ORTP 2035 Technical Report – Appendices
Oahu Regional Transportation Plan 2035

Mobilizing Oahu | Fulfilling Our Legacy

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Prepared for the
Oahu Metropolitan Planning Organization

Prepared by
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A Travel Time Range Maps

Figure A-1: 2007 AM Peak Period Auto Travel Times to Downtown Honolulu

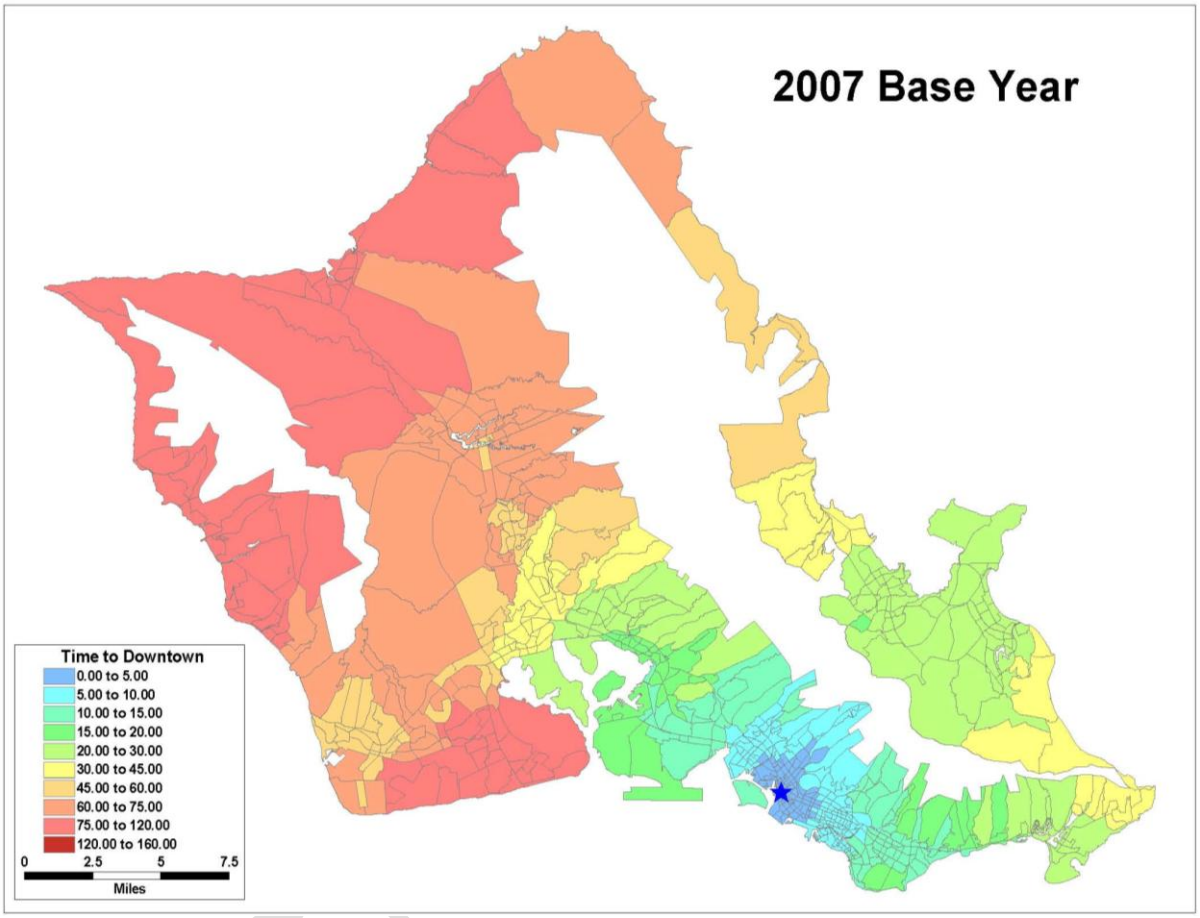

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Figure A-2: 2007 AM Peak Period Auto Travel Times to Kapolei

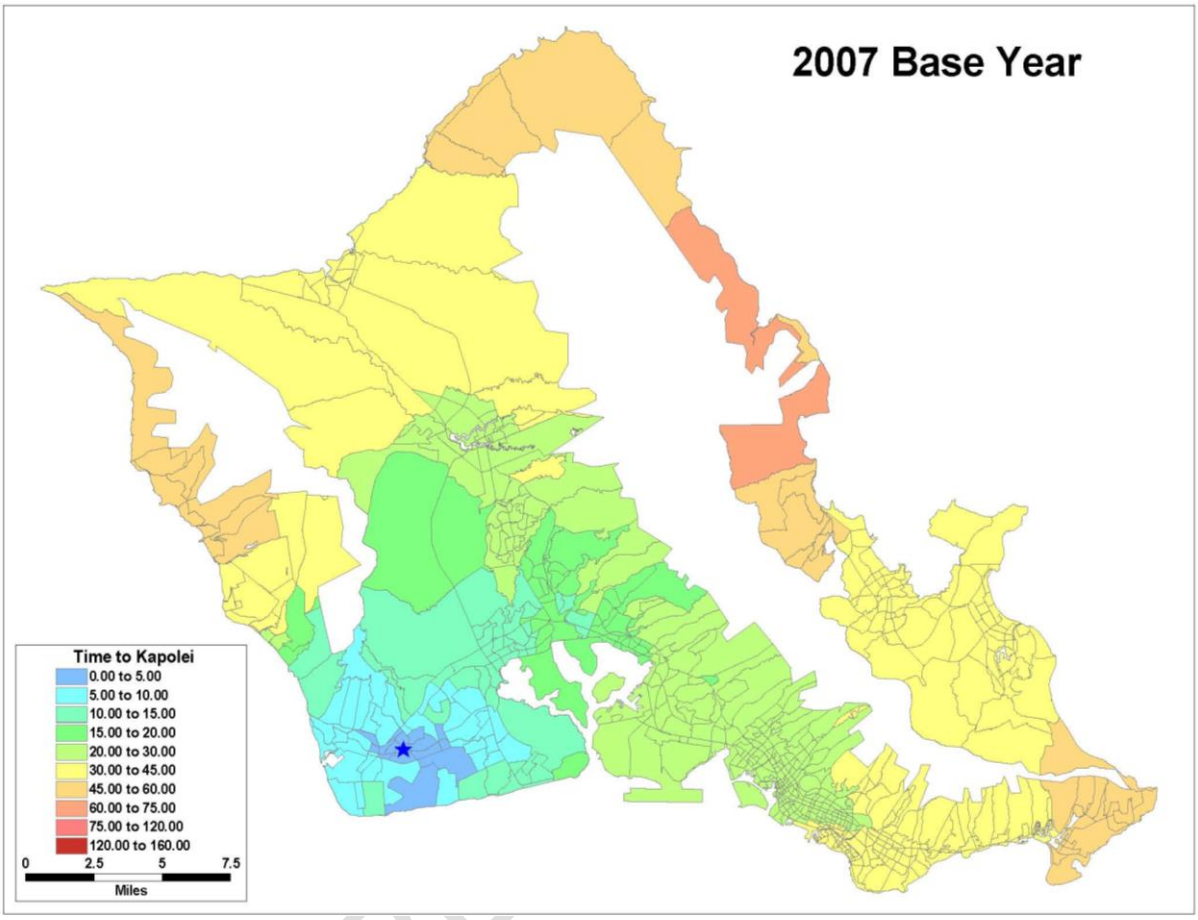

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Figure A-3: 2007 AM Peak Period Auto Travel Times to Waikiki

