Task 8: Deliverable H-1

Packages of Projects and Strategies to Address the Three COTS Project Goals

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Central Oahu Transportation Study

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1.0 INTRODUCTION

1.1 *Purpose of this Alternatives Paper*

The purpose of this paper is to identify and compare the most effective set of strategies and system improvements to improve mobility for Central Oahu. The current *Oahu Regional Transportation Plan 2040* (ORTP) recognized that the single occupant vehicle will remain a major mode of transport; however, "Oahu's growth will result in increasing congestion and longer travel times along already congested roadways such as Interstate Route H-1". Therefore, early in the study three goals were established. These goals were established early in the study at the first public meeting held November 30, 2016.

1. Reduce congestion experienced by travelers in Central Oahu
2. Create easy access to the HART Rail system
3. Create a multimodal system in Central Oahu

1.2 *Commuter Mode Choice*

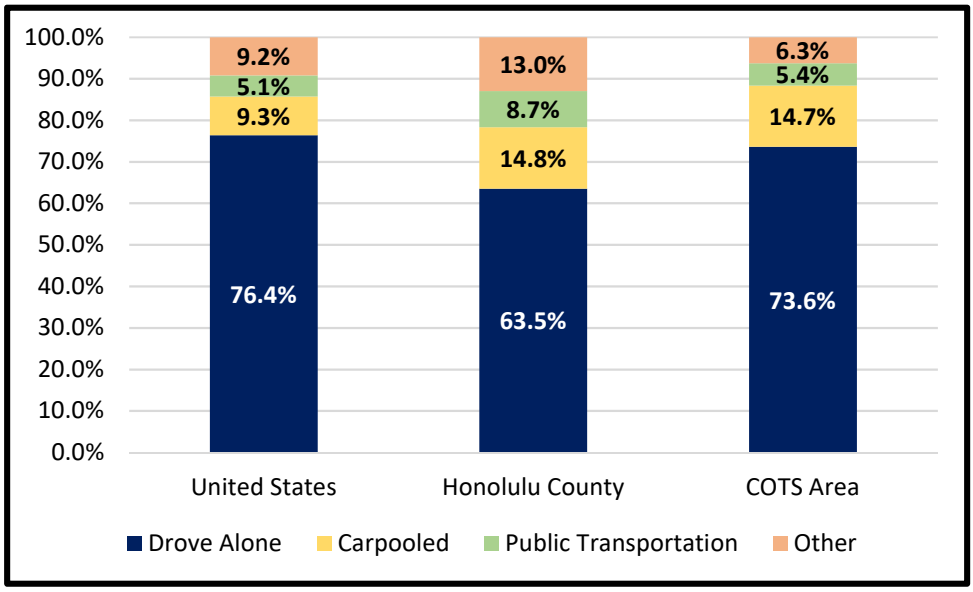
Embedded in the COTS goals is an anticipated shift in mode choice from current levels to the future analysis year 2040. Commuter transportation modal splits for the COTS area are shown in **Figure 1** and **Figure 2**. Both figures present the mode of transportation used to commute to work. Mode choice includes driving alone, driving with others (carpooling), and public transportation. Other commute modes include walking, bicycling, taxi, motorcycle and work at home.

The information presented is based on the United States Census American Community Survey five-year averages for the period 2012-2016. This is the latest data available for individuals 16 years of age and older who are employed. Even though the commute trip to work is about 20 percent of overall daily travel, travel demand during peak commute hours provides the highest degree of congestion and delay. Therefore, the commute trip and mode choice are used to gauge the impact of transportation projects.

Another important element of travel during the peak commute hours is the number of trips made to and from schools and places of higher education. Typically, home-based school trips represent approximately 10 percent of all trips made according to data from the OahuMPO model and other U.S. regions. In addition, many of these trips are made by automobile instead of by walking or bicycling; therefore, they are a substantive component of peak hour traffic. There is limited data for "within" Central Oahu travel or specific mode shares. School travel varies by neighborhood and school. School travelers will benefit from enhanced active transportation networks and reduced auto use.

Figure 1 shows how the COTS area neighborhoods compare to the United States overall and the City and County of Honolulu (Honolulu County) for the top three mode choices of driving alone, carpooling, and public transportation. As shown in **Figure 1**, COTS area neighborhoods are more aligned with the U.S. overall for public transportation use and driving alone than with Honolulu County; but are almost the same for carpooling with Honolulu County.

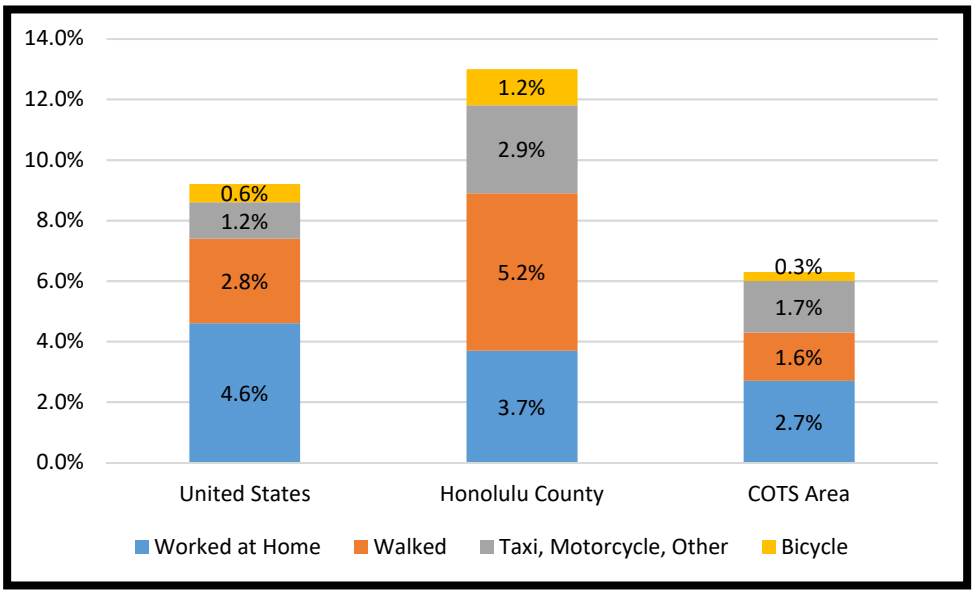
Figure 1. Commute to Work by Mode



Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Figure 2 presents the percentage for the remaining four "other" categories of worked at home; walk; taxi, motorcycle, and bicycling. In the period 2012 to 2016, the COTS neighborhoods with a combined 6.3 percent had a lower overall use of these modes than Honolulu County and the US overall, compared to the US overall with 9.2 percent and Honolulu County overall with 13 percent. This is due to the suburban nature of the COTS area with fewer job opportunities nearby that would enable commuting by walking or bicycling.

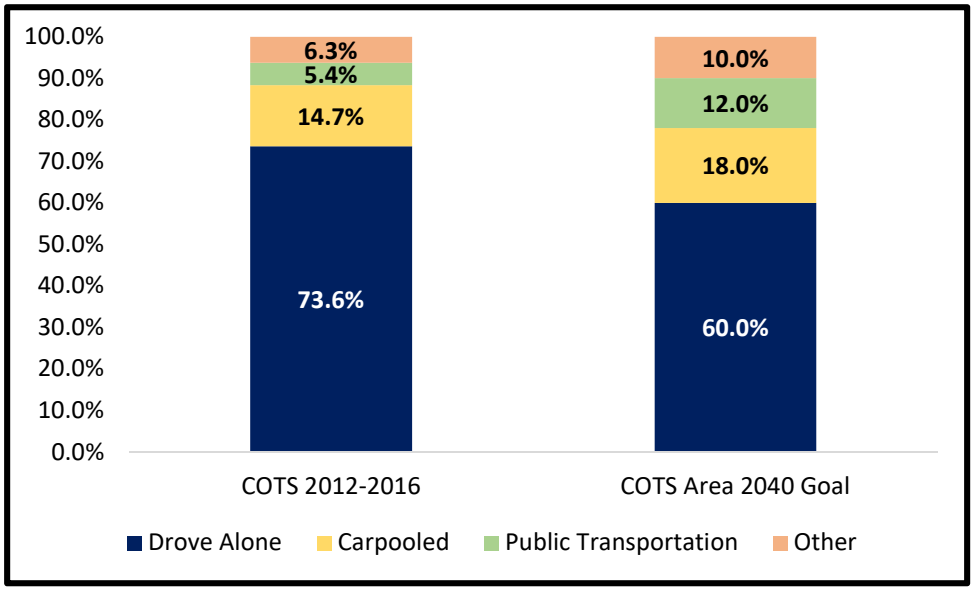
Figure 2. Commute to Work by Other Modes



Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

The COTS recommended projects will encourage a shift in mode choice. This should result in a multimodal transportation system that provides improved and sustainable regional transportation mobility. The COTS team developed an aggressive goal for the commute to work mode choice for the planning year 2040. This was based on professional judgement and research on comparable cities where rail has been recently introduced, such as Seattle. The goals by mode are shown in **Figure 3** alongside the current mode use.

Figure 3. Commute to Work Mode for Current Conditions Compared to COTS Goals



Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates
COTS Consultant Team

In the next 25 years the goal is to have the single occupant vehicle mode drop almost 14 percentage points from 73.6 to 60 percent. To accomplish that goal, the use of carpooling would be incentivized through the use of TDM measures (Project 501.1 to 501.10) that include free real-time online carpool matching, emergency ride home program, and employer-based commuter/parking programs. Carpooling as a mode would increase by 3.3 percentage points and the "Other" category would increase by 3.7 percentage points. The single largest increase is the use of transit which would increase by 6.6 percentage points to 12 percent. This is admittedly a large increase in the choice to use transit to commute to work. However, with the full rail system scheduled for opening in 2025 and the expected planning for extensions to occur and possibly be opened by 2040, this goal of 12 percent transit is within the realm of possibility.

Land use and transportation are closely linked. While Central Oahu is largely considered a "bedroom community," opportunity exists to implement land use changes that focus development to increase density and add mixed-uses around transit centers. These changes would complement and help create modal shifts. The multimodal infrastructure investments being made (i.e., rail) can increase multimodal use and decrease single occupancy vehicle (SOV) use (i.e., driving alone).

As Central Oahu and Leeward Oahu (e.g., Ewa, Kapolei) residential projects are developed, they need to distribute jobs, create multimodal facilities and designs to encourage better mode

distribution than the present. As Oahu implements smart growth strategies such as transit oriented development, the COTS area will benefit from employing similar strategies to increase multimodal accessibility to bus, rail, and active transportation facilities. These strategies will combat the expected increase in congestion resulting from population growth. Rail is anticipated to open in 2025 with interim opening as far as Aloha Stadium by 2021. Opportunities exist for improving the situation for Central Oahu commuters to access that new and time-dependable transportation option.

The following mode split goals were identified as a stretch target. The targets are compared to national averages, Oahu, and to existing splits for Central Oahu in **Table 1**, below.

Table 1. Mode Split COTS Goals Compared to Current Averages

Location	Year	Modal Split						
		SOV	HOV	Transit	Bike	Walk	Taxi/ Motorcycle	Work at Home
COTS Goal	2040	60%	18%	12%	2%	2.5%	2.5%	3%
National Average	2012-2016	76.4%	9.3%	5.1%	0.6%	2.8	1.2	4.6%
Oahu	2012-2016	64%	14.7%	8.4%	1.2%	5.2%	2.8%	3.7%
COTS Area	2012-2016	73%	16%	5%	0.2%	1.8%	1.8%	2.4%

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

1.3 *Packages of Projects and Strategies*

Sections 2.0 through 4.0 identify three packages of projects that would focus on one of the three goals.

- Package One focuses on projects to Reduce Congestion.
- Package Two focuses on projects to provide Access to Rail.
- Package Three focuses on projects to create a Multimodal Transportation system in Central Oahu.

Each section provides a Summary of the Goal, a List of Projects, a Map of the projects, and analyzes the projects against Performance Measures. The section then describes the costs, benefit cost ratios, and implementation and financing issues for each package.

1.4 *Previous Analyses and Reports in the COTS Project*

Most of the work to develop the analyses in this paper were presented in previous reports for the COTS. During the course of the analyses, projects were dropped, added, or altered to better achieve the study goals. **Appendix A** provides an overview of the analyses and shows how projects were carried forward or not selected for further analysis. Details are omitted in this paper so that the focus on packages is succinct and can be easily considered by the readers.

Seven projects were revised and one added during the current effort to develop packages of projects in order to better address the three goals and/or to make them more financially feasible:

1. **Project 101.1 Bus Service Expansion (included in all packages)**
   This project added two new routes, D and 50, to serve the COTS area. The revised project includes all new or revised routes serving the COTS area and the three closest rail stations: Waiawa (Pearl Highlands), Pouhala (Waipahu), and Halaulani (Leeward Community College). The bus routes and their characteristics are described in Section 3: Access to Rail Package. The project will require 59 buses, including spares, and provide 390 weekday service hours, resulting in 136,500 annual hours of bus service. This package does not include the community circulators serving Wahiawa and Mililani/Mililani Mauka as those routes are not expected to change.
2. **Project 102.5: Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd (Included in all packages)**
   This project initially included a 2,000-space parking structure plus a 400-space surface parking lot. This project could be initially constructed with a 1,000-space structure and a 400-space surface lot resulting in a savings of 50% or $62,725,670 in construction costs. This reduced scale project was considered in the analysis of packages of projects.
3. **Project 102.8: Aerial Gondola between Mililani Transit Center and Leeward Community College (Included in all packages)**
   This project was shortened and the number of stations was reduced. The shortened project includes a 5-mile line between the Mililani Transit Center and Leeward Community College with a total of four stations. This results in a savings of 25% or $78,000,000. While some reduction in land and O&M costs would occur, these savings are generally negligible when compared to the overall construction costs or would be relatively small in the case of the aerial gondola annual O&M costs.
4. **Project 201.5: New Pathway connecting Kamehameha Highway at Waipahu Street to Leeward Community College (Included in Package 3, Multimodal System)**
   Project 201.5 provides a dedicated shared use path from the Waipio and Waikele communities to LCC and the future rail system. The alignment for this path could include the Cane Haul Road alignment that begins opposite Kaupu Place and wraps around the Diamond Head end of Waipahu. A bridge over Farrington Highway would be needed to connect to the Halaulani rail station and the adjacent college campus. No safe and convenient active mode connection is currently available between communities on the mauka side of the H-1 freeway to Leeward Community College. This project would expand the bicycle and pedestrian network by roughly one mile. This project combined with Projects 201.1 and 201.4 will complete the regional bike network in this part of the COTS area and provide cyclists with safe access to rail at both the Pouhala and Halaulani stations.
5. **Project 201.8: Bike Pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue (Included in Package 3, Multimodal System)**
   Project 201.8 provides a 1.1-mile separate bike facility on Meheula Parkway across the H-2 interchange to minimize potential vehicle-bicycle conflicts and better connect Mililani Mauka with central Mililani. This creates a crucial multimodal connection between the

existing off-street path that starts at Ainamakua Drive, on the east side of Meheula, and the Mililani Transit Center at Lanikuhana Drive, also on the east side of Meheula. The path could be implemented within the existing right-of-way on the east side of Meheula by widening the existing sidewalk.

The proposed path would require interchange improvements including: possibly cantilevering a structure from the existing parkway overcrossing, modifying the ramp crossings to include additional traffic control devices (e.g., rectangular rapid flashing beacons), and modifying the ramp design to create nearly right-angle turns to slow vehicle speeds and improve visibility of cyclists. The extents of this project were increased from the original concept to connect to the existing off-street pathway at Ainamakua Drive. This project is anticipated to increase mobility through the creation of a new off-street path. This project will have an effect on safety by constructing a pathway to current design standards that formalizes a connection that allows pedestrians and bicycles to avoid travel on adjacent high-speed roadways.

6. **Project 202.3: Bike Lanes on Meheula Parkway between the H-2 Interchange and Kapanoe Street (Included in Package 3, Multimodal System)**
   This project provides a 1.8-mile dedicated bike facility on Meheula Parkway through most of Mililani Mauka to separate vehicles and bicyclists and enhance bicycle travel and safety. Bicycle lanes could be striped in both directions between Lehiwa Street and Kapanoe Street without modifying the vehicle capacity in this corridor. In the eastbound direction, a bicycle lane could also be extended from Ainamakua Drive to Lehiwa Street. However, west of Lehiwa Drive, Meheula Parkway includes three westbound vehicle lanes and an on-street bicycle lane could not be installed without removing one of those vehicle lanes. Given, the importance of encouraging bicycle travel and enhancing safety for cyclists, this project should be further evaluated from a design and capacity perspective to determine feasibility of including bicycle lanes along the entire segment and not just the sections with two travel lanes.

   The length of this project was reduced from the original concept to account for the improved facility as a part of the changes in Project 201.8 that extends the off-street pathway to the existing off-street path at Ainamakua Drive. Ideally, this project should be combined with Project 201.8. This project is anticipated to increase mobility through the reconfiguration of the existing roadway to provide dedicated space for bicycles. This project will improve safety for those who currently share the roadway with vehicles, however not have a significant effect on those less comfortable traveling adjacent to traffic without a physical separation.

7. **Project 407.1, Extend Paiwa Street from north of Lumiana Street to Kamehameha Highway/Ka Uka Boulevard Intersection (Included in Package 1, Reduce Congestion)**
   Paiwa Street currently terminates at the south end of Central Oahu Regional Park and currently no circulation is provided at this location including for bicyclists and pedestrians.

Project 407.1 would extend a road through the park to serve all travel modes including transit.

This project was originally screened out in Deliverable E due to increases in travel time generated by the OahuMPO model and the challenges associated with developing a new standard capacity roadway through an established park environment. Due to local public support, Project 407.1 has been added back and re-analyzed for this report. This project would run through a major regional park and is unlikely to be approved at the federal level due to conflicts with Section 4(f) of the Department of Transportation Act of 1966 (Section 4(f)). Section 4(f) prohibits U.S. Department of Transportation agencies from using land from publicly owned parks "unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such use." As a result, the project would have to be constructed using only state funds.

One project was added to address the project goals by improving multimodal connectivity and access to rail:

- **Project 202.8. Bicycle Lanes on Paiwa Street between H-1 and Waipahu Street (Included in Package 3, Multimodal System)**
  An off-street shared-use path exists along Paiwa Street, from H-1 to Central Oahu Regional Park. Project 202.8 proposes to provide a dedicated bike facility through the park and connecting to Kamehameha Highway. This project would provide an on-street bicycle facility along Paiwa Street, connecting the existing shared-use path to existing and proposed bicycle facilities on Waipahu Street, making connections to additional communities and rail stations. Bicycle lanes can be implemented through the use of a road diet that converts the four-lane travel way into one-lane in either direction with a center, dual, left-turn lane, and bike lanes on each side.

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2.0 PACKAGE ONE: REDUCE CONGESTION

2.1 *Summary of the Reduce Congestion Goal*

The Reduce Congestion goal seeks ways to reduce overall travel time and congestion. Vehicle use, which consists of both SOV and high-occupancy vehicle (HOV) trips plus truck trips carrying freight, represent the mode with the highest proportion of travel for COTS residents, employees and visitors now and through 2040. This is because the COTS area will continue to be a residential-dominant area, even with the planned centers and commercial spaces that create employment included with new master planned development such as Koa Ridge.

Therefore, the Reduce Congestion Package of improvements is designed to minimize congestion and delay, especially for commuters to and from job centers in both the Primary Urban Center (PUC) and in Kapolei, where significant job growth is planned over the next 20 years and beyond.

A key issue for Central Oahu is that most of the significant existing traffic congestion occurs on H-1 east of the H-2 interchange. This is evidenced by the queues that form on southbound H-2 and Kamehameha Highway in the morning as the majority of traffic travels towards the PUC. Typical travel times while schools are in session between Mililani Town Center and top employment destinations for Central Oahu residents are illustrated in **Table 2** below. This information indicates that not only are some travel times lengthy, but times can vary substantially depending on congestion, incidents (i.e., collisions), and construction (where applicable). Lack of reliability is a key issue for drivers traveling from Central Oahu to and through the Primary Urban Center.

Table 2. Existing Weekday AM Peak Period Drive Times from COTS to Major Destinations

From Mililani Town Center to:	Range of Weekday Drive Times (Arriving at 8am)	Range of Weekday Transit AM Peak Travel Times
Leeward Community College	12 to 24 minutes	39 minutes
Kapolei Shopping Center	18 to 28 minutes	46-70 minutes (to Kapolei TC)
Downtown Honolulu (Bishop/King)	35 to 70 minutes	37 to 84 minutes (to Alapai TC)
UH Manoa	45 to 85 minutes	51 to 118 minutes

Source: Google Typical Travel Times on a Thursday morning arriving at 8am at the specified destination (Obtained December 12, 2018). Transit travel times are based on TheBus public schedules.

With the increase in development in the Ewa plain and additional development in Central Oahu, congestion can be managed if a multi-pronged, comprehensive approach is approved by all parties. Congestion management should be addressed through transit, bike/walk, rideshare/carpooling, operations/Intelligent Transportation Systems (ITS), and transportation demand management (TDM) programs. This will require behavior change.

Better balancing travel demand across modes and reducing the reliance on the use of single-occupant vehicle (SOV) trips can help address congestion. A multi-pronged, comprehensive approach is necessary for long-term congestion management throughout Central Oahu. This approach includes transit, bike, walk, rideshare/carpooling, operations/ ITS, and additional TDM strategies such as working from home, alternative work week scheduling, parking fees, and other solutions to keep unnecessary trips from occurring during rush hour times.

The OahuMPO is in the process of updating the Congestion Management Process in 2019. Based on initial coordination with agency partners, the OahuMPO anticipates transit, rideshare/carpooling, operations/ITS, and a variety of TDM strategies to be prioritized through this process.

2.2 *List of Projects in the Congestion Reduction Package*

Congestion can be minimized through the implementation of three strategies:

- Reduce the total number of vehicles on roadways by shifting SOV drivers into vehicles with multiple passengers
- Reduce the total number of vehicles on roadways by shifting SOV drivers onto bus or high-capacity transit vehicles where passenger capacities are much higher than a small car
- Increase vehicle capacity through the addition of expanded or new roadways and/or technology

The first strategy, shift SOV drivers to other vehicles (i.e., carpools), can be accomplished using financial incentives, priority lanes, preferred parking at their destination, and measures that are typically referred to as TDM measures.

The second strategy, shifting SOV drivers to transit, is accomplished when transit service is financially incentivized, travel time reliability is increased, safe and secure, convenient and efficient, and convenient and attractive first-mile/last-mile connections are made between home and work. Expanded bus service and the planned operation of rail transit in 2025, connecting COTS area communities to the Waiawa, Leeward Community College, and Pearl Highlands stations, will be of the utmost importance.

