03

CHAPTER

Transportation

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

The analysis is organized into four main sections:

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

The following transportation-related effects are addressed:

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

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

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

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

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

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

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

3.1 Changes to this Chapter since the Draft Environmental Impact Statement

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

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

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

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

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

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

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

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

3.2 Methodology

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

3.2.1 Analytical Tools and Data Sources

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

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

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

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

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

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

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

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

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

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

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

3.2.2 Approach to Estimating Transportation Effects

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

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

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

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

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

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

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

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

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

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

Source: Highway Capacity Manual

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

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

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

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

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

3.3 Existing Conditions and Performance

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

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

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

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

Numbers are rounded to nearest hundred.

3.3.1 Existing Travel Patterns

Daily Person Trips

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

Mode of Travel

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

Transit Trips by Trip Purpose

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

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

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

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

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

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

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

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

Numbers rounded to nearest hundred.

Vehicle Occupancy

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

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

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

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

Reverse Commute

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

Captive versus Choice Riders

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

3.3.2 Existing Transit Conditions and Performance

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

System Characteristics

TheBus System

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

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

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

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

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

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

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

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

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

TheHandi-Van Service

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

TheBoat Service

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

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

Fleet

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

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

Fare Structure

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

Transit Facilities

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

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

Table 3-6 TheBus Fare Structure—Existing Conditions

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

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

Other Transit Services

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

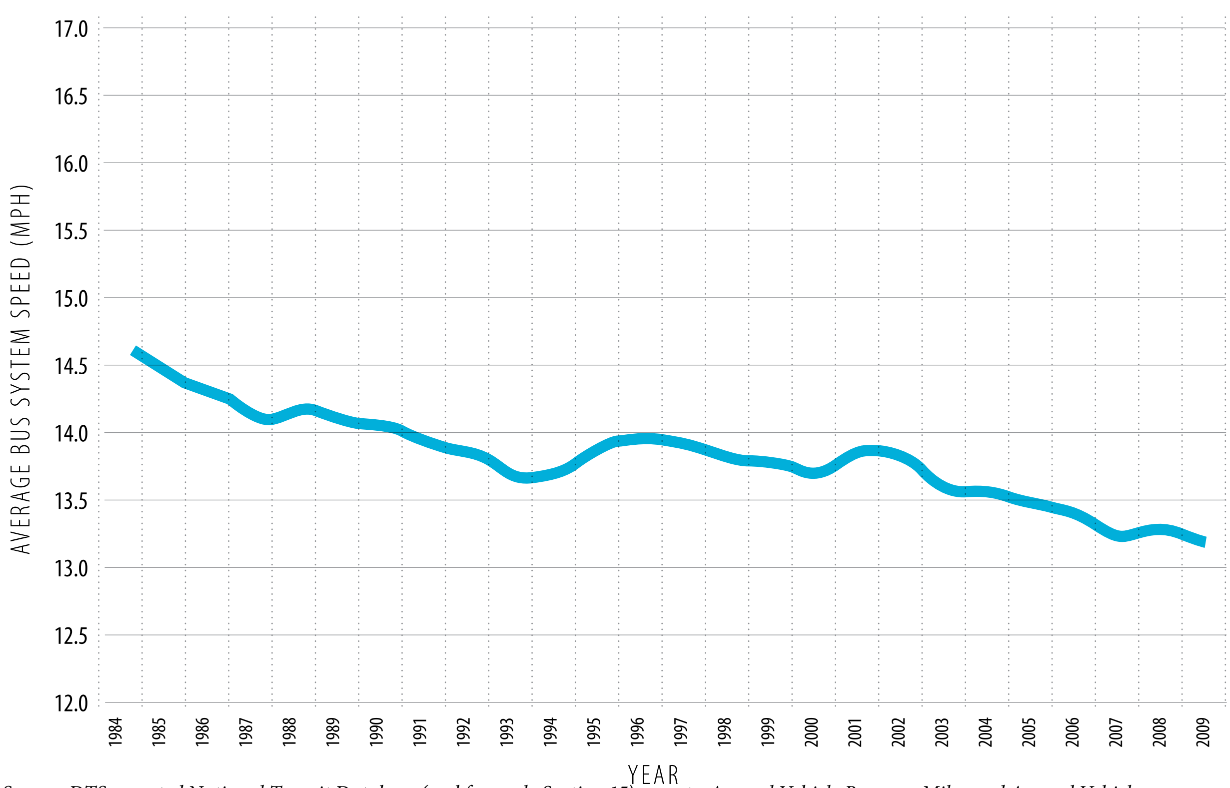
System Performance

This section examines existing transit system performance characteristics.

Transit Speed

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

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



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

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

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

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

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

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

Transit Ridership

Systemwide

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

Selected Routes in the Study Corridor

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

Transit Reliability

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

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

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

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

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

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

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

Transit Effectiveness/Load Factors

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

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

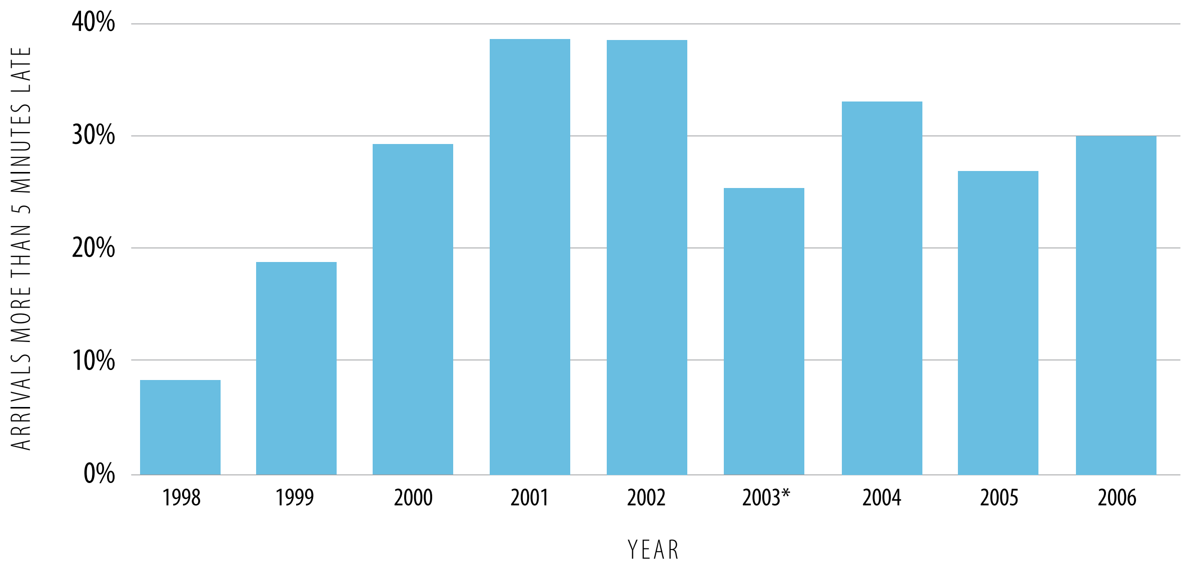
In Honolulu, passenger boardings per vehicle revenue hour averaged 41.0 to 45.3 from 2001 to 2006, while the range for the nation was between 37.3 and 40.4 during the same period. This is notable because the national rate includes the highest-capacity transit operations in the largest metropolitan areas.

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

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

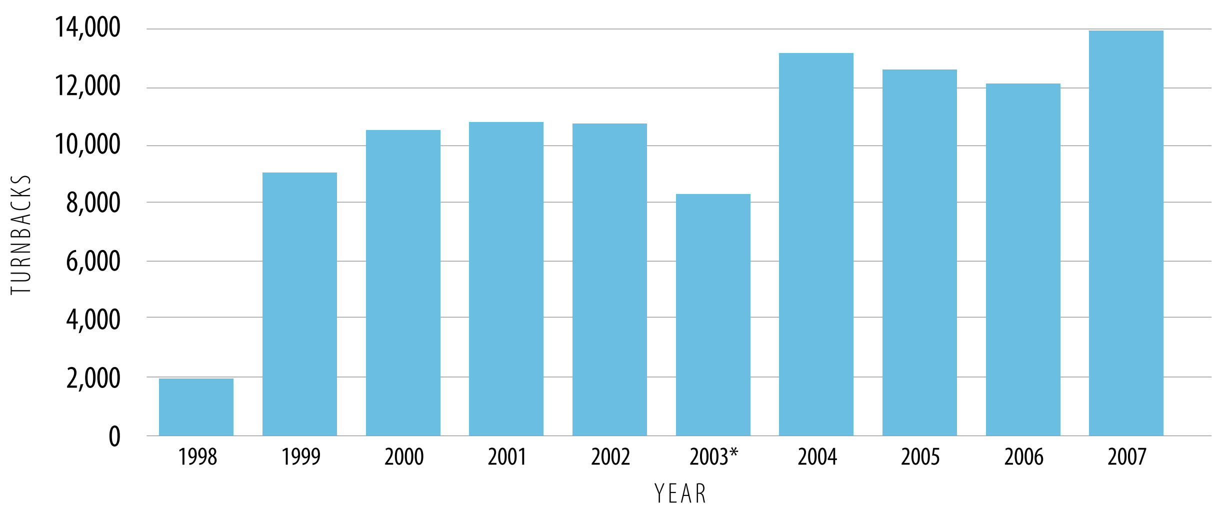
Access to Transit

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



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

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



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

Figure 3-3 TheBus Systemwide Annual Service Incidents Involving Turnbacks

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

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

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

Transfers

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

3.3.3 Existing Streets and Highways Conditions and Performance

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

System Characteristics

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

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

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

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

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

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

System Performance

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

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

Figure 3-4 Selected Screenline Facilities Locations

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

Screenline Volumes and Operating Conditions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Freight

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

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

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

3.3.4 Existing Parking Conditions and Performance

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

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

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

3.3.5 Existing Bicycle and Pedestrian Network Conditions and Performance

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

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

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

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

3.3.6 Existing Airport Facilities

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

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

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

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

3.4 Transportation Consequences and Mitigation

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

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

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

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

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

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

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

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

3.4.1 Future Travel Patterns

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

Daily Person Trips

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

Mode of Travel

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

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

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

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

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

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

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

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

Trips by truck are not included in this table.

