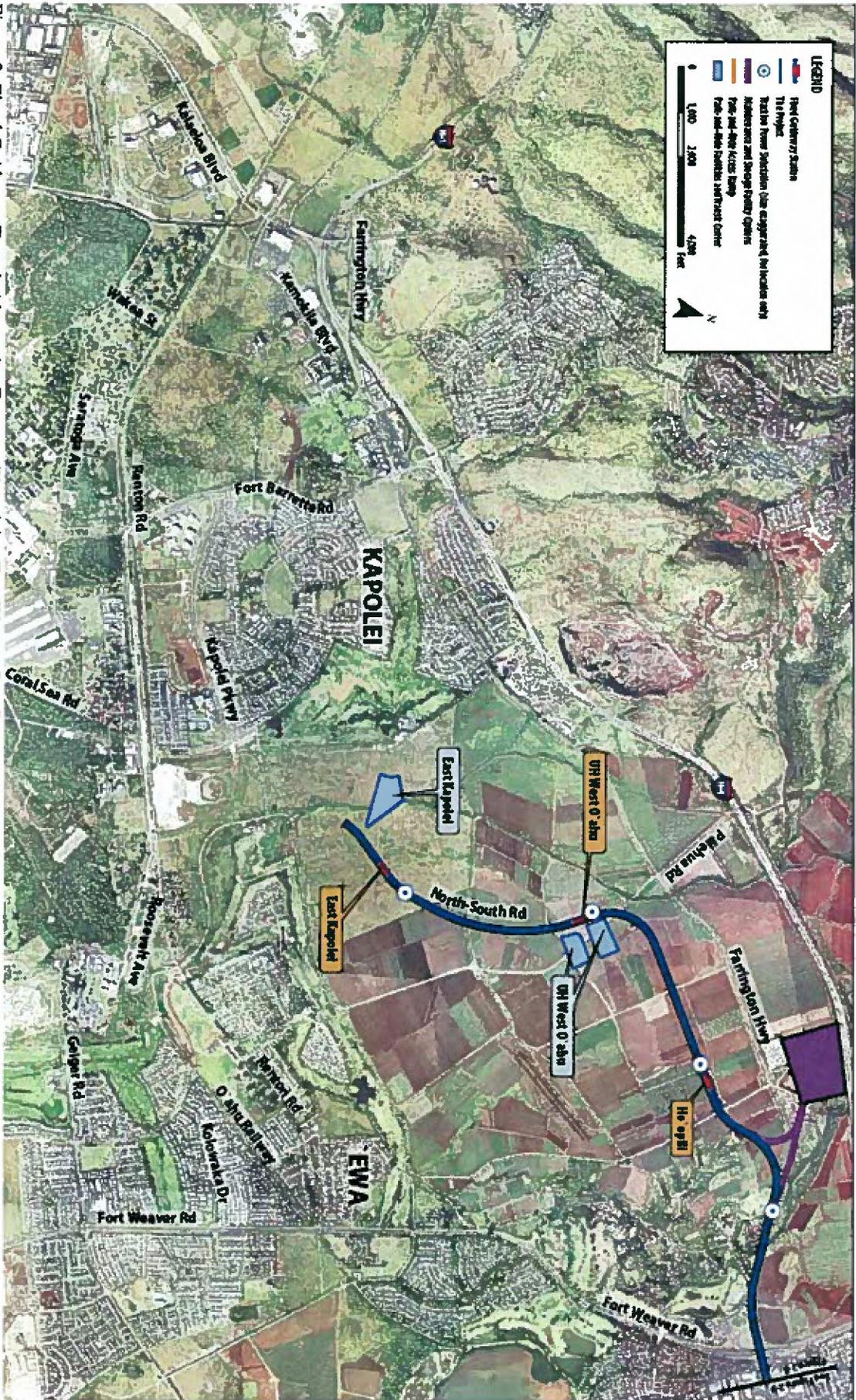


Figure 2: Fixed Guideway Transit Alternative Features (Kapolei to Fort Weaver Road)
 Source: EIS, Chapter 2