The third strategy is the addition of new travel lanes. This strategy typically receives the most attention from stakeholders, but it is becoming more challenging to achieve due to environmental, fiscal, and sustainability challenges.

The selection of projects in the Congestion Reduction package was based on the individual project benefits and level of investment conducted in previous COTS studies (see **Appendix A**). The projects listed in **Table 3** are expected to have a measurable impact on reducing traffic congestion (regardless of mode) and are recommended for inclusion as a package of improvements. The locations of these projects are shown in **Figure 4**.

Projects considered but not included either had a high anticipated level of investment and/or low benefits. One example of a project that was not included in this package is Project 102.6: HART rail technology between Mililani and Leeward Community College. Given the lower land use densities in the Mililani and Waipio areas (compared to those along the already planned rail line) and the much higher level of investment in this type of high-capacity transit project, the aerial gondola in Project 102.8 was determined to be a more efficient system that would be able to serve comparable ridership at a fraction of the cost.

As mentioned in **Section 1.4**, seven projects were revised and one added during the development of packages of projects to better address the three goals and to make them more financially feasible.

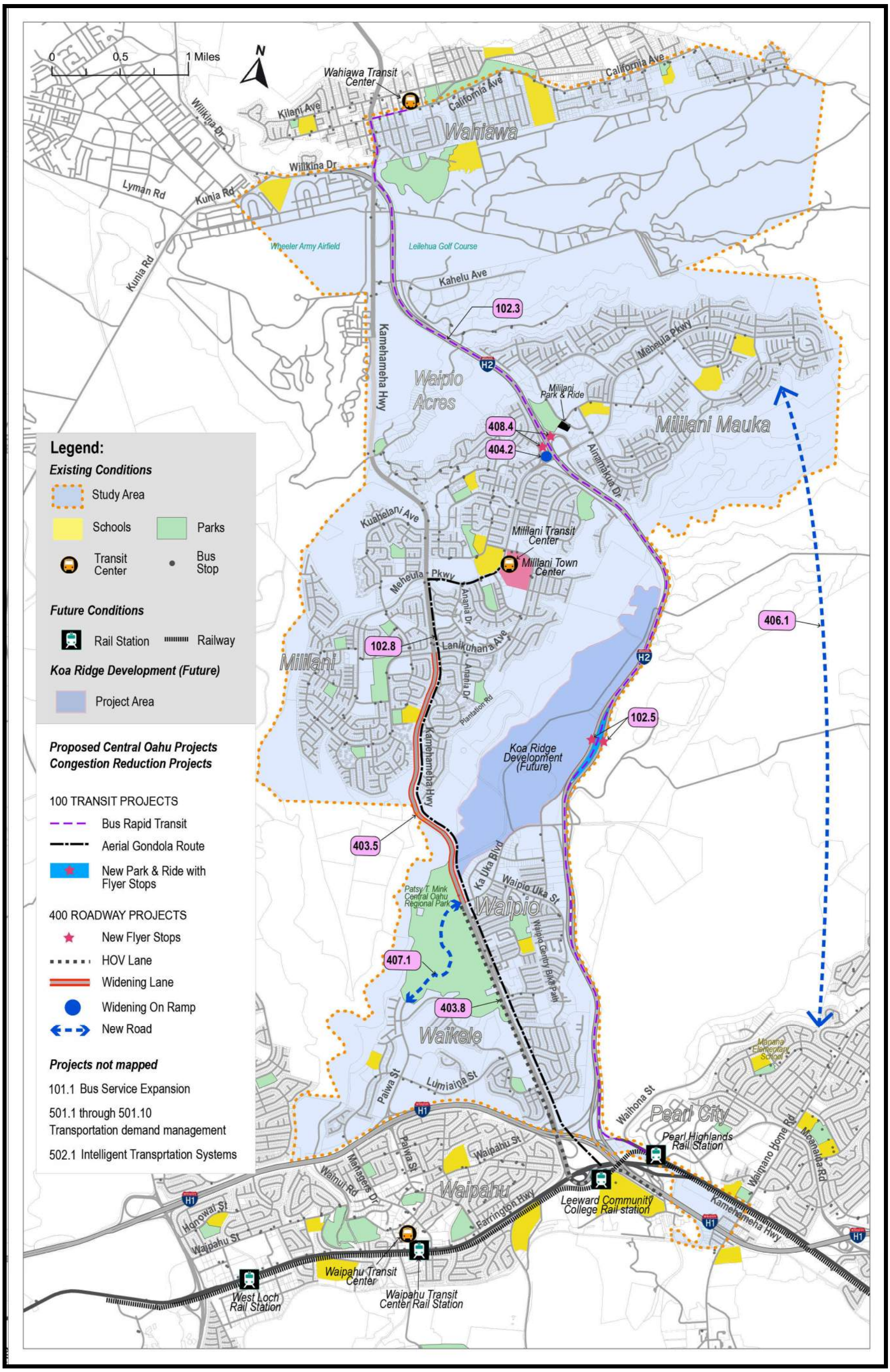
This included three projects in the Reduce Congestion Package: Project 101.1, Project 102.5, and Project 102.8.

Table 3. Projects in the Congestion Reduction Package

Project Number	Project Description	Anticipated Effect on Reducing Congestion	Corridor(s) Served
100 TRANSIT PROJECTS			
101	**GENERAL**		
101.1	Bus Service Expansion	Shift SOV drivers to transit by increasing frequency and convenience	H-2 and Kamehameha Highway
102	**HIGH CAPACITY TRANSIT**		
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	Shifts SOV drivers to transit by providing convenient connection to rail via H-2 HOV lanes	H-2 and Kamehameha Highway
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Shifts SOV drivers from both Koa Ridge and future Waiawa developments to transit by providing convenient connection to rail via H-2 HOV lanes and reduces overall transit travel time	H-2
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	Shifts SOV drivers to transit by providing a convenient and reliable high-capacity connection to rail	H-2 and Kamehameha Highway
400 ROADWAY PROJECTS			
403	**KAMEHAMEHA HIGHWAY**		
403.5	Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	Provides additional north-south capacity through study area as congestion increases on H-2 with future growth and eliminates existing bottleneck	Kamehameha Highway
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	Incentivizes HOV use by prioritizing multi-occupant vehicles in an already congested corridor	Kamehameha Highway
404	**H-2 INTERCHANGES**		
404.2	H-2 & Meheula Pkwy (widen on-ramp)	Provides additional capacity to access H-2 freeway from Mililani Mauka	H-2
406	**CENTRAL MAUKA ROADS**		
406.1	New Road between Mililani Mauka and Pearl City	Reduces demand through Waiawa interchange with H-1 and provides another connection between COTS area and points east	H-2

Project Number	Project Description	Anticipated Effect on Reducing Congestion	Corridor(s) Served
407	**PAIWA EXTENSION**		
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	Improves areawide connectivity and provides a more direct and higher-capacity connection between Kamehameha Highway and H-1	Kamehameha Highway and H-1
408	**MILILANI ACCESS**		
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	Shifts SOV drivers to transit by providing convenient connection to rail via H-2 HOV lanes and reduces overall transit travel time	H-2
500 TRANSPORTATION SYSTEM MANAGEMENT			
501	**TRANSPORTATION DEMAND MANAGEMENT**		
501.1 through 501.10	TDM Package	Required to help with shifting of SOV drivers to carpool, transit, bicycling and walking	All w/in study area
502	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**		
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	Increases system operating efficiency and manages vehicle demand during incidents	All w/in study area

Figure 4. Reduce Congestion Package Projects



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2.3 *How this Package of Projects Performs*

The roadway projects included either provided substantive regional benefits (as in the case of the new road between Mililani Mauka and Pearl City or the widening of Kamehameha Highway at two locations) or improved access to a regional facility (as in the case of the widening of the Meheula Parkway on-ramp to H-2). Implementation of these projects as part of this package would substantially increase corridor capacity and would enhance vehicular mobility and access for the COTS area.

Near the outset of the study, a series of performance measures were identified to determine the level of effectiveness of each project and how it might contribute towards the study's overall goals. The following performance measures are most applicable to this COTS goal.

- **Performance Measure 1**, Change from baseline conditions in AM peak period travel time between specified Origin and Destinations by auto/truck modes (except bike and walk)
- **Performance Measure 2**, Change from baseline conditions in AM peak period transit travel time to major destinations
- **Performance Measure 3**, Number of congested lane miles in Central Oahu
- **Performance Measure 4**, Change from baseline conditions in total AM peak period auto travel time between origins and destinations within the COTS area
- **Performance Measure 6**, Amount of bus/rail transit service
- **Performance Measure 7**, Connectivity to rail transit and frequency of intermodal connections
- **Performance Measure 11**, Contributes to mode split shift away from single-occupant vehicle
- **Performance Measure 20**, Transit shelter availability

Overall, Package 1, Reduce Congestion, would positively address Performance Measures 1, 3 and 4 related to vehicle travel times and congestion, as well as Measure 2, transit travel time (in this case for buses on H-2 and Kamehameha Highway). Specifically, all of the roadway projects combined would contribute to reduced travel times relative to future 2040 baseline conditions with no improvements. Travel times savings to regional destinations would range from less than one minute (traveling to LCC or Kapolei) to six (6) minutes or more to more distant locations (e.g., downtown Honolulu or UH Manoa campus) during the AM peak period. This represents reductions in travel time ranging from less than one percent for some trips to nearly 12% for the longest trips. While these reductions may seem relatively low, they could result in a travel time savings for commuters of roughly 25 hours per year, with additional savings expected to occur during the PM peak period.

Local vehicle mobility would also benefit with combined savings of over an hour for all trips made between local origins and destinations within the COTS area. Savings for individual trips will be less at approximately one to four (4) minutes each, but the increase in roadway capacity and improved connectivity would reduce overall congestion for many travelers. The largest contributors to local travel time savings are Projects 403.5 (Kamehameha Hwy Widening from 3 to 4 lanes) and Project 406.1 (New Road between Mililani Mauka and Pearl City), the latter of which reduces demand on Kamehameha Highway, which is a primary or "backbone" facility

within the COTS area. Project 407.1 (Paiwa Street Extension) will improve connectivity between the Mililani/Waipio communities and Waipahu and reduce demand on Kamehameha Highway makai of Ka Uka Boulevard. This project will enhance access between the COTS area and both the Waipahu Transit Center (with a future rail station), as well with Kapolei where future jobs and the expanding UH West Oahu campus are located.

This package would have mixed results in terms of Measure 11, which calls for shifting SOV use to HOV or non-auto modes. Excessive congestion also stifles freight movement and economic growth in a region, which can affect quality of life, access and safety (e.g., emergency response). Package 1 contains four projects that would improve bus transit service, accessibility to rail, and implement TDM measures that incentivize carpooling, transit, and non-auto travel.

The Reduce Congestion Package will have safety benefits within the study area. The elimination of bottlenecks on Kamehameha Highway and reduced demand on H-2 is expected to result in fewer rear-end collisions that occur with stop-and-go traffic. The inclusion of ITS to provide real-time traffic information and dynamic message signs will alert drivers to incidents in advance and provide travel options to minimize delays and reduce demand in the immediate area of an incident.

The detailed results by project for each applicable performance measure related to reducing congestion are presented in **Table 4**, **Table 5**, and **Table 6**.

Table 4. Performance Measures Applied to Transit Projects in the Reduce Congestion Package

TYPES OF TRANSIT PROJECTS	APPLICABLE PERFORMANCE MEASURES TO REDUCE CONGESTION				
	2	6	7	11	20
101.0 GENERAL					
101.1 Bus Service Expansion		42 added hours	Yes	Yes	
102.0 HIGH CAPACITY TRANSIT					
102.3 Bus Rapid Transit between Wahiawa and Pearl Highlands Station	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	20 added service hours	Yes	Yes	Shelter(s) at each stop/ station
102.5 Park & Ride with Flyer stop in H-2 median mauka of Ka Uka Boulevard	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	14 added service hours	Yes	Yes	Shelter(s) at each stop/ station
102.8 Aerial Gondola between Mililani Leeward Community College Rail Station	LCC=-9 min Kapolei=-9 m PUC=-8 min UH=-8 min	94 added gondola car hours	Yes	Yes	Shelter(s) at each stop/ station

Table 5. Performance Measures Applied to Roadway Projects in the Reduce Congestion Package

TYPES OF ROADWAY PROJECTS	APPLICABLE PERFORMANCE MEASURES TO REDUCE CONGESTION				
	1	2	3	4	11
403.0 Kamehameha Highway					
403.5 Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	LCC = -2 mins Kapolei = -1 mins PUC = -1 mins UH = -1 mins	-2 min	AM = 47 miles PM = 65 miles	-12 min	No
403.8 Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway	LCC = -1 mins Kapolei = 0 mins PUC = 0 mins UH = 0 mins	-3 min	AM = 53 miles PM = 62 miles	-6 min	Yes
404.0 H-2 Interchanges					
404.2 H-2 & Meheula Pkwy (widen on-ramp)	LCC = 0 mins Kapolei = +1 mins PUC = +1 mins UH = +1 mins	-1 min	AM = 57 miles PM = 64 miles	-2 min	No
406.0 Central Mauka Roads					
406.1 New Road between Mililani Mauka and Pearl City	LCC = -4 mins Kapolei = -3 mins PUC = -6 mins UH = -6 mins	-5 to -10 mins	AM = 52 miles PM = 64 miles	-39 min	No
407.0 Paiwa Extension					
407.1 Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	LCC = -1 mins Kapolei = -1 mins PUC = -1 mins UH = -1 mins	-1 min	AM = 55 miles PM = 67 miles	-5 min	No
408.0 Mililani Access					
408.4 New flyer stops at H-2 with pedestrian pathway to Park & Ride					Yes

Table 6. Performance Measures Applied to TDM Projects in the Reduce Congestion Package

TYPES OF TDM PROJECTS	APPLICABLE PERFORMANCE MEASURES TO REDUCE CONGESTION	
	7	11
501.0: Transportation Demand Management	Yes	Yes
502.0: Intelligent Transportation Systems	Yes	Yes

2.4 *Project Development Issues in the Reduce Congestion Package*

The projects in this package do not require a substantial amount of land or right-of-way (ROW) acquisition. The one major exception is the new road between Mililani Mauka and Pearl City (Project 406.1), which would be constructed in an area where no public right-of-way for an arterial roadway is currently available. The new road project would require nearly 44 acres of land to construct depending on the final alignment, and it would need to intersect with one or more roadways in the Pearl City area to connect to another arterial roadway. Two projects would require smaller amounts of land: Project 403.8 (Kamehameha Highway HOV lanes) with less than 4 acres required and Project 102.8 (Aerial Gondola between Mililani Transit Center and Leeward Community College) which could require nominal ROW for support towers that could not be located in the public ROW (e.g., the median of a street). Project 407.1 (Paiwa Street Extension) already includes public right-of-way and the width required to accommodate the proposed section could be dedicated for vehicular and active mode travel.

The projects in the Reduce Congestion Package will require environmental study prior to their approval, funding and construction. Four of the 10 projects (102.3, 403.8, 501.1-10, and 502.1) are expected to be exempt from significant environmental review. Three projects are expected to require an Environmental Assessment (EA) including the two flyer stops in the H-2 median (Projects 102.5 and 408.4) and the widening of the Meheula Parkway on-ramp to H-2 (Project 404.2). Three projects are expected to require a full Environmental Impact Statement (EIS) and in order of increasing complexity these include the widening of Kamehameha Highway from 3 to 4 lanes (Project 403.2), the Paiwa Street extension (Project 407.1), the aerial gondola (Project 102.8), and the new roadway between Mililani Mauka and Pearl City (Project 406.1).

The design complexity and constructability of the projects in the Reduce Congestion package varies. The projects that can be constructed or operated within existing rights-of-way or do not involve significant impacts to existing traffic are those that are expected to be exempt from an EA or EIS. The more complex projects from a construction standpoint include the widening of Kamehameha Highway from 3 to 4 lanes (Project 403.2), the Paiwa Street extension (Project 407.1), the aerial gondola (Project 102.8), and the new roadway between Mililani Mauka and Pearl City (Project 406.1).

The combination of project development features was evaluated previously in this study (see **Appendix A**). Projects were scored based on the length of time expected for design, land acquisition, environmental documentation and mitigation, and construction.

Design: Projects were scored 1 through 5, with 1 representing the most complex design projects while 5 represents the least complex design projects. New roadways or transit projects (e.g., rail, aerial gondola) would have the most lengthy design period and would score a 1.

Land Acquisition: Projects were scored a 0 or a 1 depending if land acquisition for ROW is required. Projects that do not require land acquisition were scored a 1, while those that require land acquisition were scored a 0.

Environmental: The type of documentation required impacts the timing of projects. Projects were scored a 5 if no further environmental documentation is required. Projects were scored a 4 if eligible for both a Categorical Exclusion under NEPA and an Exemption under HRS Chapter 343. Projects were scored a 3 if they are not exempt from the requirements of HRS Chapter 343 but would only require a Categorical Exclusion under NEPA. Projects were scored a 2 if they would require an EA and a 1 if they would require an EIS because this adds the largest amount of time, typically two to three years.

Constructability: Construction complexity and the Maintenance of Traffic (MOT) during construction are important considerations in terms or planning for transportation improvement projects. Projects that are more complex in terms of constructability and MOT generally require a longer construction period and are scored with a 1. Those that require little or no time to implement are scored with a 5.

Projects with the highest total score are expected to require the least amount of time to implement, whereas projects with the lowest total score would likely require the most time to implement. The scoring of projects within the Reduce Congestion Package is summarized in **Table 7**.

The practical implication is that projects with the least environmental study and simplest construction could be implemented sooner while a longer, concentrated level of effort on the more complex package components (contingent upon funding availability and other planning issues) is conducted.

Table 7. Relative Timing for Phases of Projects in the Reduce Congestion Package

Project Number	Project Description	Design	Land Acquisition	Environmental Documentation and Mitigation	Construction	TOTAL SCORE
100 TRANSIT PROJECTS						
101.0	**GENERAL**					
101.1	Bus Service Expansion	5	1	3	5	14
102.0	**HIGH CAPACITY TRANSIT**					
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	5	0	3	5	13
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	2	0	2	3	7
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College Rail Station	1	0	1	2	4
400 ROADWAY PROJECTS						
403.0	**KAMEHAMEHA HIGHWAY**					
403.5	Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	3	1	1	3	8
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	4	0	3	2	9

Project Number	Project Description	Design	Land Acquisition	Environmental Documentation and Mitigation	Construction	TOTAL SCORE
404.0	**H-2 INTERCHANGES**					
404.2	H-2 & Meheula Pkwy (widen on-ramp)	3	1	2	3	9
406.0	**CENTRAL MAUKA ROADS**					
406.1	New Road between Mililani Mauka and Pearl City	1	0	1	1	3
407.0	**PAIWA STREET EXTENSION**					
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	4	1	1	4	10
408.0	**MILILANI ACCESS**					
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	1	1	2	2	6
500 TRANSPORTATION SYSTEM MANAGEMENT						
501.0	**TRANSPORTATION DEMAND MANAGEMENT**					
501.1 thru 501.10	TDM Measures	5	1	3	5	14
502.0	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**					
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	4	1	3	4	12

2.5 *Cost of Projects in the Reduce Congestion Package*

Table 8 presents the cost of projects in the Reduce Congestion Package. Column 3 shows construction cost, and Column 4 shows the total operating cost through 2040. The total package cost would be $612,638,675 for construction and $561,624,894 for up to 21 years of operation (dependent on start of operations as shown in **Table 10**).

Table 8. Construction and Total Cost of Reduce Congestion Package

Project Number	Project Description	Construction Cost	Operating Cost through 2040
100 TRANSIT PROJECTS			
101	**GENERAL**		
101.1	Bus Service Expansion	$159,896,495	$364,332,505
102	**HIGH CAPACITY TRANSIT**		
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	$30,217,600	$27,499,511
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$51,740,000	$7,766,039

Project Number	Project Description	Construction Cost	Operating Cost through 2040
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	$216,450,000	$115,759,343
400 ROADWAY PROJECTS			
403	**KAMEHAMEHA HIGHWAY**		
403.5	Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	$37,901,404	$2,753,445
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	$25,627,138	$4,296,159
404	**H-2 INTERCHANGES**		
404.2	H-2 & Meheula Pkwy (widen on-ramp)	$8,223,342	$1,055,721
406	**CENTRAL MAUKA ROADS**		
406.1	New Road between Mililani Mauka and Pearl City	$56,968,577	$19,528,007
407	**PAIWA EXTENSION**		
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	$10,593,703	$3,593,153
408	**MILILANI ACCESS**		
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$6,909,732	$680,953
500 TRANSPORTATION SYSTEM MANAGEMENT			
501	**TRANSPORTATION DEMAND MANAGEMENT**		
501.1 through 501.10	TDM Package	N/A	$13,662,353
502	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**		
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	$8,110,684	$697,705
	Total Package Construction and Operating Cost	**$612,638,675**	**$561,624,894**

2.6 *Benefit Cost of Projects in the Reduce Congestion Package*

A key metric in evaluating individual projects in this study is the benefit cost (BCA) ratio. BCA measures the total project benefits relative to the total costs (including construction, land, and operations & maintenance). The BCA ratio for all projects was calculated and presented in a previous report (see **Appendix A**). The BCA ratios for projects included in the Reduce Congestion package are shown in **Table 9**.

Table 9. Benefit Cost Analysis of Reduce Congestion Package

Project Number	Project Description	Total Benefit	Total Cost	Benefit Cost Ratio
100 TRANSIT PROJECTS				
101	**GENERAL**			
101.1	Bus Service Expansion	$2,134,994,900	$524,229,000	4.07
102	**HIGH CAPACITY TRANSIT**			
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	$246,029,028	$57,717,111	4.26
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$152,724,771	$59,506,039	2.57
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	$282,650,324	$332,209,343	0.85
400 ROADWAY PROJECTS				
403	**KAMEHAMEHA HIGHWAY**			
403.5	Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	$149,781,500	$40,654,849	3.68
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	$127,985,458	$43,703,836	2.93
404	**H-2 INTERCHANGES**			
404.2	H-2 & Meheula Pkwy (widen on-ramp)	$75,465,147	$9,279,063	8.13
406	**CENTRAL MAUKA ROADS**			
406.1	New Road between Mililani Mauka and Pearl City	$182,137,989	$77,917,996	2.34
407	**PAIWA EXTENSION**			
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	$54,039,483	$14,186,856	3.81
408	**MILILANI ACCESS**			
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$ 3,867,918	$7,590,685	0.51
500 TRANSPORTATION SYSTEM MANAGEMENT				
501	**TRANSPORTATION DEMAND MANAGEMENT**			
501.1 through 501.10	TDM Package	$39,896,247	$13,662,353	2.92
502	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**			
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	$7,566,441	$8,465,269	0.89
	TOTAL	**$3,457,139,206**	**$1,189,122,400**	**2.91**

Table 9 shows that the total benefits and total costs results in the package BCA ratio of 2.91, based on a 3% discount rate for benefits. A BCA greater than 1.0 is considered beneficial.

