Baseline Auto and Transit Travel Demand Forecasts Report
Oahu Regional Transportation Plan 2035 Project

Deliverable 7.3.2

Mobilizing Oahu | Fulfilling Our Legacy

November 2009
Prepared for the
Oahu Metropolitan Planning Organization

Prepared by
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This report was funded in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation. The views and opinions of the agency expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

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Acronyms Used in this Document

DTA	Dynamic Traffic Assignment
ORTP	Oahu Regional Transportation Plan
TAA	Transportation Analysis Area
TAZ	Transportation Analysis Zone
TIP	Transportation Improvement Program
VMT	Vehicle Miles of Travel
VHT	Vehicle Hours of Travel
VHD	Vehicle Hours of Delay

Executive Summary

This report includes review and documentation of the 2035 baseline travel demand forecasting model forecasts. The results of these forecasts are also compared to the 2007 existing conditions travel demand forecasting model results. Socioeconomic comparisons, the 2035 baseline project overview, mode choice results, and assignment results are presented.

Travel demand on Oahu is directly related to the density and geographic distribution of population and land use. Total island population is expected to grow by 23 percent, from 905,600 persons in 2007 to 1,113,600 by 2035. Total households are expected to grow even more, by 31 percent, indicating that overall household size is projected to decrease. The majority of population growth is anticipated to be concentrated in the following six Transportation Analysis Areas (TAA):

- Ward-Chinatown
- Kakaako
- Honouliuli-Ewa Beach
- Kapolei-Ko Olina-Kalaeloa
- Makakilo-Makaiwa
- Waiawa-Koa Ridge

Islandwide employment is projected to increase by 25 percent between 2007 and 2035, or from 556,900 to 693,300 jobs. Currently, 71 percent of the jobs are located in TAAs 1 through 10 (see Figure 2-1) which also contain the island's most congested roadways. In 2035, TAAs 1 through 10 are expected to still have the majority of jobs (64 percent of the island total). This reflects over 52,100 more work trips in 2035 in the TAAs 1 through 10 and on Oahu's most congested roadways. However, the number of jobs in Honouliuli-Ewa Beach, Kapolei-Ko Olina-Kalaeloa, Makakilo-Makaiwa, and Waiawa-Koa Ridge are forecast to increase at a higher rate, more than doubling by 71,100. While these areas would only contain 17 percent of all jobs in 2035, they are likely to result in less overall work trips in the congested TAAs 1 through 10.

Tourism also plays a significant role in transportation on Oahu. In 2007, there were 33,800 visitor units on Oahu, with over 85 percent located in Waikiki. The number of total visitor units is expected to increase 17 percent to 39,600 by 2035 with Waikiki comprising only 70 percent of the share, reflecting the City's policy to not intensify development in Waikiki but, rather, to direct growth to resort areas such as Ko Olina and Turtle Bay.

Keeping pace with the projected population and employment growth between 2007 and 2035, total system-wide daily person trips are projected to increase by about 26 percent for the 2035 baseline. Transit mode share for total daily trips is projected to increase from five percent in 2007 to six percent for the 2035 baseline alternative. Total transit boardings increase by 69 percent, with approximately 26 percent of total system-wide boardings on fixed-guideway transit. The presence of the fixed-guideway line in 2035 provides relatively better transit accessibility.

Related to the increase in overall trips, total vehicle miles traveled (VMT) is forecasted to increase by 19 percent over 2007 existing conditions, somewhat less than forecasted population growth, suggesting a decrease in trip length. This is likely due in part to the forecasted employment growth in Honouliuli-Ewa Beach and Kapolei-Ko Olina-Kalaeloa TAAs, providing nearby employment and shopping opportunities for residents of these growing population centers. Arterials and collectors are expected to experience a slightly higher share of VMT growth than the overall average, also consistent with the types of roadways in these areas.

Vehicle Hours of Delay (VHD) between the 2007 existing conditions scenario and the 2035 baseline scenario are projected to increase by 46 percent in total, outpacing increases in population over the same period. The reason delay increases at a rate disproportionate to growth in population and overall travel is that when roadways are already operating at or near capacity, even an incremental increase in volume can significantly affect congestion levels and associated delay.

Roadway congestion is projected to be in similar locations in 2035 as in 2007, with a little more severity along the H-1 corridor. Improvements to facilities in the Ewa and Kapolei communities are expected to alleviate severely congested roads in that area.

Compared with 2007, travel times also are expected to increase along most routes and, particularly, in TAAs 1 through 10 (including from Waianae and Kapolei into Downtown). Travel times to and from Ewa Beach are projected to improve somewhat due to the improvements to Fort Weaver Road and the addition of North-South Road. Transit travel times through the TAAs 1 through 10 are similar to auto travel times due to the addition of the fixed guideway line and continued congestion in the H-1 corridor.

1 Introduction

1.1 Report Purpose

This report includes review and documentation of 2035 baseline travel forecasting results. It is intended for the review of the reasonableness of the 2035 baseline travel demand forecasts, and will be a complement to the ORTP 2035 deliverable 7.4.2 *Baseline Analysis Report*.

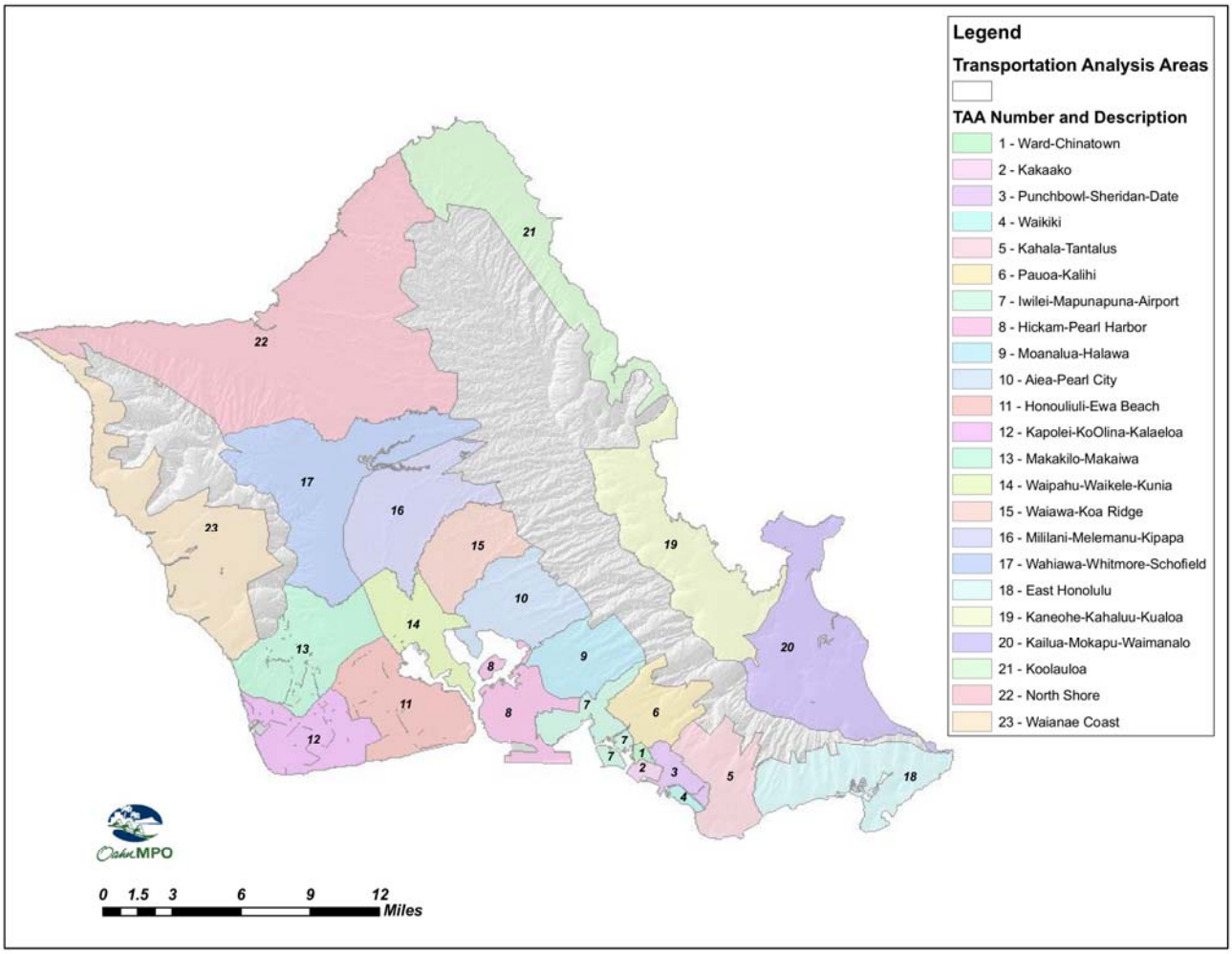
1.2 Report Overview

This report provides a review and evaluation of the forecasted 2035 baseline results affecting the transportation system on the island of Oahu. Chapter two compares the socio-economic and demographic data between 2007 and 2035 as this data has a direct influence on travel patterns around the island. Chapter three provides an overview of the 2035 baseline projects and which ones were used for modeling. Chapter four summarizes the travel demand forecasting results such as trip distribution and mode choice. And, Chapter five displays the travel demand forecasting assignment results such as vehicle miles traveled, vehicle hours of delay, transit boardings by mode, and highway and transit travel time plots.

2 Socioeconomic Comparisons

Socioeconomic and demographic characteristics influence the travel patterns found on the island of Oahu. The demand for travel is directly related to the density and geographic distribution of population and land use. To assist in the analysis of the comparisons, the results in the tables below are summarized by the 23 Transportation Analysis Areas (TAA), as shown in Figure 2-1.

Figure 2-1. Transportation Analysis Area Map



2.1 Population and Households

Table 2-1 lists population statistics by TAA. Examination of 2007 population figures reveals the total island population to be 905,600 persons, growing to 1,113,600 by 2035 (a 23 percent increase). Table 2-2 lists household statistics by TAA and shows

that total households in 2007 were 311,000 and are expected to grow to 405,900 (31 percent increase) by 2035.

Population is projected to increase in all but four TAAs, but the number of households in these four TAAs are forecasted to increase between 2007 and 2035. This means that the household size may be decreasing because of the demographic changes over time. Table 2-3 shows the average household size by TAA. Overall, the household size is predicted to decrease by six percent for Oahu.

Population and households are directly tied to the number of trips made from each area. So as these two variables increase, so do the number of trips. However, a slight decrease in household size for a certain area means fewer trips per household for that area. Also, as household size shrinks and the population grows older, there may be a higher demand for transit services in these areas.

The Kakaako TAA's population and households are expected to triple by the year 2035. This is consistent with the *Primary Urban Center Development Plan,* which shows that this area already has the infrastructure and regulations in place to build higher-density residential and mixed-use development. The Kapolei-Ko Olina-Kalaeloa, and Waiawa-Koa Ridge TAAs are expected to more than double in population and households between 2007 and 2035. This population and household growth is consistent with the policy in the *General Plan for the City and County of Honolulu* to encourage development within the secondary urban center of Kapolei and the Ewa and Central Oahu urban fringe areas. Most of the population growth is anticipated to occur in the following areas:

- Ward-Chinatown (83 percent growth in population, 93 percent growth in households)
- Kakaako (260 percent growth in population, 284 percent growth in households)
- Honouliuli-Ewa Beach (91 percent growth in population, 103 percent growth in households)
- Kapolei-Ko Olina-Kalaeloa (180 percent growth in population, 198 percent growth in households)
- Makakilo-Makaiwa (91 percent growth in population, 96 percent growth in households)
- Waiawa-Koa Ridge (291 percent growth in population, 298 percent growth in households)

Figure 2-2 shows the forecasted change in population between 2007 and 2035 by Traffic Analysis Zone (TAZ). Figure 2-3 shows the forecasted change in households between 2007 and 2035 by TAZ. The TAZ level on these maps were provided to show a finer level of granularity of detail as opposed to the TAA level which is shown in the tables so the areas where major changes occurred could be pinpointed. The dark outline shows where the TAA boundaries are.

Table 2-1: Population by TAA for Oahu (2007 and 2035)

Transportation Analysis Area (TAA)	Population		Population Change (Year 2007 to Year 2035)	
	Year 2007	Year 2035	Difference	Percentage Difference
1. Ward-Chinatown	10,600	19,400	8,800	83%
2. Kakaako	10,400	37,300	26,900	260%
3. Punchbowl-Sheridan-Date	72,800	84,700	11,800	16%
4. Waikiki	19,500	21,800	2,300	12%
5. Kahala-Tantalus	73,300	76,100	2,800	4%
6. Pauoa-Kalihi	77,200	84,200	7,000	9%
7. Iwilei-Mapunapuna-Airport	16,300	19,800	3,500	21%
8. Hickam-Pearl Harbor	18,500	18,600	100	1%
9. Moanalua-Halawa	54,000	54,400	400	1%
10. Aiea-Pearl City	67,300	68,000	700	1%
11. Honouliuli-Ewa Beach	53,600	102,200	48,600	91%
12. Kapolei-Ko Olina-Kalaeloa	18,300	51,300	33,000	180%
13. Makakilo-Makaiwa	15,600	29,900	14,300	91%
14. Waipahu-Waikele-Kunia	56,100	60,900	4,800	9%
15. Waiawa-Koa Ridge	11,900	46,700	34,800	291%
16. Mililani-Melemanu-Kipapa	53,400	52,600	-800	-1%
17. Wahiawa-Whitmore-Schofield	35,700	34,500	-1,100	-3%
18. East Honolulu	48,800	49,300	600	1%
19. Kaneohe-Kahaluu-Kualoa	53,600	52,300	-1,200	-2%
20. Kailua-Mokapu-Waimanalo	62,500	61,800	-700	-1%
21. Koolauloa	14,400	16,200	1,800	12%
22 North Shore	18,000	20,400	2,400	13%
23. Waianae Coast	43,700	51,100	7,400	17%
Total	905,600	1,113,600	208,000	23%

Note: Individual TAA numbers may not sum to totals due to rounding.
Data source: City Department of Planning and Permitting, 2009.