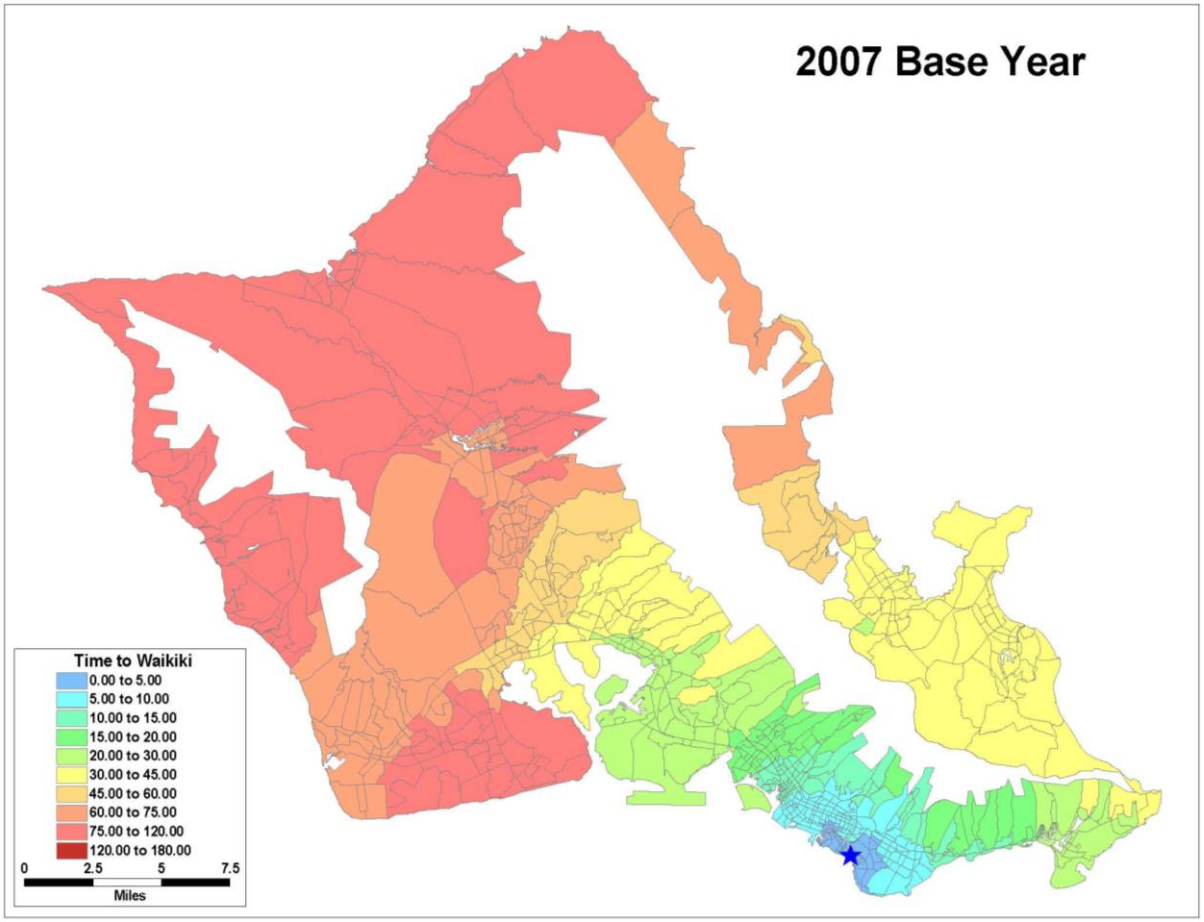

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Figure A-4: 2007 AM Peak Period Auto Travel Times to Mililani

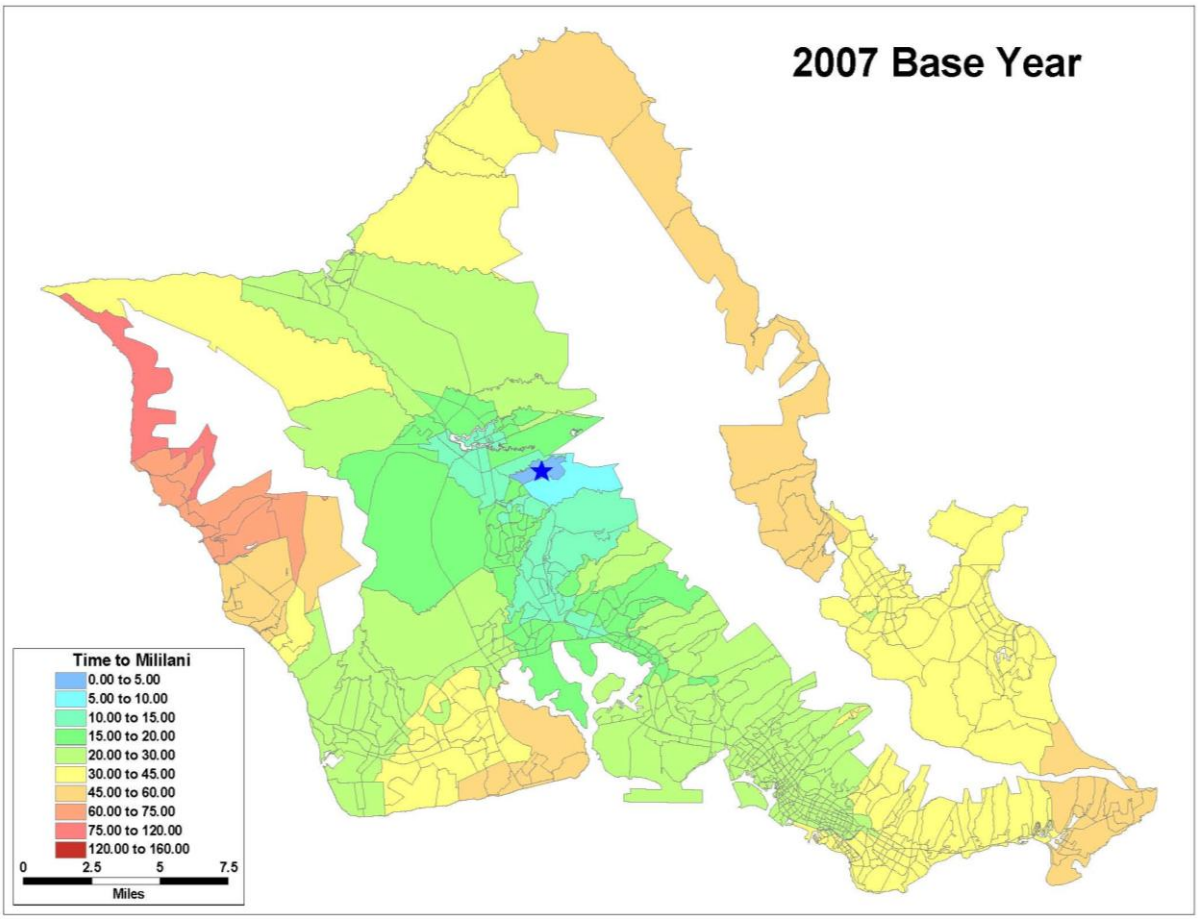

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Figure A-5: 2007 AM Peak Period Auto Travel Times to Honolulu International Airport

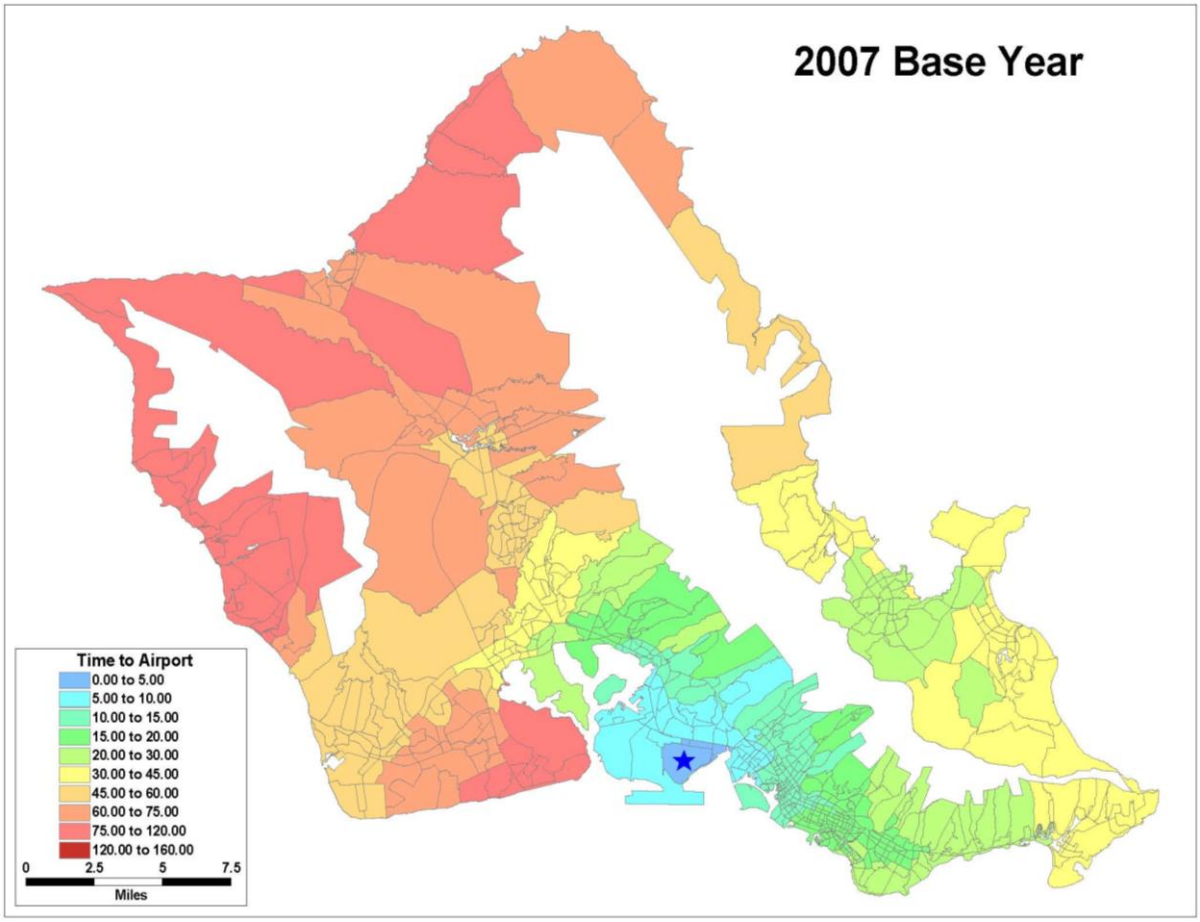

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Figure A-6: 2035 Baseline AM Peak Period Auto Travel Times to Downtown Honolulu

