Honolulu Rail Transit Project – East Kapolei to Ala Moana Center

Case for the Project

Project Characteristics

The Honolulu Rail Transit Project is a proposed 20.5-mile light metro rail line in an exclusive right-of-way. Most of the alignment is elevated above existing arterial roadways. The line includes 21 stations from East Kapolei, in West O'ahu, to Ala Moana Center, located in the Honolulu urban core east of Downtown Honolulu and adjacent to Waikīkī. Year 2030 service is anticipated to operate 20 hours per day, with 3-minute headways in the peak periods and 6-minute headways in the midday. End-to-end travel time is estimated to be 42 minutes. Service will be provided by a mixture of 3-car and 2-car trains. Average weekday rail boardings in 2030 are projected to be about 122,000. A peak hour directional maximum load of 8,100 passengers per hour is anticipated. The project is estimated to cost slightly over $5.0 billion (in Year-of-Expenditure dollars), not including finance charges.

Project Setting – Current Conditions

As shown above, the line serves the urbanized southern shore of O'ahu, a narrow corridor between the Pacific Ocean and two mountain ranges. The corridor is served by only one continuous limited access highway, Interstate H-1, as well as a limited number of multi-lane arterial roadways. The rail line serves key employment centers including Downtown Honolulu, the Pearl Harbor Naval Base, Honolulu International Airport, and Ala Moana Center. Other key employment centers are located within the corridor but beyond the ends of the rail line, including

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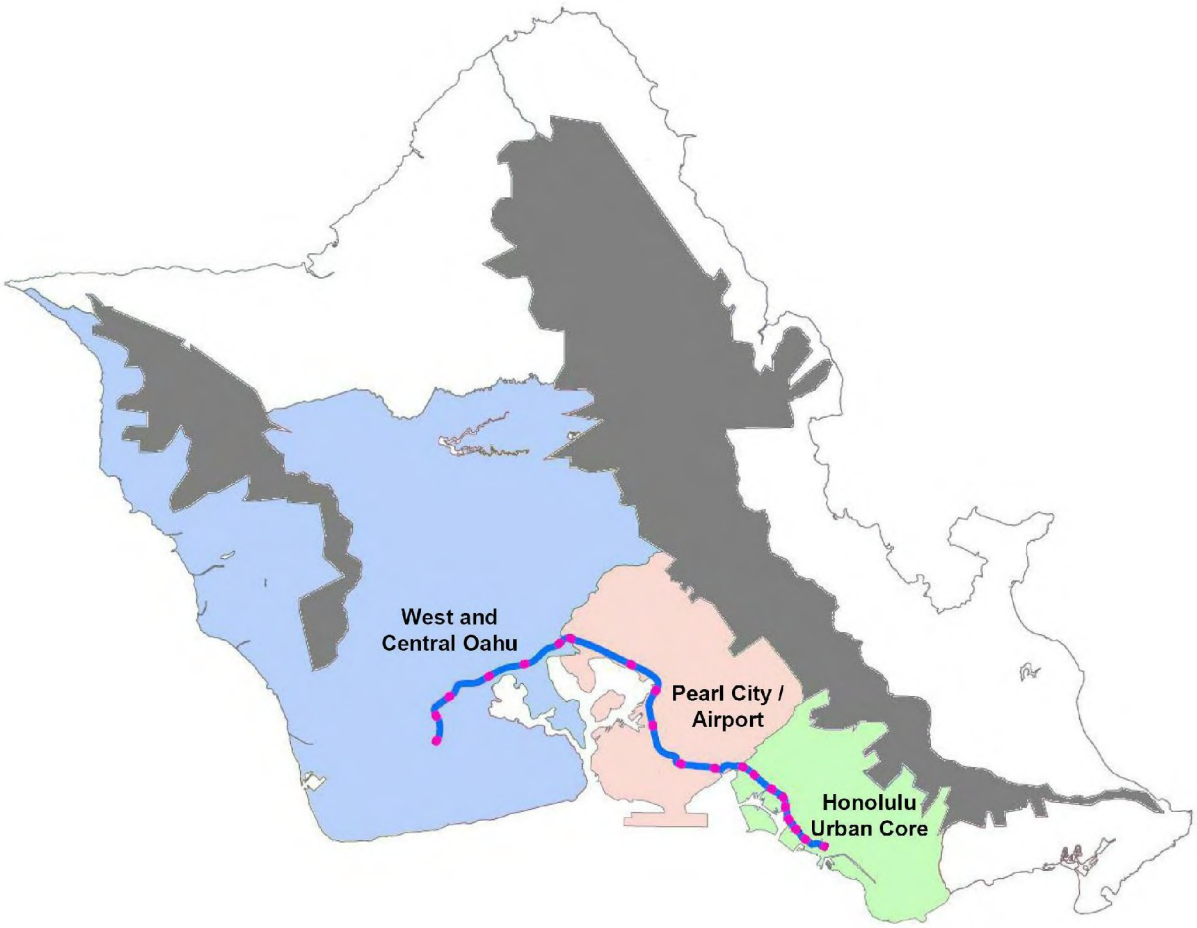
the emerging urban center of Kapolei, to the west of the line, and Waikīkī and the University of Hawai'i at Mānoa, east of the line. These centers are accessed by bus services extended beyond the rail line.

