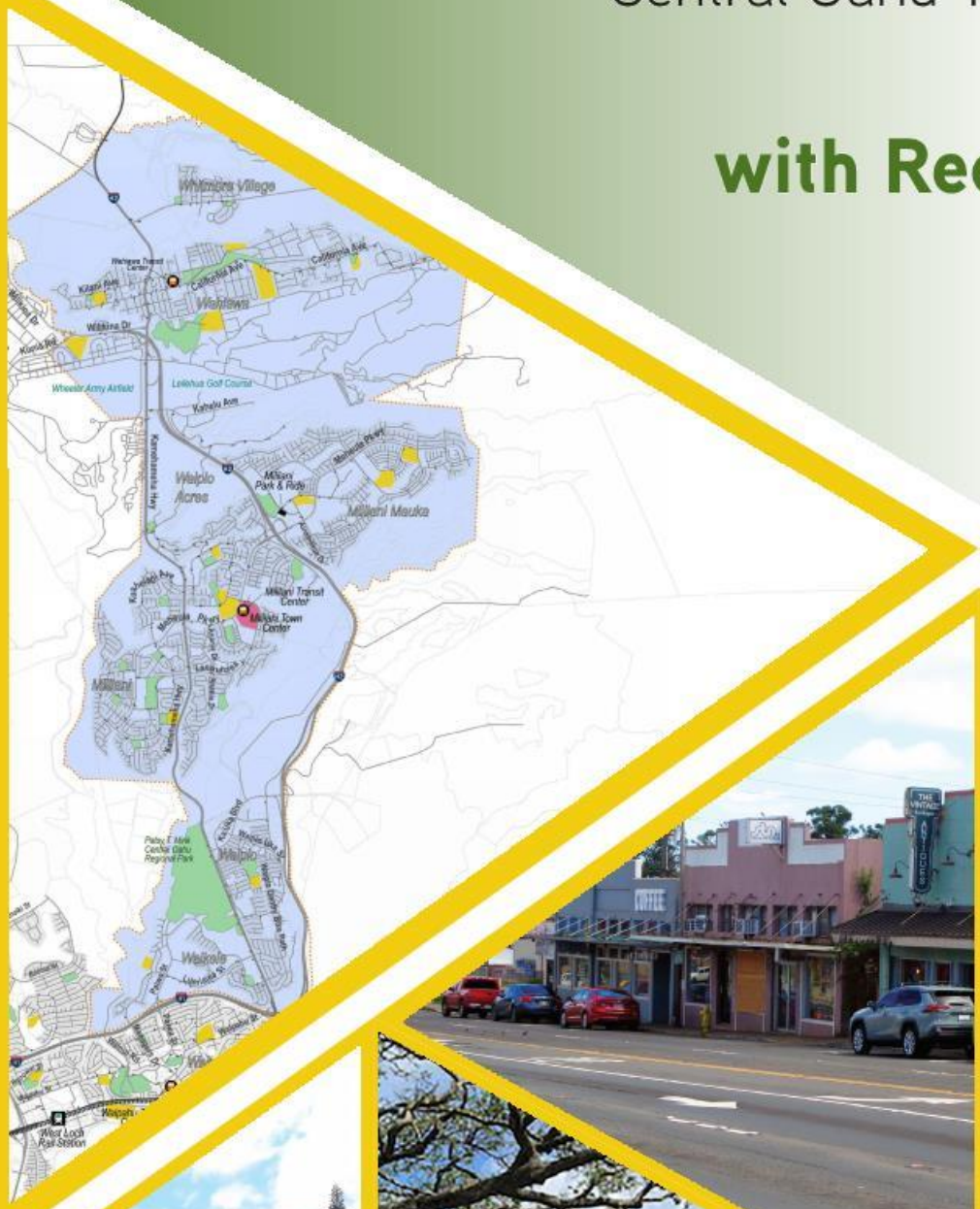
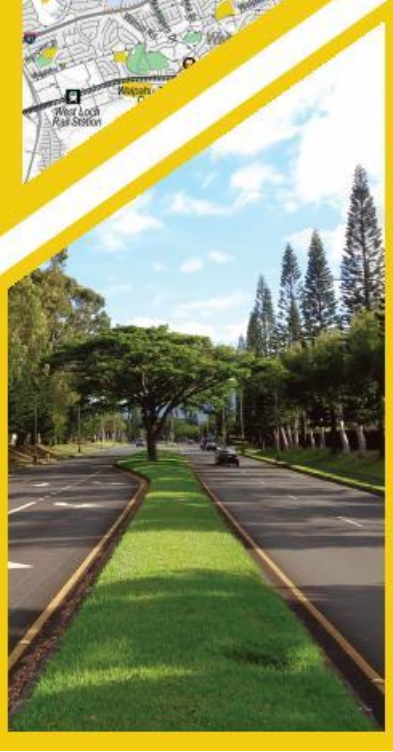
Central Oahu Transportation Study

Final Report with Recommendations

December 2019





A study sponsored by OahuMPO

Prepared by:
SSFM International, Inc. with
Fehr & Peers and Weslin Consulting Services

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Task 9: Deliverable H-2

Draft Final Report with Recommendations

December 2019

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Prepared for
Oahu Metropolitan Planning Organization

Prepared by

SSFM International, Inc. with
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HOUSE OF REPRESENTATIVES

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

The Central Oahu Transportation Study (COTS) in an initiative that began over a decade ago. This multimodal transportation needs study is the first of its kind to be done by the Oahu Metropolitan Planning Organization (OahuMPO) in the State. We are so pleased to have the support from Hawaii Department of Transportation and the City and County of Honolulu's Department of Transportation Services. The Mililani, Waipio and Wahiawa area requested this needs assessment years ago, and with the technical expertise and support of OahuMPO, we finally have a comprehensive report to help guide our transportation needs and assist us in planning more sustainable communities.

The COTS study initially encountered resistance, even though it was fully funded and needed in our community. As the Chair of OahuMPO Policy Board at the time, it was with great pride that we negotiated the current scope of this study to include, "strategies and systems improvements that are technically feasible, financially realistic, sustainable and meet regional transportation needs." Our community was at the heart of this Study, so it was imperative that we allowed the community to provide input and incorporate their concerns and ideas into this final document.

I would like to express my appreciation to the dedicated staff of Oahu Metropolitan Planning Organization, our Communities of Mililani, Waipio Gentry, Waikele and Wahiawa, the State Department of Transportation, the Honolulu City and County Department of Transportation Services, the Mililani/Waipio/Melemanu Neighborhood Board #25 and all those who helped put this document together. This document should encourage us all to continue to plan for our future.

Sincerely,

Representative Ryan Yamane

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APPENDICES

Appendix A Summary Pages for each Recommended Project
Appendix B Full List of Projects Considered
Appendix C Survey Forms Used to Gather Community Input
Appendix D CAC Permitted Action Group Perspective Statement

ACRONYMS

ACS	American Community Survey
ADA	Americans With Disabilities Act of 1990
BCA	Benefit Cost Analysis
BRT	Bus Rapid Transit
CAC	Citizen Advisory Committee
COTS	Central Oahu Transportation Study
DTS	City and County of Honolulu Department of Transportation Services
EA	Environmental Assessment
EIS	Environmental Impact Statement
FY	fiscal year
GHG	greenhouse gas
HDOT	Hawaii Department of Transportation
HOV	high occupancy vehicles
HRS	Hawaii Revised Statutes
ITS	Intelligent Transportation Systems
NCTAMS PAC	Naval Computer and Telecommunications Area Master Station, Pacific
NEPA	National Environmental Policy Act
O&M	operations and maintenance
OahuMPO	Oahu Metropolitan Planning Organization
ORTP	Oahu Regional Transportation Plan
OTS	Oahu Transit Services, Inc.
PIG	Permitting Interaction Group
PMT	person miles traveled
PUC	primary urban center
SOV	single-occupant vehicle
STIP	Statewide Transportation Improvement Program
TDM	Transportation Demand Management
TIP	Transportation Improvement Program
V/C	volume to capacity ratio
VMT	vehicle miles traveled
vpd	vehicles per day

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OVERVIEW OF THE CENTRAL OAHU TRANSPORTATION STUDY

The Central Oahu Transportation Study (COTS) assesses the multimodal transportation needs of the region and identifies key transportation system improvements, strategies and policies that can improve regional transportation mobility and access in a sustainable way. The strategies and system improvements are technically feasible, financially realistic, sustainable, and meet regional transportation needs.

This report comprises the deliverable for **Task 9, Deliverable H-2**. The full list of tasks are:

- Task 1: Coordinate and review past and on-going traffic, transit, and land use studies prepared by other agencies, establish a project management working group, and develop a stakeholder involvement process.
- Task 2: Identify Performance Measures and measures of economic sustainability to collect and establish a comprehensive baseline multimodal transportation dataset.
- Task 3: Analyze and evaluate regional transportation, demographic, economic, and land use trends and issues.
- Task 4: Determine and assess current and future multimodal needs and opportunities for the region through technical methodologies, user survey and stakeholder outreach. The technical forecasting of future traffic, transit, land use, and other related projections will utilize and be done in coordination with OahuMPO's current travel demand forecast model and Congestion Management Process.
- Task 5: Identify potential strategies and system improvements for key corridors in the region, including but not limited to, transit improvements with connections to the Honolulu rail transit system and H-2.
- Task 6: Assess order-of-magnitude of impacts of the potential strategies and system improvements utilizing identified Performance Measures. This order-of-magnitude assessment will include expected project and strategy implementation timing, project delivery issues including land acquisition, environmental impacts, and estimates of operations and maintenance costs.
- Task 7: Define the benefits and costs of the potential strategies and system improvements and compare those benefits and costs to each other.
- Task 8: Compare and prioritize those potential strategies and system improvements that meet the desired purpose mentioned above (technically feasible, financially realistic, and sustainable).
- **Task 9: Develop recommendations and an implementation timeframe to set priorities for those strategies and system improvements.**

Twelve deliverables document the results of the nine tasks and their subtasks. The reports include:

A. Assessment of Previous Studies and Surveys associated with the study area and recommendations for further data collection or survey work as needed. Report A provides the assessment of the studies and surveys identified in two deliverables that have been submitted: List of Previous Studies and List of Previous Surveys.
B. Identification of the Trends and Issues impacting the COTS area. This report will include the demographics, economics and land trends occurring in the study area as well as identify the impacts of those trends.

B.2 Identification and definitions of Performance Measures, Sustainability Performance Measures, Baseline and Data Elements that will be used to guide and evaluate project alternatives.

C. Data Memorandum that lists the information needed based upon Deliverables A through B.2 and documents the results of the data collection.
D. A discussion of previous Alternatives as well as strategies for improvements will be presented in this report.
E. The Preliminary Ranking of Identified Projects is detailed in this report. The Performance Measures identified in Report B will be applied to the alternatives. TransCAD model using the OahuMPO model runs will provide a means to compare alternatives (as applicable). The outcome of these tasks will be a ranking of alternatives and their impacts on the study area. A separate technical memorandum (Deliverable E-2) will be prepared summarizing the effectiveness of the TransCAD model as a planning tool for this study.
F. Documents the Feasibility Assessment of the alternatives. Documentation will include identifying criteria for feasibility and sustainability assumptions; reporting on the impacts by Performance Measure; identification of environmental impacts and identified mitigations; and, assumptions for implementation all leading to a refinement of the alternative rankings.
G. The Financial Assessment will be documented in this report. Financial assumptions and requirements including costs will be reviewed. The benefits and costs of the alternatives will be assessed and compared including any identified trade-offs.

H.1 The Packages of Projects and Strategies to Address the Three COTS Goals identifies and compares the most effective set of strategies and system improvements to improve mobility for Central Oahu.

H.2 The Report on Prioritization and Recommendations for Implementation will summarize and prioritize strategies; identify recommendations; identify impacts of no implementation; recommend an implementation timeframe; and, identify any impacts if implementation is not accomplished within the recommended timeframe.

I. This report will provide a summary of the Community Input and how that input was used to inform the study.
J. Survey Results from any new surveys will be documented in this report.

After community concerns were expressed about the study area, OahuMPO decided to expand the study area to include all of Wahiawa and Whitmore Village. Four reports document the results of the study for the expanded study area. The reports include:

W-1 Identification of the Trends and issues impacting the COTS area. This report describes the demographics, economic, and land trends occurring in the study area, and it identifies the impacts of those trends.

W-2 Presents the list of projects, their descriptions, and locations. This report provides an assessment of the Performance Measures and a Feasibility Assessment.

W-3 The Financial Assessment. This report documents the financial assumptions and requirements. The benefits and costs of the alternatives are assessed and compared, including any identified trade-offs.

W-4 The Final Report on Prioritization and Recommendations for Implementation. This report summarizes and prioritizes strategies; identifies recommendations; identifies impacts of no implementation; recommends and implementation timeframe. Impacts are discussed if implementation is not accomplished within the recommended timeframe.

The projects for the original and expanded study are combined into this final report called Deliverable H-2.

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EXECUTIVE SUMMARY

The Central Oahu Transportation Study (COTS) assesses the multimodal transportation needs of the region and identifies key transportation system improvements, strategies, and policies that can improve regional transportation mobility and access in a sustainable way. The strategies and system improvements were evaluated using data driven analyses to recommend projects that are technically and financially feasible, sustainable, and help meet the region's transportation goals.

Rapid development in the COTS area since the 1970s has caused increased congestion during peak periods. Residents desire to improve their mobility and access within the region and beyond it. In addition, the study examines future development (such as Koa Ridge), changing regional travel patterns, and the need for new transportation infrastructure to keep pace with anticipated development.

The results of the COTS support the Oahu Metropolitan Planning Organization (OahuMPO) in preparing its Long Range Transportation Plan by creating a list of projects that are vetted through technical analyses, with cost estimates and community review. It supports the Transportation Improvement Program (TIP) for programming funding over the short term (next one to four years).

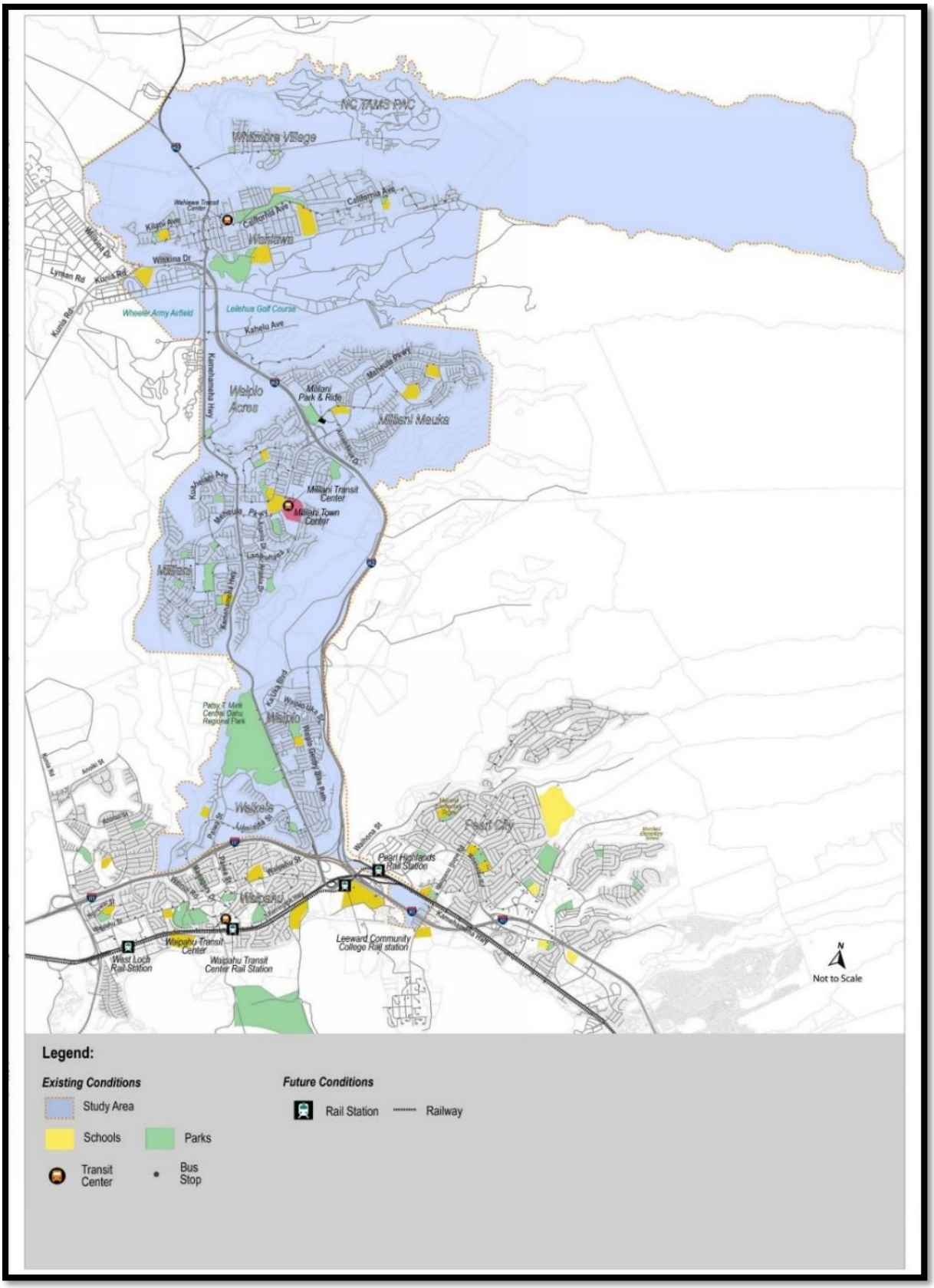
The results of the COTS support the participating agencies by identifying projects in the study area that help the district and the island-wide transportation system. The projects under State or County jurisdiction can be forwarded through their respective project development and budgeting processes.

<u>Study Area</u>

The full study area map is presented in **Figure ES-1**. The full study area starts at the H-1 corridor where it extends slightly beyond the H-1/H-2 merge to include the Waiawa Rail Station at Pearl Highlands and parking garage, which are transportation facilities important to Central Oahu residents. Moving northward, the study area encompasses Waipio and Mililani to the west and the H-2 corridor and Mililani Mauka to the east. The upper regions of the study area include Wahiawa (not including Schofield Barracks or Wheeler Army Airfield), and Whitmore Village/ Naval Computer and Telecommunications Area Master Station, Pacific (NCTAMS PAC).

This is a large study area. Analyses were done for two sub-areas: Mililani-Waipio and Wahiawa-Whitmore Village. The dividing line between the two is California Avenue.

Figure ES-1. Central Oahu Transportation Study Area



Approach

The study began with a review of past and on-going traffic, transit, and land use studies prepared by others, including public sector entities and private landowners. After that, the team identified the major regional transportation, demographic, economic, and land use trends and issues facing Central Oahu. The team developed performance measures and a comprehensive baseline for multimodal transportation.

Future needs and opportunities for the region were identified using technical review, surveys, and stakeholder and community outreach. This work was coordinated with OahuMPO's current travel demand forecast model and their Congestion Management Process.

Draft studies and reports were reviewed by OahuMPO staff and by its participating agencies who formed a Project Management Working Group. Changes were made to the draft reports based on comments received. Community meetings were held to identify goals and additional projects, and to solicit feedback on projects identified to address those goals.

The initial identification of projects in the Mililani-Waipio sub-area resulted in 90 potential projects, including 17 that would be completed by a private developer (Koa Ridge). A mobility analysis resulted in 20 projects being dropped. The application of performance measures and feasibility review resulted in no projects dropped and one bicycle project added. The nine Transportation Demand Management (TDM) projects were combined into a single project due to their relatively low cost. Thirty-seven projects met the technically feasible requirement and were evaluated in the financial feasibility analysis.

After community concerns were expressed about the study area, OahuMPO decided to expand the study area to include all of Wahiawa and Whitmore Village. Thus, a similar set of analyses were conducted for the Wahiawa-Whitmore Village area, resulting in 18 additional projects that were technically feasible.

The study team reviewed order-of-magnitude impacts based on the performance measures plus a review of implementation and project delivery issues including timing, project obstacles, land acquisition, environmental impacts, estimates of costs for construction and for operations and maintenance (O&M), quantifiable benefits and costs, and calculated a Benefit Cost Analysis (BCA) ratio. This part of the study addressed the financially feasible requirement.

Projects that have general community support are typically easier to implement. Gathering community input was an important part of the Central Oahu Transportation Study. Public involvement opportunities included community wide meetings, working with a Permitted Interaction Group (PIG) of the OahuMPO Citizen Advisory Committee (CAC), and a series of surveys (administered both online and at community events) gathering participant reactions to the set of project alternatives.

List of Projects Recommended by Type

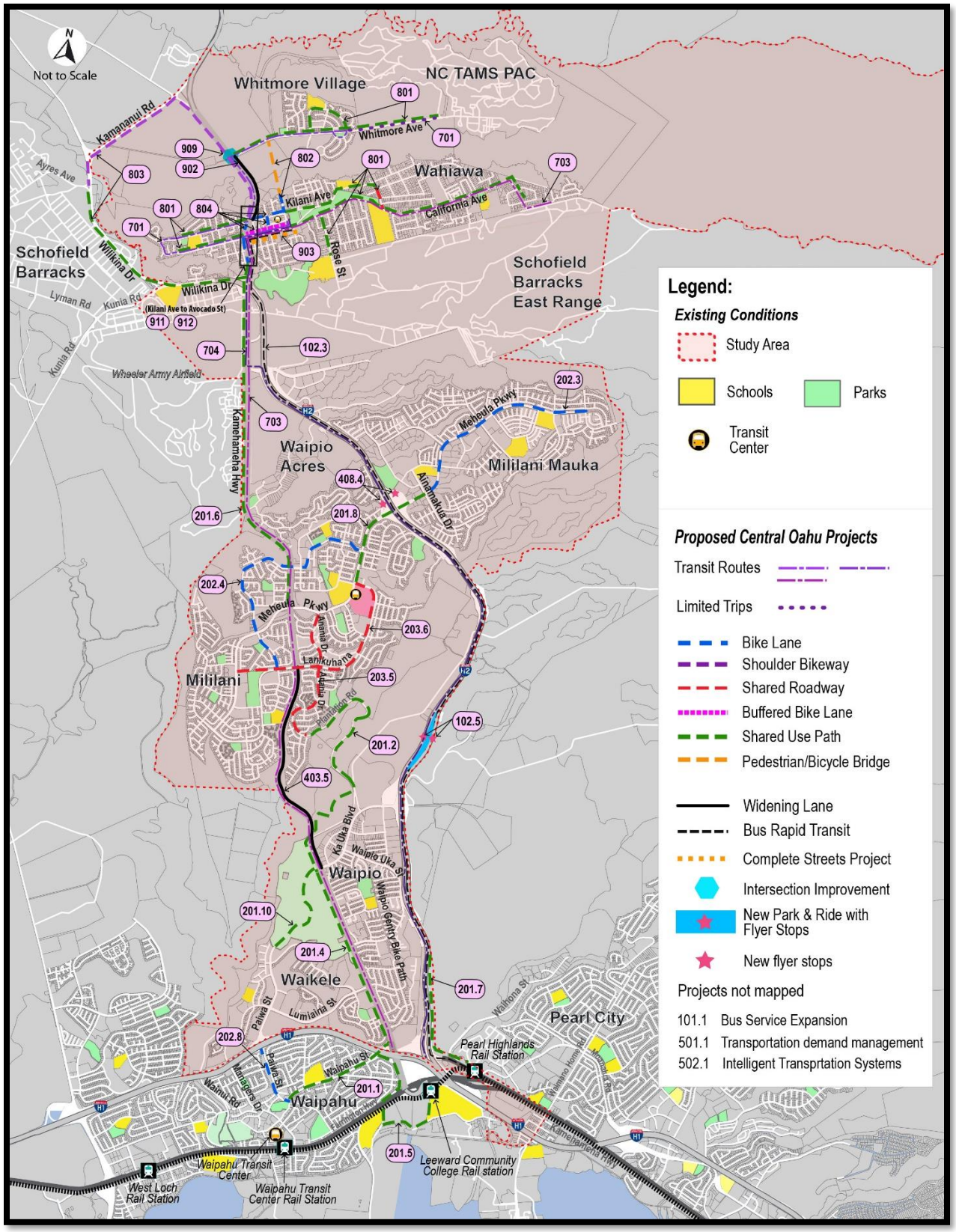
Table ES-1 shows the list of projects that are recommended, either in the short-term or the mid-term. There are six transit projects, nine roadway projects, and eight bicycle and pedestrian projects. Those projects that the community survey respondents identified as their top choice within that project type are shown with an asterisk. All of these are recommended in the short-term to emphasize priority. **Figure ES-2** shows the locations of the recommended projects.

Table ES-1. Recommended Projects by Type and Sub Area

MILILANI / WAIPIO			
TRANSIT PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
101.1 *	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	X	
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands		X
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands		X
ROADWAY PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue		X
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	X	
501.1	Transportation Demand Management (TDM)	X	
502.1	Intelligent Transportation Systems (ITS)	X	
BICYCLE AND PEDESTRIAN PACKAGES		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
A * Mililani To Waipahu	201.1 New Pathway – Waipahu Street 201.2 New Pathway – Anania Drive to Central Oahu Regional Park 201.4 New Pathway on Kamehameha Highway 201.5 New Pathway on Kamehameha Highway 203.5 Bike Route – Anania Drive, Meheula Parkway to Kipapa Gulch	X	
B Meheula Parkway	201.8 Bike Pathway on Meheula Parkway 202.3 Bike Lanes on Meheula Parkway 202.4 Bike Lanes on Kuahelani Avenue 203.6 Bike Route on Lanikuhana Avenue		X
C Paiwa / Central Oahu Regional Park	201.10 Bike Pathway 202.8 Bike Lanes	X	
D – New Pathway	201.6 New Pathway Kamehameha Highway 201.7 New Pathway on Cane Haul Road, H-2 to the Waiawa Rail Station at Pearl Highlands		X

WAHIAWA / WHITMORE VILLAGE			
TRANSIT PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	X	
703 *	Expanded Late Night Service Bus Routes 51/52	X	
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	X	
ROADWAY PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue		X
903 *	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	X	
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	X	
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	X	
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	X	
BICYCLE AND PEDESTRIAN PACKAGES		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
801 *	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	X	
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village		X
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road		X
804	New and Upgraded Bike Lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street		X

Figure ES-2. Recommended Projects



Community Input Process

Community input was solicited in multiple ways. In the first two years of the study, there were two community meetings. The first community meeting served as a study kick-off and was attended by 46 guests. It was held on November 30, 2016 at Mililani High School Cafeteria. The format was an open house followed by a presentation. The study stations each had interactive boards where people could describe where they live and work, most important issues to them, travel needs, preferred performance measures, and projects that should be considered. Fourteen projects were identified by the public at the first community meeting. These were carried forward into the project for analyses and evaluation.

The second community meeting was held on November 16, 2017 at Kanoelani Elementary School Cafeteria in Waipio. There were 31 guests. After a short overview presentation, attendees rotated through three stations: Project Overview and Information, Transit and TDM Projects, and Multimodal and Pricing Projects. At each station, a study team member made a short presentation, elicited discussion, and passed out feedback forms. Each feedback form was relevant to the modal topic area. This style of meeting was recommended by the CAC-PIG.

Upon recommendation of the PIG, it was decided to gather input directly from Neighborhood Boards and at community events, rather than through a final community meeting. Three types of survey were used: a "dot" exercise at community events, a four-page paper survey, and an equivalent online survey.

Selection Criteria for Recommended Projects

The following criteria were used in the final selection of recommended projects:

- Transportation Benefits Provided
- Performance Characteristics
- Benefit Cost Ratio
- Community Support

The transportation benefits analysis examined six potential benefits. Each benefit was assigned a score from 0 to 3. Total points were then added for all eight benefits. Later, these benefits were assigned financial values and became part of the benefit cost analysis.

- Number of other modes enhanced
- Potential to reduce vehicle congestion
- Infrastructure Condition
- Safety
- Deficiency Status
- Contribution to the mode share goal

Analysis was made of how projects met the performance measures that had been identified early in the project. The performance measures applied differs by type of project, as explained in **Deliverable Report B-2, Performance Measures**.

Cost analysis included quantification in dollars of benefits and costs followed by a calculation of benefit cost ratio. These are shown in **Table ES-2** for Short-Term Projects and **Table ES-3** for Mid-Term projects. Benefit (Column A) sums all benefits over a multi-year period to 2040. Transit, Roadway, and Bicycle/Pedestrian projects have different types of benefits. Explanations of these, along with explanations of baseline (2018), discount rate (3%), inflation rate (1%) were presented in **Deliverable G, Benefit Cost Analysis** and **Deliverable W-3, Benefit Cost Analysis of Potential Projects in the Wahiawa/Whitmore Village Area**.

Total Cost (Column B) adds construction cost plus operations and maintenance cost for the period from project opening to 2040. Many of these projects have value beyond 2040, but that is the forecast year used for consistency throughout this study.

Table ES-2. Cost and Benefit Analysis of Short-Term Projects Recommended

Project Number	Project Description	A Benefit	B Total Cost (Con + O&M)	C BCA (3%)
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	$ 221.2 M	$ 66.2 M	3.34
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	$ 34.3 M	$ 10.3 M	3.33
703	Expanded Late Night Service Bus Routes 51/52	$ 30.9 M	$13.4 M	4.26
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	$ 143.5 M	$46.5 M	3.09
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	$3.9 M	$7.6 M	0.51
501	Transportation Demand Management	$ 42.9 M	$15.1 M	2.84
502	Intelligent Transportation System	$ 6.1 M	$8.8 M	0.69
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	$ 44.1 M	$7.6 M	5.84
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	$1.4 M	$2.1 M	0.66
911	Kamehameha between Kilani Avenue and Avocado Street Traffic Signal Timing	$12.0 M	$66,454	180.95
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	$ 4.7 M	$49,763	94.39
Package A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	$37.04 M	$16.92 M	2.19

Project Number	Project Description	A Benefit	B Total Cost (Con + O&M)	C BCA (3%)
Package C	Bicycle and Pedestrian Package – New Pathway and Lanes through Paiwa/Central Oahu Regional Park	$16.43 M	$6.44 M	2.55
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	$22.7 M	$23.2 M	0.98

Table ES-3. Cost and Benefit Analysis of Mid-Term Recommended Projects

Project Number	Project Description	A Benefit	B Total Cost (Con + O&M)	C BCA (3%)
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	$ 99.1 M	$28.9 M	3.43
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	$ 263.0 M	$125.4 M	2.10
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	$ 40.6 M	$149.8 M	3.68
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	$19.8 M	$17.3 M	0.87
Package D	Bicycle and Pedestrian Package – New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands	$10.97 M	$15.04 M	0.73
Package B	Bicycle and Pedestrian Package – New Pathway, Lanes, and Route through Meheula Parkway	$53.91 M	$9.84 M	5.48
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	$7.9 M	$4.6 M	1.73
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS	$9.6 M	$6.4 M	1.50
804	New and Upgraded Bike Lanes in Wahiawa Commercial District	$3.9 M	$893,000	4.35

Community Support

Based on the surveys conducted in the Mililani-Waipio sub-area:

- The highest transit rating was for "Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) (62% positive) followed by "Bus Rapid transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3) (53% positive) and "Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands" (Project 102.5) (54% positive).
- The top transit project was "Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) (35%). This answer is consistent with positive rating results. The community events also favored "Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) as the top project at 51%, followed by "Bus Rapid transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3) at 23%.
- The highest roadway ratings were for "New Road to Pearl City" (60% Positive), Project "Widening Kamehameha Highway" (53% Positive), and "Intelligent Transportation Systems (ITS)" (59% Positive).
- The top roadway project in the survey was the "New Road to Pearl City" (Project 406.1) (31%), followed by "Widening Kamehameha Highway" (Project 403.5) (18%) and "ITS" (15%), which is consistent with findings on other questions. This mirrors the results of the top project choices in the online survey.
- The highest bicycle and pedestrian ratings were for Package A, Mililani to Waipahu, (53% positive); Package D, New Pathway Wahiawa to the Waiawa Rail Station at Pearl Highlands, (52% positive); and Package C, Paiwa/Central Oahu Regional Park, (51% positive). Package B, Meheula Parkway, was 44% positive and 39% neutral.
- The top bicycle project was Package D, New Pathway Wahiawa to the Waiawa Rail Station at Pearl Highlands (39%); followed by Package C, Paiwa/Central Oahu Regional Park (33%); Package A, Mililani to Waipahu (30%); and then Package B (14%). This question showed a variation in order from the rating question, although Package B, New Pathway, Lanes, and Route through Meheula Parkway, remains at the bottom.

In the Wahiawa-Whitmore Village sub-area:

- For transit projects, the top project was "Expanded Late Night Service, Routes 51/52" (Project 703) (54%). After that, "Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2" (Project 704) (14%) and "Increase bus service to/from Whitmore Village and Wahiawa Transit Center" (Project 701) (13%) ranked next highest. All projects received some top votes.
- For roadway projects, the top project was "California Avenue Complete Streets from Kamehameha Highway to Wahiawa District Park" (Project 903) (38%) followed by "Kamehameha Highway Widening North of Whitmore Avenue to Kilani Avenue" (Project 902) (28%). All projects received some top votes, but in a somewhat distributed manner.

- For bicycle and pedestrian projects, the highest-ranking project was a "New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit" (Project 801) (59%). This was followed by a tie between "New Pedestrian and Bicycle Bridge connecting Wahiawa and Whitmore Village" (Project 802) and "New and Upgraded Bike Lanes in Wahiawa Commercial District" (Project 804) (19% each).

Demographic Trends

Population data was derived from the American Community Survey (ACS) (September 2016). Many important insights come from studying the data.

Mililani-Waipio has been and will continue to grow in population. By contrast, the Wahiawa area has been stable, with growth less than 0.017%; and Whitmore Village has been in decline, with a negative growth rate of -14.4%. The Central Oahu area hosts only 10% of the island's jobs. The natural conclusion from this is that Central Oahu has a need to commute. Central Oahu is a suburban community. It will be challenging to provide the transportation infrastructure to support this population. Identifying projects to provide improved mobility is one of the purposes for this study.

The age of the population has risen in the study area. In the five-year average, the percentage of those over 65 years of age has risen from 11.33% to 14.0%. Wahiawa and Whitmore Village are even more pronounced rising from 15.8% to 17.6% of those aged 65 or older. This follows an island-wide trend of an aging population. Over the next few years, Central Oahu will have a greater need for public transportation as people can no longer drive, and a greater demand for Handi-Van service. The percent of persons reporting a disability in Mililani-Waipio is smaller (7.3%) than Oahu as a whole. The percentage of disabled people in Wahiawa-Whitmore Village area is larger at 16.2% for Wahiawa and 11.8% for Whitmore Village.

The study area shows little migration (most people lived in the district a year ago), which suggests many people are aging in place. Thus, many who had once been commuters are now staying within the study area during the day. This implies that bus routes that circulate the community are valuable. Convenient connections to rail, which do not require seniors to travel in the uncertain freeway conditions, are also valued.

Across the Central Oahu area, mean household income was steady from 2005 through 2010 and increased in the next five-year period. But, median income in the study area varies greatly by sub-area. In Mililani Makua, it is $112,601 and in Waipio Acres it is $67,563. Some of this may be due to multiple workers in a household, and some due to household composition differences

such as size and multi-generational. About 37% of households have three or more vehicles. Most households own their home versus being renters.

In the Wahiawa-Whitmore Village area, incomes were mostly flat or decreased slightly. Wahiawa's mean household income is the lowest of all sub-areas. Lower household income relates to higher unemployment, less disposable income for travel and other needs. Household sizes are high, especially in Whitmore Village (44% have four or more members). Higher household income is typically associated with the increased rates in driving. However, rail may offer an alternative to these household members, and easy access is critical to making that choice. Households with multiple members typically need multiple modes of transportation.

Kamehameha Highway in Waipio

The base number of workers over 16 years of age has averaged 47,000 in the Mililani-Waipio area. The distribution of commute by mode has remained stable. Drive alone is the highest percentage, at about 74%. This is followed by 15% for carpool. For the non-automobile modes, 5.4% use public transportation and 2.6% work at home. About 1.8% bike and 1.7% use taxi or motorcycle.

Wahiawa adds another 8,274 workers and Whitmore Village adds 2,180 workers for a study area total of 10,454 workers. This is about 25% more added to the COTS area as a whole. In Wahiawa, approximately 65% drove alone. This is followed by 14% for carpool, 10% for transit, and 6% for bike. In Whitmore Village, approximately 71% drove alone, followed by about 13% that rode transit and 10% that carpool.

The low numbers for alternate modes will be changed only through investment in facilities, which make them more favorable to travelers. The introduction of rail is a game changer and is expected to support behavior change, including non-vehicle modes to access rail. Unique to Whitmore Village, the ACS reported no bicycle use as the primary mode of transport to work. Bicycle and safety projects may encourage bicycle use in the area.

Travel time to work via public transportation has risen from a mean of 49.1 minutes in the period 2005-2009 to a mean of 59 minutes five years later in the period 2010-2014. Absent any new investment, this mean will continue to grow. The sole adjustment drivers can make is what time they leave to get on the road. The data shows that 28.6% of Mililani-Waipio residents leave before 6:00 AM and an additional 24.4% leave before 7:00 AM. In Wahiawa-Whitmore Village, 40% now leave before 6:00 AM and an additional 21.2% leave before 7:00 AM.

A possible reaction to this increasing travel time is that workers may be shifting where they work. There has been a steady decline in those who commute to the "principal city" (Honolulu) from 46% to 42.4%. This also may reflect opportunities growing in Kapolei and Ewa, which is in the

non-peak direction on H-1, although H-2 will become increasingly more congested. Whether commuting in the eastern or western direction, access to rail is a critical way to avoid driving.

Travel trends

Based on data from the State of Hawaii Department of Health Crash Data Base, the number of motor vehicle crashes in the Mililani-Waipio sub-area in the period 2007-2011 was 287. The number of motor vehicle crashes in the Wahiawa area was 284. The data shows a relatively constant number of incidents, except for 2009 which appears to be an outlier. Pedestrian crashes are steadily increasing from 57 in the period 2007-2010 to 90 in the period 2011-2014.

For the period, 2007-2011, Wahiawa shows 284 motor vehicle crashes. Of these, 194 were car/truck crashes. They also experienced 67 motorcycle or moped crashes, 50 pedestrian crashes, and seven bicycle crashes. This is a much higher proportion of motorcycle crashes. Pedestrian and bicycle incidents are comparable to elsewhere in the COTS area. Projects that improve safety are important to the entire study area. Attention to speed reduction and pedestrian safety is critical.

Kamehameha Highway at Kipapa Gulch

The existing year conditions for this study was 2016. During the AM peak period, major congestion occurs on H-2 southbound between Ka Uka Boulevard and the H-1 Interchange. After the H-1/H-2 merge, traffic congestion is severe all the way to downtown Honolulu, even with the addition of the zipper lane for high occupancy vehicles (HOV). H-1 is the cause of current congestion experienced within the study area, and it will continue to be into the foreseeable future. Traffic on local streets as well as on the majority of Kamehameha Highway and Kunia Road (except near the H-1 interchanges) are comparatively free flowing.

Most of the travel during peak times is from inside the study area to outside of it. Only 7% of trips stay within the study area. Major new projects in Central Oahu, such as Koa Ridge with 3,500 new housing units and 10 acres of commercial space, appear to mimic those patterns of travel outside the district for employment and schooling. The PM peak congestion is less severe than the AM peak. Congestion will worsen for the COTS area as future vehicle demand will further exceed the capacity of the downstream roadway system. This will result in increased queuing on the H-2 freeway, Kamehameha Highway, and Kunia Road in the mauka-bound direction in the AM peak period. Without additional downstream capacity or an alternate roadway (in addition to the planned rail system), congestion and travel time reliability will worsen.

The select link analysis shows where congestion is coming from. In the AM peak period, approximately 18% of the traffic on southbound H-2 at Ka Uka originates north of Schofield/ Wahiawa (i.e., comes from the North Shore) according to the model. About 29% originates in Mililani Mauka and 21% originates in Wahiawa and Whitmore Village. The rest comes from the

Schofield area and Mililani and enters H-2 at Kamehameha Highway and Meheula Parkway, respectively. Once that traffic reaches the H-1 merge, 86% travels east; 9% gets off at Pearl Highlands/Waipahu; and 5% goes west on H-1. The southbound distributions remain relatively stable throughout the day, just the volumes change. The future year 2040 patterns show some shifts, most notably an increase in travel towards west Oahu (3% increase) and to Pearl Highlands/Waipahu (8% increase) where they can access the rail system.

While a larger proportion of COTS area traffic will travel to and from the Kapolei, Pearl Highlands, and Waipahu areas in 2040, the primary travel attraction for the COTS area will be the primary urban center (PUC) of Honolulu. These patterns will continue to burden the H-1 freeway with excessive demand during the AM peak period. Congestion will also be an issue during the PM peak period, but the problem will be less pronounced given that trips will be distributed to several roadways traveling into the COTS area.

New development including Koa Ridge will increase employment opportunities within the COTS area and will result in increases in internal trip making. However, the greatest absolute and proportional increases in both person miles traveled (PMT) and vehicle miles traveled (VMT) will occur for trips with an origin or destination outside the COTS area. Given the preponderance of travel to and from the PUC, this will inevitably strain the regional transportation and roadway system that connects to Pearl City, Aiea, and downtown Honolulu. In addition, the overall increase in VMT will negatively contribute to fossil fuel consumption, greenhouse gas (GHG) emissions, and associated climate change impacts.

Eighteen bus routes serve the COTS area, including suburban trunks, suburban feeders, community circulators, and Express routes. Transit times on TheBus routes show declining annual average speed and issues with both on-time performance and schedule adherence. If no actions are taken, transit performance will continue to erode resulting in slower speeds and loss of passengers. This loss, together with continuing growth, will result in more personal vehicles on the road during peak periods. Additional vehicles will lengthen peak periods and lead to the continuation of commuter frustration. Transit projects, particularly those projects that provide dedicated bus lanes, bus rapid transit (BRT) services, and that provide reliability will encourage the shift of commuters to transit and improve overall transportation performance.

Community Goals

Early in the study process at a community meeting, three important goals were set to help guide the selection of projects. These goals are:

- Reduce congestion experienced by travelers in Central Oahu
- Create easy access to the HART rail system
- Create a multimodal system in Central Oahu

Sixteen projects contribute to the Reduce Congestion goal are shown in **Table ES-4.**

Table ES-4. Projects that Contribute to the Reduce Congestion Goal

Project Number	Project Name	How it contributes to congestion relief
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Encourage mode shift away from auto
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Encourage mode shift away from auto Reduces transit travel time
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Encourage mode shift away from auto Reduces transit travel time
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	Adds capacity
Pkg A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Encourage mode shift away from auto
Pkg D	New Pathways	Encourage mode shift away from auto
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	Encourage mode shift away from auto
703	Expanded Late Night Service Bus Routes 51/52	Encourage mode shift away from auto
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Encourage mode shift away from auto Reduces transit travel time
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	Adds capacity
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Improve intersection operations
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Improve intersection and roadway operations
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	Improve intersection and roadway operations
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	Encourage mode shift away from auto
501.1	Transportation Demand Management (TDM)	Encourages mode shift to HOV
502.1	Intelligent Transportation Systems (ITS)	Provide information on mode choice

Ten projects contribute to the Rail Access goal are shown in **Table ES-5**.

Table ES-5. Projects that Contribute to the Rail Access Goal

Project Number	Project Name	How it contributes to Rail Access
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Adds two routes and new connections.
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Peak travel service to the Waiawa Rail Station at Pearl Highlands
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Adds parking. Express bus to Waiawa Station. Ped/Bike access from Koa Ridge.
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	Increased transit efficiency Safe bike/ped crossings
Pkg A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Access to Waipahu Station
Package D	Bicycle and Pedestrian Package – New Pathway	Access to the Waiawa Rail Station at Pearl Highlands
703	Expanded Late Night Service Bus Routes 51/52	Adds bus service to connect with rail stations
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Access to the Waiawa Rail Station at Pearl Highlands
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	Access to Wahiawa Transit Center
804	New and Upgraded Bike Lanes in Wahiawa Commercial District	Access to Wahiawa Transit Center

Eighteen projects contribute to the Multimodal Transportation System goal are shown in **Table ES-6**.

Table ES-6. Projects that Contribute to the Multi-Modal Transportation System Goal

Project Number	Project Name	How it contributes to Multimodal
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Helps increase transit mode share
102.3	Bus Rapid transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Helps increase transit mode share
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Helps increase transit mode share
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	Helps increase transit mode share
Pkg A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Adds bicycle and pedestrian networks
Pkg B	Meheula Parkway Bike	Adds bicycle and pedestrian networks
Pkg C	Paiwa/Central Oahu Park Bike	Adds bicycle and pedestrian networks
Pkg D	New Pathways	Adds bicycle and pedestrian networks
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	Helps increase transit mode share
703	Expanded Late Night Service Bus Routes 51/52	Helps increase transit mode share
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Helps increase transit mode share

Project Number	Project Name	How it contributes to Multimodal
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	Adds bicycle and pedestrian networks
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	Adds bicycle and pedestrian networks
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road	Adds bicycle and pedestrian networks
804	New and Upgraded Bike Lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	Adds bicycle and pedestrian networks
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	Adds bicycle and pedestrian networks
501.1	Transportation Demand Management	Helps increase non-SOV share mode share
502.1	Intelligent Transportation Systems	Multimodal information

Embedded in the COTS goals is an anticipated shift in mode choice from current levels to the future analysis year 2040. Modal split goals have been set as a stretch target to strive for an increase in sustainable transportation and reduction in single-occupant vehicle (SOV) use, 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. The stretch goals are shown in **Table ES-7** contrasted against both current levels, national averages, and Oahu island-wide comparisons.

Table ES-7. Commute to Work 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 for 2012-2016 data: 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. In 2016, 70% of Seattle commuters chose not to drive alone to work. Seattle's mode share split in 2016 was 30% drove alone, 9% carpool/vanpool, 47% public transportation, and 14% other.

In the next 25 years the goal is to have the SOV mode drop almost 14 percentage points from 73.6% to 60%. To accomplish that goal, the use of carpooling would be incentivized through TDM measures (Project 501.1) 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% and the "Other" category, such as taxi or work at home, would increase by 3.7%. The single largest increase is the use of transit which would increase by 6.6% to 12%. This is admittedly a large increase in transit mode share to commute to work. However, with the opening of the rail system between the Kualakai station in East Kapolei to the Halawa Station at Aloha Stadium in late 2020, and the full rail system scheduled for opening in 2025, this 12% transit goal is within the realm of possibility.

Implementation

This study provides projects in two timeframes: short-term and mid-term. Short-term represents projects that could start within one to four years, the period of the current TIP/STIP. Mid-term projects that involve roadway widening or new construction will need environmental, design, and construction project development work which typically takes three to five years (or longer). These projects should be identified in the next Oahu Regional Transportation Plan (ORTP). When ready for project design and construction, they will need to be on OahuMPO's TIP and the Hawaii Department of Transportation's (HDOT) Statewide Transportation Improvement Program (STIP).

Transit projects are subject to the current bus route analysis being conducted by the City and County of Honolulu's Department of Transportation Service (DTS) as part of rail opening. Central Oahu residents can take full advantage of rail and start changing their travel habits to use rail as first choice mode. Interim rail from East Kapolei to Aloha Stadium is scheduled to begin December 2020. A second interim opening as far as Middle Street will occur about two years later. The transit route expansion projects would involve adding buses to the fleet. To be conservative, the cost estimates in this study assume that new bus purchases would be involved and would be potentially 2 to 3 years out.

The likely jurisdiction for each project is shown in **Table ES-8**.

Table ES-8. Central Oahu Transportation Study

MILILANI / WAIPIO					
TRANSIT PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
101.1 *	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	County	$8.7 Million	X	
102.3	Bus Rapid transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	County	$28.9 Million		X
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	State	$103.9 Million		X
ROADWAY PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	State	$37.9 Million		X
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	State	$6.9 Million	X	
501.1	Transportation Demand Management (TDM)	State	$13.6 Million	X	
502.1	Intelligent Transportation Systems (ITS)	State	$8.1 Million	X	
BICYCLE AND PEDESTRIAN PACKAGES				**Recommendation**	
Project Number	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
A * Mililani To Waipahu	201.1 New Pathway - Waipahu Street 201.2 New Pathway - Anania Drive to Central Oahu Regional Park 201.4 New Pathway on Kamehameha Highway 201.5 New Pathway on Kamehameha Highway 203.5 Bike Route - Anania Drive, Meheula Parkway to Kipapa Gulch	County Private State State County	$17.26 Million	X	
B Meheula Parkway	201.8 Bike Pathway on Meheula Parkway 202.3 Bike Lanes on Meheula Parkway 202.4 Bike Lanes on Kuahelani Avenue 203.6 Bike Route on Lanikuhana Avenue	County County County County	$14.22 Million		X
C Paiwa / Central Oahu Regional Park	201.10 Bike Pathway 202.8 Bike Lanes	County County	$6.5 Million	X	
D - New Pathway	201.6 New Pathway Kamehameha Highway 201.7 New Path - Cane Haul Road, H-2 to the Waiawa Rail Station at Pearl Highlands	State County/ Private	$15.83 Million		X

WAHIAWA / WHITMORE VILLAGE					
TRANSIT PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	County	$865,000	X	
703 *	Expanded Late Night Service Bus Routes 51/52	County	Zero capital; all O&M	X	
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	County	$3.7 M buses $18.86 M for bus rapid transit treatments	X	
ROADWAY PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	State	$18 Million construction		X
903 *	California Avenue Complete Streets from Kamehameha Highway to Wahiawa District Park	County	$7.3 Million	X	
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	State	$1.97 Million construction	X	
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	State	$60,000	X	
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	County	$45,000	X	
BICYCLE AND PEDESTRIAN PACKAGES				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost (rounded)**	**Short-Term**	**Mid-Term**
801 *	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	 County County County State County County	$22.78 Million construction	X	
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	State	$4.36 Million		X
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road	 State State State	$6.36 Million		X
804	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	 State County County/ Private	$893,000		X

The initial cost of all projects recommended in **Table ES-8** is $349.79 Million. The short-term projects total $119.03 Million and could possibly occur in the fiscal year (FY) 2021-2022. Programming and budgeting would have to occur next year when budgets are set for FY2021.