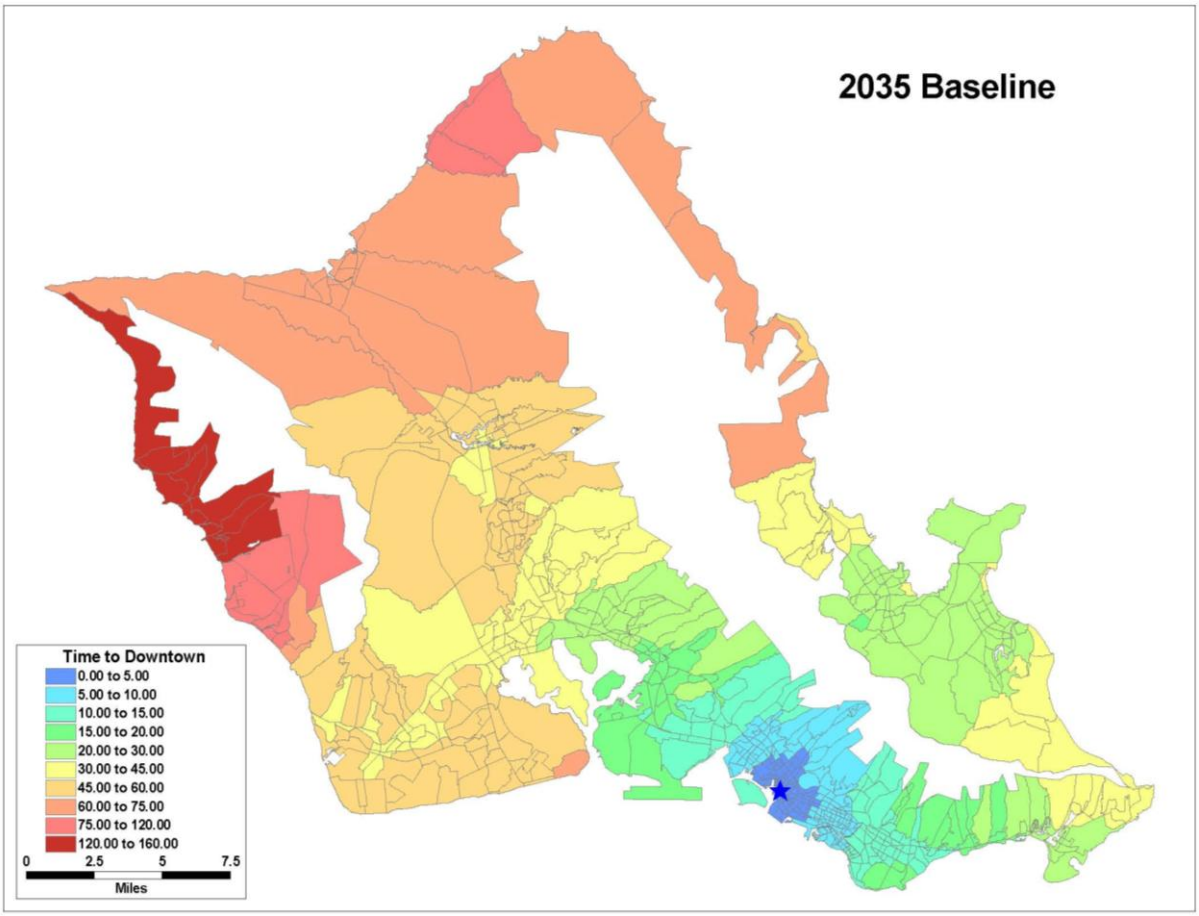

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Figure A-7: 2035 Baseline AM Peak Period Auto Travel Times to Kapolei

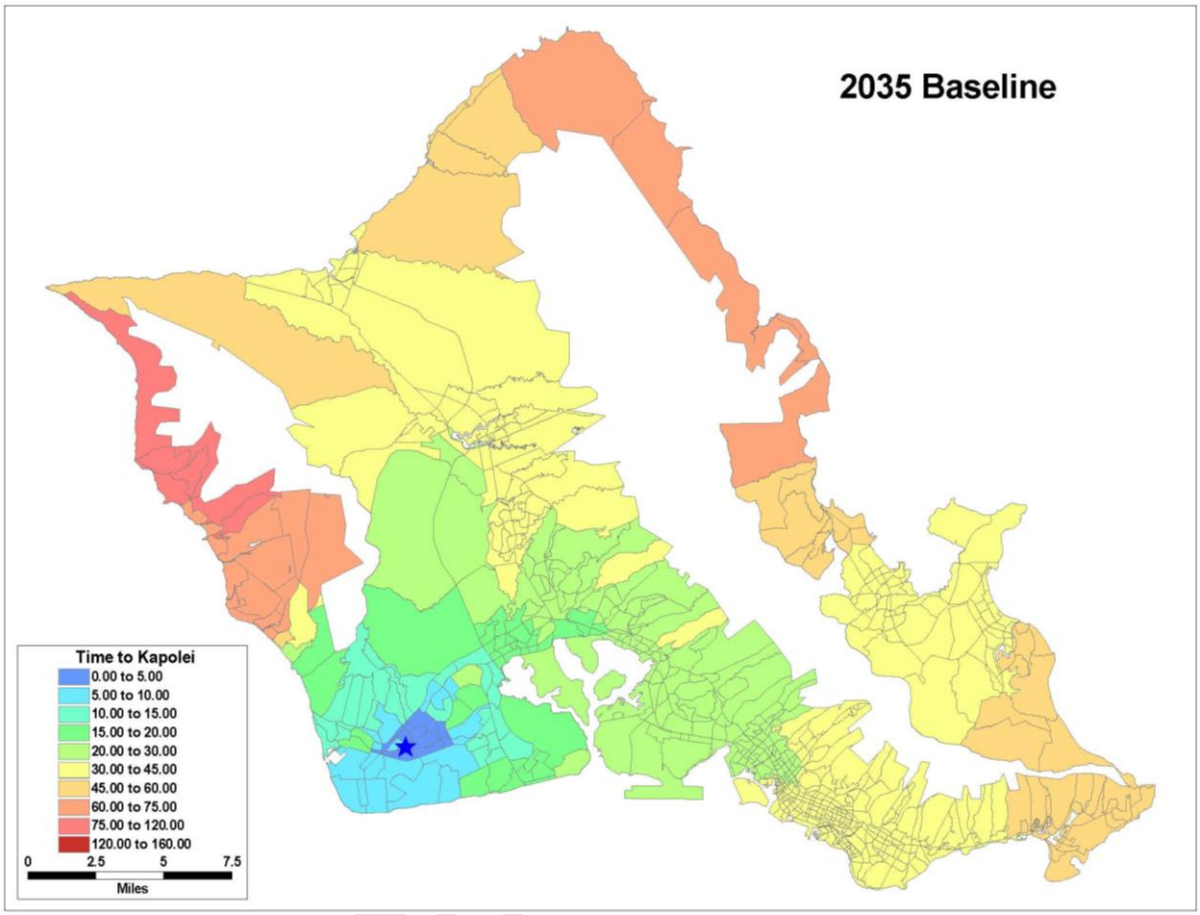

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Figure A-8: 2035 Baseline AM Peak Period Auto Travel Times to Waikiki