Table 2-2: Households by TAA for Oahu (2007 and 2035)

Transportation Analysis Area (TAA)	Households		Households Change (Year 2007 to Year 2035)	
	Year 2007	Year 2035	Difference	Percentage Difference
1. Ward-Chinatown	5,500	10,600	5,100	93%
2. Kakaako	5,700	21,900	16,200	284%
3. Punchbowl-Sheridan-Date	38,300	46,100	7,800	20%
4. Waikiki	11,500	13,100	1,600	14%
5. Kahala-Tantalus	26,800	28,700	1,900	7%
6. Pauoa-Kalihi	23,500	26,900	3,400	14%
7. Iwilei-Mapunapuna-Airport	4,800	5,900	1,100	23%
8. Hickam-Pearl Harbor	5,500	5,700	200	4%
9. Moanalua-Halawa	17,600	18,300	700	4%
10. Aiea-Pearl City	22,100	23,300	1,200	5%
11. Honouliuli-Ewa Beach	15,600	31,600	16,000	103%
12. Kapolei-Ko Olina-Kalaeloa	5,400	16,100	10,700	198%
13. Makakilo-Makaiwa	4,800	9,400	4,600	96%
14. Waipahu-Waikele-Kunia	15,200	17,900	2,700	18%
15. Waiawa-Koa Ridge	4,000	15,900	11,900	298%
16. Mililani-Melemanu-Kipapa	18,200	19,300	1,100	6%
17. Wahiawa-Whitmore-Schofield	10,500	10,800	300	3%
18. East Honolulu	17,500	18,900	1,400	8%
19. Kaneohe-Kahaluu-Kualoa	17,300	18,100	800	5%
20. Kailua-Mokapu-Waimanalo	18,700	19,700	1,000	5%
21. Koolauloa	3,700	4,400	700	19%
22 North Shore	6,200	7,600	1,400	23%
23. Waianae Coast	12,400	15,600	3,200	26%
Total	311,000	405,900	94,900	31%

Note: Individual TAA numbers may not sum to totals due to rounding.
Data source: City Department of Planning and Permitting, 2009.

Table 2-3: Household Size by TAA for Oahu (2007 and 2035)

Transportation Analysis Area (TAA)	Household Size		Household Size Change (Year 2007 to Year 2035)	
	Year 2007	Year 2035	Difference	Percentage Difference
1. Ward-Chinatown	1.92	1.84	-0.08	-4%
2. Kakaako	1.81	1.71	-0.10	-6%
3. Punchbowl-Sheridan-Date	1.90	1.84	-0.06	-3%
4. Waikiki	1.70	1.67	-0.03	-2%
5. Kahala-Tantalus	2.73	2.65	-0.08	-3%
6. Pauoa-Kalihi	3.28	3.13	-0.15	-5%
7. Iwilei-Mapunapuna-Airport	3.38	3.32	-0.06	-2%
8. Hickam-Pearl Harbor	3.36	3.24	-0.12	-4%
9. Moanalua-Halawa	3.07	2.97	-0.10	-3%
10. Aiea-Pearl City	3.05	2.92	-0.12	-4%
11. Honouliuli-Ewa Beach	3.44	3.23	-0.21	-6%
12. Kapolei-Ko Olina-Kalaeloa	3.36	3.18	-0.19	-6%
13. Makakilo-Makaiwa	3.28	3.17	-0.11	-3%
14. Waipahu-Waikele-Kunia	3.69	3.41	-0.28	-8%
15. Waiawa-Koa Ridge	2.96	2.95	-0.01	0%
16. Mililani-Melemanu-Kipapa	2.93	2.73	-0.20	-7%
17. Wahiawa-Whitmore-Schofield	3.40	3.19	-0.21	-6%
18. East Honolulu	2.79	2.61	-0.18	-6%
19. Kaneohe-Kahaluu-Kualoa	3.10	2.90	-0.21	-7%
20. Kailua-Mokapu-Waimanalo	3.34	3.13	-0.21	-6%
21. Koolauloa	3.92	3.64	-0.27	-7%
22 North Shore	2.89	2.70	-0.19	-7%
23. Waianae Coast	3.51	3.27	-0.24	-7%
Total	2.91	2.74	-0.17	-6%

Data source: City Department of Planning and Permitting, 2009.

Figure 2-2: Population Change by TAZ: 2007 to 2035

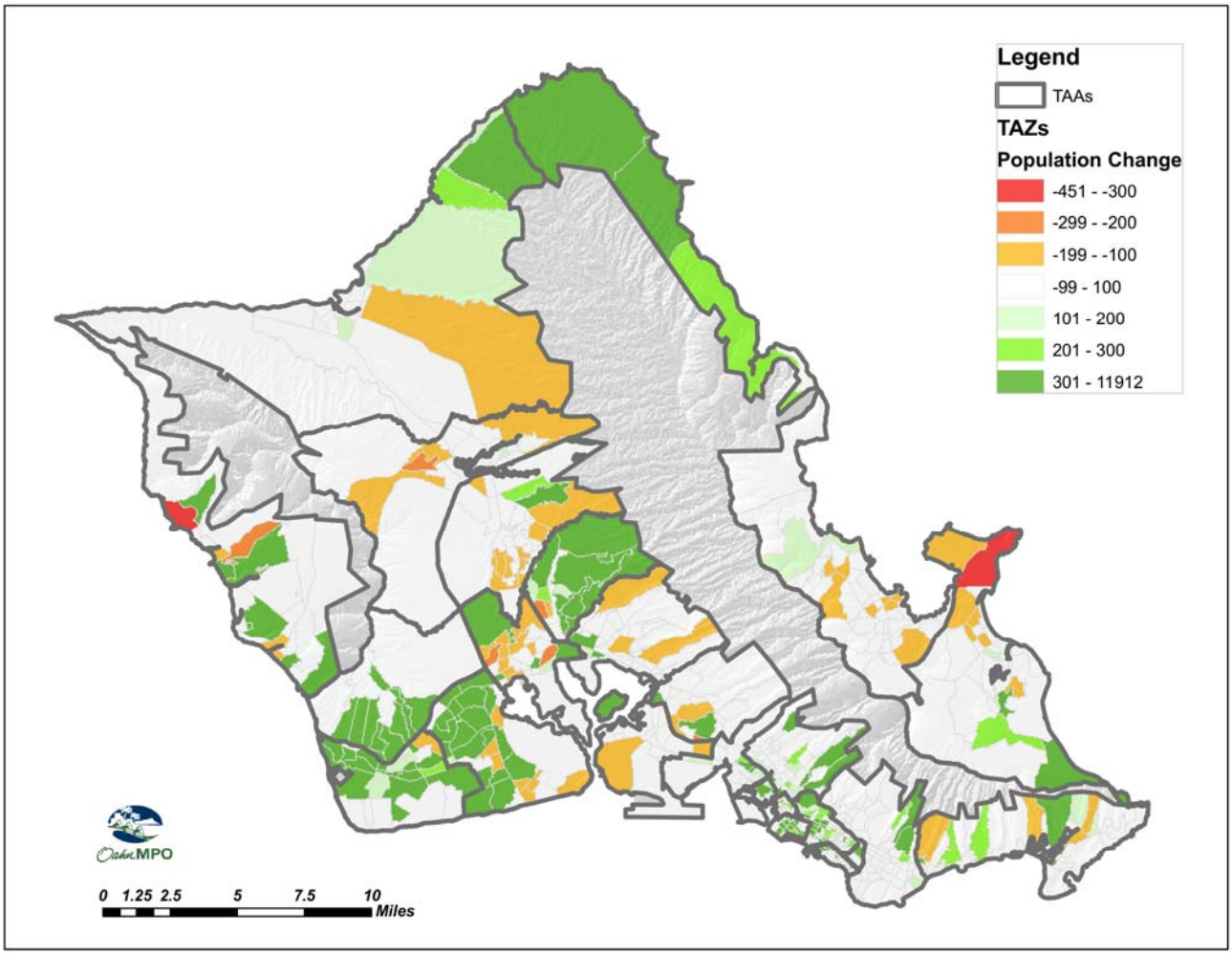
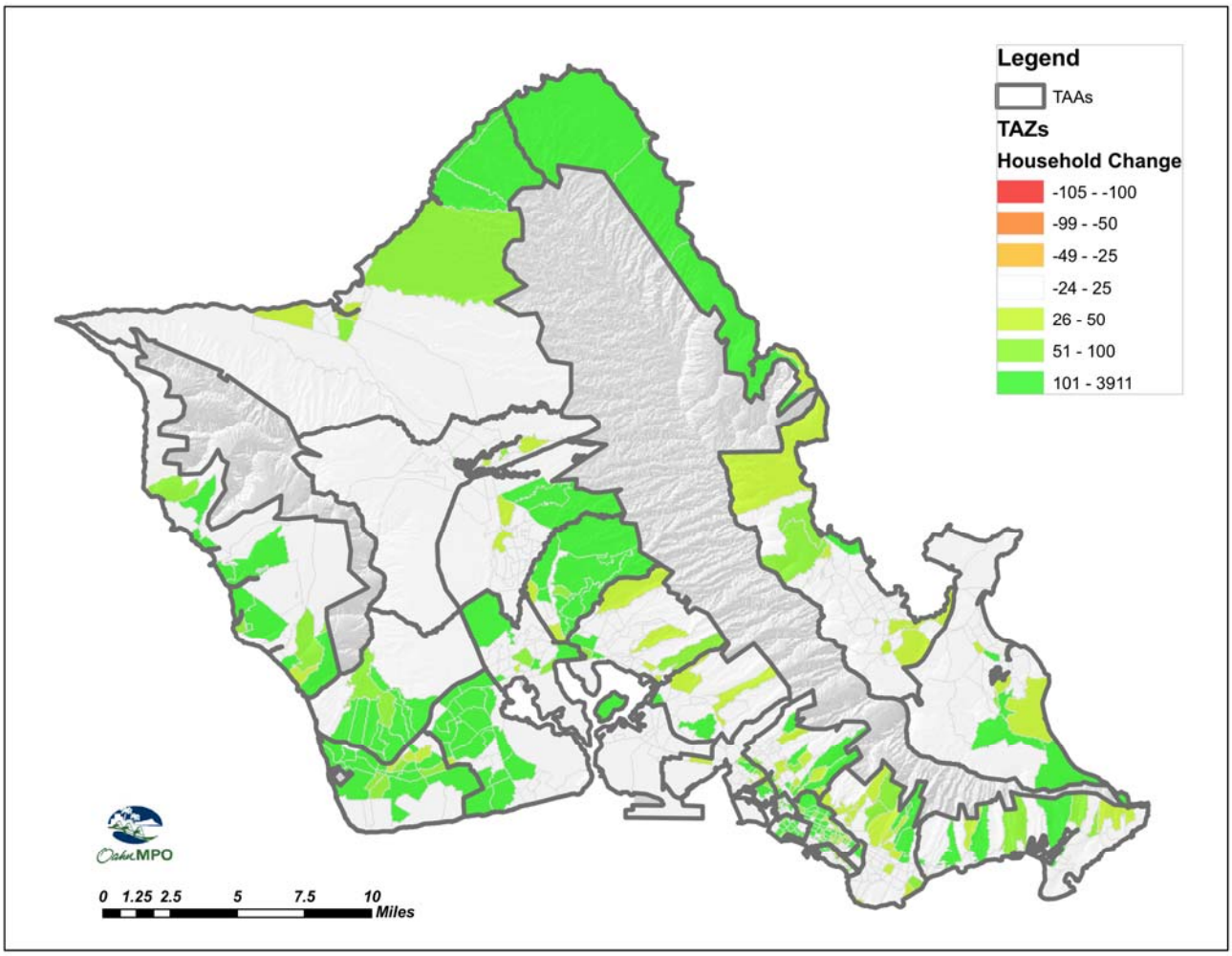


Figure 2-3: Households Change by TAZ: 2007 to 2035



2.2 Employment

Table 2-4 shows employment statistics by TAA. 71 percent of the jobs are located in TAAs 1 through 10) for 2007. In 2035, almost all TAAs are expected to experience an increase in jobs. TAAs 1 through 10 are still expected to have a majority (64 percent) of all jobs in 2035. This accounts for over 52,100 more work trips in 2035 in TAAs 1 through 10 and on Oahu's most congested roadways. The number of jobs in Honouliuli-Ewa Beach, Kapolei-Ko Olina-Kalaeloa, Makakilo-Makaiwa, and Waiawa-Koa Ridge are forecast to more than double by 71,100. The expected increase in employment in these areas will help alleviate congestion in the H-1 corridor by giving commuters more opportunities to work closer to home.