Mid-term projects total $230.7 Million in FY 2023-2025. However, about 15% of that (or $20 Million) is needed to undertake environmental studies, design, and land acquisition (necessary for just one or two projects), and then construction. This planning and design work can be programmed for FY2021.

Impacts if Projects are not Implemented within the Timeframe

The combination of roadway, transit, and active transportation projects is intended to minimize congestion, increase transit ridership, and to provide convenient and safer travel options for people who walk and bike. However, none of the projects by themselves represent a single solution that will address the travel needs of most COTS residents, employees, and visitors. Instead, the effect of implementing multiple projects and packages of projects in a timely manner is critical to: 1) reduce future delays for motor vehicles; 2) change the behavior of some travelers to use rail, bus, bicycles, or walking; and 3) enhance the quality of life and safety for those who already choose to walk, bicycle, and take transit.

An important travel option for area residents, employees, and visitors will be the rail project. Enhancing multimodal access to the Waiawa Rail Station at Pearl Highlands, including access to buses within the COTS area that will serve the station, is critical to the area's mobility solutions. This includes constructing bike lanes and shared use facilities connecting bus stops, building and operating park and ride facilities to minimize modal transfer times, and selectively adding capacity to key roadways to improve bus operations and minimize auto travel time. Failure to encourage new transit riders by improving access to rail and bus will further exacerbate projected vehicle congestion levels.

The success of rail is dependent upon frequent, reliable bus connections to the rail stations within the COTS area. A major portion of rail ridership is projected to come from Central Oahu with the Waiawa Rail Station at Pearl Highlands being one of the highest use stations. Identified projects adding bus expansion and supporting projects along the Kamehameha Highway and H-2 corridors need to be in place prior to the full rail opening in 2025. Along with the increase in routes, hours of service, and frequency are the accompanying projects that speed up the transit trip. These include, BRT elements, highway ramp metering with transit bypass, and the use of the freeway space for transit-specific projects.

The largest project is the "Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands" (Project 102.5) at $103.9 Million. This project has been assigned to the state because it is on a state-owned facility. While this is a sizeable investment, it could be phased. The first phase cost for the ramps and surface parking is $37.5 Million. The later phase would provide structured parking. This is a critical project to ensure that residents of Central Oahu and the North Shore can access rail easily and remove them from H-2 and H-1. Without a convenient park and

ride, there may be no place to park when they get to the Waiawa Rail Station at Pearl Highlands. Residents may be more inclined to forego rail and drive to their destination.

Other projects providing safe pedestrian and bicycle connections within the community and to transit remove more cars from neighborhood streets and provide a safer environment. These projects need to be implemented to encourage bicycling and walking. Amenities such as secure bicycle storage, wayfinding, electronic signage, along with other ITS elements, are necessary at transit centers and high capacity transit stops.

Delaying implementation of projects will result in worsening congestion and safety issues, such as increased crashes and neighborhood diversions. In addition, congestion will result in reduced worker productivity and economic challenges for businesses located in or dependent on access to the COTS area.

1.0 INTRODUCTION AND BACKGROUND

1.1 Study Objectives

The Central Oahu Transportation Study (COTS) is a means to assess the multimodal transportation needs of the region and identify key transportation system improvements, strategies, and policies that can improve regional transportation mobility and access in a sustainable way. Projects had to be technically feasible, financially realistic, and sustainable. To the extent possible, the work was designed to be data driven.

The goal of the Central Oahu Transportation Study is to assess the multi-modal transportation needs of Central Oahu.

Rapid development in the COTS area since the 1970s has caused increased congestion during peak periods. Residents desire to improve their mobility and access within the region and beyond it. In addition, the study was to examine future development (such as Koa Ridge), changing regional travel patterns, and the need for new transportation infrastructure to keep pace with anticipated housing development.

The results of the COTS support the Oahu Metropolitan Planning Organization (OahuMPO) in preparing its Long Range Transportation Plan by creating a list of projects that are vetted through technical analyses, with cost estimates, and community review. It supports the Transportation Improvement Program (TIP) for programming funding over the short term (next one to four years) and mid-term (four to five years).

The results of the COTS support the participating agencies by identifying projects in the study area that help the district and the island-wide transportation system. The projects under State or County jurisdiction can be forwarded through their respective project development and budgeting processes.

1.2 Study Area & Maps

The full study area map is presented in **Figure 1-1**. The full study area starts at the H-1 corridor where it extends slightly beyond the H-1/H-2 merge to include the Waiawa Rail Station at Pearl Highlands and parking garage, which are transportation facilities important to Central Oahu residents. Moving northward, the study area encompasses Waipio and Mililani to the west and the H-2 corridor and Mililani Mauka to the east. Note that Waiawa is not part of the study area; its future development remains to be determined by the landowner and the city. The upper regions of the study area include Wahiawa (but does not include Schofield Barracks or Wheeler Army Airfield), and Whitmore Village/Naval Computer and Telecommunications Area Master Station, Pacific (NCTAMS PAC).

This is a large study area. Analyses were done for two sub-areas: Mililani-Waipio (see **Figure 1-2**) and Wahiawa-Whitmore Village (see **Figure 1-3**). The dividing line between the two is California Avenue.

Figure 1-1. Central Oahu Transportation Study Area

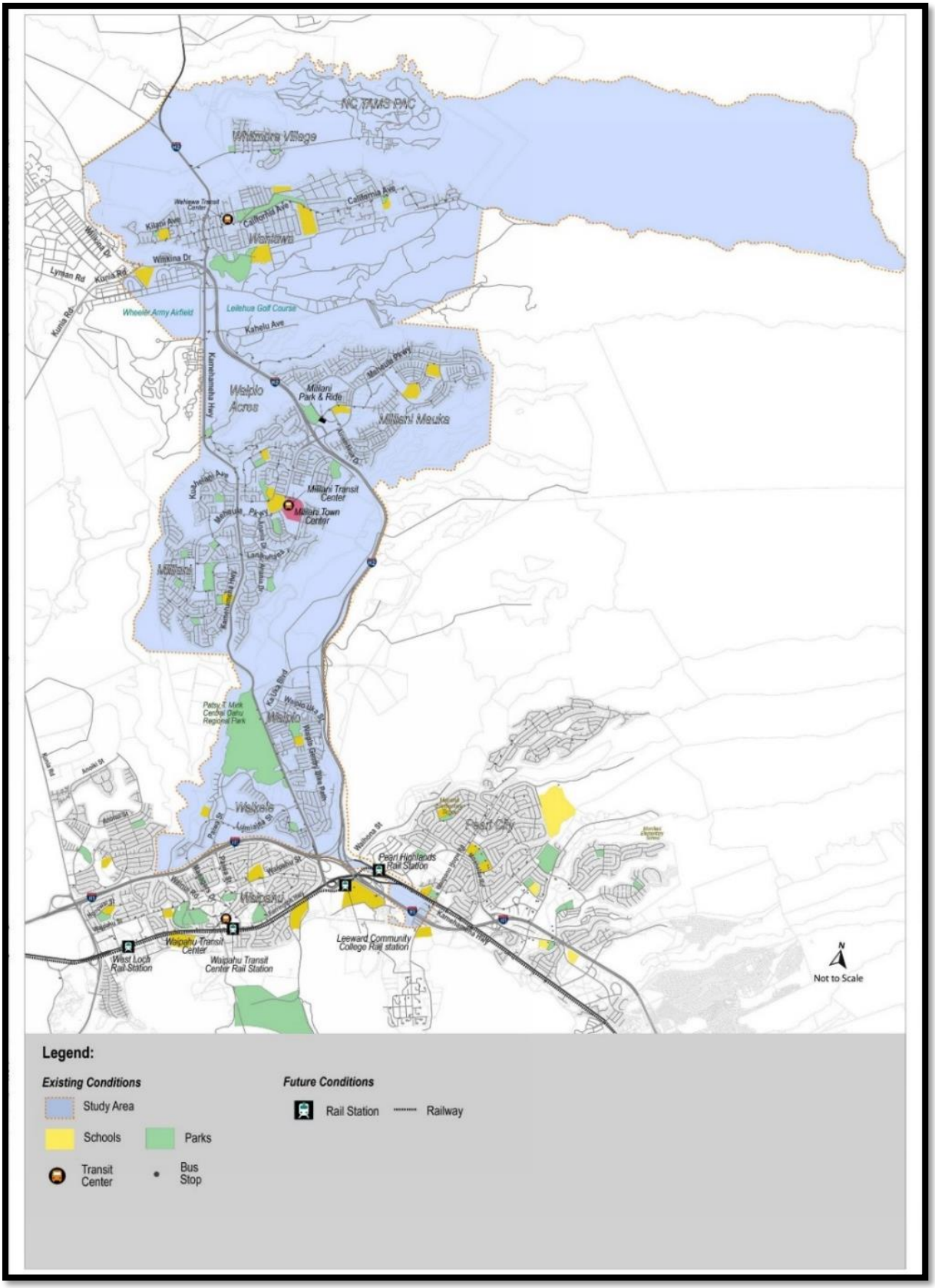


Figure 1-2. Mililani-Waipio Sub-Area

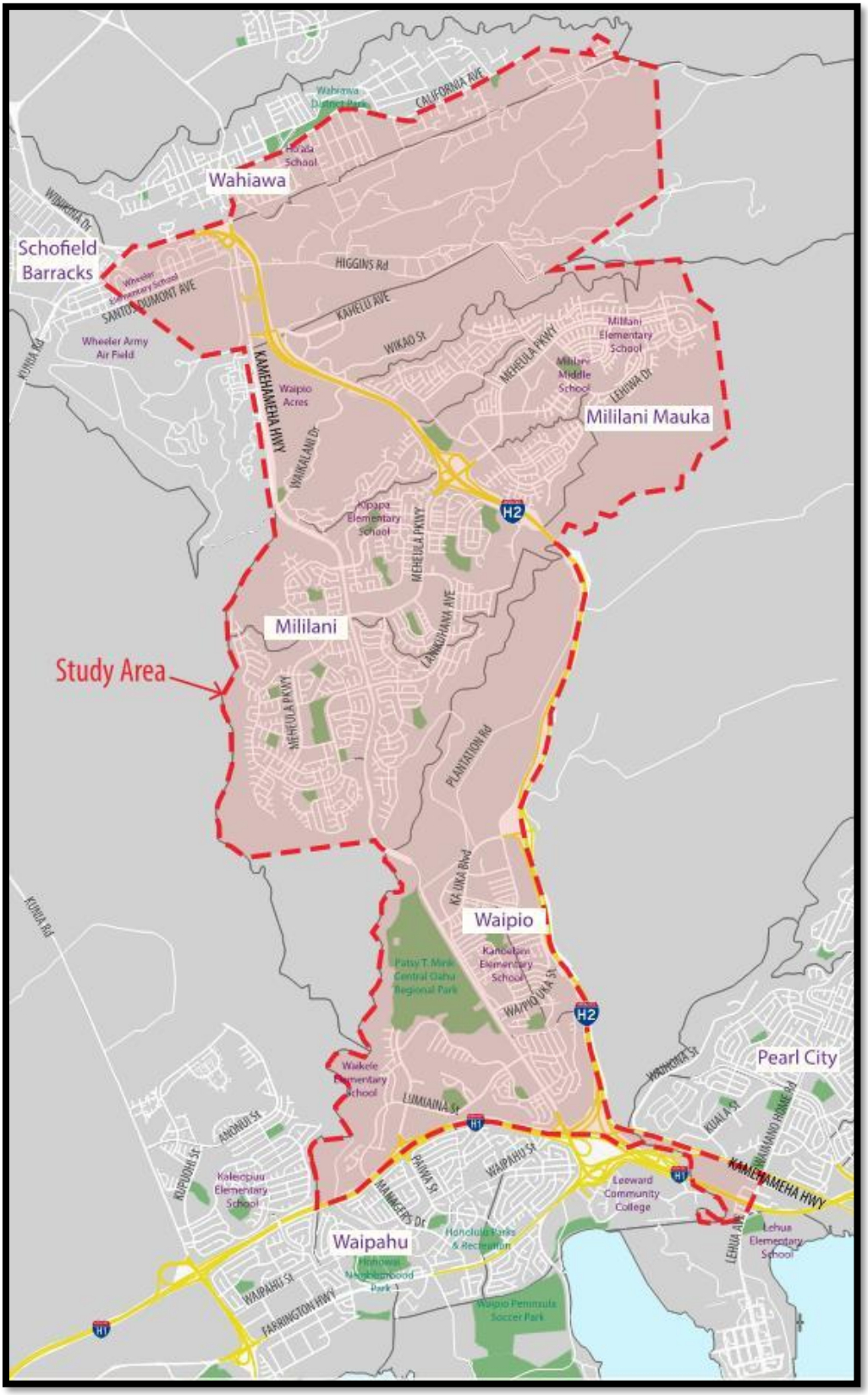
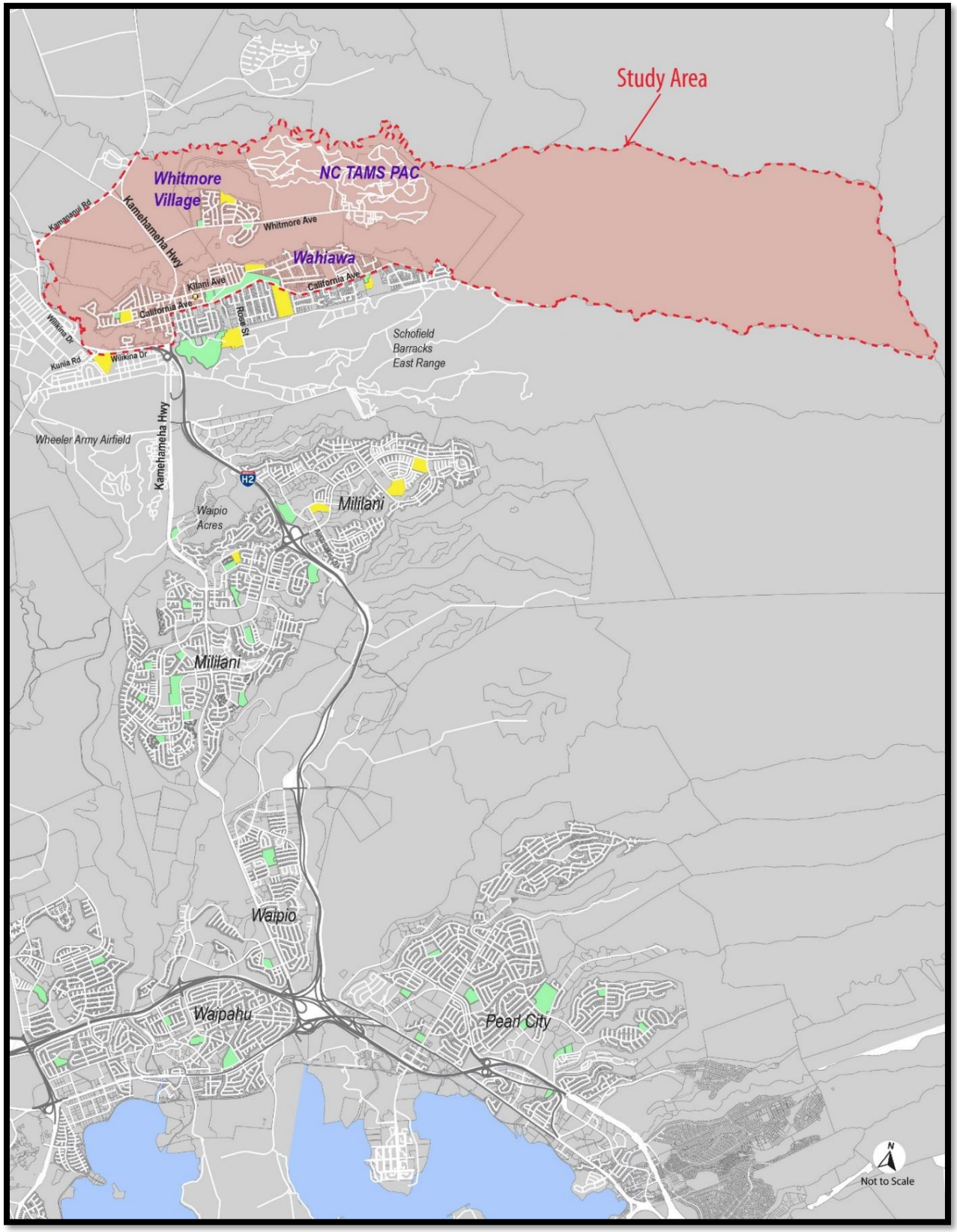


Figure 1-3. Wahiawa-Whitmore Village Sub-Area



1.3 Approach

The study approach included multiple tasks and interim deliverables. The study team was multi-disciplined and included planners, transportation planners, transit experts, traffic engineers, and experts in bicycling and complete streets strategies.

The study began with a review of past and on-going traffic, transit, and land use studies prepared by others, including public sector entities and private landowners. After that, the team identified the major regional transportation, demographic, economic, and land use trends and issues facing Central Oahu. The team developed performance measures and a comprehensive baseline for multimodal transportation.

Future needs and opportunities for the region were identified using technical review, surveys, and stakeholder outreach. This work was coordinated with OahuMPO's current travel demand forecast model and their Congestion Management Process.

Draft studies and reports were reviewed by OahuMPO staff and by its participating agencies who formed a Project Management Working Group. Changes were made to the Draft Reports based on comments received. Community meetings identified Goals (see **Section 1.5**), identified additional projects, and provided feedback on the projects identified to address those goals.

The initial identification of projects in the Mililani-Waipio sub area resulted in 90 potential projects, including 17 that would be completed by a private developer (Koa Ridge). A mobility analysis resulted in 20 projects being dropped. The application of performance measures and feasibility review resulted in no projects dropped, and one bicycle project added. The nine Transportation Demand Management (TDM) projects were combined into a single project due to their relatively low cost. Thirty-seven projects met the technically feasible requirement and were brought into the financial feasibility analysis.

Policy level review at this stage led to a decision to expand the study area northward. Thus, a similar set of analyses was conducted for the Wahiawa-Whitmore Village area, resulting in 18 additional projects that were technically feasible.

The study team reviewed order-of-magnitude impacts based on the performance measures plus a review of implementation and project delivery issues including timing, project obstacles, land acquisition, and environmental impacts. The team developed estimates of costs for construction and for operations and maintenance (O&M). The team developed quantifiable benefits and costs and calculated a benefit cost analysis (BCA) ratio. This part of the study addressed the financially feasible requirement.

Projects that enjoy general community support are typically easier to implement. Gathering community input was an important part of the COTS. Public Involvement opportunities included community-wide meetings, working with a Permitted Interaction Group (PIG) of the OahuMPO Citizen Advisory Committee (CAC), and a series of surveys (administered both online and at

community events) gathering participant reactions to the set of project alternatives. The community input process and results are discussed more in **Section 1.7**.

After taking into account all the technical analyses, project delivery review, cost analyses, and community input, a total of 23 projects are recommended. Eleven are in the Mililani-Waipio sub-area. Twelve are in the Wahiawa-Whitmore Village sub-area.

1.4 Other Reports in this Study

The following reports are part of this study.

A. Assessment of Previous Studies and Surveys associated with the study area and recommendations for further data collection or survey work as needed. Report A provides the assessment of the studies and surveys.
B. Identification of the Trends and Issues that impact the COTS area. This report include the demographics, economics and land trends occurring in the study area as well as identifies the impacts of those trends.

B.2 Identification and definitions of Performance Measures, Sustainability Performance Measures, Baseline and Data Elements used to guide and evaluate project alternatives.

C. Data Memorandum that lists the information needed based upon Deliverables A through B-2 and documents the results of the data collection.
D. A discussion of previous Alternatives as well as strategies for improvements will be presented in this report. Wherever possible, existing data was used, keeping new data collection to a minimum.
E. The Preliminary Ranking of Identified Projects is detailed in this report. The Performance Measures identified in Report B were applied to the alternatives. TransCAD model using the OahuMPO model runs provided a means to compare alternatives (when applicable). The outcome of these tasks was a ranking of alternatives and their impacts on the study area. A separate technical memorandum (Deliverable E-2) was prepared summarizing the effectiveness of the TransCAD model as a planning tool for this study.
F. Documented the Feasibility Assessment of the alternatives. Documentation included identifying criteria for feasibility and sustainability assumptions; reporting on the impacts by Performance Measure; identification of environmental impacts and identified mitigations; and, assumptions for implementation all leading to a refinement of the alternative rankings.
G. The Financial Assessment was documented in this report. Financial assumptions and requirements including costs were explained. The benefits and costs of the alternatives were assessed and compared including any identified trade-offs.

H.1 Packages of Projects and Strategies to Address the Three COTS Goals. This report identifies and compares the most effective set of strategies and system improvements to improve mobility for Central Oahu.

W-1 Identification of Trends and Issues in the Wahiawa-Whitmore Village Study Area. This report describes the demographics, economic, and land use trends occurring in this portion of the COTS area, and it identifies the impacts of those trends.

W-2 Project Descriptions. This report describes the projects and maps their locations. It also provides an assessment of the Performance Measures and a Feasibility Assessment.

W-3 Financial Assessment of Projects. Financial assumptions and requirements including costs are reviewed. The benefits and costs of the alternatives are assessed and compared, including any identified trade-offs.

W-4 Prioritization and Recommendations for Implementation for the Wahiawa-Whitmore Village study area.

H.2 The Report on Prioritization and Recommendations for Implementation (this report). Summarizes and prioritizes strategies; identifies recommendations; recommends an implementation timeframe; and, identifies any impacts if implementation is not accomplished within the recommended timeframe. This report combines the project lists and assessment for Mililani-Waipio (reports A through H-1) and Wahiawa-Whitmore Village (reports W-1 through W-4).

The following reports are forthcoming:

I. This report will provide a summary of the Community Input and how that input was used to inform the study.
J. Survey Results from any new surveys will be documented in this report.

1.5 Three Community Goals

Early in the study process at a community meeting, three important goals were set to help guide the selection of projects. These are shown below and are used throughout this report to describe projects and their impacts/benefits.

- Reduce congestion experienced by travelers in Central Oahu
- Create easy access to the HART rail system
- Create a multimodal system in Central Oahu

How the recommended projects address the three community goals is discussed in **Chapter 5.0**.

1.6 List of Projects Recommended by Type

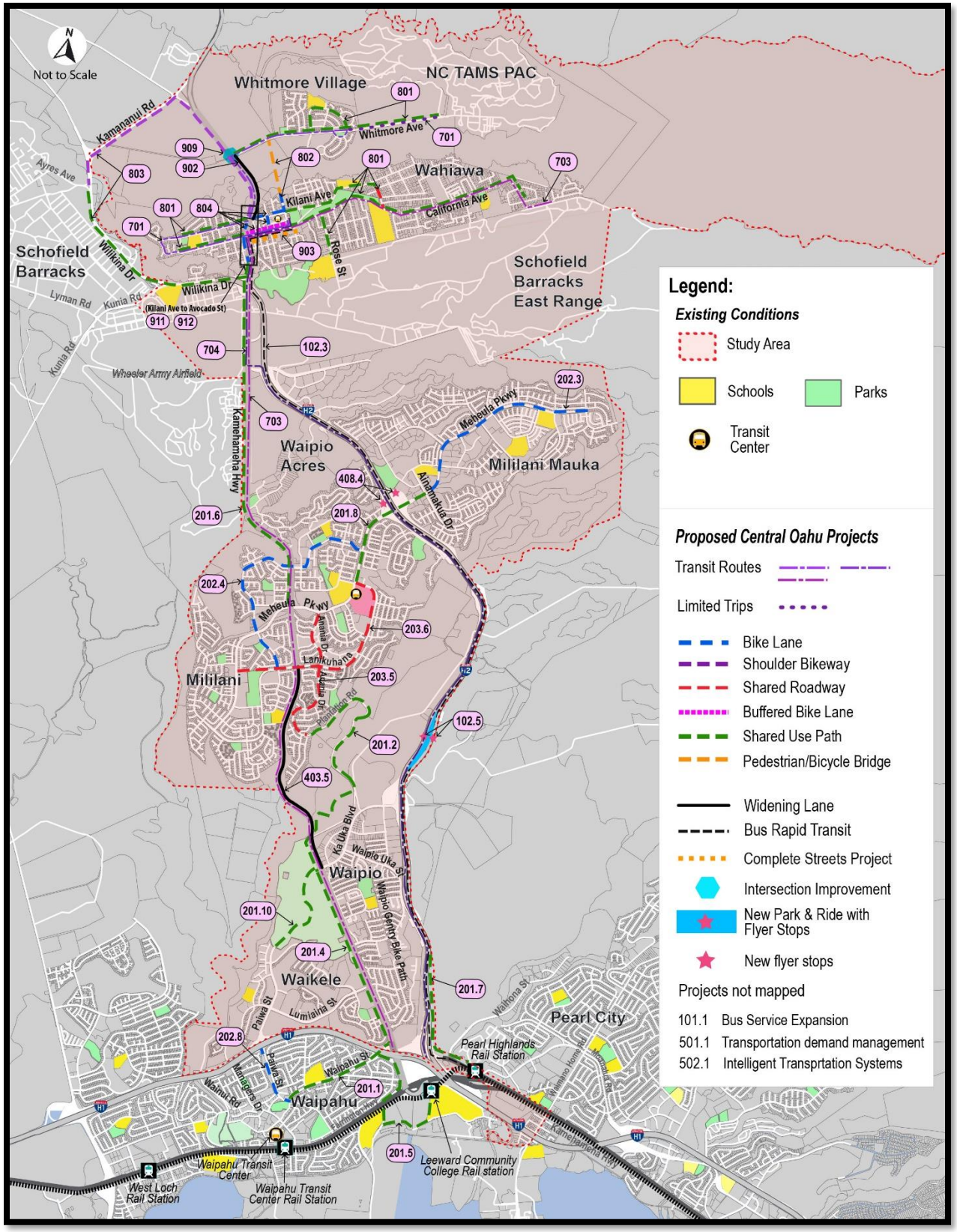
Table 1-1 shows the list of projects that are recommended, either in the short-term or the mid-term. There are six transit projects, nine roadway projects, and eight multimodal projects for bicycles and pedestrians. Those projects that the community survey respondents identified as their top choice within that project type are shown with as asterisk. All of these are placed in the short term to emphasize priority. Following **Table 1-1** is **Figure 1-4** which shows the locations of the recommended projects.

Table 1-1. Recommended Projects by Type and Sub-Area

MILILANI / WAIPIO			
TRANSIT PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
101.1 *	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	X	
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands		X
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands		X
ROADWAY PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue		X
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	X	
501.1	Transportation Demand Management (TDM)	X	
502.1	Intelligent Transportation Systems (ITS)	X	
BICYCLE AND PEDESTRIAN PACKAGES		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
A * Mililani To Waipahu	201.1 New Pathway – Waipahu Street 201.2 New Pathway – Anania Drive to Central Oahu Regional Park 201.4 New Pathway on Kamehameha Highway 201.5 New Pathway on Kamehameha Highway 203.5 Bike Route – Anania Drive, Meheula Parkway to Kipapa Gulch	X	
B Meheula Parkway	201.8 Bike Pathway on Meheula Parkway 202.3 Bike Lanes on Meheula Parkway 202.4 Bike Lanes on Kuahelani Avenue 203.6 Bike Route on Lanikuhana Avenue		X
C Paiwa / Central Oahu Regional Park	201.10 Bike Pathway 202.8 Bike Lanes	X	
D – New Pathway	201.6 New Pathway Kamehameha Highway 201.7 New Pathway on Cane Haul Road, H-2 to the Waiawa Rail Station at Pearl Highlands		X

WAHIAWA / WHITMORE VILLAGE			
TRANSIT PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	X	
703 *	Expanded Late Night Service Bus Routes 51/52	X	
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	X	
ROADWAY PROJECTS		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue		X
903 *	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	X	
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	X	
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	X	
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	X	
BICYCLE AND PEDESTRIAN PACKAGES		**Recommendation**	
Project No.	**Project Name**	**Short-Term**	**Mid-Term**
801 *	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	X	
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village		X
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road		X
804	New and Upgraded Bike Lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street		X

Figure 1-4. Recommended Project Locations



1.7 Community Input Process

Community input was solicited in multiple ways. In the first two years of the study, there were two community meetings. Advertisement was done through presentations at Neighborhood Boards, advertisement in the Mililani Town Association Newsletter, Facebook, Website, Press Release, Email, and posting flyers.

The first community meeting served as a study kick-off and was attended by 46 guests. It was held on November 30, 2016 at Mililani High School Cafeteria. The format was an open house followed by a presentation. The open house portion had five study stations showing the study area, demographics, travel characteristics, performance measures, and previously identified projects. In addition, there were four agency information stations for the Central Oahu Sustainable Communities Plan, HART information, TheBus information, and VanPool information.

The study stations each had interactive boards where people could describe: where they live and work, most important issues to them, travel needs, preferred performance measures, and projects that should be considered. Fourteen projects were identified by the public at the first community meeting. These were carried forward into the project for analyses and evaluation.

The second community meeting was held on November 16, 2017 at Kanoelani Elementary School Cafeteria in Waipio. There were 31 guests. After a short overview presentation, attendees rotated through three stations: Project Overview and Information, Transit and TDM Projects, and Multimodal and Pricing Projects. At each station, a study team member made a short presentation, elicited discussion, and passed out feedback forms. Each feedback form was relevant to the modal topic area. This style of meeting was recommended by the CAC-PIG.

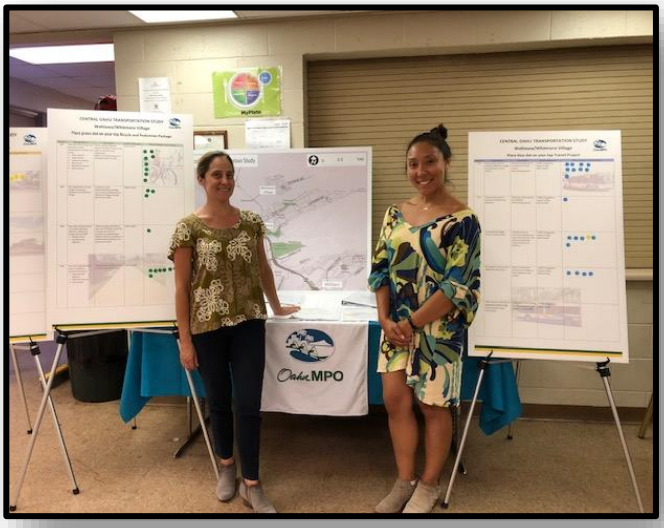
The PIG met periodically with OahuMPO staff to be briefed on the reports and studies. The consultant study team project manager met with the PIG on April 24, 2019 at Mililani Chili's. During the meeting, attendees tested the project preferences survey, and their feedback was used to improve the usability. The PIG also prepared a separate report summarizing their input and providing their perspective. This report can be found in Appendix D.

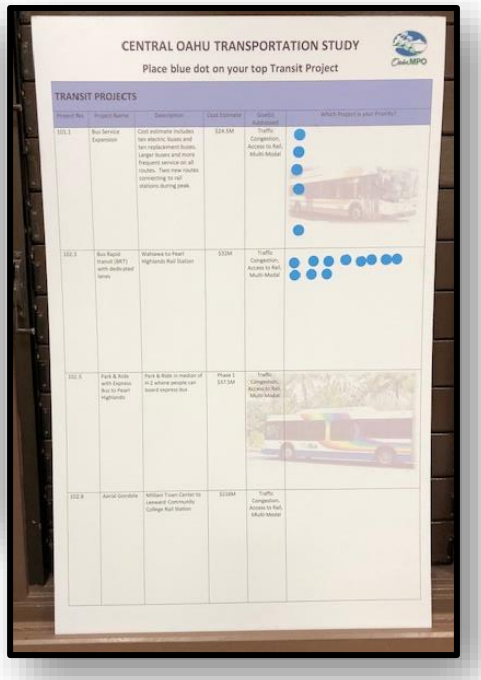
Upon recommendation of the PIG, it was decided to gather input directly from Neighborhood Boards and at community events rather than through a final community meeting. Several materials were prepared for this purpose. Four strategies were used to solicit public input on project alternatives:

- Project Boards where individuals could place a single colored "Dot" on their favorite project, one each for transit, roadway, bike/pedestrian
- A four page "brochure" which asked three questions of respondents
  - Reaction to each project listed: positive, neutral, negative
  - Favorite project by modal type
  - How they would "spend" $80 Million among the projects (Mililani survey only).
- Two surveys were prepared, one for the Mililani-Waipio projects and another for the Wahiawa-Whitmore Village projects.

- An online survey which asked the same questions as the paper survey was prepared separately for the Mililani-Waipio projects and the Wahiawa-Whitmore Village projects.

Results of these surveys were tabulated by OahuMPO. A brief review comparing results can be found in **Section 3.4** of this report showing how community input helped the study team select projects for the recommendation list.





Top: OahuMPO staff solicit input at community meetings

Right: Interactive project board

2.0 PRIORITIES AND RECOMMENDATIONS FOR CENTRAL OAHU

2.1 Introduction

This chapter explains the recommended projects by type, location, and cost. The recommendation is a set of 23 projects providing transportation benefits that are technically and financially feasible in the COTS region. There are 14 short-term projects and nine mid-term projects. There are three types of projects recommended for Central Oahu: transit, roadway, and bicycle and pedestrian. Project sheets for the 23 recommended projects can be found in **Appendix A**.

Projects are shown in two time periods: short-term and mid-term. Short-term projects could begin implementation processes over the next one to four years and would complement the introduction of rail. Mid-term projects are highly desirable and enjoy community support but would generally require project development timing of three to five years, and in some cases longer than that.

The combined study effort examined over 114 projects. These projects were analyzed and reviewed through public involvement processes. This created a winnowing process. The full list of projects considered can be found in **Appendix B** of this report. Selection of recommended projects was based on their transportation benefits to the region, their performance characteristics, benefit cost ratio, and community support. See **Chapter 3.0** for the results of the selection criteria analyses.

Chapter 4.0 looks at how the projects address the transportation needs of the Central Oahu community, and **Chapter 5.0** describes how the recommended projects will help accomplish the three community goals. **Chapter 6.0** examines a timeline for implementation and what could happen if the recommended projects are not implemented.

2.2 Recommended Transit Projects

Transit is a high priority on Oahu as a matter of public policy and investment. It is the only reasonable and cost-effective modal option for getting more cars off the road.

Roads such as H-1 provide a capacity and time constraint for Central Oahu travelers that cannot be overcome through further highway widening. The HART Rail is the only thing that provides capacity, reduces travel time, and produces a dependable schedule. The rail line will not go into Central Oahu. Therefore, Central Oahu residents would take advantage of the benefits of rail, if they had access to frequent, reliable, and altered bus service to and from the Waiawa Rail Station at Pearl Highlands and Halaulani Rail Station at Leeward Community College.

2.2.1 Short-Term Transit Projects

101.1 Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations ($8.71 Million initial investment for ten vehicles)

This project adds two new routes, D and 50, and recommends extension of two others, Routes 98 and 443, to better serve the COTS area. The number of bus service hours would expand from 42 to 90 daily providing all day service on each route except Route 98, which is a peak period express bus.

The initial cost estimate (comparable to construction cost of roadway and bicycle projects) includes ten new buses for added service. They would be replaced once within the study period (2040), assuming a useful life of 12 years per bus which is reflected in the BCA ratio.

This project benefits to the COTS area, which already has high bus ridership, is additional options, increased frequency, and convenience. It provides connections between COTS communities, in addition to rail. An added benefit is that congestion may be reduced by shifting single occupant vehicle (SOV) drivers to transit.

701 Increase bus service to/from Whitmore Village & Wahiawa Transit Center ($865,000 initial investment for purchasing one vehicle)

This project introduces hub and spoke to Wahiawa and Whitmore Village. Hub and Spoke provides the community a network of routes that connect at a hub. The hub for this project would be Wahiawa Transit Center. The trunk routes are Routes 51 and 72. The Whitmore Village portion of Route 72 would be operated as a separate route providing 45-minute service in the peak periods due to route length.

Whitmore Village and the Ewa portions of Wahiawa along Kilani Avenue and California Avenue would benefit from this increased service. Fourteen more trips would be added, doubling the amount of service. This adds approximately eight weekday service hours and would increase ridership by 500 passenger boardings.

703 Expanded Late Night Service Bus Routes 51/52 (no initial investment)

This project would add one Route 52 trip and three Route 51 trips in the middle of the night, essentially creating 24-hour service. Route 51 would continue from the Wahiawa Transit Center to Haleiwa. Nearly 450 passenger boardings and eight additional service hours would result. Those with non-traditional work hours, such as shift workers from the hotel or service industry, would be the greatest beneficiaries, as well as those who would like to spend their recreational time in Honolulu at later hours. New job opportunities could arise from this access. If Project 703 occurs, Handi-Van service would increase to match fixed route service hours to provide comparable service.

Limited stops are anticipated: Wahiawa Transit Center; Armory Park and Ride Lot; H-2 at Mililani; H-2 Park and Ride Lot; and the Waiawa Rail Station at Pearl Highlands.

BRT treatments would be used for 18 hours serving an estimated 1,750 passengers. Passenger connections to freeway express stops would have to be built.

2.2.2 Mid-Term Transit Projects

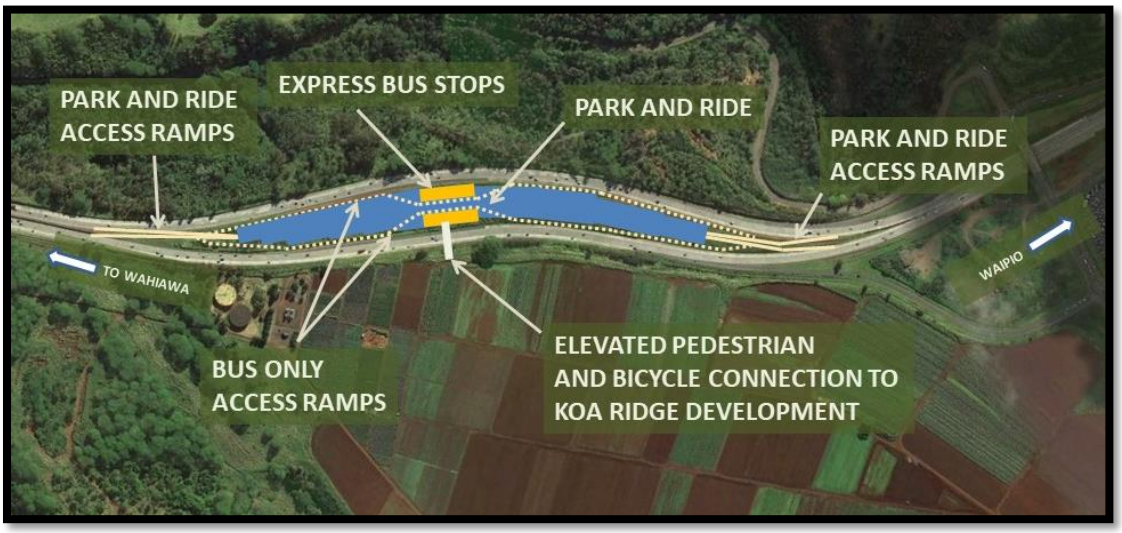
102.3 Bus Rapid Transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands ($28.9 Million for facilities and equipment)
This project would provide a bus rapid transit line from Mililani Transit Center on dedicated lanes through Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands.

This project would greatly benefit COTS travelers by giving them a convenient and speedy access to two rail stations. Congestion may be reduced by shifting SOV drivers to transit.

704 Bus Rapid Transit (BRT) from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2 ($22.6 Million initial investment for facilities and equipment)
This project has similarities to project 102.3. This routing saves eight minutes. During the peak periods, there would be bus-only lanes from the Wahiawa Transit Center along H-2 in the peak direction, which allows for bus speeds to increase due to avoided congestion.

102.5 Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands ($37.5 Million first phase; $103.9 Million Final Build-out)
This project provides direct access to rail via a bus route on the H-2 freeway by utilizing available right of way in the freeway median. A Park & Ride facility would be built in the freeway median with access ramps in both directions. In the future, this space could be expanded for a parking structure, built in phases for several thousand parking spaces. A conceptual layout of the facility is shown in **Figure 2-1**.

Figure 2-1. Conceptual Layout of Park & Ride Facility in H-2 Median



Background image courtesy of Google Maps

This project may reduce congestions by shifting SOV drivers from both Koa Ridge and future Waiawa development to transit by providing a convenient connection to rail on high-occupancy vehicle (HOV) lanes. Overall transit times would benefit COTS riders. This project provides additional Park & Ride capacity for those intending to access the Waiawa Rail Station at Pearl Highlands.

A shared use bicycle and pedestrian bridge would connect the Koa Ridge development to express bus access.

2.2.3 Transit Projects Evaluated, but Not Recommended or Could be Considered in the Long Term

Many other transit mode options were considered, but not recommended.

- Extension of the HART technology to Mililani was rejected due to prohibitive cost and higher priorities for HART extensions (e.g. University, Kapolei) (Project 102.1).
- Construction of an aerial gondola from Mililani Transit Center to the Halaulani Rail Station at Leeward Community College or the Waiawa Rail Station at Pearl Highlands (Project 102.8). While this option provided some interesting features and enjoyed some community support, in the final analysis the high cost ($332 Million) and the low BCA (0.85) led to its dismissal. The aerial gondola concept may be resurrected and given further study at a future date after HART rail has been in service for a few years.
- Increased Bus Service from Schofield to Wahiawa Transit Center (Project 702). This option was not included in priorities because it was not a community priority.
- Align Express Route 83 on proposed Leilehua High School-Kahelu Road connection (Project 705). Since Project 906 is not a recommended project, Project 705 is moot.

2.3 Recommended Roadway Projects

Roadway projects in the short-term include lower cost items such as ramps, signal timing, or intersection improvements, which improve operations and reduce bottlenecks. Intelligent Transportation Systems (ITS) uses technology for driver information to allow better travel choices. TDM are programs such as marketing and matching people into shared ride modes (e.g., vanpools and carpools).

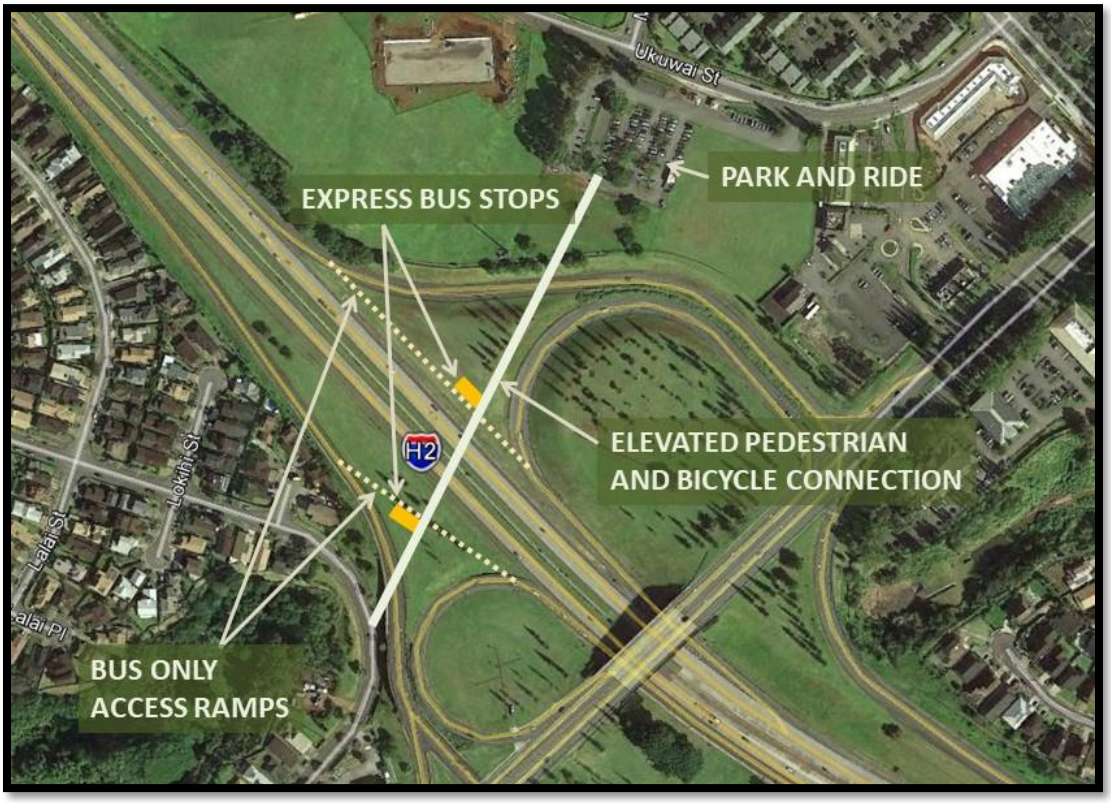
Mid-term roadway projects add capacity. They could be costly and would have to compete for funding with many other projects island-wide and state-wide. Further, they will require several years to go through environmental review, possible land acquisition, and project development stages (i.e., design, bid, construction).

2.3.1 Short-Term Roadway Projects

<u>408.4 Mililani Access at H-2 & Meheula Parkway with new bus stops ($6.9 Million construction)</u>
This project allows buses traveling on H-2 to serve Mililani and Mililani Mauka passengers without leaving the H-2 right of way. This saves travel time for bus operations and for passengers. The project provides 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 Mililani Mauka Park & Ride lot and the green space on the Ewa side of H-2 providing a safer bicycle and pedestrian experience connecting Mililani Mauka and Mililani Town. A conceptual layout of the facility is shown in **Figure 2-2**.

The project may reduce congestion by shifting SOV drivers to transit by providing convenient connection to rail and reducing overall transit travel time. This project will improve access to rail.

Figure 2-2. Conceptual Layout of Express Bus Stops and Pedestrian Bridge



<u>903 California Avenue Complete Streets Project from Kamehameha Avenue to Wahiawa District Park ($7.3 Million construction cost)</u>
This project would bring greater balance to the mobility options for users on California Avenue by implementing Complete Streets concepts. It would install safety improvements, dedicated bicycle facilities, widened sidewalks and waiting areas at intersections, and expanded on-street parking options along a 0.45-mile segment of California Avenue. It is consistent with the City and County of Honolulu's Complete Streets program and Blue Zones studies. Safety is the major

consideration, but Complete Streets projects have also contributed to economic activity and vitality for adjacent businesses.

909 Kamehameha Highway at Whitmore Avenue Intersection Improvements ($1.97 Million construction cost)

This project would widen the westbound approach and southbound departure legs to accommodate a second westbound left-turn lane on Whitmore Avenue. This would involve widening the road sections for approximately 750 feet. It includes an additional 11 feet of pavement and signal modification.

The existing westbound turning movement volume is approximately 500 vehicles in each of the AM and PM peak periods. This volume far exceeds the warrant for two left turn lanes. The additional capacity would allow for more "green time" for through traffic on Kamehameha Highway. This project could be a companion to the widening of Kamehameha Highway (Project 902), if constructed.

911 Kamehameha Highway between Avocado Street & Kilani Avenue Traffic Signal Timing ($60,000 construction cost)

This project would re-time the four traffic signals along Kamehameha Highway from Kilani Avenue and the H-2 southbound off-ramp. Adaptive signals would help maintain a steady travel speed along the corridor and would increase arterial throughput. This would reduce congestion along Kamehameha Highway.

912 California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing ($45,000 construction cost)

There are three signalized intersections in this segment of California Avenue. Signal timing modifications would be made following a study that includes traffic counts, queueing observations, and signal operations review. Adaptive signals are recommended because they allow timings to be adjusted to maintain desired travel speed. National studies show that adaptive signals increase capacity from 5% to 15%, while reducing travel time by 10%.

501.1 Transportation Demand Management (TDM) ($13.6 Million multi-year program)

TDM supports congestion management and access to rail. Programs could provide marketing for ride share matching and access to services that are necessary to encourage a shift in transportation behavior. TDM strategies include funding for an administrator and staff to support the program. Recognized vanpools and carpools can have premium parking spaces reserved at the Waiawa Rail Station at Pearl Highlands and H-2 median Park & Ride lots.

502.1 Intelligent Transportation Systems (ITS) ($8.8 Million multi-year program)

This project informs drivers about their travel options, including alternate driving routes and alternate modes of travel. It provides expectations for their current trip and travel time using traffic information and dynamic signage. Specific improvements also include phone apps, dynamic message signs, ramp metering onto the freeway, and adaptive signals on major arteries to maximize traffic flow efficiency and adjust to changing demand.

Some ITS elements are already planned or being implemented by the Hawaii Department of Transportation (HDOT) and the Department of Transportation Services (DTS). The level of investment reflects additional ITS infrastructure for the COTS area.

2.3.2 Mid-Term Roadway Projects

403.5 Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue ($37.9 Million construction cost)

This project provides additional north-south capacity for 1.8 miles from Ka Uka Boulevard to Lanikuhana Avenue through the COTS area. As congestion increases on H-2 due to future growth, the project will improve existing bottlenecks. This could be accomplished either by widening the existing structure or a parallel structure for one direction travel. The widening offers the option for one lane to serve HOV travelers.