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

Transit Trips by Trip Purpose

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

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

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

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

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

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

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

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

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

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

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

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

Numbers rounded to nearest hundred.

Reverse Commute Markets

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

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

Service to Transit-Dependent Households

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

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

3.4.2 Effects on Transit

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

In 2030 under the No Build Alternative, even with ORTP planned improvements, the key measures of transit reliability, accessibility, mobility, and equity would all be worse than today.

The Project will benefit the overall transportation system, enhancing the key measures of transit reliability, accessibility, mobility, and equity.

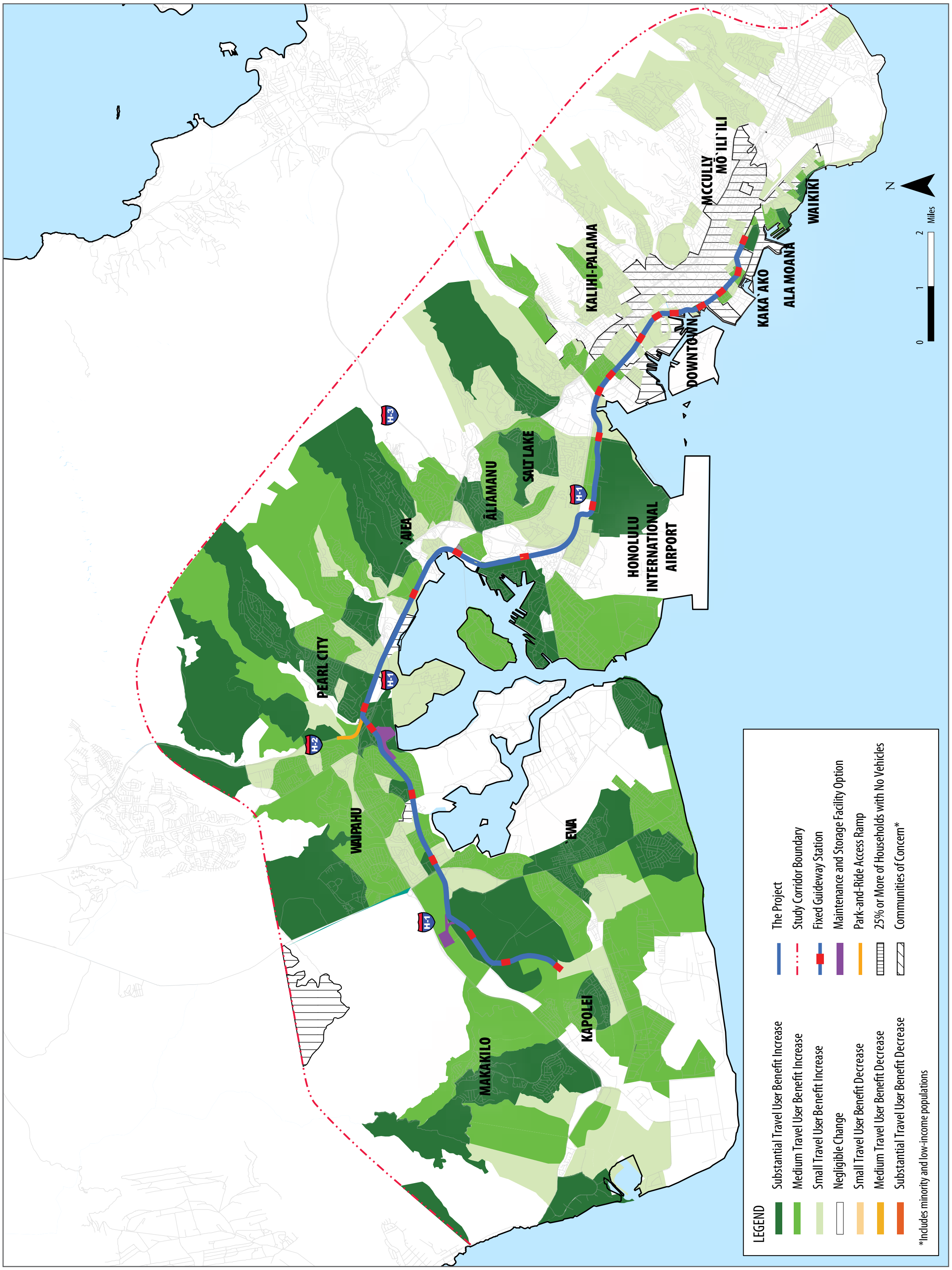

Figure 3-5 Transit-dependent Households and Transit-user Benefits—2030 Project

TheBus Network with the Project

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

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

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

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

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

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

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

Transit Speed

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

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

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

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

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

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

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

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

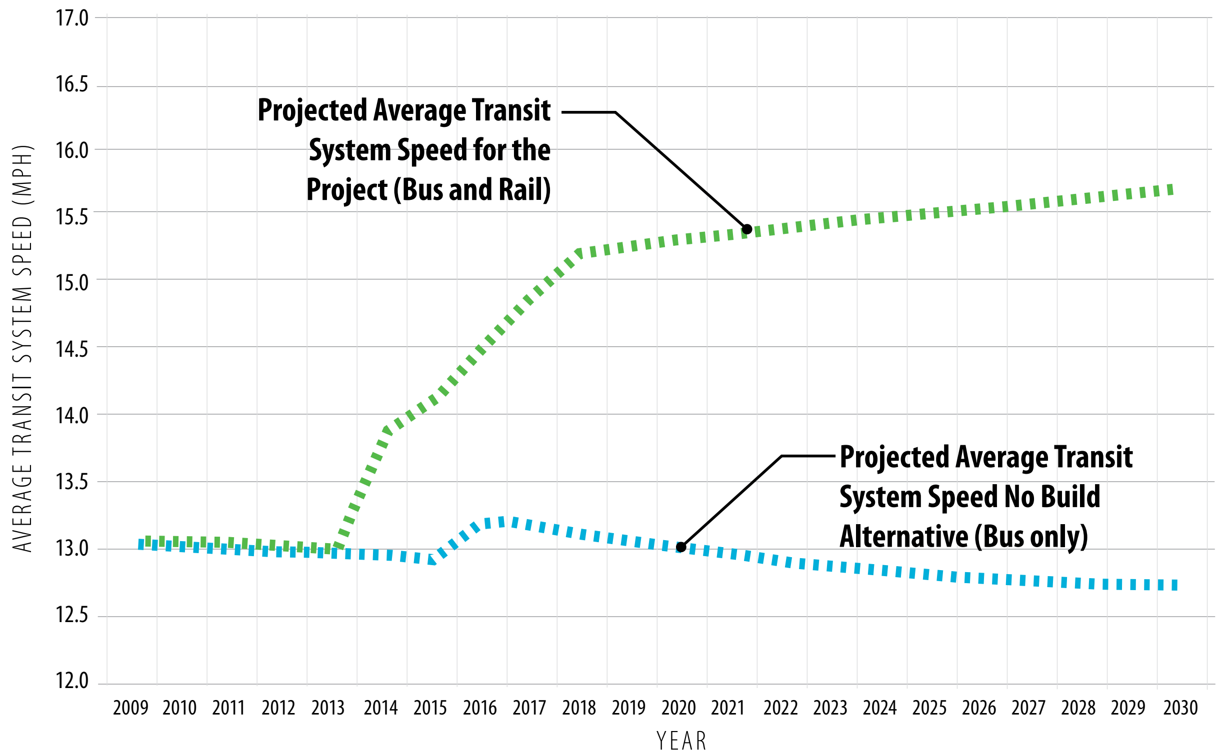

Figure 3-6 Transit Average Operating Speeds in Miles per Hour—No Build Alternative and the Project