Because of the constrained topography of O'ahu, trips in the corridor not only include those with origins and destinations along the southern shore of the island but also trips originating in, or destined for, the Wai'anae coast, west of the Wai'anae Range, and Central O'ahu, between the Wai'anae and Ko'olau Ranges. Other than trips internal to these areas, trips to and from these locations are funneled into the corridor along the southern shore. The area served by the rail line includes three different travel market areas. These include West and Central O'ahu, Pearl City / Airport, and the Honolulu Urban Core, as shown below.



These three travel market areas contain, today, a population of about 680,000, about 77 percent of O'ahu's total. About 40 percent of this population is in the Honolulu Urban Core, about 40 percent is in West and Central O'ahu, and about 20 percent is in the Pearl City / Airport area. These markets also include about 440,000 employment opportunities, about 88 percent of O'ahu's total. Over 60 percent of this employment is in the Honolulu Urban Core.

Over 90 percent of islandwide current weekday person trips have at least one end in these three travel market areas, with 81 percent of all person trips occurring within or between these market areas. Current weekday linked transit trips number about 180,000. Over 95 percent of these have at least one end in the three market areas on the west and south side of the island, with 81

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percent of all transit trips occurring within or between these market areas. The largest current transit market is trips within the Honolulu Urban Core, accounting for about 47 percent of all transit trips. The next largest market is trips from the West and Central O'ahu and Pearl City / Airport areas to the Honolulu Urban Core, accounting for about 15 percent of transit trips.

Current trips within the Honolulu Urban Core are relatively short. The average work trip within the Urban Core is about 2.85 miles. The peak period travel time for this trip via an automobile is about 7.4 minutes. For the same average trip the peak period travel time via transit is about 29.9 minutes. Trips into the Honolulu Urban Core from West and Central O'ahu and Pearl City / Airport, on the other hand, are much longer. The average distance for this work trip is about 17.9 miles. The peak period travel time via an automobile is about 54 minutes (for an average travel speed of about 20 mph) while the peak period travel time via transit, for the same trip, is about 95 minutes.

Anticipated Future Conditions

O'ahu's population is expected to grow by about 240,000 by 2030. This growth is anticipated to occur almost entirely in West and Central O'ahu (68 percent of the growth) and the Honolulu Urban Core (28 percent of the growth). While the population growth in West and Central O'ahu will primarily occur in currently undeveloped areas, the growth in the Honolulu Urban Core will involve redevelopment and densification, particularly in the Kaka'ako area immediately east of Downtown and in Downtown Honolulu itself. Both areas are directly served by the rail line.

O'ahu's employment opportunities are expected to grow by about 130,000 by 2030. This growth is anticipated to occur in West and Central O'ahu (53 percent of the growth), in the Honolulu Urban Core (37 percent of the growth), and in Pearl City / Airport (9 percent of growth).

A considerable investment in highway capacity improvements is expected by 2030, nearly $3.2 billion (in 2005 dollars). This investment will help the highway system accommodate increased demand, but increases in congestion still are expected. The average automobile travel time for a peak period work trip into the Honolulu Urban Core from West and Central O'ahu and Pearl City / Airport is expected to increase to about 58.6 minutes from its current 54 minutes.

Highway investments will also benefit transit. Specific projects include extension of HOV lanes on H-1 from the Waiawa Interchange to the Makakilo Interchange, a PM contraflow lane on H-1 from the Keehi Interchange to the Paiwa Interchange, and the Nimitz Flyover HOV lanes from the Keehi Interchange to Pacific Street. With these improvements the increase in transit travel times also is only slight, with the average transit travel time for a peak period work trip into the Honolulu Urban Core from West and Central O'ahu and Pearl City / Airport expected to increase to about 98.5 minutes from its current 95 minutes. With a level of transit service similar to today daily transit trips increase to about 226,000 in 2030 from about 180,000 today. As a share of total daily travel, though, transit declines from 5.82 percent to 5.66 percent.

Benefits of Low-Cost Transit Improvements

Providing increased transit service, utilizing the HOV improvements in the highway system, results in some increased transit usage, to about 234,000 daily trips, and a 5.87 percent share of daily travel. The service improvements fall into two categories, the provision of more express service and more frequent limited-stop service utilizing preferential facilities, and an increase in community circulator service connecting to the trunk service at transit centers. The improved service results in about 3.15 million hours of user benefits for 2030 transit patrons, of which

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about 94 percent accrues to trips within and between the three primary market areas. The highest benefits accrue to trips within West and Central O'ahu (1.15 million hours) and to trips from the West and Central O'ahu and the Pearl City / Airport areas to the Honolulu Urban Core (725,000 hours).