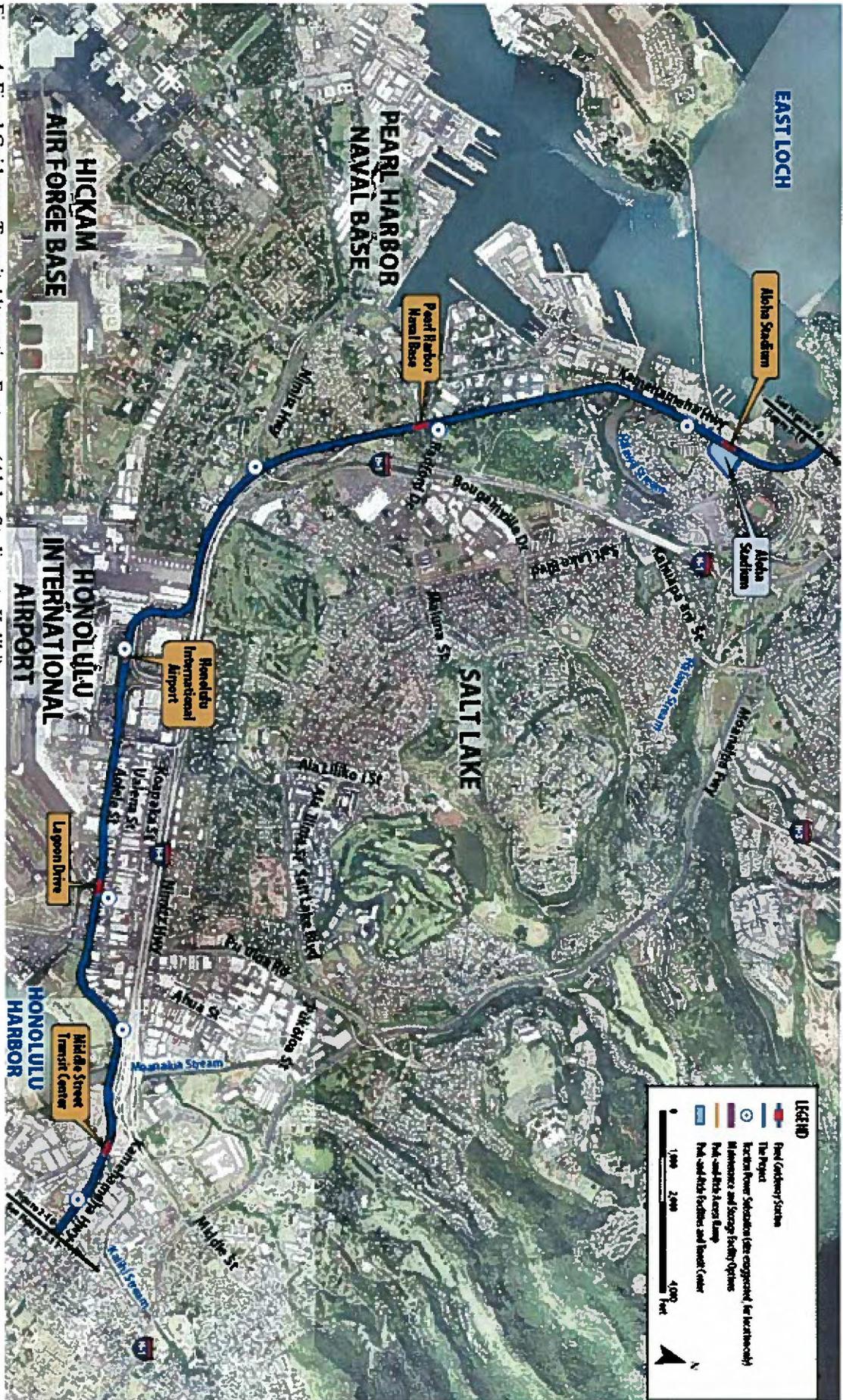


Figure 4: Fixed Guideway Transit Alternative Features (Aloha Stadium to Kalia)
 Source: EIS, Chapter 2



Figure 5: Fixed Guideway Transit Alternative Features (Kalihi to Ala Moana)
 Source: EIS, Chapter 2

3. Report Data

Report data for Milestone I pertain to forecasts of the following project characteristics:

- Physical scope
- Service levels
- Capital costs
- Operating and maintenance costs
- Ridership
- Revenues

The data are described in detail in the following subsections.

3.1 Physical Scope

Table 1 summarizes the Project's physical scope, including mode, alignment, stations, and other project characteristics. The data primarily comes from the EIS, but also includes data analyzed for decisions made during the EIS process. Sources of the information include sponsoring, supporting and participating agencies of the Project, such as the State of Hawaii's Community Development Authority (HCDA) related to the Kaka'ako and Kalaeloa communities, Department of Transportation (HDOT), Oahu Metropolitan Planning Organization (OahuMPO). A full listing of agencies is located in the *Project Management Plan (PMP) for the Honolulu High-Capacity Transit Corridor Project, City and County of Honolulu* (RTD 2009b).