Table 2-5 summarizes employment statistics by category. Total employment on Oahu in 2007 is estimated at about 556,900 jobs, growing to 693,300 by 2035 (25 percent). This increase is consistent with forecasted population growth between 2007 and 2035, and somewhat less than the forecasted growth in households. Figure 2-4 shows the forecasted change in employment between 2007 and 2035 by TAZ. The TAZ level on the map was provided to show a finer level of granularity of detail as opposed to the TAA level which is shown in the table so the major changes occurred could be pinpointed. The dark outline shows where the TAA boundaries are.

Table 2-4: Employment by TAA for Oahu (2007 and 2035)

Transportation Analysis Area (TAA)	Employment		Employment Change (Year 2007 to Year 2035)	
	Year 2007	Year 2035	Difference	Percentage Difference
1. Ward-Chinatown	57,300	64,200	6,900	12%
2. Kakaako	33,300	43,100	9,800	29%
3. Punchbowl-Sheridan-Date	52,600	61,600	9,000	17%
4. Waikiki	46,100	48,100	2,000	4%
5. Kahala-Tantalus	38,500	43,500	5,000	13%
6. Pauoa-Kalihi	22,500	29,200	6,700	30%
7. Iwilei-Mapunapuna-Airport	76,900	81,700	4,800	6%
8. Hickam-Pearl Harbor	26,800	27,700	900	3%
9. Moanalua-Halawa	16,500	17,700	1,100	7%
10. Aiea-Pearl City	24,300	30,100	5,800	24%
11. Honouliuli-Ewa Beach	14,000	40,300	26,200	187%
12. Kapolei-Ko Olina-Kalaeloa	22,500	55,200	32,600	145%
13. Makakilo-Makaiwa	2,100	5,700	3,600	171%
14. Waipahu-Waikele-Kunia	17,500	23,000	5,500	31%
15. Waiawa-Koa Ridge	6,200	14,900	8,700	141%
16. Mililani-Melemanu-Kipapa	19,300	22,700	3,400	18%
17. Wahiawa-Whitmore-Schofield	19,500	21,800	2,300	12%
18. East Honolulu	7,000	6,600	-400	-6%
19. Kaneohe-Kahaluu-Kualoa	12,600	12,700	100	1%
20. Kailua-Mokapu-Waimanalo	25,000	25,800	800	3%
21. Koolauloa	5,800	7,100	1,300	22%
22 North Shore	4,000	3,900	-100	-2%
23. Waianae Coast	6,500	6,800	300	4%
Total	556,900	693,300	136,500	25%

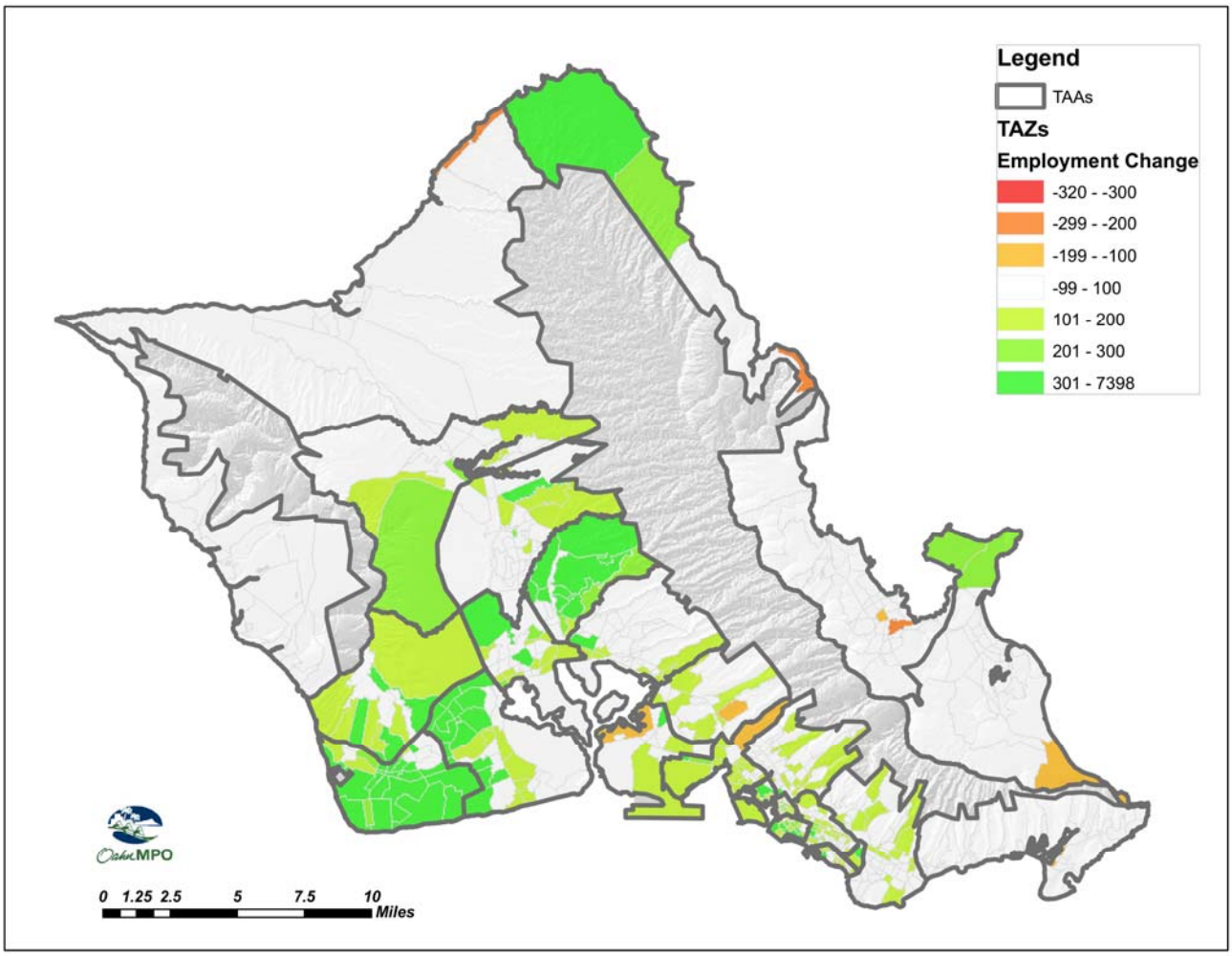
Note: Individual TAA numbers may not sum to totals due to rounding.
Data source: City Department of Planning and Permitting, 2009.

Table 2-5. Employment by Category for Oahu (2007 and 2035)

Employment Category	Year 2007	Year 2035	Difference	Percentage Difference
Military	44,300	46,700	2,400	5%
Government	37,400	42,500	5,100	14%
Hotel	16,500	18,800	2,300	14%
Agriculture	2,500	2,800	200	9%
Transportation/Communications/Utilities	42,500	49,800	7,300	17%
Industrial	30,400	34,600	4,200	14%
Finance/Insurance/Real Estate	28,900	35,900	6,900	24%
Service	224,100	306,100	82,100	37%
Retail	99,500	120,500	21,000	21%
Construction	30,900	35,700	4,900	16%
Total Employment	**556,900**	**693,300**	**136,500**	**25%**

Note: Individual TAA numbers may not sum to totals due to rounding.
Data source: City Department of Planning and Permitting, 2009.

Figure 2-4: Employment Change by TAZ: 2007 to 2035



2.3 Tourism

The island of Oahu is a popular tourist destination and this is borne out by the number of hotel rooms on the island. There were 33,770 visitor units (visitor units include hotel rooms and housing units held for use by visitors) on Oahu in 2007, with over 85 percent of these located in Waikiki. The total number of visitor units is expected to increase to 39,620 by 2035 (17 percent) with Waikiki comprising only 70 percent of the share. Table 2-6 presents visitor unit estimates and forecasts and shows that resort areas such as Ocean Pointe, Ko Olina, and Turtle Bay increased significantly, with 9500 percent, 603 percent, and 125 percent growth, respectively. This agrees with the City's policy articulated in the *General Plan of the City and County of Honolulu* which is not to intensify development in Waikiki, but rather to direct growth to resort areas such as Ko Olina and Turtle Bay. Figure 2-5 visually shows the forecasted change in visitor units between 2007 and 2035 by TAZ. The TAZ level on the map was provided to show a finer level of granularity of detail as opposed to the TAA level which is shown in the table so the major changes

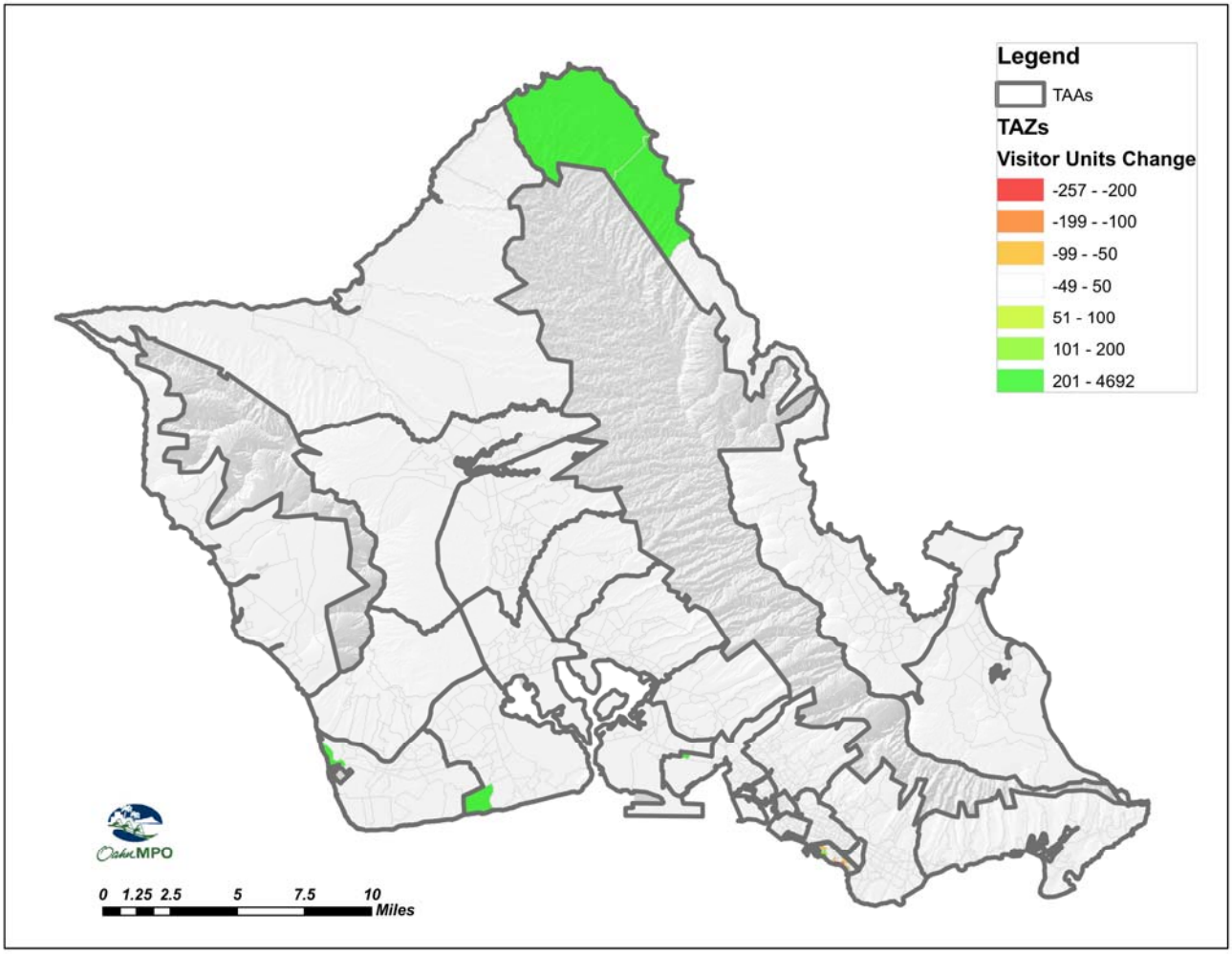
occurred could be pinpointed. The dark outline shows where the TAA boundaries are.