902 Kamehameha Highway Widening from north of Whitmore Avenue to Kilani Avenue ($18 Million construction cost)

This project would widen the existing two-lane pavement section to four lanes (two in each direction). In addition, it includes a ten-foot-wide shared use path with buffer on the east side of the street. The widening from north of Whitmore Avenue to Kilani Avenue would be 0.8-mile long. The widening adds 22 feet and includes widening of the 300-foot Karsten Thot Bridge section just north of Kilani Avenue.

The existing volume on this section of roadway is 27,500 vehicles per day (vpd), and volumes are expected to grow to nearly 31,000 vpd by 2040. These volumes exceed capacity for a two-lane road by 50%. Existing conditions extend back to where the highway meets Kamananui Road during the PM peak period. Additional capacity would also reduce delays at the Whitmore Avenue intersection, where a dual left-turn lane could be installed. A construction challenge for this improvement is the adjacent ground slopes that may require retaining walls.

2.3.3 Roadway Projects Evaluated, but Not Recommended or Could be Considered in the Long Term

- Kamehameha Highway HOV lanes (Ka Uka Boulevard to Farrington Highway) (Project 403.8) was not recommended because community sentiment favored any widening to be for all traffic, not just HOV. The BCA for this project was positive (2.93) but less positive than project 403.5 (3.68).
- While Widen on-ramp at H-2 and Meheula Parkway (Project 404.2) had a very high BCA (8.13) it did not enjoy community support and was eliminated for that reason. Higher priorities were for the mainline roadways over the ramps.
- New Central Mauka Road (Project 406.1) is not recommended due to severe implementation challenges (including lack of a sponsor), although it rated high among community members. It was not possible under the constraints of this study to find an actual alignment and to determine how it would connect to the regional network in Pearl City. The study team has low confidence in the cost estimate ($182 Million). A capacity

project of this significance is beyond what HDOT is undertaking at this time. If it is pursued, it would need a robust community vetting process and examination of right of way and environmental impacts.

- Paiwa Street Extension from north of Lumiauau Street to Kamehameha Highway/ Ka Uka Boulevard intersection (Project 407.1) had support from the CAC-PIG, but not from the community at large. This may be due in part to running through Central Oahu Regional Park. A shared use path was preferred (Project 201.10).
- Roundabout at Kamehameha Highway and California Avenue (Project 910) would construct a two-lane roundabout to improve vehicle movements. Each of the intersection approaches would have to be realigned to provide adequate deflection and reduce the speed of vehicles. The inscribed diameter would be 150 to 180 feet, which is the standard for an urban two-lane roundabout. Pedestrian crossings and bike crossings would be part of the design. While the project scored well technically, it received poor ratings from the community members surveyed.

2.4 Recommended Bicycle and Pedestrian Packages and Projects

Waipio, Waikele, Mililani, Mililani Mauka, Wahiawa, and Whitmore Village share the characteristic that they have limited bicycle and pedestrian facilities and are considered non-friendly to travel other than by automobile or bus. The road widths, however, are conducive to reallocating space for non-auto modes of travel. Short-term projects emphasize completing connections between existing facilities and creating more access by bicyclists and pedestrians. Mid-term projects are mostly new pathway facilities, including one bridge. In general, packages include two or more projects. By packaging those in similar proximity, construction costs could be reduced, and connectivity enhanced more quickly.

2.4.1 Short-Term Bicycle and Pedestrian Packages and Projects

<u>Bicycle and Pedestrian Package A – New Pathways and Route from Mililani to Waipahu ($17.5 Million construction cost)</u>

This package has multiple projects to improve the existing network:

- 201.1 New pathway from Waipahu Street to Kamehameha Highway
- 201.2 New pathway from Anania Drive to Central Oahu Regional Park
- 201.4 New pathway on Kamehameha Highway from Ka Uka Boulevard to Waipahu Street
- 201.5 New pathway on Kamehameha Highway from Waipahu Street to Anania Drive
- 203.5 Anania Drive from Meheula Parkway to Kipapa Gulch Path. This project completes the bicycle connection to Meheula Parkway to Kipapa Gulth Path

The new pathways would be off-street facilities which is the safest treatment for all users from children to older adults.

Bicycle and Pedestrian Package C – New Pathway and Lanes through Paiwa/Central Oahu Regional Park ($5.5 Million construction cost)

This package consists of two projects to be part of the regional bicycle network.

- 201.10 Pathway through Central Oahu Regional Park. This off-street facility would connect Kamehameha Highway to Paiwa Street through the park and would be attractive for all users.
- 202.8 New bike lanes on Paiwa Street from H-1 to Waipahu Street. This facility could be used for commuting, school or shopping trips.

801 New Off-street Bicycle and Pedestrian Connections to Schools, Parks, and Transit ($8.5 Million construction cost)

This project involves the widening of sidewalks within the existing right of way. Once completed, 7.5 miles of 10-foot-wide shared use path along the primary streets in Wahiawa and Whitmore Village are proposed. The purpose is to enhance connectivity and safety for the bicycle and walk modes. Streets include:

- North side of Kilani Avenue (Anoni Street to Kamehameha Highway and North Cane Street to Uluku Street)
- Anoni Street
- South side of California Avenue (Anoni Street to Kamehameha Highway and North Cane Street to Karsten Drive)
- North side of Whitmore Avenue (Kamehameha Highway to NCS)
- West side of Rose Street (California Avenue to Wahiawa Middle School)
- Outside curve along Ihihi Avenue (Whitmore Avenue to Helemano Elementary School)

In addition, a bike route would be created on Uuku Street (Glen Avenue to California Avenue) to connect the shared use paths on the eastern end of Wahiawa.

Bike routes exist in places along portions of Kilani Avenue and California Avenue, by Kaala Elementary School and Wahiawa District Park. There are also bike routes on Whitmore Avenue. Shared use paths are recommended in tandem with these bike routes as they provide safer opportunities for interested but concerned bicyclists of all ages and abilities. The bike paths go along roads with bus stops, providing multimodal options.

Adequate right of way is available to widen the existing sidewalks for shared use paths. Construction would encourage mode shift from personal vehicles to active transportation.

2.4.2 Mid-Term Bicycle and Pedestrian Packages and Projects

Bicycle and Pedestrian Package B – New Pathway, Lanes, and Route through Meheula Parkway ($9.5 Million construction cost)
This package has multiple projects:

- 201.8 Pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue. This project completes the bicycle connection along Meheula Parkway from off-street path to Mililani Transit Center. This project will improve the existing network and provide a safe facility for people walking and bicycling.
- 202.3 Bicycle lane on Meheula Parkway between Mililani H-2 Interchange and Kapanoe Street. This project extends bicycle access along Meheula Parkway into Mililani Mauka.
- 202.4 Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway. This project creates bicycle access into Mililani Mauka.
- 203.6 Bicycle route on Lanikuhana Avenue from south end of Meheula Parkway to Mililani Town Center. This project consists of signage and pavement markings.

Bicycle and Pedestrian Package D – New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands ($16 Million construction cost)
This package consists of two pathway projects to improve the existing network:

- 201.6 Pathway on Kamehameha Highway from Wahiawa to Anania Drive.
- 201.7 Pathway on the Cane Haul Road, H-2 to the Waiawa Rail Station at Pearl Highlands.

802 New Bicycle and Pedestrian Bridge Connecting Wahiawa and Whitmore Village ($4.36 Million construction cost)
This project includes the construction of a shared use bridge over the gulch north of North Cane Street connecting to Whitmore Avenue. A bike lane would also be installed along North Cane Street from Kilani Avenue to the bridge. The total extent of the project is 0.7 mile. The bridge would be 500 feet long and 12 feet wide.

Currently, there is no bicycle or pedestrian facility between Wahiawa and Whitmore Village. This would provide a direct connection and encourage active transportation. This project may involve land acquisition, which is not included in cost estimate.

803 New Bicycle and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS
This project includes the construction of 1.9 miles of 10-foot-wide shared-use paths along Wilikina Drive, from Kamehameha Highway to Ayres Avenue, providing an off-street path from Schofield Barracks to Wahiawa. In addition, the project includes 2.6 miles of shoulder bikeway along Wilikina Drive, Kamananui Road, and Kamehameha Avenue, providing a bicycle connection between communities.

804 New and upgraded bike lanes in Wahiawa Commercial District ($893,000 construction cost)
This project would install bicycle lanes on the following roads:

- Kamehameha Highway between Avocado Street and Kilani Avenue.
- Kilani Avenue between Kamehameha Avenue and North Cane Street.
- Lehua Street between Kilani Avenue and California Avenue.

The project would also widen existing bicycle lanes on California Avenue between Kamehameha Highway and North Cane Street.

Upgraded bicycle facilities in the commercial district provide connection and reconfigure the travel way to improve safety. In some cases, on-street parking would be removed on one side to make way for the bike lanes. It would allow 11-foot vehicle lanes and 6.5-foot bike lanes. The roadway serves 12,400 to 18,399 vpd. A road diet would buffer the bike lane, making it safer for bicyclists.

2.4.3 Bicycle and Pedestrian Projects Evaluated, but Not Recommended or Could be Considered in the Long Term

All bicycle and pedestrian projects reviewed were recommended for either short- or mid-term implementation.

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3.0 SELECTION CRITERIA AND DISCUSSION

The following criteria were used in the final selection of recommended projects:

- Transportation Benefits Provided
- Performance Characteristics
- Benefit Cost Ratio
- Community Support

3.1 Transportation Benefits

Analysis was made of the transportation benefits that each recommended project would provide. Each benefit was assigned a score from 0 to 3. Total points were then added for all seven benefits. Later, these benefits were assigned financial values and became part of the BCA. The transportation benefit values are shown in **Table 3-1**. The seven benefits include:

- Whether the benefit was local or area-wide
- Number of other modes enhances
- Potential to reduce vehicle congestion
- Infrastructure Condition
- Safety
- Deficiency Status
- Contribution to the mode share goal

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Table 3-1. Transportation Benefits for Recommended Projects

PROJECT TITLE		General Location	Primary Mode or Program: B = Bicycle P = Pedestrian R = Roadway T = Transit Pr = Program	Potential COTS Benefit							
Number	Description			Areawide = 3 Local = 2 Program = 1	Number of Other Modes Enhanced	Potential to Reduce Vehicle Congestion Low = 0 High =3	Infrastructure Condition Low = 0 High =3	Safety Low = 0 High =3	Deficiency Status Near-Term = 3 Mid-Term = 2 Long-Term =1	Contributes to Mode Share Goal Low = 0 High = 3	Point Total
700 TRANSIT PROJECTS											
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Islandwide	T	3	2	1	0	1	2	2	11
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Central Oahu	T	3	2	1	0	0	2	2	10
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Central Oahu	T	3	2	1	0	0	2	1	9
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	Whitmore Village	T	2	2	1	0	1	2	2	10
703	Expanded Late Night Service Bus Routes 51/52	Wahiawa to Haleiwa	T	3	2	1	0	1	2	2	11
704	Bus Rapid Transit (BRT) from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Wahiawa to Pearl Highlands	T	2	2	1	0	1	2	3	11
800 BICYCLE AND PEDESTRIAN PROJECTS											
PACKAGE A: Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu											
201.1	New Pathway on Waipahu St between Paiwa St and Kamehameha Highway	Waipahu	B	2	1	0	0	3	3	3	12
201.2	New Pathway between Anania Dr and Central Oahu Regional Park	Kipapa Gulch	B	3	1	0	0	3	3	3	13
201.4	New Bike Pathway along Kamehameha Highway from Ka Uka Boulevard to Waipahu Street	Waipio	B	3	1	0	0	3	3	3	13
201.5	New Ped/Bike Path connecting Kam. Highway at Waipahu Street to LCC Station	Leeward Community College	B	3	1	0	0	3	2	3	12
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	Mililani	B	1	0	0	0	0	1	1	3
PACKAGE B: New Pathway, Lanes, and Route through Meheula Parkway											
201.8	Bicycle pathway through the H-2/Meheula Parkway Interchange	Mililani	B	3	1	0	0	3	3	3	13
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	Mililani Mauka	B	2	0	0	0	2	2	2	8
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway	Mililani	B	3	0	0	0	2	2	2	9
203.6	Bicycle route on Lanikuhana Avenue from South end of Meheula Pkwy to Mililani Shopping Center	Mililani	B	1	0	0	0	0	1	1	3

PROJECT TITLE		General Location	Primary Mode or Program: B = Bicycle P = Pedestrian R = Roadway T = Transit Pr = Program	Potential COTS Benefit							
Number	Description			Areawide = 3 Local = 2 Program = 1	Number of Other Modes Enhanced	Potential to Reduce Vehicle Congestion Low = 0 High =3	Infrastructure Condition Low = 0 High =3	Safety Low = 0 High =3	Deficiency Status Near-Term = 3 Mid-Term = 2 Long-Term =1	Contributes to Mode Share Goal Low = 0 High = 3	Point Total
PACKAGE C: New Pathway and Lanes through Paiwa/Central Oahu Regional Park											
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Highway and Paiwa Street	Central Oahu Regional Park	B	3	1	0	0	3	2	3	12
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street	Central Oahu	B	3	1	0	0	3	2	3	12
PACKAGE D: New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands											
201.6	New Bike Pathway along Kamehameha Highway. between Wahiawa and Anania Drive	Wahiawa	B	3	1	0	0	3	3	3	13
201.7	Bike Pathway on Cane Haul Road between H-2 & the the Waiawa Rail Station at Pearl Highlands	Pearl Highlands	B	3	1	0	0	3	2	3	12
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	Wahiawa	B/P	2	1	0	0	3	3	3	12
802	New Pedestrian and Bicycle Bridge connecting Wahiawa and Whitmore Village	Wahiawa	B/P	3	1	0	1	3	1	3	12
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road	Wahiawa	B/P	3	1	0	0	2	3	3	12
804	New and Upgraded Bike Lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	Wahiawa	B	2	0	0	0	2	3	2	9
900 ROADWAY AND TRAFFIC OPERATIONS PROJECTS											
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	Waipio Interchange	R	2	1	1	1	0	2	0	7
408.4	Mililani Access and at H-2 and Meheula Parkway with New Bus Stops, New flyer stops at H-2 with pedestrian pathway to Park & Ride	Mililani Mauka	R	2	2	0	0	1	2	1	8
501.1	Transportation Demand Management (TDM). Free real-time online carpool matching	Islandwide	Pr	1	0	1	0	0	2	2	6

PROJECT TITLE		General Location	Primary Mode or Program: B = Bicycle P = Pedestrian R = Roadway T = Transit Pr = Program	Potential COTS Benefit							
Number	Description			Areawide = 3 Local = 2 Program = 1	Number of Other Modes Enhanced	Potential to Reduce Vehicle Congestion Low = 0 High =3	Infrastructure Condition Low = 0 High =3	Safety Low = 0 High =3	Deficiency Status Near-Term = 3 Mid-Term = 2 Long-Term =1	Contributes to Mode Share Goal Low = 0 High = 3	Point Total
502.1	Intelligent Transportation System (ITS). Outreach promotion and marketing of alternative transportation	Islandwide	Pr	1	3	1	0	0	2	2	9
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	Whitmore Village-Wahiawa	R	3	3	3	0	2	2	1	14
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	Wahiawa	P	2	3	0	0	2	2	3	12
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Whitmore Village	R	2	0	1	0	1	2	0	6
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Wahiawa	R	3	0	3	0	1	3	0	10
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	Wahiawa	R	2	0	1	0	1	3	0	7

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3.2 Performance Measures

Analysis was made of how projects met the performance measures identified early in the project. The performance measures applied differs by type of project, as explained in **Deliverable B-2, Performance Measures**. The performance measure results for the recommended projects are shown in **Table 3-2, Table 3-3,** and **Table 3-4**.

Table 3-2. Application of Performance Measures to Recommended Transit Projects

TRANSIT PROJECTS		APPLICABLE PERFORMANCE MEASURES					
Project Number	**Project Description**	**2**	**6**	**7**	**11**	**20**	**21**
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations		42 added hours	Yes	Yes		
102.3	Bus Rapid Transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	16 added service hours	Yes	Yes	Shelter(s) at each stop/ station	
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	LCC=-7 min Kapolei=-6 m PUC=-7 min UH=-7 min	14 added service hours	Yes	Yes	Shelter(s) at each stop/ station	
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	N/A	8 added weekday revenue hours	Yes	Yes	N/A	Yes
703	Expanded Late Night Service Bus Routes 51/52	N/A	8 added weekday revenue hours	Yes	Yes	N/A	Yes
704	Bus Rapid Transit (BRT) from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	-8 min	18 added weekday service hours	Yes	Yes	Shelter(s) at each stop/ station	Yes

Table 3-3. Application of Performance Measures to Recommended Bicycle and Pedestrian Packages and Projects

BICYCLE PROJECTS			APPLICABLE PERFORMANCE MEASURES								
Project Number	**Project Description**	**5**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**16**	**19**
Bicycle Package A: Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu											
201.1	New Pathway on Waipahu St between Paiwa Street and Kamehameha Highway	0 min	No	1.0 mi	1.0 mi	Yes	Yes	0	0	1 collision	New
201.2	New Pathway between Anania Drive and Central Oahu Regional Park	-18 mins	No	2.58 mi	2.58 mi	Yes	Yes	0	1	0 collisions	New
201.4	New Bike Pathway along Kamehameha Highway from	0 min	No	1.65 mi	1.65 mi	Yes	Yes	0	0	2 collisions	New

BICYCLE PROJECTS			APPLICABLE PERFORMANCE MEASURES								
Project Number	**Project Description**	**5**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**16**	**19**
	Ka Uka Boulevard to Waipahu Street										
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	0 collisions	New
203.5	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	0 min	No		1.3 mi	Yes	Yes	0	0		New
Bicycle Package B: New Pathway, Lanes, and Route through Meheula Parkway											
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	0 collisions	New
202.3	Bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe St	0 min	No		1.96 mi	Yes	Yes	0	0	1 collision	New
202.4	Bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway *fatalities for every million vehicle miles	0 min	No		0.14 mi	Yes	Yes	1.73 *	0	3 collisions, 1 ped fatality	New
203.6	Bicycle route on Lanikuhana Avenue from South end of Meheula Pkwy to Mililani Shopping Center	0 min	No		2.35 mi	Yes	Yes	0	0		New
Bicycle Package C: New Pathway and Lanes through Paiwa/Central Oahu Regional Park											
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	0 collisions	New
202.8	Bicycle lanes on Paiwa Street between H-1 and Waipahu Street										
Bicycle Package D: New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands											
201.6	New Bike Pathway along Kamehameha Highway. between Wahiawa and Anania Dr	0 min	No	3.62 mi	3.62 mi	Yes	Yes	0	2	1 collision	New
201.7	Bike Pathway on Cane Haul Road between H-2 & the Waiawa Rail Station at Pearl Highlands	-11 mins	Yes	1 mi	1 mi	Yes	Yes	0	0	1 collision	New

BICYCLE PROJECTS			APPLICABLE PERFORMANCE MEASURES								
Project Number	**Project Description**	**5**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**16**	**19**
Bicycle Projects											
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	0 min	No	7.0 mi	7.25 mi	Yes	Yes			2 collisions	New
802	New Pedestrian and Bicycle bridge connecting Wahiawa and Whitmore Village	-10 min	No	0.5 mi	0.7 mi	Yes	Yes			0	New
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway	0 min	No	1.9 mi	4.5 mi	Yes	Yes			1 collision	New
804	New and Upgraded Bike Lanes in Wahiawa Commercial District • Kamehameha Highway • California Avenue • Lehua Street	0 min	No	0 mi	0.5 mi	Yes	Yes			0	New

Table 3-4. Application of Performance Measures to Recommended Roadway Projects

ROADWAY PROJECTS		APPLICABLE PERFORMANCE MEASURES											
TYPES OF ROADWAY PROJECTS													
Project Number	**Project Description**	**1**	**2**	**3**	**4**	**5**	**10**	**11**	**12**	**16**	**17**	**18**	**19**
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	LCC = 0 mins Kapolei = 0 mins PUC = 0 mins UH = 0 mins	< -1 min		- 2 min			No	0	1 collision	Fair		
408.4	Mililani Access and at H-2 and Meheula Parkway with New Bus Stops					- 8 mins	Yes	Yes					

ROADWAY PROJECTS		APPLICABLE PERFORMANCE MEASURES								
Project Number	**Project Description**	**3**	**4**	**10**	**11**	**12**	**16**	**17**	**18**	**19**
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	1 more congested lane-mile in AM	+4 min	0.8 mi shared use path	Yes (with path)	N/A	2 collisions	Fair	Fair (high priority for repair or upgrade)	N/A
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	N/A	N/A	0.45 mi bike lane	Yes	2	6 collisions	Fair	N/A	Fair
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	N/A	N/A	N/A	No	N/A	N/A	Fair	N/A	N/A
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	N/A	-1 min	N/A	No	N/A	2 collisions	N/A	N/A	N/A
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	N/A	0 min	N/A	No	2	6 collisions	N/A	N/A	N/A

3.3 Benefit Cost Ratio

This section provides a financial analysis of each of the recommended projects.

Benefit (Column A) sums all benefits over a multi-year period to 2040. Transit, roadway, and bicycle/pedestrian projects have different types of benefits. These, along with explanations of baseline (2018), discount rate (3%), inflation rate (1%) were presented in **Deliverable G, Benefit Cost Analysis** and **Deliverable W-3, Benefit Cost Analysis of Potential Projects in the Wahiawa/Whitmore Village Area**.

Total Cost (Column B) adds construction cost plus O&M cost for the period from project opening to 2040. Many of these projects have value beyond 2040, but that is the forecast year used for consistency throughout this study.

The BCA results for the short-term projects are shown in **Table 3-5**. The benefit cost analysis results for the mid-term projects are shown in **Table 3-6**.

Table 3-5. Benefit Cost Analysis of Recommended Short-Term Projects

Project Number	Project Description	A Benefit	B Total Cost (Con + O&M)	C BCA (3%)
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	$ 221.2 M	$ 66.2 M	3.34
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	$ 263.0 M	$125.4 M	2.10
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	$ 34.3 M	$ 10.3 M	3.33
703	Expanded Late Night Service Bus Routes 51/52	$ 30.9 M	$13.4 M	4.26
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	$ 143.5 M	$46.5 M	3.09
408.4	Mililani access and at H-2 and Meheula Parkway with New Bus Stops	$3.9 M	$7.6 M	0.51
501	Transportation Demand Management	$ 42.9 M	$15.1 M	2.84
502	Intelligent Transportation System	$ 6.1 M	$8.8 M	0.69
902	Kamehameha Highway widening from north of Whitmore Avenue to Kilani Avenue	$19.8 M	$17.3 M	0.87
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	$1.4 M	$2.1 M	0.66
911	Kamehameha between Kilani Avenue and Avocado Street Traffic Signal Timing	$12.0 M	$66,454	180.95
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	$ 4.7 M	$49,763	94.39
Package A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	$37.04 M	$16.92 M	2.19
Package C	Bicycle and Pedestrian Package – New Pathway and Lanes through Paiwa/Central Oahu Regional Park	$16.43 M	$6.44 m	2.55
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	$22.7 M	$23.2 M	0.98

Table 3-6. Benefit Cost Analysis of Recommended Mid-Term Projects

Project Number	Project Description	A Benefit	B Total Cost (Con + O&M)	C BCA (3%)
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	$ 99.1 M	$56.4 M	3.43
403.5	Widen Kamehameha Highway for 1.8 miles from Ka Uka to Lanikuhana; could be a new parallel structure or widen for HOV ($24 M)	$ 40.6 M	$149.8 M	3.68
Package D	Bicycle and Pedestrian Package - New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands	$10.97 M	$15.04 M	0.73
Package B	Bicycle and Pedestrian Package – New Pathway, Lanes, and Route through Meheula Parkway	$53.9 M	$9.84 M	5.48
802	New pedestrian and bicycle bridge connecting Wahiawa and Whitmore Village	$7.9 M	$4.6 M	1.73
803	New bike and pedestrian connection between Wahiawa, Whitmore Village, and NCTAMS	$9.6 M	$6.4 M	1.50
804	New and upgraded bike lanes in Wahiawa Commercial District	$3.9 M	$893,000	4.35

3.4 Community Support for the Recommended Projects

OahuMPO focused community input on community events, presentations at neighborhood boards, a paper survey, and an on-line version of the paper survey. A separate detailed report is available, and the forms used are provided in **Appendix C** of this report.

The survey results were gathered in two parts:

- First, for projects in the Mililani-Waipio (to California Avenue sub-region)
- Second, for projects in the Wahiawa-Whitmore Village area (north of California Avenue).

3.4.1 Mililani-Waipio to California Avenue Projects Survey Results

The on-line survey for the Mililani-Waipio area resulted in 172 responses looking at 16 projects (four transit; eight roadway; and four bike/pedestrian packages). The first question asked respondents for their reaction to each project, whether it was positive, neutral, or negative. The second question asked respondents for their "top" project in each model category. A third question asked respondents to assign dollars to their preferred projects, up to $80 Million (note, due to its cost, this essentially meant aerial gondolas could not be selected). Asking similar but different questions allows certain nuances in preferences to emerge. These are discussed below.

OahuMPO went to nine community events, including three neighborhood boards in the study sub-area. Using poster boards, attendees were asked to place one dot next to each of their top projects for transit, roadways, and bicycle/pedestrian. There were 271 participants.

In regards to the transit projects, "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" (Project 101.1), "Bus Rapid Transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3), and "Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands" (Project 102.5), all received positive (greater than 50%) ratings in the paper and online surveys with less than 20% negative ratings. The exception was the "Aerial Gondola" (Project 102.8), which received equal number of negative and positive (42% to 44%) responses. Overall, about a quarter (25% to 28%) of all the responses were neutral toward all the transit projects.

- Highest rating was for "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) (62% positive) followed by "Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3) (53% positive) and "Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands" (Project 102.5) (54% positive).
- The top transit project was "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) (35%). This answer is consistent with positive rating results. The community events also favored "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" as the top project at 51%, followed by "Bus Rapid Transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" at 23%.
- The "Aerial Gondola" showed considerable interest among "top" projects with 30% of those surveyed choosing this project. The community events also had 17% of respondents choose this as their top transit project. These results suggest more review of an aerial gondola would be beneficial.
- For the dollar allocation question, transit projects were included in 168 lists. "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) ($24.5 Million) was selected most often, followed almost evenly by "Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3) ($29 Million) and "Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands" (Project 102.5) ($37.5 Million).
- Those who participated at the community events selected "Bus Service Expansion with Increase Frequency, New Routes, and Extension to Rail Stations" (Project 101.1) as their top project, more than twice the next choice which was "Bus Rapid Transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands" (Project 102.3).

For roadway projects, "Widening Kamehameha Highway" (Project 403.5), "New Road to Pearl City" (406.1), and "Intelligent Transportation Systems (ITS)" (Project 502.1) all received Positive (greater than 50%) ratings. All other roadway projects received more positive than negative Ratings. More

respondents were neutral to the roadway projects than the transit projects by five to ten percentage points.

- Highest ratings were for “New Road between Mililani Mauka and Pearl City” (Project 406.1) (60% Positive), “Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue” (Project 403.5) (53% Positive), and “Intelligent Transportation Systems (ITS)” (Project 502.1) (59% Positive).
- The top roadway project in the survey was the “New Road between Mililani Mauka and Pearl City” (Project 406.1) (31%), followed by “Widening Kamehameha Highway” (Project 403.5) (18%) and Intelligent Transportation Systems (ITS)” (Project 502.1) (15%), which is consistent with findings on other questions. This mirrors the results of the top project choices in the online survey.
- Those who participated the community events overall chose “New Road between Mililani Mauka and Pearl City” (Project 406.1) at 28% followed by “Mililani Access at H-2 and Meheula Parkway with New Bus Stops” (Project 408.4) at 24% and “Widening Kamehameha Highway” (Project 403.5) at 16%. When examining only the Mililani and Waipahu respondents, “New Road to Pearl City” and “Widening Kamehameha Highway” are the top two, but “Mililani Access at H-2 and Meheula Parkway with New Bus Stops” comes in a strong third.
- In the dollar allocation question, roadway projects were included in 214 lists. “New Road between Mililani Mauka and Pearl City” (Project 406.1) ($57 Million) was selected most often, followed by “Widening Kamehameha Highway” (Project 403.5) ($38 Million) and Intelligent Transportation Systems (ITS)” (Project 502.1) ($8 Million) and “Mililani Access at H-2 and Meheula Parkway with New Bus Stops” (Project 408.4) ($7 Million).

For bicycle and pedestrian projects, Package A, New Mililani to Waipahu; Package C, Paiwa/Central Oahu Regional Park; and Package D, Wahiawa to the Waiawa Rail Station at Pearl Highlands all received positive (greater than 50%). All four packages received more positive than negative ratings. Negative ratings were low (13% to 17%). Neutral ratings were consistent across packages (33% to 39%).

- The highest bicycle and pedestrian ratings were for Package A, Mililani to Waipahu, (53% positive); Package D, New Pathway Wahiawa to the Waiawa Rail Station at Pearl Highlands, (52% positive); and Package C, Paiwa/Central Oahu Regional Park, (51% positive). Package B, Meheula Parkway, was 44% positive and 39% neutral.
- The top bicycle project was Package D, New Pathway Wahiawa to the Waiawa Rail Station at Pearl Highlands (39%); followed by Package C, Paiwa/Central Oahu Regional Park (33%); Package A, Mililani to Waipahu (30%); and then Package B (14%). This question showed a variation in order from the rating question, although Package B, New Pathway, Lanes, and Route through Meheula Parkway, remains at the bottom.

- Those who participated at the community events overall chose Package D, “New Pathway, Wahiawa to the Waiawa Rail Station at Pearl Highlands” at 39% followed by Package A, “Mililani to Waipahu) at 31%.
- In the dollar allocation question, bicycle and pedestrian projects were included in 135 lists. Package A, New Pathways and Route from Mililani to Waipahu ($17 Million) was selected most often; followed by Package C, New Pathway and Lanes through Paiwa/Central Oahu Regional Park ($5.5 Million) and Package D, New Pathways from Wahiawa to the Waiawa Rail Station at Pearl Highlands ($16 Million).

3.4.2 Wahiawa-Whitmore Village Projects Survey Results

OahuMPO solicited project preferences at community events for Wahiawa and Whitmore Village sub-area for four weeks, approximately a month after the Mililani-Waipio outreach efforts. It looked at 18 projects (five transit; nine roadway; four bicycle/pedestrian packages). OahuMPO surveyed community members at the Wahiawa Neighborhood Board meeting (June 17, 2019), at the Wahiawa Bon Dance (June 21, 2019) and at a Blue Zones “California Avenue Solutions” event (June 24, 2019). The Wahiawa Bon Dance had the largest number of respondents. A total of 168 persons ranked their top projects.

- For transit projects, the top project was “Expanded Late Night Service Bus Routes 51/52” (Project 703) (54%). After that, “Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2” (Project 704) (14%), and “Increased Bus service to and from Whitmore Village (14%) and the Wahiawa Transit Center” (Project 701) (13%) ranked next highest. All projects received some top votes.
- For roadway projects, the top project was “California Avenue Complete Streets from Kamehameha Highway to Wahiawa District Park” (Project 903) (38%) followed by “Kamehameha Highway Widening from north of Whitmore Avenue to Kilani Avenue” (Project 902) (28%). All projects received some top votes, but in a somewhat distributed manner.
- For bicycle and pedestrian projects, the highest ranking was “New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit” (Project 801) (59%). This was followed by a tie between “New Pedestrian and Bicycle Bridge connecting Wahiawa and Whitmore Village” (Project 802) and “New and Upgraded Bike Lanes in Wahiawa Commercial District” (Project 804) (19% each).

The online survey was advertised through an email blast and at community events. A total of 44 responses were received. Sixty-four percent said they live in the Wahiawa-Whitmore Village area; 25% said they work in this area. Ninety-four percent drive as their primary mode of transportation; 14% walk and 14% ride the bus (multiple responses allowed to this question). Results of the online survey are presented in **Table 3-7**.

Table 3-7. Community Reaction to Projects (Online Survey)

Project Number	Project Description	Positive	Neutral	Negative	TOP CHOICE
Transit Projects					
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	61%	34%	4.5%	23%
702	Increase Bus Service Schofield & Wahiawa Transit Center	54.5%	39%	7%	7%
703	Expanded Late Night Service Bus Routes 51/52	66%	29.5%	4.5%	30%
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	64%	27%	9%	**36%**
705	Align Express Route 83 on Proposed Leilehua HS to Kahelu Road Connection	48%	45%	7%	6%
Bicycle and Pedestrian Projects					
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	65%	26%	9%	**53%**
802	New Pedestrian and Bike Bridge Connecting Wahiawa and Whitmore Village	63%	21%	16%	21%
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS	60%	28%	12%	16%
804	New and Upgraded Bike Lanes in Wahiawa Commercial District	51%	28%	21%	9%
Roadway Projects					
901	Whitmore Avenue Widening, Saipan Drive to Ihihi Avenuei/Nani Ihi Avenue	30%	57.5%	12.5%	2.5%
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	60%	35%	5%	15%
903	California Avenue Complete Streets from Kamehameha Highway to Wahiawa District Park	77.5%	12.5%	10%	25%
906	New Roadway at Leilehua High School to Kahelu Road Connection between California Avenue and Higgins Road	52.5%	30%	17.5%	**30%**
909	Kamehameha Highway at Whitmore intersection improvements	55%	35%	10%	5%
910	Roundabout at Kamehameha Highway and California Avenue	37.5%	10%	52.5%	5%
911	Re-time traffic signals Kamehameha Highway between Kilani Avenue and Avocado Street	77.5%	17.5%	5%	10%
912	Re-time traffic signals California Avenue between Kamehameha Highway and Wahiawa District Park	70%	22.5%	7.5%	7.5%
915	Transit Signal Priority Kamehameha Highway from Kilani Avenue to Avocado Street	50%	37.5%	12.5%	0%

Several observations can be made from these results.

- For transit, all four projects received high positive ratings, low negative ratings, and a substantial number of neutral ratings. The top choice differs between the two surveys. For the community events, the top transit project was "Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2" (Project 704) followed by "Expanded Late Night Service Bus Routes 51/52" (Project 703).

- Bicycle and pedestrian projects received high positive ratings, low negative ratings, and middle level neutral ratings. Both surveys chose the top choice project in the same order with “New Off Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit” (Project 801) on the top.
- For roadway projects, there were high positive ratings for all but “Roundabout at Kamehameha and California Avenue” (Project 910), low negative ratings, and mid-level neutral ratings. The top choice project differed greatly between the two surveys. At the community events, “California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park” (Project 903) and “Kamehameha Highway Widening from north of Whitmore Avenue to Kilani Avenue” (Project 902) were first and second. In the on-line survey, “New two-lane roadway at Leilehua High School-Kahelu Road Connection Between California Avenue and Higgins Road” (Project 906) and “California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park” (Project 903) were first and second.

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4.0 HOW THE PROJECTS FIT THE NEEDS OF THE STUDY AREA AND ITS TRAVEL CHARACTERISTICS

The COTS prepared two analyses of Trends and Issues: one for the Mililani-Waipio area and the other for Wahiawa-Whitmore Village area. The detailed studies are available on the COTS webpage (www.OahuMPO.org/CentralOahu) and are known respectively as **Deliverable B, Trends and Issues** and **Deliverable W-1, Trends and Issues for the Wahiawa-Whitmore Village Area**.

These two reports are rich with data from the American Community Survey (ACS), State of Hawaii Department of Health Crash Data, and forecasts from the OahuMPO travel demand model. The data are presented in text with accompanying graph and map formats. These analyses were critical to understanding the travel needs and patterns of the area and became important information for developing projects that could best address the needs of residents.

As will be discussed below, there are some critical differences between the Mililani-Waipio area and the upper Wahiawa-Whitmore Village area which affect the kinds of projects needed. In some cases, a project developed for Mililani could be extended up to Wahiawa; in general, these projects used Kamehameha Highway. In other cases, the best travel condition for Wahiawa and beyond was to bypass Mililani by using H-2.

4.1 Population

The Central Oahu Sustainable Communities Plan Area is the second largest on Oahu after the Primary Urban Center (PUC), in terms of population. In 2010, the census population was 168,643, or just under 18% of the island population. The area has been steadily growing and population is anticipated to reach 192,369 in the year 2040, but the same percentage of the island total population will remain the same. Most of the future growth will come from the Koa Ridge Master Planned Development, which is in the lower reaches of the area, but will add greatly to the demand for peak travel.

Mililani-Waipio has been and will continue to grow in population. By contrast, the Wahiawa area has been stable, with growth less than 0.017%; and Whitmore Village has been in decline, with a negative growth rate of -14.4%. The Central Oahu area houses only 10% of the island's jobs. **Table 4-1** shows the actual and projected population of Oahu by Development Plan Area.

Implications. The natural conclusion from this is that Central Oahu has a need to commute. Central Oahu is a suburban community. It will be challenging to provide the transportation infrastructure to support this population. Identifying projects to provide improved mobility is one of the purposes for this study.

Table 4-1. Oahu Population by Time Period and Development Plan Area

Development Plan Area	Actual Population				Projected Population		
	1980	1990	2000	2010	2020	2025	2040
Primary Urban Center	417,240	432,023	419,333	435,118	444,795	449,881	467,074
Ewa	35,523	42,931	68,696	101,397	130,702	146,096	172,679
Central Oahu	**101,685**	**130,526**	**148,208**	**168,643**	**174,351**	**179,984**	**192,369**
East Honolulu	43,213	45,654	46,735	49,914	51,514	50,627	49,985
Koolaupoko	109,373	117,694	117,999	115,164	115,868	114,626	113,258
Koolauloa	10,983	14,263	14,546	16,732	17,427	17,704	18,104
North Shore	13,061	15,729	18,380	17,720	18,570	18,906	19,641
Waianae	31,487	37,411	42,259	48,519	50,480	51,590	53,589
TOTAL	762,565	836,231	876,156	953,207	1,003,700	1,029,400	1,086,700

Source: City & County of Honolulu, Department of Planning & Permitting

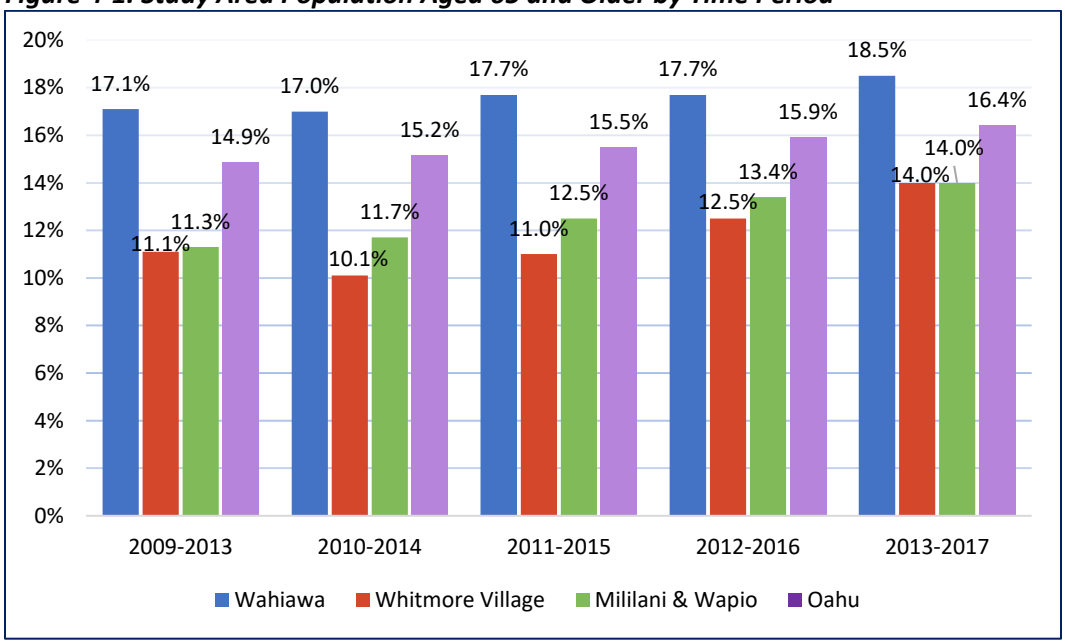
4.2 Population Characteristics that Affect Trip Making

The original study area encompasses about 55% of the Central Development Plan area. Analyses were conducted for these census blocks and tracks. When five-year averages are shown, they are for the period 2013-2017, the latest available.

4.2.1 Age

The age of the population has risen in the study area (see **Figure 4-1**). In the five-year average, the percentage of those over 65 years of age has risen from 11.3% to 14.0%. Wahiawa and Whitmore Village are even more pronounced rising from 15.8% to 17.6% aged 65 or older. This follows an island-wide trend of an aging population. Over the next few years, Central Oahu will have a greater need for public transportation as people can no longer drive and a greater demand for Handi-Van service.

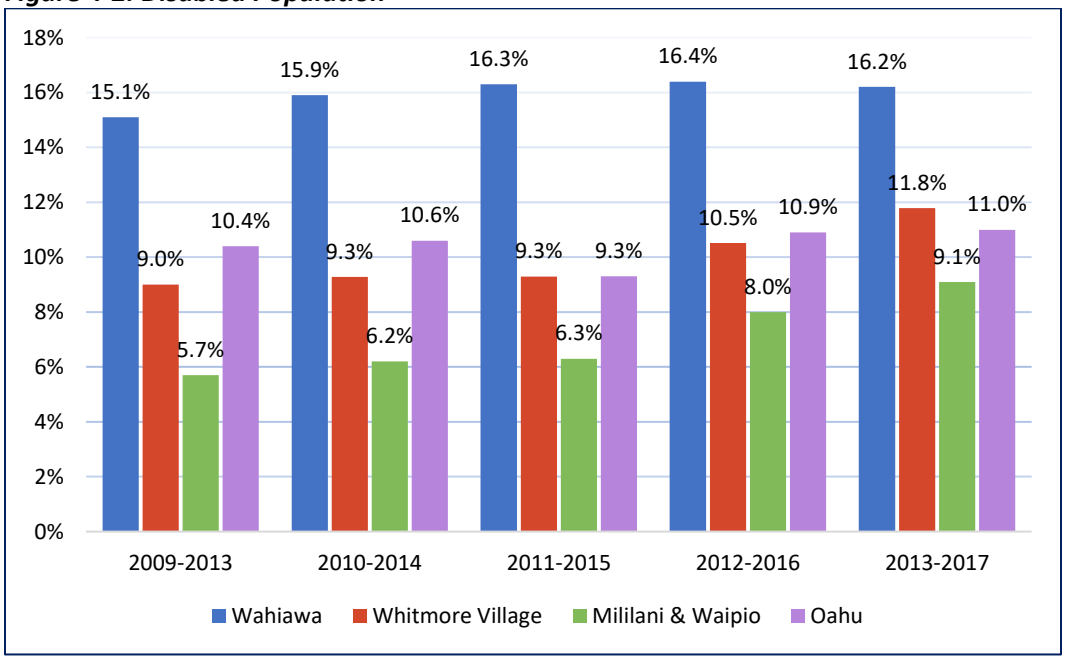
Figure 4-1. Study Area Population Aged 65 and Older by Time Period



Source: American Community Survey, five-year averages, Table S0101

The latest five-year period of 2013-2017 shows the percentage of persons reporting a disability in the Mililani-Waipio area is smaller (9.1%) than Oahu as a whole (11%). The percentage of disabled persons in Wahiawa is substantially higher at 16.2% as shown in **Figure 4-2**. This may also be a derivative of aging as Wahiawa has a higher percentage of elderly than the other areas.

Figure 4-2. Disabled Population



Source :American Community Survey, five-year averages, Tables S1810

Implications. The study area shows little migration (most people lived in the district a year ago), which suggests many people are aging in place. Thus, many who had once been commuters are now staying within the study area during the day. This implies that bus routes that circulate the community are valuable. Convenient connections to rail, which do not require seniors to travel in the uncertain freeway conditions, are also valued.

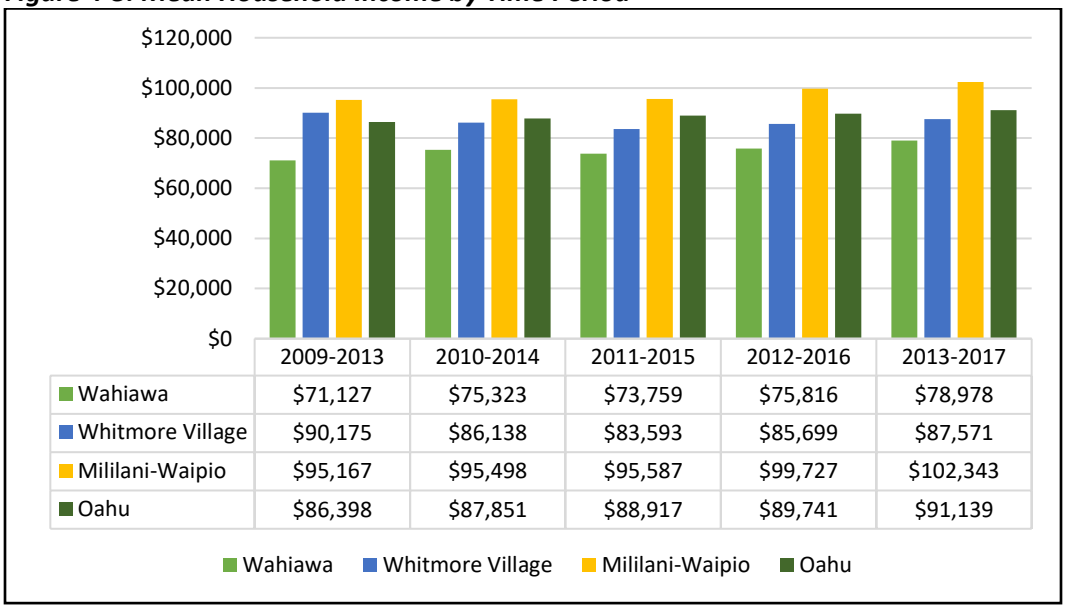
4.2.2 Household Economic Status

Across the Central Oahu area, mean household income was steady from 2005-2010 and increased in the next five-year period. But, median income in the study area varies greatly by sub-area. In Mililani Makua, the median income is $112,601 and in Waipio Acres the median income is $67,563. Some of this may be due to multiple workers in a household, and some due to household composition differences such as size and multi-generational. About 37% of households have three or more vehicles. Most households own their home versus being renters.

In the Wahiawa-Whitmore Village area, incomes were mostly flat or decreased slightly. Wahiawa mean household income is the lowest of all sub-areas. **Figure 4-3** shows a comparison of the COTS area (i.e., Mililani-Waipio Area), Wahiawa, and Whitmore Village to each other and to Oahu as a whole.

Lower household income relates to higher unemployment and less disposable income for travel and other needs. Household sizes are high, especially in Whitmore Village where 44% of households have four or more members.

Figure 4-3. Mean Household Income by Time Period



	2009-2013	2010-2014	2011-2015	2012-2016	2013-2017
Wahiawa	$71,127	$75,323	$73,759	$75,816	$78,978
Whitmore Village	$90,175	$86,138	$83,593	$85,699	$87,571
Mililani-Waipio	$95,167	$95,498	$95,587	$99,727	$102,343
Oahu	$86,398	$87,851	$88,917	$89,741	$91,139

Source: *American Community Survey*, September 2016, Table S1901

Implications. Higher household income is typically associated with increased rates in driving. However, rail may offer an alternative to these household members and easy access is critical to them making that choice. Households with multiple members typically need multiple modes of transportation.

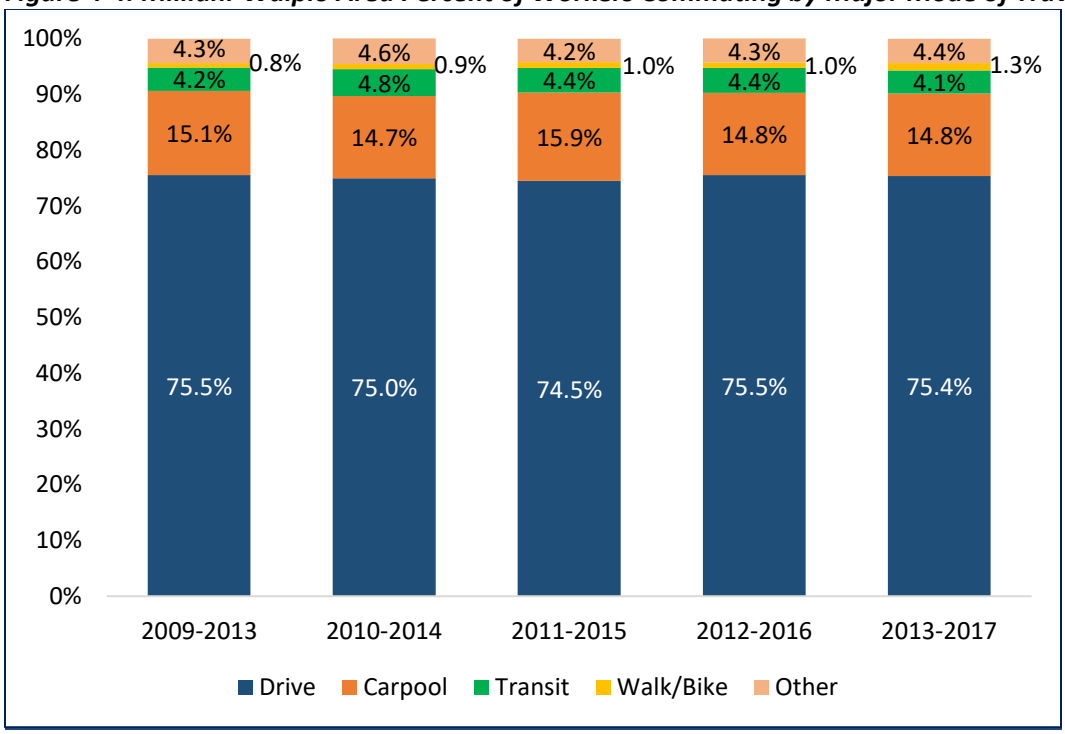
4.2.3 Commuting Behavior

The COTS base number of workers over 16 years of age has averaged 47,000. The distribution by mode has remained stable. Drive alone is the highest percentage, at about 74%. This is followed by 15% carpools. For the non-automobile modes, 5.4% use public transportation and 2.6% work at home. About 1.8% bike and 1.7% use taxi or motorcycle.