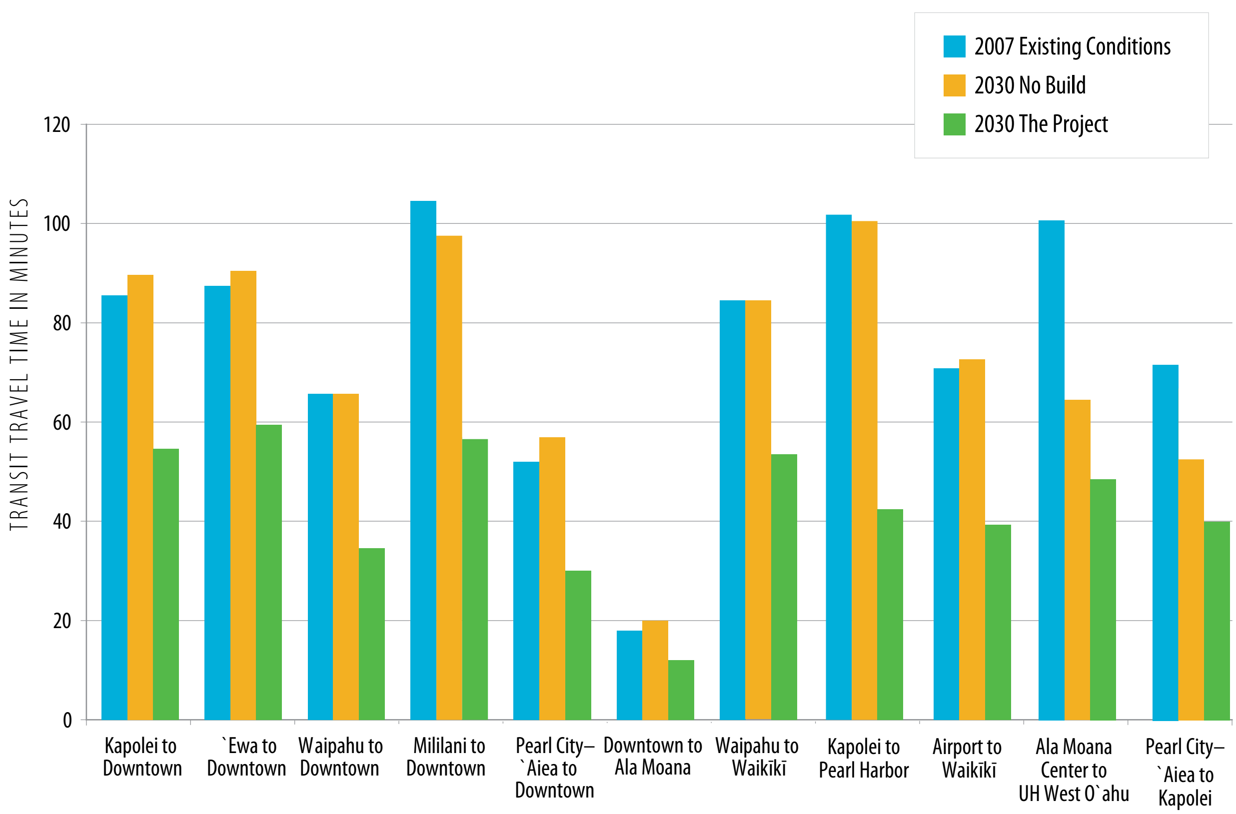

Figure 3-7 A.M. Peak-Period Transit Travel Times by Travel Market—Existing Conditions, No Build Alternative, and Project

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

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

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

Transit User Benefits for New Starts

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

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

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

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

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

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

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

Source: O`ahuMPO Travel Demand Forecasting Model.

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

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

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

Positive Attributes of a Fixed Guideway System

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

Transit User Benefits—Selected Major Travel Markets

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

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

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

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

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

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

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

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

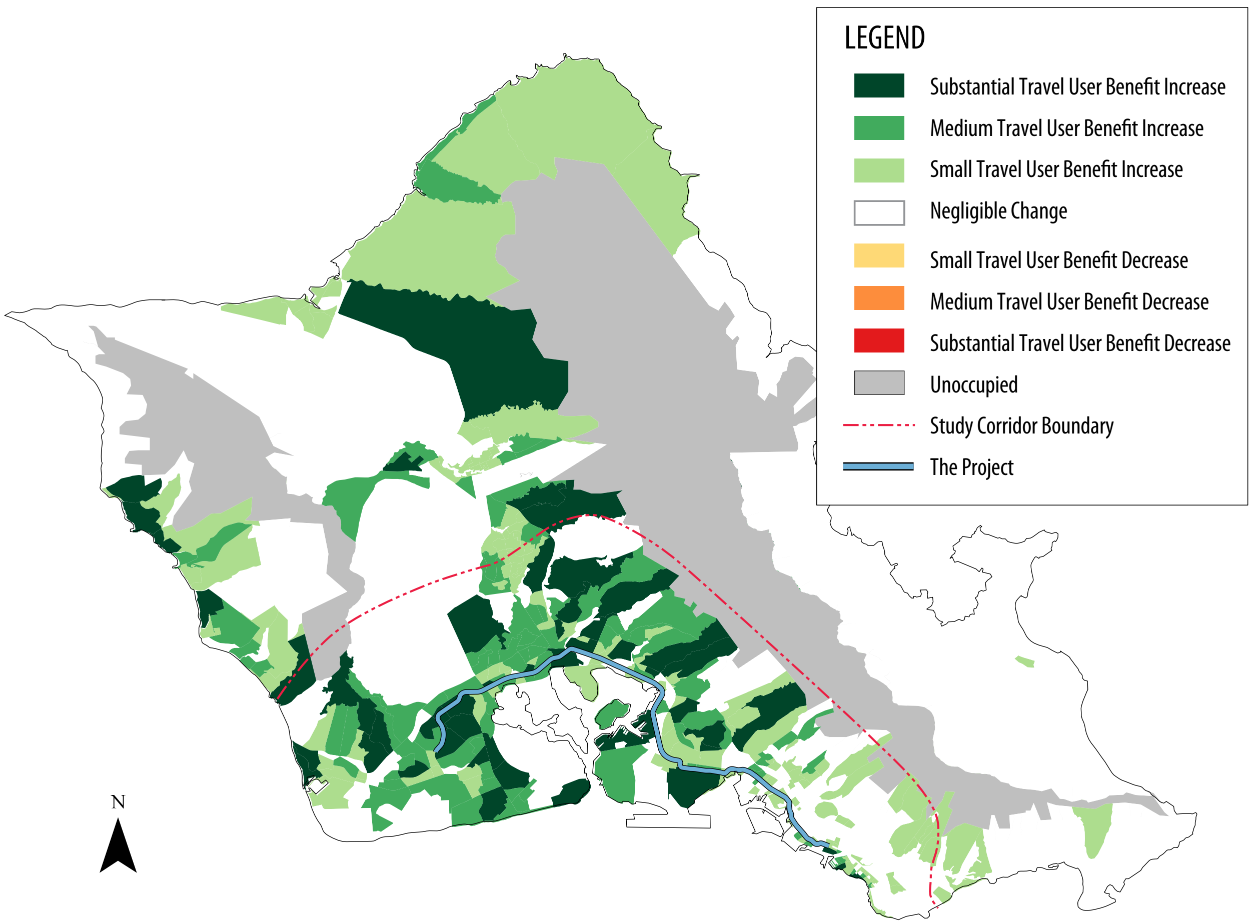

Figure 3-8 Positive User Benefits of the Project Compared to No Build Alternative—2030

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

Transit Ridership

No Build—Systemwide Ridership

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

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

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

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

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

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

Numbers rounded to nearest hundred.

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

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

The Project—Systemwide Ridership

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

Station and Link Volumes

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

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

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

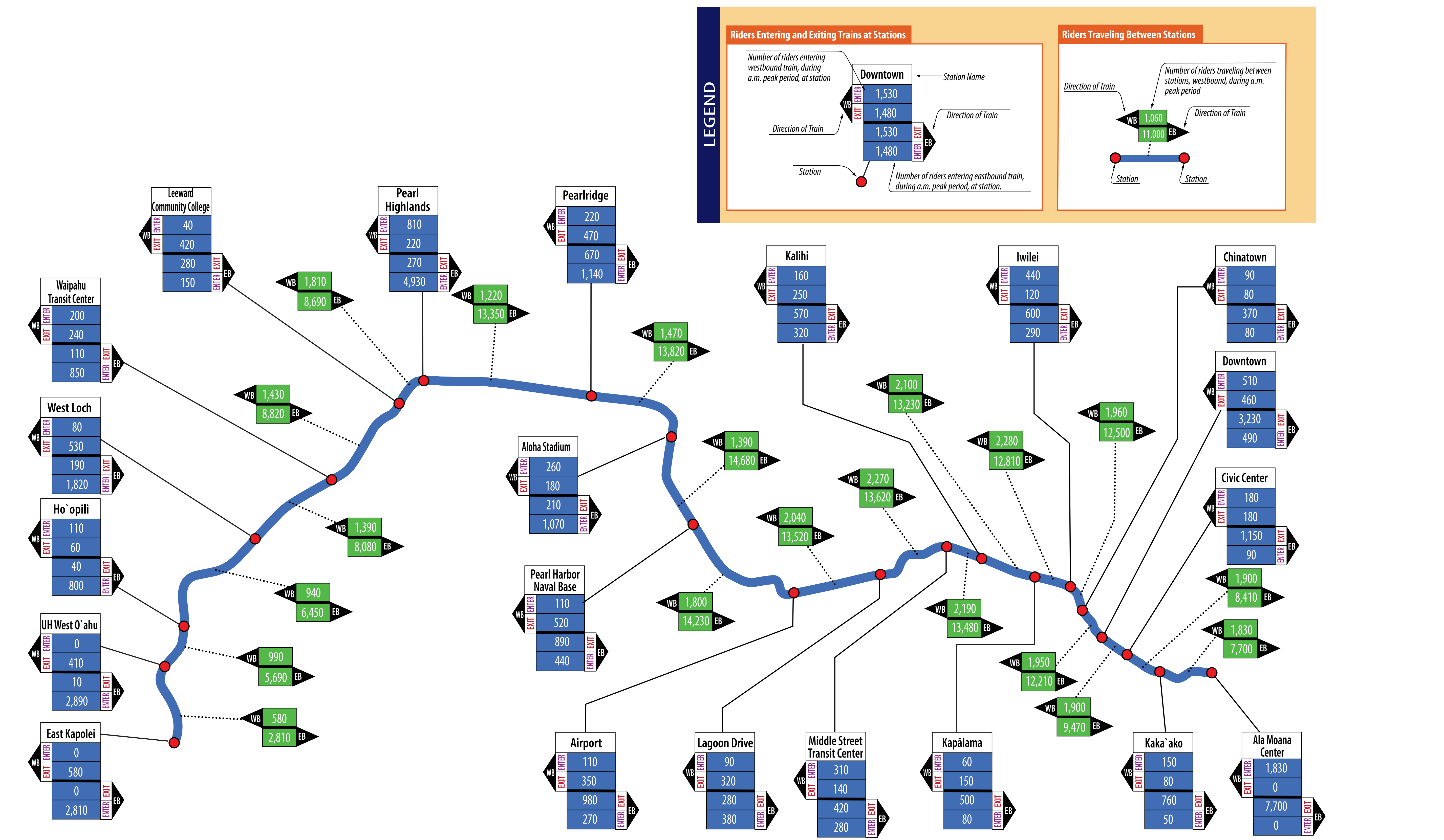

Figure 3-9 2030 A.M. Two-hour Peak Period Boardings, Alightings, and Link Volumes