Table 2-6: Visitor Units for Oahu (2007 and 2035)

Transportation Analysis Area (TAA)	Visitor Units		Visitor Units Change (Year 2007 to Year 2035)	
	Year 2007	**Year 2035**	**Difference**	**Percentage Difference**
1. Ward-Chinatown	100	100	0	0%
2. Kakaako	0	250	250	0%
3. Punchbowl-Sheridan-Date	1,420	1,360	-60	-4%
4. Waikiki	28,830	27,750	-1,080	-4%
5. Kahala-Tantalus	260	250	-10	-4%
6. Pauoa-Kalihi	20	20	0	0%
7. Iwilei-Mapunapuna-Airport	660	1,030	370	56%
8. Hickam-Pearl Harbor	0	0	0	0%
9. Moanalua-Halawa	0	0	0	0%
10. Aiea-Pearl City	60	60	0	0%
11. Honouliuli-Ewa Beach	10	960	950	9500%
12. Kapolei-Ko Olina-Kalaeloa	780	5,480	4,700	603%
13. Makakilo-Makaiwa	0	0	0	0%
14. Waipahu-Waikele-Kunia	0	0	0	0%
15. Waiawa-Koa Ridge	0	0	0	0%
16. Mililani-Melemanu-Kipapa	0	0	0	0%
17. Wahiawa-Whitmore-Schofield	240	220	-20	-8%
18. East Honolulu	400	380	-20	-5%
19. Kaneohe-Kahaluu-Kualoa	40	40	0	0%
20. Kailua-Mokapu-Waimanalo	50	50	0	0%
21. Koolauloa	630	1,420	790	125%
22 North Shore	50	40	-10	-20%
23. Waianae Coast	220	210	-10	-5%
Total	33,770	39,620	5,850	17%

Note: Individual TAA numbers may not sum to totals due to rounding.
Data source: City Department of Planning and Permitting, 2009.

Figure 2-5: Visitor Unit Change by TAZ: 2007 to 2035



3 2035 Baseline Overview

The 2035 baseline network consists of the 2007 existing conditions network plus fifteen (15) additional projects. The baseline projects for the Oahu Regional Transportation Plan (ORTP) 2035 are shown in Table 3-1. Of the fifteen projects shown, ten of them are modeled. The travel demand forecasting model does not have the capability to model intelligent transportation system or bikeway projects.

The 2035 baseline project table shown here includes information from the Transportation Improvement Program (TIP) on project type, project sponsor (i.e., City or State), project number from the relevant TIP, and project title and description. The table also provides the relevant *ORTP 2030* project number, as appropriate. As described in one of the footnotes to the table, it should be noted that the TIP project(s) listed may comprise only selected portion(s) or phase(s) of a multi-phase *ORTP 2030* project or program. In addition to the capital projects shown on the table, ongoing operations, maintenance, and preservation work (of regional significance) are also generally considered to be part of the 2035 baseline scenario. For example, the bus network supporting the Honolulu High-Capacity Transit Corridor Project is considered to be part of the 2035 baseline scenario.

Figure 3-1 through Figure 3-9 that follow the project list table show the travel demand forecasting model network plots of each of the ten baseline projects.

Table 3-2 shows the lane-miles by facility type and area type for the 2035 baseline projects. See Appendix Table A - 1 for area type definitions.

Table 3-1. Baseline Projects for 2035 ORTP

Project Type*	City or State	TIP ID#	ORTP 2030 Project No.**	TIP Facility/Project Title	TIP Project Description	Modeled in Travel Demand Forecasting Model?
Projects from FYs 2008-2011 TIP (as of Revision #13, July 2009)						
Highway Project(s)						
A	S	S10	4	Freeway Management System, Interstate H-1, H-2, and Moanalua Freeway, Phase 1B	Manage and guide the Intelligent Transportation System (ITS) program. The project includes software development, equipment procurement assistance, acceptance testing, performance monitoring, and strategic planning. The project consists of installation of closed-circuit television (CCTV) cameras, vehicle detectors, cabinets, and communication equipment. Minor interior modifications of the H-3 Control Center will be done to accommodate system improvements. Phase 1 involves the development of the CCTV system.	No
C	S	S29	20	Interstate Route H-1, PM Zipper Lane, Westbound	Develop a PM zipper lane alternative from Radford Drive to the Waikele Interchange.	Yes
C	S	S48	N/A	Kalanianaole Highway (Route 72) Improvements, Vicinity of Hawaii Kai Drive to Keahole Street (Add Lane)	Add an additional townbound lane from Hawaii Kai Drive to Keahole Street. Includes utility relocation, asphalt concrete pavement, sidewalk, highway lighting, landscaping, irrigation, guardrail, signing and pavement markings.	Yes
A	C	C03	4	Computerized Traffic Control System	This is an ARRA backup project. Should ARRA funds become available, the funds will be used for the project in the Kapolei, Makakilo, and/or Kailua areas. Upgrade and expand fiber optic lines, closed-circuit television (CCTV) cameras, data collection, and signal control in urban and rural areas for connectivity to the Traffic Control Center. Project locations vary.	No
C	C	C34	N/A	Kalaeloa Boulevard (Route 95), Widening and Reconstruction, Phase 1, Oahu Railway and Land Company (O.R. & L.) Right-of-Way to Lauwiliwili	This is an ARRA funded project. Improve and widen Kalaeloa Boulevard, between the old O.R.& L. right-of-way and Lauwiliwili Street, to a six-lane divided roadway, meeting the City and County of Honolulu standards for dedication. Kalaeloa Boulevard is a major regional arterial roadway that serves as an access between the H-1 Freeway and the major	Yes

				Street	industrial areas on Oahu. Stimulus funding will allow the project to move forward in a timely manner to better address the regional traffic and safety issues of the area.	
Transit Project(s)						
E	C	C17	31	Honolulu High Capacity Transit Corridor Project [Airport Alternative will be included]	This is an ARRA-funded project. Plan, design, construct, inspect, relocate, and acquire land and equipment for a fixed guideway system between East Kapolei and Ala Moana Center.	Yes
E	C	C18	30	Intra-island Ferry ***	Continue ferry demonstration project operations and plans, design, and construct facilities for a ferry operation which would serve as an extension of the bus service and provide West Oahu residents with another transportation option to downtown Honolulu. The project will include, but not be limited to parking lots, passenger terminals, and improved docking facilities.	No
Bicycle Project(s)						
F	S	S42	2	Kalanianaole Highway (Route 72), Bicycle Improvements, Waimanalo Beach Park to Makapuu	Improve bike route on Kalanianaole Highway, from Huli Street to Makapuu Beach Park	No
Projects from FYs 2006-2008 TIP not already included above (i.e., recently constructed/currently under construction)						
Highway Project(s)						
C	S	S63	14	Interstate Route H-1, Addition and Modification of Freeway Access, Makakilo IC to Palailai IC (Kapolei IC Complex) [soon to be or currently under construction]	Improve/modify freeway access to Interstate Route H-1 between Makakilo IC and Palailai IC (Kapolei Interchange Complex) (Phase 1)	Yes
C	S	S73	N/A	Interstate Route H-1, Kinau Off-Ramp Improvements, Near Queens Medical Center [soon to be or currently under construction]	The project will construct a right-turn lane from the Kinau Off-Ramp to provide a direct access to Lusitana Street. The design includes the addition of an 11-ft wide, 200-foot long deceleration lane.	Yes
C	S	S58	N/A	North/South Road, Vicinity of Kapolei Parkway to Interstate Route H-1	Construct North/South Road from Kapolei Parkway to vicinity of the H-1 Freeway. Improvements include a multi-lane highway and an interchange at the H-1 Freeway. (Phases 1B	Yes

				[under construction]	and 1C)	
C	C	C6	N/A	Kamokila Boulevard Extension [construction is complete]	Construct an approximately 200-foot extension of Kamokila Boulevard from the old Oahu Railway and Land Company (O.R. & L.) right-of-way to F.D. Roosevelt Avenue.	Yes
C	C	C7	26	Kapolei Parkway [construction is substantially complete]	Design and construct Kapolei Parkway in two phases between Renton Road and the City/State property line at the western boundary of Ewa Villages (0.7 miles).	Yes
Projects from FYs 2004-2006 TIP not already included above (i.e., recently constructed/currently under construction)						
Highway Project(s)						
C	S	S7	N/A	Fort Weaver Road Widening, Vicinity of Aawa Drive to Geiger Road [under construction]	Widen the roadway to six lanes. Improvements include turning lanes, traffic signal modifications, and additional highway lighting.	Yes
Bicycle Project(s)						
F	S	S41	2	Kamehameha Highway Bikeway, Radford Drive to Arizona Memorial	Construct a bikeway, including drainage improvements, markings, signing, and Americans with Disabilities Act improvements.	No

*Key	
A =	Islandwide Projects
B =	Safety and Operational Improvement Projects
C =	Congestion Relief Projects
D =	Second Access Projects
E =	Transit Projects
F =	Bicycle Projects

**ORTP 2030 project number provided for information only. TIP project(s) listed above may comprise only selected portion(s) or phase(s) of a multi-phase ORTP 2030 project or program.

***Operation of the intra-island ferry was terminated on June 30, 2009, and cannot be “guaranteed” to be in place in 2035.

N/A = Not applicable (i.e. project not listed in current TIP)

Figure 3-1. Highway Project – Interstate Route H-1, PM Zipper Lane, Westbound

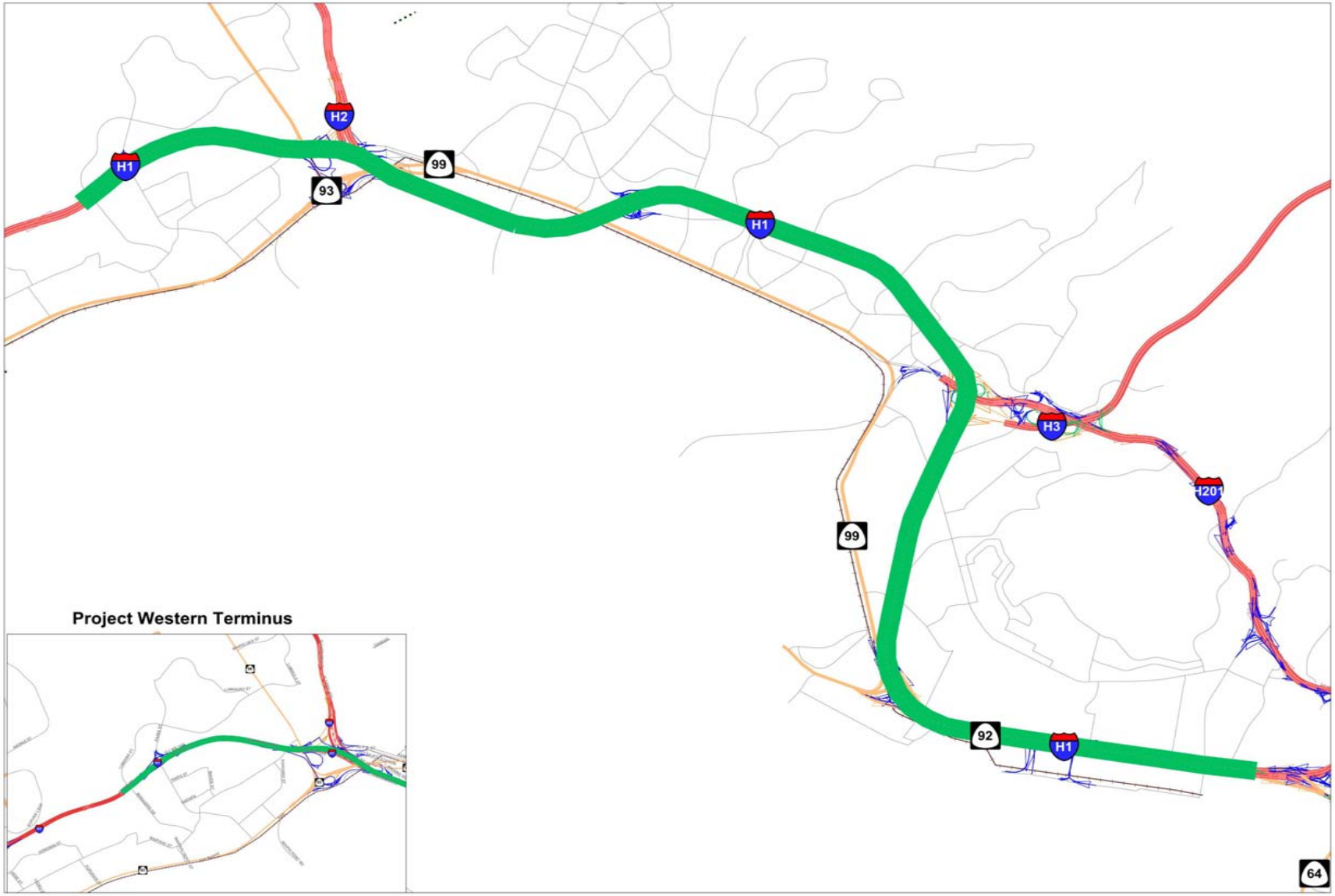


Figure 3-2. Highway Project – Kalanianaole Highway (Route 72) Improvements, Vicinity of Hawaii Kai Drive to Keahole Street (Add Lane)