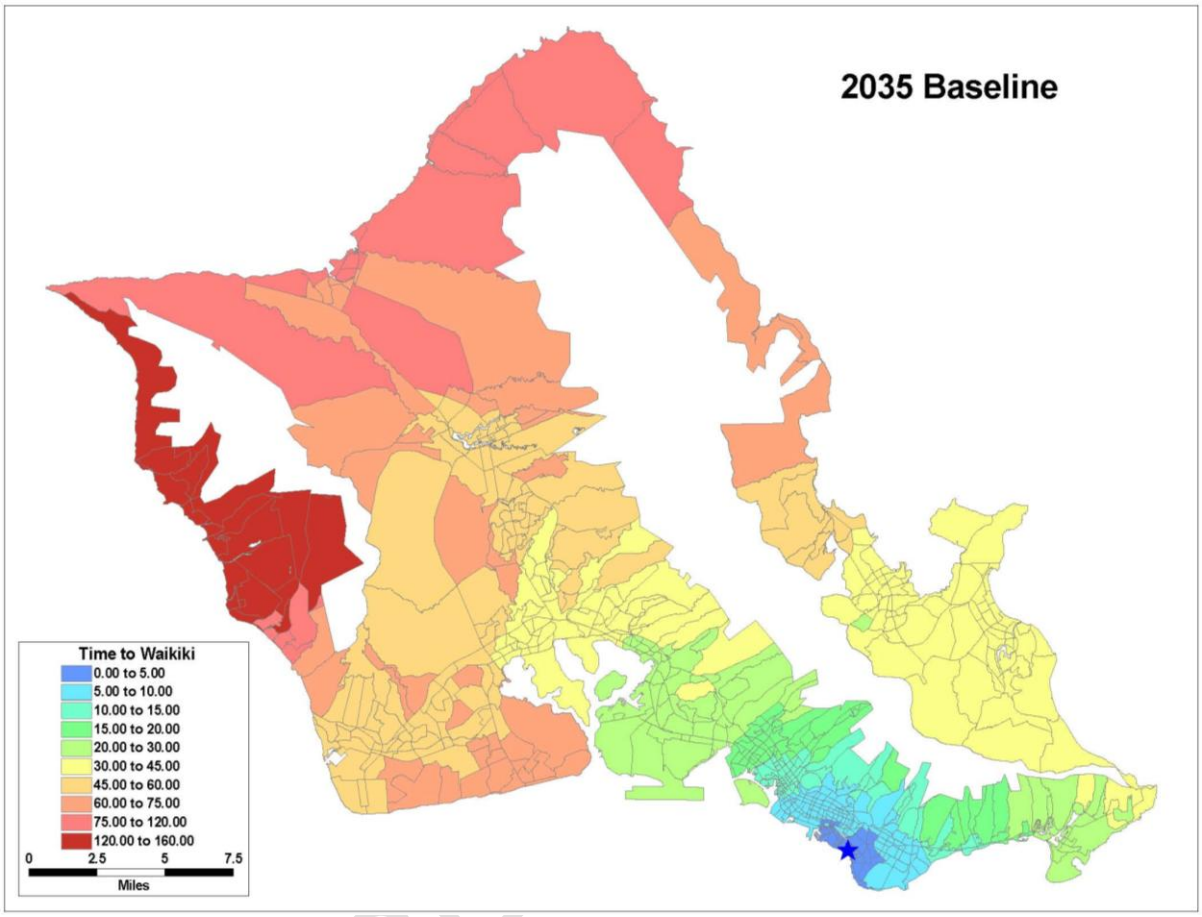

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Figure A-9: 2035 Baseline AM Peak Period Auto Travel Times to Mililani

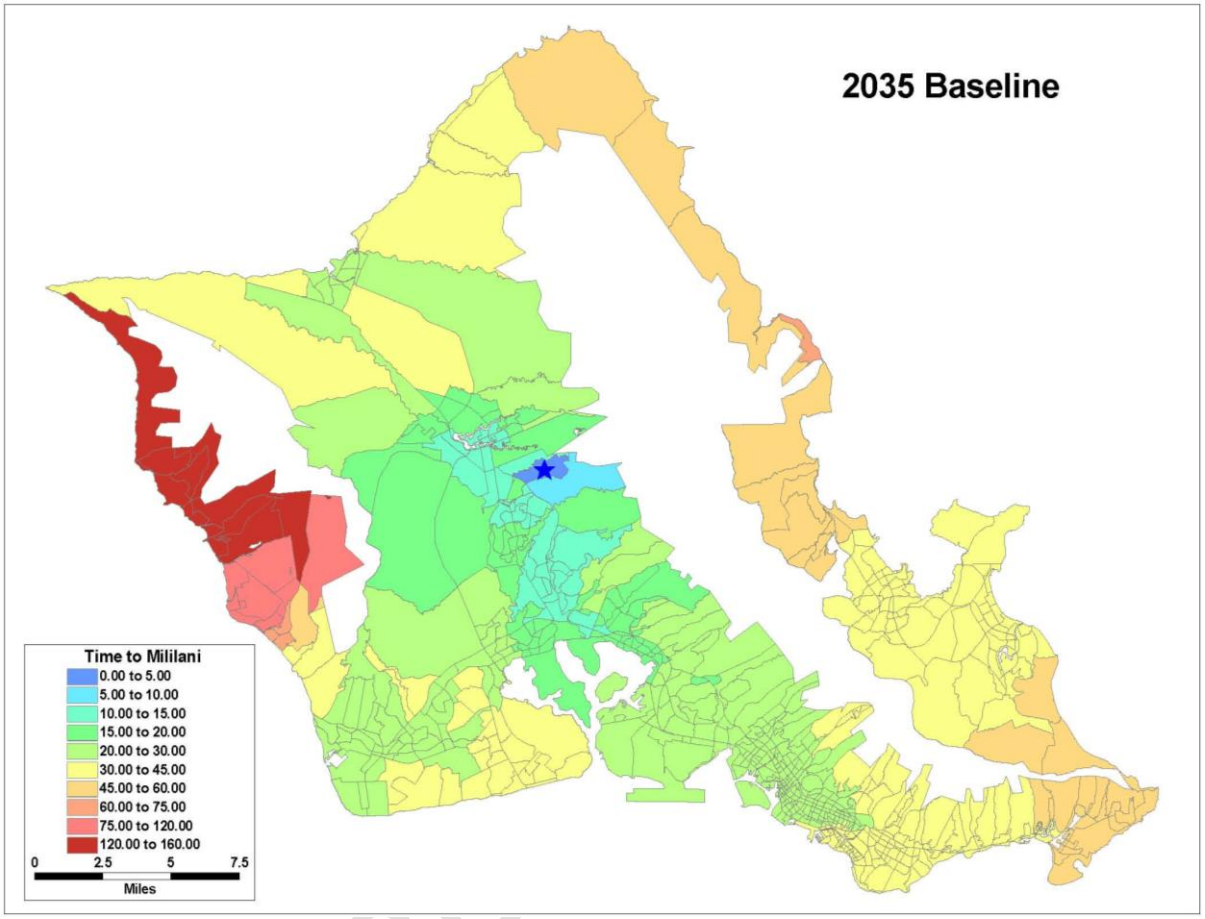

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Figure A-10: 2035 Baseline AM Peak Period Auto Travel Times to Honolulu International Airport

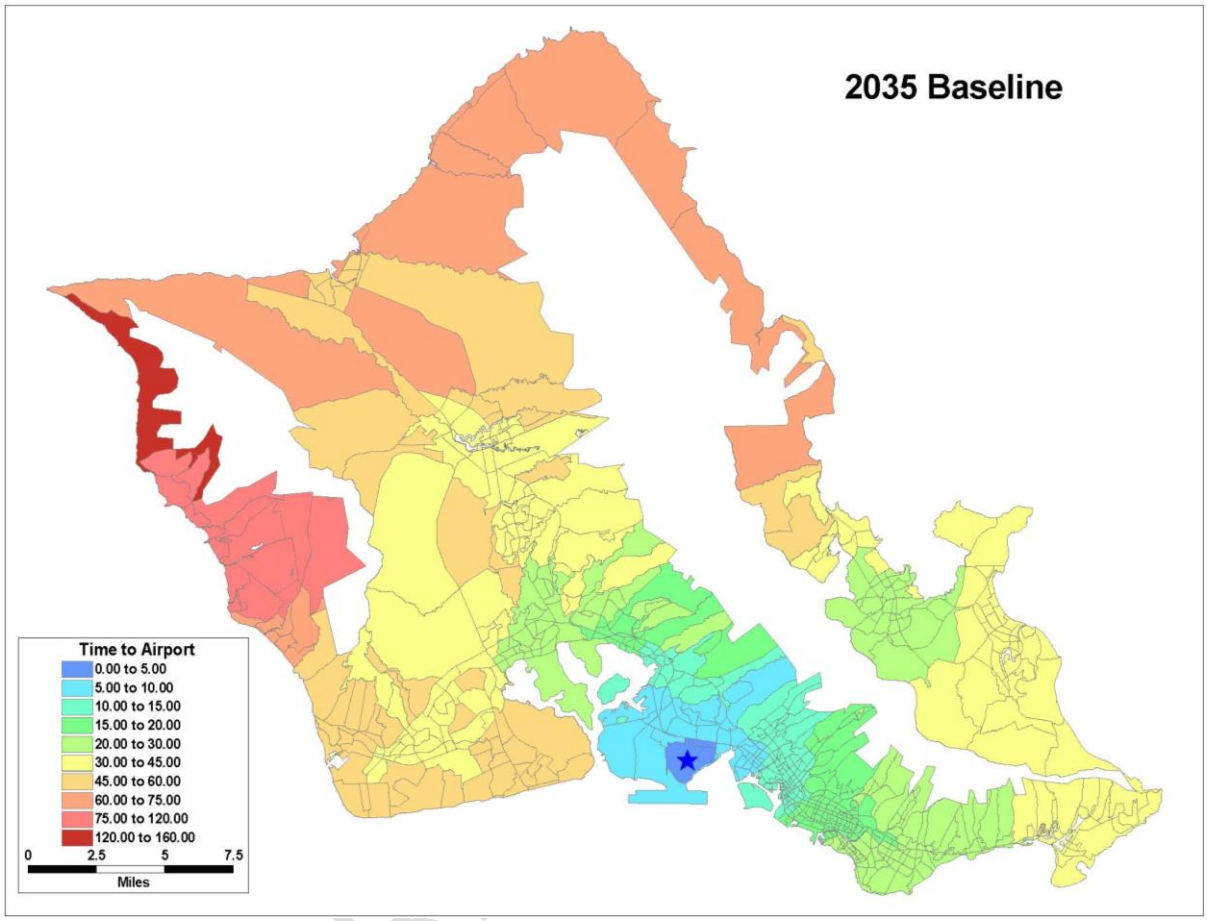

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Figure A-11: ORTP 2035AM Peak Period Auto Travel Times to Downtown Honolulu