2.7 *Implementation, Priority, and Financing Issues for the Reduce Congestion Package*

Should the Reduce Congestion package be the preferred improvement package for the COTS area, financial sources will have to be identified. This will represent the primary initial constraint for project implementation. However, the package is structured as to allow development of individual projects including planning, design and environmental review. In some cases, projects with lesser construction complexity and those that are not specifically tied to another system or plan can proceed in advance of others.

The range of project delivery issues among projects within the package means they would be implemented over time. The most effective from a transit and roadway capacity standpoint (aerial gondola and new mauka road) would be built at least 15 years from now, contingent upon on funding and agency priorities.

Table 10 identifies the required coordination within other systems or plans, the desired and likely opening year based on engineering judgement and experience, and near-term actions that can be completed within the next one to three years.

Table 10. Implementation Issues Associated with the Reduce Congestion Package

Project Number	Project Description	Coordination with Other Systems/ Plans	Project Development Step	Step Description	Potential Timing
100 TRANSIT PROJECTS					
101	**GENERAL**				
101.1	Bus Service Expansion	Will be effective immediately but can be implemented incrementally	Planning	Identify routing and stops	2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2022
			Engineering	Purchase add'l vehicles	2023-20241
			Construction	Install stop features/ update website/develop operator and bus assignments	2024-2025
			Operation	Start of Operations	2025
102	**HIGH CAPACITY TRANSIT**				
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	Should be tied to opening of rail project in 2025	Planning	Identify routing, stops etc.	2019-2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2021
			Engineering	Purchase new vehicles	2023
			Construction	Install stop features/ update website	2025
			Operation	Start of Operations	

Table 10. Implementation Issues Associated with the Reduce Congestion Package (cont.)

Project Number	Project Description	Coordination with Other Systems/ Plans	Project Development Step	Step Description	Potential Timing
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Should be tied to opening of rail project in 2025	Planning	Coordinate w/DOT, FHWA, and adjacent property owners	2019-2020
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2021
			Environmental	Conduct EA	2022
			Engineering	Design structure and stops	2023
			Construction	Build facilities	2024-2025
			Operation	Start of Operations	2025
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	Should be tied to opening of rail project in 2025	Planning	Estimate ridership, identify alignment, conduct alternatives analysis,	201920
			Pre. Design	Identify tower and station locations, estimate costs and funding sources	2020-2021
			Environmental	Prepare EIS	2022-2023
			Engineering	Design stations and multimodal connections	2023-2024
			Construction	Build system	2025-2028
			Operation	Start of Operations	2028
400 ROADWAY PROJECTS					
403	**KAMEHAMEHA HIGHWAY**				
403.5	Kamehameha Highway between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	None required but should be open as soon as feasible	Planning	Prepare forecasts and operations analysis	2019-2020
			Pre. Design	Identify bridge widening requirements, estimate costs and funding sources	2021-2022
			Environmental	Conduct EIS	2023-2024
			Engineering	Finalize design	2025
			Construction	Widen bridge and roadway	2026-2027
			Operation	Start of Operations	2028
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	None required but should be open as soon as feasible	Planning	Prepare forecasts and operations analysis	2019-2020
			Pre. Design	Identify transitions/merges, estimate costs and funding sources	2021-2022
			Environmental	Prepare EIS	2023-2024
			Engineering	Finalize design	2025
			Construction	Widen roadway	2026-2027
			Operation	Start of Operations	2028

Table 10. Implementation Issues Associated with the Reduce Congestion Package (cont.)

Project Number	Project Description	Coordination with Other Systems/ Plans	Project Development Step	Step Description	Potential Timing
404	**H-2 INTERCHANGES**				
404.2	H-2 & Meheula Pkwy (widen on-ramp)	None required but should be open as soon as fesible	Planning	Prepare forecasts and operations analysis	2019
			Pre. Design	Design transitions/merges, estimate costs and funding sources	2019-2020
			Environmental	Prepare EA	2020
			Engineering	Finalize design	2021
			Construction	Widen ramp	2021-2022
			Operation	Start of Operations	2023
406	**CENTRAL MAUKA ROADS**				
406.1	New Road between Mililani Mauka and Pearl City	Will require extensive public outreach and coordination with Pearl City stakeholders	Planning	Identify alignment, connections, prepare forecasts and operations analysis	2019-2020
			Pre. Design	Identify connections and footprint, estimate costs and funding sources	2021-2022
			Environmental	Prepare EIS	2023-2024
			Engineering	Finalize design	2025
			Construction	Build new roadway	2026-2027
			Operation	Start of Operations	2028
408	**MILILANI ACCESS**				
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	Should be tied to opening of rail project in 2025 but could be effective immediately	Planning	Coordinate w/ DOT, FHWA and adjacent property owners	2019
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2020
			Environmental	Prepare EA	2021
			Engineering	Design structure and stops	2022
			Construction	Build facilities	2023
			Operation	Start of Operations	2023

Table 10. Implementation Issues Associated with the Reduce Congestion Package (cont.)

Project Number	Project Description	Coordination with Other Systems/ Plans	Project Development Step	Step Description	Potential Timing
500 TRANSPORTATION SYSTEM MANAGEMENT					
501	**TRANSPORTATION DEMAND MANAGEMENT**				
501.1 through 501.10	TDM Package	Will be most effective with rail operating but programs should be implemented incrementally with existing transit service	Planning	Identify measures, phasing, and responsible agencies	2019
			Pre. Design	Develop program details, estimate costs and funding sources	2020
			Environmental	Confirm exemptions	2020
			Engineering	Finalize programs and responsibilities	2020
			Construction	Begin phased program implementation	2021
			Operation	Start of Operations	2022
502	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**				
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	Will be effective immediately but can be implemented incrementally	Planning	Identify sign and signal modification locations, phasing, and responsible agencies	2019
			Pre. Design	Develop design details, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions or prepare EA as needed	2021
			Engineering	Finalize design	2022-2024
			Construction	Install signage and modify signal equipment	2024
			Operation	Start of Operations	2024

3.0 PACKAGE TWO: ACCESS TO RAIL

3.1 *Summary of Access to Rail Goal*

The Access to Rail package identifies those projects that provide the highest degree of dependable service to the three rail stations serving the COTS project area. These stations can take patrons in the direction of Pearl Harbor, town and the University of Hawaii area or towards Kapolei and the University – West Oahu where there are different job centers.

- Waiawa (Pearl Highlands)
- Pouhala (Waipahu)
- Halaulani (Leeward Community College)

This package includes projects that provide COTS area residents more transit options. The mode split goal is to increase transit as a commute mode from 5.4 percent transit (as reported in the 2012-2016 five-year averages shown earlier in **Figure 1**) to 12 percent in 2040.

3.2 *List of Projects in the Access to Rail Package*

Table 11 identifies the 13 projects included in the Access to Rail Package. The goal of this grouping is to improve bus service and add multimodal access while making sure both major corridors (Kamehameha Highway and H-2) have projects with direct access to rail. The package includes bus service expansion, three options for high capacity transit projects, six bike path projects, one roadway project, and two area-wide projects.

Table 11. Projects in the Access to Rail Package

Project Number	Project Name	Anticipated Effect on Rail Access	Corridor(s) Served
100 TRANSIT PROJECTS			
101 GENERAL			
101.1	Bus Service Expansion	Express bus routes will be rerouted to serve rail stations, with more peak period trips. New routes are created to provide new trip connections.	H-2 and Kamehameha Highway
102 HIGH CAPACITY TRANSIT			
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station; truncated at Mililani TC	Provides Wahiawa residents with peak period BRT service to Mililani TC to connect to Gondola to Halaulani.	Kamehameha Highway from Wahiawa Transit Center to Mililani Transit Center
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Provides additional park-and-ride capacity for H-2 corridor with express bus service to Waiawa Station. Provides pedestrian/bicycle access from Koa Ridge.	H-2 Corridor

Project Number	Project Name	Anticipated Effect on Rail Access	Corridor(s) Served
102.8	Aerial Gondola between Mililani and Leeward Community College Rail Station (Halaulani)	Provides direct service to Halaulani Station along Kamehameha Highway corridor.	Kamehameha Highway from Meheula Parkway to Halaulani Station
200 BICYCLE PROJECTS			
201 BICYCLE PATHS (Off-street bicycle facility)			
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	Links the Kamehameha Corridor at Waipahu Street with the Pouhala Rail Station.	Connects to Kamehameha Highway
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	Provides bicycle connection to Pouhala Rail Station in concert with 201.10 or 201.4 and 201.1.	Adjacent to Kamehameha Highway between Anania Drive and the Park
201.4	New Pathway along Kamehameha Highway from Ka Uka Blvd to Waipahu St	In concert with 201.1 provides a bicycle link to Pouhala Rail Station.	Kamehameha Highway between Ka Uka Blvd. and Waipahu St.
201.5	New Pathway connecting Kamehameha Highway at Waipahu St to Leeward Community College	Provides an alternative for bicyclists to connect to the Halaulani Rail Station at Leeward Community College.	Completes bicycle connection along Kamehameha Highway to Leeward Community College
201.7	New Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	Adds a new bicycle connection between Waipio and Waiawa Rail Station (Pearl Highlands).	Passes under H-2.
201.10	Bike Pathway in Central Oahu Regional Park	Provides a bicycle link through the Park to connect with Paiwa Street and the Pauhala Rail Station.	Connects Kamehameha Highway to Paiwa Street through the park.
400 ROADWAY PROJECTS			
408 MILILANI ACCESS			
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	This project increased transit efficiency and provides a safe, separated pedestrian and bicycle crossing of H-2.	H-2 Corridor

Project Number	Project Name	Anticipated Effect on Rail Access	Corridor(s) Served
500 TRANSPORTATION SYSTEM MANAGEMENT			
501 TRANSPORTATION DEMAND MANAGEMENT			
501.1 through 501.10	TDM Package	This package of strategies supports rail access.	COTS areawide
INTELLIGENT TRANSPORTATION SYSTEMS			
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, ramp metering with HOV bypass)	This package of strategies informs drivers about their travel options, including transit and access to rail.	H-2 Corridor

As described in **Section 1.4**, seven projects were revised and one added during the development of packages of projects. This was to better address the three goals and to make them more financially feasible. This included four projects in the Access to Rail Package: Project 101.1, Project 102.5, Project 102.8, and Project 201.5

Projects are described below according to which of three rail stations they access.

A. Travel to Pouhala (Waipahu) Rail Station

The Waipahu Transit Center and Pouhala rail station will be served by four bus routes operating in portions of the COTS area as part of **Project 101.1 Bus Service Expansion**: Route 50, Route 99, Route 103, and Route 433. All buses are 40-foot vehicles with approximately 40 seats. Buses would run at a frequency of every 15 minutes during peak hours and 30 minutes during off-peak hours for the all-day service Routes 50 and 433 and provide a limited number of trips in the peak periods for Routes 99 and 103. Existing and expanded bus routes are shown in **Figure 5**.

- **Project 101.1: Expanded Bus Service**

  Expanded bus service would increase the frequency of service and the total number of trips. This is shown in **Table 12** which provides a description of each route, the area served, and operating characteristics. The operating characteristics includes frequency. The express routes shown in the table (Routes 83, 84, 84A, 96, 98, 99, and 103) provide peak period, peak direction trips only. The trips are one-way inbound to the rail stations in the morning peak period and outbound from the stations in the afternoon peak period. The frequency listed is for a limited number of trips. For example, Route 103 provides two trips that are 30-minutes apart. Note that this table does not include the community circulators currently serving Mililani, Mililani Mauka, and Wahiawa as those routes will not change. Project 101.1 costs and benefits were developed based upon service commencing in 2025 to coincide with the full rail opening. It is acknowledged that some services can be implemented earlier.

Figure 5. Existing and Expanded Bus Routes

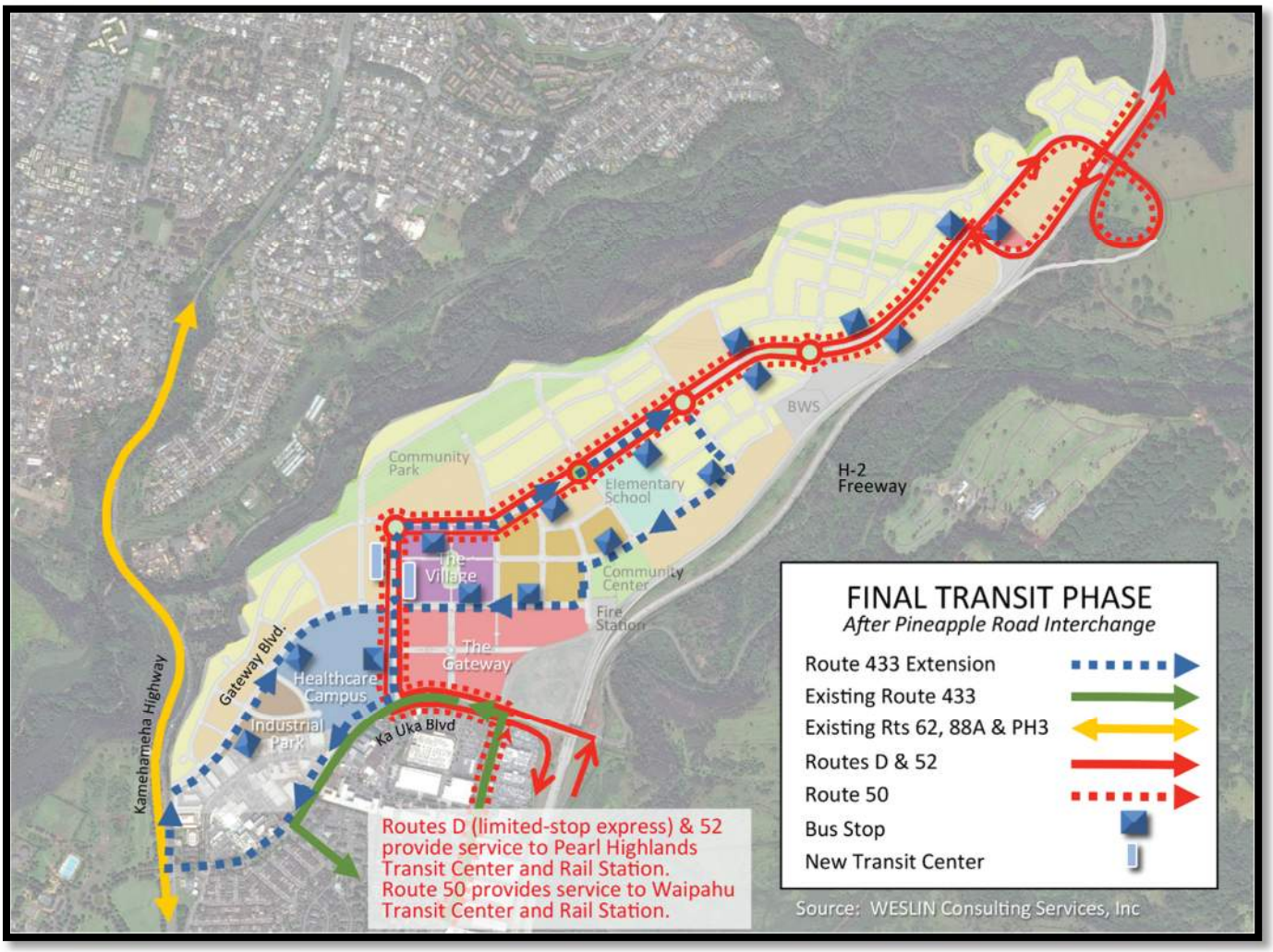

Table 12. Expanded Bus Service Route Descriptions

Route	Number of Roundtrips	Frequency	Communities Served	Transit Centers, Major Stops	Number of Required Vehicles	Vehicle Size
D	48	15-minute peak, 30-minute off-peak	Wahiawa, Mililani Mauka, Koa Ridge	Wahiawa TC, Koa Ridge TC, H-2 Flyer Stops, Waiawa Station	4	40-foot
50	60	15-minute peak and off-peak service	Mililani, Koa Ridge, Waipio, Waikele, Waipahu	Mililani TC, Koa Ridge TC, Waipahu TC	5	40-foot
51	48	15-minute peak and off-peak service	Wahiawa, Mililani, Waipio	Wahiawa TC, Mililani TC, Waiawa via Kamehameha Highway	7	60-foot
52	48	20-minute peak and off-peak service	Haleiwa, Wahiawa, Mililani, Mililani Mauka, Koa Ridge	Haleiwa P&R, Wahiawa TC, Mililani TC, Mililani Mauka P&R, Koa Ridge TC, Waiawa Station	6	60-foot
83	20	15-minute peak period, peak direction	Haleiwa, Wahiawa, Mililani Mauka,	Haleiwa P&R, Wahiawa TC, Mililani Mauka P&R via Flyer Stop, H-2 Median Flyer Stop, Waiawa Station	9	60-foot
84	8	20-minute peak period, peak direction	Mililani	Mililani TC, H-2 Median Flyer Stop, Waiawa Station	3	40-foot
84A	8	20-minute peak period, peak direction	Mililani	Mililani TC, H-2 Median Flyer Stop, Waiawa Station	3	40-foot
96	4	20-minute peak period, peak direction	Waipio	Waiawa Station	2	40-foot
98	4	15-minute peak period, peak direction	Mililani Mauka	Mililani P&R, H-2 Median P&R, Waiawa Station	3	40-foot
99	4	30-minute peak period, peak direction	Wahiawa, Mililani, Waipio, Waikele, Waipahu	Wahiawa TC, Mililani TC, Waipahu TC	3	40-foot
103	2	30-minute peak period, peak direction	Waikele, Waipahu	Waipahu TC	1	40-foot
433	34	30-minute peak and off-peak service	Waipahu, Waipio, Koa Ridge	Waipahu TC, Koa Ridge TC	3	40-foot

- Route 50 will be a new service connecting Mililani Transit Center, Koa Ridge Transit Center, and Waipio neighborhoods with the Waipahu Transit Center. Westbound from Mililani Transit Center the route will operate on Meheula, to the Mililani Mauka Park-and-Ride Lot, returning to H-2 to the new interchange at Pineapple Road, traveling south through Koa Ridge to serve the new Koa Ridge Transit Center, traveling through the new development to Waipio, left on Ka Uka, right on Moaniani, left Waipio Uka, left Lumikula, right Lumiaina, left Managers Drive to right on Hikimoe. This new route will provide 60 round trips.
- Route 99 currently provides two morning peak period and two afternoon peak period trips between Mililani and Kapolei. With the full implementation of rail, this route will add two additional morning and two afternoon peak period trips which will connect Wahiawa TC, Mililani, Waipio, and Waikele with the Waipahu Transit Center where the route will end. Truncating the route in Waipahu, allows for the two additional trips without the need for additional equipment or expense.

- Route 103 currently provides two morning trips and two afternoon trips between Waikele and downtown Honolulu. With the full implementation of rail service, this route will be redesigned to serve the Waipahu Transit Center. Currently the route travels along Lumiaina in Waikele; however, with the introduction of Route 50, this would be redundant service. Therefore, the route would be redesigned to operate on Lumiauau Street, providing new bus service. The route would provide two morning and afternoon peak period trips.

- Route 433 currently terminates in Waipio and will be extended to serve the Koa Ridge Transit Center, traveling through Waipio, and connecting to Waipahu Transit Center. From Waipahu TC, the bus travels right on Mokuola, left on Farrington, left on Paiwa, right on Lumiaina, right on Lumiauau, left on Kamehameha, right on Waipio Uka, right on Moaniani to Kaiser Clinic continuing to Koa Ridge Transit Center via left on Ka Uka right onto Kamehameha Highway, right onto Gateway Boulevard (part of Koa Ridge), and left to the Koa Ridge Transit Center. Route 433 will provide 34 roundtrips.

Four bicycle projects combine to provide two alternative bike path routes to Pouhala rail station from Mililani, Koa Ridge, Waikele, and Waipio neighborhoods. The bike pathways provide safety for intending bicycle users whether for commuting or recreational purposes.

- **Project 201.1: New Bicycle Pathway on Waipahu Street between Paiwa St and Kamehameha Highway**

  This project would include construction of a shared use path on Waipahu Street in Waipahu between Kamehameha Highway and Paiwa Street connecting bicycle facilities to access Pouhala station. The path would be approximately 1.0 mile providing active mode connectivity and safety. Separate bicycle facilities are limited in the southern portion of the COTS area, especially in terms of active mode connections to the adjacent Waipahu community via Kamehameha Highway. Adequate right-of-way appears to be available to

provide a shared use path for most of the length of the proposed improvement. This would help to contribute to expanding the bicycle and pedestrian network by roughly one mile.

- **Project 201.2: New Pathway between Anania Dr and Central Oahu Regional Park**

  This new path could initially follow the existing Plantation Road alignment until it was integrated into the new Koa Ridge community and would link Central Oahu Regional Park to Mililani without requiring use of a private automobile. Separate bicycle facilities are limited throughout the COTS area, and no dedicated bicycle and pedestrian connections connecting the Mililani and Waipio communities. This would help to contribute to expanding the bicycle and pedestrian network by roughly 2.4 miles depending on the final route.

- **Project 201.4: New Pathway along Kamehameha Highway from Ka Uka Blvd to Waipahu St**

  This new path could be incorporated into the Central Oahu Regional Park and would likely be best suited along the Ewa side of the highway. This would help to contribute to expanding the bicycle and pedestrian network by roughly 1.6 miles depending on the final routing. This project combined with Project 201.1 completes the regional bike network in this area and provides a commuting option to the rail system in Waipahu.

- **Project 201.10: Bike Pathway in Central Oahu Regional Park**

  This project provides a dedicated bike facility through the regional park connecting the existing northern terminus of Paiwa Street (north of Lumiauau Street) to Kamehameha Highway at the park entrance (opposite Ka Uka Boulevard). This project includes an off-street shared use path that could be installed by widening the existing meandering sidewalk through Central Oahu Regional Park to its current terminus. A new improved path would installed between the softball fields and Paiwa Street. This project is similar to road Project 407.1, Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection, and could be built instead of Project 407.1 to provide bicycle and pedestrian access to the Waipahu Rail Station.