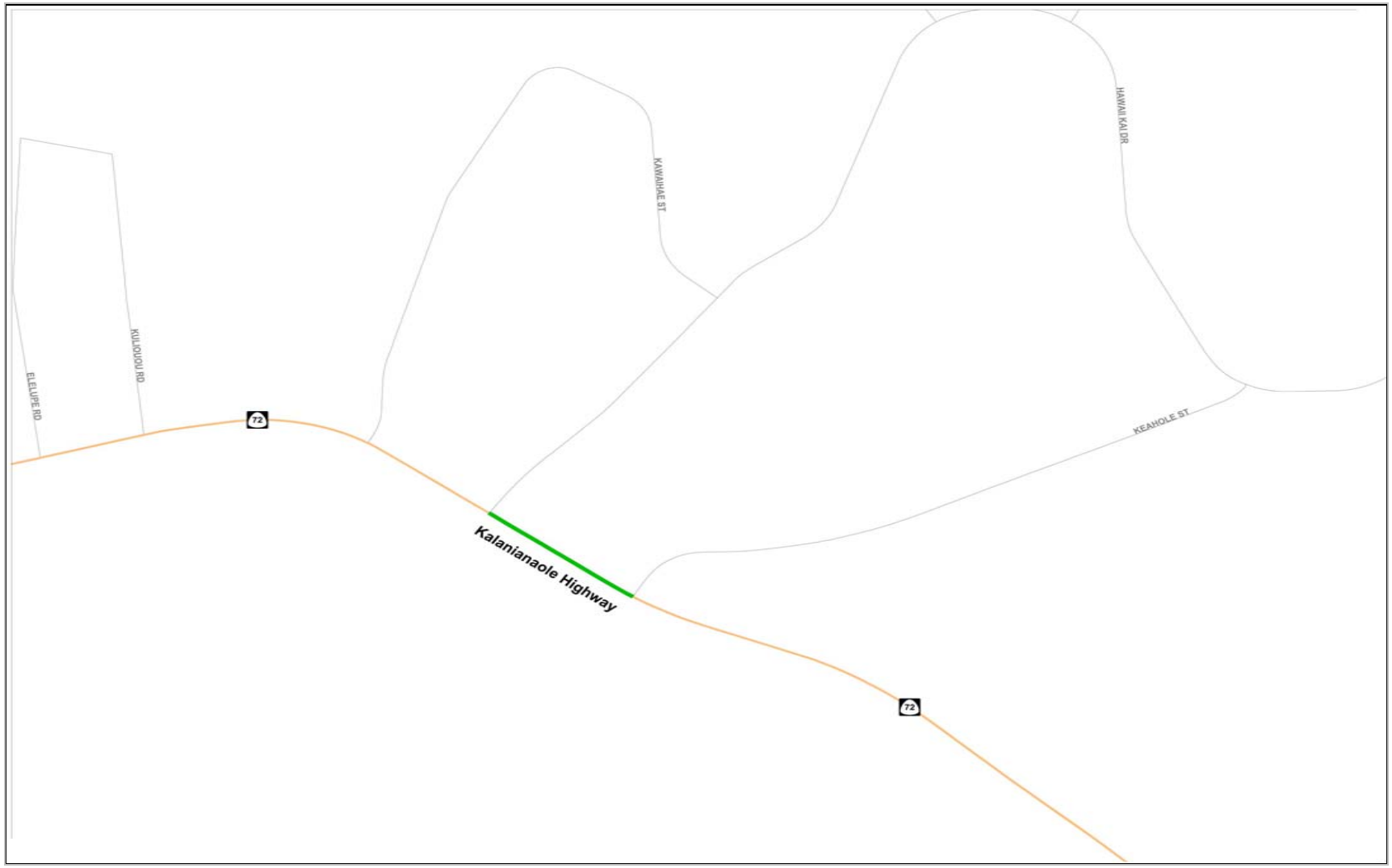


Figure 3-3. Highway Project – Kalaeloa Boulevard (Route 95), Widening and Reconstruction, Phase 1, Oahu Railway and Land Company (O.R. & L.) Right-of-Way to Lauwiliwili Street

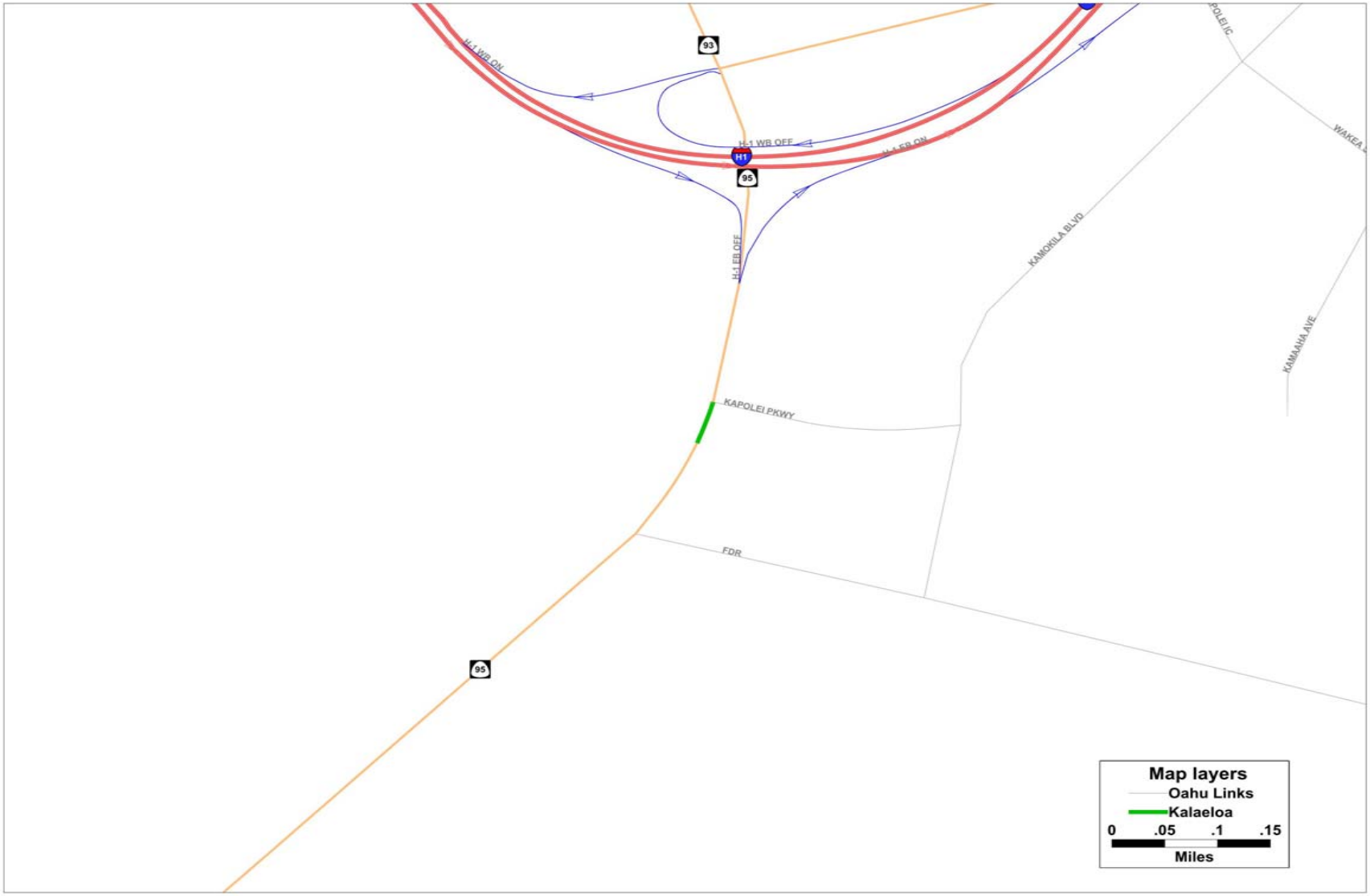


Figure 3-4. Transit Project – Honolulu High Capacity Transit Corridor Project [Airport Alternative]

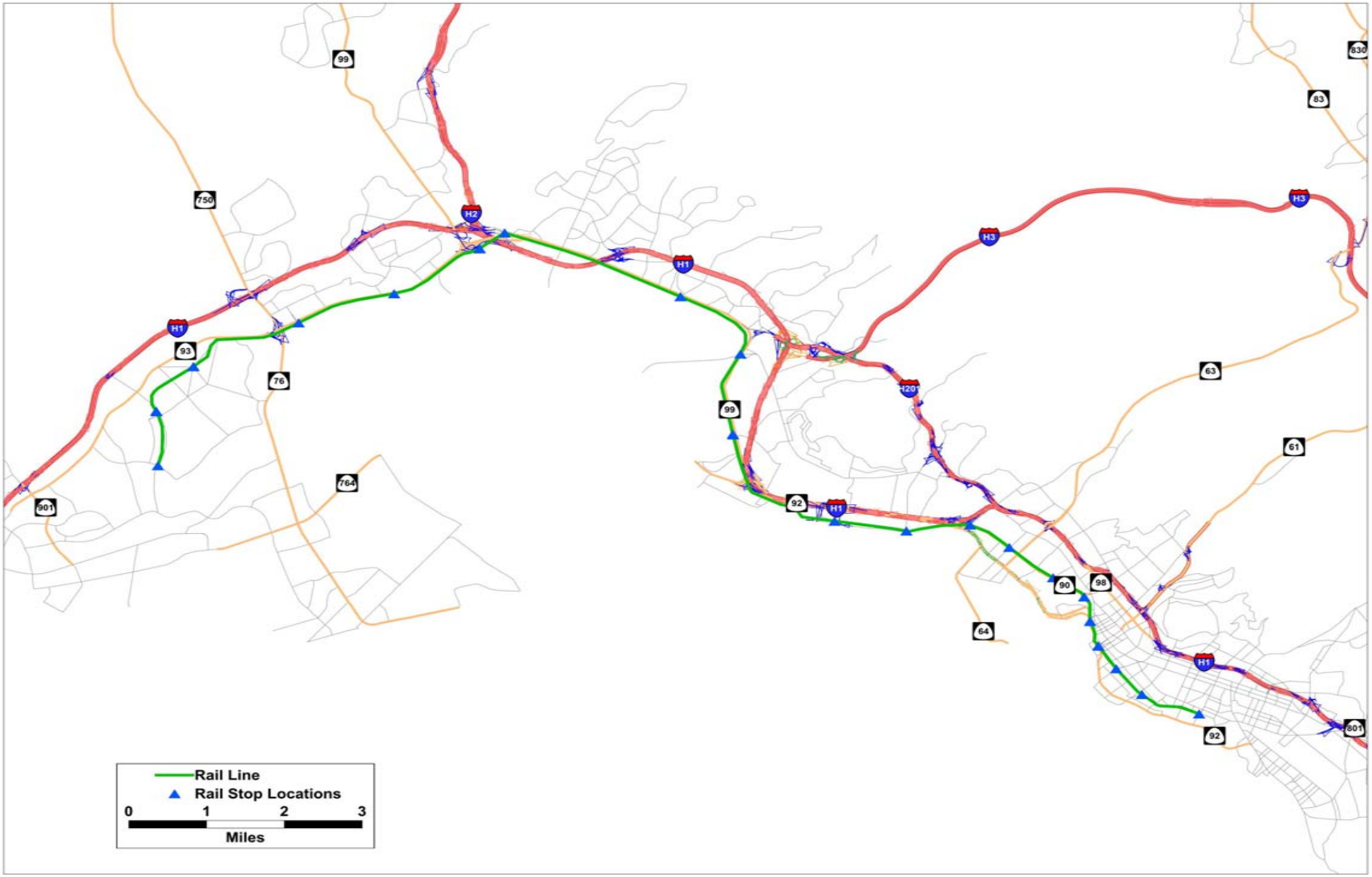


Figure 3-5. Highway Project – Interstate Route H-1, Addition and Modification of Freeway Access, Makakilo Interchange to Palailai Interchange (Kapolei Interchange Complex)

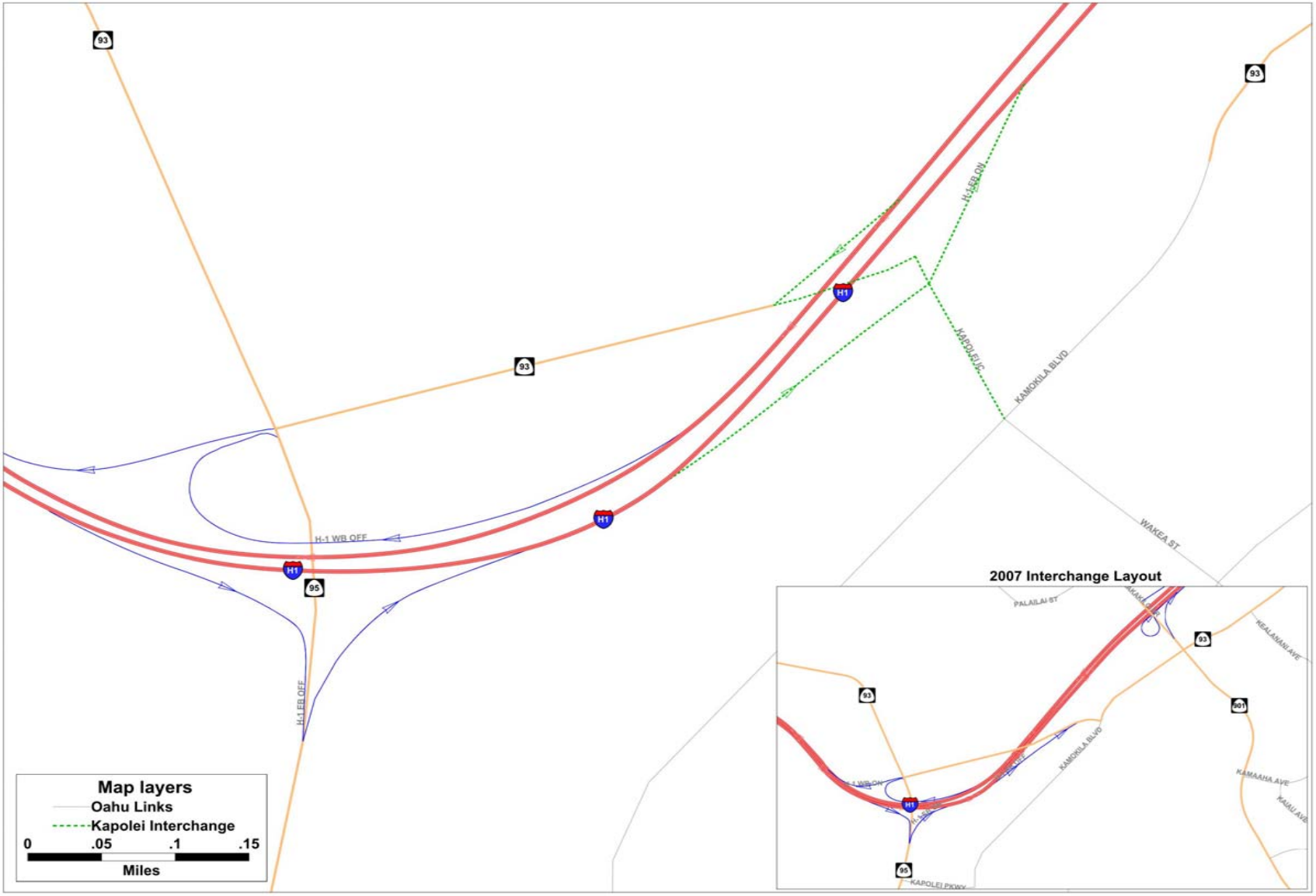


Figure 3-6. Highway Project – North-South Road, Vicinity of Kapolei Parkway to Interstate Route H-1