Additional Benefits from the Rail Project

Implementation of the Honolulu Rail Transit Project provides additional benefits to 2030 transit patrons. The rail line provides a higher speed and more reliable trunk service along the southern shore of O'ahu than is available with the low-cost transit improvements of the Baseline. The community circulator services provided with the Baseline continue to function effectively by providing connections to the rail line. The transit system with the rail line in place accommodates about 281,000 daily transit trips, a 7.05 percent share of daily travel. The service results in about 20.7 million additional hours of user benefits, with about 95 percent of these benefits accruing to trips using rail. The highest benefits accrue to trips from the West and Central O'ahu and the Pearl City / Airport areas to the Honolulu Urban Core (9.35 million hours), to trips within the Honolulu Urban Core (2.1 million hours), and to trips from West and Central O'ahu to the Pearl City / Airport area (2.0 million hours).

Trips from the West and Central O'ahu and the Pearl City / Airport areas to the Honolulu Urban Core benefit from significantly reduced transit travel times. For "No Build" conditions the average transit travel time for a peak period work trip is expected to increase to about 98.5 minutes from its current 95 minutes. With low-cost transit improvements the average transit travel time would decrease to 93.7 minutes. With the rail project the average transit travel time would decrease to 65.4 minutes, quite competitive with an automobile travel time of 58.6 minutes.

These trips into the Honolulu Urban Core can be further divided into trips destined for areas adjacent to the rail line, many of which can be accessed by walking from a rail station, and trips destined for portions of the Urban Core further away from the rail line, most of which would be accessed by a bus connection from a rail station. These two areas are shown below.

Of the 9.35 million hours of user benefits, about 4.85 million hours accrue to trips destined to areas near to the rail line. About 4.5 million hours accrue to trips destined to areas further from the rail line, including destinations such as Waikīkī and the University of Hawai'i at Mānoa, showing that because of reduced travel times on the rail line benefits accrue even to transit patrons who need to transfer to a bus after egressing the rail system.

Trips from West and Central O'ahu to the Pearl City / Airport area also benefit from reduced transit travel times. For "No Build" conditions the average transit travel time for a peak period work trip is expected to decrease to about 93.4 minutes from its current 94.9 minutes. With low-cost transit improvements the average transit travel time would decrease to 92.6 minutes. With the rail project the average transit travel time would decrease to 54.8 minutes, compared to an automobile travel time of 45.1 minutes.

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Overall average transit travel times with the Honolulu Urban Core will not change significantly from today's average with any of the 2030 transit alternatives. The average transit travel time for a peak period work trip will be about 27.7 minutes with the rail transit system compared to about 29.9 minutes today. Rather than significant travel time savings, the benefits of rail for trips within the Urban Core are in terms of the ease and reliability of using rail, particularly for trips that involve walking to and from rail. Consistent with experience in other cities, it is also likely that additional midday trips will be made because of the convenience and availability of the rail line.

While the benefits to transit patrons described above are significant, the cost to implement the Honolulu Rail Transit Project is also significant. The cost-effectiveness of the project (in 2008 dollars) is estimated at $16.35 per hour of user benefit.

Uncertainties

Future 2030 travel conditions and the effect of the Honolulu Rail Transit Project on them, as described above, depend on a variety of assumptions which may or may not come to pass. These assumptions fall into three primary categories, demographics and land development patterns, investments in highway infrastructure, and the reactions of O'ahu travelers to a new transit mode.

With respect to demographics and land development patterns, the 2030 forecast assumes modest growth in population between now and 2030, less than 1 percent per year. But this may be an overestimate. A lower bound estimate of ridership on the rail line would be to assume today's population level remains unchanged in 2030. The forecast also assumes that much of the growth in population and a considerable portion of the growth of employment will occur in West and Central O'ahu. While considerable residential development has occurred in these areas, to date new employment opportunities have not developed as rapidly. The effect on rail ridership of less employment occurring in West and Central O'ahu than currently assumed can be examined.

With respect to highway infrastructure, as noted earlier, nearly $3.2 billion (in 2005 dollars) of highway improvements are assumed to occur by 2030, resulting in a relatively small increase in congestion in the future compared to today. If these infrastructure improvements are not implemented it is likely that rail transit will be an even more attractive alternative than has currently been assumed.

The addition of a rail line to O'ahu's transit system will have several effects on the type of transit trips that will be made. It will result in more transfers as the shortest travel time will often involve transferring from bus to rail and perhaps to bus again. Riders may be less willing to make these transfers than the travel forecasting models assume. The willingness of O'ahu travelers to use park-and-ride lots is also uncertain since current park-and-ride lots are underutilized. The assumption that secure park-and-ride lots at rail stations with frequent all day service will be well used may be incorrect. Finally, the travel forecast assumes that additional midday trips will be made because of the convenience and availability of the rail line.

Changing assumptions such as those described above result in forecasting a range of possible rail usage levels, from around 90,000 daily rail boardings at the low end to over 150,000 daily rail boardings at the upper end. The current forecast of about 122,000 daily riders in 2030 is near the middle of this range.