  Currently, bicyclists must share the internal park roadways and parking lots with vehicles between the park entrance at Ka Uka Boulevard and the eastern side of the softball field complex. The remaining connection to Paiwa Street is unimproved and is essentially a dirt path that is now blocked by a tall gate and fence. This project would allow a more direct and safer connection for bicyclists traveling between the Waipio and Waikele communities; and, would provide another travel option for Waikele residents to access the park via walking and biking. This improvement would add 0.85 mile of pedestrian and bicycle infrastructure to the COTS area and provide a safe bicycling and pedestrian option to Waipahu Transit Center.

The completion of the four bicycle/pedestrian paths provide commuters and recreational users two options to access Waipahu TC from Mililani, Koa Ridge, and Waipio communities. Users can travel through the park to connect at the north end of Paiwa Street to continue to the transit center

via projects 201.2 and 201.10 or continue adjacent to Kamehameha Highway to the Waipahu Street bike path and Paiwa Street via projects 201.4 and 201.1.

B. Travel to Halaulani (Leeward Community College) Rail Station

There are no planned direct bus routes connecting COTS area neighborhoods to the Halaulani rail station or Leeward Community College. Given the location of the campus, travel times via direct bus would be longer than traveling via bus to either the Pouhala or Waiawa rail stations and transferring to rail to access the Leeward Community College. Route 51 which travels from Wahiawa and Mililani along Kamehameha Highway serves a bus stop on Farrington Highway and Waiawa Road which is close to a one-half mile walk to the campus. Route 51 will provide 48 round trips.

Two high capacity transit projects would serve the Kamehameha Highway corridor to Leeward Community College and the Halaulani rail station.

- **Project 102.8: Aerial Gondola between Mililani and Halaulani (Leeward Community College)**

  The lower cost of implementation, reduced construction complexity, and separation from traffic flows make aerial gondola technology a viable and safe alternative for accessing rail. Project 102.8 has been modified in this report to allow a phased implementation, and cost and BCA have been calculated based on this modified project. The initial project will have four stations (compared to the seven at build out). The Mililani station will be at the Mililani Transit Center. Additional stations include Kamehameha Highway and farside of Lanihuhana Avenue (allowing access from the pedestrian crossing located near Anania Drive and Akaku Street), Kamehameha Highway and farside of Waipio Uka, and the terminus at the rail station.

- **Project 102.3: Bus Rapid Transit (BRT) Service from Wahiawa to Mililani TC**

  Project 102.3 has been modified to provide higher-quality bus transit service with some dedicated lanes from Wahiawa to the Mililani TC. Cost and BCA for BRT have been calculated based on the modified project description. Bus routes would be redesigned to operate as BRT services. Approximately 15 hours of additional bus service would be added to take advantage of BRT treatments in the peak periods; however, local routes that serve each stop would need to remain in service for passenger convenience and service area coverage. Providing service to Mililani TC allows passengers to connect to the Aerial Gondola to the Halaulani rail station and Leeward Community College or to express buses that serve the Waiawa rail station.

- **Project 201.5: New Pathway connecting Kamehameha Highway at Waipahu Street to Leeward Community College**

  Project 201.5 provides a dedicated shared use path from the Waipio and Waikele communities to LCC and the future rail system. The alignment for this path could include the Cane Haul Road alignment that begins opposite Kaupu Place and wraps around the Diamond Head end of Waipahu. A bridge over Farrington Highway would be needed to

connect to the Halaulani rail station and the adjacent college campus. No safe and convenient active mode connection is currently available between communities on the mauka side of the H-1 freeway to Leeward Community College. This project would expand the bicycle and pedestrian network by roughly one mile. This project combined with Projects 201.1 and 201.4 will complete the regional bike network in this part of the COTS area and provide cyclists with safe access to rail at both the Pouhala and Halaulani stations.

C. Travel to Waiawa (Pearl Highlands) Rail Station

Peak hour, peak direction, express buses serving the COTS area will be rerouted from Downtown, the University of Hawaii, and Pearl Harbor destinations to the Waiawa rail station where they will terminate. **Project 101.1: Expanded Bus Service** includes express Routes 83, 84/A, 96, and a new revised 98 which will provide the peak period connections to the station. Additional routes will provide all day service to the station and the COTS area. These are Routes D and 52. These routes will serve the transit center as part of the station using the direct access ramp inbound to the station and Kamehameha Highway access to H-2 outbound from the station.

- Route D is a new route serving the Wahiawa Transit Center at California and Cane, traveling to Kamehameha, turning left onto Leilehua Golf Course Road to serve the park-and-ride lot located at the Armory, accessing H-2 south to the Mililani Mauka Park-and-Ride Lot (this diversion would be eliminated with the construction of the freeway flyer stops with accompanying pedestrian bridge to the park-and-ride), returning to H-2 to the new interchange at Pineapple Road, traveling south through Koa Ridge to serve the new Koa Ridge Transit Center, continuing on H-2 to Waiawa Station. Route D will provide 15-minute peak and 30-minute off-peak service with 48 roundtrips.

- Route 52 will be rerouted from its current alignment to the Waiawa Station. The route will serve Haleiwa, Wahiawa, and Mililani along its current route. After serving the Mililani Mauka Park-and-Ride lot the route will access H-2 south exiting at the new Pineapple Road interchange to serve the Koa Ridge Development. The route will return to H-2 via Ka Uka Boulevard and travel to the Waiawa Station via the direct access ramp where the route will terminate. The route will provide 20-minute peak and mid-day service with 48 roundtrips. This described alignment would be altered with the development of Project 102.5. Instead Route 52 would serve the H-2 park-and-ride and continue to the Waiawa Station.

- Route 83 currently provides express peak period trips between Haleiwa (2 am/2 pm trips) and Wahiawa (7 am/7 pm trips) and downtown Honolulu with three trips continuing to the University of Hawaii at Manoa (although all return trips originate in downtown). Route 83 would provide ten am and ten pm trips to/from Haleiwa and a total of 20 am and pm trips serving Wahiawa to Waiawa Station via the H-2 median park-and-ride lot. The 20 peak period trips serving Wahiawa include the 10 trips that continue to or start from Haleiwa.

- Routes 84 and 84A provide peak hour, peak direction service between Mililani Town (upper Mililani and lower Mililani, respectively) and downtown Honolulu. Each route provides four morning and four afternoon trips. These routes would be rerouted to terminate at the Waiawa Station via the H-2 median park-and-ride lot and would provide eight peak period, peak direction trips each, doubling current levels.
- Route 96 currently provides two morning and two evening peak period, peak direction trips between Waipio and downtown Honolulu. This route would be truncated at the Waiawa Station providing four peak period, peak direction trips; doubling current service.
- Route 98 will be totally redesigned to provide new peak period, peak direction service for residents in Mililani Mauka connecting to the Waiawa Station. Mililani Mauka is currently served by community circulator Route 501. Unlike Mililani Town, Mauka residents do not have express route services traversing through the community other than the park-and-ride lot. Route 98 will provide four trips in the morning and afternoon peak periods traveling the 501 alignment then accessing H-2 to travel to the Waiawa Station via the H-2 median flyer stop.

Three projects are identified that will enhance access to the station and provide additional park and ride capacity.

- **Project 102.5: Park & Ride with Flyer Stop in H-2 median mauka of Ka Uka Boulevard**

  This project provides direct access to bus transit routes on the H-2 freeway by utilizing available right-of-way in the freeway median. A Park and Ride facility would be constructed in the freeway median with access ramps in both directions. A shared use bicycle and pedestrian bridge would connect the Koa Ridge development to express bus access as shown in **Figure 6**.

  The full buildout of the project could have 400 surface parking spaces, a five-story parking garage with 2,000 additional parking spaces, and passenger amenities. This project can be phased and is recommended to start with 800 surface parking spaces. As demand builds, the parking structure can be added later. The 800 spaces are included in this package.

- **Project 408.4: New Flyer Stops at H-2 with Pedestrian Pathway to Mililani Mauka Park and Ride Lot**

  This project allows buses traveling on H-2 to serve Mililani and Mililani Mauka passengers without leaving the H-2 right-of-way, saving travel time for both bus operations and passengers. The project would provide two bus-only ramps (mauka and makai bound) connecting to an elevated pedestrian and bicycle path and bridge. The pedestrian and bicycle connection is between the Mililani Mauka park and ride lot and the green space on the Ewa side of H-2, as seen in **Figure 7**.

Figure 6. Conceptual Layout of Park and Ride Facility

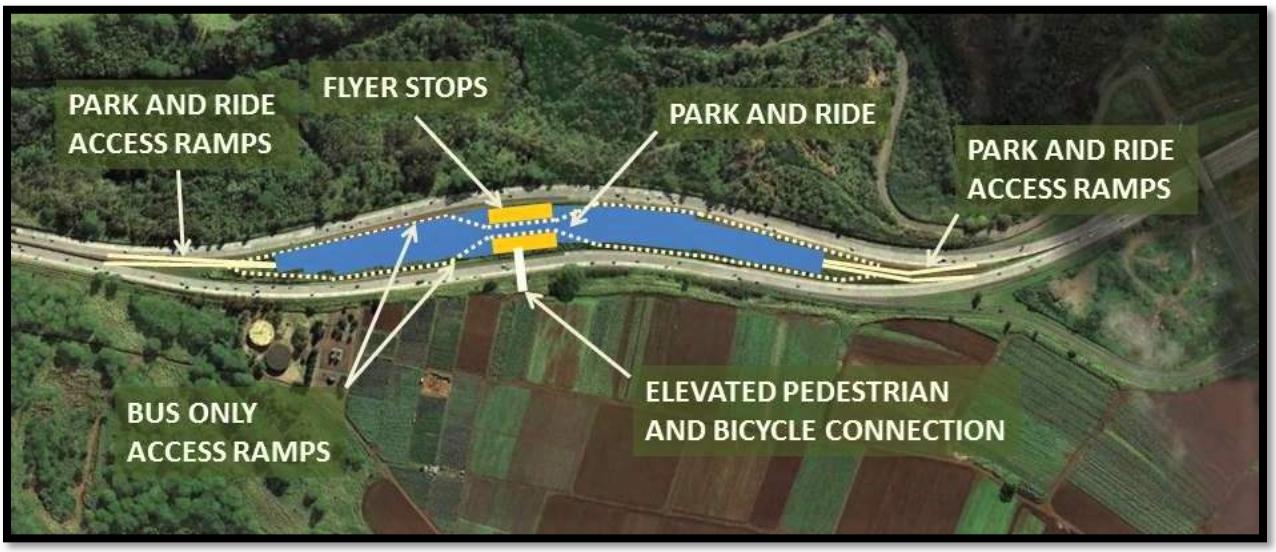

Figure 7. Conceptual Layout of Flyer Stops and Pedestrian Bridge

This project serves as a highly desirable alternative mode link between the two Mililani communities that can also be used for those not accessing bus services. It provides pedestrians and bicyclists an alternative safe pathway across the Meheula Parkway interchange with H-2 which is designed well for vehicle flow but is not friendly to other modes.

Express buses would avoid exiting the freeway and would save the 8 to 10 minutes traversing through the congested intersections to access the park and ride during peak periods. This project gives access to express services that already exist but bypass Mililani without negatively impacting riders that are onboard. Currently North Shore and Wahiawa express buses bypass Mililani. This project would add approximately 1,100 feet of separated pedestrian and bicycle facility to the Mililani/Mililani Mauka network. This link provides a protected crossing of H-2 avoiding on/off ramps and multiple vehicle movements.

- **Project 201.7: New Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station**

  This project includes approximately 1.0 mile of shared use path between the Waipio community at H-2 and the Waiawa Rail Station. No safe and convenient active mode connection is currently available between Waipio and Pearl City. While this project would not complete a link to Pearl City, it would provide a commute and recreational opportunity for residents in Waipio to access the new rail station. The alignment would need to be refined based on topographic constraints (including creek crossings) and it may require use of a portion of Waihona Street to complete the path. This project would help to contribute to expanding the bicycle and pedestrian network by nearly 2.5 miles of facilities.

D. COTS Area-Wide Projects

The COTS identified other projects that provide strategies designed to improve transportation travel through-out the study area. These include TDM strategies to reduce single occupant vehicle travel and support alternative transportation modes for the entire study area and ITS techniques to provide travel time savings for those traveling on the major corridors. Two of these projects were included in this package to provide a complete multimodal strategy.

- **Projects 501.1 through 501.10: Transportation Demand Management Measures**

  Transportation demand management (TDM) techniques that support rail access are employer provided transit passes and preferred parking for vanpools. Programs would provide the marketing, ride matching, and access to services that are necessary to encourage a shift in transportation behavior. The TDM strategies are included in the access to rail package and provide funding for an administrator and staff to support the overall program. Recognized vanpools and carpools can have premium spaces reserved at the Waiawa and H-2 median park-and-ride lots.

- **Project 502.1: Intelligent Transportation Solutions (Real-time traffic info, dynamic signage, adaptive signals, freeway access ramp metering with HOV bypass)**

  This project informs drivers about their travel options, (including alternative driving routes and alternate modes of travel) and expectations for their current trip and travel time. This project includes specific improvements including: phone apps to inform travel choices prior to departure, dynamic message signs along the highway indicating travel time to destinations and time by transit, ramp metering at on-ramps to freeways, adaptive signals on major arterials to maximize traffic flow efficiency and adjust to changing demands. Some of the elements are already being implemented by DOT and DTS, but the level of investment and infrastructure could be increased for these elements in the COTS area.

Locations of projects in the Access to Rail Package are shown on **Figure 8**.

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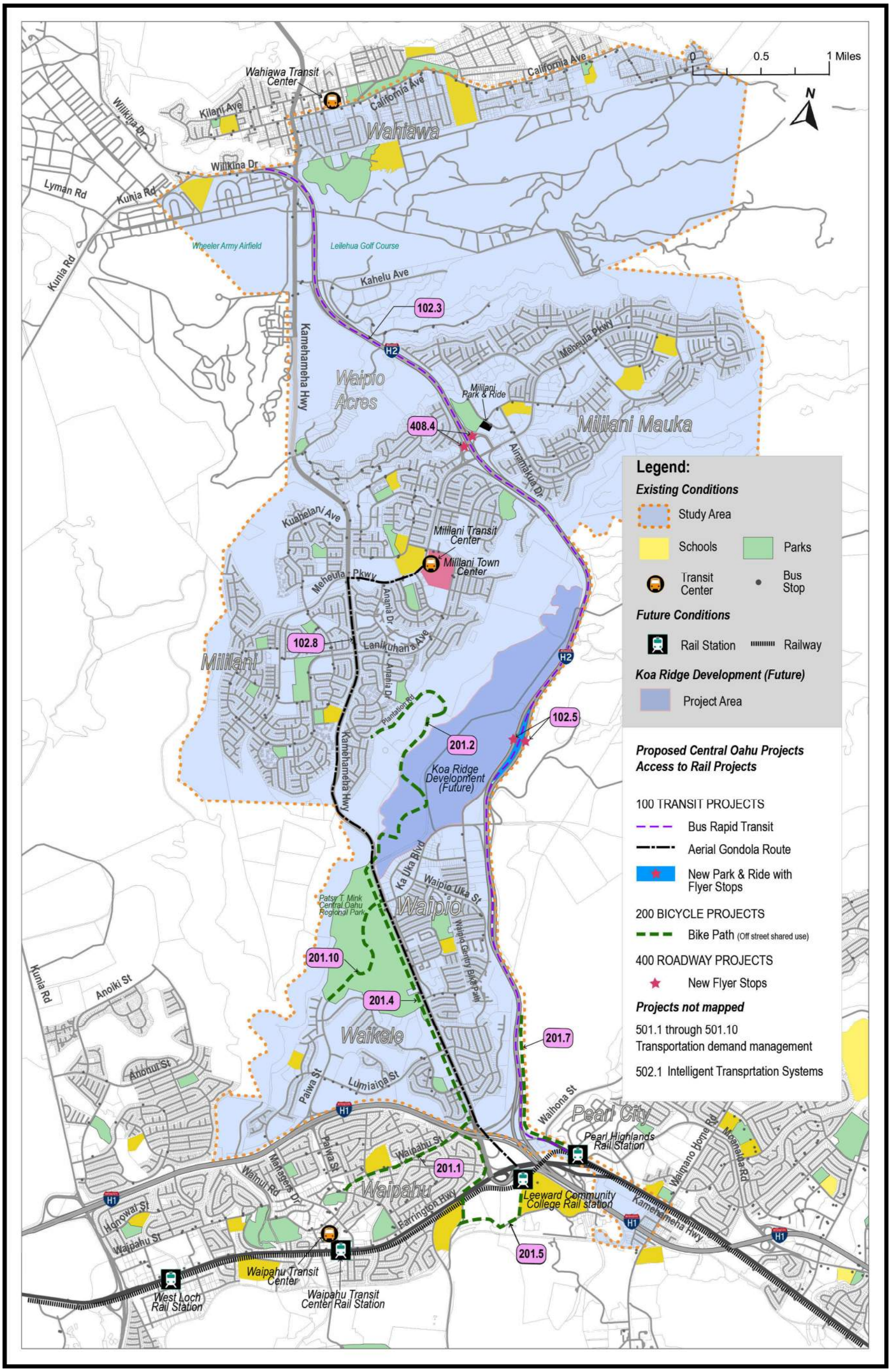
Figure 8. Access to Rail Package Projects



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3.3 *How the Access to Rail Package of Projects Performs*

The highlight for this package is the identification of high-capacity transit projects providing COTS area residents' transit options to provide access to the three rail stations closest to the COTS area. The performance measures applicable to Package 2, Access to Rail, include measures to reduce congestion and improve travel time.

- **Performance Measure 2**, Change from baseline conditions in AM peak period transit travel time to major destinations
- **Performance Measure 5**, Change from baseline conditions in the AM peak period travel time between origins and destinations within the COTS area via biking and walking
- **Performance Measure 6**, Amount of bus/rail transit service
- **Performance Measure 7**, Connectivity to rail transit and frequency of intermodal connections
- **Performance Measure 8**, Amount of pedestrian infrastructure
- **Performance Measure 9**, Amount of bicycle infrastructure
- **Performance Measure 10**, Improvements to existing bicycle and pedestrian system
- **Performance Measure 11**, Contributes to mode split shift away from single-occupant vehicle
- **Performance Measure 18,** Bridges state of good repair
- **Performance Measure 19**, Sidewalk, bikeways, and multi-use path conditions
- **Performance Measure 20**, Transit shelter availability

The implementation of the transit projects to improve access to rail including new or realigned bus routes, freeway bus flyer stops in two locations (adjacent to Mililani Mauka Park-and-Ride and H-2 median), BRT serving Wahiawa, the park-and-ride facility in the median of H-2, and the aerial gondola would encourage residents to shift their mode of travel to transit. These transit projects were analyzed in Deliverable F: Application of Performance Measures and Feasibility Assessment to positively address Performance Measures 2, 6, 7, 11 and 20 as they relate to transit travel as shown in **Table 13**. Performance Measure 18 which is defined as "bridges state of good repair" is added to Project 102.5 since that includes a new pedestrian/bicycle bridge connection.

Table 13. Performance Measures Applied to Transit Projects in the Access to Rail Package

TRANSIT PROJECTS	APPLICABLE PERFORMANCE MEASURES					
TRANSIT PROJECTS	**2**	**6**	**7**	**11**	**18**	**20**
101.0 General Transit Projects						
101.1 Bus Service Expansion	See Tables 14-16	390 added daily revenue bus hours	Yes	Yes		
102.0 High Capacity Transit Projects						
102.3 Bus Rapid Transit between Wahiawa and Pearl Highlands Station	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	20 added daily revenue bus hours	Yes	Yes		Shelter(s) at each stop/ station
102.5 Park & Ride with Flyer stop in H-2 median mauka of Ka Uka Boulevard	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	14 added daily revenue bus hours	Yes	Yes	New ped/ bike bridge	Shelter(s) at each stop/ station
102.8 Aerial Gondola between Mililani Leeward Community College Rail Station	LCC=-9 min Kapolei=-9 m PUC=-8 min UH=-8 min	94 added daily gondola car hours	Yes	Yes		Shelter(s) at each stop/ station

Table 14 shows the current travel times bus riders experience on routes traveling from Wahiawa Transit Center and Mililani Transit Center to four destinations. Travel times are shown inbound to the destinations for the morning or AM Peak and Midday periods. The travel times in the afternoon or PM Peak are for the return trip. Routes 51 and 52 (and connecting Routes C and 40) operate all day, while Routes 83, 84, 84A, 98, 98A, and 99 operate in the peak periods only.

- Kapolei Transit Center – There is one route providing single ride transit services between Wahiawa Transit Center or Mililani Transit Center and Kapolei Transit Center. Route 99 provides two morning peak and two afternoon peak trips. Single transfer trips are shown in the following table combining Routes 51 and 40 and Routes 52 and C for those passengers that travel outside of Route 99 offerings.
- Leeward Community College – Route 51 is the only route providing service close to Leeward Community College. Travel times include an 11-minute walk from or to the Route 51 bus stops on Farrington Highway at Waiawa Road.
- Downtown Honolulu at Alapai Transit Center – The difference in travel times in the afternoon peak as compared to the morning peak period shows how the morning zipper lane reduces travel time.
- University of Hawaii at Manoa – Route 83 provides three morning peak trips to UH Manoa, Route 84 provides one morning peak trip and Route 84A provides two morning peak period trips. None of these routes provide a comparable afternoon peak period trip. All other trip travel times shown include a transfer at either Alapai or Ala Moana Center to Route A to complete the trip to UH Manoa.

Table 14. Transit Travel Times

Bus Routes	Current Travel Time in Minutes											
	Kapolei Transit Center			Leeward Community College			Downtown Honolulu - Alapai TC			University of Hawaii at Manoa		
	AM Peak Period	Midday	PM Peak Period	AM Peak Period	Midday	PM Peak Period	AM Peak Period	Midday	PM Peak Period	AM Peak Period	Midday	PM Peak Period
Wahiawa Transit Center												
51	--	--	--	53	51	62	99	104	118	133	136	161
52	--	--	--	--	--	--	75	75	87	101	106	125
83	--	--	--	--	--	--	45	--	61	60	--	96
99	57	--	64	--	--	--	--	--	--	--	--	--
51 & 40	85	105	88	--	--	--	--	--	--	--	--	--
52 & C	80	85	82									
Mililani Transit Center												
51	--	--	--	39	35	45	84	58	101	118	119	144
52	--	--	--	--	--	--	59	58	69	85	89	107
84	--	--	--	--	--	--	37	--	64	51	--	99
84A	--	--	--	--	--	--	44	--	64	59	--	99
98A	--	--	--	--	--	--	41	--	76	--	--	--
99	46	--	51	--	--	--	--	--	--	--	--	--
51& 40	70	89	71	--	--	--	--	--	--	--	--	--
52 & C	64	68	65	--	--	--	--	--	--	--	--	--

Source: City Department of Transportation Services, TheBus Public Time Tables

Table 15 presents the travel times between rail stations for the three stations serving the COTS area: Pouhala, Halaulani, and Waiawa. The travel times are derived from the HART transit time calculator.