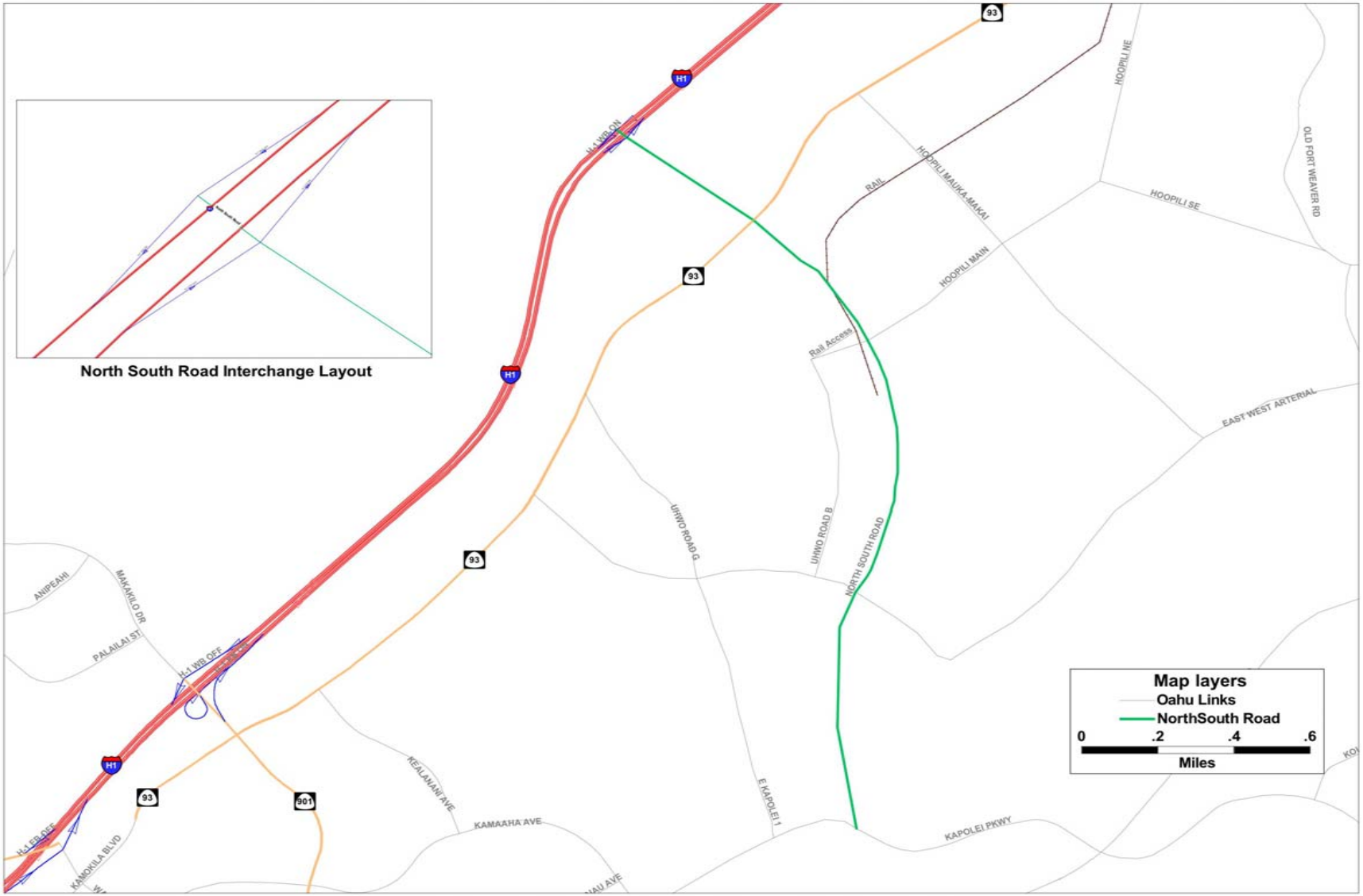


Figure 3-7. Highway Project – Kamokila Boulevard Extension

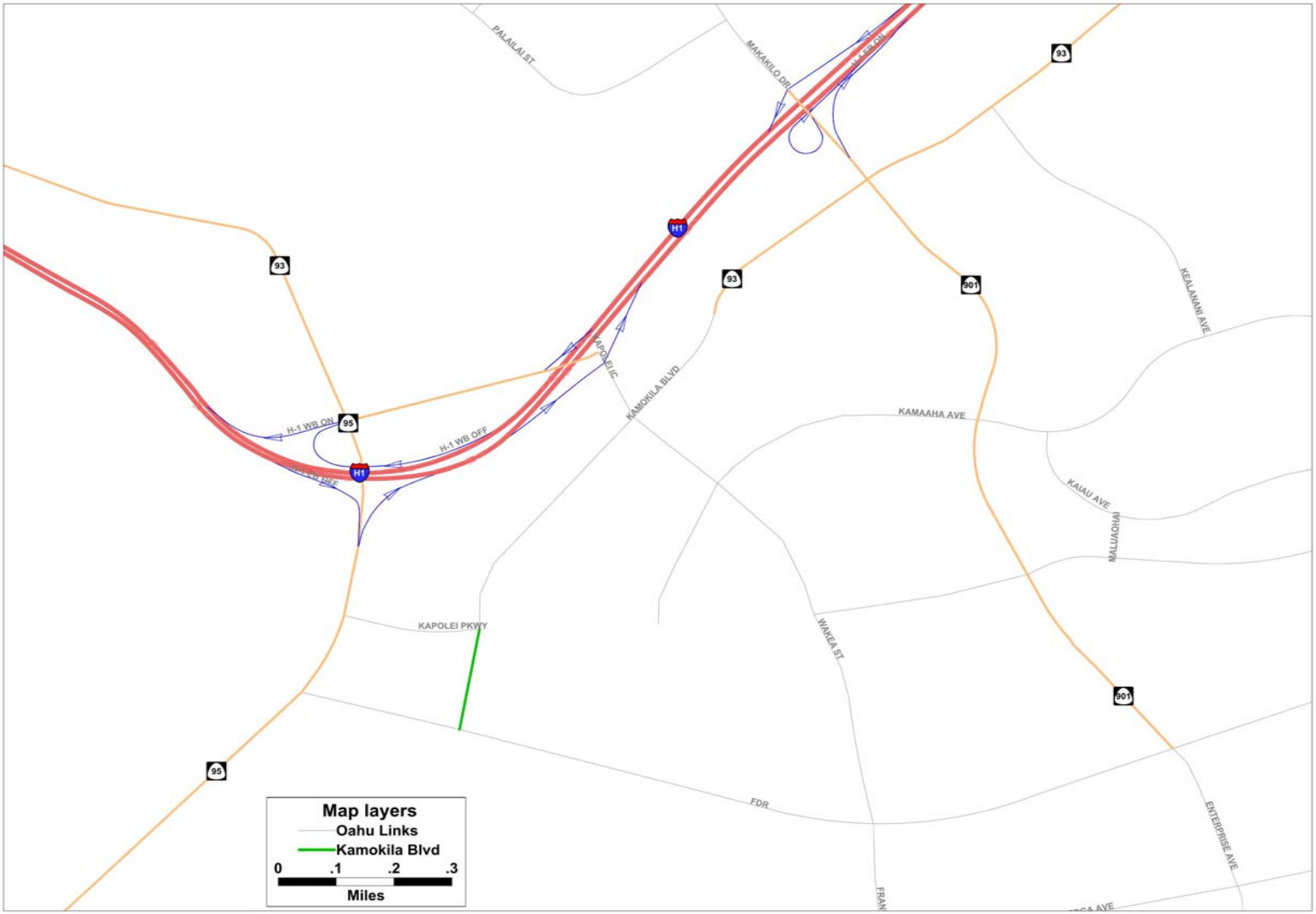


Figure 3-8. Highway Project – Kapolei Parkway

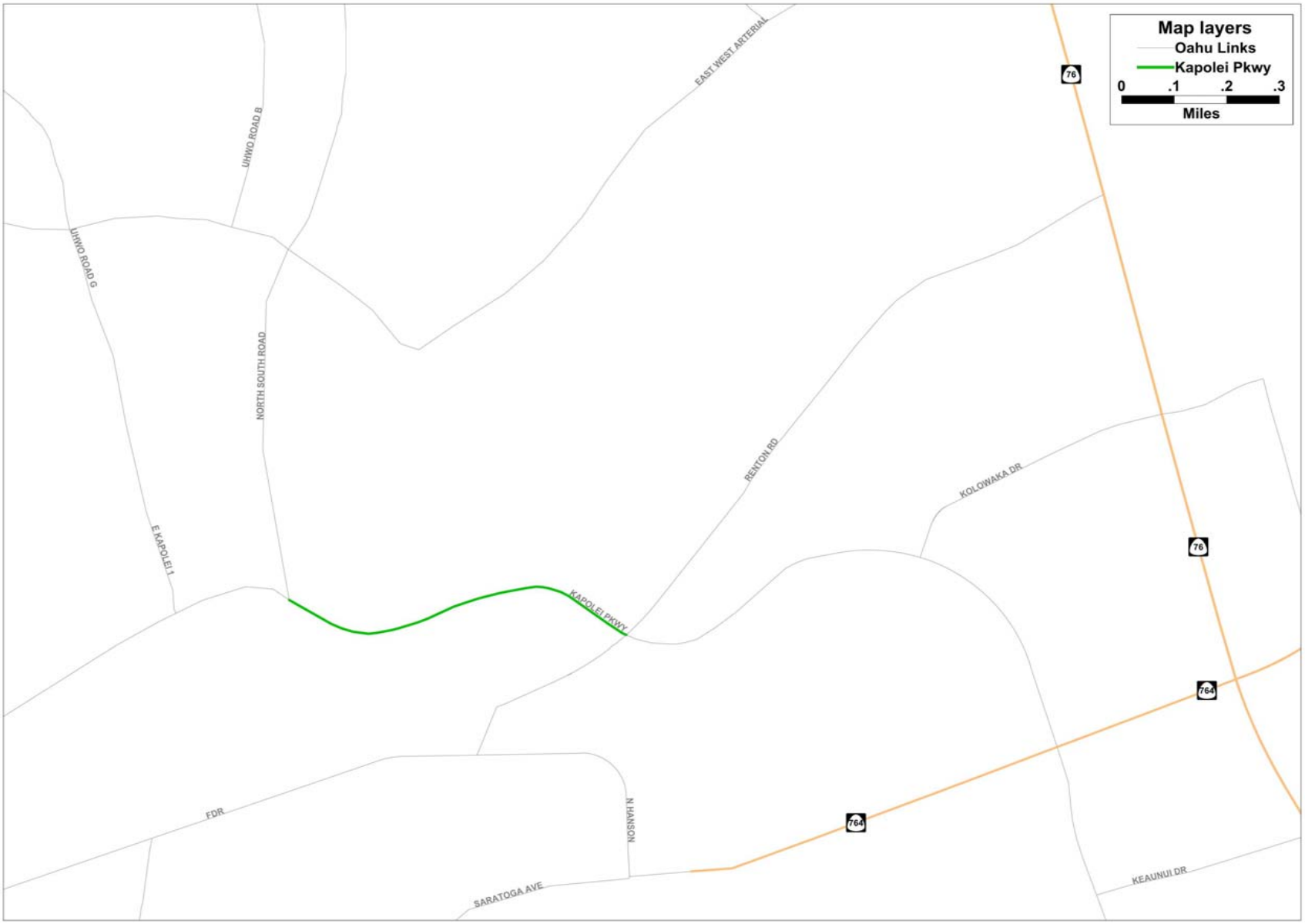


Figure 3-9. Fort Weaver Road Widening, Vicinity of Aawa Drive to Geiger Road

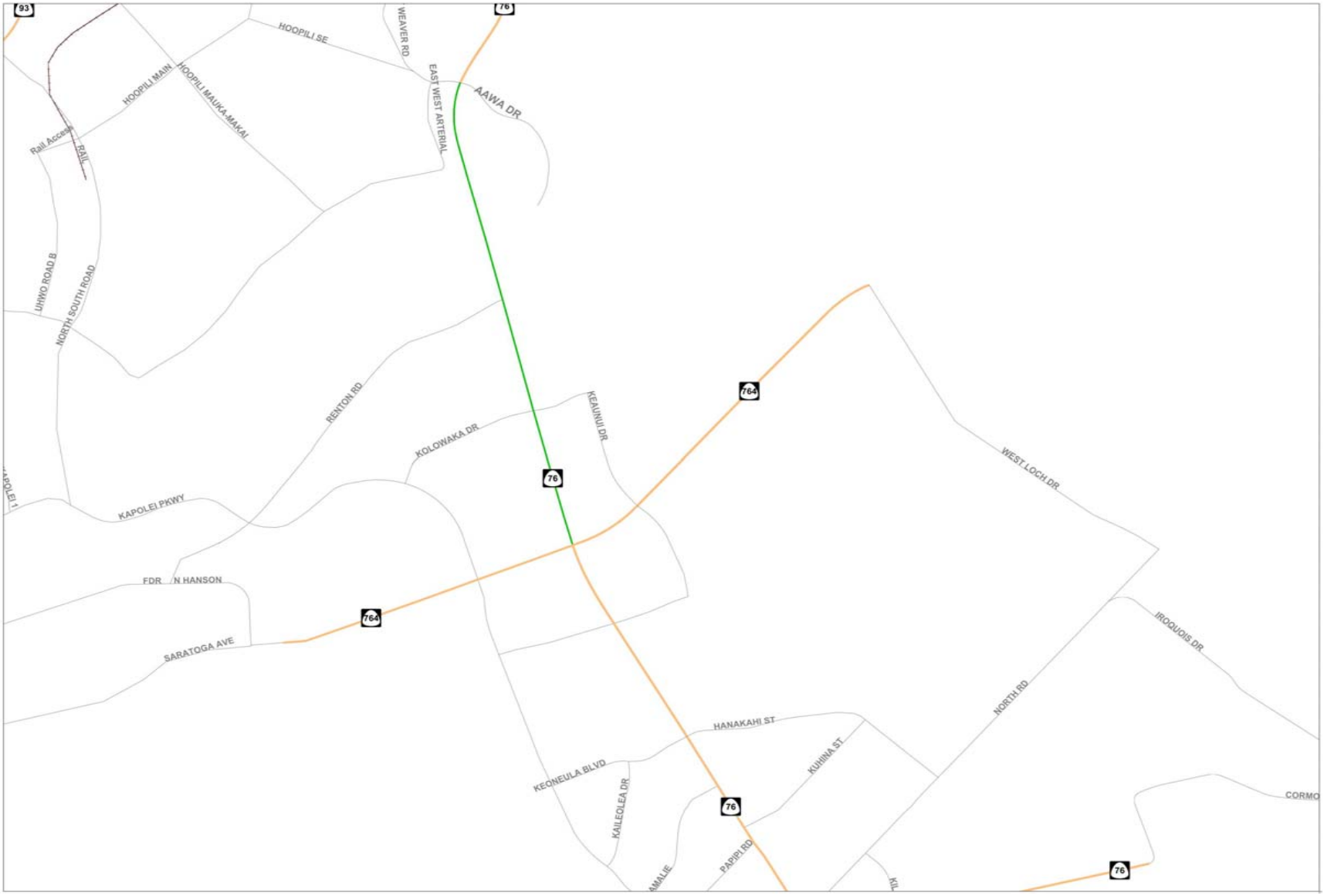


Table 3-2. 2035 Baseline Project Lane Miles by Facility Type and Area Type

	Area Type[1]								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways*	0	6	16	70	151	35	53	22	**353**
Expressways	0	0	3	13	32	28	40	13	**130**
Class I arterials	11	16	36	52	101	7	68	17	**307**
Class II arterials	6	15	37	26	52	20	74	40	**271**
Class III arterials	4	4	24	27	104	4	31	1	**199**
Class I collectors	2	6	14	57	90	3	41	6	**219**
Class II collectors	1	4	26	44	195	8	127	14	**420**
Local Streets	4	2	11	39	76	5	68	10	**216**
High Speed Ramps	0	0	1	6	20	3	9	1	**41**
Low Speed Ramps	0	3	4	20	23	1	12	1	**62**
Centroid Connectors	6	11	41	80	167	17	105	55	**483**
Rail	2	1	3	14	15	0	3	0	**38**
All Facility Types	**36**	**67**	**215**	**447**	**1027**	**131**	**633**	**183**	**2738**

*The zipper lane (both AM and PM) and HOV lanes are included under the freeway facility type. When in operation, the zipper lane takes away one lane from the general purpose lanes traveling in the opposite direction. In the AM period, there are 43 HOV lane miles, while the PM period has HOV 40 lane miles.

[1] See Table A - 1 for Area Type Definitions

4 Person Trips by Purpose and Mode

This section describes the basic travel demand forecasting model results such as person trips and mode choice associated with the 2035 baseline, comparing it to the 2007 Existing Conditions results.

As compared to year 2007, total system-wide daily person trips are projected to increase by about 26 percent for the 2035 baseline, keeping pace with the projected growth in population between 2007 and 2035. Transit mode share for total daily trips is projected to increase from five percent in 2007 to six percent for the 2035 baseline alternative (Table 4-1).

Table 4-1. Total Daily Person Trips by Mode—2007 and 2035 Baseline Alternative

Alternative	2007		2035 Baseline		Percentage Growth
	Number	Percent by Category	Number	Percent by Category	
Trips by Residents					
Private automobile	2,680,243	84%	3,334,398	82%	24%
Transit	164,761	5%	246,015	6%	49%
Bike/walk	340,258	11%	462,701	11%	36%
Total Trips by Residents	3,185,262	100%	4,043,114	100%	27%
Trips by Visitors					
Private Automobile	104,077	30%	120,717	32%	16%
Transit	27,196	8%	30,175	8%	11%
Taxi	9,780	3%	9,514	3%	-3%
Tour Bus	48,657	14%	57,762	15%	19%
Bike/Walk	161,755	46%	155,141	42%	-4%
Total Trips by Visitors	351,465	100%	373,309	100%	6%
Ground Access Trips by Air Passengers					
Private Automobile	14,307	23%	25,356	23%	77%
Transit	681	1%	4,555	4%	569%
Taxi	8,049	13%	14,533	13%	81%
Tour Bus	12,667	20%	22,486	20%	78%
Shuttle Bus	27,796	44%	45,770	41%	65%
Total Trips by Air Passengers	63,500	100%	112,700	100%	77%
Truck Trips					
Total Trips by Truck	195,322	100%	237,306	100%	21%
Total Daily Trips (All)	*3,795,549*	*100%*	*4,766,429*	*100%*	*26%*

Table 4-2 shows the mode choice results by purpose for residents in the 2035 baseline alternative model run. 82.5 percent of all resident trips were made by private vehicles (single, 2, and 3+ occupants), while over six percent of all resident trips were made by transit (express, local, fixed guideway, park-and-ride, or kiss-and-ride). Over 11 percent of the resident trips were made with the auxiliary mode (walk and bike). The journey-to-work/home-based work trip purpose shows that 12.3 percent of the trips are made by transit. Home-based college trips also show a high percentage is made by transit (25.7 percent). These purposes show a much higher percentage of trips on transit compared to the overall percentage of six percent.