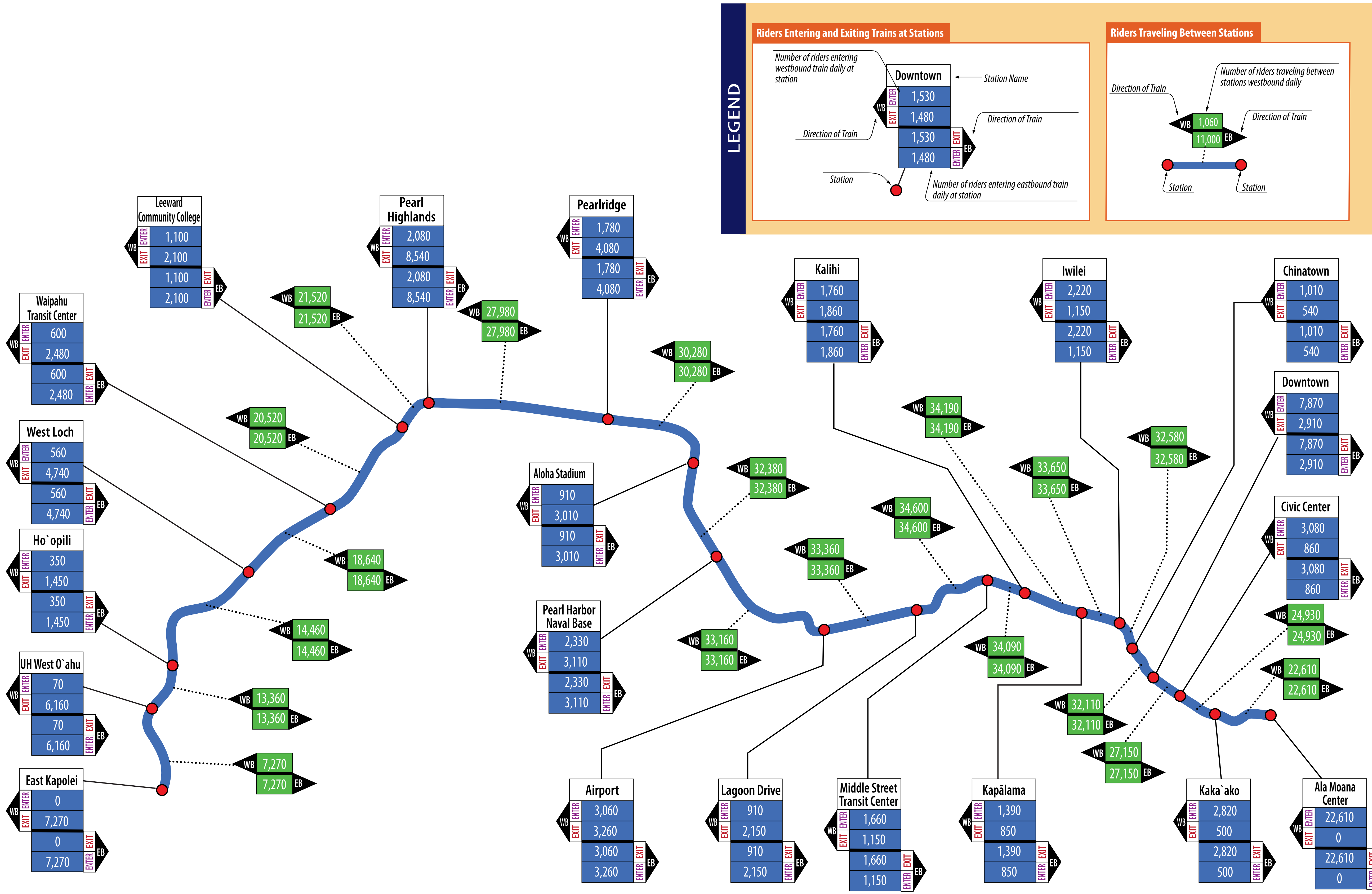

Figure 3-10 2030 Daily Boardings, Alightings, and Link Volumes

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

Ridership by Type of Service

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

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

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

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

Changes in Transit and Private Vehicle Demand

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

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

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

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

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

Numbers rounded to nearest hundred.

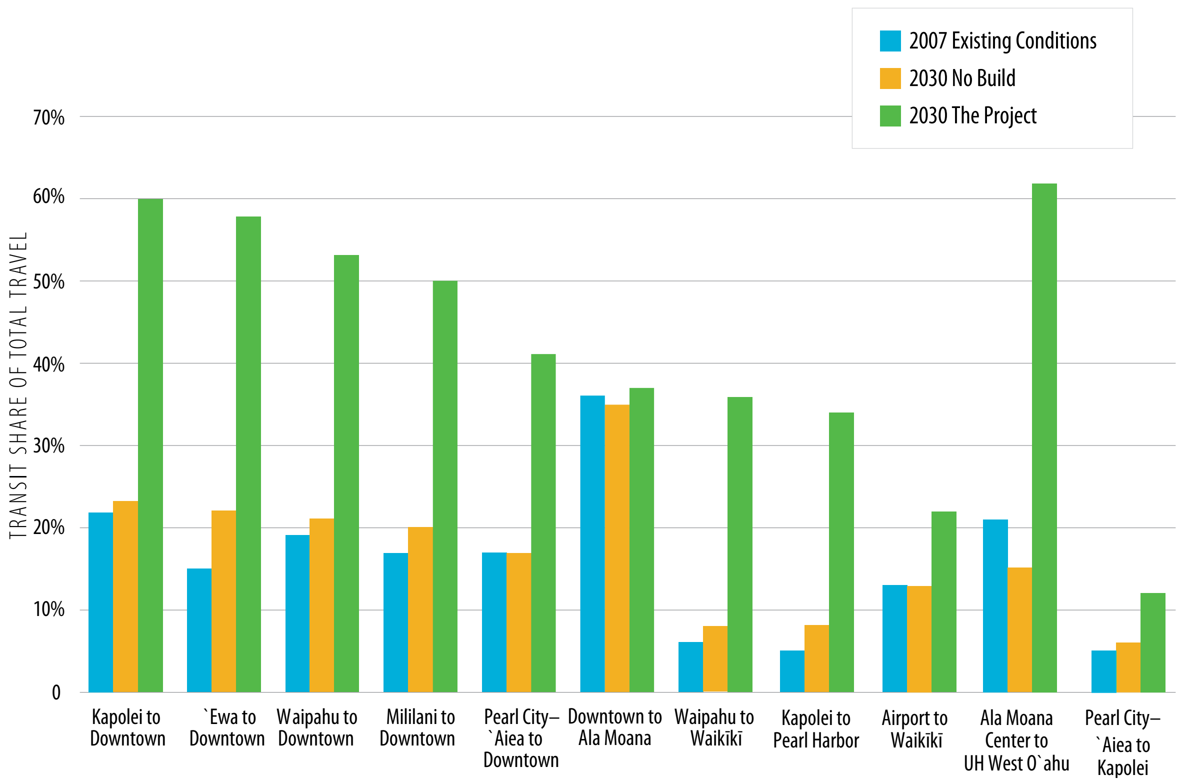

Figure 3-11 Transit Shares of Home-based Work Trips in A.M. Two-Hour Peak Period—Existing Conditions, No Build Alternative, and Project

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

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

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

Transit Reliability

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

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

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

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

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

Access to Fixed Guideway Stations

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

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

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

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

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

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

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

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

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

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

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

Transfers

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

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

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

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

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

Comfort and Convenience

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

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

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

3.4.3 Effects on Streets and Highways

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

- Changes in peak-hour traffic volumes at selected screenlines

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

Screenline Volumes and Operating Conditions

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

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

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

Effects of Guideway on Traffic

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

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

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

Traffic Effects at Stations

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

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

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

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

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

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

Numbers rounded to nearest five

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

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

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

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

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

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

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

[1] Mitigation measures are discussed in Section 3.4.7.