Wahiawa adds another 8,274 workers and Whitmore Village adds 2,180 workers for an additional total of 10,454 workers. This is about 25% more added to the COTS area. In Wahiawa, approximately 65% drove alone. This is followed by 14% for carpool, 10% for transit, and 6% for bike. In Whitmore Village, approximately 71% drove alone, followed by about 13% that rode transit and 10% that carpool.

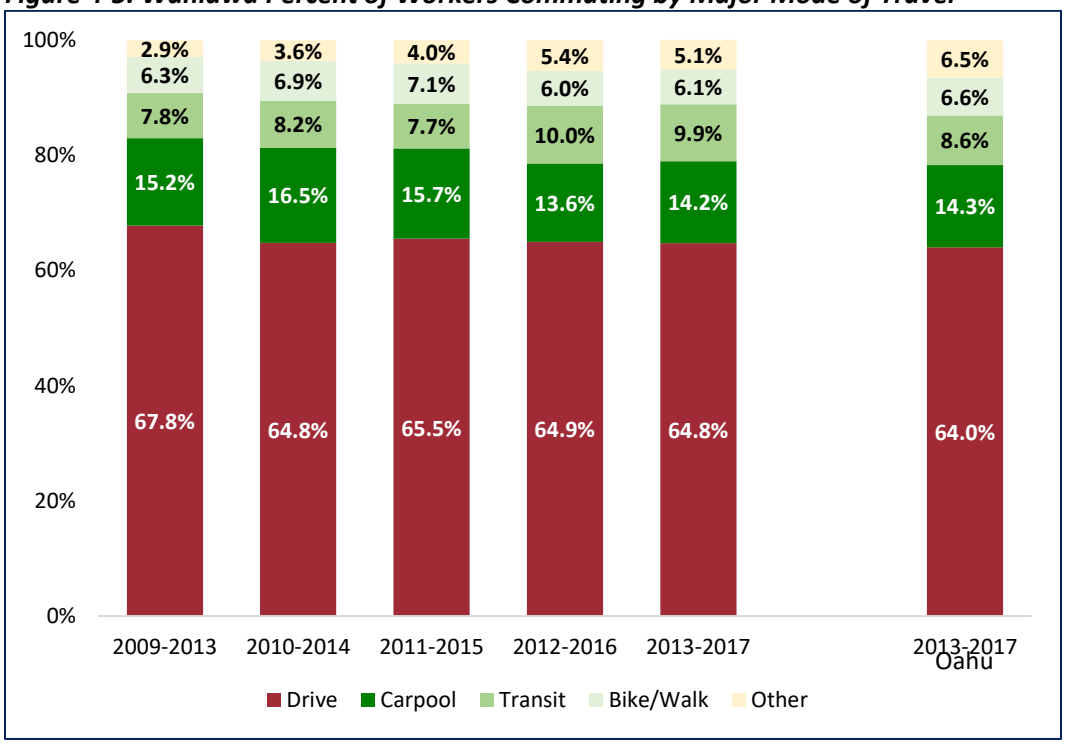
Figure 4-4, **Figure 4-5**, and **Figure 4-6** show the major modes of commuting for workers in the Mililani-Waipio, Wahiawa, and Whitmore Village areas, respectively.

Figure 4-4. Mililani-Waipio Area Percent of Workers Commuting by Major Mode of Travel



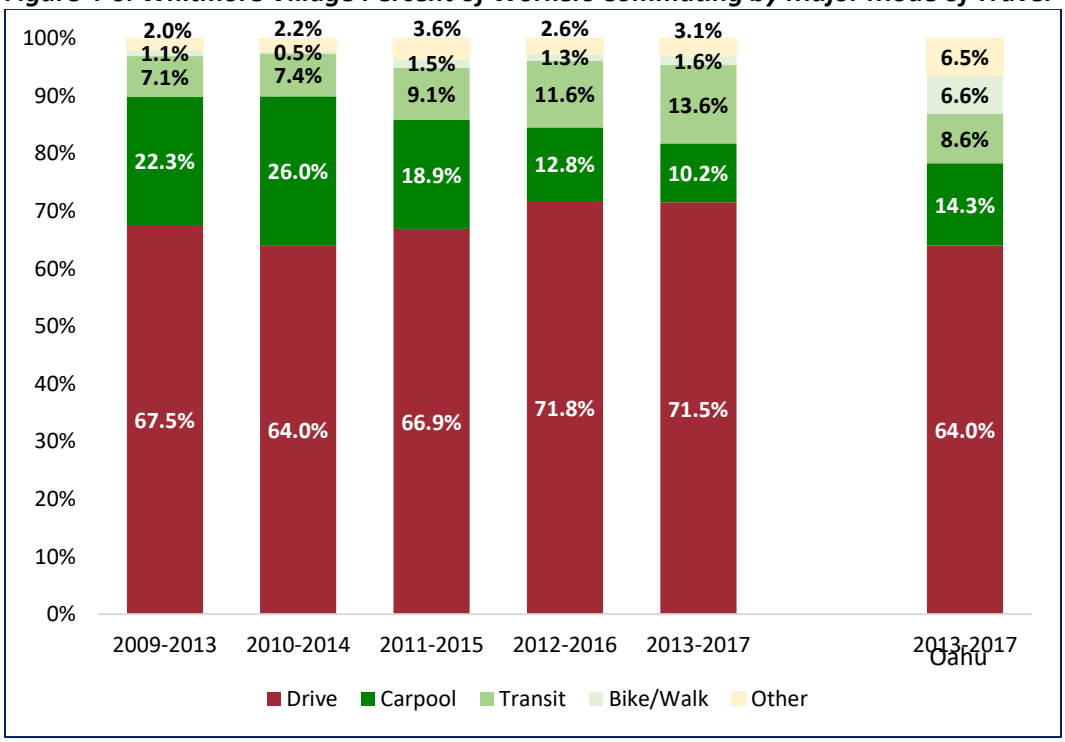
Source: American Community Survey, September 2016, Table S1801

Figure 4-5. Wahiawa Percent of Workers Commuting by Major Mode of Travel



Source: American Community Survey, five-year averages, Tables S0801

Figure 4-6. Whitmore Village Percent of Workers Commuting by Major Mode of Travel



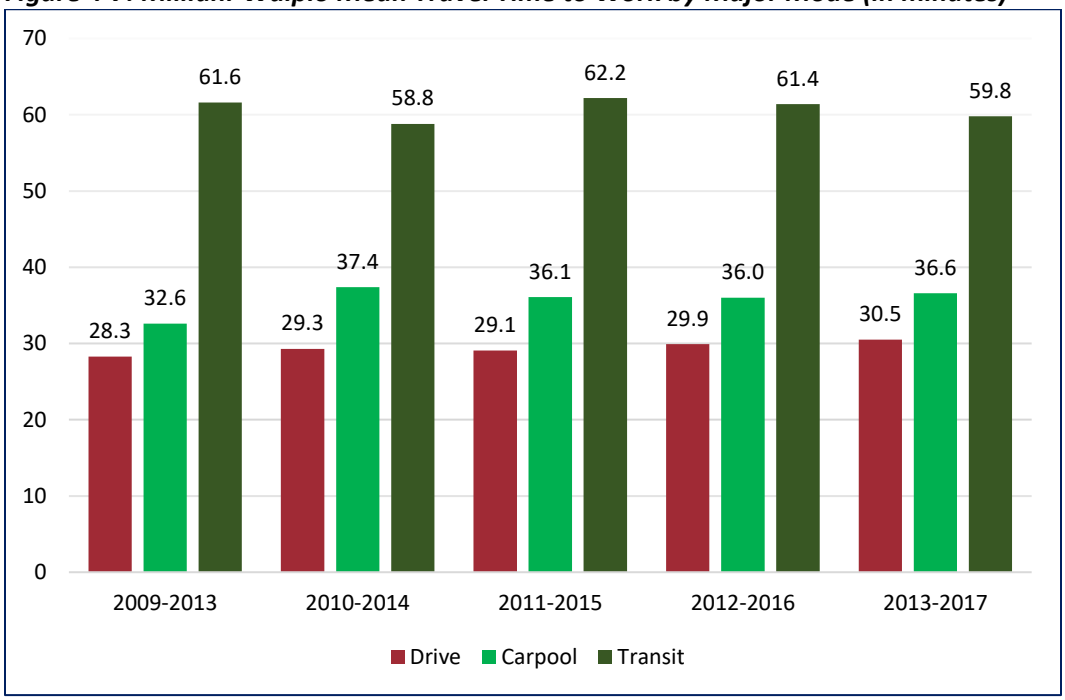
Source: American Community Survey, five-year averages, Tables S0801

Implications. The low numbers for alternate modes will be changed only through investment in facilities that make them more favorable to travelers. The introduction of rail is a game changer and is expected to support behavior change, including non-vehicle modes to access rail. Unique to Whitmore Village, the ACS reported very little (less than 2%) bicycle use or walking as the primary mode of transport to work. Bicycle and safety projects may encourage bicycle use in the area.

4.2.4 Travel Time and Commute Start Time

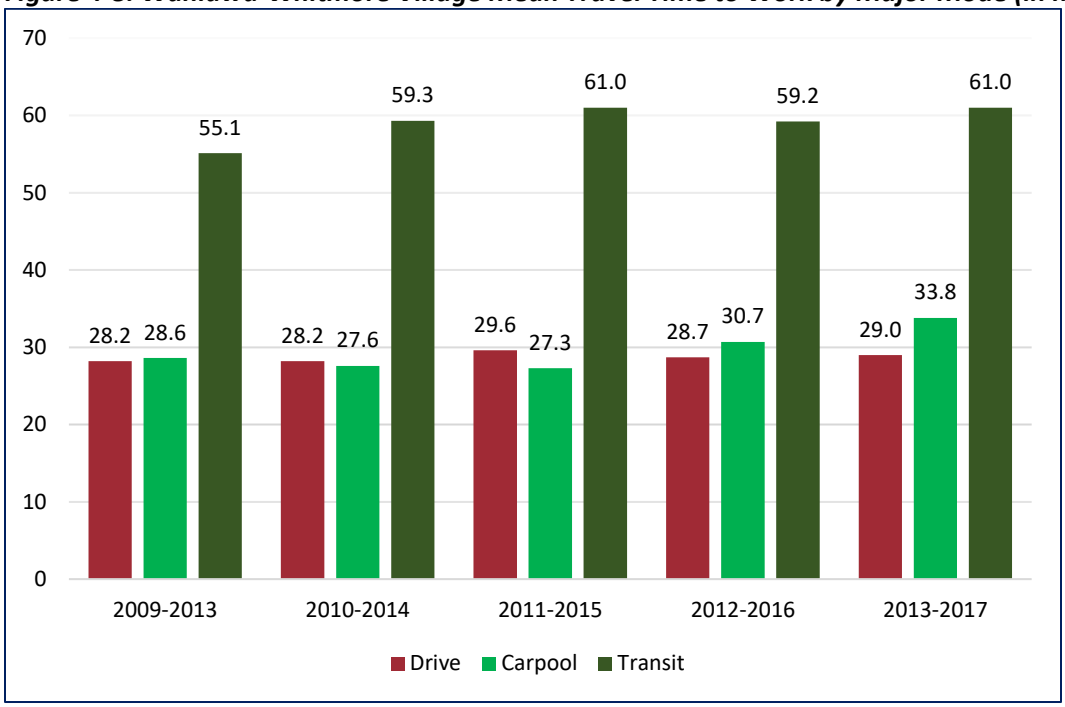
Figure 4-7 and **Figure 4-8** show how travel time to work has remained fairly constant for the three major modes of travel within the two geographic areas: Drive, Carpool, and Transit. As shown in the figures, commuting by transit takes twice as long for passengers to travel to work.

Figure 4-7. Mililani-Waipio Mean Travel Time to Work by Major Mode (in minutes)



Source: American Community Survey, September 2016, Table S0802

Figure 4-8. Wahiawa-Whitmore Village Mean Travel Time to Work by Major Mode (in minutes)

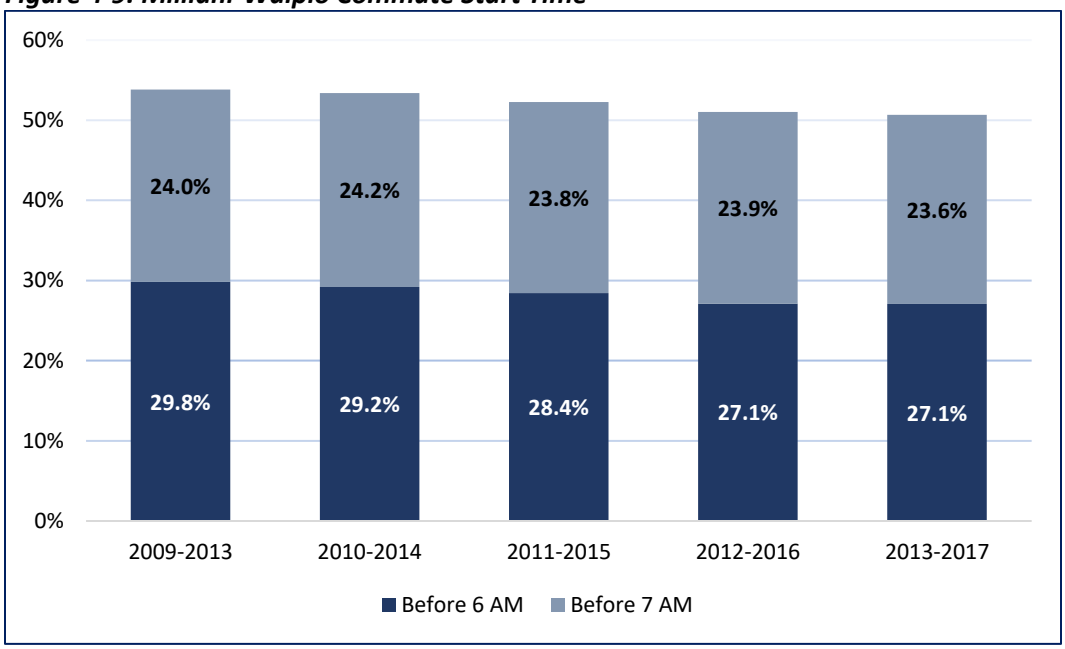


Source: American Community Survey, five-year averages, Tables S0802

Implications. Absent any new investment, travel time to work, especially by transit, will continue to grow. One adjustment drivers can make is what time they leave to get on the road. **Figure 4-9** and **Figure 4-10** show the time workers start their commute. **Figure 4-9** shows that Mililani and Waipio area commuters earlier start times have decreased slightly from 29.8% of commuters leaving home before 6 AM in the five-year period of 2009-2013 to 27.1% leaving before 6 AM in the five-year period 2013-2017. **Figure 4-10** shows a different trend for commuters living in Wahiawa and Whitmore Village. Commuters leaving earlier has increased in the same time periods. These two figures combine travel start times. In Whitmore Village, 40% of commuters now leave before 6:00 AM and an additional 21.2% leave before 7:00 AM.

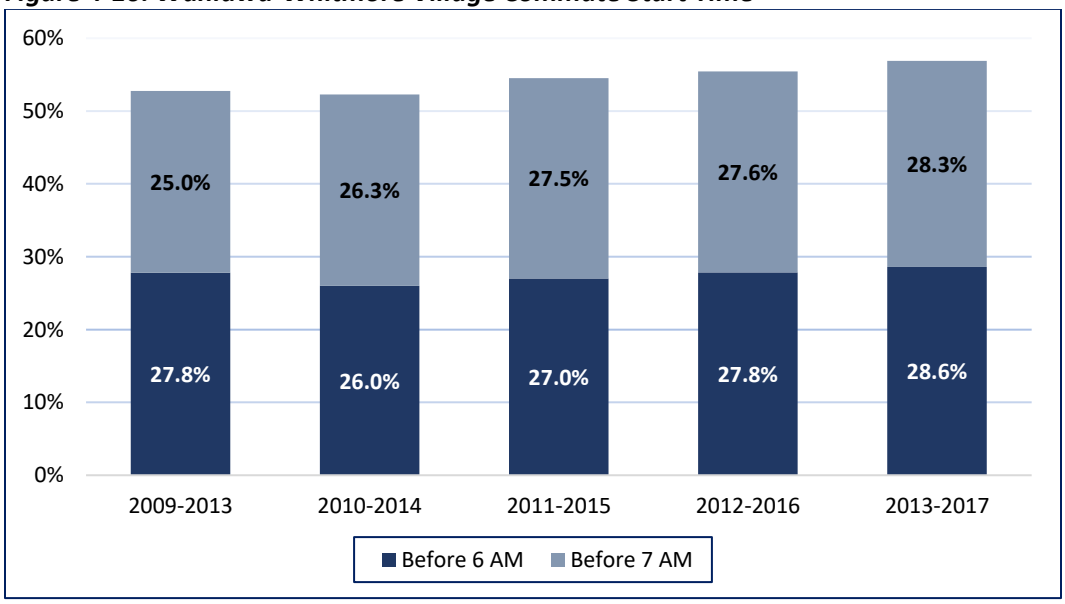
As a possible reaction to this increasing travel time, workers may be shifting where they work as another adjustment. As shown in **Figure 4-11**, there has been a steady decline in those who commute to the "principal city" (Honolulu) from 44.1% in the 2009-2013 period to 40% in the 2013-2017 period. This also may reflect opportunities growing in Kapolei and Ewa, which is in the non-peak direction on H-1, although H-2 will become increasingly more congested. Whether commuting in the eastern direction or western, access to rail is a critical way to avoid the drive commute.

Figure 4-9. Mililani-Waipio Commute Start Time



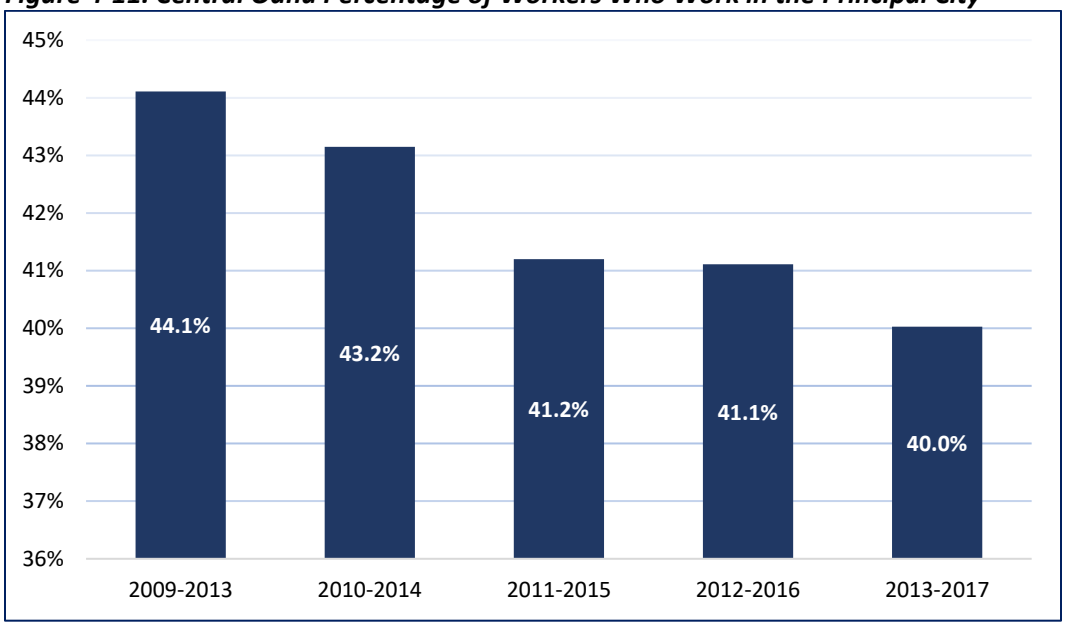
Source: American Community Survey, five-year averages, Tables S0802

Figure 4-10. Wahiawa-Whitmore Village Commute Start Time



Source: American Community Survey, September 2016, Tabled S0802

Figure 4-11. Central Oahu Percentage of Workers Who Work in the Principal City

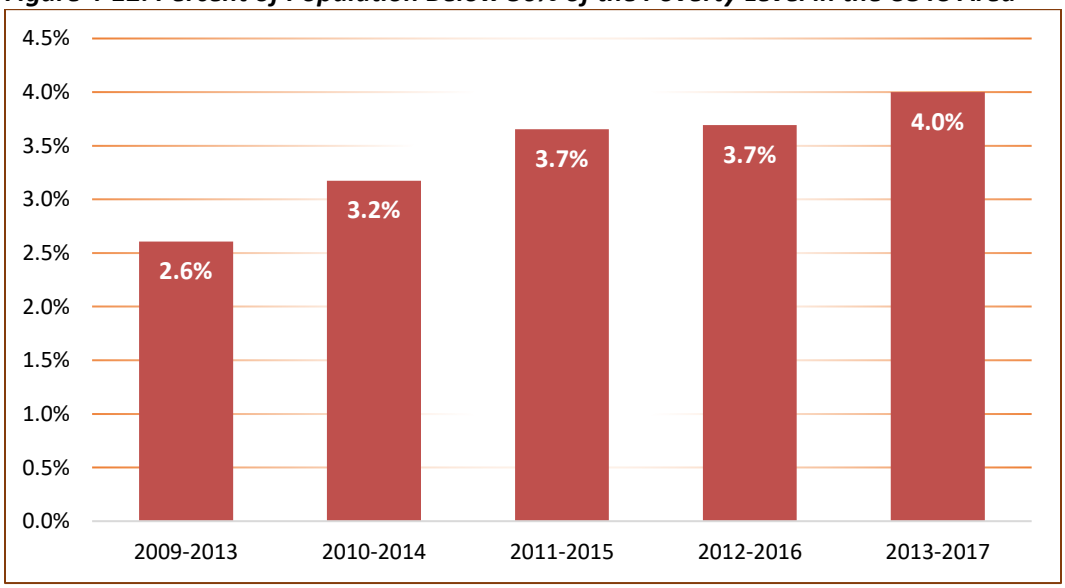


Source: American Community Survey, September 2016, Table S1710

4.2.5 Environmental Justice Populations

The percent of the population below the poverty level is low but steadily climbing from 2.6% to 4.0% as shown in **Figure 4-12**. These levels are low and non-indicative of where there is poverty in the COTS area.

Figure 4-12. Percent of Population Below 50% of the Poverty Level in the COTS Area



Source: American Community Survey, five-year averages Table S1710

Altogether, the entire project area including both the Mililani-Waipio and Wahiawa-Whitmore Village areas has nine census block groups that qualify as environmental justice areas based on income, race, or both.

The five census block groups that qualify as environmental justice based on income and/or race for the Mililani-Waipio area are shown in **Figure 4-13**. Four of the block groups selected for race (shown in red) are located in Wheeler Army Airfield, Launani Valley, Waipio Acres and west and south of Mililani District Park. The single EJ block group selected for income (shown in yellow) is located north of Mililani High School.

Wahiawa has four block groups that qualify for environmental justice consideration due to income, race, or both. The census block groups that qualify as environmental justice areas in the Wahiawa-Whitmore Village area are shown in **Figure 4-14**. Of the four block groups selected as environmental justice, one is for income located in Whitmore Village, two are selected for race and income located in Wahiawa adjacent to Kamehameha Highway, and one is for race located in Wahiawa Heights.

Figure 4-13. Environmental Justice Areas in Mililani and Waipio

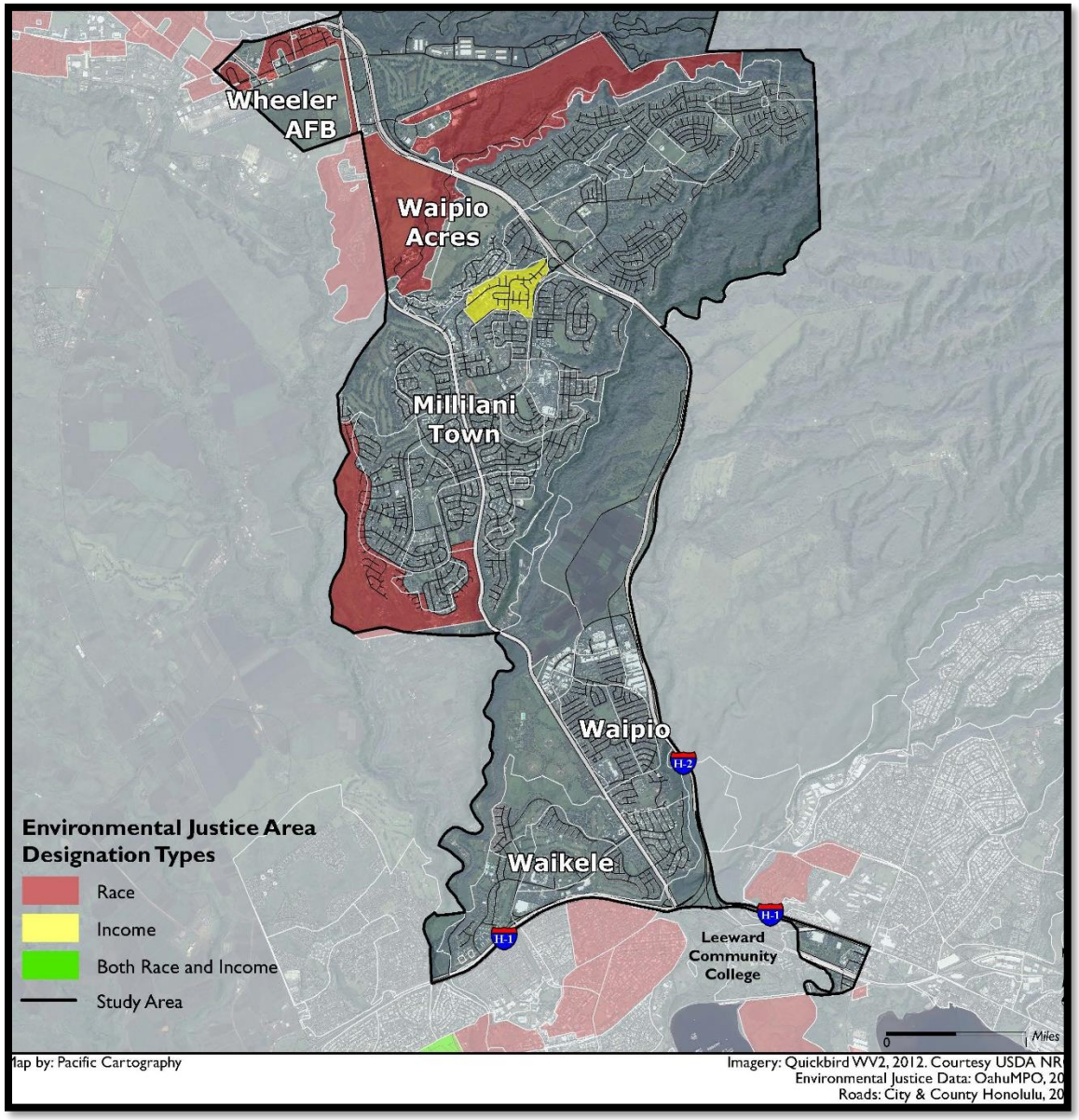
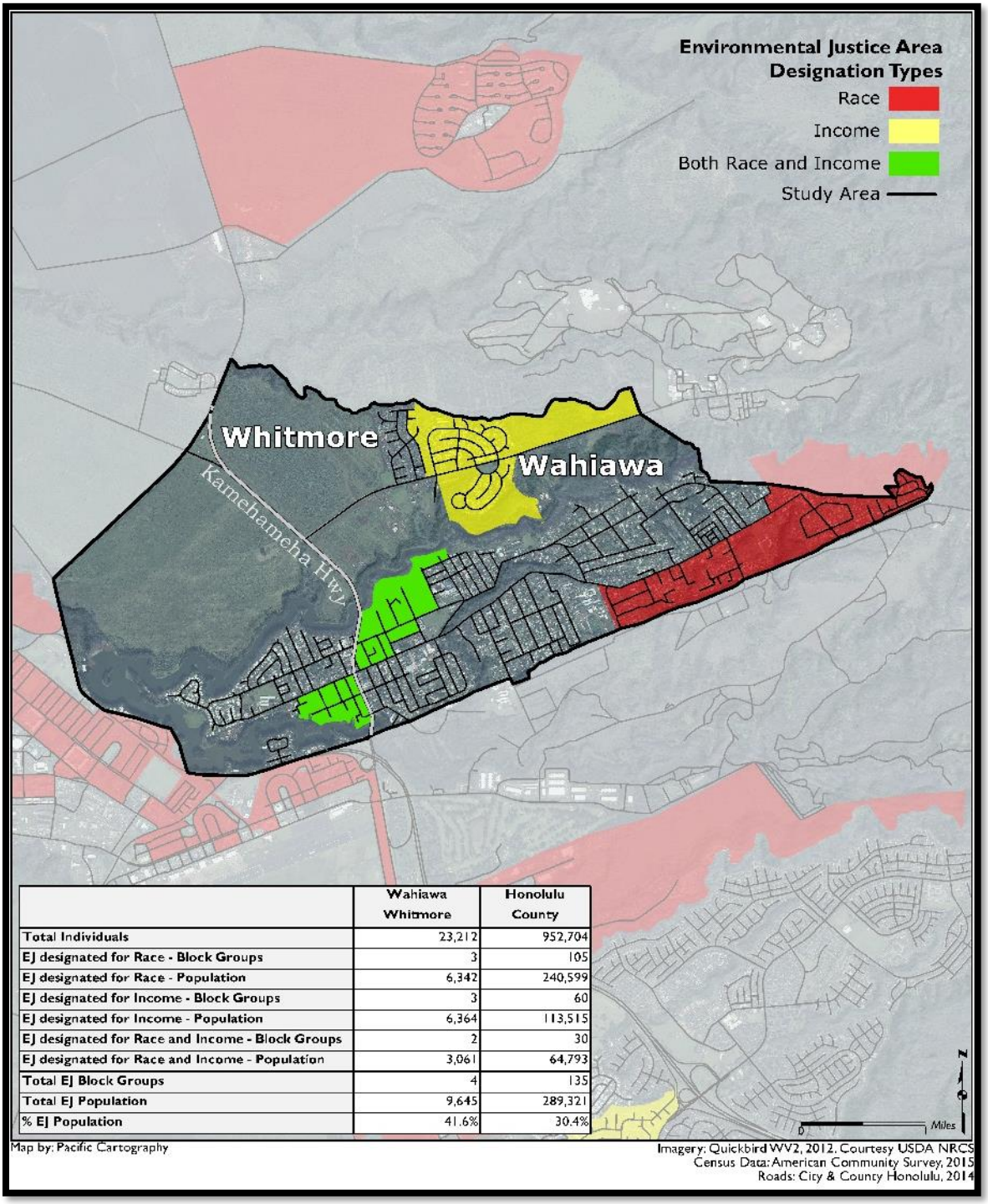


Figure 4-14. Environmental Justice Areas in Wahiawa and Whitmore Village



	Wahiawa Whitmore	Honolulu County
Total Individuals	23,212	952,704
EJ designated for Race - Block Groups	3	105
EJ designated for Race - Population	6,342	240,599
EJ designated for Income - Block Groups	3	60
EJ designated for Income - Population	6,364	113,515
EJ designated for Race and Income - Block Groups	2	30
EJ designated for Race and Income - Population	3,061	64,793
Total EJ Block Groups	4	135
Total EJ Population	9,645	289,321
% EJ Population	41.6%	30.4%

4.3 Transportation

4.3.1 Safety and Crash Trends

The number of motor vehicle crashes in the Mililani-Waipio area in the period 2007-2011 was 287, as shown in **Figure 4-15**. The number of motor vehicle crashes in the Wahiawa area was 284, almost the same, as shown in **Figure 4-16**. The size of the circle indicates the number of incidents by location. Fault and severity are not part of the database.

Figure 4-15. Number of Motor Vehicle Crashes in the Mililani/Waipio/Melemanu Neighborhood Board Area, 2007-2011

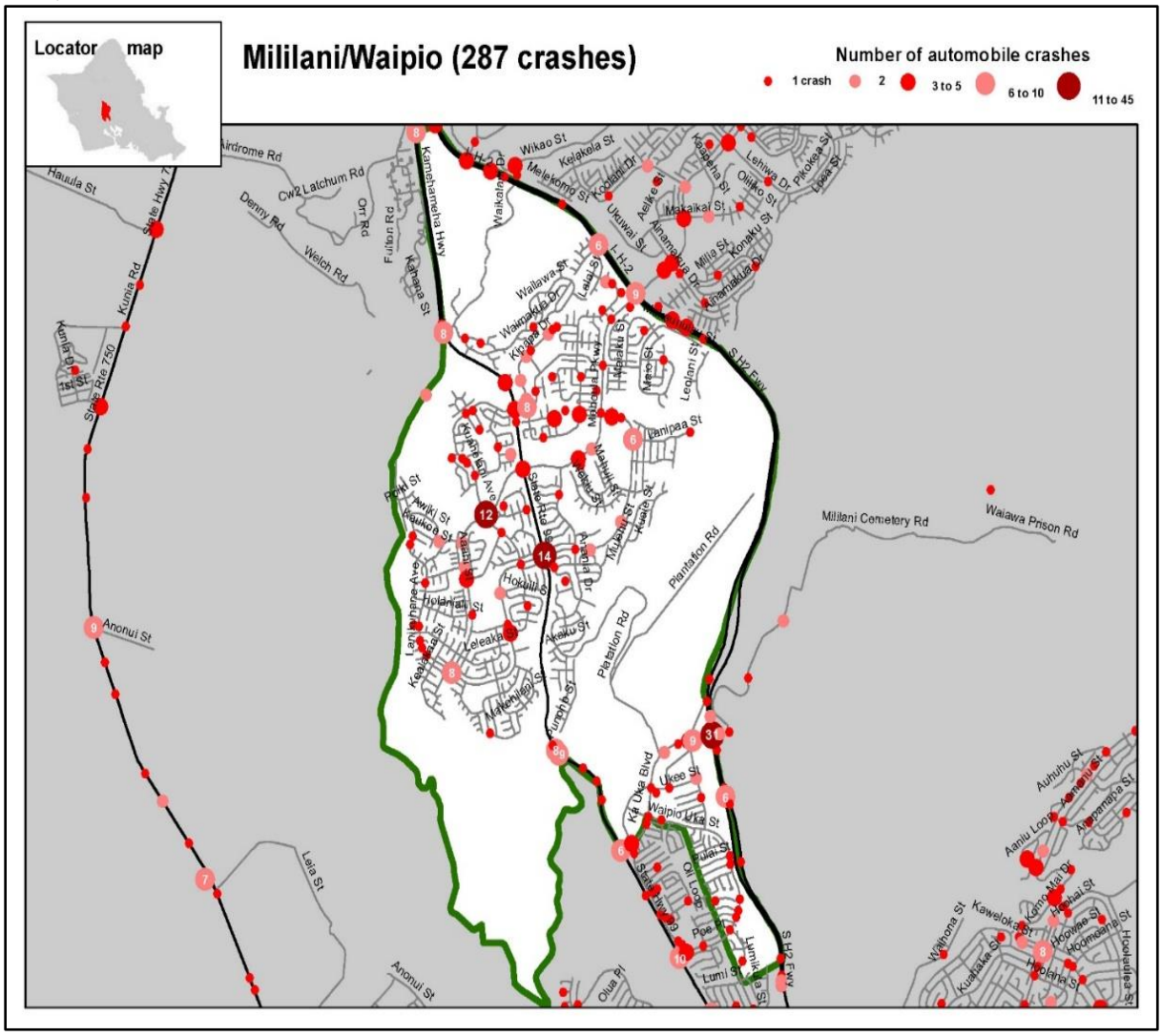
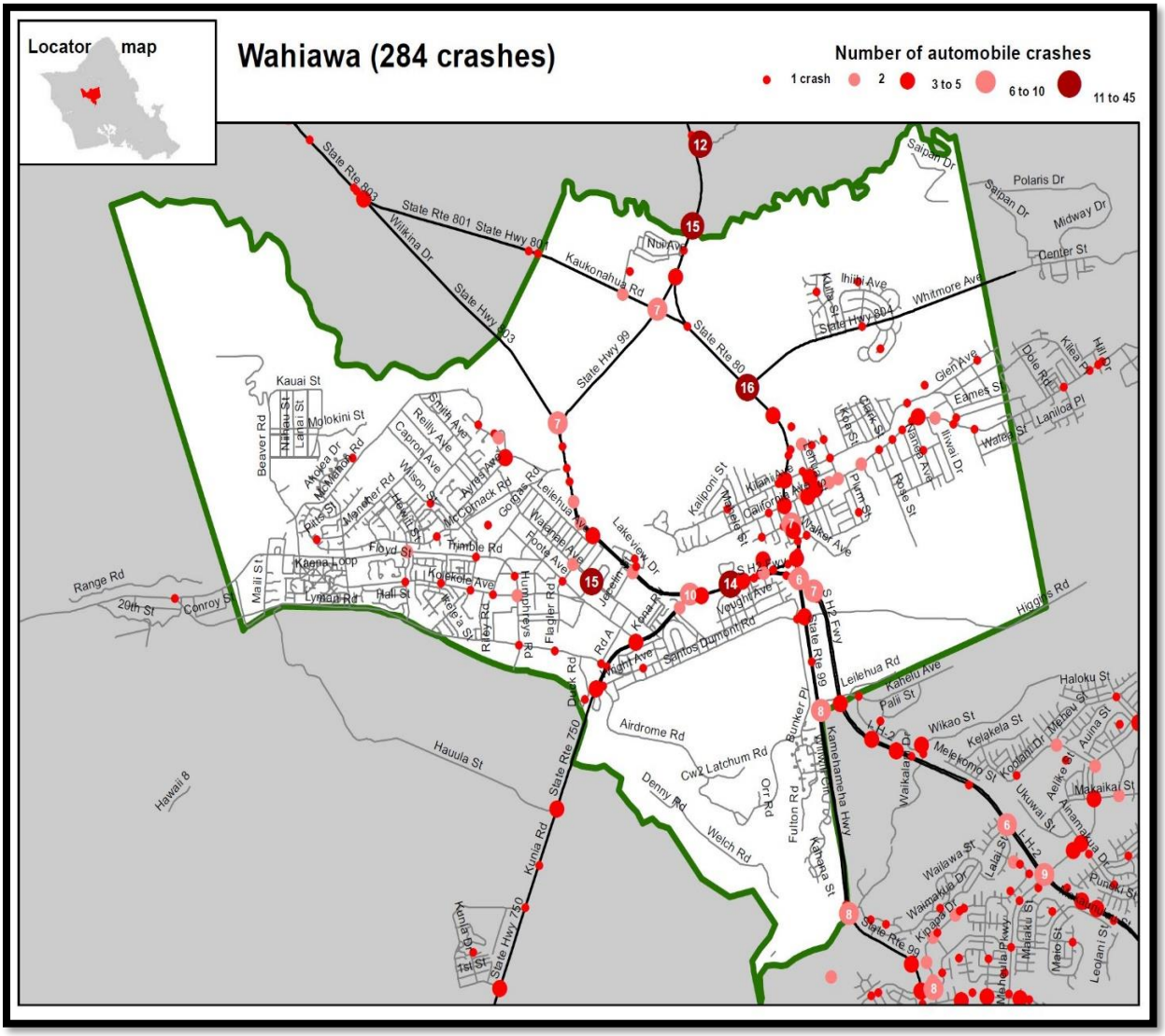

Locator map
Mililani/Waipio (287 crashes)
Number of automobile crashes
1 crash
2
3 to 5
6 to 10
11 to 45
Mililani Cemetery Rd
Waiawa Prison Rd
Plantation Rd
Kamehameha Hwy
Kunia Rd
Anonui St
Laiia St
Wikao St
Kelakela St
Melekomo St
Waiawa St
Lanipaa St
Leeaka St
Hokuili St
Ka Oka Blvd
Ukee St
Waipio Uka St
Aunuhu St
Aanilu Loop
Kawelokapu St
Hoolaniea St
Hoolana St
Hoomaana St
Hoowaa St
Kuialaka St
Wailuna St
Luni St
Pee St
Olua Pl
S H2 Fwy
L H-2
Kaheka St
Fulton Rd
Welch Rd
Denny Rd
Orr Rd
Cw2 Latchum Rd
Airdrome Rd
Hauula St
State Hwy 72
State Rte 750
Kunia Dr
Kunia Pl
Mililani Mauka Blvd
Meheula Pkwy
Mililani St
Kuala St
Mililani Ave
Hoolaulani St
Lanikuhana Ave
Kaiwiki St
Hauoka St
Pono St
Kaiwiki St
Kaiwiki Pl
Kaiwiki Ln
Kaiwiki Cir
Kaiwiki Ln
Kaiwiki Ln
Kaiwiki Ln

Figure 4-16. Number of Motor Vehicle Crashes in Wahiawa-Whitmore Village, 2007-2011



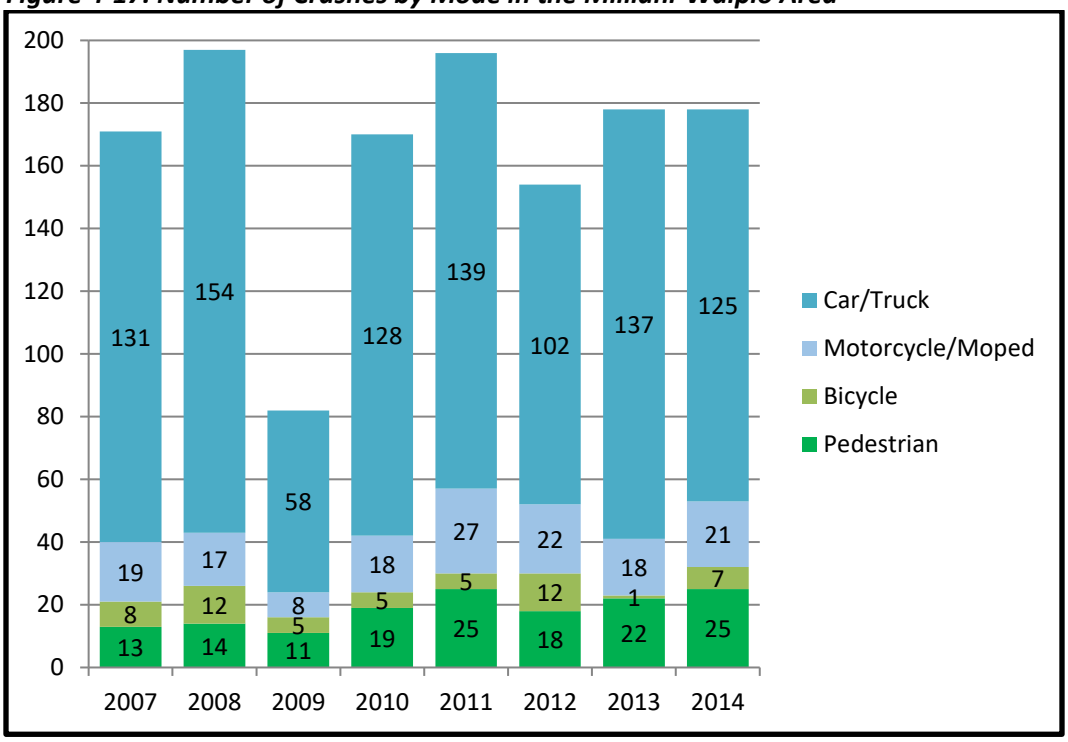
Source: Mapbook of EMS-attended motor vehicle crashes on Oahu, by Neighborhood Board area, 2007-2011

The number of crashes by mode in the Mililani-Waipio and Wahiawa-Whitmore Village areas are shown in **Figure 4-17** and **Figure 4-18**, respectively.

As shown in **Figure 4-17,** there has been a relatively constant number of incidents in the Mililani-Waipio area except for in 2009, which appears to be an outlier. Pedestrian crashes are steadily increasing from 57 in the period 2007-2010 to 90 in the period 2011-2014.

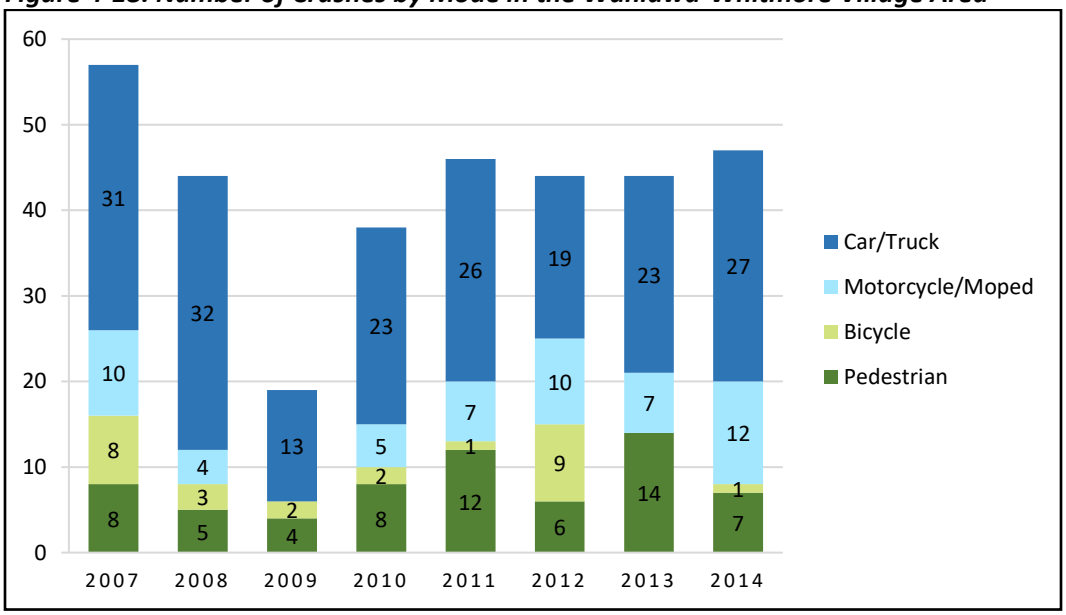
Figure 4-18 shows that there has been a relatively constant number of total collisions in the Wahiawa-Whitmore Village area since 2010, after a low point in 2009 and a high point in 2007 during this 8-year period. Pedestrian collisions totaled 25 between 2007 and 2010 but increased by 56% to 39 in the following four years through 2014. Similarly, the number of motorcycle collisions nearly doubled during the latter period of 2011 through 2014.

Figure 4-17. Number of Crashes by Mode in the Mililani-Waipio Area



Source: State of Hawaii Department of Health Crash Data

Figure 4-18. Number of Crashes by Mode in the Wahiawa-Whitmore Village Area



Source: State of Hawaii Department of Health Crash Data

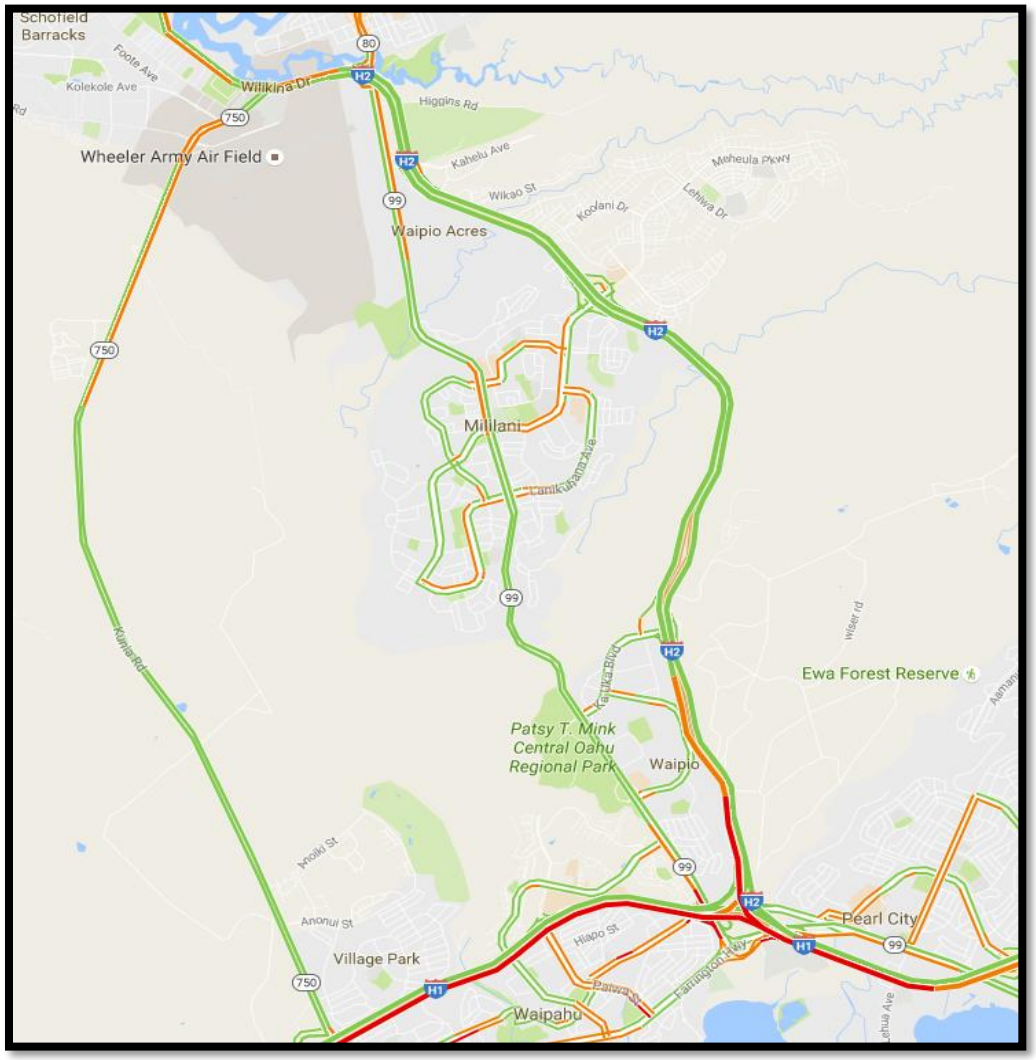
Implications. Projects that improve safety are important to the entire study area. Attention to speed reduction and pedestrian safety is critical.