Table 15. Travel Time between Rail Stations

Rail Stations	Travel Time Between Stations (in minutes)		
	Pouhala	Halaulani	Waiawa
Kualakai (East Kapolei)	11	13	14
Keoneae (UHWO)	9	11	12
Honouliuli (Hoopili)	5	7	8
Hoaeae (West Loch)	3	5	6
Pouhala (Waipahu TC)	--	2	3
Halaulani (Leeward CC)	2	--	1
Waiawa (Pearl Highlands)	3	1	--
Kalauao (Pearl Ridge)	7	5	4
Halawa (Aloha Stadium)	10	8	7
Pearl Harbor	12	10	9

Rail Stations	Travel Time Between Stations (in minutes)		
	Pouhala	Halaulani	Waiawa
Honolulu International Airport	15	13	12
Lagoon Drive	17	15	14
Middle Street Transit Center	19	17	16
Kalihi	21	19	18
Kapalama	23	21	20
Iwilei	25	23	22
Chinatown	26	24	23
Downtown	27	25	24
Civic Center	28	26	25
Kakaako	29	27	26
Ala Moana Center	31	29	28

Source: HART Transit Time Calculator

Table 16 shows the estimated travel time from the three COTS area rail stations to the following destinations: Leeward Community College, Kapolei Transit Center, Honolulu Alapai Transit Center and the University of Hawaii at Manoa.

These travel times include wait time between rail and a bus connection, walk time, and bus transit time to the final destination. Connecting bus wait times are estimated at half the bus frequency. If a connecting bus route operates every 15 minutes, the estimated wait time is 7.5 minutes.

- Leeward Community College adds 1-minute to the travel time to walk from the station to the campus
- Kapolei Transit Center adds 7.5-minutes for a connecting bus from the Keoneae Station (University of Hawaii West Oahu), plus an 8-minute bus ride.
- Honolulu at the Alapai Transit center adds an 8-minute walk from the Civic Center Station.
- University of Hawaii at Manoa adds a 5-minute wait for a connecting bus and a 12-minute bus ride to Sinclair Circle.

Table 16. Estimated Travel Time by Rail to Destinations

Destinations	Travel Time from Rail Station in Minutes (peak period)		
	Pouhala	Halaulani	Waiawa
Leeward Community College	3	1	2
Kapolei Transit Center	24.5	26.5	27.5
Honolulu (Alapai TC)	36	34	33
University of Hawaii at Manoa	48	46	45

As shown in **Table 17**, implementation of the bicycle projects positively address Performance Measures 5, 7, 8, 9, 10, 11, and 19. Since the bicycle paths will also be used as pedestrian paths, Performance Measure 8 (amount of pedestrian infrastructure) has been included as a positive impact. A new bike/pedestrian bridge is included in Project 201.5 which provides a positive impact on Performance Measure 18. As noted, all bicycle projects will connect to rail as a stand-alone project or in connection to current facilities or in concert with other identified bicycle path projects. As such, all had a positive impact on Performance Measure 7.

Table 17. Performance Measures Applied to Bicycle Projects in the Access to Rail Package

BICYCLE PROJECTS	APPLICABLE PERFORMANCE MEASURES							
BICYCLE PROJECTS	**5**	**7**	**8**	**9**	**10**	**11**	**18**	**19**
201.0 Bicycle Paths								
201.1 New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	0 min	Yes	1.0 mi	1.0 mi	Yes	Yes		New
201.2 New Pathway between Anania Dr and Central Oahu Regional Park	-18 mins	Yes	2.58 mi	2.58 mi	Yes	Yes		New
201.4 New Bike Pathway along Kamehameha Highway from Ka Uka Boulevard to Waipahu Street	0 min	Yes	1.65 mi	1.65 mi	Yes	Yes		New
201.5 New Ped/Bike Path connecting Kam. Highway at Waipahu Street to LCC Station	0 min	Yes	0.84 mi	0.84 mi	Yes	Yes	New ped/ bike bridge	New
201.7 Bike Pathway on Cane Haul Road between H-2 & Pearl Highlands station	-11 mins	Yes	1 mi	1 mi	Yes	Yes		New
201.10 Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	0 min	Yes	1 mi	1 mi	Yes	Yes		New

Note: All bicycle projects are shown with a "Yes" for PM 7. However, most of these projects will only connect to rail in concert with other bike paths in the package.

Table 18 and **Table 19** show that roadway projects and TDM projects perform favorably within the Access to Rail Package.

Table 18. Performance Measures Applied to Roadway Projects in the Access to Rail Package

ROADWAY PROJECTS	APPLICABLE PERFORMANCE MEASURES	
ROADWAY PROJECT	**11**	**18**
408.0 Mililani Access		
408.4 New flyer stops at H-2 with pedestrian pathway to Park & Ride	Yes	New ped/bike bridge

Table 19. Performance Measures Applied to TDM Projects in the Access to Rail Package

TRANSPORTATION DEMAND MANAGEMENT (TDM) PROJECTS	APPLICABLE PERFORMANCE MEASURES	
TYPES OF TDM & ITS PROJECTS	**7**	**11**
501.1 through 501.10: Transportation Demand Management	Yes	Yes
502.0: Intelligent Transportation Systems	Yes	Yes

Combined this package of projects will positively impact Performance Measure 11 promoting a change in mode split. This package will have safety benefits as people shift their travel patterns away from the single occupant vehicle. The inclusion of ITS will provide real-time traffic information that will allow drivers to alter their travel path to avoid incidents.

3.4 *Project Development Issues in the Access to Rail Package*

The projects in this package do not require a substantial amount of land or ROW acquisition as most are within City or State ROW. Two of the bicycle projects (Projects 201.2 and 201.7) will require land acquisition, approximately 6.7 acres combined. The estimated cost of that land is $240,000 which is included in the project costs. Project 102.8 (Aerial Gondola between Mililani Transit Center and Leeward Community College) could require nominal ROW for any support towers that could not be located in the public ROW (e.g., the median of a street). This would be determined during the design phase of the project.

Access to Rail projects will require a range of environmental study prior to their approval, funding and construction. Nine of the package projects are expected to be exempt from significant environmental review. These include Project 101.1 (Bus Service Expansion), Project 102.3 (BRT), five bicycle path projects (201.1, 201.4, 201.5, 201.7, and 201.10) and the two Transportation System Management Projects 501 and 502.1 (TDM and ITS). Two projects are expected to require an EA, including the flyer stop and park-and-ride in the H-2 median (Project 102.5) and the flyer stops along H-2 at the Meheula Parkway interchange (Project 408.4). Two projects are expected to require an EIS. Project 102.8 (Aerial Gondola) is expected to be more complex than Project 201.2 (new pathway between Anania Drive and Central Oahu Regional Park).

Some projects in this package are able to be implemented sooner which allows for a longer, concentrated level of effort on the more complex package components (contingent upon funding availability and other planning issues).

Generally, the projects that can be constructed or operated within existing rights-of-way or do not involve significant impacts to existing traffic are those that are expected to be exempt from an EA or EIS. The most complex project from a construction standpoint is the aerial gondola (Project 102.8). The range of constructability will allow projects within the package to be implemented over time, with the most effective from a transit capacity standpoint being built later contingent upon on funding and agency priorities. Only Project 102.8 is expected to have a significant impact on traffic during construction.

Projects were scored based on the length of time expected for design, land acquisition, environmental documentation and mitigation, and construction.

Design: Projects were scored 1 through 5, with 1 representing the most complex design projects while 5 represents the least complex design projects. New roadways or transit projects (e.g., rail, aerial gondola) would have the most lengthy design period and would score a 1.

Land Acquisition: Projects were scored a 0 or a 1 depending if land acquisition for ROW is required. Projects that do not require land acquisition were scored a 1, while those that require land acquisition were scored a 0.

Environmental: The type of documentation required impacts the timing of projects. Projects were scored a 5 if no further environmental documentation is required. Projects were scored a 4 if eligible for both a Categorical Exclusion under NEPA and an Exemption under HRS Chapter 343. Projects were scored a 3 if they are not exempt from the requirements of HRS Chapter 343 but would only require a Categorical Exclusion under NEPA. Projects were scored a 2 if they would require an EA and a 1 if they would require an EIS because this adds the largest amount of time, typically two to three years.

Constructability: Construction complexity and the MOT during construction are important considerations in terms or planning for substantive transportation improvement projects. Projects that are more complex in terms of constructability and MOT generally require a longer construction period and are scored with a 1. Those that require little or no time to implement are scored with a 5.

Projects with the highest total score are expected to require the least amount of time to implement, whereas projects with the lowest total score would require the most time to implement. The scoring of projects within the Access to Rail Package is provided in **Table 20**.

Table 20. Relative Timing for Phases of Projects in the Access to Rail Package

Project Number	Project Description	Design	Land Acquisition	Environmental	Construction	TOTAL SCORE
100 TRANSIT PROJECTS						
101.0	**GENERAL**					
101.1	Bus Service Expansion	5	1	3	5	14
102.0	**HIGH CAPACITY TRANSIT**					
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	5	0	4	5	14
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	2	0	2	3	7
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College Rail Station	1	0	1	2	4
200 BICYCLE PROJECTS						
201.0	**BICYCLE PATHS (Off-street bicycle facility)**					
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	3	1	3	5	12
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	3	0	2	5	10
201.4	New Bike Pathway along Kamehameha Highway. from Ka Uka Boulevard to Waipahu Street	3	1	3	5	12
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	3	1	3	5	12
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	3	0	3	5	11
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	3	0	3	5	11
400 ROADWAY PROJECTS						
408.0	**MILILANI ACCESS**					
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	1	1	2	2	6

Project Number	Project Description	Design	Land Acquisition	Environmental	Construction	TOTAL SCORE
500 TRANSPORTATION SYSTEM MANAGEMENT						
501.0	**TRANSPORTATION DEMAND MANAGEMENT**					
501.1 – 501.10	TDM Package	5	1	4	5	15
502.0	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**					
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	4	1	4	4	13

3.5 *Cost of Projects in the Access to Rail Package*

A. *Construction Cost and Operations Cost*

The cost of transportation projects is a combination of the resources, such as land, labor, and materials, expended on the project by the entity providing the project. These costs are agency costs and do not include costs borne by the users of the facility once complete. The following sections provide the construction costs for each project, which includes the land cost for those projects requiring ROW and operating costs for a multi-year project.

Cost assumptions and methodologies were conducted previously in the COTS (see **Appendix A**). The planning level construction costs for the projects identified in this package are summarized in **Table 21**. Column 3 shows construction cost, and Column 4 shows the operating cost through 2040.

The Bus Service Expansion includes the purchase of 118 buses; 49 required for operation of COTS area bus services that connect to rail and 9 vehicles to account for 20 percent spares for a total of 58 vehicles and their replacement after 12 years and is shown in the "construction" column. The total package cost would be $487,496,048 for construction; and $530,922,159 for up to 21 years of operation (dependent on start of operations as shown in **Table 22)**.

Table 21. Cost of Access to Rail Package

Project Number	Project Description	Construction/ Initiation Cost	Operating Cost through 2040
100 TRANSIT PROJECTS			
101 GENERAL			
101.1	Bus Service Expansion	$159,896,495	$364,332,505
102 HIGH CAPACITY TRANSIT			
102.3	Bus Rapid Transit between Wahiawa and Mililani TC	$30,217,600	$27,499,511
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$ 51,740,000	$7,766,039
	Pedestrian/Bicycle bridge from Koa Ridge to Flyer Stop		
102.8	Aerial Gondola between Mililani and Leeward Community College	$216,450,000	$115,759,343

Project Number	Project Description	Construction/ Initiation Cost	Operating Cost through 2040
200 BICYCLE PROJECTS			
201 BICYCLE PATHS (Off-street bicycle facility)			
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	$3,211,096	$167,169
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	$5,900,213	$282,487
201.4	New Bike Pathway along Kamehameha Highway. from Ka Uka Boulevard to Waipahu Street	$4,882,430	$188,320
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	$3,129,252	$117,694
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	$4,150,208	$117,694
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	$2,009,647	$100,041
400 ROADWAY PROJECTS			
408 MILILANI ACCESS			
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$6,909,732	$680,954
500 TRANSPORTATION SYSTEM MANAGEMENT			
501 TRANSPORTATION DEMAND MANAGEMENT			
501.1 – 501.10	TDM Package	----	$ 13,662,353
502 INTELLIGENT TRANSPORTATION SYSTEMS			
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	$8,110,684	$697,705
PACKAGE TOTAL		**$487,496,048**	**$530,922,159**

3.6 *Benefit Cost of Projects in the Access to Rail Package*

A key metric in evaluating individual projects in this study is the BCA ratio, which measures the total project benefits relative to the total costs (including construction, land, and operations & maintenance). The BCA ratio for each project was calculated and presented in Deliverable G, and the BCA ratios for all projects included in the Access to Rail Package are shown in **Table 22**. The combined benefits and costs for the Access to Rail Package is 2.82, based on a 3% discount rate for benefits. As described in Deliverable G, BCA ratio is shown just to 2040. Projects identified for the Access to Rail Package will continue to provide benefits well past 2040.

Table 22. Benefit Cost Analysis of Access to Rail Package

Project Number	Project Description	Total Benefits	Total Cost	BCA Ratio
100 TRANSIT PROJECTS				
101 GENERAL				
101.1	Bus Service Expansion	$2,134,994,900	$524,229,000	4.07
102 HIGH CAPACITY TRANSIT				
102.3	Bus Rapid Transit between Wahiawa and Mililani TC	$246,029,028	$57,717,111	4.26
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$152,724,771	$59,506,039	2.57
	Pedestrian/Bicycle bridge from Koa Ridge to Flyer Stop			
102.8	Aerial Gondola between Mililani and Leeward Community College	$282,650,324	$332,209,343	0.85
200 BICYCLE PROJECTS				
201 BICYCLE PATHS (Off-street bicycle facility)				
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	$12,037,789	$3,378,265	3.56
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	$ 2,579,412	$6,182,700	0.40
201.4	New Bike Pathway along Kamehameha Highway. from Ka Uka Boulevard to Waipahu Street	$ 7,788,842	$5,070,750	1.54
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	$ 6,797,183	$3,246,946	2.09
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	$ 2,727,004	$4,267,902	0.63
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	$ 3,641,248	$2,109,688	1.73
400 ROADWAY PROJECTS				
408 MILILANI ACCESS				
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$ 3,867,918	$7,590,685	0.51
500 TRANSPORTATION SYSTEM MANAGEMENT				
501 TRANSPORTATION DEMAND MANAGEMENT				
501.1 – 501.10	TDM Package	$ 39,896,247	$ 13,662,353	2.92
502 INTELLIGENT TRANSPORTATION SYSTEMS				
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	$ 6,111,841	$8,808,390	0.69
	TOTAL	**$2,901,846,507**	**$1,027,979,172**	**2.82**

3.7 *Implementation, Priority, and Financing Issues*

Financing for the Access to Rail package will be the primary constraint for complete implementation of this package. The Aerial Gondola, H-2 Median Park-and-Ride, and Flyer Stops will require additional environmental studies and funding for construction. Other projects, such as bus service expansion, BRT and bicycle projects, have less implementation complexity and can be started and opened while environmental studies are underway for the major capital projects. **Table 23** identifies the implementation issues associated with the individual projects in the Access to Rail Package.

Table 23. Implementation Steps Associated with Access to Rail Package

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
100 TRANSIT PROJECTS					
101	**GENERAL**				
101.1	Bus Service Expansion	Start immediately with incremental implementation full service by 2025	Planning	Identify routing and stops	2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2022
			Engineering	Purchase additional vehicles	2023-2024
			Construction	Install stop features/update website/develop operator and bus assignments	2024-2025
			Operation	Start of Operations	2025
102	**HIGH CAPACITY TRANSIT**				
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	Should be tied to opening of rail project in 2025	Planning	Identify routing, stops etc.	2019-2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2021
			Engineering	Purchase new vehicles; design bus only (except for right turns) segments	2023
			Construction	Install stop features/ update website	2025
			Operation	Start of Operations	2025

Table 23. Implementation Steps Associated with Access to Rail Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Should be tied to opening of rail project in 2025	Planning	Coordinate w/DOT, FHWA, and adjacent property owners	2019-2020
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2021
			Environmental	Conduct EA	2022
			Engineering	Design structure and stops; ramps and bridge	2023
			Construction	Build facilities	2024-2025
			Operation	Start of Operations	2025
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	Should be tied to opening of rail project in 2025	Planning	Estimate ridership, identify alignment, conduct alternatives analysis,	2019-2020
			Pre. Design	Identify tower and station locations, estimate costs and funding sources	2020-2021
			Environmental	Prepare EIS	2022-2023
			Engineering	Design stations and multimodal connections	2023-2024
			Construction	Build system	2025-2028
			Operation	Start of Operations	2028
200 BICYCLE PROJECTS					
201	**BICYCLE PATHS**				
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	None required but should be open as soon as feasible and coordinated with Project 201.2	Planning	Confirm alignment, identify any scheduled roadway or utility work for coordination	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022
			Operation	Start of Operations	2019

Table 23. Implementation Steps Associated with Access to Rail Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	Coordinate with Koa Ridge Development. Should be open as soon as feasible and coordinated with Projects 201.1, 201.4 and 201.10	Planning	Confirm alignment and need for land acquisition, coordinate with Koa Ridge Development and identify any scheduled work impacting project	2019
			Pre. Design	Identify obstacle, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption or Prepare EA or EIS	2020-2021
			Engineering	Finalize design and complete land acquisition as needed	2022
			Construction	Build path	2023-2024
			Operation	Start of Operations	2024
201.4	New Pathway along Kamehameha Highway from Ka Uka Blvd to Waipahu St	None required but should be open as soon as feasible and coordinated with Projects 201.1	Planning	Confirm alignment, identify any scheduled roadway or utility work for coordination	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022
			Operation	Start of Operations	2022

Table 23. Implementation Steps Associated with Access to Rail Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
201.5	New Pathway connecting Kamehameha Highway at Waipahu St to Leeward Community College	None required but should be open as soon as feasible and coordinated with rail opening and Projects 201.1 and 201.4	Planning	Confirm alignment, coordinate with HDOT and identify any scheduled work impacting project	2019
			Pre. Design	Identify obstacles, connections to other bike paths and rail station, estimate costs and funding sources	2020-2021
			Environmental	Conduct EA or EIS	2021-2022
			Engineering	Finalize design	2023
			Construction	Build path and bridge	2024-2025
			Operation	Start of Operations	2025
201.7	New Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	None required but should be open by rail project in 2025	Planning	Confirm alignment and need for land acquisition, identify any scheduled work impacting project	2019
			Pre. Design	Identify obstacles, connections to other bike paths and rail station, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemption or conduct EA/EIS	2021-2022
			Engineering	Finalize design and complete land acquisition as needed	2023
			Construction	Build path	2024-2025
			Operation	Start of Operations	2029
201.10	Bike Pathway in Central Oahu Regional Park	None required but should be open as soon as feasible and coordinated with Project 201.2	Planning	Confirm alignment, identify any scheduled work in Park	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022-2023
			Operation	Start of Operations	2023

Table 23. Implementation Steps Associated with Access to Rail Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
408	**MILILANI ACCESS**				
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	Should be tied to opening of rail project in 2025 but could be effective immediately	Planning	Coordinate w/ DOT, FHWA and adjacent property owners	2019
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2020
			Environmental	Prepare EA	2021
			Engineering	Design structure and stops	2022
			Construction	Build facilities	2023
			Operation	Start of Operations	2023
500 TRANSPORTATION SYSTEM MANAGEMENT					
501	**TRANSPORTATION DEMAND MANAGEMENT**				
501.1 through 501.10	TDM Package	Will be most effective with rail operating but programs should be implemented incrementally with existing transit service	Planning	Identify measures, phasing, and responsible agencies	2019
			Pre. Design	Develop program details, estimate costs and funding sources	2020
			Environmental	Confirm exemptions	2020
			Engineering	Finalize programs and responsibilities	2020
			Construction	Begin phased program implementation	2021
			Operation	Start of Operations	2022
502	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**				
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	Will be effective immediately but can be implemented incrementally	Planning	Identify sign and signal modification locations, phasing, and responsible agencies	2019
			Pre. Design	Develop design details, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions or prepare EA as needed	2021
			Engineering	Finalize design	2022-2024
			Construction	Install signage and modify signal equipment	2024
			Operation	Start of Operations	2024

4.0 PACKAGE THREE: MULTIMODAL SYSTEM

4.1 *Summary of the Create a Multimodal Transportation System Goal*

The proposed Multimodal Package combines projects that are deemed most appropriate for creating a multimodal transportation system in the COTS area. The goal of multi-modalism is to enable a mode shift away from SOV travel and towards healthier and more sustainable transportation modes such as active transportation (e.g., walking and bicycling) and mass transit (e.g., bus, rail, HOV). Modal split goals, as shown in **Table 24**, have been set that strive for an increase in sustainable transportation and reduction in SOV thereby helping to reduce congestion on the roads. Increasing multimodal access will also provide alternatives for completing the "first/last mile" access to rail stations that is key for individual's transit use.

Table 24. Modal Split Targets

Location	Year	Modal Split						
		SOV	HOV	Transit	Bike	Walk	Taxi/ Motorcyle	WAH
COTS Goal	2040	60%	18%	12%	2%	2.5%	2.5%	3%
National Avg.	2016	76.4%	9.3%	5.1%	0.6%	2.8	1.2	4.6%
Oahu Islandwide	2012-2016	64%	14.7%	8.4%	1.2%	5.2%	2.8%	3.7%
COTS Area	2012-2016	73%	16%	5%	0.2%	1.8%	1.8%	2.4%

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

4.2 *List of Projects in Multimodal System Package*

Projects were selected that integrate into the existing transportation system bus transit centers, dedicated bicycle facilities, and comprehensive sidewalk network along roadways in newer communities (i.e. Mililani) as well as in commercial areas in older communities (i.e. Waipahu and Wahiawa). Projects included in the Multimodal Package are shown in **Table 25**. A map of existing and proposed multimodal facilities in and around the COTS area can be found on **Figure 9**.