Table 4-3 shows the comparison of the 2035 baseline mode choice results by purpose to the 2007 existing conditions results. This table shows the change and the percent change between 2007 existing conditions and the 2035 baseline scenario. The drive modes increased at relatively the same rate as the population growth (24 percent). The walk-to-express bus mode decreased 39 percent in the 2035 baseline alternative because many of the commuter express buses were truncated at fixed-guideway stations and thus turned into local feeder buses. The informal park-and-ride mode was significant in the existing year 2007,[2] so naturally as a fixed-guideway system with formal park-and-ride lots become available in the future, the convenience and safety of the system would shift more people into the formal park-and-ride mode.

[2] The 2005 On-Board Survey done for the Honolulu High Capacity Transit Corridor Project revealed that over 90 percent of park and ride trips were "informal." See City and County of Honolulu, Department of Transportation Services, Rapid Transit Division, Honolulu High Capacity Transit Corridor Project, *Final Model Development, Calibration, and Validation Report*, October 2009.

Table 4-2. 2035 Baseline Alternative Mode Choice Summary Results by Trip Purpose for Residents

Mode	Purpose											Total
	Journey-to-Work / Home-Based-Work	Journey-to-Work / Home-Based-Other	Journey-to-Work / Work-Based	Journey-to-Work / Non-Home-Based	Journey-at-Work / Work-Based	Journey-at-Work / Non-Home-Based	Non-Work-Related / Home-Based-School (K-12)	Non-Work-Related / Home-Based-College	Non-Work-Related / Home-Based-Shopping	Non-Work-Related / Home-Based-Other	Non-Work-Related / Non-Home-Based	
Single-occupant vehicle	537,847	81,396	162,196	29,254	115,755	2,964	8,251	35,796	112,407	264,081	142,211	1,492,158
	59%	*37%*	*67%*	*33%*	*53%*	*25%*	*3%*	*49%*	*29%*	*27%*	*23%*	*37%*
Double-occupant vehicle	150,651	73,731	42,062	33,730	29,881	1,714	65,337	8,506	131,865	300,523	221,472	1,059,472
	17%	*33%*	*17%*	*38%*	*14%*	*14%*	*23%*	*12%*	*34%*	*31%*	*35%*	*26%*
Three-or-more occupant vehicle	40,971	46,442	12,652	15,965	11,634	428	104,720	2,869	95,405	247,180	204,567	782,833
	5%	*21%*	*5%*	*18%*	*5%*	*4%*	*37%*	*4%*	*25%*	*25%*	*33%*	*19%*
Walk to express transit	3,445	222	2	526	0	0	237	205	0	0	0	4,637
	0%	*0%*	*0%*	*1%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Walk to local bus transit	55,713	4,265	7,129	5,151	4,352	4,475	16,089	9,518	9,799	24,869	3,534	144,894
	6%	*2%*	*3%*	*6%*	*2%*	*37%*	*6%*	*13%*	*3%*	*3%*	*1%*	*4%*
Walk to fixed guideway transit	27,379	1,846	5,052	1,835	1,735	1,161	3,175	5,715	1,366	11,847	1,930	63,041
	3%	*1%*	*2%*	*2%*	*1%*	*10%*	*1%*	*8%*	*0%*	*1%*	*0%*	*2%*
Informal Park-and-ride transit	1,129	48	0	7	0	0	261	96	138	215	0	1,894
	0%	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Formal Park-and-ride transit	12,547	0	0	0	0	0	2	1,575	11	533	0	14,668
	1%	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*2%*	*0%*	*0%*	*0%*	*0%*
Kiss-and-ride transit	10,741	253	15	0	1	1	1,554	1,841	749	1,673	3	16,831
	1%	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*	*2%*	*0%*	*0%*	*0%*	*0%*
Auxiliary walk	51,859	10,809	13,795	3,112	52,910	1,246	74,489	4,143	30,236	122,771	51,246	416,616
	6%	*5%*	*6%*	*3%*	*24%*	*10%*	*26%*	*6%*	*8%*	*12%*	*8%*	*10%*
Auxiliary bike	12,666	1,860	954	33	2,119	13	8,488	3,441	2,584	11,401	2,546	46,105
	1%	*1%*	*0%*	*0%*	*1%*	*0%*	*3%*	*5%*	*1%*	*1%*	*0%*	*1%*
Total	*904,948*	*220,872*	*243,857*	*89,613*	*218,387*	*12,002*	*282,603*	*73,705*	*384,560*	*985,093*	*627,509*	*4,043,149*

Table 4-3. Comparison of 2035 Baseline to 2007 Mode Choice Results by Purpose for Residents (Change and Percent Change)