4.3.2 Roadway Conditions

The OahuMPO model used in this study has a base year of 2012 and a future year of 2040. The COTS area base year population, inclusive of Mililani-Waipio and Wahiawa-Whitmore Village, was 101,850 and employment was about 35,250. The existing year conditions for this study was 2016.

During the AM peak period, major congestion occurs on H-2 southbound between Ka Uka Boulevard and the H-1 Interchange. After the H-1/H-2 merge, traffic congestion is severe all the way to downtown Honolulu, even with the addition of the zipper lane for HOV. H-1 is both the cause of current congestion experienced within the study area and it will continue to be into the foreseeable future. Traffic on local streets, as well as on the majority of Kamehameha Highway and Kunia Road (except near the H-1 interchanges), are comparatively free flowing. **Figure 4-19** shows the typical existing AM peak period congestion in the Mililani-Waipio area.

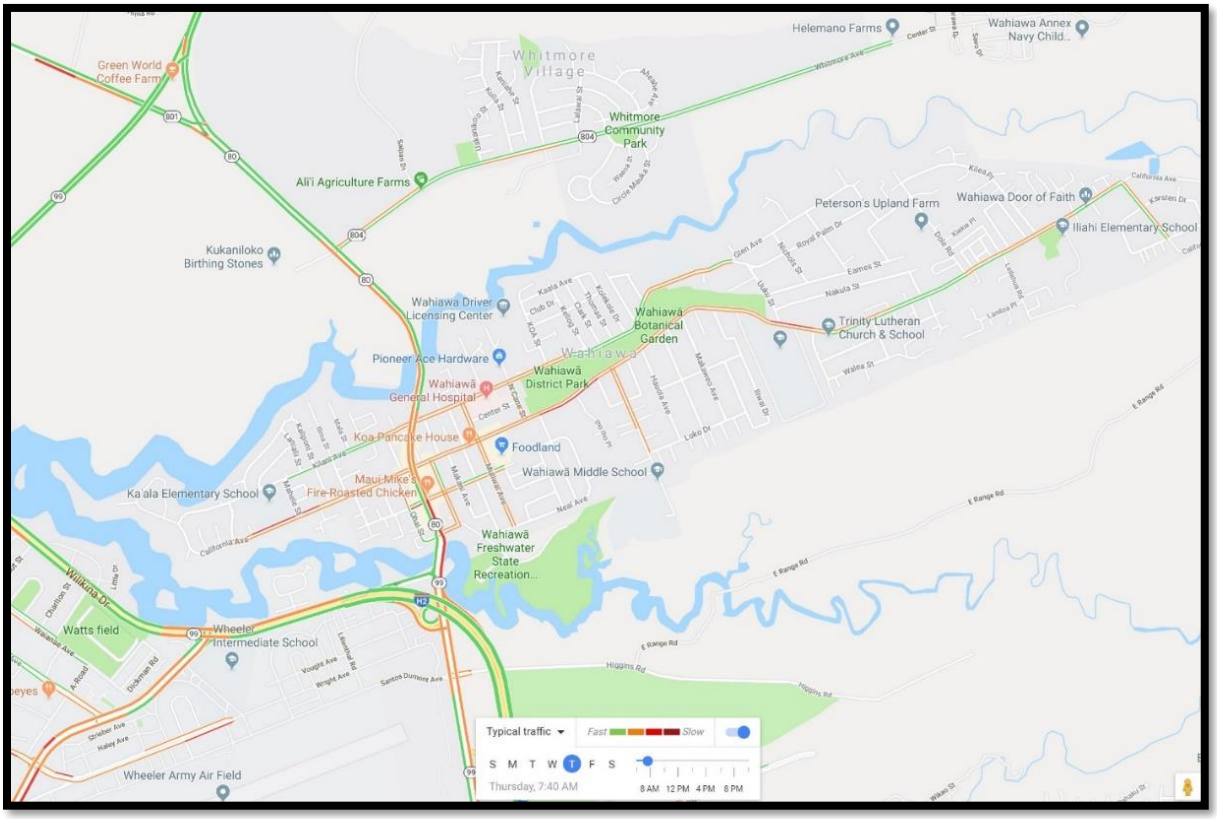
Figure 4-19. Typical Existing AM Peak Period Congestion in the Mililani-Waipio Area



Source: Google Maps (2019)

Most of the travel during peak times is from inside the study area to outside of it. Only 7% of trips stay within the study area. Major new projects in Central Oahu, such as Koa Ridge with 3,500 new housing units and 10 acres of commercial space appear to mimic those patterns of travel outside the district for employment and schooling. The PM peak congestion is less severe than the AM peak. **Figure 4-20** shows the AM peak period congestion for the Wahiawa-Whitmore Village area.

Figure 4-20. Typical Existing Weekday AM Peak Period Congestion in the Wahiawa-Whitmore Village Area



Source: Google Maps (2019)

The existing volume to capacity (V/C) ratios for the study area in **Figure 4-21** and **Figure 4-22** for the model base condition (2012) show more roads having V/C ratios that are over capacity as compared to the typical congestion shown in **Figure 4-19** and **Figure 4-20**. The future year (2040) V/C patterns show many more congested roadways as illustrated in **Figure 4-23** and **Figure 4-24**.

Implications. Congestion will worsen for the COTS area as future vehicle demand will further exceed the capacity of the downstream roadway system. This will result in increased queuing on the H-2 freeway, Kamehameha Highway, and Kunia Road in the mauka-bound direction in the AM peak period. Without additional downstream capacity or an alternate roadway (in addition to the planned rail system), congestion and travel time reliability will worsen.

Figure 4-21. OahuMPO Travel Demand Model - Base Year (2012) AM Peak Period V/C for the Mililani-Waipio Area

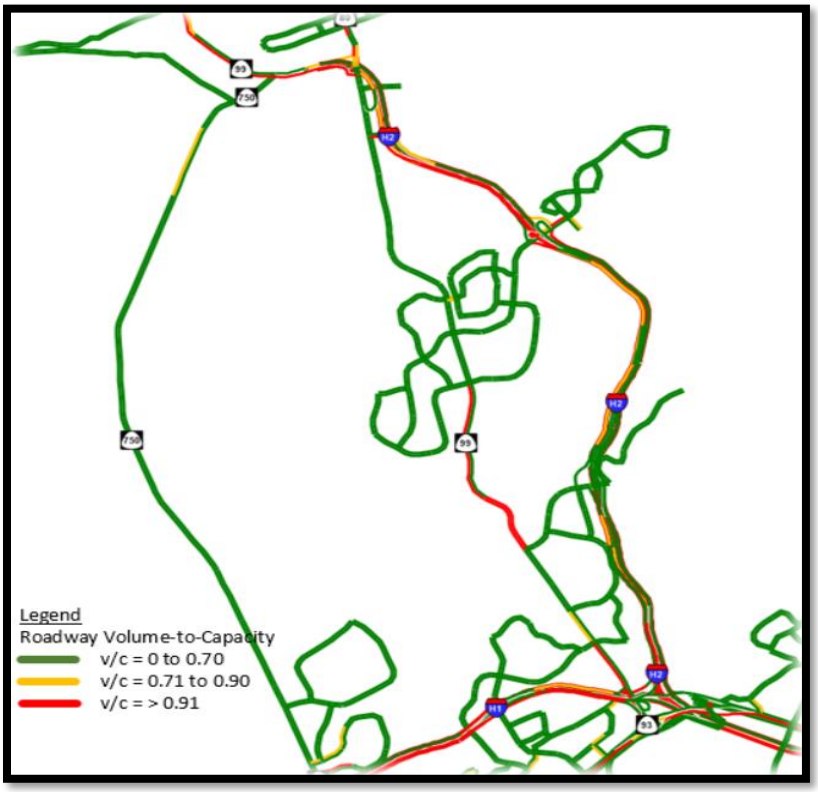


Figure 4-22. OahuMPO Travel Demand Model - Base Year (2012) AM Peak Period V/C for the Wahiawa-Whitmore Village Area

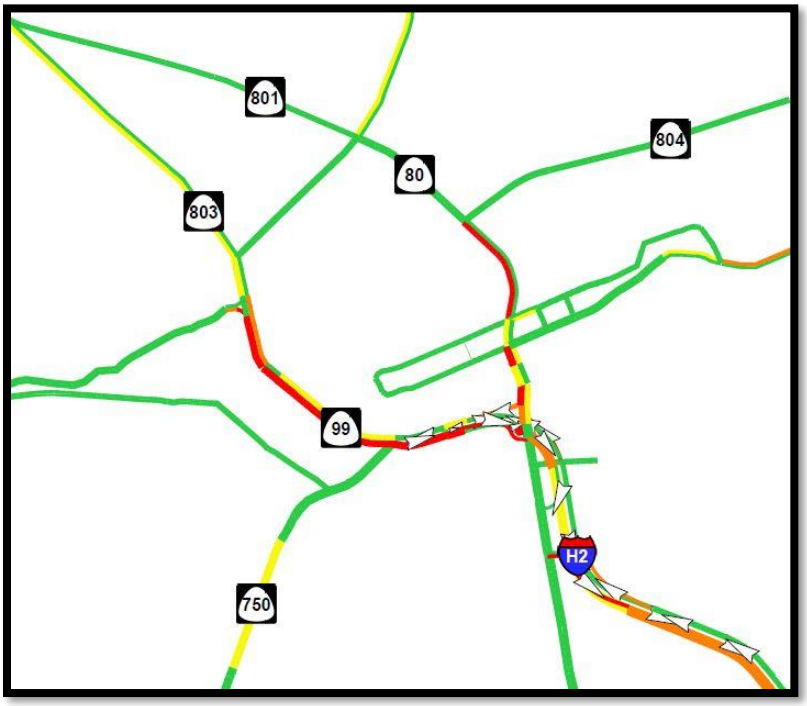


Figure 4-23. OahuMPO Travel Demand Model - Future Year (2040) AM Peak Period V/C for the Mililani-Waipio Area

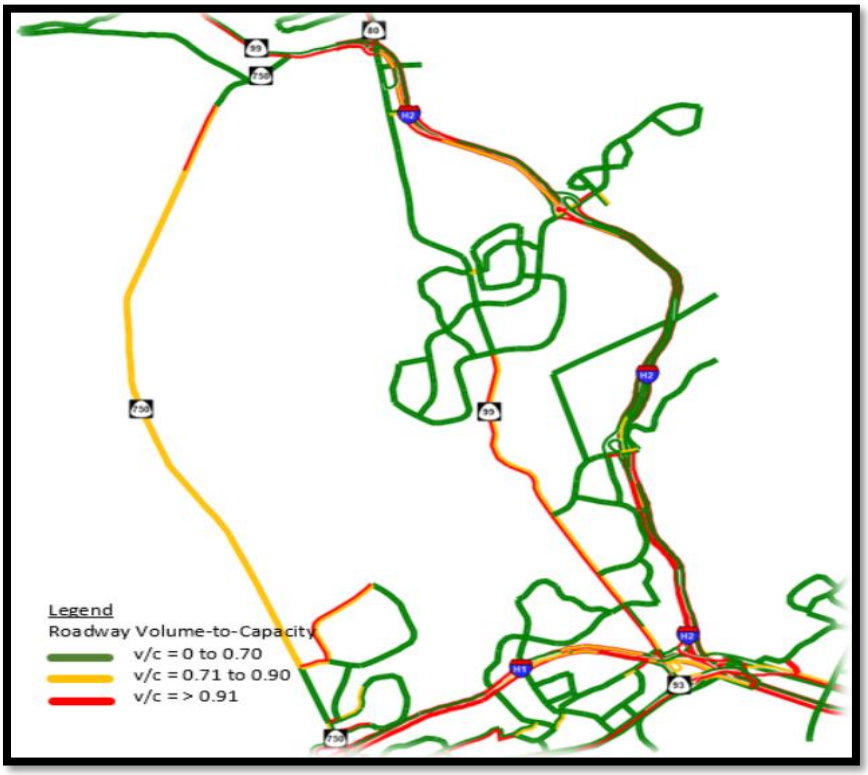
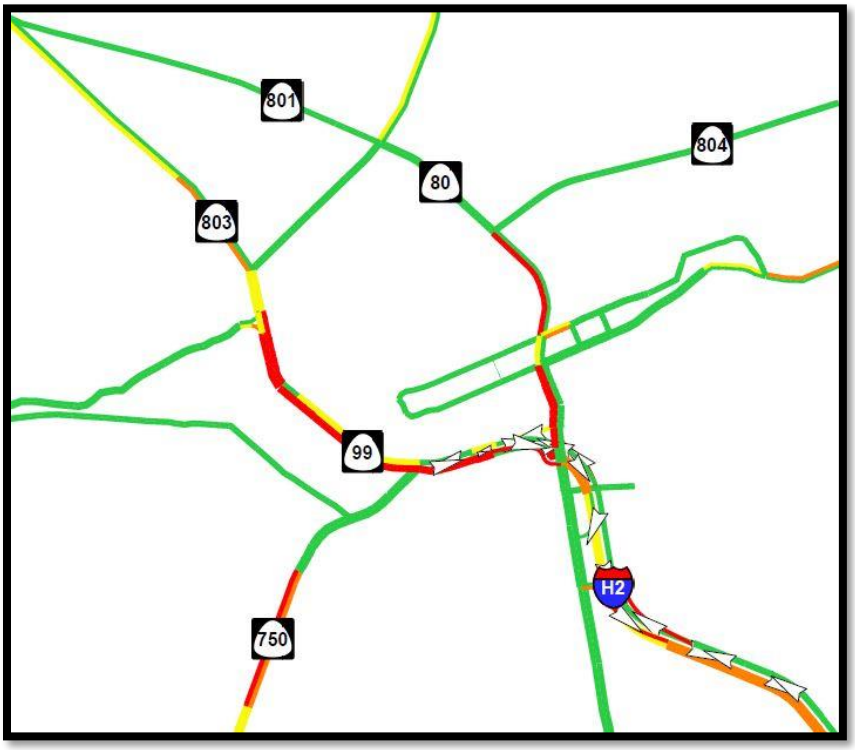


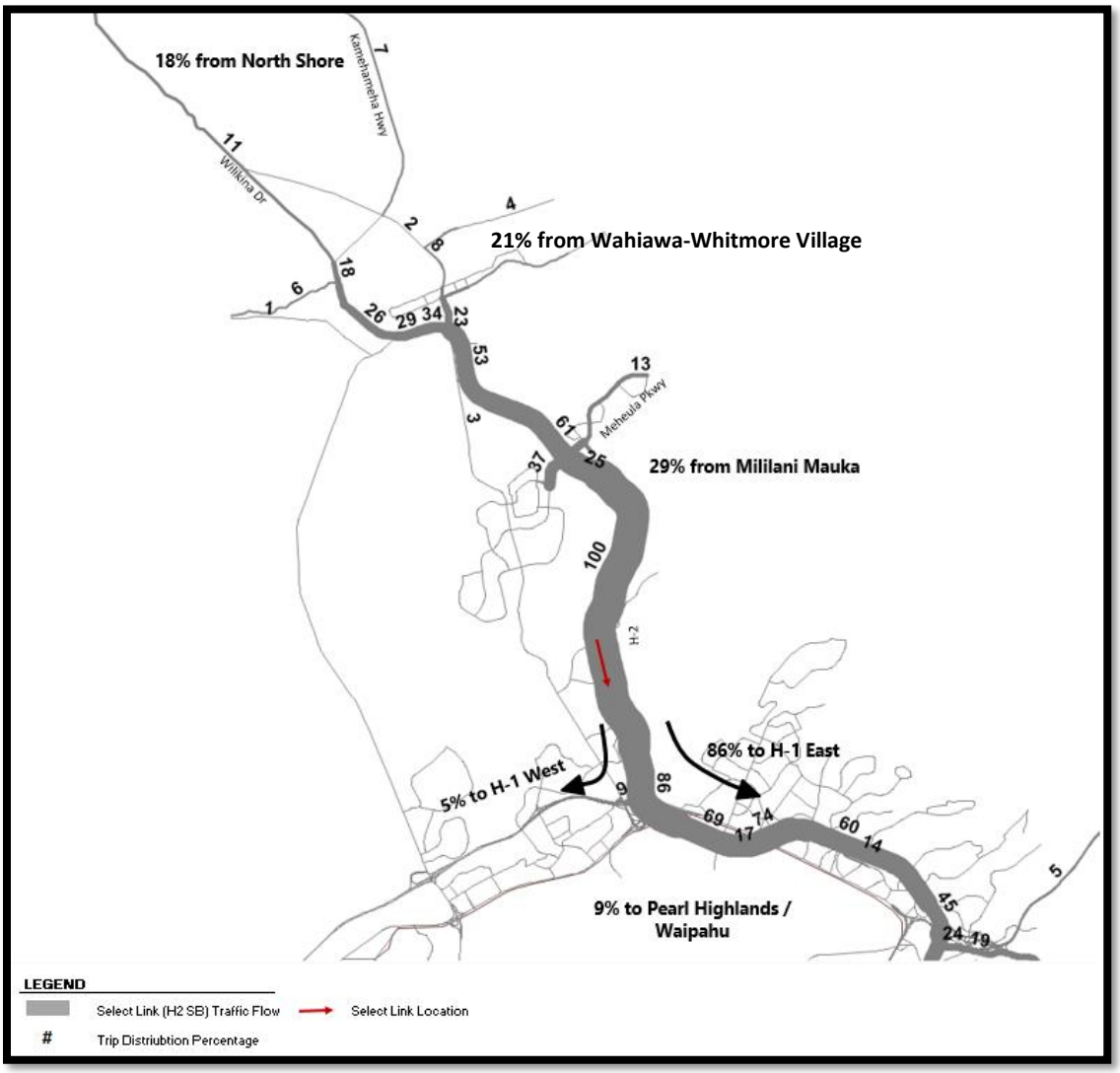
Figure 4-24. OahuMPO Travel Demand Model - Future Year (2040) AM Peak V/C for the Wahiawa-Whitmore Village Area



4.3.3 Travel Patterns

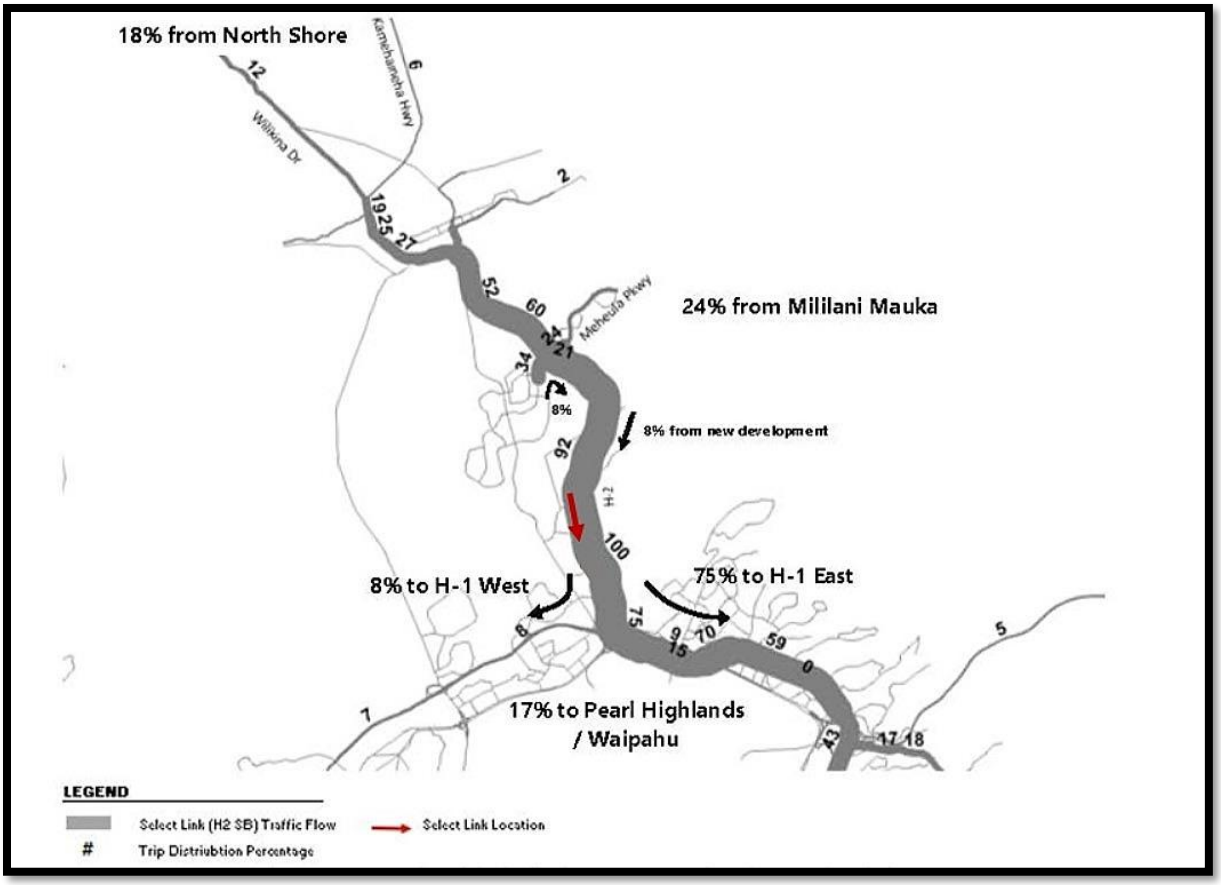
The select link analysis shows where congestion is coming from and is provided in **Figure 4-25**. In the AM peak period, approximately 18% of the traffic on southbound H-2 at Ka Uka originates north of Schofield/Wahiawa (i.e., comes from the North Shore) according to the model. About 29% originates in Mililani Mauka and 21% originates in Wahiawa and Whitmore Village. The rest comes from the Schofield area and Mililani and enters H-2 at Kamehameha Highway and Meheula Parkway, respectively. When this traffic reaches the H-1 merge, 86% travels east, 9% travels to Pearl Highlands/Waipahu, and 5% goes west on H-1.

Figure 4-25. H-2 Southbound Select Link Distribution - Base Year (2012) AM Peak Period



As seen in **Figure 4-26**, the future year 2040 patterns show some shifts, most notably an increase in travel towards west Oahu and to Pearl Highlands/Waipahu where they can access the rail system.

Figure 4-26. H-2 Southbound Select Link Distribution - Future Year (2040) AM Peak Period



Implications. While a larger proportion of COTS area traffic will travel to and from the Kapolei, Pearl Highlands, and Waipahu areas in 2040, the primary travel attraction for the COTS area will be to the PUC of Honolulu. These patterns will continue to burden the H-1 freeway with excessive demand during the AM peak period. Congestion will also be an issue during the PM peak period, but the problem will be less pronounced given that trips will be distributed to several roadways traveling into the COTS area.

4.3.4 Person and Vehicle Miles of Travel

A comparison of trip lengths for existing condition and future year condition is shown in **Table 4-2**. This data suggests that diversion in direction will take place.

Table 4-2. Trip Lengths in Central Oahu

Trip Type[1]		Base Year (2012)		Future Year (2040)		Net Difference			
						Absolute Number		Percent Difference	
		AM	PM	AM	PM	AM	PM	AM	PM
PMT	I-I	45,254	51,798	50,447	57,824	5,193	6,026	11%	12%
	I-X	372,708	286,349	445,256	411,255	72,548	124,907	19%	44%
	X-I	189,526	468,902	251,121	578,323	61,595	109,422	32%	23%
VMT	I-I	28,390	34,542	31,419	37,899	3,029	3,357	11%	10%
	I-X	288,478	215,489	325,094	297,874	36,616	82,386	13%	38%
	X-I	137,024	369,036	180,208	431,024	43,184	61,987	32%	17%

Implications. New development, including Koa Ridge, will increase employment opportunities within the COTS area and will result in increases in internal trip making. However, the greatest absolute and proportional increases in both person miles traveled (PMT) and vehicle miles traveled (VMT) will occur for trips with an origin or destination outside of the COTS area. Given the preponderance of travel to and from the PUC, this will inevitably strain the regional transportation and roadway system that connects to Pearl City, Aiea, and downtown Honolulu. In addition, the overall increase in VMT will negatively contribute to fossil fuel consumption, greenhouse gas (GHG) emissions, and associated climate change impacts.

4.3.5 Transit Conditions

The DTS contracts with Oahu Transit Services, Inc. (OTS), a non-profit corporation to manage, operate, and maintain the bus system (TheBus) and the paratransit service (TheHandi-Van). TheHandi-Van provides origin to destination transportation services to mobility impaired Americans With Disabilities Act of 1990 (ADA) qualified individuals. DTS, through OTS, contracts with various taxicab companies to provide supplemental paratransit services. Day to day management and operations of TheBus and TheHandi-Van is handled by OTS. The DTS Public Transit Division is responsible for the overall system administration monitoring of the performance of TheBus and TheHandi-Van operations.

TheBus currently operates 104 routes. The 104 routes serve about 3,800 bus stops. Passenger amenities include approximately 980 passenger shelters and 2,400 benches. Bus routes fall within eight service classifications. These classifications and their function are described in **Table 4-3**. All classifications are included as they show how Central Oahu's service compares and connects to service in other parts of the island.

Table 4-3. Classification of Route Types in the Oahu Transit Network

Route Type	Description
Rapid Bus	Rapid bus routes provide limited stop express service in both directions on heavily traveled corridors. The *CityExpress!* Route A offers 15-minute service; *CountryExpress!* Routes C and E typically provide 30-minute service.
Urban Trunk	Urban trunk routes provide frequent, direct service connecting neighborhoods within the Primary Urban Center operating along major corridors and typically have 15-minute or less headways. These routes include the major east-west corridor Routes numbered 1, 2, 3 and 13.
Urban Feeder	Urban feeder routes connect the mauka/makai neighborhoods within the Urban Center. These routes serving the hills and valleys of Honolulu connect residents to the urban trunk and limited-stop express routes as well as providing service to major destinations such as downtown Honolulu, the University of Hawaii at Manoa and Waikiki. Urban feeder routes numbered 4, 5, 6, 7 and 8 typically provide service intervals of 30-minutes or less.
Suburban Trunk	Suburban trunk routes provide all day service from outlying communities to the urban center. They provide connections between the suburban communities connecting with community circulators at transit centers. Routes stop at all local bus stops and operate all day, every day. Suburban trunk routes typically provide 30-minute service. **Routes 52 and 62 are COTS area bus routes in this category.**
Suburban Feeder	These routes provide service in lower demand areas providing connections to major attractions such as shopping areas, hospitals or schools. These routes typically provide 60-minute service and some routes offer intermittent or peak-period-only. **Route 72 serving Wahiawa is the COTS area route in this category.**
Community Circulators	These routes provide circulation within their community. They connect at a neighborhood hub or transit center after completing their single cycle trip. Community circulators provide timed connections to other circulators and suburban trunk routes. They stop at all local bus stops and frequently operate with loops and branches. **Routes 433, 501 and 504 are COTS area routes in this category.**
Community Access	These routes operate on a standard schedule serving regular bus stops but utilize the TheHandi-Van vehicles. Accessible service is provided for registered TheHandi-Van customers with 24-hour advance notice diverting within ½ mile of the service route. Community access routes provide 60-minute service. **Route 503 is in this category.**
Express	Peak expresses serve home-to-work trips by connecting specific neighborhoods to employment centers. These trips are provided in the peak period and peak direction only with minimal scheduled departures. Peak Express service destined for Pearl Harbor and Hickam Air Force Base destinations are designated with a "PH" preceding the route number. These routes serve all the local bus stops in the neighborhoods and work destination areas (including downtown Honolulu and Pearl Harbor). **Express routes serving the COTS area are Routes 83, 84, 84A, 88A, 96, 98, 98A, 99, PH2, and PH3.**

Table 4-4 identifies TheBus routes serving the COTS area. These routes include two suburban trunks, one suburban feeder, ten express routes, one community access route, and two community circulators. Route 99 started in December 2016 to provide service two morning and two afternoon peak runs between the Wahiawa Transit Center and Kapolei Transit Center via the Mililani Transit Center and Waipahu Transit Center. The trial for this new route was a success and it is now permanent. Two routes (Routes 40 and 42) serve nearby COTS area stops but are not considered to be serving COTS residents.

Table 4-4. TheBus Routes Serving the COTS Area

Number	Description	Classification
52	Wahiawa-Honolulu	Suburban Trunk
62	Wahiawa-Honolulu	Suburban Trunk
72	Wahiawa-Schofield	Suburban Feeder
83	Wahiawa-Honolulu	Express
84	Mililani-Honolulu	Express
84A	Mililani-Honolulu	Express
88A	North Shore Express	Express
96	Waipio Gentry-Honolulu	Express
98	Wahiawa-Honolulu	Express
98A	Mililani-Waikiki	Express
99	Wahiawa-Kapolei	Express
101	Waikele-Honolulu	Express
PH2	Mililani-Pearl Harbor	Express
PH3	Wahiawa-Pearl Harbor	Express
433	Waipahu TC-Waikele-Waipio	Community Circulator
501	Mililani TC-Mililani Mauka	Community Circulator
503	Launani Valley-Mililani	Community Access
504	Mililani-TC-Mililani South	Community Circulator

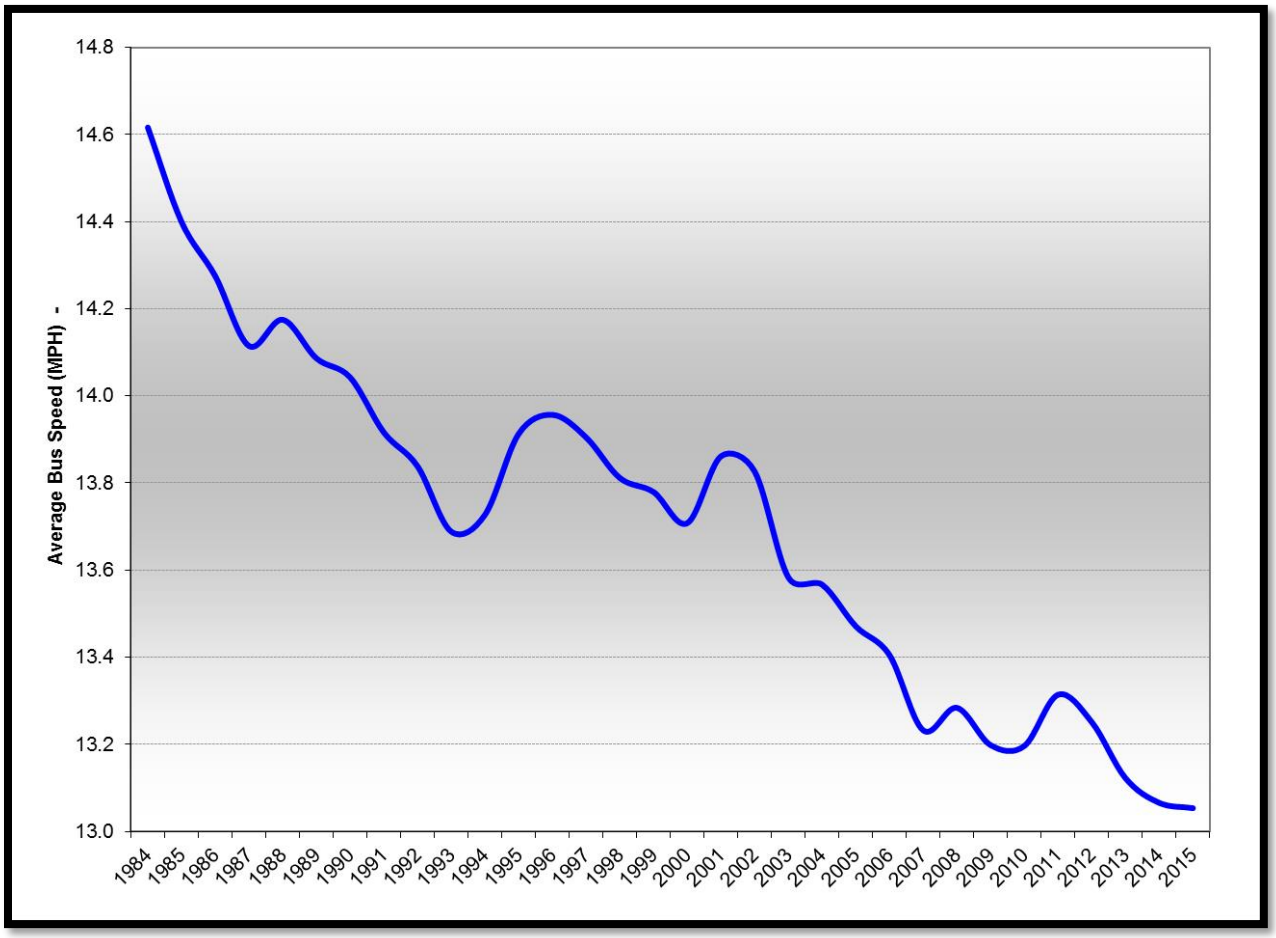
Source: DTS/OTS Public Timetables, 2017

Figure 4-27 provides data on the declining annual average speed achieved by TheBus starting in 1984. While the actual decline is 1.57 miles per hour and may seem minor, the impact on the system and to the customer is not. More time has been added to bus schedules to account for increasing delays primarily caused by traffic congestion. This adds to operation costs while not improving service frequency. On-time performance has suffered, and service frequencies have, in some cases, been cut to offset declining speeds and poor on-time performance. This figure may help explain the increasing transit travel time reported by COTS area workers. Even though ten of the routes serving the COTS area are express buses, these routes serve all local bus stops while in the neighborhoods and after exiting the freeway.

Table 4-5 presents on-time performance for bus routes serving the COTS area. This information is presented and separated for service within the COTS area, outside of the COTS area, and overall route. A better on-time performance was recorded for bus route service inside the COTS area than outside the area. Four of the bus routes are wholly within the COTS area. The express routes highlighted in **Table 4-5** in blue shading operate with "Zoom" scheduling. Zoom operations allow routes to operate early at specific timepoints. For example, during the morning trips into Honolulu, routes must stay on schedule in the neighborhood. However, once the bus is off the freeway and serving downtown bus stops the bus can leave stops early since passengers are disembarking. The

reserve occurs during the afternoon. On-time performance and schedule adherence for Saturdays and Sundays have similar ranges.

Figure 4-27. Average TheBus Speed



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

Table 4-5. TheBus Weekday Schedule Adherence

Route	Within COTS Area			Outside of COTS Area			Overall		
	Early	*On Time*	*Late*	*Early*	*On Time*	*Late*	*Early*	*On Time*	*Late*
52	27%	56%	17%	28%	58%	14%	28%	57%	15%
62	14%	57%	29%	13%	58%	29%	14%	58%	29%
72	16%	66%	18%				16%	66%	18%
433	7%	69%	24%	13%	65%	21%	9%	68%	23%
501	9%	76%	15%				9%	76%	15%
503	4%	71%	25%				4%	71%	25%

Route	Within COTS Area			Outside of COTS Area			Overall		
	Early	*On Time*	*Late*	*Early*	*On Time*	*Late*	*Early*	*On Time*	*Late*
504	5%	76%	19%				5%	76%	19%
83	17%	58%	26%	49%	41%	10%	35%	48%	17%
84	22%	75%	3%	36%	52%	12%	29%	63%	8%
84A	30%	57%	12%	29%	46%	25%	30%	52%	19%
88A	27%	58%	15%	26%	59%	15%	26%	59%	15%
96	39%	52%	9%	21%	52%	26%	29%	52%	19%
98	40%	52%	8%	31%	49%	20%	36%	51%	13%
98A	56%	33%	11%	24%	48%	28%	36%	42%	22%
99	13%	67%	21%	12%	70%	18%	13%	68%	20%
103	25%	69%	6%	39%	47%	13%	34%	55%	11%
PH2	43%	55%	3%	45%	47%	8%	44%	50%	6%
PH3	26%	67%	7%	14%	52%	34%	21%	60%	19%

Source: C&C Honolulu, Department of Transportation Services, December 2016.

Implications. If no actions are taken, transit performance will continue to erode resulting in slower speeds and loss of choice passengers. This loss, together with continuing growth, will result in more personal vehicles on the road during peak periods. Additional vehicles will lengthen peak periods and lead to the continuation of commuter frustration. Identifying transit projects as described in earlier chapters, particularly those projects that provide dedicated bus lanes or BRT services, that provide reliability will encourage the shift of commuters to the transit mode and improve overall transportation performance.

TheBus averages 70,000,000 annual unlinked passenger trips. Over the past six years, this has varied from 66,285,449 passenger trips in 2014 to 76,296,597 passenger trips as reported to the National Transit Database. **Table 4-6** provides ridership details of the bus routes serving the COTS area. Ridership is shown for each bus route within the COTS area, total route ridership, and the percent of route ridership occurring within the COTS area. The number of bus trips (roundtrip) is provided along with the number of riders per trip.

Table 4-6. Ridership of TheBus Routes Serving COTS Area

ROUTE	BUS TRIPS (roundtrip)	RIDERSHIP			
		COTS Area	Total	COTS % of Total	Riders per Trip
52	30	1,405	3,947	35.6%	132
62	37.5	2,670	5,309	50.3%	142
72	12	608	--	100.0%	51
83	7	235	474	49.6%	68
84	4	123	230	53.5%	58
84A	4	118	236	50.0%	59
88A	2	45	279	16.1%	140
96	2	68	148	45.9%	74
98	3	86	120	71.7%	40
98A	2	58	149	38.9%	75
99	2	22	88	25.0%	44
103	2	55	87	63.2%	44
433	34.5	543	1,264	43.0%	37
501	21.5	333	--	100.0%	15
503	16	Data Unavailable			
504	21.5	200	--	100.0%	9
PH2	1	19	40	47.5%	40
PH3	1	25	39	64.1%	39

Source: City and County of Honolulu Department of Transportation Services, December 2016 data.

Two of the five DTS-operated Park & Ride lots are located within the COTS area. **Table 4-7** describes those two lots and the two transit centers located within the COTS area.

Table 4-7. Transit Facilities in the COTS Area

Transit Facility Location	Facility Type	Features	Bus Routes
Wahiawa Transit Center between Center Street and California Avenue	Transit Center	6 bus positions Parking structure attached	52, 62, 72, 83, 99, PH3
Mililani Transit Center Meheula Parkway by Town Center of Mililani	Transit Center	7 bus positions	52, 84A, 98A, 99, 501, 503, 504
Mililani Mauka **95-1101 Ukuwai Street**	Park & Ride Lot	176 parking spaces	52, 98, 98A, 501, PH2
Wahiawa **Hawaii National Guard Facility across from Wheeler Army Airfield (shared use with Hawaii National Guard)**	Park & Ride Lot	50 parking spaces	52, 62, 83, 84, 84A, 98, 98A, 503, PH3

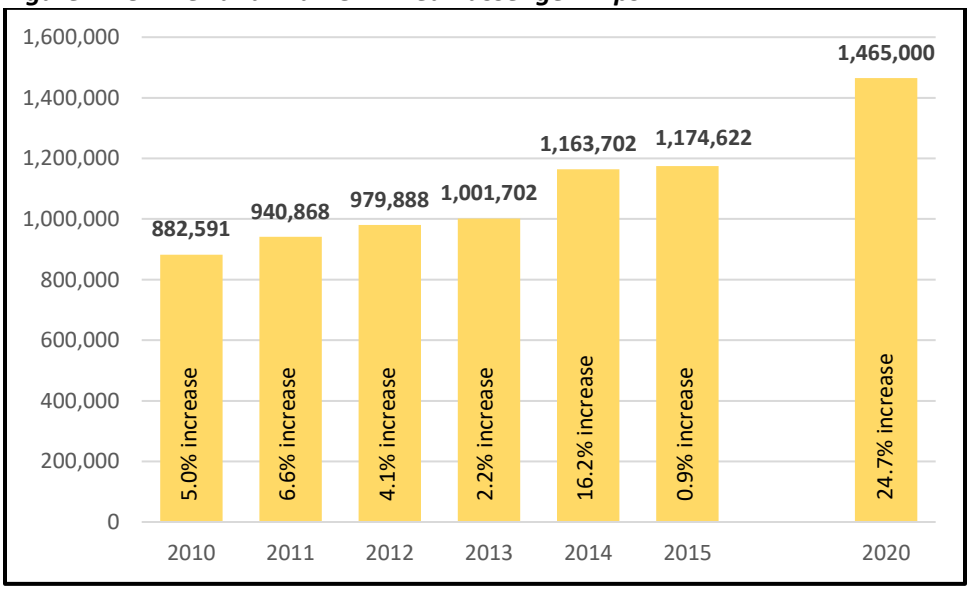
Source: City and County of Honolulu Department of Transportation Services.

4.3.6 ADA Paratransit Service Provided by TheHandi-Van

ADA Paratransit services are provided to passengers within ¾ mile of a fixed route operation. These services are offered during times the fixed route is in operation. Some areas such as those ¾ mile from the Route 2 and Route 40 alignments have 24-hour service while the remaining, including the COTS area, are generally between the hours of 4:00 AM to 1:00 AM depending upon fixed route hours in the geographic area. Whitmore Village ADA Paratransit service provides shorter service hours to match the fixed route service hours of 5:10 AM to 7:00 PM.

In 2015 TheHandi-Van provided 1,174,622 passenger trips[1]. The demand for paratransit services has continued to increase. **Figure 4-28** shows TheHandi-Van annual unlinked passenger trips DTS reported to the National Transit Database for the years 2010 to 2015. As shown, actual trips have increased from 882,591 in 2010 to 1,174,622. The chart gives the percent increase from the following year. The number of trips reported in 2010 were five percent higher than those reported in 2009. In 2020, the number of trips expected to be served increases to 1,465,000 which is a 24.7 percent increase from 2015. This projection is based on a "status quo" scenario where the fare and on time performance remain equivalent to today.

Figure 4-28. TheHandi-Van Unlinked Passenger Trips



Source: DTS reported National Transit Database reports Annual Unlinked Passenger Trips and Draft Demand Projection for TheHandi-Van for the City and County of Honolulu.

Implication. As the project area population continues to age, and with a higher percentage of disabilities, it is expected that paratransit service demand will increase within the study area.

[1] 2015 National Transit Database (NTD) transit profiles. Data is provided annually to the NTD by DTS.

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5.0 HOW THE RECOMMENDED PROJECTS ADDRESS THE COMMUNITY GOALS

The purpose of this study 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 community 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

The sections below discuss the three goals and indicate which recommended projects will address them. In addition, this chapter discusses the topic of mode shift, which is key to all three goals.

5.1 Reduce Congestion Experienced by Travelers in Central Oahu

The reduce congestion goal seeks ways to reduce overall travel time and congestion. Vehicles trips represent the mode with the highest proportion of travel for Central Oahu residents, employees, and visitors, now and through 2040. This is because the COTS area will continue to be a resident-dominant area, even with the planned commercial spaces that create employment included in new master planned developments such as Koa Ridge. Land use decisions over the past 20 years will result in continued congestion for Central Oahu.

A key issue is that the greatest cause of long travel times and congestion for Central Oahu is outside this district; it is on H-1 east of the H-1/H-2 merge. This is evidenced by the queues that form on southbound H-2 and Kamehameha Highway in the morning as most 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 5-1**. The data 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 and transit riders traveling from Central Oahu to and through the primary urban center.

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/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.

Table 5-1. 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 18 minutes	39 minutes
Kapolei Shopping Center	20 to 28 minutes	52 minutes (to Kapolei TC)
Downtown Honolulu (Bishop/King)	26 to 45 minutes	52 minutes (to Alapai TC)
University of Hawaii – Manoa	30 to 55 minutes	69 minutes
From Wahiawa Transit Center to:	**Range of Weekday Drive Times (Arriving at 8am)**	**Range of Weekday Transit AM Peak Travel Times**
Leeward Community College	14 to 22 minutes	52 minutes
Kapolei Shopping Center	22 to 35 minutes	63 minutes (Kapolei TC)
Downtown Honolulu (Bishop/King)	30 to 55 minutes	54 minutes (Alapai TC)
University of Hawaii - Manoa	35 to 65 minutes	65 minutes

Source: Google Typical Travel Times on a Thursday morning arriving at 8am at the specified destination (Obtained September 4, 2019).

HDOT has been addressing capacity on H-1 along with safety and system upgrades. Capacity projects have not been a priority for the State Department of Transportation in the past several years due to funding limitations. Two roadway projects in Central Oahu meant to add capacity include: Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue (Project 403.5); Kamehameha Highway Widening North of Whitmore Avenue to Kilani Avenue (Project 902). Project 403.5 has a cost of $150 Million and a BCA of 3.68. Project 902 has a cost of $20 million and a BCA of 0.87.

Other projects that reduce congestion include transit, bicycling and walking projects, rideshare and carpooling, intelligent transportation systems (ITS) and transportation demand management (TDM) programs. Several of these are in the list of short-term projects, meaning they have few impediments to implementation. Programs that help shift travelers into higher occupancy vehicle (HOV) trips help reduce congestion for everyone.

The projects that contribute to the reduce congestion goal are shown in **Table 5-2**.

Table 5-2. Projects that Contribute to the Reduce Congestion Goal

Project Number	Project Name	How it contributes to congestion relief
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Encourage mode shift away from auto
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Encourage mode shift away from auto Reduces transit travel time
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Encourage mode shift away from auto Reduces transit travel time
403.5	Widen Kamehameha Highway Between Ka Uka Boulevard and Lanikuhana Avenue	Adds capacity
Pkg A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Encourage mode shift away from auto
Pkg D	New Pathways	Encourage mode shift away from auto
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	Encourage mode shift away from auto
703	Expanded Late Night Service Bus Routes 51/52	Encourage mode shift away from auto
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Encourage mode shift away from auto Reduces transit travel time
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	Adds capacity
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Improve intersection operations
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Improve intersection and roadway operations
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	Improve intersection and roadway operations
802	New pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	Encourage mode shift away from auto
501.1	Transportation Demand Management (TDM)	Encourages mode shift to HOV
502.1	Intelligent Transportation Systems (ITS)	Provide information on mode choice

5.2 Create Easy Access to the HART Rail System

This study offers several projects that provide COTS area residents with more transit options, including more service, express service, and BRT service either through Mililani Transit Center via Kamehameha Highway or from Wahiawa Transit Center via H-2. All service recommended would connect to one or more rail stations. Further, Project 102.5, would offer both bus connection service and parking in the median of H-2. Parking is expected to be at a premium even after the parking facility at the Waiawa Rail Station at Pearl Highlands is completed. Thus, providing additional parking for Central Oahu residents would allow them to avoid driving to Pearl Highlands and risk finding that garage is already filled. Some of the bicycle projects are designed to provide an alternative to accessing rail.

Projects that contribute to HART Rail System access are designed to provide dependable service to the three rail stations serving the COTS project area: Halaulani Rail Station at Leeward Community College, Pouhala Rail Station at Waipahu, and Waiawa Rail Station at Pearl Highlands. These stations can take riders in the direction of Pearl Harbor Shipyard, Aloha Stadium, the Airport,

downtown Honolulu, and the University of Hawaii or towards Kapolei and the University of Hawaii-West Oahu.

Three projects that provide additional transit capacity and access to rail are Project 101.1, Project 102.5, and Project 408.4. They are explained in greater detail here for that reason.

Project 101.1 would incrementally add transit service and frequency under the DTS/HART bus-rail integration program, as shown in **Figure 5-1** and described in Table 5-3. . The total construction and O&M cost of Project 101.1 is $66 million and it has a BCA of 3.34.

Figure 5-1. Existing and Expanded Bus Routes in Project 101.1

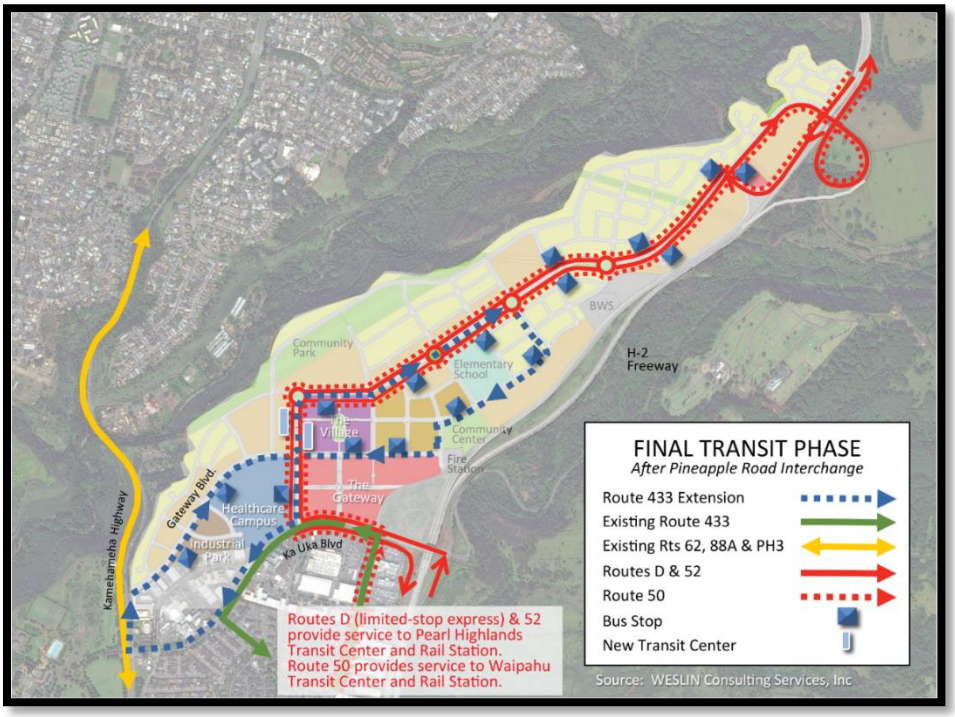


Table 5-3. Description of Expanded Bus Service in Project 101.1

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, 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
98	4	15-minute peak period, peak direction	Mililani Mauka	Mililani P&R, H-2 Median P&R, Waiawa Station	3	40-foot
433	34	30-minute peak and off-peak service	Waipahu, Waipio, extended to Koa Ridge	Waipahu TC, Koa Ridge TC	3	40-foot

Project 102.5 provides direct access to bus transit on the H-2 freeway by utilizing available right of way in the median. A Park & Ride facility could be constructed with access ramps in both directions. This project could be either a city or a state project and would involve close coordination between the two. See illustration in Figure 2-1 on page 18. The cost is incremental over time starting at $37.5 million for the first phase. It has a BCA of 2.10.