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

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

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

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

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

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

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

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

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

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

Maintenance and Storage Facility Effects on Traffic

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

- Near Leeward Community College
- Near Ho‘opili

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

Effects on Freight Traffic

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

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

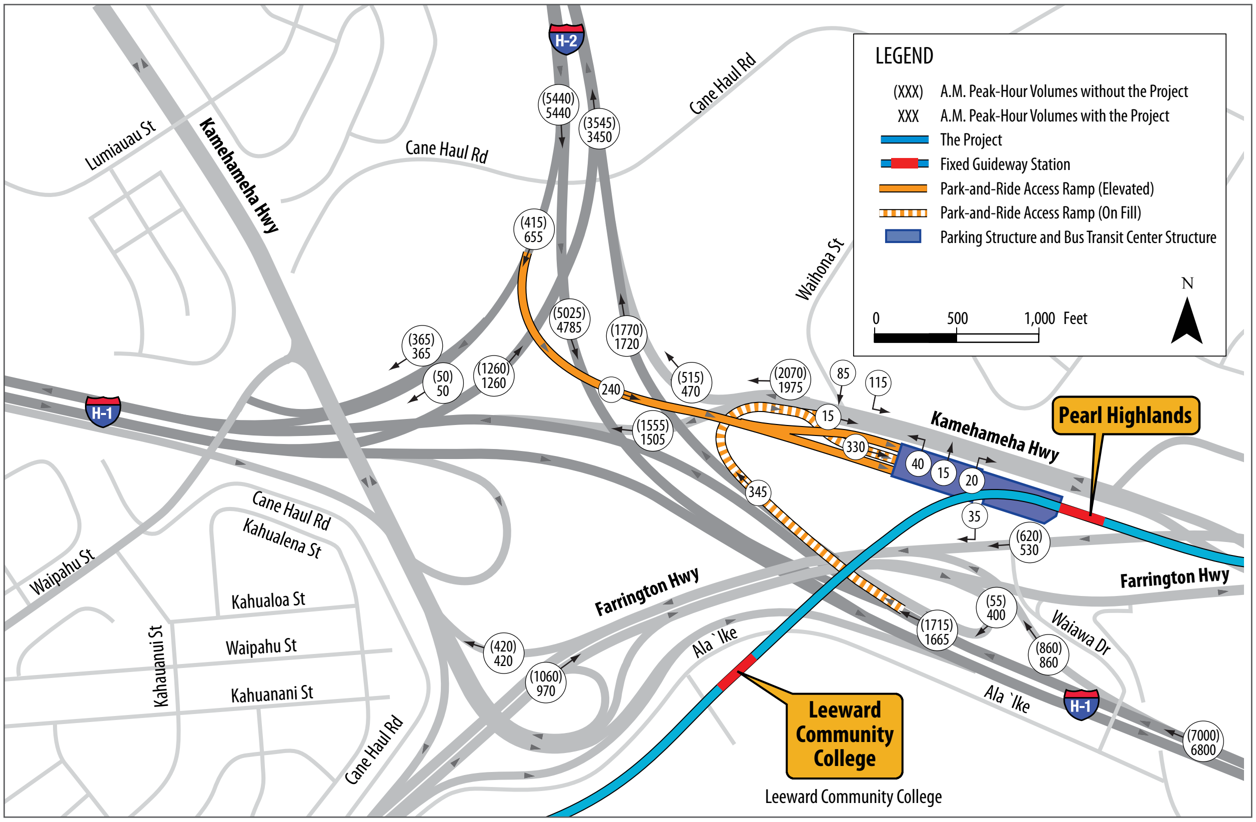

Figure 3-12 Pearl Highlands Station Area—2030 A.M. Peak-Hour Volumes

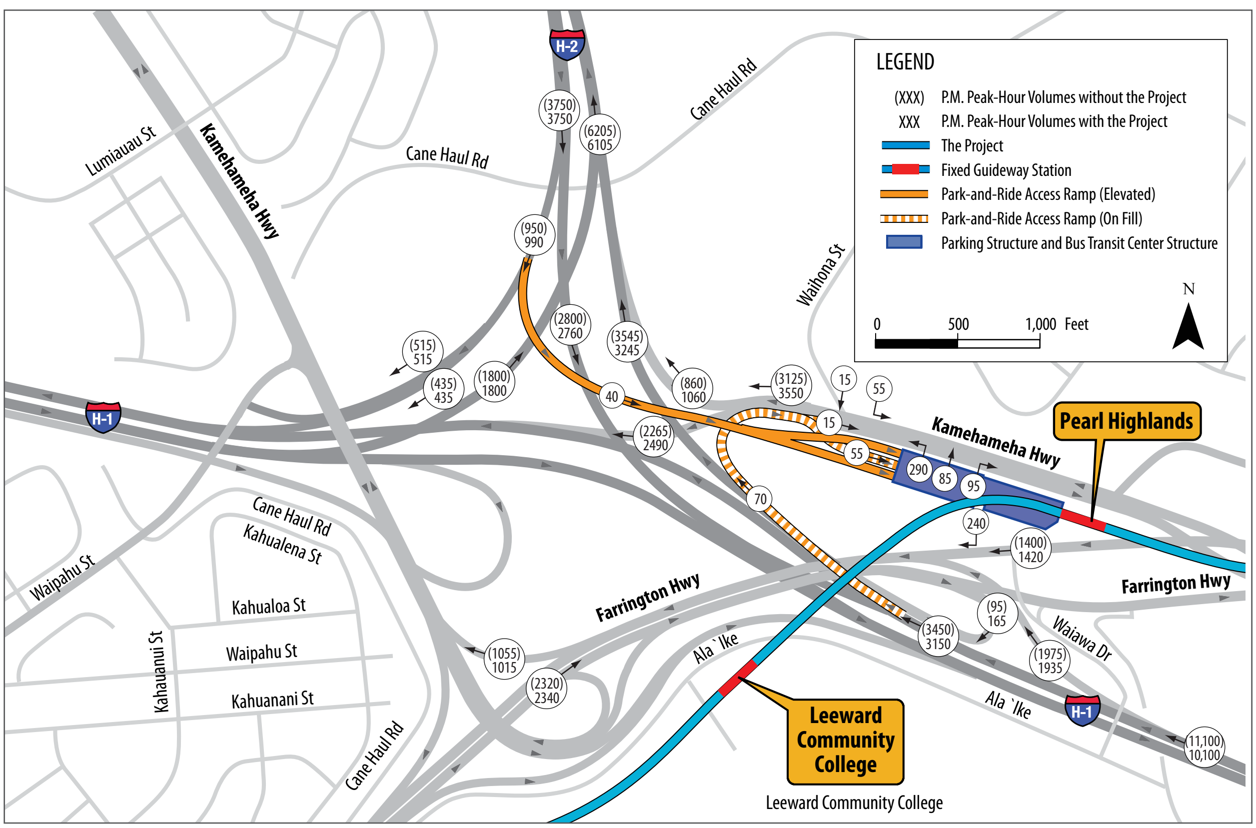

Figure 3-13 Pearl Highlands Station Area—2030 P.M. Peak-Hour Volumes

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

Effects on Interstate Freeways

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

Agency Coordination

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

3.4.4 Effects on Parking

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

Effects on Parking Supply

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

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

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

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

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

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

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

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

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

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

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

Spillover Parking Effects on Station Areas

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

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

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

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

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

Loading Zones

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

3.4.5 Effects on Bicycle and Pedestrian Facilities

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

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

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

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

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

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

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

3.4.6 Effects to Airport Facilities

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

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

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

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

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

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

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

Agency Coordination

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

3.4.7 Mitigation of Long-term Transportation Effects

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

Traffic

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

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

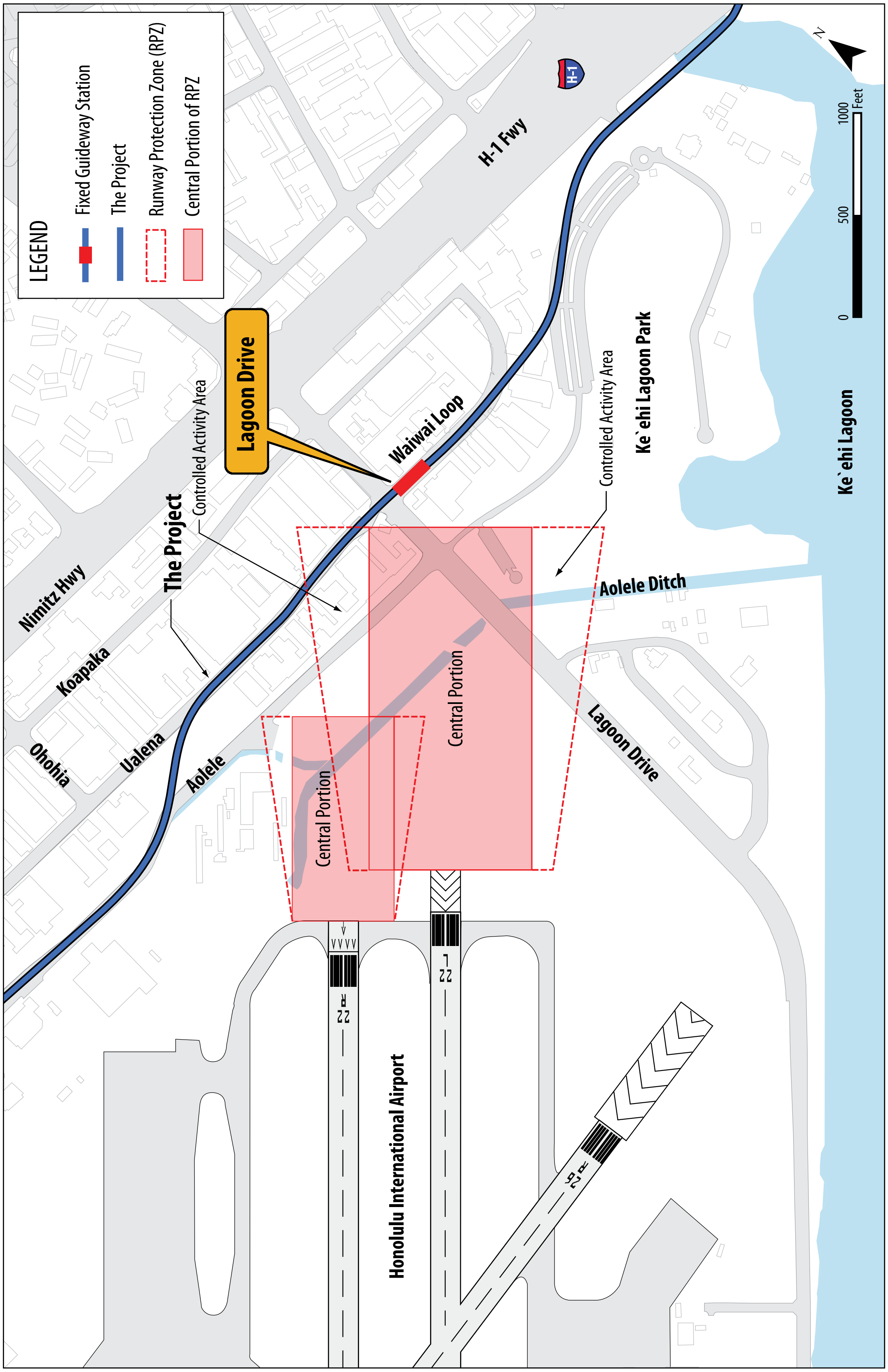

Figure 3-14 Airport Runway Protection Zone

Highway eastbound and Waiawa Road intersection.