Table 25. Projects Included in the Multimodal System Package

Project Number	Project Description	Rationale	Corridor(s) Served
100 TRANSIT PROJECTS			
101 GENERAL			
101.1	Bus Service Expansion	Improve upon an existing high-use transit ridership.	H-2 and Kamehameha Highway
102 HIGH CAPACITY TRANSIT			
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	Increase transit capacity independent of vehicle travel flow conditions.	Kamehameha Highway from Wahiawa Transit Center to Mililani Transit Center
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Improve upon a transportation network to give faster access to transit	H-2
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	Increase transit capacity independent of vehicle travel flow conditions.	Kamehameha Highway from Meheula Pkwy to Halaulani Station
200 BICYCLE PROJECTS			
201 BICYCLE PATHS (Off-street bicycle facility)			
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	Improve upon the existing bicycle network by providing off-street facilities where space exists	Connects to Kamehameha Highway
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	Improve upon the existing bicycle network by providing off-street facilities where space exists	Adjacent to Kamehameha Highway
201.4	New Bike Pathway along Kamehameha Hwy. from Ka Uka Boulevard to Waipahu Street	Improve upon the existing bicycle network by providing off-street facilities where space exists	Adjacent to Kamehameha Highway
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	Improve upon the existing bicycle network by providing off-street facilities where space exists	Completes bicycle connection along Kamehameha Highway to LCC

Table 25. Projects Included in the Multimodal System Package (cont.)

Project Number	Project Description	Rationale	Corridor(s) Served
201.6	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	Improve upon the existing bicycle network by providing off-street facilities where space exists	Adjacent to Kamehameha Highway
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	Improve upon the existing bicycle network by providing off-street facilities where space exists	Connects H2 to Pearl Highlands Rail Station
201.8	Bicycle pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue	Improve upon the existing bicycle network by providing off-street facilities where space exists	Completes bicycle connection along Meheula Pkwy from off-street path to Mililani Transit Center
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	Improve upon the existing bicycle network by providing off-street facilities where space exists	Connects to Kamehameha Highway to Paiwa St through the park
202 BICYCLE LANES			
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	Create a network of low traffic/low stress bikeway facilities that may be used for everyday trips around the community, such as to school or shopping.	Extends bicycle access along Meheula Pkwy into Mililani Mauka
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	Create a network of low traffic/low stress bikeway facilities that may be used for everyday trips around the community, such as to school or shopping.	Creates bicycle access into Mililani Makai
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	Create a network of low traffic/low stress bikeway facilities that may be used for everyday trips around the community, such as to school or shopping.	Extends bicycle access along Paiwa Street into Waipahu

Table 25. Projects Included in the Multimodal System Package (cont.)

Project Number	Project Description	Rationale	Corridor(s) Served
203 BICYCLE ROUTES			
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	Create a network of bikeway facilities with signage and pavement markings where separated travel way for bikes cannot be provided that may be used for everyday trips around the community, such as to school or shopping.	Completes bicycle connection on Meheula Pkwy
203.6	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	Create a network of bikeway facilities with signage and pavement markings where separated travel way for bikes cannot be provided that may be used for everyday trips around the community, such as to school or shopping.	Connects to Meheula Pkwy
400 ROADWAY PROJECTS			
403 KAMEHAMEHA HIGHWAY			
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	Improve upon a transportation network with additional capacity.	Kamehameha Highway
408 MILILANI ACCESS			
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	Improve upon a transportation network to give faster access to transit.	H-2
500 TRANSPORTATION SYSTEM MANAGEMENT			
501 TRANSPORTATION DEMAND MANAGEMENT			
501.1	Free Real-Time Online Carpool Matching	To provide easy access to carpool opportunities that can be scheduled in advance for repetitive commute trips or for the less frequent (two to three times a week) or occasional trips.	Islandwide program that includes the COTS Study Area
501.2	Outreach Promotion and Marketing of Alternative Transportation	To provide information about alternative transportation in an easy to access format.	Islandwide program that includes the COTS Study Area

Table 25. Projects Included in the Multimodal System Package (cont.)

Project Number	Project Description	Rationale	Corridor(s) Served
501.3	Emergency Ride Home Program	To provide a ride to commuters at little to no cost if an event occurs that requires the person to leave work early or stay late thereby missing their bus, carpool, or vanpool or other travel mode.	Islandwide program that includes the COTS Study Area
501.5	Employer Based Commuter / Parking Programs	To provide the information and incentives to encourage their employees to use alternative modes or they can provide free parking which encourages driving alone.	Islandwide program that includes the COTS Study Area
501.6	Emerging and Innovative Strategies – Carsharing	To provide an alternative or substitute for private vehicle ownership.	Islandwide program should include the COTS Study Area
501.7	Emerging and Innovative Strategies – BIkesharing	To provide bicycles at multiple stations intended for short trips.	Islandwide program should include the COTS Study Area
501.8	Vanpool Program	To provide access to vanpooling as an alternate mode.	Islandwide program that includes the COTS Study Area
501.9	Support of Working from Home	To identify benefits to employers to have employees work from home either full-time or one or more days a week.	Islandwide policy that includes the COTS Study Area
501.10	Support of Alternate/Shifted Work Hours	To identify benefits to employers and employees to shift work hours to avoid the peak of the peak travel.	Islandwide policy that would include the COTS Study Area

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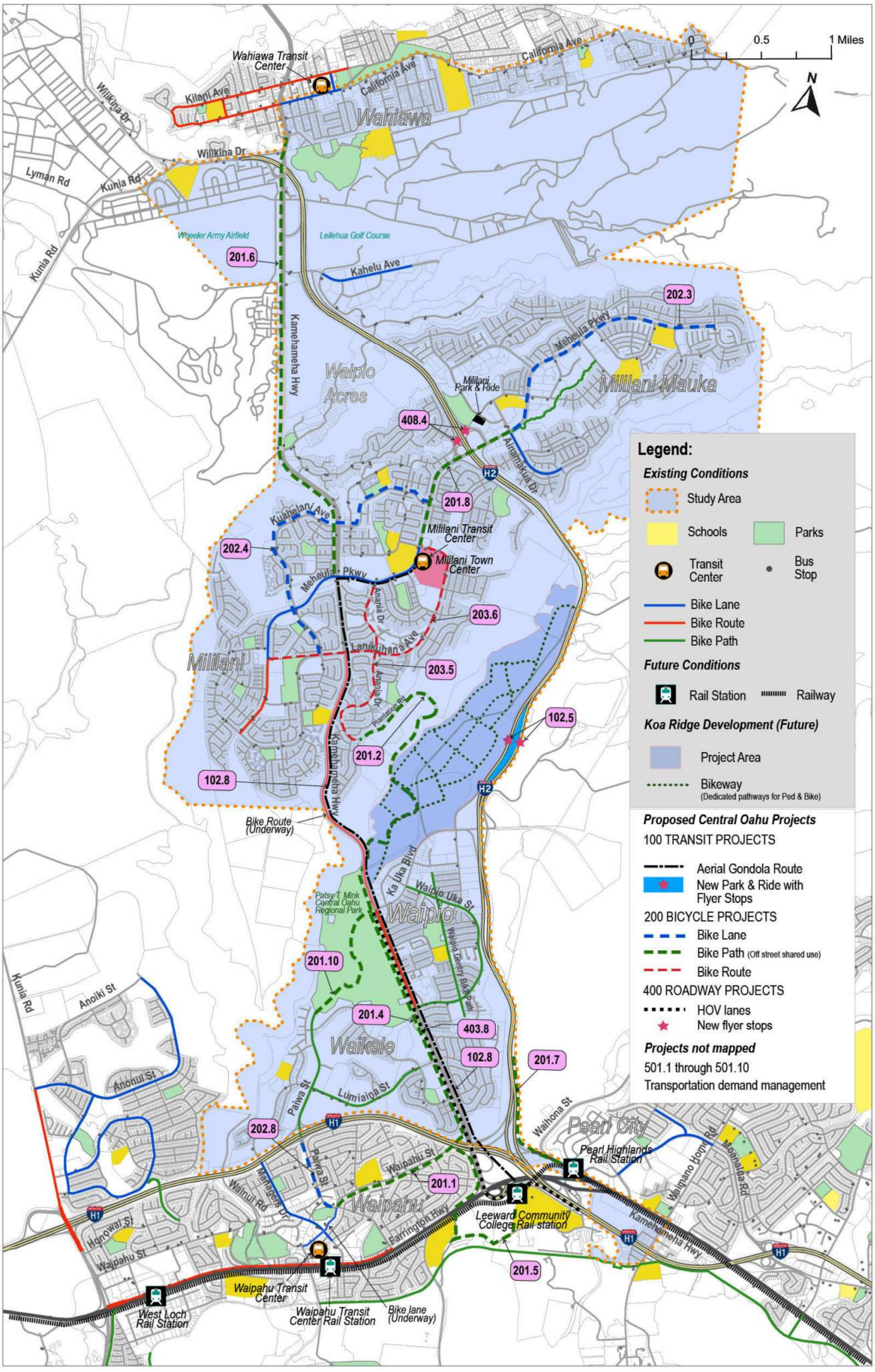
Figure 9. Multimodal Package Projects



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As discussed in **Section 1.4**, seven projects were revised and one project added during the development of packages of projects. Seven of these projects are included in the Multimodal System Package: Project 101.1, 102.5, 102.8, 201.5, 202.3, and 202.8.

Travel within the community makes up the highest percentage of individual's trips. Improved access to transit should result in a reduction in vehicle use, thereby increasing the safety for bicyclists and pedestrians. Significant increase in bicycle use will only come with the completion of a connected network of safe bikeways. This serves to increase livability and health of the community, even if it does not have a significant effect on commuter modal split. With land use changes, increased density, and mixed use development, additional multimodal connectivity within the COTS area will enable a greater shift in modal split. Therefore, new multimodal facilities should be considered for implementation as a requirement of other roadway or development projects, or through the use of active transportation funds, for the benefit of the community as a whole.

A. Transit

Four transit projects are included in Package 3, Multimodal System, for Central Oahu.

- **Project 101.1: Bus Service Expansion**

  Increases the convenience of transit travel through reduced wait and travel times. Service is proposed to the Waipahu Transit Center and Rail Station as well as connecting transit centers in Wahiawa and Mililani with the Pearl Highlands Rail Station.

  While expanded bus service will be beneficial to providing a viable option for Central Oahu residents and employees, this service has limitations in that headways and reliability are directly affected by traffic. Therefore, an increase in bus service would benefit from the construction of Project 408.4. This project is anticipated to increase mobility by making existing bus transit service more accessible and thereby more attractive for users.

- **Project 102.3: Bus Rapid Transit (BRT) Service from Wahiawa to Pearl Highlands Rail Station**

  Project 102.3 has been modified to provide higher-quality bus transit service with some dedicated lanes from Wahiawa to the Mililani TC. This project provides higher-quality bus transit service with some dedicated lanes through the entire COTS area resulting in a direct connection to the future rail system. This includes redesigning some existing bus routes to operate as BRT services. This service would serve approximately 2,050 passengers. BRT treatments would be dependent upon freeway flyer stops and associated pedestrian connections to maintain bus speed. This project is anticipated to increase mobility through the creation of designated bus lanes that increase efficiency and ease of travel. This prioritizes bus travel outside of passenger vehicle traffic thereby increasing people moving capacity.

- **Project 102.5: Park & Ride with Flyer Stop in H-2 median mauka of Ka Uka Boulevard**

  This project provides direct access to bus transit routes on the H-2 freeway by utilizing available right-of-way in the freeway median. A Park and Ride facility would be constructed in the freeway median with access ramps in both directions. A shared use bicycle and pedestrian bridge would connect the Koa Ridge development to express bus access.

- **Project 102.8: Aerial Gondola between Mililani Transit Center and Leeward Community College Transit Station**

  Provides higher capacity grade-separated transit service by way of gondola, between the Leeward Community College and Mililani. This type of system has a system capacity of 800 to 3,000 passengers per hour depending on a variety of operational factors. The project is expected to be phased with the initial terminus located at the Mililani Transit Center, two intermediate stops along Kamehameha Highway, and the other terminus at the rail station. The benefit of the gondola is that it would include stations closer to the population centers in each community (vs bus service along the H-2 corridor), be independent of vehicular travel delay during high-volume periods, and would require less travel time between the stations and residents' homes or employees place of work. This project is anticipated to increase mobility through the creation of a separated travel way to increase people moving capacity without effecting existing vehicle traffic.

B. Bicycle

Thirteen bicycle and multi-use pathway projects are contained in this package.

- **Project 201.1: New Bicycle Pathway on Waipahu Street between Paiwa St and Kamehameha Highway**

  Provides a 1.0-mile dedicated shared use path along Waipahu Street from the southern edge of the COTS area to central Waipahu. From there, access to the Waipahu Transit Center, Rail Station, or Pearl Harbor Bike Path can be more easily made. This project should be combined with Projects 201.5 and 201.10 (both included as part of Multimodal Package). The resultant pathway is anticipated to increase mobility by providing a dedicated space for bicycles and pedestrians that doesn't currently exist. This pathway will improve safety and connectivity by providing a safe, high-comfort off-street connection where only a low-comfort on-street shared road facility is available today.

- **Project 201.2: New Pathway between Anania Dr and Central Oahu Regional Park**

  Provides a 2.4-mile dedicated shared use path connecting the Mililani and Waipio communities. The new path could initially follow the existing Plantation Road alignment until it was integrated into the new Koa Ridge community and would connect link Central Oahu Regional Park to Mililani without requiring visitors to use a private automobile. This

project is anticipated to increase mobility through the creation of a new off-street path, formalizing a connection for bicycles and pedestrians. This pathway will improve safety and connectivity by providing a safe, high-comfort off-street connection where only a low-comfort on-street shared road facility is available today.

- **Project 201.4: New Pathway along Kamehameha Highway from Ka Uka Blvd to Waipahu St**

  This new path could be incorporated into the Central Oahu Regional Park and would likely be best suited along the Ewa side of the highway. This would help to contribute to expanding the bicycle and pedestrian network by roughly 1.6 miles depending on the final routing. This project combined with Project 201.1 completes the regional bike network in this area and provides a commuting option to the rail system in Waipahu.

- **Project 201.5: New Pathway connecting Kamehameha Highway at Waipahu Street to Leeward Community College**

  Provides a 1.0-mile dedicated shared use path from the Waipio and Waikele communities to LCC and the future rail system. A bridge over Farrington Highway would be needed to connect to the LCC rail station and the adjacent college campus. This project should be combined with Project 201.1 (included as part of Multimodal Package). This project is anticipated to increase mobility through the creation of a new off-street path and dedicated bridge. This pathway will improve safety and connectivity by providing a safe, high-comfort off-street connection where only a low-comfort on-street shared road facility is available today.

- **Project 201.6: New Pathway on Kamehameha Hihgway between Wahiawa and Anania Dr in Mililani**

  Provides a dedicated shared use path between the communities of Wahiawa, at the intersection with Kamehameha/Avocado Street, and Mililani, at the intersection with Meheula Parkway/Anania Drive. This project would help to contribute to expanding the bicycle and pedestrian network by roughly 3.4 miles. This project should be combined with Projects 201.2, 201.4, and 201.5 (all included as part of Multimodal Package).

- **Project 201.7: New Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station**

  Provides a 1.0-mile dedicated shared use path between H-2, and the Waipio community, and the Pearl Highlands Rail Station. This provides a commuter and recreational opportunity for residents in Waipio to access the new rail station. This project should be combined with Projects 201.4 and 202.6 (included as part of Multimodal Package) to extend the connection to all of the Waipio community and link it to the Pearl Harbor Historic Trail.

- **Project 201.8: Bike Pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue**

  Provides a 1.1-mile separate bike facility on Meheula Parkway across the H-2 interchange to minimize potential vehicle-bicycle conflicts and better connect Mililani Mauka with central Mililani. This creates a crucial multimodal connection between the existing off-street path that starts at Ainamakua Drive, on the east side of Meheula, and the Mililani Transit Center at Lanikuhana Drive, also on the east side of Meheula. The path could be implemented within the existing right-of-way on the east side of Meheula by widening the existing sidewalk.

  The proposed path would require interchange improvements including: possibly cantilevering a structure from the existing parkway overcrossing, modifying the ramp crossings to include additional traffic control devices (e.g., rectangular rapid flashing beacons), and modifying the ramp design to create nearly right-angle turns to slow vehicle speeds and improve visibility of cyclists. The extents of this project were increased from the original concept to connect to the existing off-street pathway at Ainamakua Drive. This project is anticipated to increase mobility through the creation of a new off-street path. This project will have an effect on safety by constructing a pathway to current design standards that formalizes a connection that allows pedestrians and bicycles to avoid travel on adjacent high-speed roadways.

- **Project 201.10: Bike Pathway in Central Oahu Regional Park**

  Provides a 0.85-mile dedicated bike facility through the regional park connecting the existing northern terminus of the Paiwa Street shared use path (north of Lumiauau Street) to Kamehameha Highway at the park entrance (opposite Ka Uka Boulevard). This project would allow a more direct and safer connection for bicyclists traveling between the Waipio and Waikele communities, and would provide another travel option for Waikele residents to access the park via walking and biking. This project should be combined with Projects 201.2 and 202.8 (both included as part of Multimodal Package). This project is anticipated to increase mobility through the creation of a new off-street path, formalizing a connection for bicycles and pedestrians. This project will have an effect on safety by constructing a pathway to current design standards that formalizes a connection that allows pedestrians and bicycles to avoid travel on adjacent high-speed roadways.

- **Project 202.3: Bike Lanes on Meheula Parkway between the H-2 Interchange and Kapanoe Street**

  Provides a 1.8-mile dedicated bike facility on Meheula Parkway through most of Mililani Mauka to separate vehicles and bicyclists and enhance bicycle travel and safety. Bicycle lanes could be striped in both directions between Lehiwa Street and Kapanoe Street without modifying the vehicle capacity in this corridor. In the eastbound direction, a bicycle lane could also be extended from Ainamakua Drive to Lehiwa Street. However, west of Lehiwa Drive, Meheula Parkway includes three westbound vehicle lanes and an on-street bicycle

lane could not be installed without removing one of those vehicle lanes. Given, the importance of encouraging bicycle travel and enhancing safety for cyclists, this project should be further evaluated from a design and capacity perspective to determine feasibility of including bicycle lanes along the entire segment and not just the sections with two travel lanes.

The extents of this project was reduced from the original concept to account for the improved facility as a part of the changes in Project 201.8 that extends the off-street pathway to the existing off-street path at Ainamakua Drive. As a result, this project should be combined with Project 201.8. This project is anticipated to increase mobility through the reconfiguration of the existing roadway to provide dedicated space for bicycles. This project will improve safety for those who currently share the roadway with vehicles, however not have a significant effect on those less comfortable traveling adjacent to traffic without a physical separation.

- **Project 202.4: Bicycle Lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway**

  Provides a 1.8-mile dedicated bike facility on Kuahelani Avenue between Meheula Parkway in Mililani and Hokuahiahi Park that will separate vehicles and bicyclists, and enhance bicycle travel and safety. This project would provide a multimodal connection between two neighborhoods in Mililani across Kamehameha Highway and provides access to multiple schools and parks. This project is anticipated to increase mobility through the reconfiguration of the existing roadway to provide dedicated space for bicycles. This project will improve safety for those who currently share the roadway with vehicles, however not have a significant effect on those less comfortable traveling adjacent to traffic without a physical separation.

- **Project 202.8. Bicycle Lanes on Paiwa Street between H-1 and Waipahu Street**

  Provides a 0.6-mile dedicated bike facility on Paiwa Street between H-1 and Waipahu Street. This project would provide a dedicated on-street bicycle facility along Paiwa Street, connecting the existing shared-use path to existing and proposed bicycle facilities on Waipahu Street, making connections to additional communities and rail stations. This project could be combined with Project 201.10.

- **Project 203.5: Bicycle Route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path**

  Designates a bicycle route that will highlight the presence of cyclists to drivers and enhance overall bicycle travel along Anania Drive between bicycle facilities on Meheula Drive and those proposed in Project 201.2. This project would implement signage and traffic calming devices on Anania Drive to insure slower vehicle travel speeds that are comfortable for the majority of cyclists to share the road with. This project should be combined with Project 201.2.

- **Project 203.6: Bicycle Route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Shopping Center**

  Designates a bicyle route that will highlight the presence of cyclists to drivers and enhance overall bicycle travel along Lanikuhana Avenue within the residential community and between bicycle facilities on Meheula Parkway. This project would implement signage and traffic calming devices on Lanikuhana Ave to insure slower vehicle travel speeds that are comfortable for the majority of cyclists to share the road with.

C. Roadway

Two roadway/transit projects are part of the package.

- **Project 403.8: Kamehameha Highway High Occupancy Vehicle Lanes from Ka Uka Boulevard to Farrington Highway**

  Provides additional vehicular capacity within the highway corridor along the segment with the highest vehicle demand while incentivizing ridesharing and minimizing additional single occupant vehicle travel. By providing HOV lanes on the subject segment, multi-occupant vehicles already traveling along the highway would have a dedicated right-of-way that would help bypass existing queues. The designation of these lanes as HOV-only facilities would encourage the practice of ridesharing and would decrease reliance on single occupant vehicle travel. This project is anticipated to increase mobility through the creation of designated HOV lanes that increase efficiency and ease of travel. This prioritizes HOV travel, as opposed to SOV use, thereby increasing people moving capacity.

- **Project 408.4: New Flyer Stops at H-2 with Pedestrian Pathway to Mililani Mauka Park and Ride Lot**

  Allows buses traveling on H-2 to serve passengers without leaving the H-2 right-of-way, saving travel time for both bus operations and passengers. The project would provide two bus-only ramps (mauka and makai bound) connecting to an elevated pedestrian and bicycle path and bridge. The pedestrian and bicycle connection is between the Mililani Mauka park and ride lot and the green space on the Ewa side of H-2. This project serves as a highly desirable alternative mode link between the two Mililani communities that can also be used for those not accessing bus services by providing pedestrians and bicyclists an alternative safe pathway across the Meheula Parkway interchange with H-2 which is designed well for vehicle flow but is not friendly to other modes. This project is anticipated to increase mobility through the creation of a designated bus, bicycle and pedestrian travelway that will increase efficiency and ease of travel for other modes of travel. This project should increase pedestrian and bicycle safety by providing dedicated space for travel.