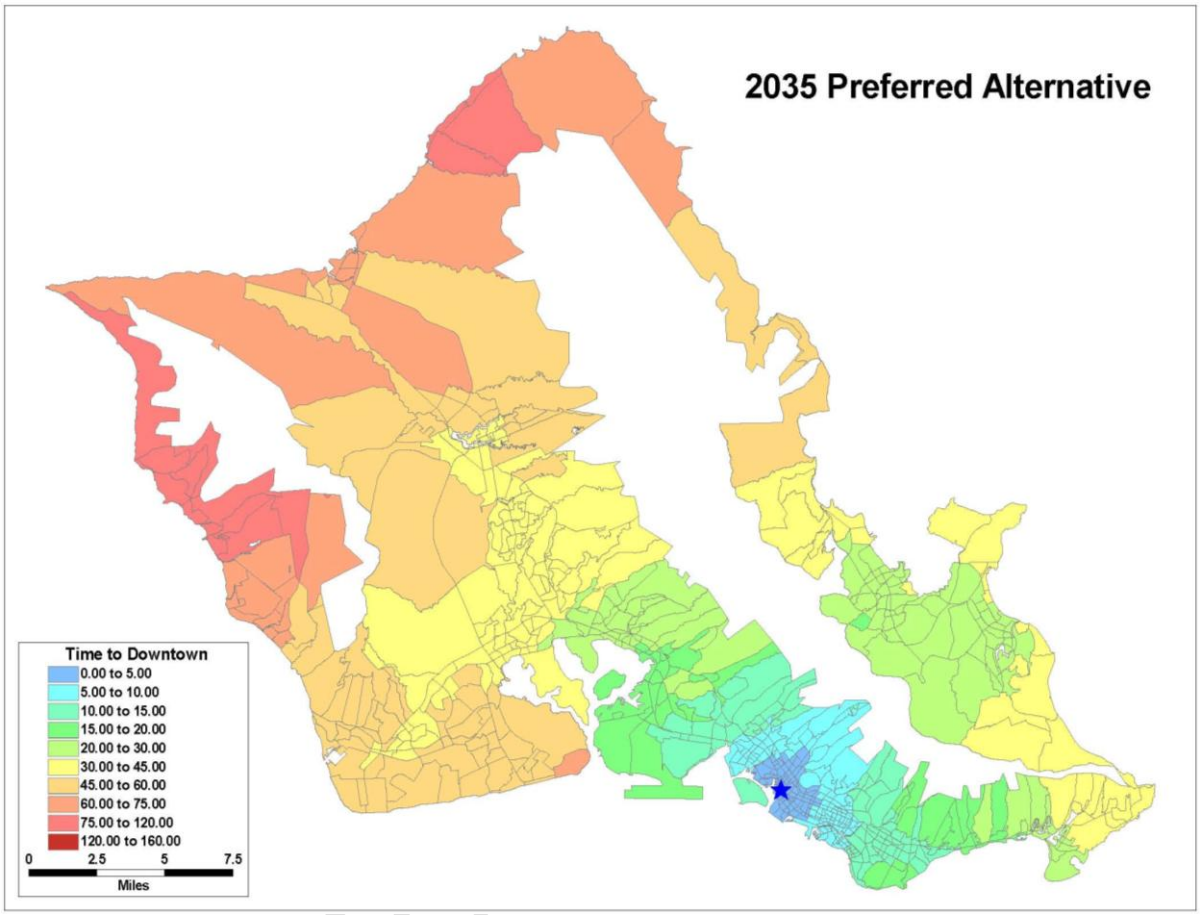

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Figure A-12: ORTP 2035 AM Peak Period Auto Travel Times to Kapolei

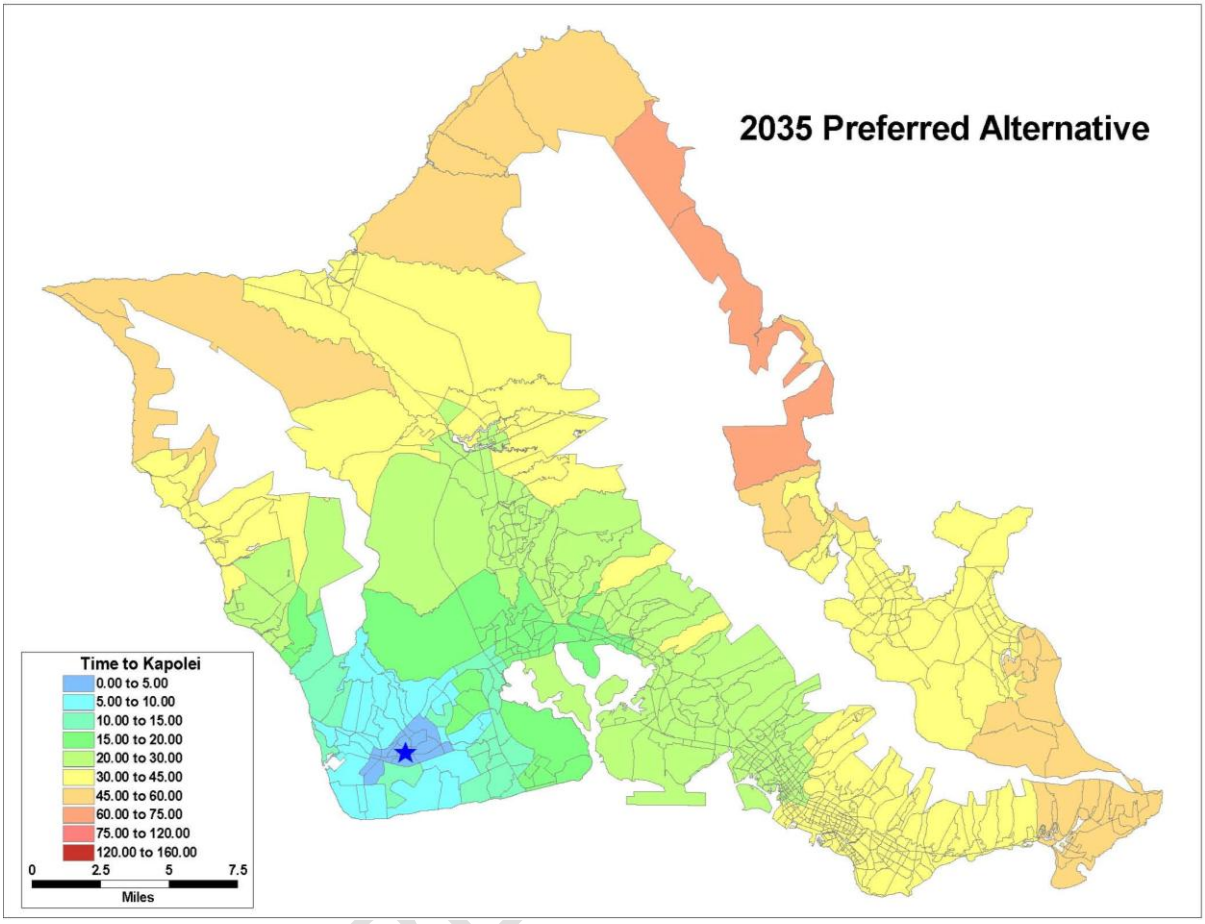

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Figure A-13: ORTP 2035 AM Peak Period Auto Travel Times to Waikiki