Table 1: Milestone I Physical Scope Data

Characteristic	Planning and Project Development	
	Source	Data
Mode	EIS Chapter 2	Steel wheel on steel rail (Light Metro)
Alignment	EIS Chapter 2	Airport Alternative, from East Kapolei to Ala Moana Center, has been identified as the Project.
Right-of-Way (ROW)	Appendix C of the EIS	Preliminary ROW Plans
Alignment mileage	EIS Chapter 2	20 miles
Plan and profile drawing	EIS Appendix B of the EIS	Information about preliminary alignment plans and profiles for the elevated fixed guideway
Stations	EIS Chapter 2	21 stations
Platform measurements	EIS Chapter 2	Each station could have one to three platforms at 240 feet long, and 12 to 30 feet wide.
Station Features	EIS Chapter 2	High level platforms (same level as vehicle floor), stairs, elevators, escalators, ticket-vending machines, bicycle parking, landscaping, lighting.
Rail maintenance and storage facility	EIS Chapter 2	Two potential locations (one needed): (1) 41-acre agricultural area adjacent to an electrical substation in Ho'opili (2) 44-acre vacant site near Leeward Community College
Traction power substations (TPSS)	EIS Chapter 2	23 substations. Each will house transformers, rectifiers, batteries, and ventilation equipment.
Traction power substation measurements	EIS Chapter 2	40 feet long 16 feet wide 12 feet high

Table 2: Project Stations and their characteristics*

Station No.	Working Name/ Location	Planned Station Type	Planned Station Features
1	East Kapolei North-South Road @ East – West Road	Center Platform Concourse	<ul style="list-style-type: none"> • 900 spaces Park-and-Ride lot • Two entrances
2	UH West Oahu North-South Road @ UHWO entrance	Side Platform Concourse	<ul style="list-style-type: none"> • 1,000 spaces Park-and- Ride lot • Two entrances • Bus Transit Center • Major bus interface
3	Ho‘opili Future street minor east-west street approximately 300 feet south of Farrington Highway	Side Platform	<ul style="list-style-type: none"> • Two entrances
4	West Loch Farrington Highway @ Leoku Street	Side Platform Concourse	<ul style="list-style-type: none"> • Major bus interface • Bus Transit Center • Two entrances
5	Waipahu Transit Center Farrington Highway @ Mokuola Street	Side Platform Concourse	<ul style="list-style-type: none"> • Major bus interface • Two entrances
6	Leeward Community College LCC parking lot	Center Platform	<ul style="list-style-type: none"> • Community college interface • Access from below platform circulation space
7	Pearl Highlands Kamehameha Highway @ Kuala Street	Side Platform Concourse	<ul style="list-style-type: none"> • 1,600 spaces, multi-level, Park-and-Ride structure • Bus Transit Center • Major bus interface • Pedestrian bridges to adjacent neighborhoods
8	Pearlridge Kamehameha Highway @ Kaonohi Street	Side Platform Concourse	<ul style="list-style-type: none"> • Major bus interface • Two entrances
9	Aloha Stadium Kamehameha Highway @ Salt Lake Boulevard	Side Platform Concourse	<ul style="list-style-type: none"> • 600 spaces Park-and-Ride lot • Bus Transit Center • Major bus interface
10	Pearl Harbor Naval Base Kamehameha Highway @ Radford Road	Side Platform Concourse	

11	Airport Aolele Street @ Alaauna Street	Side Platform Concourse	<ul style="list-style-type: none"> • Pedestrian connections to Airport Terminal
12	Lagoon Aolele Street @ Lagoon Drive	Side Platform	<ul style="list-style-type: none"> • Two entrances
13	Middle Street Transit Center Dillingham Boulevard @ Middle Street	Side Platform Concourse	<ul style="list-style-type: none"> • Bus Transit Center, built outside of project • Major bus interface • Pedestrian Bridge to Transit Center
14	Kalihi Dillingham Boulevard @ Mokauea	Side Platform	<ul style="list-style-type: none"> • Two entrances
15	Kapalama Dillingham Boulevard @ Kokea Street	Side Platform	<ul style="list-style-type: none"> • Two entrances
16	Iwilei Kaaahi Street @ Dillingham Boulevard	Side Platform Concourse	
17	Chinatown Nimitz @ Kekaulike	Side Platform Concourse	
18	Downtown Nimitz @ Alakea Street	Side Platform Concourse	<ul style="list-style-type: none"> • Two entrances
19	Civic Center Halekauwila Street @ South Street	Side Platform	<ul style="list-style-type: none"> • Two entrances
20	Kakaako Halekauwila Street @ Ward Street	Side Platform	
21	Ala Moana Center Kona Street mauka of AMC	Center/Side Platform	<ul style="list-style-type: none"> • Existing Bus Transit Center • Major bus interface • Entry building integrated into existing parking structure/shopping center

Source: EIS Chapters 2 and 3, and PMP

*Stations are shown in Figure 1 from Ewa to Diamond Head (west to east).