Project 408.4 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. A conceptual layout of Project 408.4 is provided in **Figure 2-2** in **Section 2.2.2**.

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. 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 eight to ten 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 the Wahiawa express bus bypasses 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.

In summary, there are several projects that contribute well to the rail access goal (see **Table 5-4**), along with contributing to the multi-modal and reduce congestion goals.

Table 5-4. Projects that Contribute to the Access to Rail Goal

Project Number	Project Name	How it contributes to Rail Access
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Adds two routes and new connections.
102.3	Bus Rapid Transit Mililani to the Waiawa Rail Station at Pearl Highlands	Peak travel service to the Waiawa Rail Station at Pearl Highlands
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Adds parking. Express bus to Waiawa Station Pedestrian/Bike access from Koa Ridge
408.4	Mililani Access and at H-2 and Meheula Parkway with Bus Stops	Increased transit efficiency Safe bike/pedestrian crossings
Package A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Access to Waipahu Station
Package D	Bicycle and Pedestrian Package – New Pathway	Access to the Waiawa Rail Station at Pearl Highlands
703	Expanded Late Night Service Bus Routes 51/52	Adds bus service to connect with rail stations
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the	Access to the Waiawa Rail Station at Pearl Highlands

Project Number	Project Name	How it contributes to Rail Access
	Waiawa Rail Station at Pearl Highlands via H-2	
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	Access to Wahiawa Transit Center
804	New and Upgraded Bike Lanes in Wahiawa Commercial District	Access to Wahiawa Transit Center

5.3 Create a Multimodal System in Central Oahu

This goal seeks to create networks of facilities for transit and bicycle/pedestrian to rival the networks for vehicles. The objective of multi-modalism is to create choice and 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).

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). Multimodal projects are shown in **Table 5-5**.

Table 5-5. Projects that Contribute to the Multimodal Transportation System Goal

Project Number	Project Name	How it contributes to Multi-Modal
101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	Helps increase transit mode share
102.3	Bus Rapid Transit from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	Helps increase transit mode share
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	Helps increase transit mode share
Package A	Bicycle and Pedestrian Package – New Pathways and Route from Mililani to Waipahu	Adds bicycle and pedestrian networks
Package B	Meheula Parkway Bike	Adds bicycle and pedestrian networks
Package C	Paiwa/Central Oahu Park Bike • New pathway between Kamehameha Highway and Paiwa Street • Bike lane on Paiwa Street	Adds bicycle and pedestrian networks
Package D	New Pathways • Kamehameha Highway • Cane Haul Road	Adds bicycle and pedestrian networks
801	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	Adds bicycle and pedestrian networks
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	Adds bicycle and pedestrian networks

Project Number	Project Name	How it contributes to Multi-Modal
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road	Adds bicycle and pedestrian networks
804	New and Upgraded Bike Lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	Adds bicycle and pedestrian networks
701	Increase Bus Service Whitmore to Wahiawa TC	Helps increase transit mode share
703	Expanded Late Night Service Bus Routes 51/52	Helps increase transit mode share
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	Helps increase transit mode share
408.4	Mililani Access and at H-2 and Meheula Parkway with Bus Stops	Helps increase transit mode share
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	Adds bicycle and pedestrian networks
501.1	Transportation Demand Management	Ride Share mode share
502.1	Intelligent Transportation Systems	Multimodal information

5.4 Commuter Mode Choice

Embedded in the COTS goals is an anticipated shift in mode choice from current levels to the future analysis year 2040. Modal split goals have been set as a stretch target to 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. The stretch goals are shown in **Table 5-6** contrasted against both current levels, national averages, and Oahu island-wide comparisons.

Table 5-6. Commute to Work 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.	2013-2017	76.4%	9.3%	5.1%	0.6%	2.7	1.2	4.7%
Oahu Islandwide	2013-2017	64.0%	14.3%	8.6%	1.2%	5.4%	2.8%	3.6%
COTS Area	2013-2017	73.4%	14.9%	5.2%	0.3%	2.0%	1.6%	2.6%

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

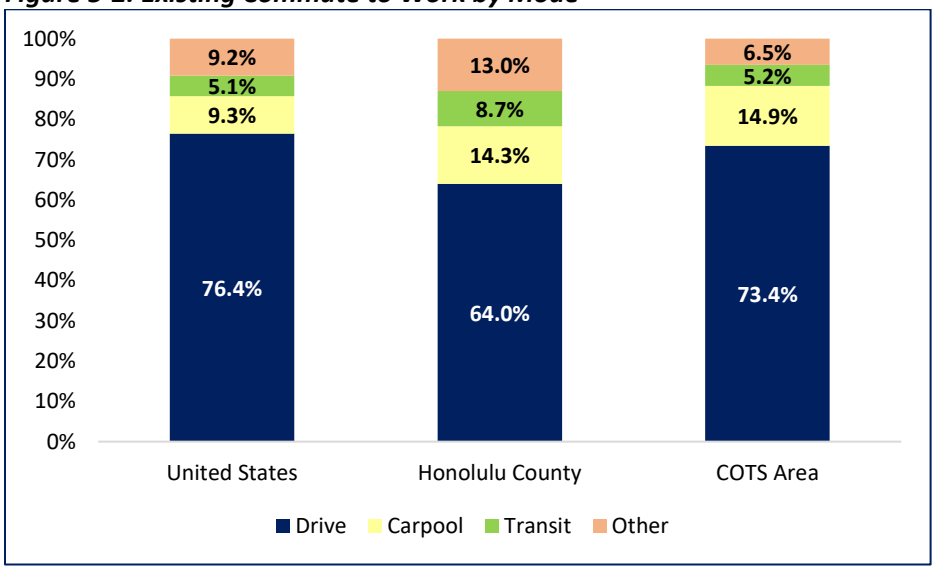
The COTS recommended projects will encourage a shift in mode choice. This should result in a multimodal transportation system that provides improved and sustainable regional transportation mobility. The COTS team developed an aggressive goal for the commute to work mode choice for the planning year 2040. This was based on professional judgement and research on comparable cities where rail has been recently introduced, such as Seattle. In 2016, 70% of Seattle commuters chose not to drive alone to work. Seattle's mode share split in 2016 was 30% drove alone, 9% carpool/vanpool, 47% public transportation, and 14% other2.

Existing commuter transportation modal splits for the entire COTS area (including Wahiawa and Whitmore Village) are shown in **Figure 5-2** and **Figure 5-3**. Both figures present the mode of transportation used to commute to work. Mode choice includes driving alone, driving with others (i.e., carpooling), and public transportation. Other commute modes include walking, bicycling, taxi, motorcycle and work at home.

Figure 5-2 shows how the COTS area neighborhoods, including Wahiawa and Whitmore Village, compared to the United States overall and the City and County of Honolulu (Honolulu County) for the top three commute mode choices of driving alone, carpooling, and public transportation and other. As shown in **Figure 5-2**, 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 5-3 presents the percentage for the remaining four "other" categories of worked at home; walk; taxi, motorcycle, and bicycling. In the period 2013 to 2017, the COTS neighborhoods, including Wahiawa and Whitmore Village, with a combined 6.5 percent had a lower overall use of these modes than Honolulu County with 13 percent and the US overall with 9.2 percent. This is due to the suburban nature of the COTS area with fewer job opportunities nearby that enable commuting by walking or bicycling.

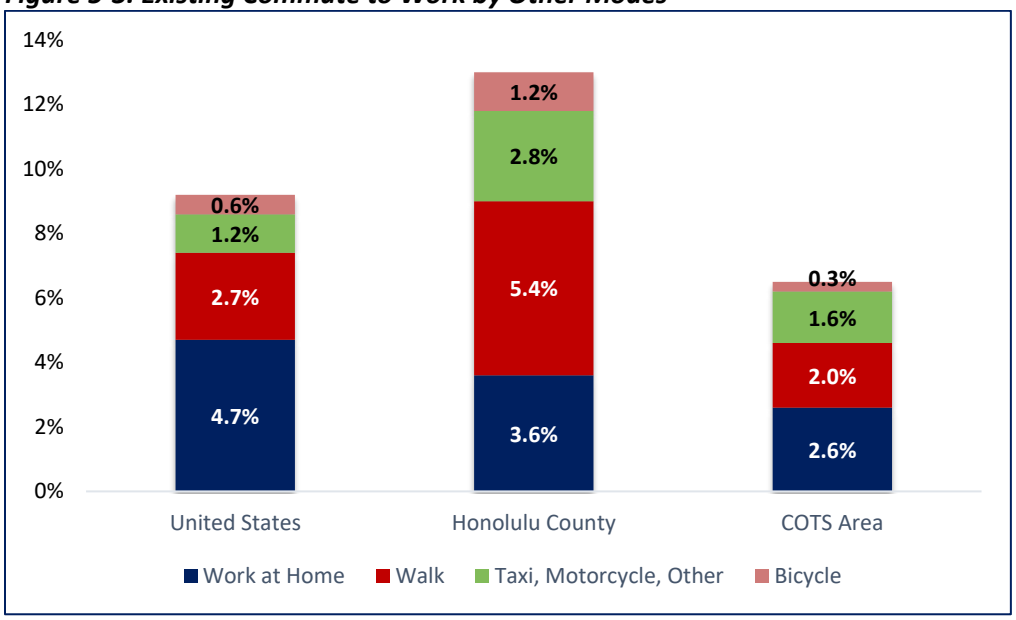
Figure 5-2. Existing Commute to Work by Mode



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

[2]Commute Seattle. 2016. Commute Seattle Mode Split Infograph. Available online at: https://commuteseattle.com/wp-content/uploads/2015/05/2016Commute_Seattle_modesplit_Infograph-2.pdf.

Figure 5-3. Existing Commute to Work by Other Modes

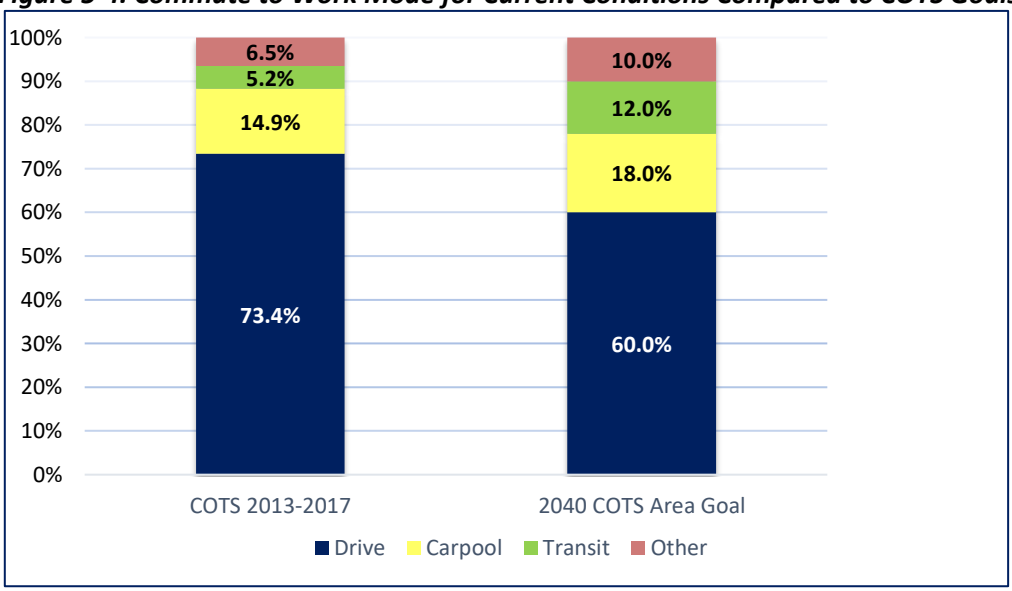


Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Figure 5-2 and **Figure 5-3** are based on the U.S. Census American Community Survey five-year averages for the period 2013-2017. 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.

The goals by mode are shown in **Figure 5-4** alongside the current mode use.

Figure 5-4. 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

Analysis. In the next 25 years the goal is to have the SOV mode drop almost 14 percentage points from 73.6% to 60%. To accomplish that goal, the use of carpooling would be incentivized through TDM measures (Project 501.1) 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% and the "Other" category would increase by 3.7%. The single largest increase is the use of transit, which would increase by 6.6% to 12%. This is admittedly a large increase in the choice to use transit to commute to work. However, with the opening of the rail system between the Kualakai station in East Kapolei and Halawa Station at Aloha Stadium in late 2020, and the full rail system scheduled for opening in 2025, this goal of 12 percent transit is within the realm of possibility.

6.0 IMPLEMENTATION TIMEFRAMES

This study provides projects in two timeframes: short-term and mid-term. Short-term represents projects that could start within one to four years, the period of the current TIP/STIP. Mid-term projects that involve widening or new construction will need environmental, design, and construction project development work which typically takes three to five years (or longer). These projects should be identified in the next ORTP. When ready for project design and construction, they will need to be on the TIP and STIP.

Transit projects are subject to the current bus route analysis being conducted by DTS as part of rail opening. Central Oahu residents can take full advantage of rail and start changing their travel habits to use rail as first choice mode. Interim rail from East Kapolei to Aloha Stadium is scheduled to begin December 2020. A second interim opening as far as Middle Street will occur about two years later. The transit route expansion projects would involve adding buses to the fleet. To be conservative, the cost estimates in this study assume that new bus purchases would be involved and would be potentially two to three years out.

6.1 Environmental, Land, and Project Delivery Considerations

This section briefly addresses considerations for implementing projects.

6.1.1 Environmental

Some projects require advance work before they can be constructed. One of the major considerations is how it might impact the environment. If project construction involves federal funds, then the National Environmental Policy Act (NEPA) must be complied with; if it involves state land or funds, then Hawaii Revised Statutes (HRS) Chapter 343 must be complied with. If an agency determines that there are no impacts to communities or natural resources, then it may be exempt under HRS Chapter 343 or be eligible for a Categorical Exclusion under NEPA. If there is uncertainty about impacts, the typical course is to prepare an Environmental Assessment (EA); consult with relevant agencies and communities; and conduct studies of matters such as water, air quality, archaeological and cultural resources, and flora and fauna. If significant impacts are anticipated, then an Environmental Impact Statement (EIS) is required.

This study has assessed that most of the projects in the short-term list are either exempt or do not need an environmental assessment. They are operational (transit routes) or involve signal timing. The bikeway projects in Package A and Project 801 are likely to need some level of environmental review.

The two BRT projects (Project 102.3 and Project 704), the H-2 Park & Ride (Project 102.5) and Mililani H-2 Access at Meheula with bus stops (Project 408.4), may require environmental review and documentation such as an environmental assessment or impact statement depending on the level of construction and impacts involved. The two widening projects (Project 403.5 and Project 902) would definitely need environmental review and documentation such as an environmental assessment or impact statement.

6.1.2 Land Acquisition

Most of the projects recommended would not require any land acquisition; they can be done within the existing right of way. However, the high capacity transit projects (Projects 102.3 and 102.5) and several of the bikeway projects (Projects 201.2, 201.7, and 802) would require additional or new right of way. This will prolong the project implementation.

6.2 Project Jurisdiction

Roadway projects may be under state or county jurisdiction. Coordination between the two levels of government, including the traffic signal recommendations, is essential.

The bicycle and pedestrian projects fall mostly within County jurisdiction. The City and County of Honolulu has been diligently pursuing such projects on an island-wide basis. Projects that only need striping are done during the routine re-paving schedule. New pathways and widenings are conducted as Capital Improvement Projects. This study has grouped them for ease in implementation.

The likely jurisdiction for each project is shown in **Table 6-1**.

Table 6-1. Jurisdiction for Recommended Projects

MILILANI / WAIPIO					
TRANSIT PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
101.1 *	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	County	$8.7 Million	X	
102.3	Bus Rapid transit (BRT) from Mililani Transit Center to the Waiawa Rail Station at Pearl Highlands	County	$28.9 Million		X
102.5	Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands	State	$37.5 Million		X
ROADWAY PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	State	$37.9 Million		X
408.4	Mililani Access at H-2 and Meheula Parkway with New Bus Stops	State	$6.9 Million	X	
501.1	Transportation Demand Management (TDM)	State	$13.6 Million	X	
502.1	Intelligent Transportation Systems (ITS)	State	$8.1 Million	X	

BICYCLE AND PEDESTRIAN PACKAGES				Recommendation	
Project Number	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
A * Mililani To Waipahu	201.1 New Pathway - Waipahu Street 201.2 New Pathway - Anania Drive to Central Oahu Regional Park 201.4 New Pathway on Kamehameha Highway 201.5 New Pathway on Kamehameha Highway 203.5 Bike Route - Anania Drive, Meheula Parkway to Kipapa Gulch	County Private State State County	$17.26 Million	X	
B Meheula Parkway	201.8 Bike Pathway on Meheula Parkway 202.3 Bike Lanes on Meheula Parkway 202.4 Bike Lanes on Kuahelani Avenue 203.6 Bike Route on Lanikuhana Avenue	County County County County	$14.22 Million		X
C Paiwa / Central Oahu Regional Park	201.10 Bike Pathway 202.8 Bike Lanes	County County	$6.5 Million	X	
D - New Pathway	201.6 New Pathway Kamehameha Highway 201.7 New Path - Cane Haul Road, H-2 to the Waiawa Rail Station at Pearl Highlands	State County/ Private	$15.83 Million		X

WAHIAWA / WHITMORE VILLAGE					
TRANSIT PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
701	Increase Bus Service to/from Whitmore Village and Wahiawa Transit Center	County	$865,000	X	
703 *	Expanded Late Night Service Bus Routes 51/52	County	Zero capital; all O&M	X	
704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and the Waiawa Rail Station at Pearl Highlands via H-2	County	$3.7 M buses $18.86 M for bus rapid transit treatments	X	
ROADWAY PROJECTS				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost**	**Short-Term**	**Mid-Term**
902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	State	$18 Million construction		X
903 *	California Avenue Complete Streets from Kamehameha Highway to Wahiawa District Park	County	$7.3 Million	X	
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	State	$1.97 Million construction	X	
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	State	$60,000	X	

912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	County	$45,000	X	
BICYCLE AND PEDESTRIAN PACKAGES				**Recommendation**	
Project No.	**Project Name**	**Jurisdic-tion**	**Initial Cost (rounded)**	**Short-Term**	**Mid-Term**
801 *	New Off-Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	 County County County State County County	$22.78 Million construction	X	
802	New Pedestrian and Bicycle Bridge Connecting Wahiawa and Whitmore Village	State	$4.36 Million		X
803	New Bike and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway • Kamananui Road	 State State State	$6.36 Million		X
804	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	 State County County/ Private	$893,000		X

6.3 Financial Programming by Jurisdiction

The initial cost of all projects recommended in **Table 6-1** is $349.79 Million.

The short-term projects total $119.03 Million and are possible to occur in the FY 2021-22. Programming and budgeting would have to occur next year when budgets are set for FY2021.

Mid-term projects total $230.7 Million in FY 2023-2025. However, about 15% of that (or $20 Million) is needed to undertake environmental studies, design, and land acquisition (necessary for just one or two projects), and then construction. This planning and design work can be programmed for FY2021.

For the short-term, $77.6 Million is attributed to projects that can be sponsored by the City, for bus service and for bicycle, pedestrian, and Complete Street projects. These projects were among the highest ranked by Central Oahu residents. The cost of Bicycle and Pedestrian Packages A and D was divided equally between State and City.

The HDOT short-term total is $41.4 Million for five projects, the largest being implementation of ITS.

The County mid-term total is $52.3 Million.

The HDOT mid-term total is $75.4 Million. The largest project is widening Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue at $37.9 Million. The second largest is the H-2 Park & Ride with express service to the Waiawa Rail Station at Pearl Highlands, which has an initial cost of $37.5 Million for ramps and surface parking.

6.4 Impacts if not Implemented within the Timeframe

The combination of roadway, transit, and active transportation projects is intended to minimize congestion, increase transit ridership, and to provide convenient and safer travel options for people who walk and bike. When people change mode to bus or rail transit, they gain personal travel benefits. They also remove cars from the road.

One 40-foot bus has a seating capacity to replace 30 vehicles. An average vehicle occupancy on Oahu is 1.4 persons per vehicle. This is illustrated in **Figure 6-1**, taken during a demonstration on Merchant Street in Honolulu, which compares the amount of roadway space needed for 30 cars versus one bus.

Figure 6-1. Space Capacity Diagram: Thirty Cars Versus One Bus

Photo Credits: Harrison Rue

The recommended bus service projects create 338 new bus trips, which would add seating capacity of 14,444 new seats. The estimate assumes routes D, 50, 98, 433, 72, and 51/52 are using standard 40-foot buses with seating capacity of 42 seats; and a 60-foot BRT bus with 58 seats. If every bus runs at full capacity (i.e., all seats are taken), this is equivalent to more than 14,000 personal vehicle trips removed in each direction, using an average vehicle occupancy of 1.4 persons per vehicle.

None of the projects by themselves represent a single solution that will address the travel needs of most Central Oahu residents, employees, and visitors. Instead, the effect of implementing multiple projects and packages of projects in a timely manner is critical to: 1) reduce future delays for motor vehicles; 2) change the behavior of some travelers to use rail, bus, bicycles, or walking; and 3) enhance the quality of life and safety for those who already choose to move via walking, bicycling, and taking transit.

An important travel option for area residents, employees, and visitors will be the rail project. Enhancing multimodal access to the Waiawa Rail Station at Pearl Highlands, including access to buses within the COTS area that will serve the station, is critical to the area's mobility solutions.

This includes constructing bike lanes and shared use facilities connecting bus stops, building and operating Park & Ride facilities to minimize transfer times, and selectively adding capacity to key roadways to improve bus operations and minimize auto travel time. Failure to encourage new transit riders by improving access to rail and bus will further exacerbate projected vehicle congestion levels.

The success of rail is dependent upon frequent, reliable bus connections to the rail stations within the COTS area. A major portion of rail ridership is projected to come from Central Oahu with the Waiawa Rail Station at Pearl Highlands being one of the highest use stations. Identified projects adding bus expansion and supporting projects along the Kamehameha Highway and H-2 corridors need to be in place prior to the full rail opening in 2025. Along with the increase in routes, hours of service and frequency are the accompanying projects that speed up the transit trip. These include BRT elements, highway ramp metering with transit bypass, and the use of the freeway space for transit-specific projects.

Projects such as 102.5 Park & Ride with Express Bus to the Waiawa Rail Station at Pearl Highlands are critical to ensure that residents of Central Oahu can access rail easily. Without convenient Park & Ride, there may be no place to park when they get to the Waiawa Rail Station at Pearl Highlands. Residents may be more inclined to forego rail and drive to their destination. It only takes once, in many cases, for an intending passenger to give up on the parking to rail connection and maintain their commute by personal vehicle. Project 102.5 is identified to be phased so a surface parking lot can be constructed in a timely fashion. As demand increases, a parking structure can be added.

Other projects providing safe pedestrian and bicycle connections within the community and to transit remove more cars from neighborhood streets thereby providing a safer environment. These projects need to be implemented to encourage bicycling and walking. Amenities such as secure bicycle storage, wayfinding, and electronic signage along with other ITS elements are necessary at transit centers and high capacity transit stops.

Delaying implementation of projects will result in worsening congestion and safety issues, such as increased crashes and neighborhood diversions. In addition, congestion will result in reduced worker productivity and economic challenges for businesses located in or dependent on access to the COTS area.

APPENDIX A

Summary Pages for each Recommended Project

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MILILANI

TRANSIT PROJECTS

101.1	Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations	$24.3 million

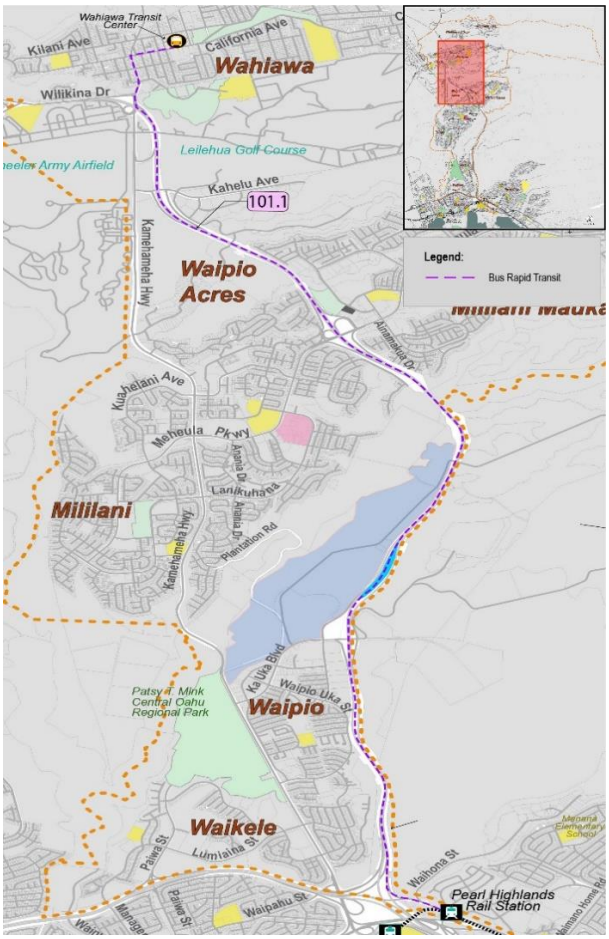
- 10 new electric buses (includes 10 replacement buses)
- New routes connecting to Waiawa Station

This project adds two new routes, D and 50, and recommends extensions on two others, Routes 98 and 433, to serve the COTS area.

- Route D would run from Wahiawa Transit Center to Waiawa Station.
- Route 50 would run between Mililani Mauka and Waiawa Rail Station at Pearl Highlands.
- Route 98 would be redesigned to provide peak period express service in Mililani Mauka, traveling through the neighborhood on a similar path of current Route 501, then accessing H-2 to Waiawa Rail Station at Pearl Highlands.
- Route 433 would be extended into Koa Ridge.

Expanded bus service would increase the hours of service from 42 to 90 daily hours to provide all day service on Routes D, 40, and 433 and peak period trips on Route 98. Ten buses are required to provide the recommended service. Since costs are projected to 2040, an additional 10 buses will need to be procured during this period to replace the buses.

This project improves upon an existing high-use transit ridership and may reduce congestion by shifting single occupant vehicle (SOV) drivers to transit by increasing frequency and convenience.



102.3	Bus Rapid Transit from Mililani Transit Center to Waiawa Rail Station at Pearl Highlands	$28.9 million

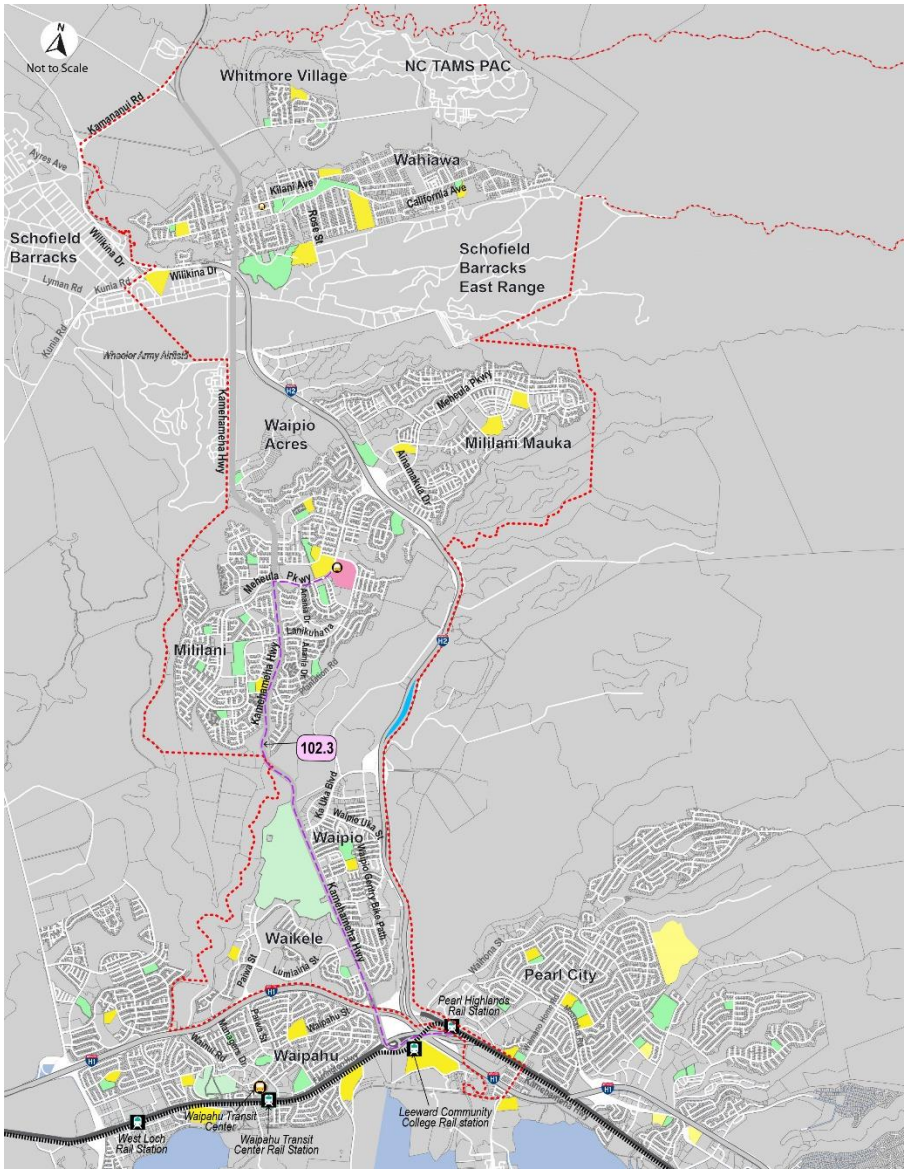
- BRT line from Mililani Transit Center to Waiawa Rail Station at Pearl Highlands

This project would provide a bus rapid transit line from Mililani Transit Center on dedicated lanes through Mililani Transit Center to Waiawa Rail Station at Pearl Highlands.

Stops would include:

- Mililani Transit Center
- H-2 P&R
- Waiawa Rail Station at Pearl Highlands

This project would greatly benefit COTS travelers by giving them a convenient and speedy access to two rail stations. Congestion may be reduced by shifting single-occupant vehicle (SOV) drivers to transit.

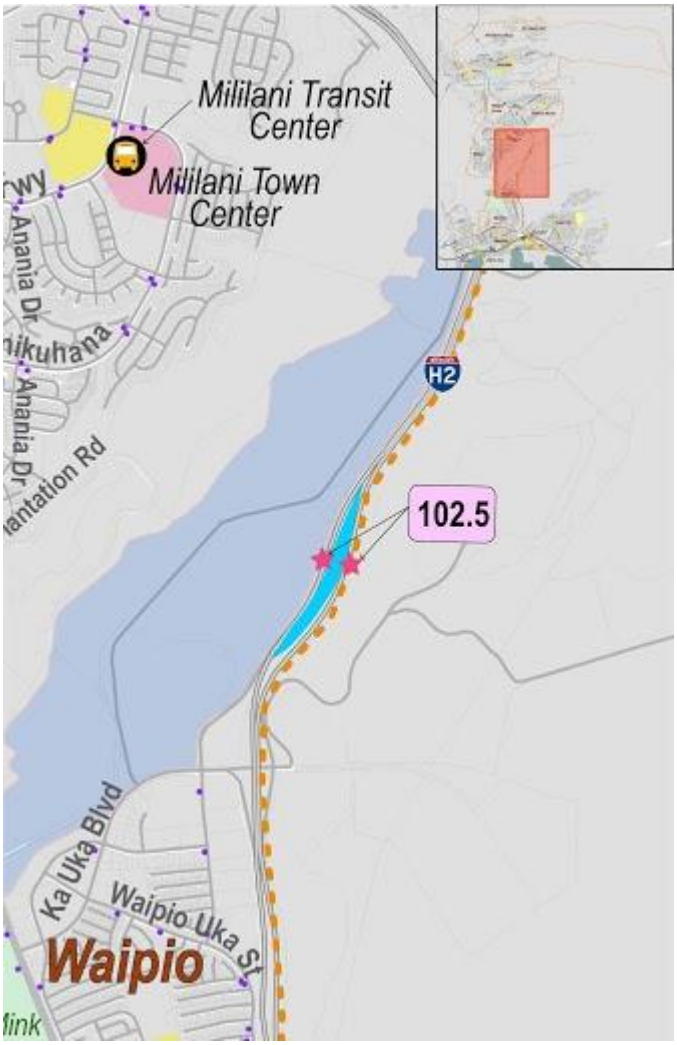


102.5	Park & Ride with Express Bus to Waiawa Rail Station at Pearl Highlands	$37.5 million (initial cost for ramps and surface parking)

- Park and Ride in median of H-2
- Express bus to Waiawa Rail Station at Pearl Highlands

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. This project initially included a 2,000-space parking structure plus a 400-space surface parking lot. This project is recommended to be phased starting with an 800-space surface lot resulting in a savings of 50% or $62,725,670 in construction costs.

This project may reduce congestion by shifting single occupant vehicle (SOV) drivers from both Koa Ridge and future Waiawa developments to transit by providing a convenient connection to rail via H-2 high-occupancy vehicle (HOV) lanes and reduces overall transit travel time.

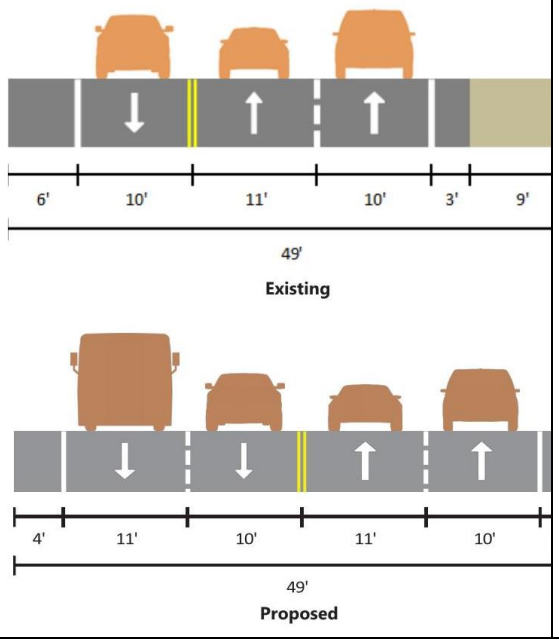


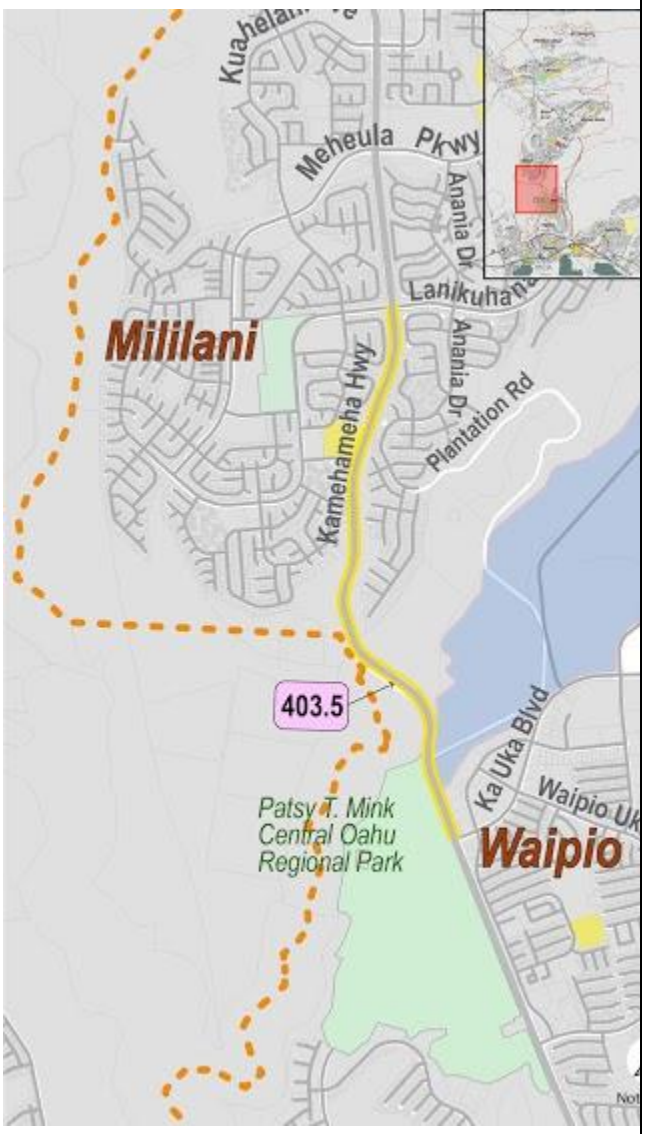
ROADWAY PROJECTS

403.5	Widen Kamehameha Highway between Ka Uka Boulevard and Lanikuhana Avenue	$38 million

- Widen from 3-lanes to 4-lanes between Ka Uka Blvd. to Lanikuhana Ave.

This project provides additional north-south capacity through study area as congestion increases on H-2 with future growth and eliminates existing bottleneck.





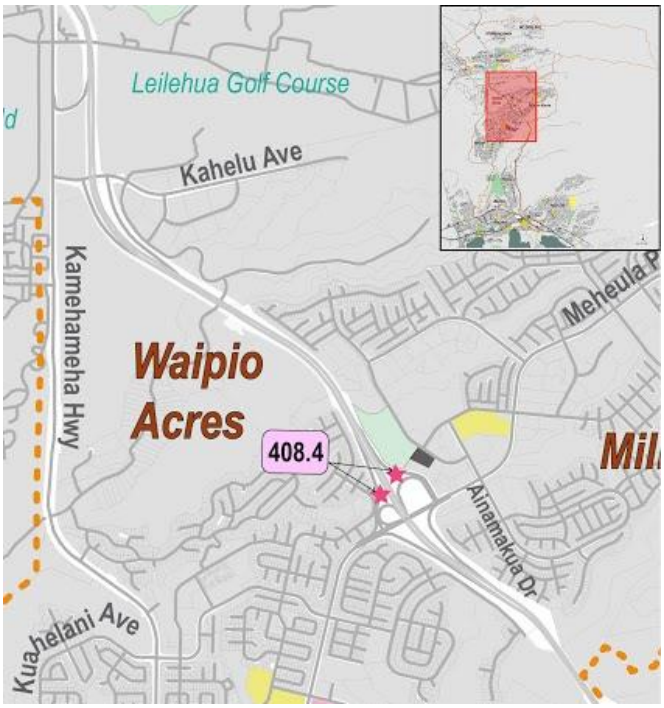
408.4	Mililani Access at H-2 and Meheula Parkway with bus stops	$6.9 million

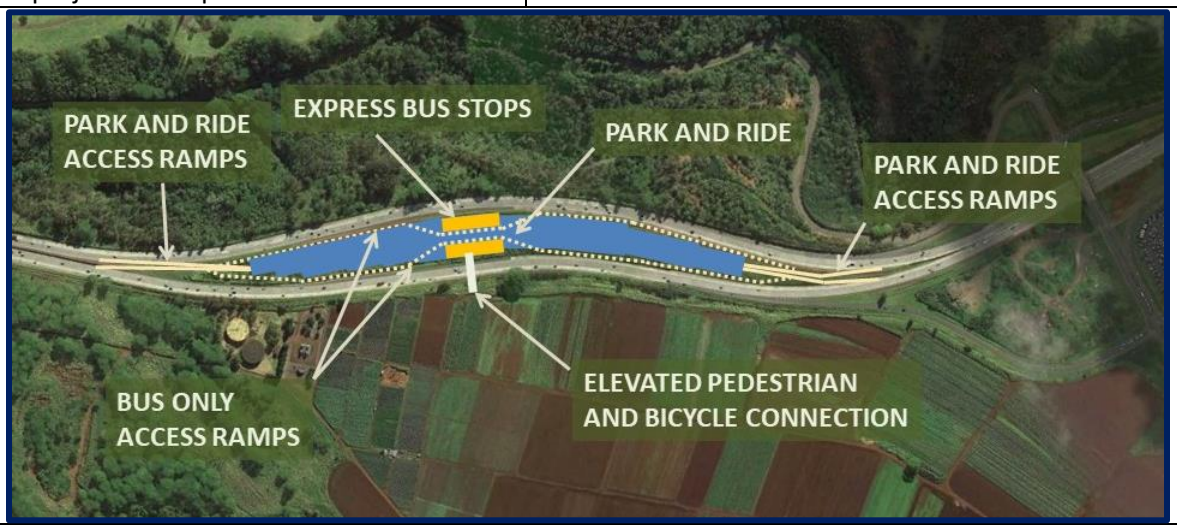
- Express bus access on H-2
- Bike/pedestrian connection from Park and Ride to H-2 express bus stops

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.

This project may reduce congestion by shifting single occupant vehicle (SOV) drivers to transit by providing a convenient connection to rail and reducing overall transit travel time.

This project will improve access to transit.



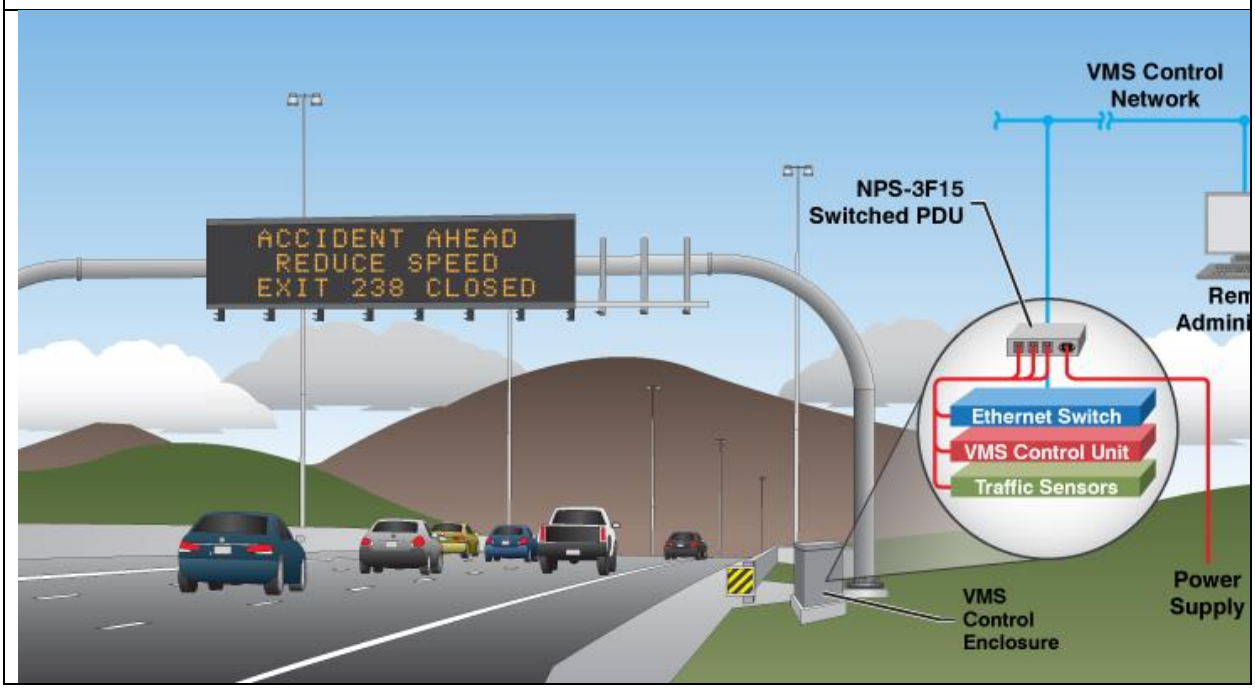


501.1	Transportation Demand Management (TDM)	n/a	
• Carpool, vanpool, alternative work schedule, work from home, emergency ride home, employer-based programs, etc. Transportation demand management (TDM) supports congestion management and access to rail. Programs could provide the marketing, ride matching, 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.			

502.1	Intelligent Transportation Systems (ITS)	$8.1 million

- 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 HDOT and DTS, but the level of investment and infrastructure could be increased for these elements in the COTS area.



BICYCLE AND PEDESTRIAN PACKAGES

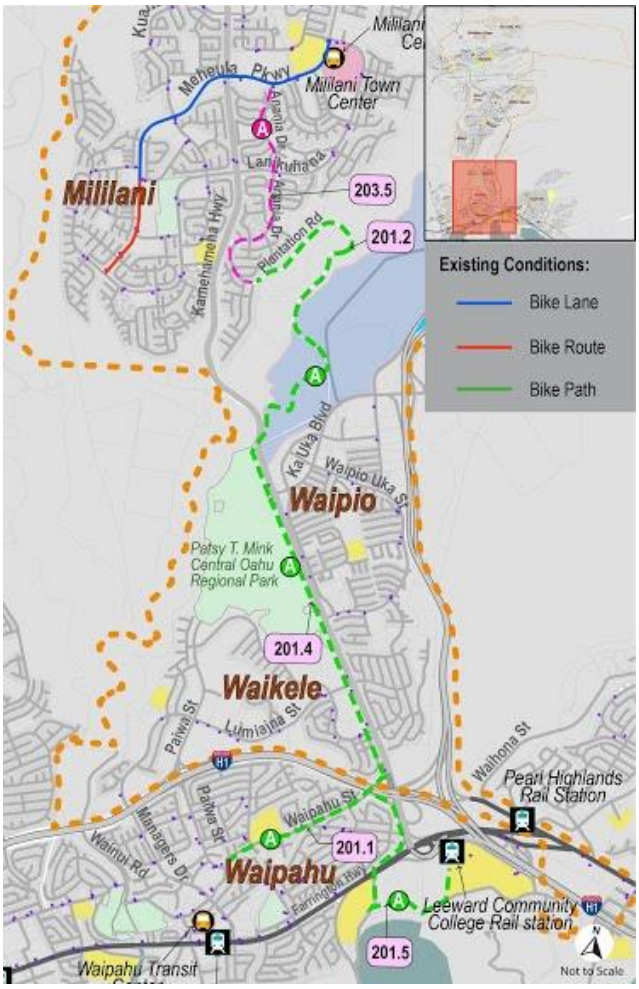
Bicycle/Pedestrian Package A New Pathways and Route from Mililani to Waipahu	$17.5 million

- 201.1: New pathway, Waipahu Street to Kamehameha Highway
  - Connects to Kamehameha Highway
- 201.2: New pathway, Anania Drive to Central Oahu Regional Park
  - Adjacent to Kamehameha Highway
- 201.4: New pathway on Kamehameha Highway, from Ka Uka Blvd. to Waipahu Street
  - Adjacent to Kamehameha Highway
- 201.5: New pathway on Kamehameha Highway, from Waipahu Street to Anania Drive
  - Completes bicycle connection along Kamehameha Highway to Leeward Community College

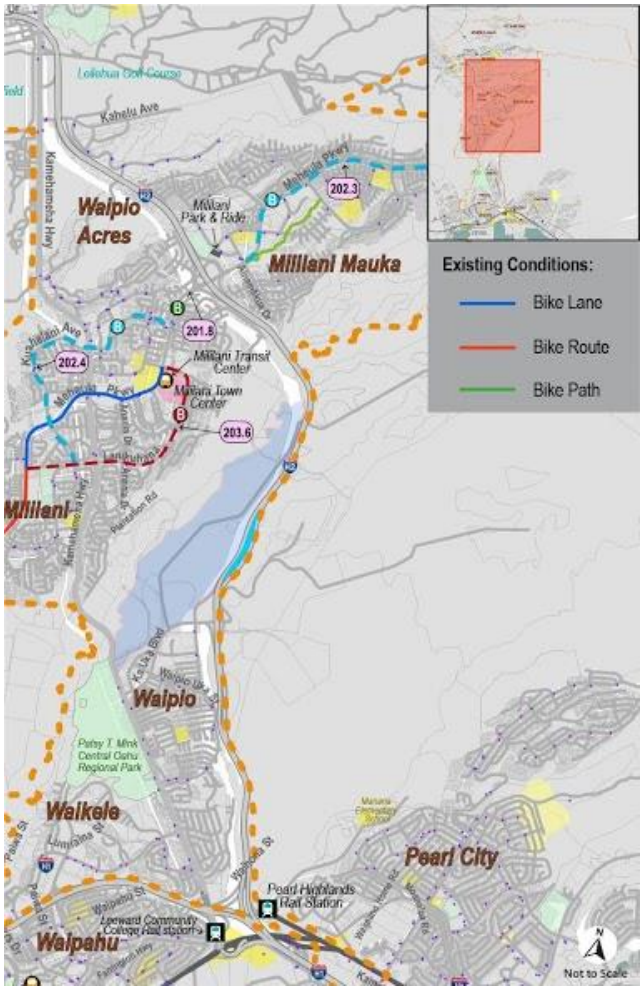
The above projects will improve the existing network by providing a safe, off-street facility for people walking and biking; an off-street pathway is generally safe for all users from children to older adults.