D. Transportation Demand Management Projects

The COTS identified other projects that provide strategies designed to improve transportation travel island-wide and through-out the study area. These include TDM strategies to reduce single occupant vehicle travel and support alternative transportation modes for the entire study area.

- **Projects 501.1 through 501.10: Transportation Demand Management Measures**

  Ten transportation demand management (TDM) techniques that support rail access are employer provided transit passes and preferred parking for vanpools. Programs would provide the marketing, ride matching, and access to services that are necessary to encourage a shift in transportation behavior. The TDM strategies are included in the access to rail package and provide funding for an administrator and staff to support the overall program. Recognized vanpools and carpools can have premium spaces reserved at the Waiawa and H-2 median park-and-ride lots.

4.3 *How this Package of Projects Performs*

Each project was assessed for its effectiveness, improved mobility, safety, and ability to meet performance measures. Effectiveness can be gauged by the project's ability to meet the modal split goals for Year 2040. Projects deemed most effective in effecting a change in modal split were prioritized for construction below. Mobility is defined as the ability and level of ease of traveling. A multimodal project can be gauged by its ability to increase the efficiency of moving people while simultaneously removing automobiles from the road. This is reflected upon in the project description.

- **Performance Measure 1**, Change from baseline conditions in AM peak period travel time between specified Origin and Destinations by auto/truck modes (except bike and walk)
- **Performance Measure 2**, Change from baseline conditions in AM peak period transit travel time to major destinations
- **Performance Measure 3**, Number of congested lane miles in Central Oahu
- **Performance Measure 4**, Change from baseline conditions in total AM peak period auto travel time between origins and destinations within the COTS area
- **Performance Measure 5**, Change from baseline conditions in the AM peak period travel time between origins and destinations within the COTS area via biking and walking
- **Performance Measure 6**, Amount of bus/rail transit service
- **Performance Measure 7**, Connectivity to rail transit and frequency of intermodal connections
- **Performance Measure 8**, Amount of pedestrian infrastructure
- **Performance Measure 9**, Amount of bicycle infrastructure
- **Performance Measure 10**, Improvements to existing bicycle and pedestrian system
- **Performance Measure 11**, Contributes to mode split shift away from single-occupant vehicle
- **Performance Measure 13**, Rate of fatalities per 100 million vehicle miles traveled
- **Performance Measure 14**, Number of serious injuries by mode
- **Performance Measure 16**, Number of non-motorized fatalities and serious injuries
- **Performance Measure 17**, Roadway state of good repair
- **Performance Measure 19**, Sidewalk, bikeways, and multi-use path conditions
- **Performance Measure 20**, Transit shelter availability

As shown in **Table 26**, the proposed bus service expansion (101.1) and Bus Rapid Transit (102.3) will add 390 hours and 20 hours of added service respectively. Bus Rapid Transit (102.3) and the

aerial gondola (102.8) each propose to reduce travel time to LCC, Kapolei, PUC, and UH by six to nine minutes each.

Table 26. Performance Measures Applied to Transit Projects in the Multimodal System Package

TRANSIT PROJECTS	APPLICABLE PERFORMANCE MEASURES				
TYPES OF TRANSIT PROJECTS	**2**	**6**	**7**	**11**	**20**
101 GENERAL					
101.1 Bus Service Expansion		42 added hours	Yes	Yes	
102 HIGH CAPACITY TRANSIT					
102.3 Bus Rapid Transit between Wahiawa and Pearl Highlands Station	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	20 added service hours	Yes	Yes	Shelter(s) at each stop/ station
102.8 Aerial Gondola between Mililani Leeward Community College Rail Station	LCC=-9 min Kapolei=-9 m PUC=-8 min UH=-8 min	94 added gondola car hours	Yes	Yes	Shelter(s) at each stop/ station
102.5 Park & Ride with Flyer stop in H-2 median mauka of Ka Uka Boulevard	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	14 added service hours	Yes	Yes	Shelter(s) at each stop/ station

As shown in **Table 27**, the new pathway between Anania Drive and Central Oahu Regional Park (201.2) will provide the greatest increase in bicycle infrastructure by adding 2.58 miles. All bicycle path projects have the added benefit of also adding an equivalent length of pedestrian infrastructure since all of these projects are shared-use facilities. Additionally, project 201.2 will provide a more direct access between Anania Drive and Central Oahu Regional Park and will reduce pedestrian and/or bicycle travel time by approximately 18 minutes.

Table 27. Performance Measures Applied to Bicycle Projects in the Multimodal System Package

BICYCLE PROJECTS	APPLICABLE PERFORMANCE MEASURES									
	5	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**16**	**19**
201.0 Bicycle Paths										
201.1 New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	0 min	No	1.0 mi	1.0 mi	Yes	Yes		0	1 collision	New
201.2 New Pathway between Anania Dr and Central Oahu Regional Park	-18 mins	No	2.58 mi	2.58 mi	Yes	Yes		1	0 collisions	New

BICYCLE PROJECTS	APPLICABLE PERFORMANCE MEASURES									
	5	7	8	9	10	11	13	14	16	19
201.4 New Bike Pathway along Kamehameha Hwy from Ka Uka Boulevard to Waipahu Street	0 min	No	1.65 mi	1.65 mi	Yes	Yes		0	2 collisions	New
201.5 New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to LCC Station	0 min	Yes	0.84 mi	0.84 mi	Yes	Yes		0	0 collisions	New
201.6 New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	0 min	No	3.62 mi	3.62 mi	Yes	Yes		2	1 collision	New
201.7 Bike Pathway on Cane Haul Road between H-2 & Pearl Highlands station	-11 mins	Yes	1 mi	1 mi	Yes	Yes		0	1 collision	New
201.8 Bicycle pathway infrastructure through the H-2/Meheula Parkway Interchange	0 min	No	0.31 mi	0.31 mi	Yes	Yes		0	0 collisions	New
201.10 Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	0 min	No	1 mi	1 mi	Yes	Yes		0	0 collisions	New
202.0 Bicycle Lanes										
202.3 Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	0 min	No		1.96 mi	Yes	Yes		0	1 collision	New
202.4 Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	0 min	No		0.14 mi	Yes	Yes	1.73 fatalities for every million vehicle miles	0	3 collisions, 1 ped fatality	New
202.8 Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	0	No		0.60 mi	Yes	Yes		0	0 collisions	New

BICYCLE PROJECTS	APPLICABLE PERFORMANCE MEASURES									
	5	7	8	9	10	11	13	14	16	19
203.0 Bicycle Routes										
203.5 Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	0 min	No		1.3 mi	Yes	Yes		0		New
203.6 Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Shopping Center	0 min	No		2.35 mi	Yes	Yes		0		New

The new bicycle lane projects (Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway (202.4) will provide the greatest benefit to safety at hot spot collision locations. The project will enhance safety along roadway segments that had three (3) collisions in the last couple of years. The safety enhancement will be a result of providing a dedicated space for bicycle travel and increasing awareness to drivers of the presence of cyclists.

Travel times for bicycle projects are shown in **Table 28**.

Table 28. Bicycle Travel Times

Project Number	Project Description	Length of Facility (miles)	Travel Times (min)
Bicycle Paths			
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Hwy	1.00	5.00
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	2.40	12.00
201.4	New Pathway along Kamehameha Hwy from Ka Uka Blvd to Waipahu St	1.60	8.00
201.5	New Pathway connecting Kamehameha Hwy at Waipahu St to Leeward Community College	1.00	5.00
201.6	New Pathway along Kamehameha Hwy between Wahiawa and Anania Dr in Mililani	3.40	17.00
201.7	New Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	1.00	5.00
201.8	Bike Pathway through the H-2/Meheula Parkway Interchange	1.10	5.50
201.10	Bike Pathway in Central Oahu Regional Park	0.85	4.25
Bicycle Lanes			
202.3	Bike Lanes on Meheula Parkway between the H-2 Interchange and Kapanoe St	1.50	7.50

Project Number	Project Description	Length of Facility (miles)	Travel Times (min)
202.4	Bicycle Lanes on Kuahelani Ave between Hokuahiahi Park and Meheula Pkwy	1.80	9.00
202.6	Bicycle lanes on Kamehameha Hwy from Waihona St connecting to the Pearl Harbor Bike Path	0.80	4.00
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	0.60	3.00
Bicycle Routes			
203.1	Bicycle Route on California Ave between Plum St and Iliahi Elementary School	1.50	7.50
203.3	Bicycle Route on Leilehua Golf Course Rd between Kamehameha Hwy and Wikao St	0.30	1.50
203.5	Bicycle Route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	1.50	7.50
203.6	Bicycle Route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Shopping Center	2.50	12.50
Complete Streets			
303.2	Complete Streets project for Kipapa Dr Between Hookelewaa St and Mili	1.00	5.00

Table 29 shows the application of the performance measures to roadway projects included in the Multimodal System Package. The Kamehameha Highway HOV lanes (403.8) will provide the second greatest benefit towards vehicle travel in the COTS study area, of all projects proposed. It is anticipated to reduce regional travel by six minutes during the AM peak period, and slightly decrease travel to the Leeward Community College by one minute in the AM peak period. Similar to other projects, however, they will have reduced AM peak period benefit if town-bound capacity is not enhanced.

The new flyer stops at H-2 with pedestrian pathway to the Park & Ride (408.4) will reduce pedestrian travel time by eight minutes during the AM peak period. By improving pedestrian access to the Park & Ride lot, this roadway project contributes to mode split shift away from single-occupant vehicles.

Table 29. Performance Measures Applied to Roadway Projects in the Multimodal System Package

ROADWAY PROJECTS	APPLICABLE PERFORMANCE MEASURES								
TYPES OF ROADWAY PROJECTS	1	2	3	4	5	10	11	17	19
403.8 Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway	LCC = -1 mins Kapolei = 0 mins PUC = 0 mins UH = 0 mins	-3 min	AM = 53 miles PM = 62 miles	-6 min			Yes	Fair/ Poor	N/A
408.0 Mililani Access									
408.4 New flyer stops at H-2 with pedestrian pathway to Park & Ride					- 8 mins	Yes	Yes		

Table 30 shows the application of performance measures to transportation demand management projects included in the Multimodal System Package. All of the potential TDM projects rate favorably when assessed against the applicable Performance Measures. The only exception is Project 501.9, Support of Working from Home, which would not contribute to increasing connectivity to rail transit or the frequency of intermodal connections.

Table 30. Performance Measures Applied to Transportation Demand Management Projects in Multimodal System Package

TRANSPORTATION DEMAND MANAGEMENT (TDM) PROJECTS	APPLICABLE PERFORMANCE MEASURES	
TYPES OF TDM PROJECTS	7	11
501.0 Transportation Demand Management (TDM)		
501.1 Free real-time online carpool matching	Yes	Yes
501.2 Outreach promotion and marketing of alternative transportation	Yes	Yes
501.3 Emergency ride home program	Yes	Yes
501.5 Employer based commuter/parking programs	Yes	Yes
501.6 Emerging and innovative strategies – Car sharing	Yes	Yes
501.7 Emerging and innovative strategies – Bike sharing	Yes	Yes
501.8 Vanpool program	Yes	Yes
501.9 Support of working from home	No	Yes
501.10 Support of alternate/shifted work hours	Yes	Yes

4.4 *Project Development Issues in the Multimodal System Package*

Only two projects in this package require land or ROW acquisition: Kamehameha Highway HOV lanes, from Ka Uka Boulevard to Farrington Highway (Project 403.8) and the new pathway between Anania Drive and Central Oahu Regional Park (Project 201.2). These two projects would be constructed in an area where no public right-of-way is currently available. Each project would require approximately 4-acres of land to construct. The HOV lanes would be in urban area while the pathway would be in agricultural area. The identified urban area has a significantly larger unit cost per acre ($3,47M) than the agricultural land ($40,399). In addition, Project 102.8 (Aerial Gondola between Mililani Transit Center and Leeward Community College) may require nominal ROW for any support towers that could not be located in the public ROW (e.g., the median of a street).

The majority of the bikeway projects are expected to be exempt from significant environmental review. The new flyer stop at H-2 with pedestrian pathway to Park and Ride (Projects 408.4) is expected to require an EA. Two projects are expected to require a full EIS: the aerial gondola (Project 102.8) and the new pathway between Anania Drive and Central Oahu Regional Park (Project 201.2). With the majority of projects in this package able to be completed without significant environmental review, there are less obstacles to implementation and realizing the benefits of the package.

The design complexity and constructability of the projects in the Multimodal System Package varies. Generally, the projects that can be constructed or operated within existing rights-of-way or do not involve significant impacts to existing traffic are those that are expected to be exempt from an EA or EIS. The more complex projects from a construction standpoint include the aerial gondola (Project 102.8), Kamehameha Highway HOV lanes (Project 403.8), and the new pathway connecting Central Oahu Regional Park (Project 201.2). This largely follows complexity of environmental review, leaving a large number of projects able to be implemented in a shorter time contingent upon on funding and agency priorities.

Projects were scored based on the length of time expected for design, land acquisition, environmental documentation and mitigation, and construction.

Design: Projects were scored 1 through 5, with 1 representing the most complex design projects while 5 represents the least complex design projects. New roadways or transit projects (e.g., rail, aerial gondola) would have the most lengthy design period and would score a 1.

Land Acquisition: Projects were scored a 0 or a 1 depending if land acquisition for ROW is required. Projects that do not require land acquisition were scored a 1, while those that require land acquisition were scored a 0.

Environmental: The type of documentation required impacts the timing of projects. Projects were scored a 5 if no further environmental documentation is required. Projects were scored a 4 if eligible for both a Categorical Exclusion under NEPA and an Exemption under HRS Chapter 343. Projects were scored a 3 if they are not exempt from the requirements of HRS Chapter 343 but would only require a Categorical Exclusion under NEPA. Projects were scored a 2 if they would

require an EA and a 1 if they would require an EIS because this adds the largest amount of time, typically two to three years.

Constructability: Construction complexity and the MOT during construction are important considerations in terms or planning for substantive transportation improvement projects. Projects that are more complex in terms of constructability and MOT generally require a longer construction period and are scored with a 1. Those that require little or no time to implement are scored with a 5.

Projects with the highest total score are expected to require the least amount of time to implement, whereas projects with the lowest total score would likely require the most time to implement. The scoring of projects within the Multimodal Package is summarized in **Table 31**.

Table 31. Scoring of Timing for Phases of Projects in the Multimodal Package

Project Number	Project Description	Design	Land Acquisition	Environmental	Construction	TOTAL SCORE
100 TRANSIT PROJECTS						
101.0	**GENERAL**					
101.1	Bus Service Expansion	5	1	4	5	15
102.0	**HIGH CAPACITY TRANSIT**					
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	5	0	4	5	14
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	2	0	2	3	7
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College Rail Station	1	0	1	2	4
200 BICYCLE PROJECTS						
201.0	**BICYCLE PATHS (Off-street bicycle facility)**					
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	3	1	3	5	12
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	3	0	2	5	10
201.4	New Bike Pathway along Kamehameha Hwy. from Ka Uka Boulevard to Waipahu Street	3	1	3	5	12
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	3	1	3	5	12

Project Number	Project Description	Design	Land Acquisition	Environmental	Construction	TOTAL SCORE
201.6	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	3	1	3	5	12
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	3	0	3	5	11
201.8	Bicycle pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue	3	1	3	5	12
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	3	0	3	5	11
202.0	**BICYCLE LANES (On-street bicycle facility delineated from vehicle traffic)**					
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	4	1	4	3	12
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	4	1	4	3	12
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	4	1	4	3	12
203.0	**BICYCLE ROUTES (On-Street bicycle facility with street signs and/or sharrows)**					
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	4	1	4	4	13
203.6	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	4	1	4	4	13
400 ROADWAY PROJECTS						
403.0	**KAMEHAMEHA HIGHWAY**					
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	4	0	4	2	10
408.0	**MILILANI ACCESS**					
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	1	1	2	2	6

Project Number	Project Description	Design	Land Acquisition	Environmental	Construction	TOTAL SCORE
500 TRANSPORTATION SYSTEM MANAGEMENT						
501.0	**TRANSPORTATION DEMAND MANAGEMENT**					
501.1	Free real-time online carpool matching	5	1	4	5	15
501.2	Outreach promotion and marketing of alternative transportation	5	1	4	5	15
501.3	Emergency ride home program	5	1	4	5	15
501.5	Employer based commuter/parking programs	5	1	4	5	15
501.6	Emergencies and innovative strategies – Carsharing	5	1	4	5	15
501.7	Emergencies and innovative strategies – Bikesharing	5	1	4	5	15
501.8	Vanpool program	5	1	4	5	15
501.9	Support of working from home	5	1	4	5	15
501.10	Support of alternate/shifted work hours	5	1	4	5	15

4.5 *Cost of Projects in the Multimodal System Package*

The cost of the recommended Multimodal System Package can be determined by summing the individual project costs that were presented in other COTS studies (see **Appendix A**). **Table 32** presents the cost of projects in the Multimodal System Package. Column 3 shows construction cost, and Column 4 shows the operating costs through 2040. The total package cost would be $538,903,566 for construction and $535,499,954 for up to 21 years of operation (dependent on start of operations as shown in **Table 33**).

Table 32. Construction and Total Cost of Multimodal Package

Project Number	Project Description	Construction/ Initiation Cost	Operating Cost through 2040
100 TRANSIT PROJECTS			
101 GENERAL			
101.1	Bus Service Expansion	$159,896,495	$364,332,505
102 HIGH CAPACITY TRANSIT			
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	$30,217,600	$27,499,511
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$51,740,000	$7,766,039
102.8	Aerial Gondola between Waipio and Leeward Community College	$216,450,000	$115,759,343

Project Number	Project Description	Construction/ Initiation Cost	Operating Cost through 2040
200 BICYCLE PROJECTS			
201 BICYCLE PATHS (Off-street bicycle facility)			
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	$3,211,096	$167,169
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	$5,900,213	$282,487
201.4	New Bike pathway along Kamehameha Hwy. from Ka Uka Boulevard to Waipahu Street	$4,882,430	$188,320
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	$3,129,252	$117,694
201.6	New Bike Pathway along Kamehameha Hwy between Wahiawa and Anania Dr.	$11,684,605	$400,192
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	$4,150,208	$117,694
201.8	Bicycle pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue	$2,609,971	$129,493
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	$2,009,647	$100,041
202 BICYCLE LANES			
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	$4,298,358	--
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	$2,533,282	--
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	$3,318,759	--
203 BICYCLE ROUTES			
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	$134,330	--
203.6	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	$146,450	--
400 ROADWAY PROJECTS			
403 KAMEHAMEHA HIGHWAY			
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	$25,627,138	$4,296,159
408 MILILANI ACCESS			
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$6,909,732	$680,954
500 TRANSPORTATION SYSTEM MANAGEMENT			
501 TRANSPORTATION DEMAND MANAGEMENT			
501.1 through 501.10	TDM Package	--	$13,662,353
	TOTAL	**$538,903,566**	**$535,499,954**

4.6 *Benefit Cost of Projects in the Multimodal Package*

A key metric in evaluating individual projects in this study is the BCA ratio, which measures the total project benefits relative to the total costs (including construction, land, and operations & maintenance). The BCA ratio for each project was calculated and presented in previous COTS reports (see **Appendix A**). The BCA ratios for all projects included in the Congestion Relief package are shown in **Table 33**. The combined benefits and costs for all projects in the Multimodal Package is 2.89, based on a 3% discount rate.

Table 33. Benefit Cost Analysis of Multimodal Package

Project Number	Project Description	Total Benefits	Total Costs	BCA Ratio
100 TRANSIT PROJECTS				
101 GENERAL				
101.1	Bus Service Expansion	$2,134,994,900	$ 524,229,000	4.07
102 HIGH CAPACITY TRANSIT				
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	$ 246,029,028	$ 57,717,111	4.26
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	$152,724,771	$59,506,039	2.57
	Pedestrian/Bicycle bridge from Koa Ridge to Flyer Stop			
102.8	Aerial Gondola between Waipio and Leeward Community College	$ 282,650,324	$332,209,343	0.85
200 BICYCLE PROJECTS				
201 BICYCLE PATHS (Off-street bicycle facility)				
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	$ 12,037,789	$ 3,378,265	3.56
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	$ 2,579,412	$ 6,394,182	0.40
201.4	New Bike Pathway along Kamehameha Hwy. from Ka Uka Boulevard to Waipahu Street	$ 7,788,842	$ 5,070,750	1.54
201.5	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station	$ 6,797,183	$ 3,246,946	2.09
201.6	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	$ 8,245,027	$ 12,084,797	0.68
201.7	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	$ 2,727,004	$ 4,295,787	0.63
201.8	Bicycle pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue	$ 7,964,200	$ 2,739,464	2.91

Project Number	Project Description	Total Benefits	Total Costs	BCA Ratio
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	$ 3,641,248	$ 2,109,688	1.73
202 BICYCLE LANES (On-street bicycle facility delineated from vehicle traffic)				
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	$ 16,379,261	$ 4,298,358	3.81
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	$ 13,378,345	$ 2,533,282	5.28
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	$ 8,568,240	$ 3,318,759	2.58
203 BICYCLE ROUTES (On-street bicycle facility with street signs and/or sharrows)				
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	$ 7,837,333	$ 134,330	58.34
203.6	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	$ 14,122,973	$ 146,450	96.44
400 ROADWAY PROJECTS				
403 KAMEHAMEHA HIGHWAY				
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway)	$ 127,985,458	$ 43,703,836	2.93
408 MILILANI ACCESS				
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	$ 3,867,918	$ 7,590,686	0.51
500 TRANSPORTATION SYSTEM MANAGEMENT				
501 TRANSPORTATION DEMAND MANAGEMENT				
501.1 through 501.10	TDM Package	$ 39,896,247	$ 13,662,353	2.92
		$3,100,215,503	**$1,074,349,520**	**2.89**

4.7 *Implementation, Priority, and Financing Issues for the Multimodal System Package*

Should the Multimodal package be the preferred improvement package for the COTS area, financing will have to be identified and will represent the primary initial constraint for project implementation. However, the package is structured in such a way as to allow development of individual projects including planning, design and environmental review. In some cases, projects with lesser construction complexity and those that are not specifically tied to another system or plan can proceed in advance of others. For each project in this package, **Table 34** identifies the required coordination with other systems or plans, the desired and likely opening year based on

engineering judgement and experience, and near-term actions that can be completed with the next one to three years.