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

Parking

Removal of Off-Street Parking

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

Removal of On-Street Parking

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

Spillover Parking

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

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

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

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

Loading Zones

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

3.5 Construction-related Effects on Transportation

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

3.5.1 Construction Staging Plans

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

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

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

3.5.2 Construction-related Effects on Transit Service

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

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

Existing bus routes were examined to determine the degree of effect during construction. Effects were classified as none, minor, or direct. Minor effects will occur when a route intersects and crosses a street with construction activity or traverses a short section of a construction zone. Direct effects will occur where a transit route travels along a considerable length of the construction zone. Table 3-26 lists the bus routes that will be affected by construction. Some bus routes will pass through multiple parts of the construction corridor. A Transit Mitigation Program, further described in Section 3.5.7, Mitigation of Construction-related Effects, identifies efforts to address construction effects on transit service.

Table 3-26 Bus Routes Affected by Construction

Minor Effects	Direct Effects
7, 10, 44, 74, 201, 202, PH1, PH2, PH3, PH4, PH5, PH6	5, 6, 8, 9, 11, 17, 18, 19, 20, 23, 31, 32, 40, 40A, 42, 43, 52, 53, 55, 56, 57, 57A, 62, 65, 71, 73, 88A, 434, A, C, E

As discussed in Section 2.5.10, the Project will be constructed in the following four phases and opened as each phase is completed:

- East Kapolei to Pearl Highlands (rail service in this phase will be opened in three parts as stations are completed)
- Pearl Highlands to Aloha Stadium
- Aloha Stadium to Middle Street
- Middle Street to Ala Moana Center

This phased opening approach will require interim changes to bus transit service to complement the fixed guideway service. The operating time periods and headways provided by the rail service affects the degree to which bus services will be modified to complement the Project. Bus service modifications will be additive from one opening segment to the next, except as noted in each phase description (provided below). Phased openings will also affect the number of buses traveling to stations and the associated traffic and pedestrian effects from that bus service. Additionally, rail service levels will be adjusted to match ridership demand duing the phased openings.

The identified phased openings and corresponding transit service changes are described as follows. Additional detail on routing changes as a result of phased openings is included in Appendix D of this Final EIS. An adjustment in the service hours described below may be needed for cut-over work to extend the rail line to the next phase.

Phase 1a: Waipahu to Leeward Community College

Three stations will be open for Phase 1a rail service—West Loch, Waipahu Transit Center, and Leeward Community College. Rail service will be provided during the midday on Saturdays and Sundays only.

Routes operating westbound on the H-1 Freeway during the PM period will utilize the new contraflow lane between Radford Drive and the Waiawa Interchange. Route 41 will be modified to operate along North-South Road providing access for ʻEwa and Kapolei residents to the UH West Oʻahu Campus. Route 418 will be added to provide connections via Kapolei Parkway between ʻEwa neighborhoods and Kapolei.

Phase 1b: East Kapolei to Leeward Community College

Three stations will be added to those identified in Phase 1a—East Kapolei, UH West Oʻahu, and Hoʻopili. Rail service will be provided during the weekdays with 15-minute headways between the hours of 8 a.m. and 6 p.m. Bus service in Kapolei will include a modification to Route 418 to connect to the East Kapolei Station, and Route C will provide service to the East Kapolei and UH West Oʻahu Stations serving the North-South Road accessing the H-1 Freeway from the North-South Road Interchange.

Phase 1c: East Kapolei to Pearl Highlands

Phase 1c rail service adds the Pearl Highlands Station operating on weekdays with 15-minute headways between the hours of 8 a.m. and 6 p.m. Bus service changes will include the implementation of two new routes in Kapolei taking advantage of new roadway connections. Route 416 will provide new service for Ko ʻOlina and West Kapolei connecting to the Kapolei Transit Center. Route 417 operating on the Makakilo Drive extension will provide direct access for Makakilo residents to the UH West Oʻahu and East Kapolei Stations continuing to the Kapolei Transit Center.

New Route 50 will operate between Mililani Transit Center and the Waipahu Transit Center and Station. Other Central Oʻahu transit service changes will include the implementation of the Wahiawā route restructuring—current Routes 62 and 72 will be replaced with Routes 51, 511, 512, and 513 serving the Wahiawā Transit Center and nearby communities, including Whitmore Village and Schofield Barracks. CountryExpress! Route D will provide limited stop service connecting the Wahiawā Transit Center, Mililani, and Waipiʼo transfer point at Ka ʻUka with Downtown Honolulu. New Route 441 will connect the Waiawa and Koa Ridge neighborhoods with the Pearl Highlands Station and businesses in Pearl City. Pearl City Route 73 will be reoriented to serve the Pearl Highlands Station, ceasing service to Leeward Community College.

Phase 2: East Kapolei to Aloha Stadium

The Pearlridge and Aloha Stadium Stations are added to the rail service in Phase 2. The operating periods are extended and will provide more frequent service. The line will operate on weekdays with 10-minute service between the hours of 6 a.m. and 10 a.m. and 4 p.m. and 8 p.m. and 20-minute midday service. Twenty-minute service will be provided on Saturdays and Sundays between the hours of 8 a.m. and 6 p.m.

Bus service changes will include truncating Routes A, 20, and 32 at Aloha Stadium. Route D will provide a stop at the Pearl Highlands Station, and Routes 44, 502, and 511 will offer more frequent service. The completion of the Project through the ʻAiea and Pearl City corridor will provide the opportunity to implement a restructuring of transit services in the area. Routes 54 and 71 will be replaced with a restructured Route 53 and Routes 543, 545, 546, and 548, all serving the Pearlridge Station. Thirty-minute peak and off-peak service will be provided on Routes 543, 545, and 546. Route 548 will offer more frequent service than the replaced Route 54 with 15-minute peak and 30-minute off-peak service. Route 53 will provide 20-minute peak and 30-minute off-peak service.

Phase 3: East Kapolei to Middle Street

Four stations will be added in Phase 3—Pearl Harbor Naval Base, Honolulu International Airport, Lagoon Drive, and Middle Street Transit Center. The operating periods and frequency of the line will be the same as in Phase 2. Bus service modifications will include more frequent peak period service (15-minute) on Route 41. Route 43 will be replaced by the rail service. More frequent peak-period service will be provided on Routes 501 and 502 in Mililani. Route D will be truncated at the Pearl Highlands Station and Routes 83 and 84 will provide 30-minute peak period service to the Pearl Highlands Station.

Community-oriented bus services in the Salt Lake, Airport, and Kalihi areas will be restructured to feeder routes offering more frequent service and travel opportunities via timed connections at the Aloha Stadium and Middle Street Transit Centers. Routes PH1, PH2, PH3, and 16 will be replaced with Route 311, serving Moanalua, Salt Lake, and the Honolulu International Airport Station; Route 312, serving Pearl Harbor Naval Base; Route 313, serving Hickam Air Force Base; and Route 314, serving the Aloha Stadium Station. Routes 312, 313, and 314 will provide 15-minute peak and 30-minute off-peak service. Route 311 will provide 30-minute peak and 60-minute off-peak service. Route 20 will be replaced with more frequent service on Route 19, which will terminate at Honolulu International Airport and provide 15-minute peak and off-peak service.

Routes A and 9 will be truncated at the Middle Street Transit Center and Station. Routes A and 1 will provide more frequent service (10-minute peak and off-peak) from the Middle Street Transit Center. Kalihi Routes 7, 10, and 32 will be replaced with Route 301, serving Māpunapuna, Salt Lake, and Foster Village; Route 303, serving Kalihi Valley Homes; Route 304, serving Ālewa Heights, Pauoa, and Palama; Route 305, serving Kalihi Valley and Kalihi Kai; and Route 306, serving Māpunapuna and Lagoon Drive. These five routes will all provide connections at the Middle Street Transit Center and Station.

Phase 4: East Kapolei to Ala Moana Center

The final construction phase occurs between Middle Street and Ala Moana Center and includes the following stations—Kalihi, Kapālama, Iwilei, Chinatown, Downtown, Civic Center, Kakaʻako, and Ala Moana Center. Rail service will operate on weekdays with 5-minute headways from 6 a.m. to 10 a.m. and 4 p.m. and 8 p.m. and with 15-minute headways from 10 a.m. to 4 p.m. Rail service will operate with 15-minute headways on Saturdays and Sundays between 8 a.m. and 6 p.m. Upon completion of this phase, bus service will be restructured. See Section 3.4.2 and Appendix D for a discussion of TheBus service with the Project. Table 2-7 (in Chapter 2) provides a discussion of rail operating hours and headways.

School buses may also be affected by temporary delays caused by construction activities. Construction-related detours may require alternative routes between school bus stops.

3.5.3 Construction-related Effects on Traffic

This section discusses potential construction-related traffic effects, such as lane closures, which may occur throughout the day, including peak travel periods. Additional lanes may be closed during off-peak travel periods. These additional lane closures will accommodate delivery of construction equipment. Construction activities will likely occur in temporary construction corridors. Estimates of construction-related procedures that will affect road closures are as follows:

- **Column Foundations (drilled shafts)**—lane closures will be required throughout the column foundation installation process. The degree of traffic disruption around areas of piling/caisson work will vary depending on the roadway's width and the availability of alternate routes. The following scenarios are anticipated:
  - **Off-peak closures**—two lanes will be closed for each half-mile construction segment for foundation and column

construction. If the alignment is along a roadway that is less than three lanes wide (e.g., Halekauwila Street), the road will be closed to non-local vehicular traffic during off-peak periods. If the street's median is more than 8 feet wide (e.g., Farrington Highway in parts of Waipahu), two lanes will remain open.
  - **Peak closures**—during peak travel periods, closure may be restricted to one or two lanes. If a street is only two lanes wide, efforts will be made to open one lane during peak periods, if necessary.
  - **Cross-streets**—if cross-streets are at least 150 feet apart to allow space for the required equipment, the only restrictions on cross-streets could be turning movements onto the alignment road where lanes are closed. Access could be closed in off-peak periods during erection of segments.
- **Columns**—lane closures will be required throughout the column construction process. Lane closures similar to those assumed for column foundations are assumed for aboveground column construction.
- **Guideway Structure**—during construction of the guideway structure between the columns, lane closures will be required. However, if the active work area spans an intersection, the cross-street will be open (with possible turning restrictions) during peak hours but closed during off-peak hours. Lane closure could also be needed in the off-peak direction during delivery and erection of segments.
- **Stations**—lane closures will be required at all locations where stations will be constructed over a roadway. Some work will likely require complete road closures, and this will be scheduled for permitted night work.
- **Park-and-Ride and Other System Facilities**—park-and-ride and other system facilities (e.g., traction power substations and the maintenance and storage facility) will primarily be built on parcels not located on public streets and highways. Substantial lane closures are not anticipated during construction of these facilities, but brief lane closures may be necessary during construction of entrances and exits.