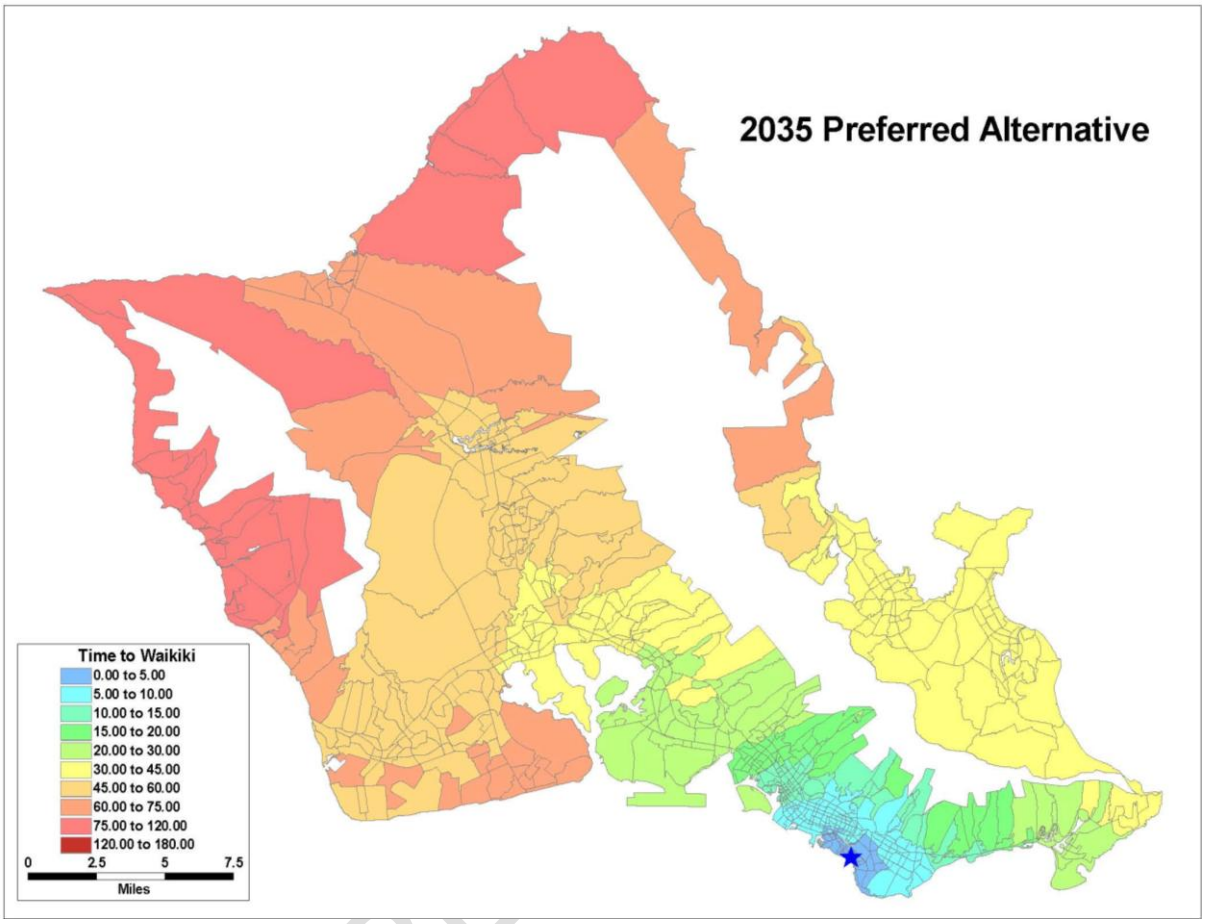

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Figure A-14: ORTP 2035 AM Peak Period Auto Travel Times to Mililani

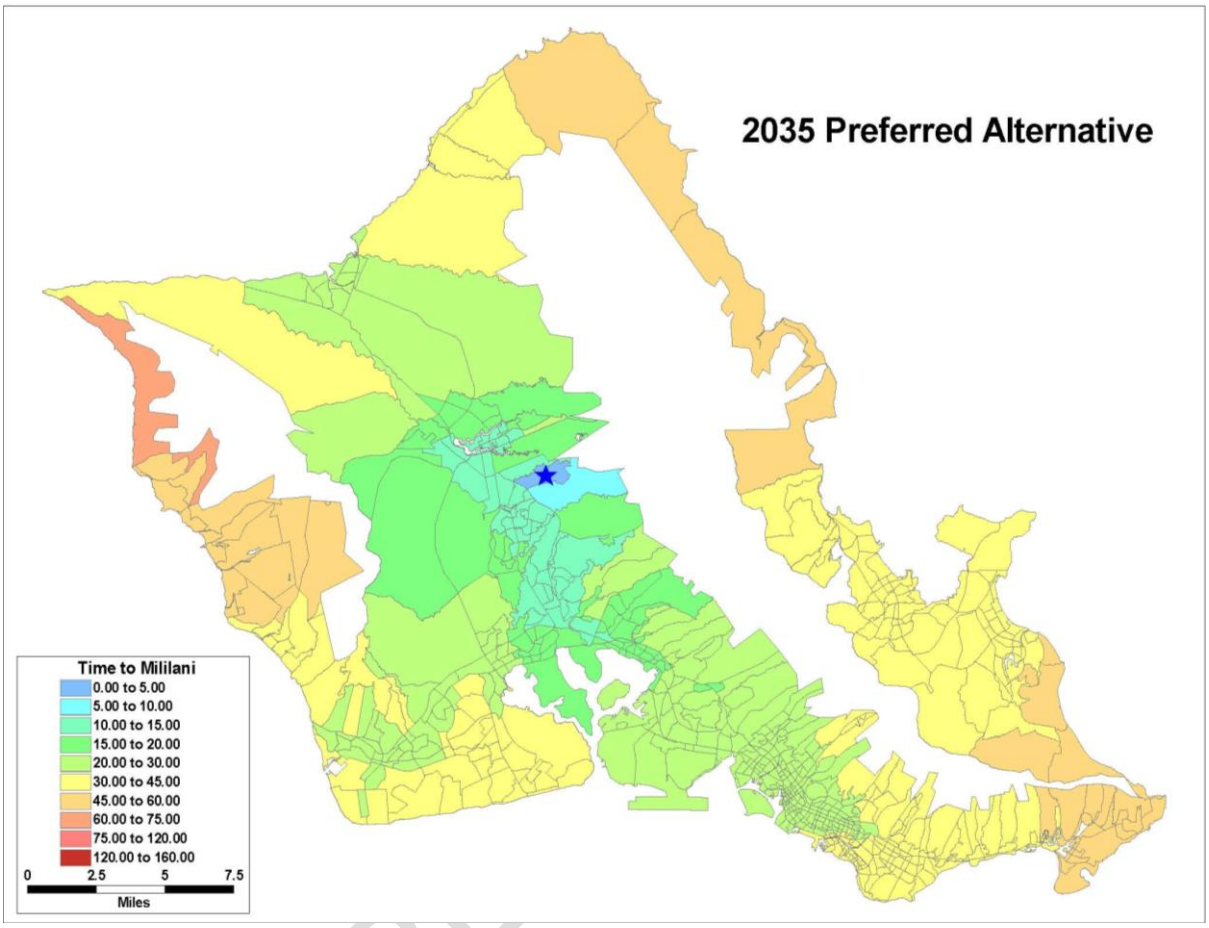

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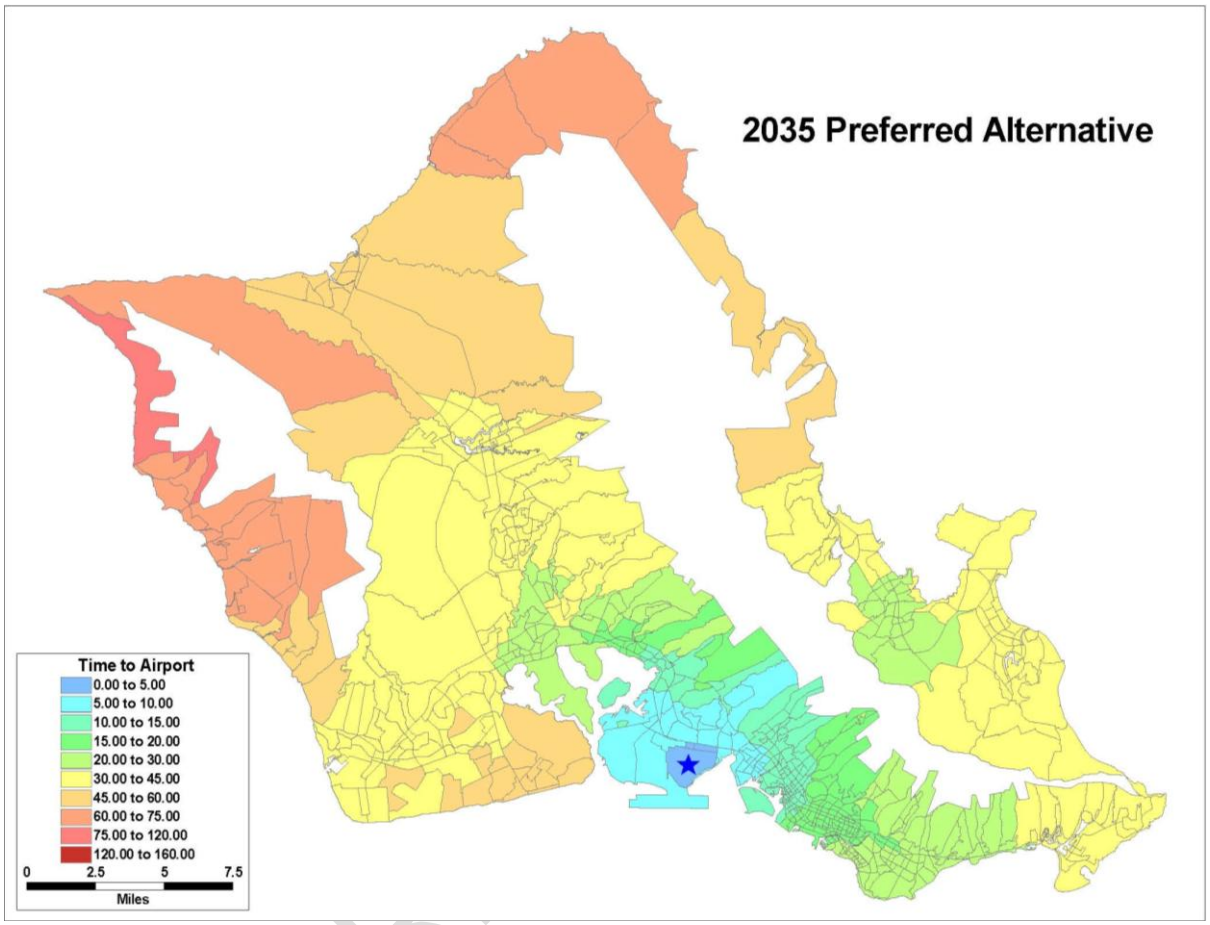
Figure A-15: ORTP 2035 AM Peak Period Auto Travel Times to Honolulu International Airport