3.2 Service Levels

The proposed fixed-guideway service levels are taken from Chapter 2 of the EIS and are shown in Table 3. Train service is planned to operate between 4 a.m. and midnight with a train arriving in each direction at a station every three to ten minutes as shown in Table 4. Trains would be capable of reaching 50 miles per hour (mph) or greater and achieve an average speed, including dwell times at stations, of 30 mph or greater as indicated in Table 5. Bikes will be allowed on the rail system as set forth in upcoming policy.

Table 3: Service Levels Data

Characteristic	Planning and Project Development	
	Source	Data
Bus revenue hours and miles	Transportation Technical Report Section 5 (Table A2-6: Bus Transit Service Comparison)	2030 Annual Revenue Vehicle Miles: 21,551,400 2030 Annual Revenue Vehicle Hours: 1,669,900
Existing Bus Network (routes)	Public Transit Division	www.Thebus.org
Projected Bus Network (routes)	EIS Appendix D (future maps)	Provides information about bus service with the Project in 2030
Existing Bus Fleet	EIS Chapter 2	2007 Existing Fleet: 540; Peak: 434
Projected Bus Fleet	EIS Chapter 2	2030 Project Fleet: 588 buses; Peak: 490 buses
Existing Bus Schedule	Public Transit Division	www.Thebus.org
Bus system feature enhancements	EIS Chapter 2	Traffic Signal Priority (TSP), automated vehicle identification with Global Positioning System (GPS), off-vehicle fare collection
Rail vehicle fleet	EIS Chapter 2	Fleet: 85 vehicles Peak: 76 vehicles Multi-vehicle trains: 2 to 3 cars (expandable to 4 cars)
Rail Vehicle Measurements	EIS Chapter 2	Train length: 120 to 180 feet (expandable to 240 feet) Length per car: 60 feet
Rail Vehicle Capacity	EIS Chapter 2	Passenger capacity per train: 325 to about 500 (expandable to 650) Passenger peak capacity per hour per direction: 8,650
Existing Park-n-Rides	Public Transit Division	1
Projected Park-n-Rides	EIS Chapter 2	6 (four from the Project)
Existing Transit Centers	Public Transit Division	6
Projected Transit Centers	EIS Chapter 2	11 (four from the Project)

Table 4: Estimated Operating Headways

Time of Day (Weekdays) ¹	System Headway (minutes between trains)
	Milestone I
4 a.m. to 6 a.m. (off-peak)	6
6 a.m. to 9 a.m. (peak)	3
9 a.m. to 3 p.m. (off-peak)	6
3 p.m. to 6 p.m. (peak)	3
6 p.m. to 8 p.m. (off-peak)	6
8 p.m. to 12 a.m. (off-peak)	10

¹ System closed from midnight to 4 a.m.

Source: EIS, Chapter 2

Table 5: Estimated Operating Speeds

Operating Speed	MPH
Average speed (including dwell time)	30+
Maximum speed	50+

Source: EIS, Chapter 2

3.3 Capital Costs

The capital costs estimate is the total cost of implementing the project and is based on the methodology and assumptions detailed in the Project's *Financial Plan* for PE Submittal (RTD 2009c). The 2006 FTA guidelines on cost estimating were used to generate capital cost estimates in 2006 dollars. These guidelines employ the standard cost categories (SCCs) FTA has established for consistent reporting, estimating, and managing of capital costs for New Starts projects. The SCCs are divided into construction-related items (items 10 through 50) and project-related items (items 60 through 90) as shown in Table 6. This method allows for the summary of capital costs to be tracked during the Project's follow-on phases (i.e., Preliminary Engineering, Final Design, and Construction). Quantities are estimated based on anticipated operating service plans and conceptual engineering performed to date. Estimated costs for each standard cost category were increased in accordance with FTA guidance for estimates developed prior to preliminary engineering, to account for unknown but expected additional expenses.