Table 3-27 lists anticipated temporary lane closures during peak periods along the alignment. Additional lanes may be closed during off-peak periods. Utility relocation could also require additional lane closures. In addition to travel lanes, a number of turning lanes will also be temporarily closed. It is proposed that left-turn lanes along Farrington and Kamehameha Highways and Dillingham Boulevard be temporarily closed during construction. Traffic signals adjacent to the fixed guideway could also be temporarily replaced or re-timed. In addition, temporary traffic signals may be placed at some unsignalized intersections during construction. Delivery of construction materials will increase the number of trucks on local roadways.

Balanced cantilever construction likely will be used for the longer spans crossing the H-1 and H-2 Freeways and possibly Fort Weaver Road. Individual lanes will be closed to allow this work to be completed without a full roadway closure. A detailed schedule showing which lanes will be affected will be prepared for the erection of segments. The actual means and methods for erecting these segments will be the contractor's decision. Construction with segmented precast sections will avoid the need for substantial shoring or false work. Appendix E, Construction Approach, describes the general construction process and methods likely to be used to construct the Project.

Phased opening of the Project to the public will have only minor effects on traffic. This will be limited to the station areas where bus transit service has been temporarily altered to complement the interim configuration of the fixed guideway service.

Table 3-27 Potential Peak Period Temporary Lane Closures During Construction[1]

Roadway Name	Cross Street From	Cross Street To	Number of Lanes	Number of Lanes to be Temporarily Closed[2]	
				Kapolei Bound	Koko Head Bound
Farrington Highway	Makamaka Place	Waipahu Depot Road	5	1	0
Kamehameha Highway	Acacia Road	Boathouse Entrance	6[3]	0	1
Kamehameha Highway	Salt Lake Boulevard	Center Drive	5[3]	1[4]	1
Salt Lake Boulevard	Kamehameha Highway		4	1	0
Kamehameha Highway	Radford Drive		5[5]	1	1
Nimitz Highway	Valkenburgh		3[6]	0	1
Ualena Street	Ohohia Street	Lagoon Drive	2	1	0
Waiwai Loop	Lagoon Drive	Curve	2	1	0
Kamehameha Highway	Middle Street	Laumaka Street	5	1	1
Dillingham Boulevard	Laumaka Street	Ka`aahi Street	4	1	1
Dillingham Boulevard	Ka'aahi Street	King Street	5	0	1
Nimitz Highway	River Street	Fort Street	8	1	1
Ala Moana Boulevard	Bishop Street	Halekauwila Street	6	0	1
Halekauwila Street	Punchbowl Street	South Street	2	1	0
Halekauwila Street	Keawe Street	Ward Avenue	2	0	1
Kona Street	Pensacola Street	Pi`ikoi Street	2	1	0
Kona Street	Pi`ikoi Street	Ke`eaumoku Street	4	2	1

[1] Left turn lanes along Farrington Highway, Kamehameha Highway, and Dillingham Boulevard will also be temporarily closed during construction.
[2] Additional closures could occur in short segments and/or during off-peak travel periods.
[3] Kamehameha Highway narrows to four lanes around the Moanalua Freeway Interchange.
[4] One Kapolei bound lane will be closed at Kamehameha Highway and Center Drive only
[5] One Town bound lane will be closed to replace the left-turn lane. One `Ewa bound lane will be closed to replace the left-turn lane.
[6] The left-turn lane in the Town bound direction will be closed and replaced with an option left-turn/through lane.

The fixed guideway will be built along several roadways that are heavily used freight routes. Construction effects on freight could occur, especially during off-peak hours. Freight movement may be delayed by the need to use an alternate route. Loading zones along the route could be temporarily relocated.

3.5.4 Construction-related Effects on Parking

Approximately 230 on-street parking spaces will be temporarily affected by project construction. Table 3-28 identifies the locations where on-street parking will be temporarily unavailable at various points along the alignment. Parking spaces will be unavailable primarily during construction of foundations and columns, and spaces may not be lost all at once. On-street parking by construction workers will not be permitted near work sites. During the actual hours of work, only those vehicles absolutely necessary for construction shall be allowed within the safety zone or allowed to stop or park on the shoulder of the roadway with the approval from the City.

Table 3-28 Potential Effect on On-Street Parking During Construction

Roadway Name	Cross Street From	Cross Street To	On- Street Parking Temporarily Lost During Construction
Moloalo Place	Waipahu Depot Street	Mokuola Street	5
Ka`aahi Street	Dillingham Boulevard	Iwilei Road	17
Halekauwila Street	Punchbowl Street	South Street	21
Halekauwila Street	South Street	Keawe Street	15
Halekauwila Street	Keawe Street	Coral Street	38
Halekauwila Street	Coral Street	Cooke Street	10
Halekauwila Street	Cooke Street	Kamani Street	44
Halekauwila Street	Kamani Street	Ward Avenue	9
Queen Street	Ward Avenue	Kamake`e Street	46
Queen Street Extension	Kamake`e Street	Waimanu Street	21

Because of the limited amount of parking available to residents and businesses in and around construction sites, construction workers will not be allowed to park their personal vehicles in the public right-of-way.

In addition, some off-street parking spaces will be temporarily unavailable during construction. This temporary effect will generally last three to six months. Contractors will need approval from business owners before private lots can be used for parking. Construction workers also will not use commercial parking facilities if doing so reduces available parking for customers or employees of that business.

3.5.5 Construction-related Effects on Bicycle and Pedestrian Facilities

Access to existing bicycle and pedestrian facilities will be maintained during all phases of construction as safety allows. Warning and/or notification signs of modification to bicycle and pedestrian facilities during construction will be provided. Proposed pedestrian detours will be submitted to the City for review and approval to ensure they are reasonable for all pedestrians and meet ADA regulations.

Proper deterrents, such as barriers or fencing, will be placed to prevent access (shortcuts) through the construction area.

Effects will occur in these areas as a result of the proximity of sidewalks to the roadway median. Many crossings will be temporarily eliminated, and disruptions will occur along adjacent sidewalks and bike paths. Sidewalk diversions will be made when necessary. In areas where additional right-of-way may be required (e.g., Dillingham Boulevard), sidewalks may be temporarily removed and pedestrians rerouted to safe locations.

The Transportation Technical Report (RTD 2008a) identifies potential conflicts or physical effects on existing and proposed bicycle facilities and the pedestrian circulation system that will result from construction of the Project.

3.5.6 Construction-related Effects on Airport Facilities

Construction of the Project will have temporary effects on airport facilities and notification of any short-term obstructions (e.g., cranes and gantries) will be made to the appropriate parties. Temporary lane closures on Ualena Street and Waiwai Loop could cause short-term delays to trucking and deliveries at airport-related facilities. The economy surface parking lot will be closed during construction of the Honolulu International Airport station, and other nearby roadways could be temporarily affected when support columns and guideway sections are transported and installed. Additionally, lei stand parking may be temporarily relocated during construction. FAA Form 7460-1, *Notice of Proposed Construction or Alteration,* will be filed prior to any construction on airport property.

3.5.7 Mitigation of Construction-related Effects

A Maintenance of Traffic (MOT) Plan and Transit Mitigation Program (TMP) will identify measures to mitigate temporary construction-related effects on transportation. The MOT Plan will address effects on streets and highways, transit, businesses and residences, and pedestrians and bicyclists. Coordination with TheBus will identify additional bus service to mitigate construction effects. While the City has identified the general content of the MOT Plan, construction methods identified by each contractor will ultimately be included in the MOT Plan. The TMP will mitigate effects on transit service operating during project construction. These plans will be developed by the contractor for each phase and coordinated/approved by HDOT (for the MOT Plan and HDOT highways only) and the City prior to starting construction in an area.

> Construction-related transportation effects will be mitigated with implementation of a Maintenance of Traffic Plan and a Transit Mitigation Program to be prepared prior to construction.

The MOT Plan and TMP will include site-specific traffic-control measures and will be developed in conjunction with the Project's Final Design. The key objectives of these plans will be to limit effects on existing traffic and maintain access to businesses. These plans will be shared with the public. Business access during construction is discussed in Section 4.18.1.

Maintenance of Traffic Plan

The following sections discuss measures included in the MOT Plan that will help mitigate construction-related transportation effects. The contractor will be given parameters, such as the number of lanes that could be closed and the procedures for closures, and will develop the MOT Plan accordingly with approval from the City or HDOT. The MOT Plan will address roadway closures for streets identified in Table 3-27. The Plan will specifically account for the effect of drilled shaft installation, crane access and operations, and the delivery and operation of materials trucks. The MOT Plan will also address the delivery and unloading of pre-cast guideway sections, including crane positioning for unloading. The contractor will submit any proposed changes to the MOT Plan to the City for approval.

Streets and Highways

Construction will be phased so that the duration of pile, caisson, and column work (which have the largest effect on traffic) will be minimized. During final design, whether under design-build or design-bid-build processes, detailed *Work Zone Traffic Control Plans,* including detour plans, will be formulated in cooperation with the City, HDOT, and other affected jurisdictions.