- 203.5: Anania Drive from Meheula Parkway to Kipapa Gulch Path
  - Completes bicycle connection to Meheula Parkway

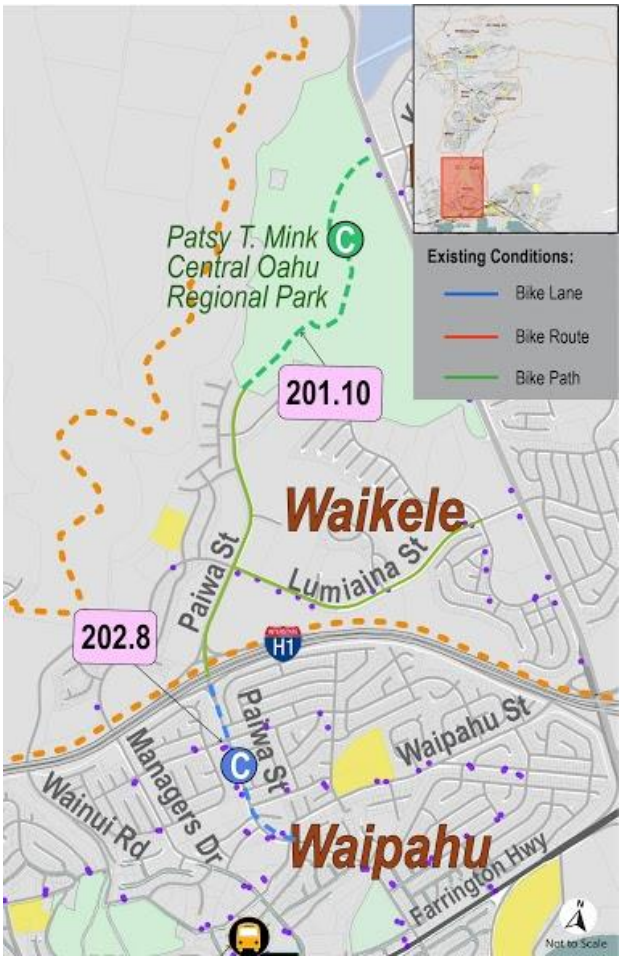
The above project provides signage and pavement markings to demonstrate use by people bicycling



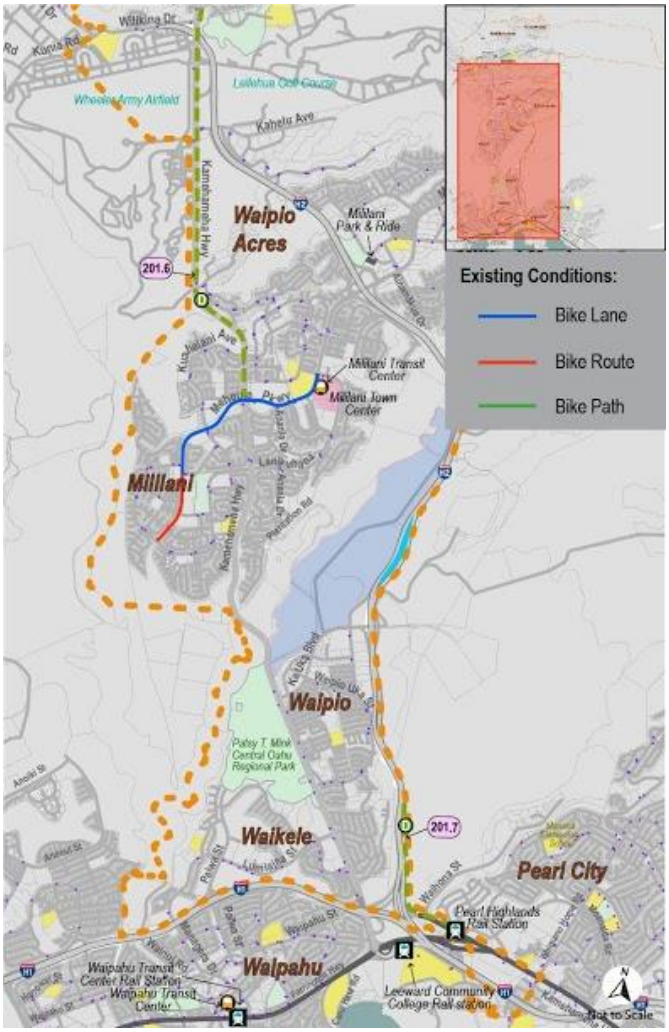
Bicycle/Pedestrian Package B New Pathway, Lanes, and Route through Meheula Parkway	$9.5 million	

• 201.8: pathway on Meheula Parkway between Ainamakua Drive and Lanikuhana Avenue
  ○ Completes bicycle connection along Meheula Parkway from off-street path to Mililani Transit Center
 	
This project will improve the existing network by providing a safe, off-street facility for people walking and biking; an off-street pathway is generally safe for all users from children to older adults
 	
• 202.3: bicycle lanes on Meheula Parkway between Mililani H-2 Interchange and Kapanoe Street
  ○ Extends bicycle access along Meheula Parkway into Mililani Mauka
• 202.4: bicycle lanes on Kuahelani Avenue between Hokuahiahi Park and Meheula Parkway
  ○ Creates bicycle access into Mililani Mauka
 	
These projects provide an on-street connection
 	
• 203.6: bicycle route on Lanikuhana Avenue from south end of Meheula Parkways to Mililani Town Center
  ○ Connects to Meheula Parkway
 	
This project provides signage and pavement markings to demonstrate use by people bicycling
		

Bicycle/Pedestrian Package C New Pathway and Lanes through Paiwa/Central Oahu Regional Park	$5.5 million	

• 201.10: pathway through Central Oahu Regional Park
  ○ Connects Kamehameha Highway to Paiwa Street through Central Oahu Regional Park
 	
This project will improve the existing network by providing a safe, off-street facility for people walking and biking; an off-street pathway is generally safe for all users from children to older adults
 	
• 202.8: bike lanes on Paiwa Street, from H-1 to Waipahu Street
  ○ Extends bicycle access along Paiwa Street into Waipahu
 	
This project helps to create a network to be used for everyday trips around the community, such as to school or shopping.
		

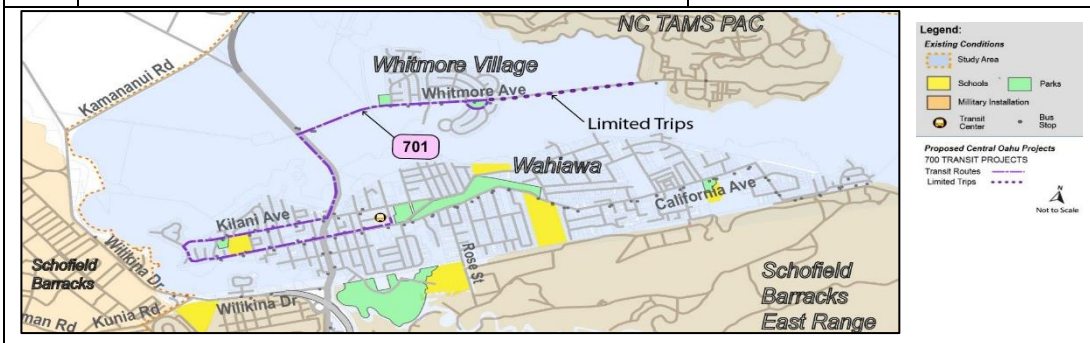
Bicycle/Pedestrian Package D New Pathways from Wahiawa to Waiawa Rail Station at Pearl Highlands	$16 million	

• 201.6: pathway on Kamehameha Highway, from Wahiawa to Anania Drive
  ○ Adjacent to Kamehameha Highway
 	
This project will improve the existing network by providing a safe, off-street facility for people walking and biking; an off-street pathway is generally safe for all users from children to older adults
 	
• 201.7: pathway, Cane Haul Road, H-2, to Waiawa Rail Station at Pearl Highlands
  ○ Connects H-2 to Waiawa Rail Station at Pearl Highlands
 	
This project will improve the existing network by providing a safe, off-street facility for people walking and biking; an off-street pathway is generally safe for all users from children to older adults
		

WAHIAWA-WHITMORE VILLAGE

TRANSIT PROJECTS

701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	$865,000 for initial investment $1,032,000 additional investment for replacement buses in 12 years



Purpose: To increase the attractiveness of transit travel through increased visibility and convenience, as well as reduced wait and travel times. Hub and Spoke provides the community a network of routes that connect at a hub. Implementation of Hub and Spoke has been on-going in Honolulu. The home trunk route in this case Route 51 is anchored at a hub (Wahiawa Transit Center). The community circulator routes are identified by three digits; the first two numbers identify the home hub and route.

Project Description: Current Route 72 provides service to Whitmore Village and Schofield Barracks via the Wahiawa Transit Center. Currently, the route can take 60 minutes to complete a cycle on the weekdays only during the first trip at 5:10 AM. Other trips can take 70 minutes, 80 minutes and more. Much of the time loss is due to traffic along Kamehameha Highway especially near the southern entrance to Wahiawa.

Route 72 operates with one vehicle to serve both destinations even though the travel needs may be different for a residential community and a military base. This project introduces hub & spoke to Wahiawa and Whitmore Village anchored at the Wahiawa Transit Center. The trunk routes are Routes 51 and 52. The Whitmore Village portion of Route 72, would be operated as a separate route providing 45-minute service in the peak periods.

This project will require an additional vehicle to allow residents in Whitmore Village and Wahiawa residents ‘Ewa of Kamehameha Highway – along Kilani Avenue and California Avenue to have 45-minute peak period service during the weekdays. The increased frequency will provide more connections to Route 51 and COTS Bus Rapid Transit Project 704 and Bus Service Expansion Route D.

New route would serve the Whitmore Village and Ewa of Kamehameha Highway portion of Wahiawa – along Kilani Avenue and California Avenue. It is acknowledged that the planned expansion of the Naval Computer and Telecommunications Area Master Station may add hundreds of workers to the site when the project is completed. This expansion may provide an opportunity to reinstate service to the facility if demand warrants during the peak periods. This would be possible with the added trips serving Whitmore Village.

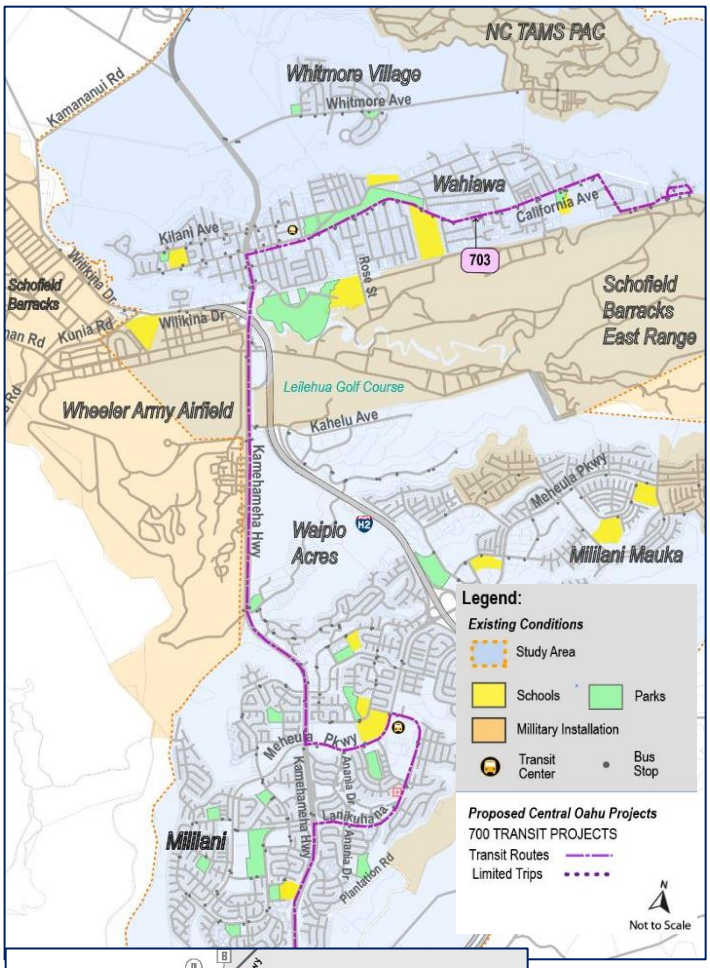
Project 701 would add 14 trips to Whitmore Village, more than doubling service. Expanded service would add approximately 8 weekday bus service hours with an approximate increase of 500 passenger boardings.

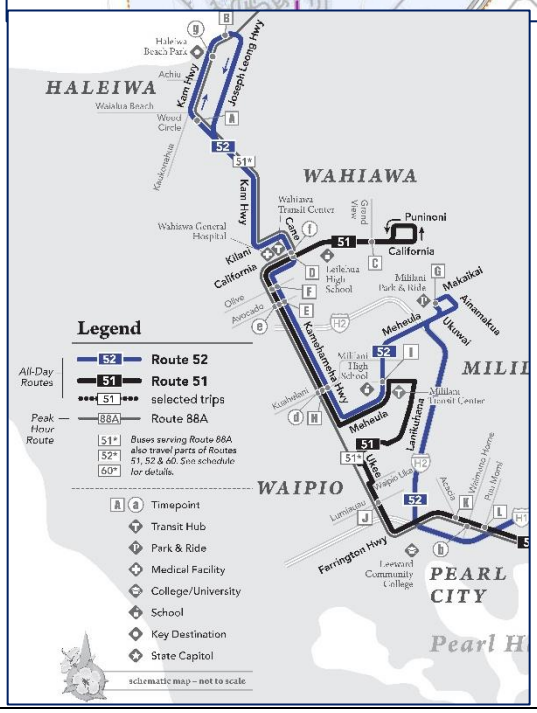
703	Expanded Late Night Service Bus Routes 51/52	$0 for initial investment $3,095,000 additional investment for replacement buses in 12 years

Provides 24-hour service by adding three early morning trips that continue to Haleiwa.

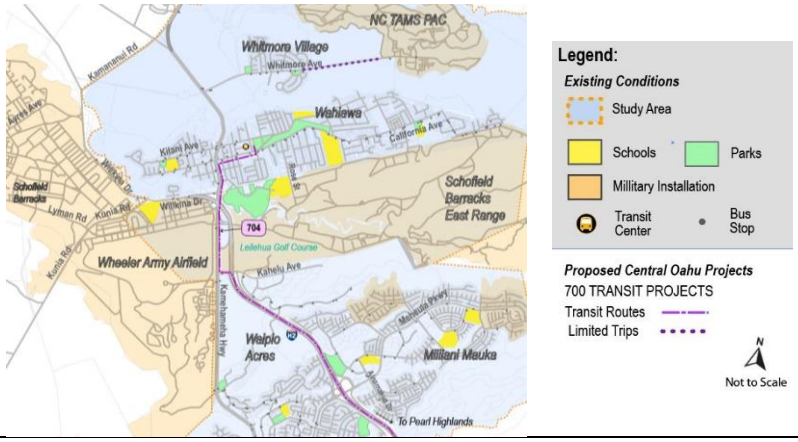
Purpose: To add service providing essentially 24-hour service for Wahiawa and Haleiwa residents.

Project Description: Current Route 51's last trip to Wahiawa ends at 11:53 PM in Wahiawa Heights. The first trip out in the morning is 4:21 AM which is a 4 ½-hour gap in service. Current Route 52 last trip arrives in Haleiwa at 9:34 PM and the first morning trip is at 4:44 AM, which is a seven-hour gap in service. This project would add one Route 52 trip and three Route 51 trips. The Route 52 trip would be scheduled to arrive in Haleiwa about 11:30 PM. The three Route 51 trips would serve the Wahiawa Transit Center and continue to Haleiwa in about one-hour intervals. These four trips will provide approximately eight additional daily hours of service and provide about 450 additional passenger boardings. By increasing fixed route service hours, TheHandi-Van would provide complementary ADA paratransit service during the same service hours.





704	Bus Rapid Transit from Wahiawa Transit Center to Armory Park & Ride and Waiawa Rail Station at Pearl Highlands via H-2	$3,700,000 for initial investment for buses $18,860,000 for construction of BRT treatments $4,126,100 additional investment for replacement buses in 12 years



Direct service from Wahiawa Transit Center to Waiawa Rail Station at Pearl Highlands.

Purpose: To provide faster bus transit service with some dedicated lanes through Wahiawa during the peak period accessing H-2 by the Armory Park-and-Ride lot to provide a more direct route to the Waiawa Rail Station at Pearl Highlands.

Project Description:

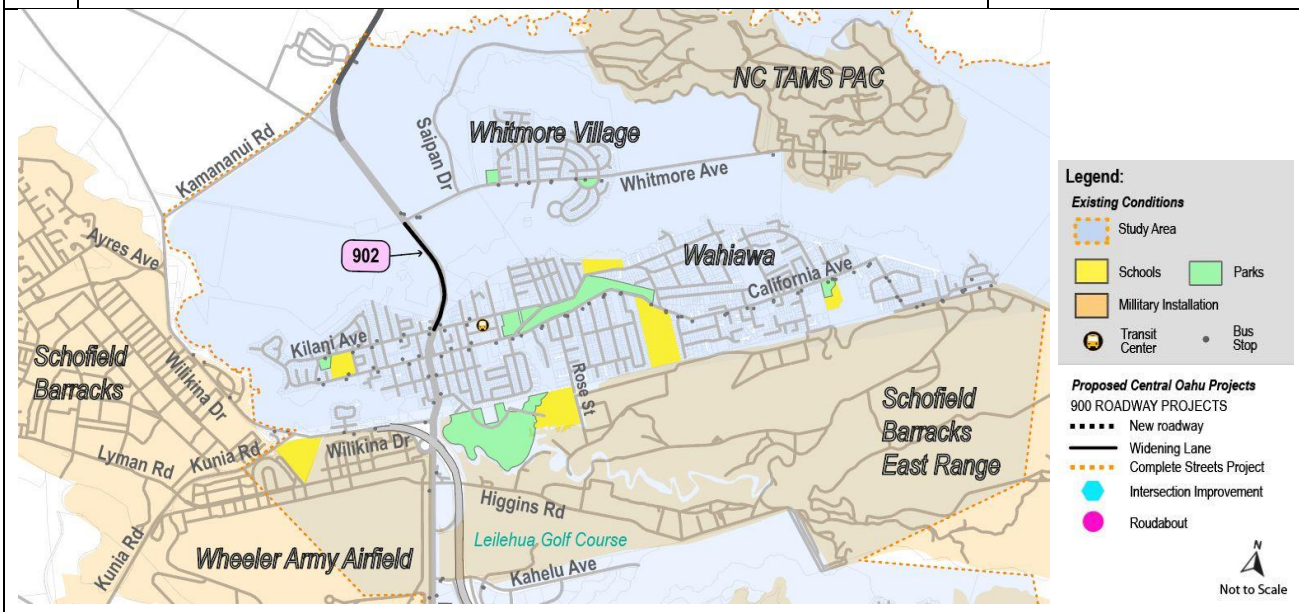
This project would provide a bus rapid transit line and dedicated lanes along Kamehameha Highway from the Wahiawa Transit Center accessing H-2 by the Armory Park & Ride lot to continue to the Waiawa Rail Station at Pearl Highlands.

Treatments would include bus only lanes in the peak periods, which other bus routes would use to take advantage of increased speeds and avoid congestion. Bus Rapid Transit stops would be located at:

- Wahiawa Transit Center-terminus
- Armory Park & Ride Lot-both directions
- COTS Project 102.5 H-2 Parking & Ride Lot-both directions
- Waiawa Rail Station at Pearl Highlands-terminus

Approximately 18 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. This service would serve approximately 1,750 passengers. BRT treatments would be dependent upon freeway express bus stops and associated pedestrian connections to maintain bus speed.

902	Kamehameha Highway Widening from North of Whitmore Avenue to Kilani Avenue	$17,999,000

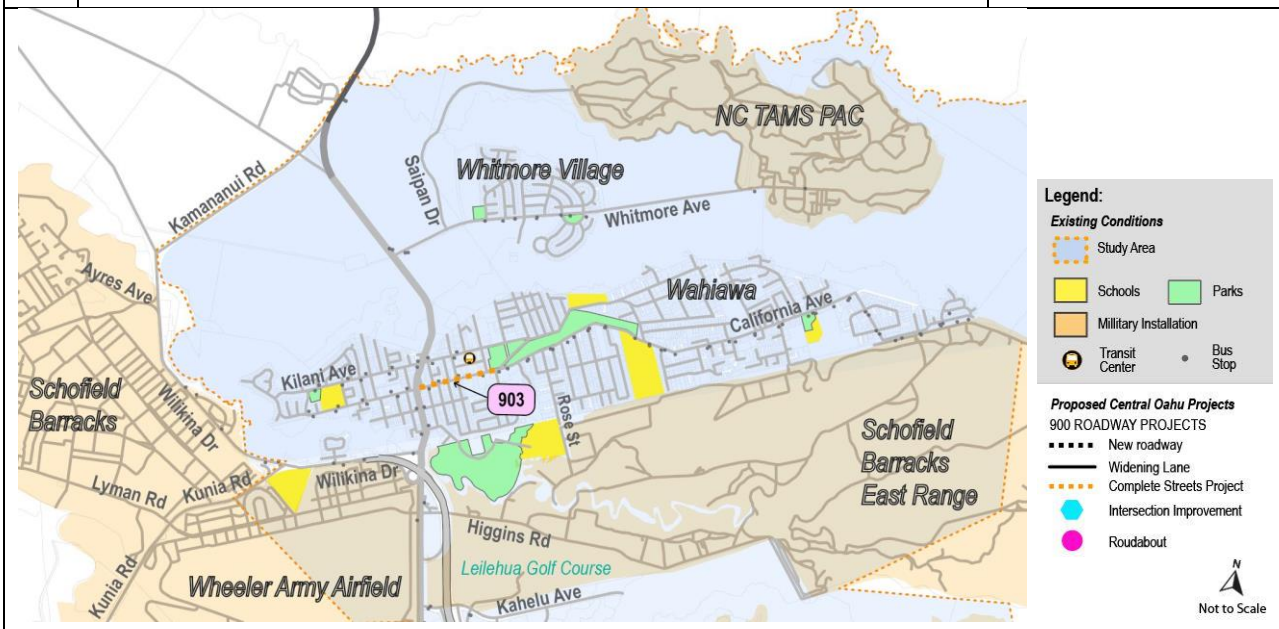


Widen highway and bridge from two-lanes to four-lanes; project may be combined with project 909.

Purpose: To provide additional capacity for traffic and reduce vehicle delays on the highway between Wahiawa and Whitmore Avenue.

Project Description: Widen the existing two-lane pavement section to four through lanes (two in each direction) plus a 10-foot wide shared use path with buffer on the east side of the street. The widening would be made from north of Whitmore Avenue to Kilani Street and would be 0.8 miles long. This would require widening the existing roadway by at least 22-feet including the approximate 300-foot long Karsten Thot bridge section just north of Kilani Avenue.

903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	$7,303,048

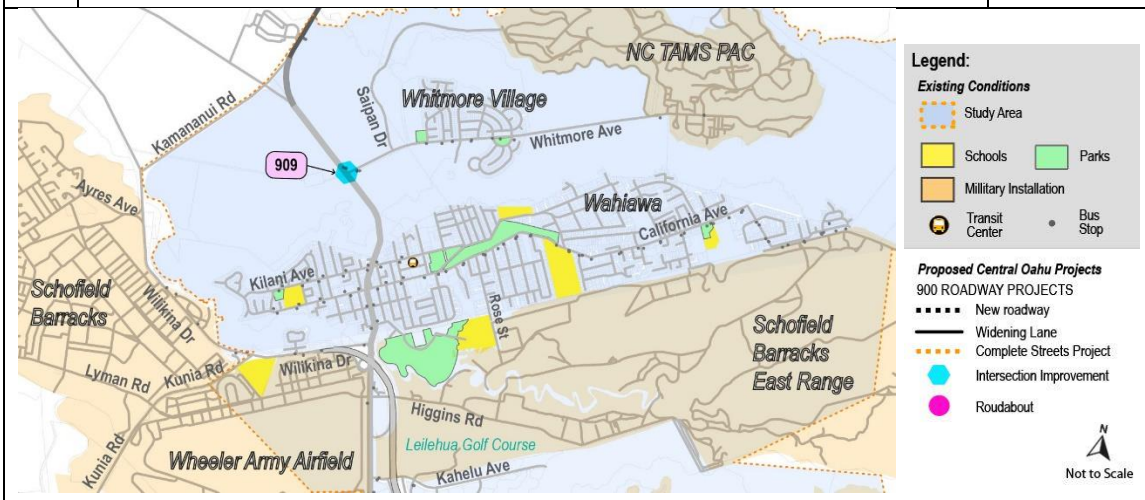


Install safety improvements, including dedicated bicycle facilities and widened sidewalks.

Purpose: To better balance the mobility options amongst all modes and enhance safety for all road users on California Avenue in Wahiawa.

Project Description: The project includes implementing complete streets improvements on California Avenue with the intent of moderating vehicle speeds, providing dedicated bicycle facilities, widening sidewalks and waiting areas at intersections, shortening pedestrian crossing distances, and expanding the on-street parking supply. The improvements would be made for a 0.45-mile long segment between Kamehameha Highway and Wahiawa District Park.

909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	$1,974,000



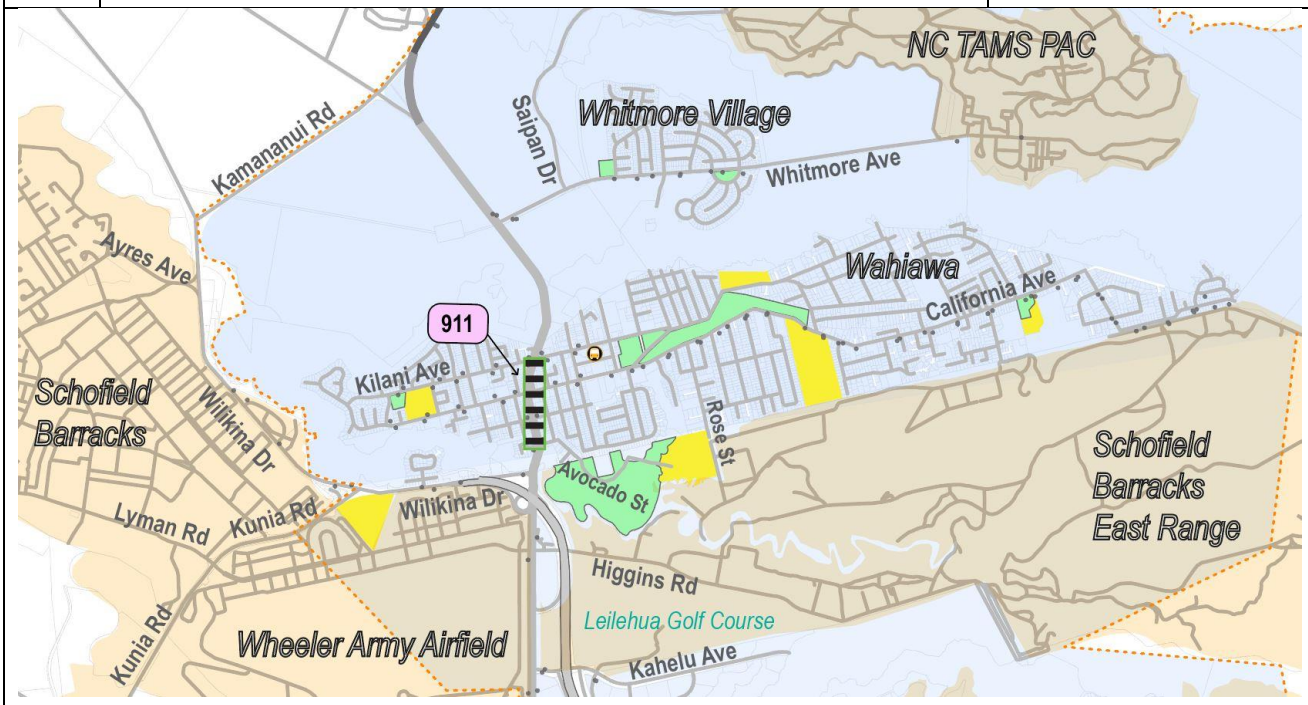
Widen roadway to accommodate dual westbound turns. This project may be combined with project 902.

Purpose: To increase intersection capacity and reduce delays for all vehicles at the intersection.

Project Description: Widen the westbound approach and southbound departure legs to accommodate a second westbound left-turn lane on Whitmore Avenue. This would involve widening the subject road sections for a total of approximately 750 feet to include an additional 11 feet of pavement and modifying the signal accordingly.

1

911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	$60,000

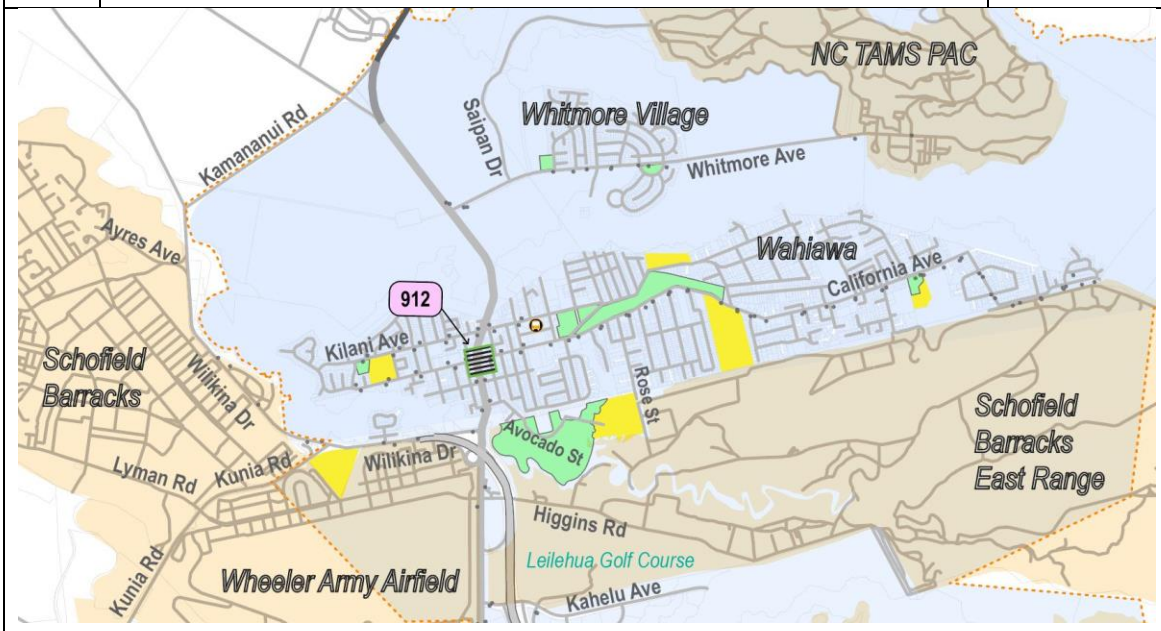


Re-time traffic signals.

Purpose: To increase arterial throughput, reduce congestion along the highway, and manage travel speeds.

Project Description: Conduct new traffic counts and queuing observations at and analyze signal operations to identify initial timing modifications at the four signalized intersections in Wahiawa between Kilani Avenue and the H-2 southbound off-ramp to Kamehameha Highway. Install adaptive signals at all locations and conduct field observations after initial timing is implemented and refine timings accordingly.

912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	$45,000

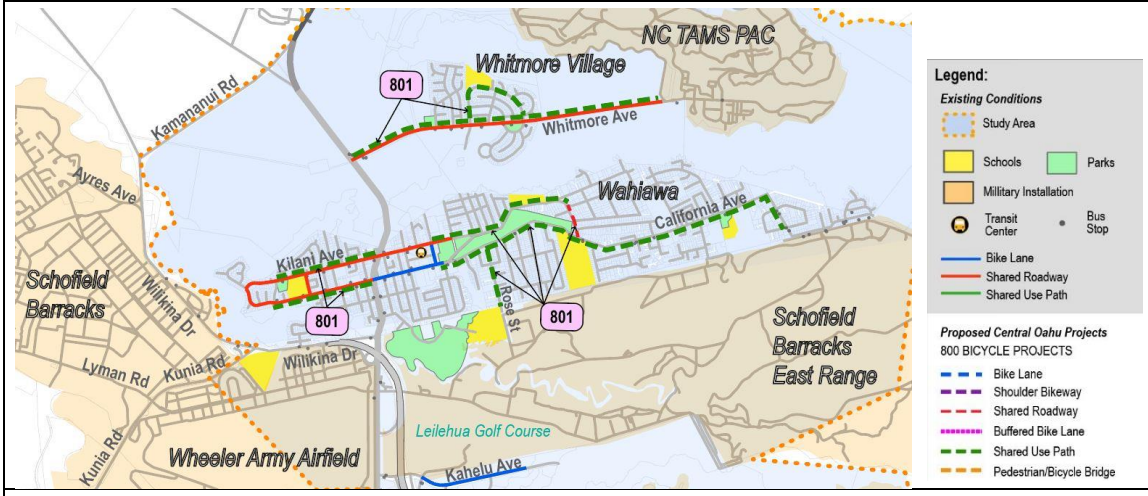


Re-time traffic signals.

Purpose: To increase arterial throughput, reduce congestion along the street, and manage travel speeds.

Project Description: Conduct new traffic counts and queuing observations at and analyze signal operations to identify initial timing modifications at the three signalized intersections in Wahiawa east of Kamehameha Highway to N Cane Street. Install adaptive signals at all locations and conduct field observations after initial timing is implemented and refine timings accordingly.

801	New Off Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit	$23,181,900

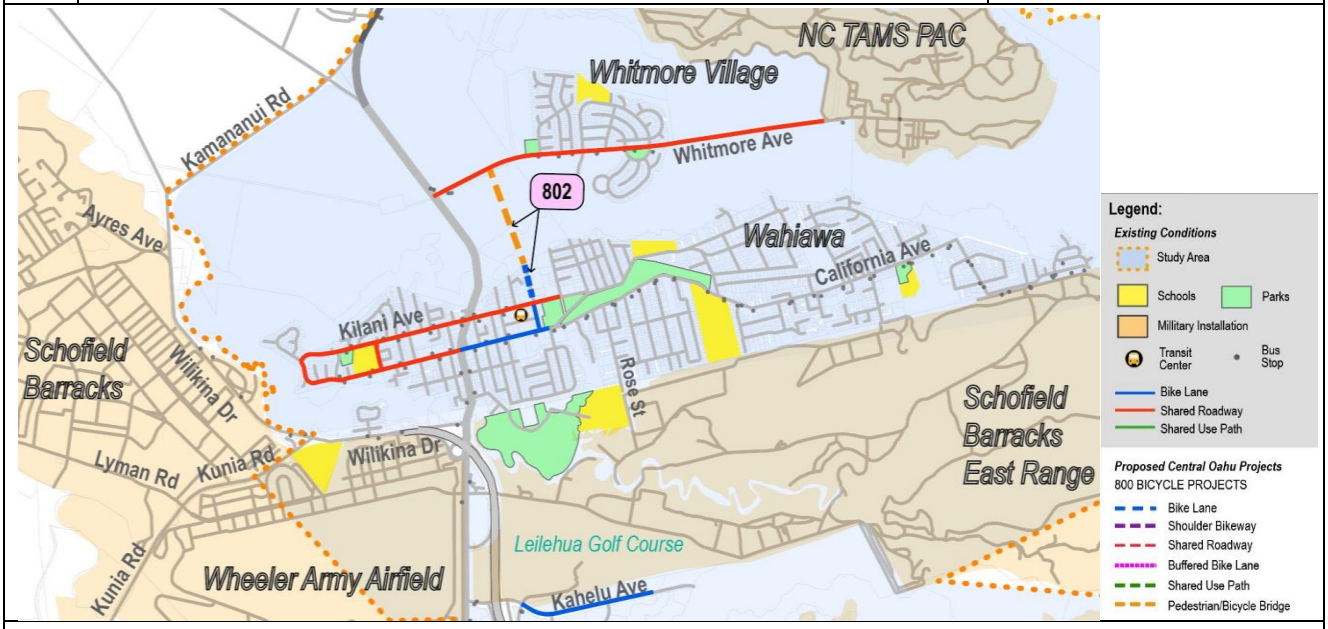


Widen asphalt sidewalk (or construct new) for shared use path for people walking and biking.

Purpose: To provide dedicated off-street shared-use paths in Wahiawa and Whitmore Village which connect the residential neighborhoods to schools and parks, thereby enhancing connectivity and safety for active transportation.

Project Description: This project includes the widening of sidewalks within the existing right-of-way to obtain nearly 7.5 miles of 10-foot wide shared use paths along primary streets in Wahiawa and Whitmore Village. Facilities are proposed along the north side of Kilani Avenue (Anoni Street to Kamehameha Highway and North Cane Street to Uuku Street), the south side of California Avenue (Anoni Street to Kamehameha Highway and North Cane Street to Karsten Drive), the north side of Whitmore Avenue (Kamehameha Highway to NCS), and the west side of Rose Street (California Ave to Wahiawa Middle School) and the outside curve along Ihiihi Avenue (Whitmore Avenue to Helemano Elementary School). Each of these facilities are proposed for implementation through the widening of sidewalks within the existing right-of-way. In addition, shared roadway would be proposed on Uuku Street (Glen Avenue to California Avenue) to connect the shared use paths on the eastern end of Wahiawa.

802	New Bicycle and Pedestrian Bridge Connecting Wahiawa and Whitmore Village	$4,364,600

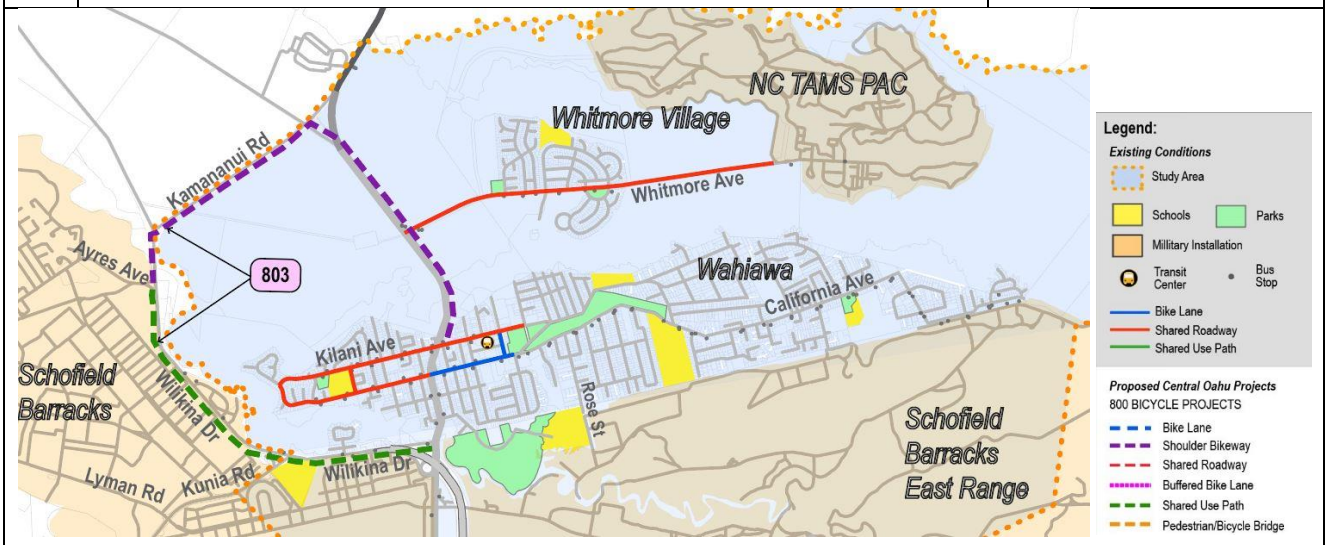


Construct new pedestrian-bicycle bridge that connects Whitmore Village to Wahiawa.

Purpose: To provide an alternative access for bicyclists and pedestrians by constructing a shared-use path bridge over the gulch connecting Wahiawa and Whitmore Village. A bike lane would also be installed along North Cane Street, from Kilani Ave to the bridge, connecting to existing facilities in Wahiawa town.

Project Description: Proposed project include the construction of a shared-use path bridge over the gulch north of North Cane Street connecting to Whitmore Avenue. In addition, a bike lane would be installed along North Cane Street, from Kilani Avenue to the bridge. The total extent of the project is 0.70 miles. The bridge is anticipated to be approximately 500-feet long and 12-feet wide.

803	New Bicycle and Pedestrian Connection between Wahiawa, Whitmore Village, and NCTAMS	$6,356,900

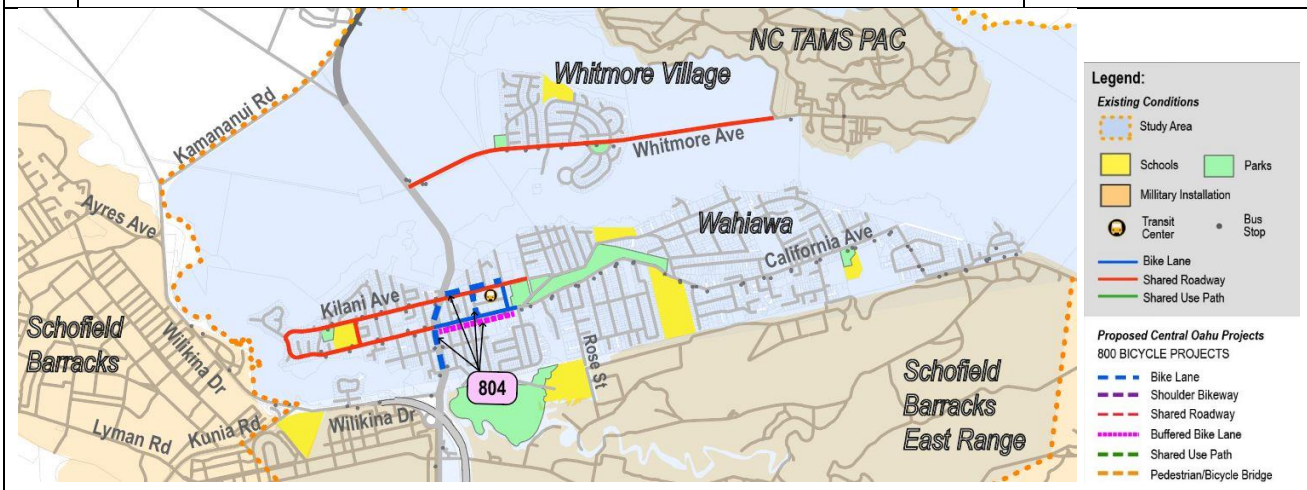


Widen sidewalks on Wilikina Drive; widen/pave shoulders on Kamehameha Hwy.

Purpose: To enhance bicycle travel and safety between Wahiawa, Whitmore Village and Schofield Barracks.

Project Description: This project includes the construction of 1.9 miles of 10-foot wide shared-use paths along Wilikina Drive, from Kamehameha Highway to Ayres Avenue, providing an off-street path from Schofield Barracks to Wahiawa town. In addition, the project includes 2.6 miles of shoulder bikeway along Wilikina Drive, Kamananui Road, and Kamehameha Avenue, providing a bicycle connection between communities.

804	New and Upgraded Bike Lanes in Wahiawa Commercial District	$893,000



Restripe and install bike lanes on both sides of the road.

Purpose: To provide upgraded dedicated bike facilities through the Wahiawa commercial district that separate bicycles from vehicles, enhancing bicycle travel and safety.

Project Description: This project would install bicycle lanes on Kamehameha Highway, between Avocado Street and Kilani Avenue, Kilani Avenue, between Kamehameha Highway and North Cane Street, and Lehua Street, between Kilani Avenue and California Avenue. The project would also widen existing bike lanes on California Avenue, between Kamehameha Highway and North Cane Street.