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B CMP Process Scoring System

1.1 Congestion Management Process Overview

1.1.1 About the OahuMPO Congestion Management Process

The purpose of the Congestion Management Process for the Oahu Metropolitan Planning Organization (OahuMPO) is to identify congested surface transportation facilities, evaluate projects proposed to mitigate congestion, and prioritize these projects using quantifiable performance measures to assist decision-makers in selecting projects for the ORTP 2035 and Transportation Improvement Program (TIP).

The CMP for the ORTP 2035 builds upon previous work by the OahuMPO, particularly the technical analysis protocol developed for use for project evaluation as part of the ORTP 2030. This process follows the procedures found in the OahuMPO's *CMS Performance Monitoring and Evaluation Plan, December 2005.*

Consistent with the previous process, the CMP covers the island of Oahu, including all segments and corridors that experience congestion. Included are freeways, expressways, arterials, and collectors as defined by the regional functional classification system and reflected in facilities contained within the OahuMPO travel demand forecasting model.

1.1.2 Selection of CMP Project Packages

The selection of projects for the 2010 CMP analysis differed slightly than what was done for the 2005 Congestion Management System (CMS) process. In the previous case, individual regionally significant roadway capacity projects that were identified through the ORTP 2030 plan development process were identified for consideration in the CMS analysis process. Each of these projects would be coded into the OahuMPO travel demand model individually and the model would be run to produce outputs that could be used for the CMS analysis.

For the 2010 CMP analysis, project packages (one or more individual road capacity projects) were defined to be run through the OahuMPO travel demand model. Project packages were developed to explore in more detail whether there were synergies among logical groupings of projects that were in close proximity to each other. It was felt that the analysis of the packages could highlight which projects were the most effective at reducing congestion within a subarea or corridor. Or, that the analysis might highlight unforeseen deficiencies in the transportation network, that modeling individual projects might miss. It was felt that the outcome of the CMP analysis might benefit future corridor or subarea planning studies, or performance monitoring programs based on the results of the analysis. It was also determined that while the effect of individual projects on the performance of the regional transportation system may be too small to be captured with the regional model, but grouping logical packages together may result in a noticeable effect.

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1.1.3 Defining Congestion

For purposes of this report, and consistent with the process previously used by the OahuMPO for the ORTP 2030, the primary means of identifying congestion is the link-based volume-to-capacity ratio (V/C ratio).[1] The V/C ratio is the calculation of the demand flow rate divided by the capacity for a roadway facility. The OahuMPO 2035 Baseline travel demand forecasting model will be used to provide a starting point from which to calculate the link-based V/C ratio. A roadway facility will be defined as congested if the V/C ratio in during the A.M. peak period is greater than 0.90, which equates to LOS E or F.

1.1.4 Performance Measures

The CMP uses performance measures documented in the *CMS Performance Monitoring and Evaluation Plan.* Performance scores for all of the measures are generated by the OahuMPO travel demand forecast model. The included in the analyses are the following:

- Change in V/C Ratio
- Vehicle Volume
- Transit Mode Share
- Vehicle Miles Traveled (VMT)
- Vehicle Hours of Delay (VHD)
- Vehicle Hours Traveled (VHT)

The methodology for calculating these measures is described below.

Change in V/C Ratio

As mentioned above, the V/C ratio is used to calculate congestion for both 2035 Baseline conditions and for comparing CMP project packages with the Baseline. The measure is presented for the two-hour morning (AM) peak period.

Vehicle Volume

Vehicle volume is the number of vehicles that use a given roadway over a specified period of time. Vehicle volumes are presented in concert with V/C ratio to provide a comparison of project effectiveness. For example, does the project (or projects) in a CMP project package reduce congestion (reduced V/C ratio), while carrying more traffic (higher vehicle volumes)? A comparison to the Baseline alternative is also provided.

[1] A complete definition of congestion can be found in the OahuMPO *CMS Performance Monitoring and Evaluation Plan*, December 2005.

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Mode Share

This performance measure provides a comparison of the daily 2035 multi-modal mode share by 11 trip purposes, produced by the OahuMPO travel demand forecast model for each CMP project package. A comparison of the percentage change with the Baseline alternative is also provided.

Vehicle Miles Traveled

Vehicle-miles traveled (VMT) is a unit that measures travel distance made by a vehicle, such as an automobile, van, pickup truck, commercial vehicle, or motorcycle. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle. The measure reflects total year 2035 forecasted islandwide VMT produced by the CMP project package for the two-hour AM peak period. Total VMT is presented by facility and Area Type and compared to the 2035 Baseline alternative (percent change).

Vehicle Hours of Delay

Vehicle-hours of delay (VHD) is defined as the difference between vehicle-hours traveled under congested conditions and vehicle hours of travel that would otherwise be expected under free flow (uncongested) conditions. VHD is calculated using travel times and travel speeds. The measure reflects total year 2035 forecasted islandwide VHD produced by the CMP project package for the two-hour AM peak period. Total VHD will be presented by facility and Area Type and compared to the 2035 Baseline alternative (percent change).

Vehicle Hours Traveled

Vehicle-hours traveled (VHT) is a measurement of the total hours traveled by all vehicles. It is calculated by multiplying the number of vehicles times the travel time of those vehicles on a network or specific links within that network. VHT is an indicator of how additional travel demand influences congestion in the system from a travel time standpoint. The measure reflects total year 2035 forecasted islandwide VHT produced by the CMP project package for the two-hour AM peak period. Total VHT is presented by facility and Area Type and compared to the 2035 Baseline alternative (percent change).

Transit Boardings

Transit boardings are a new measure that has been added to this analysis. This measure tests the impacts of congestion relief projects on transit usage, in the form of transit boardings. This measure provides a summary of 2035 transit boardings by time period and by mode. Time periods include peak and off-peak travel. Transit modes include local, limited, and express bus; guideway (Honolulu Rail Transit); and ferry. A comparison to the Baseline alternative (percent change) is also provided.