It is not anticipated that major or secondary highways will be closed to vehicular or pedestrian traffic, with the exception of some freeways or major arterials during late night and early morning weekend hours. Vehicular or pedestrian access to residences, businesses, or other establishments will be maintained. Additional temporary lane closures will occur during non-peak hours so that effects on heavy commuter traffic will be minimized. The MOT Plan will also address traffic signal changes and relocation of freight loading zones and utilities that might be temporarily affected.

During construction of the Project, the City will minimize disruption to freight movement by limiting road and lane closures and timing work along busy freight routes to avoid conflicts with truck traffic. When construction reaches roadways frequented by heavy truck traffic, detour plans prepared as part of the MOT Plan will also account for truck traffic. Additionally, in areas with substantial truck traffic, the City will work with businesses to maintain access to properties taking into account their particular vehicular needs.

Delivery of large equipment, such as drilling devices, cranes, and launching gantry truss sections, will occur along arterial routes to the construction corridor. City and HDOT approvals will be sought for proposed haul routes and included in the contract packages.

In addition, Intelligent Transportation System (ITS) applications will be implemented to make travel through and around work zones safer and more efficient. Several ITS strategies will be used, including the following:

Traveler Information—the collection, processing, and dissemination of traffic conditions, "event" information (e.g., construction, incidents), information on alternative travel modes and links to other traveler services. Information is broadcast to motorists that are en route as well as through pre-trip options such as web, phone, and media outlets.

Arterial Traffic Management—modification of the signal system along some roadways will be needed in conjunction with implementation of planned detour routes.

Incident Management—includes rapid identification of an incident, rapid response to secure the incident scene, and subsequent removal of associated vehicles from travel lanes and restoration of lane capacity.

As construction moves through a neighborhood, residents and businesses will be informed of the type and duration of construction activities and what provisions will be made to minimize disruption to daily activities. Additionally, an extensive public information program will be implemented to provide motorists with a thorough understanding of the location and duration of construction activities, as well as anticipated traffic conditions. ITS information regarding traveler information or incident management will be distributed through both daily and instant public involvement means. The project website will continue to be the primary information source for up-to-date project information. In addition, the project hotline and newsletter, local newspapers, radio and/or television spots, news releases, instant messaging lists, and flyers may be used to provide information to the public.

Transit

The MOT Plan will determine when and where changes in bus services could be needed and will include TDM elements, as provided in the TMP. Identification of potential changes to bus routes, stops, and service resulting from construction of the Project will be coordinated with TheBus. Changes in bus service could include improving frequencies on existing routes or adding new routes that circumvent specific construction areas. The City will make adjustments as needed to TheHandi-Van operations resulting from access limitations.

Pedestrians and Bicycles

Pedestrian and bicycle access will be maintained during construction as much as possible while emphasizing safety. Measures to maintain safe and efficient pedestrian and bicycle access will meet ADA regulations and could include the following:

- Channelizing pedestrian flow in areas where sidewalks are near construction—channelized structures are generally steel-framed, three-sided plywood structures built above existing sidewalks
- Providing alternative routes to avoid hazardous areas
- Making extensive use of signage to direct pedestrians and bicyclists to the safest and most efficient routes through construction zones—signs will warn pedestrians and bicyclists well in advance of sidewalk and bike lane closures

Parking

Where existing parking is disrupted by construction, signs will be posted directing people to nearby locations with available parking. The public will be kept aware of upcoming work locations, and information will be available on the project website about parking disruptions and alternatives. The City will coordinate with property and business owners regarding the timing of construction and other issues to minimize disruption to off-street parking.

Loading Zones

Where passenger and freight loading zones are removed for construction, temporary loading zones will be established nearby. The public will be kept aware of upcoming work locations, and information will be available on the project website about loading zone disruptions and alternatives.

Airport Facilities

The City will continue work with the airport to minimize disruption to travelers and businesses during construction of the guideway and stations. To the extent possible, all roadways will be kept open and access will be maintained. The economy parking lot will be completely closed during construction. Where existing parking is disrupted by construction, signs will be posted directing people to nearby locations with available parking. If the lei stand parking area needs to be relocated, signs will direct customers to the temporary parking area and from there to the lei stands.

Construction Phasing

As discussed in Section 2.5.10, the Project will be constructed and opened in phases over nine years. As the stations are completed and opened, rail service will be extended and feeder bus service from surrounding neighborhoods will be implemented, as discussed in Section 3.5.2. Express bus service to Downtown from Kapolei, Waipahu, etc. will continue to operate until the Downtown Station opens. Park-and-ride facilities and bus transit centers will open at about the same time as the stations they serve, although park-and-ride capacity and bus service may be lower at first, growing over time with demand. As each station opens, temporary signage will be installed that provides driving directions to available parking (if provided) and to passenger drop-off and pick-up locations. Signage will also direct pedestrians and bicyclists to station entrances.

Phasing will not affect construction methods but will affect the areas that will be disturbed at any specific time. The MOT Plan and the TMP will be developed for the different construction phases to minimize effects to the traveling public.

Transit Mitigation Program

The TMP will define adjustments that will mitigate the effects of construction on existing bus and TheHandi-Van service and will be customized for each construction phase and sized to properly serve projected rider demands.

In some construction phases, parallel bus routes on roads not directly affected by construction may experience an increase in service to accommodate rider demand shifted from affected bus routes. Public information and outreach will be conducted to influence current and prospective transit rider behavior.

The TMP will consider the following factors in determining required bus route service adjustments:

- Minimization of the extent of changes for bus stops and rerouting (if necessary)
- The MOT Plan as it relates to bus routes and pedestrian access to existing or relocated bus stops
- The severity and duration of construction along each corridor section and within each construction phase
- Differences between the scheduled bus route travel time currently operating and the scheduled travel time expected during construction
- The difference between the current travel time for existing traffic and traffic during construction, and whether transit could and should be given temporary traffic priority treatments during construction
- The types of temporary traffic priority treatments for transit that could be provided at a reasonable cost during construction

The TMP will generally maintain existing bus routes and stops. In areas where interruptions are expected, the following approaches may be adopted:

- Relocating bus stops
- Rerouting existing service for short sections where no additional buses are required
- Rerouting existing service for longer segments that require additional buses
- Introducing new services if they operate on different alignments not affected as heavily by construction
- Ceasing operation of routes or portions of routes temporarily and redeploying service hours to parallel routes
- Initiating a public information program to inform transit riders of service changes during construction
- Rerouting school bus routes that will be substantially delayed

3.6 Indirect and Cumulative Transportation System Effects

3.6.1 Indirect Effects

Compared to the No Build Alternative, VMT will decrease islandwide with the Project. As a result, wear and tear on roadways could also decrease, which would reduce maintenance costs. As people shift from private vehicles to the fixed guideway system, the costs associated with building and maintaining parking and other transportation-related public facilities could decrease in some areas. Reduced VMT could also reduce traffic accidents (Jovanis 1986).

As stated in Section 4.19.2, transit-oriented development (TOD) could occur as an indirect effect of the Project. TOD would include high-density land uses located near transit stations. As a result, vehicular, bicycle, and pedestrian traffic in some areas, such as ʻEwa and Kapolei, could increase.

The indirect effect of removing parking spaces to make room for the Project will be that some people who parked in those spaces will either park in another space nearby, will choose another mode to reach their destination, or will not make the trip. The indirect effect of spillover parking around stations will result in an increased demand for existing parking spaces.

3.6.2 Cumulative Effects

Planned extensions to the fixed guideway system are described in Chapter 2 and include extensions to West Kapolei, Salt Lake Boulevard, UH Mānoa, and Waikīkī. These extensions would provide additional transportation benefits beyond those provided by the Project. Other planned transportation projects (see Table 2-4 in Chapter 2) are included in all of the 2030 analyses throughout this chapter. The estimated cumulative effects of building the Project and these extensions are discussed in this section. The planned extensions would be evaluated through a separate NEPA and Hawaiʻi Revised Statues Chapter 343 environmental review process.

Effects on Transit

The planned extensions would further improve transit performance compared to the Project by reducing transit travel times and increasing reliability. Bus system operating expenses also would decrease as more trips would be taken on the guideway and the overall need for transfers to UH Mānoa and Waikīkī would be eliminated.

As a result of the additional stations and destinations covered by the extensions, ridership on the fixed guideway system with the Project and planned extensions would be substantially higher than with the Project alone. As shown in Table 3-29, daily transit ridership is estimated to be 28 percent higher for the Project with the planned extensions compared to the Project. The additional ridership would come from people accessing the fixed guideway system from stations within the 20-mile study corridor, as well as those riders traveling to the extension areas, such as UH Mānoa or Waikīkī.

Table 3-29 Daily Transit Ridership—2030 Planned Extensions

Alternative	Fixed Guideway Boardings
Project	116,300
Project with planned extensions	148,300
% Change from Project	*28%*

Effects on Streets and Highways

As shown in Table 3-30, the planned extensions would reduce VMT, VHT, and VHD compared to the Project alone. The planned West Kapolei and Kapolei Parkway Stations would both have park-and-ride facilities. Neither park-and-ride facility would affect local traffic operations. The East Kapolei park-and-ride facility would be removed when the extension to West Kapolei is completed.

Table 3-30 Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay—2030 Planned Extensions

Alternative	Daily VMT	Daily VHT	Daily VHD
Project	13,049,000	383,800	85,800
Project with planned extensions	12,989,900	381,100	84,400

Other cumulative effects could include removing additional on-street and off-street parking spaces to accommodate the fixed guideway structure, some adjustments to widths of travel lanes, and possible spillover parking effects at stations without park-and-ride facilities. With the extensions, spillover parking effects would be reduced at Project stations as demand would become more dispersed.

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