Table 6: Estimated Capital Costs by Cost Category

FTA Standard Cost Categories	YOE \$* (millions)
10 Guideway Construction	1,678
20 Station Construction	389
30 Yard, Shops & Support Facilities	138
40 Sitework & Special Conditions	895
50 Systems	311
60 Right-of-Way	129
70 Vehicles	399
80 Professional Services	996
90 Unallocated Contingency (Project Reserve)	184
Total Cost Excluding Finance Charges	5,120
Finance Charges	393
Total Cost	5,513
Project Cost (construction, vehicles, right-of-way, soft costs)	3,789
Contingency (allocated and unallocated)	1,331
Total Costs Excluding Finance Charges	5,120

Source: EIS, Chapter 6

*YOE \$ (year-of-expenditure dollars): cost estimates include assumed inflation between 2009 and the expected date of the expenditure. Totals may not add due to rounding.

The estimates for system-wide, ongoing capital expenditures, shown in Table 7, include ongoing costs for replacing, rehabilitating, and maintaining capital assets (e.g., buses, rail vehicles, and The-Handi-Van) in a state of good repair throughout the forecast period (2009 to 2030). Rail rehabilitation and replacement costs are expected to begin in 2028, 16 years after initial construction activities are completed.

Table 7: Overview of Transit Capital Expenditures through 2030 (excluding finance charges)

	2009 \$ (millions)	YOE \$* (millions)
The Project Implementation	4,281	5,120
Rail Rehab, Replacement and Purchase of Railcars	121	124
TheBus and Handi-Van Expansion and Replacement	1,014	1,258
Total	\$5,416	\$6,502

Source: EIS, Chapter 6

*YOE \$ (year-of-expenditure dollars): cost estimates include assumed inflation between 2009 and the expected date of the expenditure. Totals may not add due to rounding.

3.4 Operating and Maintenance Costs

The rail operating and maintenance (O&M) costs were estimated based on historical O&M costs for existing rail transit systems that have characteristics similar to the Project, including those in Washington, D.C.; Miami; and Los Angeles. While the O&M cost data obtained from the other properties were not used as the basis for the fixed guideway O&M cost model, values calculated from those properties' data were used to develop productivity ratios in the model, as well as O&M cost ratios for the selected build alternative. The methodology is explained in more detail in the *Memorandum on Forecasts of O&M Costs* (DPP 2009).

These costs were adjusted to reflect O'ahu's higher costs of goods and services, where appropriate. O'ahu Transit Services' operating records from previous years were used to estimate labor and bus service costs of the project. FTA's National Transit Database, as well as operating data from comparable projects nationwide (Washington, D.C.; Miami; and Los Angeles), were used to aid in estimating the Project's costs.

Table 8 shows the projected 2030 annual O&M costs for the fixed guideway and system-wide bus system. The O&M cost methodology and assumptions used for the Project were obtained from Chapter 6 of the EIS.

Table 8: Estimated 2030 Annual O&M Costs

Systems	YOE \$ (millions)
	Milestone I
Rail	133
TheBus	349
TheHandi-Van	48
Systemwide Total	530

Source: EIS, Chapter 6

3.5 Ridership

Table 9 shows estimated 2018 (opening year) and 2030 (future year) ridership for the full transit system and rail only. Detailed forecasts and transit ridership estimates were based on information from Chapter 3 of the EIS, the *Transportation Technical Report*, the *Travel Demand Forecasting Report* (RTD 2008), and the Project's operations plan. The travel model was validated using an on-board survey conducted in 2005–2006 and accepted by the FTA in July 2008.

Table 9: Estimated Transit System Ridership

System	Estimated Transit Ridership* in 2018 and 2030
	Milestone I Weekday
Rail Only (2018)	98,000
Systemwide (2018)	399,000
Rail Only (2030)	116,000
System-wide (2030)	453,000

Source: 2008 Project Travel Model data

*Values have been rounded to the nearest thousandths

3.6 Fare Box Revenue

The fare structure for the fixed guideway is assumed to follow the current bus fare structure, with transfers between modes assumed to be free. This will yield farebox revenues ranging from \$45 million in FY2009 to \$151 million (YOE \$) in FY2030.

References

- DPP 2009 City and County of Honolulu Department of Planning and Permitting. 2009. *Memorandum on Forecasts of O&M Costs*.
- RTD 2008a City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project draft environmental impact statement/section 4(f) evaluation*.
- RTD 2008b City and County of Honolulu Department of Transportation Services, Rapid Transit Division. 2008. *Honolulu high-capacity transit corridor project technical reports*.
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- RTD 2009c City and County of Honolulu Department of Planning and Permitting. 2009. *Financial Plan*.