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Table B-1 CMP Point System for Highway Projects

	Possible Points													
						Additional Vehicle Volume								
Performance Measure	**Increase**	**No Change**	**Decrease**	**New Road**	**On List of Congested Roads**	**0**	**1-500**	**501-1,000**	**1,001-1,500**	**1,501-2,000**	**2,001-2,500**	**2,501-3,000**	**3,000-3,500**	**3,501-4,000**
Change in V/C Ratio	0	2	5	3										
List of Congested Roadways					1									
Transit Mode Share	3	1	0											
Vehicle Volume Increase						0	1	2	3	4	5	6	7	8
VMT	0	1	2											
VHT	0	1	2											
VHD	0	1	2											
Total	**Points Possible: 23 (or more based on increase in Vehicle Volume)**													

Table B-2 CMP Point System for Transit Projects

	Possible Points													
						Additional Vehicle Volume								
Performance Measure	**Increase**	**No Change**	**Decrease**	**New Road**	**On List of Congested Roads**	**0**	**1-5,000**	**5,001-10,000**	**10,001-15,000**	**15,001-20,000**	**20,001-25,000**	**25,001-30,000**	**30,000-35,000**	**35,001-40,000**
List of Congested Roadways					1									
Transit Mode Share	3	1	0											
Transit Trips to Work						0	1	2	3	4	5	6	7	8
VMT	0	1	2											
VHT	0	1	2											
VHD	0	1	2											
Total	**Points Possible: 18 (or more based on increase in Transit Trips)**													

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Table B-3 CMP Point System for TDM/TSM Projects

Performance Measure	Possible Points				
	Increase	No Change	Decrease	New Road	On List of Congested Roads
Change in V/C Ratio	0	2	5	3	
List of Congested Roadways					1
Transit Mode Share	3	1	0		
Vehicle Volume Increase	3	1	0		
VMT	0	1	2		
VHT	0	1	2		
VHD	0	1	2		
Total	**Points Possible: 18**				

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Table B-4 ORTP 2035 CMP Scoring and Ranking Results

Project No.	CMP Package No.	Facility/Project Title	Points	2010 CMP Rank	Change in V/C Ratio	Vehicle Volume	List of Congested Roadways	VHT	VHD	VMT	Transit Mode Share	Transit Trips
Highway Projects												
19	18	Kapolei Parkway, Extension, Kamokila Boulevard to Kamaaha Avenue	18		3	8	0	2	2	2	1	N/A
18	23	Kapolei Parkway, Extension & Widening, Aliinui Drive to Kalaeloa Boulevard	18		3	9	0	2	2	1	1	N/A
26	5	Kamehameha Highway, Widening, Lanikuhana Avenue to Ka Uka Boulevard	18		5	7	1	1	2	1	1	N/A
61	2	Interstate Route H-1, Widening, Waiawa Interchange to Halawa Interchange	16		5	7	1	1	2	0	0	N/A
71	4	Kunia Road, Widening and Interchange Improvement, Wilikina Drive to Farrington Highway	15		5	2	1	2	2	2	1	N/A
62	7	Kahekili Highway, Widening, Kamehameha Highway to Haiku Road	15		5	3	1	2	2	1	1	N/A
N/A	25	Interstate Route H-1 Median High-Occupancy Vehicle (HOV) between Waiawa and Makakilo Interchanges	15		3	8	0	1	2	0	1	N/A
32	3	Interstate Route H-1, Widening, Ola Lane to Vineyard Boulevard	15		5	5	1	1	1	1	1	N/A
77	4	Waianae Second Access, Farrington Highway to Kunia Road	14		3	4	0	2	2	2	1	N/A
60	6	Interstate Route H-2, New Interchange, Pineapple Road Overpass	14		3	4	0	2	2	2	1	N/A
N/A	6	Central Mauka Road, Mililani/Waiawa Area, from Meheula Parkway to Kamehameha Highway	14		3	4	0	2	2	2	1	N/A
57	17	Kalaeloa East-West Spine Road, New Roadway, Kalaeloa Boulevard to Geiger Road	14		3	4	0	2	2	2	1	N/A

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Project No.	CMP Package No.	Facility/Project Title	Points	2010 CMP Rank	Change in V/C Ratio	Vehicle Volume	List of Congested Roadways	VHT	VHD	VMT	Transit Mode Share	Transit Trips
16	16	Hanua Street Extension, Farrington Highway to Malakole Street; Interstate Route H-1, New On- & Off-Ramps, Palailai Interchange	14		3	5	0	2	2	1	1	N/A
28	26	Interstate Route H-1, Contra Flow Lane extension (PM), Waiawa Interchange to Kunia Interchange and Keehi Interchange to Radford Drive	14		3	4	1	2	2	1	1	N/A
54	15	Farrington Highway, Widening, Hakimo Road to Kalaeloa Boulevard	14		5	2	1	2	2	1	1	N/A
20	14	Farrington Highway, Widening, Golf Course Road to west of Fort Weaver Road	14		5	4	1	1	2	0	1	N/A
22	17	Kualakai Parkway, Widening & Extension, Interstate Route H-1 to Franklin D. Roosevelt Avenue	13		3	3	0	2	2	2	1	N/A
27	6	Interstate Route H-2, Widening, Waipio Interchange	13		5	0	1	2	2	2	1	N/A
N/A	7	Likelike Highway Widening, from Kamehameha Highway to Kahekili Highway	13		5	1	1	2	2	1	1	N/A
28	27	Interstate Route H-1, Contra Flow Lane extension (PM), Waiawa Interchange to Kunia Interchange and Keehi Interchange to Radford Drive	13		3	4	1	2	1	1	1	N/A
59	14	Farrington Highway, Widening, west of Fort Weaver Road to Waiawa Interchange	13		5	3	1	1	2	0	1	N/A
15	1	Interstate Route H-1, New Interchange, Kapolei Interchange	13		3	5	1	1	1	1	1	N/A
31	12	Salt Lake Boulevard Widening Project	13		5	3	1	1	1	1	1	N/A
N/A	12	Puuloa Road Widening, from Pukuloa Road to Nimitz Highway	13		5	3	1	1	1	1	1	N/A
N/A	6	Wahiawa Second Access Road, from Whitmore Village to California Avenue and from California Avenue to Meheula Parkway	12		3	2	0	2	2	2	1	N/A
55	17	Kamokila Boulevard	12		3	2	0	2	2	2	1	N/A

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Project No.	CMP Package No.	Facility/Project Title	Points	2010 CMP Rank	Change in V/C Ratio	Vehicle Volume	List of Congested Roadways	VHT	VHD	VMT	Transit Mode Share	Transit Trips
56	17	Fort Barrette Road	12		3	2	0	2	2	2	1	N/A
N/A	5	Paiwa Street Extension, from Ka Uka Boulevard to Lumiauau Street	12		3	4	0	1	2	1	1	N/A
25	25	Interstate Route H-1 Widening, Waiawa to Paiwa	12		5	2	1	1	2	0	1	N/A
35	9	Makakilo Drive, Second Access, Makakilo Drive to Kualaka'i Parkway / Interstate Route H-1 Interchange	12		3	5	0	1	1	1	1	N/A
21	1	Fort Barrette Road, Widening, Farrington Highway to Barber's Point Gate	12		5	2	1	1	1	1	1	N/A
76	13	Interstate Route H-1, Widening, Ward Avenue to Punahou Street	12		5	2	1	1	1	1	1	N/A
72	2	Interstate Route H-1 Widening, from Waiau to Waiawa Interchanges	11		5	2	1	1	2	0	0	N/A
24	2	Interstate Route H-1, Widening, Waipahu Off-Ramp	11		5	2	1	1	2	0	0	N/A
75	10	Nimitz Highway High-Occupancy Vehicle (HOV) Flyover, Keehi Interchange to Pacific Street	11		5	2	0	1	1	1	1	N/A
74	3	Interstate Route H-1, Widening, Vineyard Boulevard to Middle Street	11		5	1	1	1	1	1	1	N/A
N/A	8	Makapuu Tunnel Second Access, from Lunalilo Home Road to Kalanianaole Highway north of Sea Life Park	10		3	2	0	1	1	2	1	N/A
58	24	Makakilo Mauka Frontage Road, New Roadway, Kalaeloa Boulevard to Makakilo Drive	10		3	3	0	1	1	1	1	N/A
23	19	Keoneula Boulevard, Extension, Kapolei Parkway to Franklin D. Roosevelt Avenue	9		3	2	0	1	1	1	1	N/A
34	11	Interstate Route H-1, Operational Improvements, Ward Avenue On-Ramp to University Avenue Interchange	9		5	0	0	1	1	1	1	N/A

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Project No.	CMP Package No.	Facility/Project Title	Points	2010 CMP Rank	Change in V/C Ratio	Vehicle Volume	List of Congested Roadways	VHT	VHD	VMT	Transit Mode Share	Transit Trips
Transit Projects												
78	21	Fixed Guideway, West Kapolei to East Kapolei	9				1	2	2	2	2	1
79	22	Fixed Guideway, Ala Moana to UH Manoa and Waikiki	8				1	2	1	2	2	1
TDM/TSM Projects												
7		Transportation Demand Management (TDM) Program (2011-2020)	15	1	5	0	1	2	2	2	3	N/A
3		Human Services Transportation Coordination Program (2011-2020)	15	1	5	0	1	2	2	2	3	N/A
48		Transportation Demand Management (TDM) Program (2021-2035)	15	1	5	0	1	2	2	2	3	N/A
45		Human Services Transportation Coordination Program (2021-2035)	15	1	5	0	1	2	2	2	3	N/A
8		Vanpool Program (2011-2020)	13	5	5	0	1	2	2	2	1	N/A
49		Vanpool Program (2021-2035)	13	5	5	0	1	2	2	2	1	N/A
5		Joint Traffic Management Center	8	7	2	1	1	1	1	1	1	N/A
4		Intelligent Transportation Systems (ITS) (2011-2020)	6	8	0	0	1	2	2	0	1	N/A
46		Intelligent Transportation Systems (ITS) (2021-2035)	6	8	0	0	1	2	2	0	1	N/A

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