Table 34. Implementation Steps Associated with Multimodal Package

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
100 TRANSIT PROJECTS					
101	**GENERAL**				
101.1	Bus Service Expansion	Start immediately with incremental implementation full service by 2025	Planning	Identify routing and stops	2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2022
			Engineering	Purchase additional vehicles	2023-2024
			Construction	Install stop features/update website	2024-2025
			Operation	Start of Operations	2025
102	**HIGH CAPACITY TRANSIT**				
102.3	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	Should be tied to opening of rail project in 2025	Planning	Identify routing, stops etc.	2019-2020
			Pre. Design	Design new stops, estimate costs and funding sources	2020-2021
			Environmental	Confirm exemptions	2021
			Engineering	Purchase new vehicles; design bus only (except for right turns) segments	2023
			Construction	Install stop features/ update website	2025
			Operation	Start of Operations	2025
102.5	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Should be tied to opening of rail project in 2025	Planning	Coordinate w/DOT, FHWA, and adjacent property owners	2019-2020
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2021
			Environmental	Conduct EA	2022
			Engineering	Design structure and stops	2023
			Construction	Build facilities	2024-2025
			Operation	Start of Operations	2025

Table 34. Implementation Steps Associated with Multimodal Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
102.8	Aerial Gondola between Mililani Transit Center and Leeward Community College	Should be tied to opening of rail project in 2025	Planning	Estimate ridership, identify alignment, conduct alternatives analysis,	2019-2020
			Pre. Design	Identify tower and station locations, estimate costs and funding sources	2020-2021
			Environmental	Prepare EIS	2022-2023
			Engineering	Design stations and multimodal connections	2023-2024
			Construction	Build system	2025-2028
			Operation	Start of Operations	2028
200 BICYCLE PROJECTS					
201	**BICYCLE PATHS**				
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	None required but should be open as soon as feasible and coordinated with Project 201.2	Planning	Confirm alignment, identify any scheduled roadway or utility work for coordination	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022
			Operation	Start of Operations	2022

Table 34. Implementation Steps Associated with Multimodal Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	Coordinate with Koa Ridge Development. Should be open as soon as feasible and coordinated with Projects 201.1, 201.4 and 201.10	Planning	Confirm alignment and need for land acquisition, coordinate with Koa Ridge Development and identify any scheduled work impacting project	2019
			Pre. Design	Identify obstacle, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption or Prepare EA or EIS	2020-2021
			Engineering	Finalize design and complete land acquisition as needed	2022
			Construction	Build path	2023-2024
			Operation	Start of Operations	2024
201.5	New Pathway connecting Kamehameha Highway at Waipahu St to Leeward Community College	None required but should be open as soon as feasible and coordinated with rail opening and Projects 201.1 and 201.4	Planning	Confirm alignment, coordinate with HDOT and identify any scheduled work impacting project	2019
			Pre. Design	Identify obstacles, connections to other bike paths and rail station, estimate costs and funding sources	2020-2021
			Environmental	Conduct EA or EIS	2021-2022
			Engineering	Finalize design	2023
			Construction	Build path and bridge	2024-2025
			Operation	Start of Operations	2029

Table 34. Implementation Steps Associated with Multimodal Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
201.8	Bicycle pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue	None required but should be open as soon as feasible	Planning	Confirm alignment, identify any scheduled roadway or utility work for coordination	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022
			Operation	Start of Operations	2029
201.10	Bike Pathway in Central Oahu Regional Park	None required but should be open as soon as feasible and coordinated with Project 201.2	Planning	Confirm alignment, identify any scheduled work in Park	2019
			Pre. Design	Identify obstacles, connections to other bike paths, estimate costs and funding sources	2020
			Environmental	Confirm exemption	2020
			Engineering	Finalize design	2021
			Construction	Build path	2022-2023
			Operation	Start of Operations	2023
202	**BICYCLE PATHS**				
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	None required but should be open as soon as feasible and coordinated with Project 201.8	Planning	Confirm alignment, study impacts and address mitigation.	2019
			Pre. Design	Identify obstacles, estimate costs and funding sources.	2019
			Environmental	Confirm exception	2019
			Engineering	Finalize design	2019
			Construction	Mark bike lanes	2019-2020
			Operation	Start of Operations	2020

Table 34. Implementation Steps Associated with Multimodal Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	None required but should be open as soon as feasible	Planning	Confirm alignment, study impacts and address mitigation.	2019
			Pre. Design	Identify obstacles, estimate costs and funding sources.	2019
			Environmental	Confirm exception	2019
			Engineering	Finalize design	2019
			Construction	Mark bike lanes	2019-2020
			Operation	Start of Operations	2020
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	None required but should be open as soon as feasible	Planning	Confirm alignment, study impacts and address mitigation.	2019
			Pre. Design	Identify obstacles, estimate costs and funding sources.	2019
			Environmental	Confirm exception	2019
			Engineering	Finalize design	2019
			Construction	Mark bike lanes	2019-2020
			Operation	Start of Operations	2020
400 ROADWAY PROJECTS					
403	**KAMEHAMEHA HIGHWAY**				
403.8	Kamehameha Highway High Occupancy Vehicle Lanes from Ka Uka Boulevard to Farrington Highway	Should be tied to opening of rail project in 2025 but could be effective immediately	Planning	Prepare forecasts and operations analysis	2019
			Pre. Design	Identify transitions/merges, estimate costs and funding sources	2020
			Environmental	Prepare EIS	2021-2022
			Engineering	Finalize design	2023
			Construction	Widen roadway	2024
			Operation	Start of Operations	2028

Table 34. Implementation Steps Associated with Multimodal Package (cont.)

Project Number	Project Description	Coordination with Other Systems/Plans	Project Development Step	Step Description	Potential Timing
408	**MILILANI ACCESS**				
408.4	New flyer stops at H-2 with pedestrian pathway to Park and Ride	Should be tied to opening of rail project in 2025 but could be effective immediately	Planning	Coordinate w/ DOT, FHWA and adjacent property owners	2019
			Pre. Design	Identify ped/bike bridge landing areas, estimate costs and funding sources	2020
			Environmental	Prepare EA	2021
			Engineering	Design structure and stops	2022
			Construction	Build facilities	2023
			Operation	Start of Operations	2023

Project funding for increased bus transit use (Project 102.3) would most likely come from an increase in the City and County of Honolulu (CCH) operating budget for TheBus. Project funding for new transit projects such as the aerial gondola (Project 102.8) could target federal grants or subsidies for new transit projects, similar to those provided for the rail construction. Project funding for new bicycle facilities would most likely come from capital improvement project (CIP) funding targeted by the CCH or through State/federal money for alternative transportation projects. Project funding for alternative transportation projects on State highways (Project 403.8 and 408.4) would most likely come from State TAP funding for alternative transportation projects.

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APPENDIX A

Discussion of Project Tracking through the COTS Process and

Project Tracking Matrix

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APPENDIX A

During the course of the Central Oahu Transportation Study (COTS), several analyses have been completed to assist in decision making for which of the many alternatives should be selected for further study, as well as those that should be considered for possible funding and implementation. These analyses included the following:

- Mobility benefits
- Contributions to performance measures and project feasibility
- Cost and cost benefit analysis

These analyses were reported in three separate deliverables:

- Deliverable E-1, Project Descriptions, Evaluation of Mobility Benefits, and Recommendations for Further Evaluation: This report examined 90 projects, including 17 that are to be completed by a private developer (Koa Ridge). Twenty projects were dropped or merged with others as a result of the mobility analysis.
- Deliverable F, Application of Performance Measures and Feasibility Assessment: Seventy projects were evaluated for their contributions to various performance measures and for their project feasibility. At this stage, no additional projects were dropped and one bicycle project was added on Kipapa Drive.
- Deliverable G, Benefit Cost Analysis: The cost and cost benefit review was conducted on 37 projects. A total of 25 projects were eliminated from the cost analysis (but not eliminated from the packages for the following reasons:
    - All of the projects that are the responsibility of Koa Ridge would be costed by the developer.
    - The nine Transportation System Management (TSM) projects were combined into a single project due to their relatively small cost. Four pedestrian program projects which were not site-specific, the Roosevelt Bridge Rehabilitation project, and parking strategies were deemed too difficult to quantify the benefits.

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
TRANSIT PROJECTS			
101.0	**GENERAL**		
101.1	Bus Service Expansion	Bus Service Expansion	Bus Service Expansion
101.2	Construct Transit Centers	Build Transit Center at Koa Ridge	*No quantifiable benefits*
101.3	City Operations & Maintenance	City Operations and Maintenance, including Bus Stop/ Shelter Conditions	*No quantifiable benefits*
101.4	Human Services Transportation Coordination Program	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
102.0	**HIGH CAPACITY TRANSIT**		
102.1	HART rail technology between Wahiawa and H-1	HART Rail Technology between Wahiawa and Pearl Highlands Station	*Screened out in Deliverable F, Application of Performance Measures and Feasibility Assessment*
102.2	Light Rail between Wahiawa and H-1	Light Rail between Wahiawa and Leeward Community College Rail Station	Light Rail between Wahiawa and Leeward Community College Rail Station
102.3	Bus Rapid Transit between Wahiawa and H-1	Bus Rapid Transit between Wahiawa and Pearl Highlands Station	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station
102.4	Flyer Stops between Wahiawa and H-1	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
102.5	P & R with Flyer Stop in median mauka of Ka Uka Blvd	Park & Ride with Flyer stop in H-2 median mauka of Ka Uka Boulevard	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd
102.6	HART rail technology between Mililani & H-1	HART Rail Technology between Mililani Mauka and Pearl Highlands Station	HART rail technology between Mililani and Leeward Community College
102.7	Aerial Gondola between Waipio & Wahiawa	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
102.8	Aerial Gondola between Waipio & Pearl Highlands station	Aerial Gondola between Waipio and Mililani Leeward Community College Rail Station	Aerial Gondola between Waipio and Leeward Community College
BICYCLE PROJECTS			
201.0	**BICYCLE PATHS (Off-street bicycle facility)**		
201.1	New Pathway between Paiwa St and Kamehameha Highway	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	New Pathway between Anania Dr and Central Oahu Regional Park	New Pathway between Anania Dr and Central Oahu Regional Park
201.3	New Direct Kipapa Gulch Bike Bridge and Pathway	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
201.4	New Bike Pathway along Kamehameha Highway.	New Bike Pathway along Kamehameha Highway from Ka Uka Boulevard to Waipahu Street	New Bike Pathway along Kamehameha Highway. from Ka Uka Boulevard to Waipahu Street
201.5	New Ped/Bike Path connecting Kam. Highway at Waipahu Street to PH station via LCC	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to LCC Station	New Ped/Bike Path connecting Kamehameha Highway at Waipahu Street to Leeward Community College Rail Station
201.6	New Bike Pathway along Kamehameha Highway. between Wahiawa and Anania Dr	New Bike Pathway along Kamehameha Highway. between Wahiawa and Anania Dr	New Bike Pathway along Kamehameha Highway. between Wahiawa and Anania Dr
201.7	Bike Pathway on Cane Haul Road between H-2 & Pearl Highlands station	Bike Pathway on Cane Haul Road between H-2 & Pearl Highlands station	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station
201.8	Bicycle infrastructure around H-2 & Meheula	Bicycle pathway infrastructure through the H-2/Meheula Parkway Interchange	Bicycle pathway infrastructure through the H-2/Meheula Parkway Interchange
201.9	Bike pathway along California Ave. between. Kilea Pl. and Nonohe St	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa St
202.0	**BICYCLE LANES (On-street bicycle facility delineated from vehicle traffic)**		
202.1	Ainamakua Dr between Mililani Park & Ride and Kualapa St	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
202.2	Meheula Parkway between Mililani H-2 Interchange and Mililani H-2 Interchange	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
202.3	Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St
202.4	Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway
202.5	Kamehameha Highway between H-1 and H-2	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
202.6	Waihona Street and Kamehameha Highway between Cane Haul Road bike path and Arizona Memorial	Bicycle lanes on Kamehameha Highway from Waihona St connecting to Pearl Harbor Bike Path	Bicycle lanes on Kamehameha Highway from Waihona St. connecting to Pearl Harbor Bike Path
202.7	*Project Added in Deliverable F, Application of Performance Measures and Feasibility Assessment*	Bicycle lane on Kamehameha Highway between Ka Uka Blvd and Lanikahuna Ave	Bicycle lane on Kamehameha HigHighway from Ka Uka Blvd to Lanikahuna Ave
203.0	**BICYCLE ROUTES (On-street bicycle facility with street signs and/or sharrows)**		
203.1	California Ave between Plum St and Iliahi Elementary	Bicycle route on California Ave between Plum St and Iliahi Elementary	Bicycle route on California Ave between Plum St and Iliahi Elementary
203.2	Kunia Rd btwen Anonui St and Wilikina Dr	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
203.3	Leilehua Golf Course Rd between Kamehameha Highway and Wikao St	Bicycle route on Leilehua Golf Course Rd between Kamehameha Highway and Wikao St	Bicycle route on Leilehua Golf Course Rd between Kamehameha Highway and Wikao St
203.4	Kamehameha Highway between Haleiwa Bypass and Kuahelani Ave	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
203.5	Anania Dr between Meheula Pkwy and Kipapa Gulch Path	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path
203.6	Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Shopping Center	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center
203.7	Kamehameha Highway between Waipio Uka St and Waipahu St	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
303.0	**COMPLETE STREETS (BICYCLE)**		
303.2	*Project Added in Deliverable G, Benefit Cost Analysis*	*Project Added in Deliverable G, Benefit Cost Analysis*	Kipapa Dr between Hookelawaa St and Mililani Waena Elementary School
PEDESTRIAN PROEJCTS			
301.0	**LOCATION-SPECIFIC**		
301.1	Crosswalk across Kamehameha Highway between Avocado St and Kilani St	Crosswalk across makai leg of Kamehameha Highway and Avocado Street intersection	Crosswalk across makai leg of Kamehameha Highway and Avocado Street intersection
301.2	Shared use path on Kamehameha Highway between Lanikuhana Ave and Meheula Pkwy	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
302.0	**GENERAL**		
302.1	Safe Routes to School	Safe Routes to School	*No quantifiable benefits*
302.2	Pedestrian Crossing Safety	Pedestrian Crossing Safety	*No quantifiable benefits*
302.3	Mobility Hubs	Mobility Hubs	*No quantifiable benefits*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
303.0	**COMPLETE STREETS**		
303.1	California Ave between Kamehameha Highway and Wahiawa District Park	California Ave between Kamehameha Highway and Wahiawa District Park	California Ave between Kamehameha Highway and Wahiawa District Park
303.2	Kipapa Dr between Hookelawaa St and Mililani Waena Elementary School	Kipapa Dr between Hookelawaa St and Mililani Waena Elementary School	Kipapa Dr between Hookelawaa St and Mililani Waena Elementary School
303.3	Complete Streets modifications on priority roads	Complete Streets modifications on priority roads	*No quantifiable benefits*
ROADWAY PROJECTS			
401.0	**KA UKA BLVD. & H-2 INTERCHANGE**		
401.1	Ka Uka Blvd & H-2 Northbound On-Ramp to H-2 (freeway ramp widening & signal modification)	Ka Uka Blvd & H-2 Northbound On-Ramp to H-2 (freeway ramp widening & signal modification)	*Koa Ridge project*
401.2	Ka Uka Blvd & H-2 Southbound On-Ramp to H-2 (freeway ramp approach widening)	Ka Uka Blvd & H-2 Southbound On-Ramp to H-2 (freeway ramp approach widening)	*Koa Ridge project*
401.3	Ka Uka Blvd & H-2 Southbound Off-Ramp to Ka Uka Blvd / Moaniani St. (freeway ramp approach widening)	Ka Uka Blvd & H-2 Southbound Off-Ramp to Ka Uka Blvd / Moaniani St. (freeway ramp approach widening)	*Koa Ridge project*
401.4	Ka Uka Blvd & H-2 Northbound Off-Ramp to Limuana St (freeway ramp signal modification)	Ka Uka Blvd & H-2 Northbound Off-Ramp to Limuana St (freeway ramp signal modification)	*Koa Ridge project*
401.5	Ka Uka Blvd & H-2 Southbound Off-Ramp to Ka Uka Blvd / Moaniani St (freeway ramp widening & signal modification)	Ka Uka Blvd & H-2 Southbound Off-Ramp to Ka Uka Blvd / Moaniani St (freeway ramp widening & signal modification)	*Koa Ridge project*
401.6	Ka Uka Blvd & H-2 Northbound Off-Ramp to Ka Uka Blvd (freeway ramp relocation & widening)	Ka Uka Blvd & H-2 Northbound Off-Ramp to Ka Uka Blvd (freeway ramp relocation & widening)	*Koa Ridge project*
401.7	Ka Uka Blvd & H-2 Northbound On-Ramp to H-2 (new freeway ramp & overpass widening)	Ka Uka Blvd & H-2 Northbound On-Ramp to H-2 (new freeway ramp & overpass widening)	*Koa Ridge project*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
401.8	Ka Uka Blvd & H-2 Southbound On-Ramp to H-2 (new freeway ramp & overpass widening)	Ka Uka Blvd & H-2 Southbound On-Ramp to H-2 (new freeway ramp & overpass widening)	*Koa Ridge project*
401.9	Ka Uka Blvd & H-2 Flyover Ramp	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
402.0	**KA UKA BOULEVARD**		
402.1	Ka Uka Blvd between Moaniani St and Commercial Driveway/ Spine Rd (lane addition)	Ka Uka Blvd between Moaniani St and Commercial Driveway/ Spine Rd (lane addition)	*Koa Ridge project*
402.2	Ka Uka Blvd Intersection with Commercial Driveway/ Spine Rd (intersection lane & signal modification)	Ka Uka Blvd Intersection with Commercial Driveway/ Spine Rd (intersection lane & signal modification)	*Koa Ridge project*
402.3	Ka Uka Blvd Intersection with Commercial Driveway/Spine Rd (intersection widening & modification)	Ka Uka Blvd Intersection with Commercial Driveway/Spine Rd (intersection widening & modification)	*Koa Ridge project*
402.4	Ka Uka Blvd between H-2 and new development (new road)	Ka Uka Blvd between H-2 and new development (new road)	*Koa Ridge project*
403.0	**KAMEHAMEHA HIGHWAY**		
403.1	Kamehameha Highway & Lumiaina St Intersection (intersection widening & signal modification)	Kamehameha Highway & Lumiaina St Intersection (intersection widening & signal modification)	*Koa Ridge project*
403.2	Kamehameha Highway & Waipahu St Intersection (intersection restriping & signal modification)	Kamehameha Highway & Waipahu St Intersection (intersection restriping & signal modification)	*Koa Ridge project*
403.3	Kamehameha Highway & Ka Uka Blvd Intersection (intersection widening)	Kamehameha Highway & Ka Uka Blvd Intersection (intersection widening)	*Koa Ridge project*
403.4	Kamehameha Highway between Ka Uka Blvd and North of Ka Uka Blvd. (add NB lane)	Kamehameha Highway between Ka Uka Blvd and North of Ka Uka Blvd. (add NB lane)	*Koa Ridge project*
403.5	Kamehameha Highway between Ka Uka Blvd and	Kamehameha Highway between Ka Uka Blvd and	Kamehameha Highway between Ka Uka Blvd and

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
	Lanikuhana (widen from 3 to 4 lanes)	Lanikuhana (widen from 3 to 4 lanes)	Lanikuhana (widen from 3 to 4 lanes)
403.6	Kamehameha Highway between H-2 and Kilani Ave (unknown)	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
403.7	Kamehameha Highway Roosevelt Bridge (rehabilitation)	Kamehameha Highway Roosevelt Bridge (rehabilitation)	*Unable to assess benefits for structural improvement project*
403.8	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway	Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway
404.0	**H-2 INTERCHANGES**		
404.1	H-2 & Pineapple Road Interchange	H-2 & Pineapple Road Interchange	*Koa Ridge project*
404.2	H-2 & Meheula Pkwy (widen on-ramp)	H-2 & Meheula Pkwy (widen on-ramp)	H-2 & Meheula Pkwy (widen on-ramp)
404.3	H-2 & Kamehameha Highway (widen on-ramp)	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
405.0	**H-1 & H-2 INTERCHANGE**		
405.1	Waiawa H-1/H-2 Interchange Eastbound/Southbound Merge Improvements	Waiawa H-1/H-2 Interchange Eastbound/Southbound Merge Improvements	Waiawa H-1/H-2 Interchange Eastbound/Southbound Merge Improvements
406.0	**CENTRAL MAUKA ROADS**		
406.1	New Road between Mililani Mauka and Pearl City	New Road between Mililani Mauka and Pearl City	New Road between Mililani Mauka and Pearl City
406.2	New Road between Whitmore Ave (SR 804) and California Ave	*Deleted because outside of Study Area*	*N/A*
406.3	New Road between California Ave and Meheula Pkwy	New Road between California Ave and Meheula Pkwy	New Road between California Ave and Meheula Pkwy
407.0	**PAIWA EXTENSION**		
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Highway/Ka Uka Blvd intersection	*Initially screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum. Due to community support, this project*	*N/A*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
		returned starting with Deliverable H-1.	
408.0	**MILILANI ACCESS**		
408.1	New H-2 Interchange at Mililani Mauka	New road connection to H-2 Interchange at Pineapple Road for access to Mililani Mauka	New road connection to H-2 Interchange at Pineapple Road for access to Mililani Mauka
408.2	New road from Wikao St to P & R	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
408.3	New road between H-2 and P & R	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
408.4	New flyer stops at H-2 with pedestrian pathway to P & R	New flyer stops at H-2 with pedestrian pathway to Park & Ride	New flyer stops at H-2 with pedestrian pathway to Park & Ride
TRANSPORTATION SYSTEM MANAGEMENT			
501.0	**TRANSPORTATION DEMAND MANAGEMENT**		
501.1	Free real-time online carpool matching	Free real-time online carpool matching	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.2	Outreach promotion and marketing of alternative transportation	Outreach promotion and marketing of alternative transportation	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.3	Emergency ride home program	Emergency ride home program	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.4	Major special events (e.g., Mililani Holiday Parade)	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
501.5	Employer based commuter/parking programs	Employer based commuter/parking programs	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description
501.6	Carsharing	Emerging and innovative strategies – Carsharing	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.7	Bikesharing	Emerging and innovative strategies – Bikesharing	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.8	Vanpool program	Vanpool program	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.9	Work from home	Support of working from home	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.10	Alternate/shifted work hours	Support of alternate/shifted work hours	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*
501.1 through 501.10	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*	*TDM Projects packaged into one project for inclusion in Deliverable G, Benefit Cost Analysis*	TDM Package
502.0	**INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**		
502.1	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)
PRICING SOLUTIONS			
601.0	**PRICING**		
601.1	Congestion pricing on H-1 or H-2	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*
601.2	HOT lanes	HOT lanes	HOT lanes
601.3	Parking strategies	Parking strategies	*No quantifiable benefits*