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APPENDIX B

Full List of Projects Considered

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Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
TRANSIT PROJECTS					
101.0	**GENERAL**				
101.1	Bus Service Expansion	Bus Service Expansion	Bus Service Expansion	Bus Service Expansion	*Short-term* Bus Service Expansion with Increased Frequency, New Routes, and Extension to Rail Stations
101.2	Construct Transit Centers	Build Transit Center at Koa Ridge	*No quantifiable benefits*	*Not included*	*Not recommended*
101.3	City Operations & Maintenance	City Operations and Maintenance, including Bus Stop/ Shelter Conditions	*No quantifiable benefits*	*Not included*	*Not recommended*
101.4	Human Services Transportation Coordination Program	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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*	*N/A*	*Not recommended*
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	*Not included*	*Not recommended*
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	Bus Rapid Transit between Wahiawa and Pearl Highlands Rail Station	*Mid-term* Bus Rapid Transit from Mililani Transit Center to Waiawa Rail Station at Pearl Highlands via Kamehameha Highway

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
102.4	Flyer Stops between Wahiawa and H-1	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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 Blvd	Park and Ride with Flyer Stop in median mauka of Ka Uka Blvd	Park and Ride with Express Bus to Pearl Highlands in the H-2 median mauka of Ka Uka Blvd	*Mid-term* Park & Ride with Express Bus to Waiawa Rail Station at Pearl Highlands
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	*Not included*	*Not recommended*
102.7	Aerial Gondola between Waipio & Wahiawa	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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	Aerial Gondola between Mililani Transit Center and Leeward Community College	*Not recommended*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
BICYCLE PROJECTS					
201.0	**BICYCLE PATHS (Off-St bicycle facility)**				
201.1	New Pathway between Paiwa St and Kamehameha Hwy	New Pathway on Waipahu St between Paiwa St and Kamehameha Hwy	New Pathway on Waipahu St between Paiwa St and Kamehameha Hwy	New Pathway on Waipahu St between Paiwa St and Kamehameha Hwy	*Short-term* Included in Package A – New Pathways and Route from Mililani to Waipahu with the following bicycle projects: • 201.2 • 201.4 • 201.5 • 203.5
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	New Pathway between Anania Dr and Central Oahu Regional Park	*Short-term* Included in Package A – New Pathways and Route from Mililani to Waipahu with the following bicycle projects: • 201.1 • 201.4 • 201.5 • 203.5
201.3	New Direct Kipapa Gulch Bike Bridge and Pathway	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
201.4	New Bike Pathway along Kamehameha Hwy	New Bike Pathway along Kamehameha Hwy from Ka Uka Blvd to Waipahu St	New Bike Pathway along Kamehameha Hwy from Ka Uka Blvd to Waipahu St	New Bike Pathway along Kamehameha Hwy from Ka Uka Blvd to Waipahu St	*Short-term* Included in Package A – New Pathways and Route from Mililani to Waipahu with the following bicycle projects: • 201.1 • 201.2

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
					• 201.5 • 203.5
201.5	New Ped/Bike Path connecting Kamehameha Hwy at Waipahu St to PH station via LCC	New Ped/Bike Path connecting Kamehameha Hwy at Waipahu St to LCC Station	New Ped/Bike Path connecting Kamehameha Hwy at Waipahu St to Leeward Community College Rail Station	New Pathway connecting Kamehameha Hwy at Waipahu St to Leeward Community College Rail Station	*Short-term* Included in Package A – New Pathways and Route from Mililani to Waipahu with the following bicycle projects: • 201.1 • 201.2 • 201.4 • 203.5
201.6	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	New Bike Pathway along Kamehameha Hwy. between Wahiawa and Anania Dr	*Mid-term* Included in Package D – New Pathways from Wahiawa to Waiawa Rail Station at Pearl Highlands with project 201.7
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	Bike Pathway on Cane Haul Road between H-2 and Pearl Highlands Rail Station	*Mid-term* Included in Package D – New Pathways from Wahiawa to Waiawa Rail Station at Pearl Highlands with project 201.6
201.8	Bicycle infrastructure around H-2 & Meheula	Bicycle pathway infrastructure through the H-2/Meheula Pkwy Interchange	Bicycle pathway infrastructure through the H-2/Meheula Pkwy Interchange	Bicycle pathway on Meheula Pkwy between Ainamakua Dr and Lanikuhana Ave	*Mid-term* Included in Package B – New Pathway, Lanes, and Route through Meheula Parkway with the following bicycle projects: • 202.3 • 202.4 • 203.6

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
Project Number	**Deliverable D and Deliverable E-1 Project Description**	**Deliverable F Project Description**	**Deliverable G Project Description**	**Deliverable H-1 Project Description**	**Deliverable H-2 Final Recommendation**
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*	*N/A*	*Not recommended*
201.10	Bike Pathway in Central Oahu Regional Park between Kamehameha Hwy and Paiwa St	Bike Pathway in Central Oahu Regional Park between Kamehameha Hwy and Paiwa St	Bike Pathway in Central Oahu Regional Park between Kamehameha Hwy and Paiwa St	Bike Pathway in Central Oahu Regional Park between Kamehameha Hwy and Paiwa St	*Short-term* Included in Package C – New Pathway and Lanes through Paiwa/Central Oahu Regional Park with project 202.8
202.0	**BICYCLE LANES (On-St 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*	*N/A*	*Not recommended*
202.2	Meheula Pkwy between Mililani H-2 Interchange and Mililani H-2 Interchange	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
202.3	Meheula Pkwy between Mililani H-2 Interchange and Kapanoe St	Bicycle lanes on Meheula Pkwy between Mililani H-2 Interchange and Kapanoe St	Bicycle lanes on Meheula Pkwy between Mililani H-2 Interchange and Kapanoe St	Bicycle lanes on Meheula Pkwy between Mililani H-2 Interchange and Kapanoe St	*Mid-term* Included in Package B – New Pathway, Lanes, and Route through Meheula Parkway with the following bicycle projects: • 201.8 • 202.4 • 203.6

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
202.4	Kuahelani Ave between Hokuahiahi Park and Meheula Pkwy	Bicycle lanes on Kuahelani Ave between Hokuahiahi Park and Meheula Pkwy	Bicycle lanes on Kuahelani Ave between Hokuahiahi Park and Meheula Pkwy	Bicycle lanes on Kuahelani Ave between Hokuahiahi Park and Meheula Pkwy	*Mid-term* Included in Package B – New Pathway, Lanes, and Route through Meheula Parkway with the following bicycle projects: • 201.8 • 202.3 • 203.6
202.5	Kamehameha Hwy between H-1 and H-2	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
202.6	Waihona St and Kamehameha Hwy between Cane Haul Road bike path and Arizona Memorial	Bicycle lanes on Kamehameha Hwy from Waihona St connecting to Pearl Harbor Bike Path	Bicycle lanes on Kamehameha Hwy from Waihona St. connecting to Pearl Harbor Bike Path	*N/A*	*Not recommended*
202.7	*Project Added in Deliverable F, Application of Performance Measures and Feasibility Assessment*	Bicycle lane on Kamehameha Hwy between Ka Uka Blvd and Lanikahuna Ave	Bicycle lane on Kamehameha HigHwy from Ka Uka Blvd to Lanikahuna Ave	*N/A*	*Not recommended*
202.8	*N/A*	*N/A*	*N/A*	Bicycle lanes on Paiwa St between H-1 and Waipahu St	*Short-term* Included in Package C – New Pathway and Lanes through Paiwa/Central Oahu Regional Park with project 201.10

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
203.0	**BICYCLE ROUTES (On-St bicycle facility with St 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	*Not included*	*Not recommended*
203.2	Kunia Rd btwen Anonui St and Wilikina Dr	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
203.3	Leilehua Golf Course Rd between Kamehameha Hwy and Wikao St	Bicycle route on Leilehua Golf Course Rd between Kamehameha Hwy and Wikao St	Bicycle route on Leilehua Golf Course Rd between Kamehameha Hwy and Wikao St	*Not included*	*Not recommended*
203.4	Kamehameha Hwy between Haleiwa Bypass and Kuahelani Ave	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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	Bicycle route on Anania Dr between Meheula Pkwy and Kipapa Gulch Path	*Short-term* Included in Package A – New Pathways and Route from Mililani to Waipahu with the following bicycle projects: • 201.1 • 201.2 • 201.4 • 201.5

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
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	Bicycle route on Lanikuhana Ave from South end of Meheula Pkwy to Mililani Town Center	*Mid-term* Included in Package B – New Pathway, Lanes, and Route through Meheula Parkway with the following bicycle projects: • 201.8 • 202.3 • 202.4
203.7	Kamehameha Hwy between Waipio Uka St and Waipahu St	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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	*Not included*	*Not recommended*
PEDESTRIAN PROEJCTS					
301.0	**LOCATION-SPECIFIC**				
301.1	Crosswalk across Kamehameha Hwy between Avocado St and Kilani St	Crosswalk across makai leg of Kamehameha Hwy and Avocado St intersection	Crosswalk across makai leg of Kamehameha Hwy and Avocado St intersection	*Not included*	*Not recommended*
301.2	Shared use path on Kamehameha Hwy between Lanikuhana Ave and Meheula Pkwy	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
302.0	**GENERAL**				
302.1	Safe Routes to School	Safe Routes to School	*No quantifiable benefits*	*N/A*	*Not recommended*
302.2	Pedestrian Crossing Safety	Pedestrian Crossing Safety	*No quantifiable benefits*	*N/A*	*Not recommended*
302.3	Mobility Hubs	Mobility Hubs	*No quantifiable benefits*	*N/A*	*Not recommended*
303.0	**COMPLETE STREETS**				
303.1	California Ave between Kamehameha Hwy and Wahiawa District Park	California Ave between Kamehameha Hwy and Wahiawa District Park	California Ave between Kamehameha Hwy and Wahiawa District Park	*Not included*	*Not recommended*
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	*Not included*	*Not recommended*
303.3	Complete Sts modifications on priority roads	Complete Sts modifications on priority roads	*No quantifiable benefits*	*N/A*	*Not recommended*
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*	*Koa Ridge project*	*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*	*Koa Ridge project*	*Koa Ridge project*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
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*	*Koa Ridge project*	*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*	*Koa Ridge project*	*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*	*Koa Ridge project*	*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*	*Koa Ridge project*	*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*	*Koa Ridge project*	*Koa Ridge project*
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*	*Koa Ridge project*	*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*	*N/A*	*Not recommended*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
402.0	**KA UKA BLVD**				
402.1	Ka Uka Blvd between Moaniani St and Commercial Drway/ Spine Rd (lane addition)	Ka Uka Blvd between Moaniani St and Commercial Drway/ Spine Rd (lane addition)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*
402.2	Ka Uka Blvd Intersection with Commercial Drway/ Spine Rd (intersection lane & signal modification)	Ka Uka Blvd Intersection with Commercial Drway/ Spine Rd (intersection lane & signal modification)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*
402.3	Ka Uka Blvd Intersection with Commercial Drway/Spine Rd (intersection widening & modification)	Ka Uka Blvd Intersection with Commercial Drway/Spine Rd (intersection widening & modification)	*Koa Ridge project*	*Koa Ridge project*	*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*	*Koa Ridge project*	*Koa Ridge project*
403.0	**KAMEHAMEHA HWY**				
403.1	Kamehameha Hwy & Lumiaina St Intersection (intersection widening & signal modification)	Kamehameha Hwy & Lumiaina St Intersection (intersection widening & signal modification)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*
403.2	Kamehameha Hwy & Waipahu St Intersection (intersection restriping & signal modification)	Kamehameha Hwy & Waipahu St Intersection (intersection restriping & signal modification)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*

403.3	Kamehameha Hwy & Ka Uka Blvd Intersection (intersection widening)	Kamehameha Hwy & Ka Uka Blvd Intersection (intersection widening)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*
403.4	Kamehameha Hwy between Ka Uka Blvd and North of Ka Uka Blvd. (add NB lane)	Kamehameha Hwy between Ka Uka Blvd and North of Ka Uka Blvd. (add NB lane)	*Koa Ridge project*	*Koa Ridge project*	*Koa Ridge project*
403.5	Kamehameha Hwy between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	Kamehameha Hwy between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	Kamehameha Hwy between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	Kamehameha Hwy between Ka Uka Blvd and Lanikuhana (widen from 3 to 4 lanes)	*Mid-term* Widen Kamehameha Hwy between Ka Uka Blvd and Lanikuhana Ave
403.6	Kamehameha Hwy between H-2 and Kilani Ave (unknown)	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
403.7	Kamehameha Hwy Roosevelt Bridge (rehabilitation)	Kamehameha Hwy Roosevelt Bridge (rehabilitation)	*Unable to assess benefits for structural improvement project*	*N/A*	*Not recommended*
403.8	Kamehameha Hwy HOV lanes (Ka Uka Blvd to Farrington Hwy)	Kamehameha Hwy HOV lanes (Ka Uka Blvd to Farrington Hwy)	Kamehameha Hwy HOV lanes (Ka Uka Blvd to Farrington Hwy)	Kamehameha Hwy HOV lanes (Ka Uka Blvd to Farrington Hwy)	*Not recommended*
404.0	**H-2 INTERCHANGES**				
404.1	H-2 & Pineapple Road Interchange	H-2 & Pineapple Road Interchange	*Koa Ridge project*	*Koa Ridge project*	*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)	H-2 & Meheula Pkwy (widen on-ramp)	*Not recommended*
404.3	H-2 & Kamehameha Hwy (widen on-ramp)	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
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	*Not included*	*Not recommended*
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	New Road between Mililani Mauka and Pearl City	*Not recommended*
406.2	New Road between Whitmore Ave (SR 804) and California Ave	*Deleted because outside of Study Area*	*N/A*	*N/A*	*Not recommended*
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	*Not included*	*Not recommended*
407.0	**PAIWA EXTENSION**				
407.1	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	*Initially screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum. Due to community support, this project returned starting with Deliverable H-1.*	*N/A*	Extend Paiwa St from north of Lumiauau St to Kamehameha Hwy/Ka Uka Blvd intersection	*Not recommended*
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	*Not included*	*Not recommended*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
408.2	New road from Wikao St to P & R	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
408.3	New road between H-2 and P & R	*Screened out in Deliverable E-1, Project Evaluation and Preliminary Ranking Memorandum*	*N/A*	*N/A*	*Not recommended*
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	Mililani access at H-2 and Meheula Pkwy, new bus stops	*Short-term* Mililani Access at H-2 and Meheula Parkway with bus stops
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*	*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*
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*	*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*
501.3	Emergency ride home program	Emergency ride home program	*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 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*	*N/A*	*N/A*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
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*	*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*
501.6	Carsharing	Emerging and innovative strategies – Carsharing	*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 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*	*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*
501.8	Vanpool program	Vanpool program	*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 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*	*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*
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*	*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*

Project Number	Deliverable D and Deliverable E-1 Project Description	Deliverable F Project Description	Deliverable G Project Description	Deliverable H-1 Project Description	Deliverable H-2 Final Recommendation
501.1 thru 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	TDM Package	*Short-term* Transportation Demand Management (TDM)
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.)	ITS (Real-time traffic info, dynamic signage, adaptive signals, etc.)	*Short-term* Intelligent Transportation Systems (ITS)
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*	*N/A*	*Not recommended*
601.2	HOT lanes	HOT lanes	HOT lanes	*Not included*	*Not recommended*
601.3	Parking strategies	Parking strategies	*No quantifiable benefits*	*N/A*	*Not recommended*

APPENDIX B
Project Tracking of Projects in the Wahiawa/Whitmore Village Study Area

Number	Deliverable W-2 Project Description	Deliverable W-3 Project Description	Deliverable W-4 Project Description	Deliverable H-2 Final Recommendation
700 TRANSIT PROJECTS				
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	*Short-term* Increase bus service to/from Whitmore Village and Wahiawa Transit Center
702	Increase bus service to/from Schofield and Wahiawa	Increase bus service to/from Schofield and Wahiawa	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*
703	Expanded Late Night Service, Routes 51/52	Expanded Late Night Service, Routes 51/52	Expanded Late Night Service, Routes 51/52	*Short-term* Expanded Late Night Service Bus Routes 51/52
704	Bus Rapid Transit to Pearl Highlands Rail Station	Bus Rapid Transit to Pearl Highlands Rail Station	Bus Rapid Transit to Pearl Highlands Rail Station	*Mid-term* Bus Rapid Transit from Wahiawā Transit Center to Armory Park & Ride and Waiawa Rail Station at Pearl Highlands via H-2
705	Align Express Route 83 on proposed Leilehua High School-Kahelu Road Connection	Align Express Route 83 on proposed Leilehua High School-Kahelu Road Connection	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*
800 BICYCLE AND PEDESTRIAN PROJECTS				
801	New off-street bicycle and pedestrian paths connecting to schools and parks: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	New off-street bicycle and pedestrian paths connecting to schools and parks: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	New off-street bicycle and pedestrian paths connecting to schools and parks: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	*Short-term* New Off Street Bicycle and Pedestrian Connections to Schools, Parks, and Transit
802	New pedestrian/bicycle bridge connecting Wahiawa and Whitmore Village	New pedestrian/bicycle bridge connecting Wahiawa and Whitmore Village	New pedestrian/bicycle bridge connecting Wahiawa and Whitmore Village	*Mid-term* New bicycle and pedestrian bridge connecting Wahiawa and Whitmore Village

Number	Deliverable W-2 Project Description	Deliverable W-3 Project Description	Deliverable W-4 Project Description	Deliverable H-2 Final Recommendation
803	New bike and pedestrian connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway	New bike and pedestrian connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway	New bike and pedestrian connection between Wahiawa, Whitmore Village, and NCTAMS: • Wilikina Drive • Kamehameha Highway	*Mid-term* New bicycle and pedestrian connection between Wahiawa, Whitmore Village, and NCTAMS
804	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	*Mid-term* New and upgraded bike lanes in Wahiawa Commercial District
900 ROADWAY AND TRAFFIC OPERATIONS PROJECTS				
901	Whitmore Avenue widening from end of Saipan Drive to east of Ihiihi-Nani Ihi	Whitmore Avenue widening from end of Saipan Drive to east of Ihiihi-Nani Ihi	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*
902	Kamehameha Highway widening from north of Whitmore Avenue to Kilani Avenue	Kamehameha Highway widening from north of Whitmore Avenue to Kilani Avenue	Kamehameha Highway widening from north of Whitmore Avenue to Kilani Avenue	*Mid-term* Kamehameha Highway Widening from north of Whitmore Avenue to Kilani Avenue
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	*Short-term* California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park
904	Muliwai Avenue extension between Neal Avenue and Higgins Road	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*
905	Leilehua High School-East Range Road connection between California Avenue and Higgins Road	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*
906	New roadway at Leilehua High School-Kahelu Road connection between California Avenue and Higgins Road	New roadway at Leilehua High School-Kahelu Road connection between California Avenue and Higgins Road	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*

Number	Deliverable W-2 Project Description	Deliverable W-3 Project Description	Deliverable W-4 Project Description	Deliverable H-2 Final Recommendation
907	Whitmore Avenue-Wahiawa Civic Center connection between Whitmore Avenue (opposite Saipan Drive) to Kilani Avenue (via Cane Street)	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*
908	Kamehameha Highway/California Avenue intersection modification (Blue Zone Project)	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Kamehameha Highway at Whitmore Avenue Intersection Improvements	*Short-term* Kamehameha Highway at Whitmore Avenue Intersection Improvements
910	Roundabout at Kamehameha Highway and California Avenue	Roundabout at Kamehameha Highway and California Avenue	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	*Short-term* Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	*Short-term* California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing
913	Two-way left turn on Kamehameha Highway between Kilani Avenue and Avocado Street	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*
914	Restrict mid-block left-turn movements on Kamehameha Highway from Kilani Avenue to Avocado Street	*Screened out in Deliverable W-2, Project Description and Evaluation of Potential Projects in the Wahiawa/Whitmore Village Area of the COTS*	*N/A*	*Not Recommended*

APPENDIX B

Project Tracking of Projects in the Wahiawa/Whitmore Village Study Area

Number	Deliverable W-2 Project Description	Deliverable W-3 Project Description	Deliverable W-4 Project Description	Deliverable H-2 Final Recommendation
915	Transit Signal Priority on Kamehameha Highway between Kilani Avenue and Avocado Street	Transit Signal Priority on Kamehameha Highway between Kilani Avenue and Avocado Street	*Screened out in Deliverable W-3, Benefit Cost Analysis in the Wahiawa/Whitmore Village Area of the COTS*	*Not Recommended*

APPENDIX C

Survey Forms used to gather Community Input

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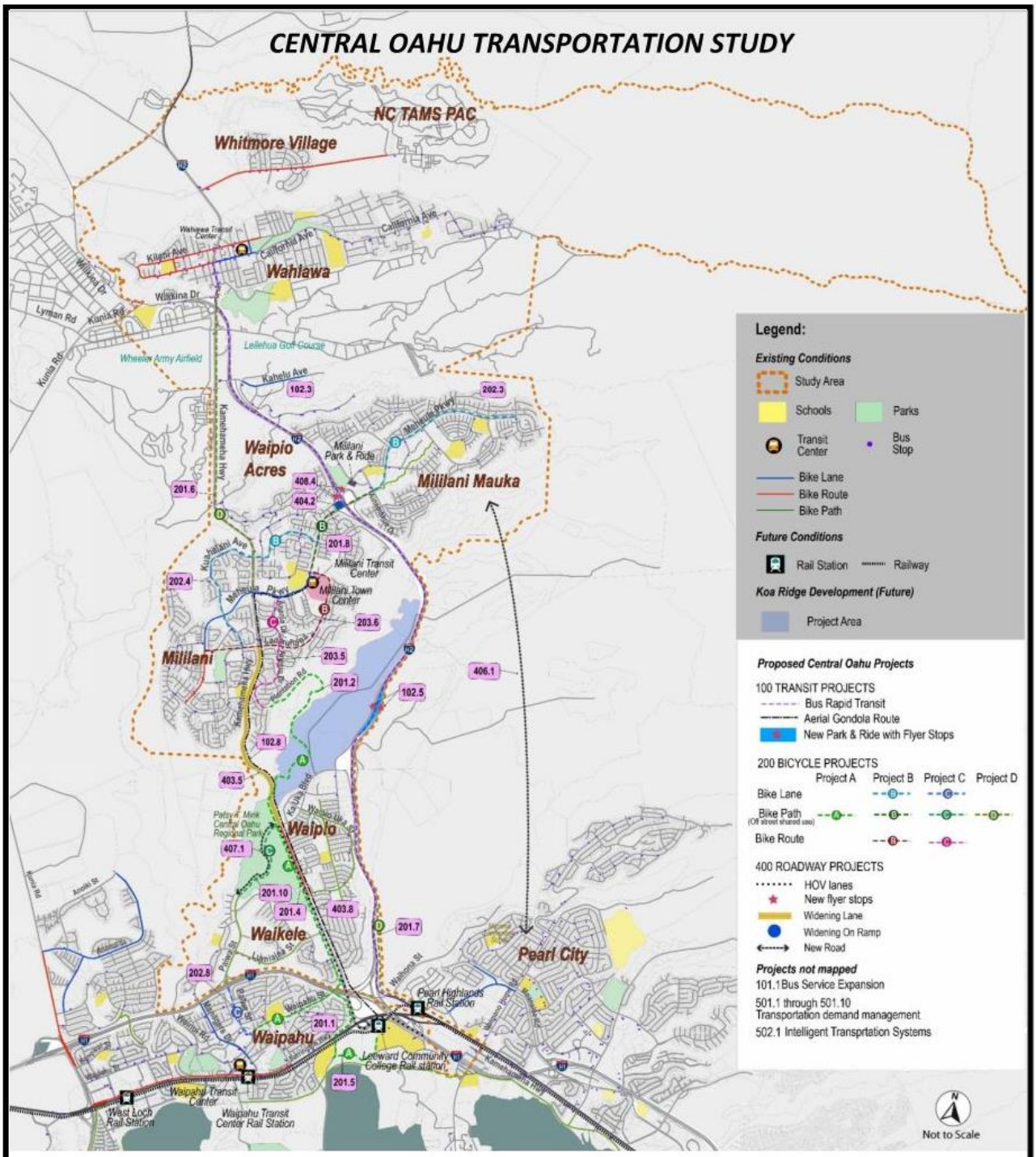
MILILANI SURVEY



What is the COTS study?

The Central Oahu Transportation Study (COTS) serves to identify, compare, and set priorities for an effective set of strategies and system improvements for Central Oahu.

Who is sponsoring this study?

The Oahu Metropolitan Planning Organization or OahuMPO is the project sponsor. OahuMPO is a government agency that plans and funds island-wide transportation on Oahu in coordination with state and local government agencies.

During community meetings on this study, the public identified three transportation goals for the study:

1) Reduce congestion
2) Ease of access to the HART rail system
3) Improve bicycle and pedestrian options for travel

TRANSIT PROJECTS: The first three are improvements for the existing bus service. The fourth introduces, something new, a five-mile gondola with direct service into the rail station.

INSTRUCTIONS: Provide your reaction to each transit project by circling Positive (+), Neutral (0) or Negative (-) in the last column for each project.

Project No.	Project Name	Description	Cost Estimate	Goal(s) Addressed	Your Reaction To This Project		
101.1	Bus Service Expansion	Cost estimate includes ten electric buses and ten replacement buses. Larger buses and more frequent service on all routes. Two new routes connecting to rail stations during peak.	$24.5M	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
102.3	Bus Rapid transit (BRT) with dedicated lanes	Wahiawa to Pearl Highlands Rail Station	$32M	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
102.5	Park & Ride with Express Bus to Pearl Highlands	Park & Ride in median of H-2 where people can board express bus	Phase 1 $37.5M	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
102.8	Aerial Gondola	Mililani Town Center to Leeward Community College Rail Station	$216M	Traffic Congestion, Access to Rail, Multi-modal	+	0	-

ROADWAY PROJECTS: Five of these make changes to existing roads, such as H-2 and Kamehameha Highway. One new road is listed and one extension of an existing road. Two projects affect how the roads are used through ride sharing or better information.

INSTRUCTIONS: Provide your reaction to each roadway project by circling Positive (+), Neutral (0) or Negative (-) in the last column for each project.

Project No.	Project Name	Description	Construction Cost Estimate	Goal(s) Addressed	Your Reaction To This Project		
403.5	Widen Kamehameha Hwy.	Three to four lanes Ka Uka Blvd. to Lanikuhana Ave.	$38M	Traffic Congestion	+	0	-
403.8	High occupancy vehicle (HOV) lane on Kamehameha Hwy.	Add lanes for HOV Ka Uka Blvd. to Farrington Hwy.	$25M	Traffic Congestion, Multi-modal	+	0	-
404.2	Widen On-Ramp	H-2 at Meheula Pky.	$8M	Traffic Congestion	+	0	-
406.1	New Road	Mililani to Pearl City	$57M	Traffic Congestion	+	0	-
407.1	Extend Paiwa St.	Lumiauau St. to Kamehameha Hwy. at Ka Uka Blvd.	$10.5M	Traffic Congestion	+	0	-
408.4	Mililani access and at H-2 and Meheula Pky. new bus stops	Express bus access pedestrian/bicycle pathway and new bridge from Mauka Park & Ride	$7M	Traffic Congestion, Access to rail Multi-modal	+	0	-
501.1	Transportation Demand Management (TDM)	Carpools, Vanpools, telework, etc.	N/A	Traffic Congestion, Access to rail, Multi-modal	+	0	-
502.1	Intelligent Transportation Systems (ITS)	Electronic signs, and web information	$8M	Traffic Congestion, Access to rail, Multi-modal	+	0	-

BICYCLE AND PEDESTRIAN PACKAGES:

The bicycle and pedestrian projects were packaged to create networks:

- Pathway is a paved surface separated from the roadway.
- Painted lane on the roadway for bicycles.
- Route is a shared roadway where vehicles and bicycles share the paved surface.

INSTRUCTIONS: Provide your reaction to each bicycle and pedestrian package by circling Positive (+), Neutral (0) or Negative (-) in the last column for each project.

Project Number and Name	Package Name	Description	Construc-tion Cost Estimate	Goal(s) Addressed	Your Reaction To this set of Projects		
201.1 New Pathway 201.2 New Pathway 201.4 New Pathway on Kamehameha Hwy. 201.5 New Pathway on Kamehameha Hwy. 203.5 Bike Route	A Mililani To Waipahu	Waipahu St. Paiwa to Kamehameha Hwy. ($3M) Anania Dr. to Central Oahu Park ($6M) From Ka Uka Blvd.to Waipahu St. ($5M) From Waipahu St. to Anania Dr. ($3M) Anania Dr. from Meheula Pky. to Kipapa Gulch Path ($0.1343)	$17.5M	Access to Rail, Multi-modal	+	0	-
201.8 Bike Pathway on Meheula Pky. 202.3 Bike Lanes on Meheula Pky. 202.4 Bike Lanes on Kuahelani Ave. 203.6 Bike Route on Lanikuhana Ave.	B Meheula Parkway	Ainamakua Dr. to Lanikuhana Ave. ($3M) H-1 Interchange to Kapanoe St. ($4M) From Hokuhiahi Park to Meheula Pky. ($2.5M) South end of Meheula Pky. to Mililani Town Center ($0.146M)	$9.5M	Multi-modal	+	0	-
201.10 Bike Pathway 202.8 Bike Lanes	C Paiwa/ Central Oahu Park	Central Oahu Park ($2M) Paiwa St. H-1 to Waipahu St. ($3.3M)	$5.5M	Access to Rail, Multi-modal	+	0	-
201.6 New Pathway Kamehameha Hwy. 201.7 New Path	D New Pathway	Wahiawa to Anania Dr. ($12M) Cane Haul Rd. H-2 to Pearl Highlands Rail Station ($4M)	$16M	Access to Rail, Multi-modal	+	0	-

INTRUCTIONS: Due to limited funds, please assign $80 Million to your top project(s).

Project	Cost as Shown
	$
	$
	$
	$
	$
YOUR TOTAL	**$**

Of all the projects listed in the previous two pages, what would be your top project in each category?

Transit	
Roadway	
Bicycle & Pedestrian	

Do you have any comments or thoughts to share?

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How to Get Involved:

- Online:
  - More information and list of community events: www.oahumpo.org/CentralOahu
  - Online Survey: booked in an online form link
- In Person:
  - Attend a community event and talk story with us
  - Talk story with your ohana and neighbors to get them involved

Keep me informed:

Name:_____

Email: _____

Mailing Address:_____

Please submit your completed booklet to OahuMPO before or by May 31, 2019, at community event or via email, mail, or fax:

Email: OahuMPO@OahuMPO.org
Mail: 707 Richards Street, Suite 200, Honolulu, Hawai'i, 96813
Fax: (808) 587-2018
Website: www.oahumpo.org

OahuMPO

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707 Richards Street, Suite 200
Honolulu, Hawaii 96813

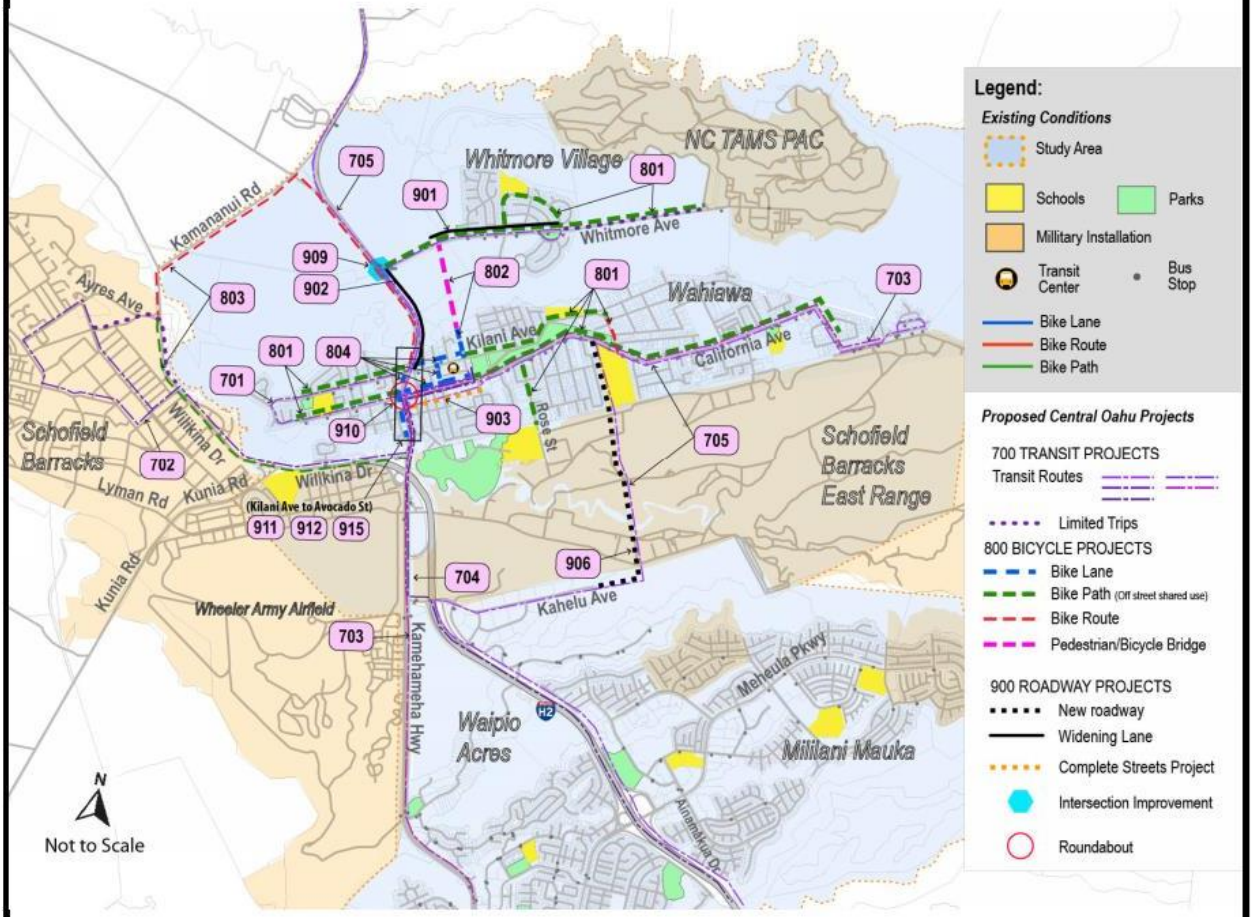
CENTRAL OAHU TRANSPORTATION STUDY – WAHIAWA/WHITMORE VILLAGE

What is the COTS study?

The Central Oahu Transportation Study (COTS) serves to identify, compare, and set priorities for an effective set of strategies and system improvements for Central Oahu. This form focuses on projects in the upper region, north of California Avenue including Whitmore Village.

Who is sponsoring this study?

The Oahu Metropolitan Planning Organization (OahuMPO) is the project sponsor. OahuMPO is a government agency that plans and funds island-wide transportation on Oahu in coordination with state and local government agencies.



GOALS

During community meetings on this study, the public identified three transportation goals for the study:

1) Reduce congestion
2) Ease of access to the HART rail system
3) Improve bicycle and pedestrian options for travel

INSTRUCTIONS: Provide your reaction to transit projects by circling Positive (+), Neutral (0) or Negative (-) in the last column.

Number	Project	Description	Goal(s) Addressed	Your Reaction To This Project		
701	Increase bus service to/from Whitmore Village and Wahiawa Transit Center	30-minute peak service to Wahiawa Transit Center. Add evening service.	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
702	Increase bus service to/from Schofield and Wahiawa	30-minute peak service to Schofield. Add evening service.	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
703	Expanded Late Night Service, Routes 51/52	Provides 24-hour service by adding three early morning trips. The early morning trips would continue to Haleiwa.	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
704	Bus Rapid Transit to Pearl Highlands Rail Station	Direct service from Armory Park & Ride to Pearl Highlands Rail Station.	Traffic Congestion, Access to Rail, Multi-modal	+	0	-
705	Align Express Route 83 on proposed Leilehua High School-Kahelu Road Connection	Add express bus service to proposed new road (project number 906).	Traffic Congestion, Multi-modal	+	0	-

BICYCLE AND PEDESTRIAN PROJECTS:

- Pathway is a paved surface separated from the roadway.
- Bike lane is a painted lane on the roadway for bicycles.
- Route is a shared roadway where vehicles and bicycles share the paved surface.

INSTRUCTIONS: Provide your reaction to each bicycle and pedestrian package by circling Positive (+), Neutral (0) or Negative (-) in the last column for each project.

Number	Project	Description	Goal(s) Addressed	Your Reaction To This Project		
801	New off-street bicycle and pedestrian paths connecting to schools and parks: • Kilani Avenue • Anoni Street • California Avenue • Rose Street • Whitmore Avenue • Ihiihi Avenue	Widen asphalt sidewalk where existing for shared use path for bicyclists and pedestrians. Where missing, construct or delineate space for path.	Multi-modal	+	0	-
802	New pedestrian and bicycle bridge connecting Wahiawa and Whitmore Village	Construct a new pedestrian/bicycle bridge that connects Wahiawa and Whitmore Village through North Cane Road.	Multi-modal	+	0	-
803	New bike and pedestrian connection between Wahiawa, Whitmore Village and NCTAMS: • Wilikina Drive • Kamehameha Highway	Widen existing sidewalk on east side of Wilikina Drive for a shared use path for bicyclists and pedestrians. Widen and pave shoulders on Kamehameha Highway and Kamananui Road.	Multi-modal	+	0	-
804	New and upgraded bike lanes in Wahiawa Commercial District: • Kamehameha Highway • California Avenue • Lehua Street	Restripe and install bike lanes on both sides of the road.	Multi-modal	+	0	-

INSTRUCTIONS: Provide your reaction to each roadway project by circling Positive (+), Neutral (0) or Negative (-) in the last column for each project.

Number	Project	Description	Goal(s) Addressed	Your Reaction To This Project		
901	Whitmore Avenue widening from end of Saipan Drive to east of Ihiihi-Nani Ihi	Widen to accommodate new center two-way left turn lane and pedestrian safety improvements.	Traffic Congestion, Multi-modal	+	0	-
902	Kamehameha Highway widening from north of Whitmore Avenue to Kilani Avenue	Widen highway and bridge from two to four lanes. This project may be combined with project number 909.	Traffic Congestion, Multi-modal	+	0	-
903	California Avenue Complete Streets Project from Kamehameha Highway to Wahiawa District Park	Install safety improvements, including dedicated bicycle facilities, widened sidewalks, and expanded on-street parking.	Multi-modal	+	0	-
906	New roadway at Leilehua High School-Kahelu Road connection between California Avenue and Higgins Road	Construct new two-lane roadway.	Traffic Congestion	+	0	-
909	Kamehameha Highway at Whitmore Avenue Intersection Improvements	Widen roadway to accommodate dual westbound turns. This project may be combined with project number 902.	Traffic Congestion	+	0	-
910	Roundabout at Kamehameha Highway and California Avenue	Construct a two-lane roundabout to replace existing traffic signal. Create gateway feature.	Traffic Congestion	+	0	-
911	Kamehameha Highway between Kilani Avenue and Avocado Street Traffic Signal Timing	Re-time traffic signals.	Traffic Congestion	+	0	-
912	California Avenue between Kamehameha Highway and Wahiawa District Park Traffic Signal Timing	Re-time traffic signals.	Traffic Congestion	+	0	-
915	Transit Signal Priority on Kamehameha Highway between Kilani Avenue and Avocado Street	Add transit signal bus prioritization on Kamehameha Highway.	Traffic Congestion, Multi-modal	+	0	-

Of all the projects listed in the previous two pages, what would be your top project in each category?

Transit	
Bicycle & Pedestrian	
Roadway	

Do you have any comments or thoughts to share?

_____

_____

_____

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How to Get Involved:

- Online:
  - More information: www.oahumpo.org/CentralOahu
- In Person:
  - Talk story with your ʻohana and neighbors to get them involved.

Keep me informed:

Name:_____

Email: _____

Mailing Address:_____

Please submit your completed booklet to OahuMPO before or by July 10, 2019, via email, mail, or fax:

Email: OahuMPO@OahuMPO.org
Mail: 707 Richards Street, Suite 200, Honolulu, Hawaiʻi, 96813
Fax: (808) 587-2018
Website: www.oahumpo.org

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APPENDIX D

CAC Permitted Action Group Perspective Statement

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Central Oahu Transportation Study Permitted Interaction Group

The Central Oahu Transportation Study Permitted Interaction Group (COTS-PIG) was formed to provide independent community stakeholder views of the critical transportation issues facing Central Oahu within the context of the Central Oahu Transportation Study.

Throughout the course of the Central Oahu Transportation Study, the COTS-PIG reviewed interim deliverables, conducted site visits of projects proposed in the study, and provided feedback to the consultant, SSFM.

The COTS-PIG's conclusions are separate and independent of the conclusions drawn by SSFM and reflect the priorities of the participating members of the COTS-PIG, primarily:

- The need to reduce the number of cars on the road through connectivity to the rail network and exploring cordon area pricing strategies in urban Honolulu to shift commuter behavior.
- The need to improve access and capacity in and out of Central Oahu by increasing the capacity of Kam Highway, adding a bike route through Kipapa Gulch, extending Paiwa road thru Central Oahu Regional Park, and making permanent the temporary road access to the Koa Ridge development from Kam Highway.

The COTS-PIG report can be found in Appendix D of the Central Oahu Transportation Study (2019).

Central Oahu Transportation Study Permitted Interaction Group Members

Dick Poirier, Chair NB#25 Mililani-Waipio-Melemanu	**Andrea Anixt** Kaʻaʻawa Community Association	**Steven Melendres** NB#35 Mililani Mauka-Launani Valley	**Elise Carmody** NB#25 Mililani-Waipiʻo-Melemanu
Joe Francher NB#26 Wahiawā	**Frank Genadio** NB#34 Makakilo-Kapolei Honokai Hale	**Tom Dinell** E Noa Corporation	**Larry Veray** NB#21 Pearl City
Karen Loomis NB#25 Mililani-Waipiʻo-Melemanu	**Michael Golojuch** Pālehua Townhouses	**Suwan Shen** American Planning Association	**Marilyn Lee** NB#25 Mililani-Waipiʻo-Melemanu
Jessie Weinburger NB#23 ʻEwa	**Ann Freed** NB#25 Mililani-Waipiʻo-Melemanu		

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A Community Perspective on Traveling to and from Central Oahu

Is inevitable gridlock avoidable?

Prepared by the

OahuMPO Central Oahu Transportation Study

Permitted Interaction Group

November 30, 2019

A Community Perspective on Traveling to and from Central Oahu
Is inevitable gridlock avoidable?

Problem Statement:

Increasing commuter travel times is the primary transportation concern of those traveling from Central and Leeward Oahu to and from downtown. On the supply side, this is a result of inadequate existing regional transportation infrastructure. Existing infrastructure cannot be expanded because of prohibitive costs, the unavailability of funding, or impediments to expansion such as the lack of available land or right-of-way. Other than rail, there are no major new transportation projects planned for the island of Oahu in the foreseeable future.

On the demand side, the cause of increasing travel times is the failure of the public planning process which thus far has approved all major development projects in the region. Such approvals have been without mitigation such as mandating concurrency conditions that would phase individual development build-out based upon the ability of the regional infrastructure to accommodate such development over time.

As a result, over 25,000 additional housing units are already approved for development but not yet built in the Central Oahu-Hoopili commuter shed and, when constructed, will result in travel time to and from Honolulu of from two and a half to as many as four hours each way. One way is only 17 miles for residents living in Mililani and working in downtown Honolulu.

The Central Oahu Transportation Study Permitted Interaction Group (COTS PIG) has concluded that the increasing likelihood of gridlock is perceived by the community as an existential threat to the continued well-being and quality of life of Central Oahu commuters and residents. The COTS PIG further asserts that the only known responses to the problem that are of appropriate scale is to reduce the number of cars on the road by 1) supporting the completion and utilization of rail, and by 2) using congestion pricing as a means to manage congestion and improve mobility on the island as discussed below, and improve access and capacity in and out of Central Oahu.

Major Goals:

I. <u>Goal: Reduce the number of cars on the road</u>

A. Objective: Ensure accessibility of Central Oahu residents to the Rail

Since the Rail does not extend to Central Oahu, it is essential that there be easy access for Central Oahu residents to the rail stations in the immediate vicinity, including Pearl Highlands.

1. Action: **Fund and construct supporting infrastructure and services to make it convenient for those driving and taking the bus to the rail stations**

For those who choose to drive their cars to the rail stations, it essential that: 1) there is a dedicated lane on H-2 that feeds directly into the station; 2) there be a feeder park & ride system of stations to service vehicular access to the Pearl Highland station; and 3) the parking garage is completed on time. For those who ride the bus to the rail stations, it is essential that: 1) there are frequent express busses between the various Central Oahu communities and the Rail stations in the area, including Pearl Highlands, Leeward Community College and Waipahu, and 2) there be a dedicated bus lane on H-2 that feeds directly to the Pearl Highlands station. Residents who commute to town need to have a convenient alternative to driving their cars. Having a dedicated lane to the rail station, ample parking, and frequent bus service allows residents to avoid traffic gridlock and incentivizes their use of the Rail.

COTS Reference: Project 102.5, Project 101.1, and Project 102.3

B. Objective: Investigate the use of congestion road pricing using city of London model

Congestion road pricing is a key part of shifting residents from single occupancy vehicles to carpooling, transit use, and/or shifting the time/day residents choose to travel to Honolulu. Charging a fee to enter the Honolulu City Center will discourage non-essential vehicles on the road during peak hours, so that traffic flow is more efficient. This provides a more reliable trip time for everyone, including private vehicles, buses, emergency response vehicles, freight vehicles, and those who have no alternative to driving.

1. Action: Study the feasibility of cordon pricing for the urban core of Honolulu

The feasibility of congestion road pricing for Honolulu can be funded and studied through the OahuMPO's Overall Work Program and looked at as a congestion

management strategy through the congestion management process in the Oahu Regional Transportation Plan.

COTS Reference: Project 501.1

II. Goal: Improve Access and Capacity in and out of Central Oahu

A. Objective: Improve roadway access and capacity in/out of Central Oahu

1. Action: Fund and construct the extension of the existing road through the Central Oahu Regional Park to Paiwa Street

This is probably the only real low-cost/easily doable available option which will add much-needed regional capacity and connectivity. The road will mitigate anticipated increased congestion caused by the Koa Ridge development at the Ka Uka Boulevard/Kam Highway choke point by allowing access to H-1 East or West via Paiwa Street. Access would also be facilitated to the Waipahu Train Station which is a block or two from the opposite end of Paiwa Street. The road thru the park could be opened or closed as appropriate as well as contra flowed as necessary.

COTS Reference: Project 407.1

2. Action: Petition the Land-Use Commission to ensure that access from Kamehameha Hwy to Koa Ridge is permanent

The State Land Use Commission decision on Koa Ridge provided for a temporary access to Kamehameha Highway to the Koa Ridge Development. This access should be made permanent to mitigate the impact of the development on Ka Uka Blvd. Otherwise, traffic to the Koa Ridge development will create gridlock on Ka Uka Blvd. and make access to the businesses in the area nearly impossible. Allowing access from Kamehameha Hwy to Koa Ridge will make permanent the only entry point on the Waianae side of the development.

3. Action: Fund and construct the widening of Kamehameha Hwy between Ka Uka Boulevard and Lanikuhana Ave.

Increasing capacity on Kamehameha Hwy will provide access for Mililani and other Central Oahu residents that avoids H-2 and the merge from H-2 to H-1. It will also provide additional capacity for internal movements within the Central Oahu area. Providing four lanes from the Ka Uka Blvd, intersection to Lanikuhana Avenue would avoid bottlenecks and congestion that currently occurs where traffic is reduced to one lane in each direction over the bridge.

A related improvement would be to restore the passing lane in the northbound direction between the bridge and Lanikuhana Avenue. Loss of this lane capacity will be more serious when the Koa Ridge development opens.

COTS Reference: Project 403.5

B. Objective: Improve bicycle access in/out of Central Oahu

1. Action: Fund and construct a bicycle route through Kipapa Gulch connecting Anania Drive and Ka Uka Blvd.

Bicycle access in an out of Central Oahu is currently limited to a dangerous route via Kamehameha Highway over the Roosevelt Bridge. Though the widening of the bridge shoulder lane has improved the situation somewhat, a much safer and more viable alternative would be through the path at the end of Anania Drive down into the gulch and ending at Ka Uka Blvd. Creating this bicycle route would provide a new and safer access to all parts of Central Oahu and the rest of the island. Such a route would serve both commuters and recreational bicyclists.

COTS Reference: Project 201.2, part of Bicycle and Pedestrian Package A

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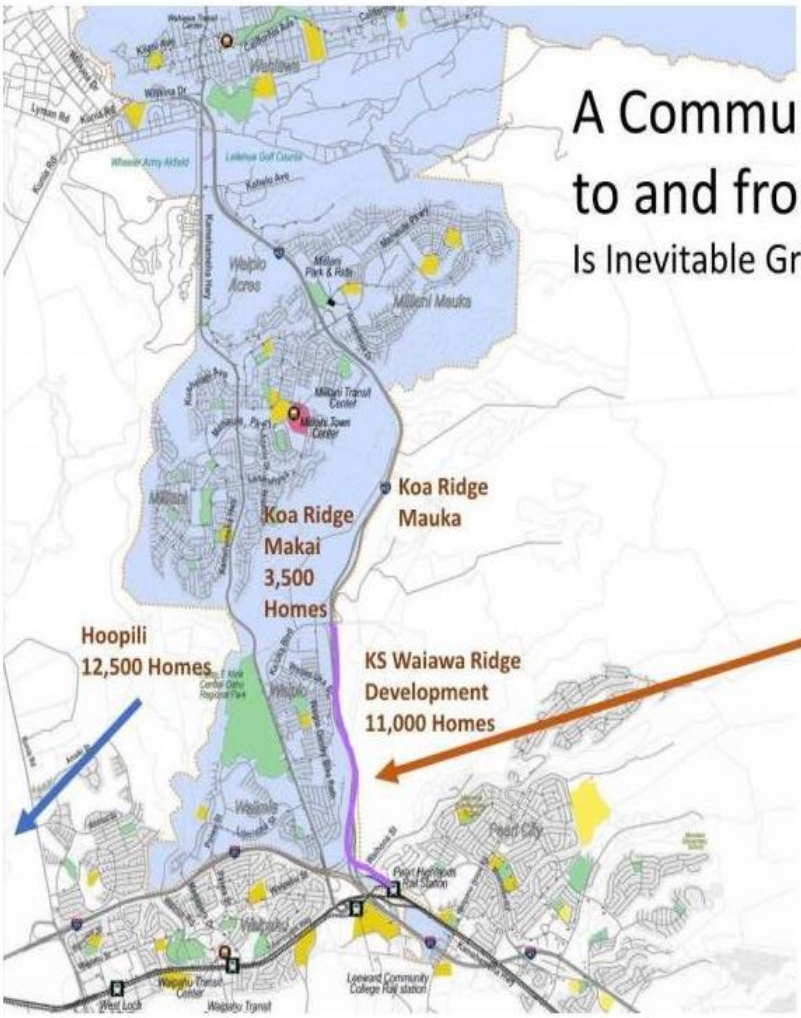


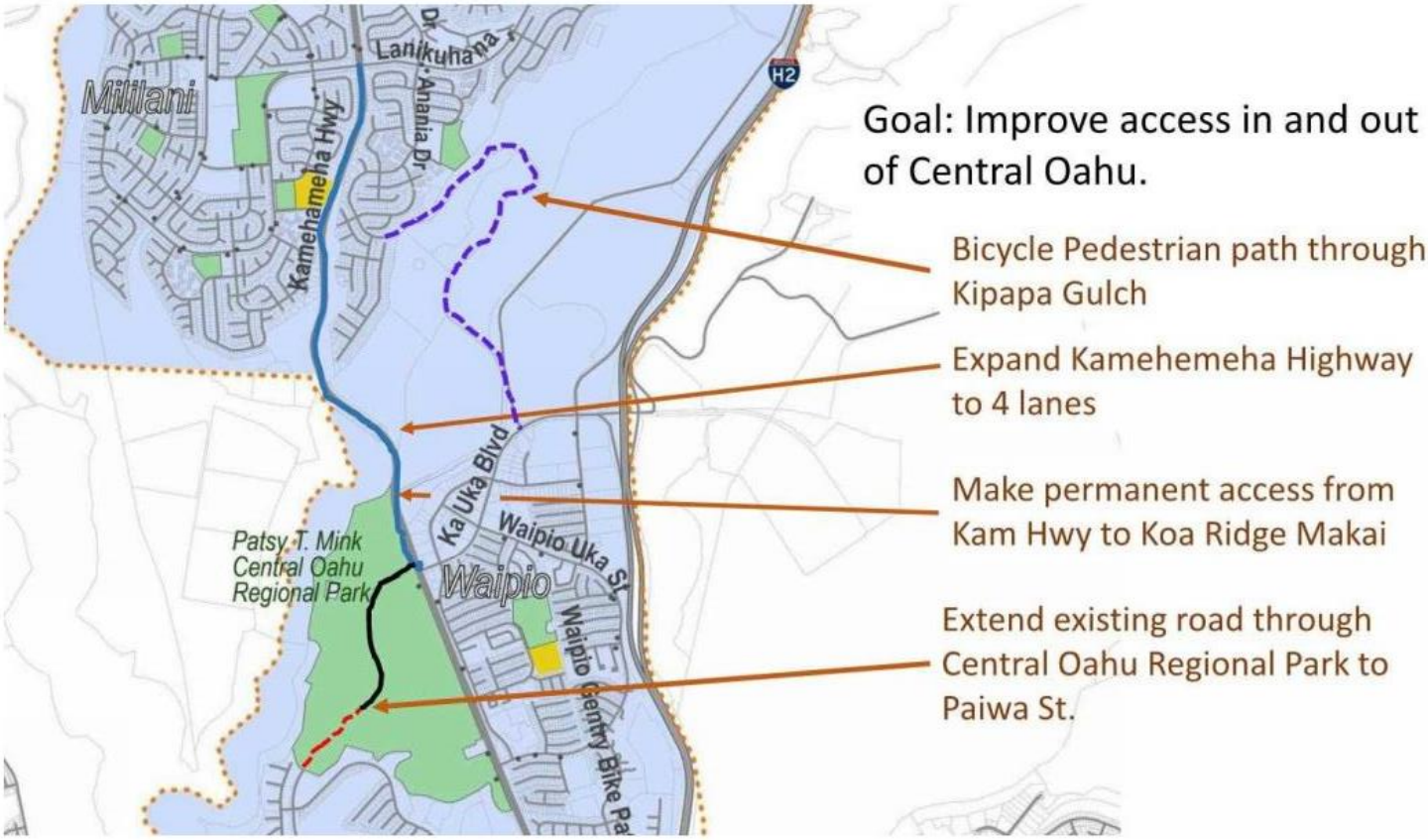
A Community Perspective on Traveling to and from Central Oahu

Is Inevitable Gridlock Avoidable?

Goal: Reduce the number of cars on the road.

Dedicated vehicle lane to Pearl Highlands Rail Station

Cordon Area Congestion Pricing for Downtown Honolulu using the city of London model.


Goal: Improve access in and out of Central Oahu.
Bicycle Pedestrian path through Kipapa Gulch
Expand Kamehemeha Highway to 4 lanes
Make permanent access from Kam Hwy to Koa Ridge Makai
Extend existing road through Central Oahu Regional Park to Paiwa St.
Mililani
Lanikuhana
Dr. Ahania Dr.
Kamehameha Hwy
H2
Ka Uka Blvd
Waipio Uka St.
Waipio
Waipio Gentry Bike Pa
Patsy T. Mink Central Oahu Regional Park