Mode	Purpose											Total
	Journey-to-Work / Home-Based-Work	Journey-to-Work / Home-Based-Other	Journey-to-Work / Work-Based	Journey-to-Work / Non-Home-Based	Journey-at-Work / Work-Based	Journey-at-Work / Non-Home-Based	Non-Work-Related / Home-Based-School (K-12)	Non-Work-Related / Home-Based-College	Non-Work-Related / Home-Based-Shopping	Non-Work-Related / Home-Based-Other	Non-Work-Related / Non-Home-Based	
Single-occupant vehicle	87,281	17,927	31,210	6,288	25,430	545	1,617	5,115	23,178	52,933	31,181	*282,705*
	19%	*28%*	*24%*	*27%*	*28%*	*23%*	*24%*	*17%*	*26%*	*25%*	*28%*	*23%*
Double-occupant vehicle	18,434	14,124	6,852	7,008	6,596	308	12,792	645	29,173	61,390	48,869	*206,191*
	14%	*24%*	*19%*	*26%*	*28%*	*22%*	*24%*	*8%*	*28%*	*26%*	*28%*	*24%*
Three-or-more occupant vehicle	10,175	9,991	3,316	3,389	2,562	76	18,381	523	21,054	50,855	45,045	*165,367*
	33%	*27%*	*36%*	*27%*	*28%*	*22%*	*21%*	*22%*	*28%*	*26%*	*28%*	*27%*
Walk to express transit	-2,411	-165	-2	172	0	0	-370	-236	0	0	0	*-3,012*
	-41%	*-43%*	*-50%*	*49%*	*0%*	*0%*	*-61%*	*-54%*	*0%*	*0%*	*0%*	*-39%*
Walk to local bus transit	1,302	358	-883	285	-49	141	2,239	-535	986	-3,512	-334	*-2*
	2%	*9%*	*-11%*	*6%*	*-1%*	*3%*	*16%*	*-5%*	*11%*	*-12%*	*-9%*	*0%*
Walk to fixed guideway transit	27,379	1,846	5,052	1,835	1,735	1,161	3,175	5,715	1,366	11,847	1,930	*63,041*
	N/A	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Informal Park-and-ride transit	-508	10	0	2	0	0	27	-68	-10	-86	0	*-633*
	-31%	*26%*	*0%*	*40%*	*0%*	*0%*	*12%*	*-41%*	*-7%*	*-29%*	*0%*	*-25%*
Formal Park-and-ride transit	12,366	-1	0	0	0	0	1	1,575	11	532	0	*14,484*
	6832%	*-100%*	*0%*	*0%*	*0%*	*0%*	*100%*	*0%*	*0%*	*53200%*	*0%*	*7872%*
Kiss-and-ride transit	4,774	72	5	0	-1	0	633	1,227	188	446	-2	*7,342*
	80%	*40%*	*50%*	*0%*	*-50%*	*0%*	*69%*	*200%*	*34%*	*36%*	*-40%*	*77%*
Auxiliary walk	15,539	3,533	2,454	663	11,812	263	18,600	1,069	9,146	36,189	11,519	*110,787*
	43%	*49%*	*22%*	*27%*	*29%*	*27%*	*33%*	*35%*	*43%*	*42%*	*29%*	*36%*
Auxiliary bike	3,138	590	180	7	492	3	2,300	818	790	2,759	543	*11,620*
	33%	*46%*	*23%*	*27%*	*30%*	*30%*	*37%*	*31%*	*44%*	*32%*	*27%*	*34%*
Total	*177,469*	*48,285*	*48,184*	*19,649*	*48,577*	*2,497*	*59,395*	*15,848*	*85,882*	*213,353*	*138,751*	*857,890*
	20%	*22%*	*20%*	*22%*	*22%*	*21%*	*21%*	*22%*	*22%*	*22%*	*22%*	*21%*

5 Assignment Results

This section describes the assignment results such as vehicle miles traveled, vehicle hours traveled, vehicle hours of delay, and transit boardings by mode associated with the 2035 baseline, comparing it to the existing year 2007 results.

5.1 Highway Assignment

The highway assignment in the model produces summaries of the total islandwide daily vehicle miles of travel (VMT) by motorized vehicles (automobiles, buses, and commercial vehicle) as estimated by the travel demand forecasting model for the 2035 baseline alternative. Table 5-1 shows the summary of the daily VMT by facility type and area type.[3] Of the more than 15.6 million daily VMT estimated, approximately 41 percent are estimated to occur on the Interstate freeway system (e.g., Interstate Routes H-1, H-2, H-3, and Moanalua Freeways), while the estimated percentages of VMT on the expressways (e.g., Likelike Highway and Pali Highway), ramps, arterials (e.g., Nimitz Highway, Dillingham Boulevard, and Moanalua Road) and collectors (e.g., Kaahumanu Street and Waipahu Street) would be 11 percent, five percent, 32 percent, and 12 percent, respectively.

Table 5-2 shows that the VMT is forecasted to increase by 19 percent over 2007 existing conditions, somewhat less than forecasted population growth, suggesting a decrease in trip length. This is likely due in part to the forecasted employment growth in Honouliuli-Ewa Beach and Kapolei-Ko Olina-Kalaeloa TAAs, providing greater employment and shopping opportunities for residents of these growing population centers. Arterials and collectors are expected to experience a slightly higher share of VMT growth than the overall average, also consistent with the infrastructure available in the highest growth areas on Oahu.

[3] See Appendix Table A - 1 for area type definitions.

Table 5-3 shows Vehicle Hours of Travel (VHT) by facility type and area type in 2035, and Table 5-4 shows the percent change in VHT from 2007 Existing Conditions to 2035 baseline scenario. The model forecasts 484,400 hours of travel in 2035, an increase of 26 percent over 2007 Existing Conditions. This increase slightly outpaces forecasted population growth of 23 percent, indicating more delay per trip in 2035 than in 2007 (given that VHT is growing more than VMT). Arterials are expected to carry the greatest share of VHT, with 37 percent of the total, followed by freeways (29 percent) and collectors (17 percent).

Table 5-5 shows 2035 baseline scenario Vehicle Hours of Delay (VHD) forecasted by the travel demand forecasting model, and Table 5-6 shows the percent change in VHD between the 2007 Existing Conditions scenario and the 2035 baseline scenario. VHD is projected to increase by 46 percent in total, outpacing increases in population over the same period. The largest forecasted increases in delay are expected on Freeways (60 percent), Expressways (57 percent), and Collectors (63 percent). Note that there are some forecasted decreases in delay for certain facility types and area types. However, this could be the result of certain facilities changing area type (as a result of the area becoming more dense) from 2007 to 2035.

Figure 5-1 through Figure 5-6 shows auto travel times to key destinations for the 2035 baseline scenario, from the static equilibrium two-hour AM peak period highway assignment. Figure 5-7 through Figure 5-11 shows levels-of-service and auto volumes from the static equilibrium two-hour AM peak period highway assignment. Figure 5-12 through Figure 5-17 shows auto travel times to key destinations for the 2035 baseline scenario, from the Dynamic Traffic Assignment[4] (DTA) 7:30 a.m. to 7:45 a.m. period. In general the DTA model shows more congestion during the ”peak of the peak,” similar to the 2007 existing conditions scenario.

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[4] Standard static equilibrium capacity restraint algorithms generally fail to properly represent the downstream effects of congestion on travel speeds. A static assignment process uses equations (known as volume-delay functions) to represent delay on each link according to an average two-hour link capacity and the two-hour volume assigned to it. A key limitation of the algorithm is that it does not represent queuing, turning conflicts, or signal timing. The delay experienced on a link is only a function of the capacity of the link and the volume assigned to it, without any effects of downstream traffic queues. This means that the model may under-estimate travel times under congested conditions. However, the static equilibrium assignment model runs reasonably quickly and is multi-class; meaning HOV lanes are restricted to high-occupancy vehicles.

A “planning-level” Dynamic Traffic Assignment (DTA) model available in TransCAD has been utilized for better understanding peak congestion. This model assigns traffic in 15-minute increments throughout the day, so that it can differentiate between shoulders of the peak and true peak conditions. Although it also relies on link-level volume-delay functions, the model considers queuing effects. Each link has a specific vehicle holding capacity (based on length) and when that holding capacity is exceeded, queues build up and reduce the capacity of upstream links. Our analysis indicates that the model more accurately represents travel times under congested conditions, particularly on freeways. The limitations of this model are that it is not multi-class (a simplification was made to reduce capacities of HOV lanes for the purposes of the DTA model) and it also does not represent signal timing or intersection geometry. Therefore, it offers little advantage in modeling arterial delay over the standard static assignment algorithm.

Table 5-1. 2035 Baseline VMT by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0	152,606	513,106	1,253,635	2,863,563	390,222	883,478	264,399	**6,321,009**
Expressways	0	0	37,085	170,631	434,786	368,060	501,154	158,639	**1,670,355**
Ramps	0	17,408	35,510	155,867	374,988	29,335	154,540	17,548	**785,196**
Arterials	123,185	243,675	610,849	721,028	1,536,866	252,035	1,057,887	427,453	**4,972,978**
Collectors	14,371	33,425	139,132	400,051	810,599	19,381	403,109	40,666	**1,860,734**
Total	**137,556**	**447,114**	**1,335,682**	**2,701,212**	**6,020,802**	**1,059,033**	**3,000,168**	**908,705**	**15,610,272**

Table 5-2. Percent Change from 2007 to 2035 Baseline VMT by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0%	56%	20%	9%	48%	-18%	6%	-26%	**20%**
Expressways	0%	0%	8%	90%	2%	10%	7%	-21%	**7%**
Ramps	0%	47%	37%	9%	17%	-66%	68%	-34%	**11%**
Arterials	57%	-40%	147%	54%	7%	-5%	23%	27%	**21%**
Collectors	59%	-45%	119%	74%	21%	8%	7%	-49%	**23%**
Total	**57%**	**-23%**	**67%**	**30%**	**26%**	**-10%**	**14%**	**-9%**	**19%**

*See Appendix Table A - 1 for area type definitions.

Table 5-3. 2035 Baseline VHT by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0	3,920	16,663	28,371	61,744	7,546	17,869	5,601	**141,714**
Expressways	0	0	853	5,044	10,559	9,089	10,369	3,124	**39,038**
Ramps	0	1,749	2,598	8,427	18,568	677	8,312	884	**41,215**
Arterials	5,589	12,204	28,435	28,678	55,915	7,205	30,379	10,088	**178,493**
Collectors	711	2,627	7,270	20,386	37,599	687	13,610	1,050	**83,940**
Total	**6,300**	**20,500**	**55,819**	**90,906**	**184,385**	**25,204**	**80,539**	**20,747**	**484,400**

Table 5-4. Percent Change from 2007 to 2035 Baseline VHT by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0%	70%	39%	17%	54%	-20%	15%	-8%	**29%**
Expressways	0%	0%	11%	166%	6%	25%	13%	-20%	**18%**
Ramps	0%	82%	32%	30%	16%	-77%	110%	-46%	**21%**
Arterials	61%	-35%	144%	57%	6%	-10%	30%	32%	**24%**
Collectors	62%	-20%	109%	68%	32%	-7%	19%	-57%	**34%**
Total	**61%**	**-19%**	**87%**	**44%**	**25%**	**-11%**	**27%**	**-4%**	**26%**

*See Appendix Table A - 1 for area type definitions.

Table 5-5. 2035 Baseline VHD by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0	1,418	8,251	8,150	16,291	1,352	3,846	1,404	**40,712**
Expressways	0	0	214	2,152	3,311	2,954	2,153	523	**11,307**
Ramps	0	1,180	1,576	4,144	9,871	86	4,840	510	**22,207**
Arterials	663	2,457	3,999	8,296	12,501	901	5,908	992	**35,717**
Collectors	136	1,291	1,705	6,724	9,380	106	3,093	148	**22,583**
Total	**799**	**6,346**	**15,745**	**29,466**	**51,354**	**5,399**	**19,840**	**3,577**	**132,526**

Table 5-6. Percent Change from 2007 to 2035 Baseline VHD by Facility Type and Area Type

	Area Type*								
Facility Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Areas**
Freeways	0%	103%	66%	42%	73%	-31%	69%	264%	**60%**
Expressways	0%	0%	22%	480%	16%	78%	44%	-17%	**57%**
Ramps	0%	105%	27%	57%	15%	-93%	181%	-50%	**31%**
Arterials	102%	3%	127%	63%	0%	-34%	71%	103%	**30%**
Collectors	84%	47%	83%	60%	79%	-51%	92%	-79%	**63%**
Total	**98%**	**40%**	**73%**	**63%**	**33%**	**-16%**	**88%**	**10%**	**46%**

*See Appendix Table A - 1 for area type definitions.

5.2 Transit Assignment

Table 5-7 shows 2035 baseline scenario transit boardings by period (peak versus off-peak) and mode for residents, visitors, and ground access air passengers. Table 5-8 shows the percent change in transit boardings from 2007 existing conditions to the 2035 baseline scenario. Total boardings increase by 69 percent, with approximately 26 percent of total system-wide boardings on fixed-guideway transit.

Figure 5-18 through Figure 5-23 show AM peak period transit travel times to key destinations for the 2035 baseline scenario. The presence of the fixed-guideway line is clearly visible as providing relatively better transit accessibility along the fixed-guideway corridor.

Table 5-7. 2035 Transit Boardings By Period and Mode

	Boardings By Mode					
Period/Mode	**Local**	**Express**	**Limited**	**Guideway**	**Ferry**	**Total**
Peak	174,248	7,521	6,890	73,141	0	**261,799**
Off-Peak	91,646	0	6,424	29,546	0	**127,616**
Total	**265,894**	**7,521**	**13,314**	**102,687**	**0**	**389,415**

Table 5-8. Percent Change in Transit Boardings, 2007 To 2035 Baseline

	Boardings By Mode					
Period/Mode	**Local**	**Express**	**Limited**	**Guideway**	**Ferry**	**Total**
Peak	48%	-21%	-58%	0%	0%	**81%**
Off-Peak	30%	0%	-57%	0%	0%	**49%**
Total	**41%**	**-21%**	**-58%**	**0%**	**0%**	**69%**

5.3 2035 Baseline Travel Time Plots

Figure 5-1: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Downtown

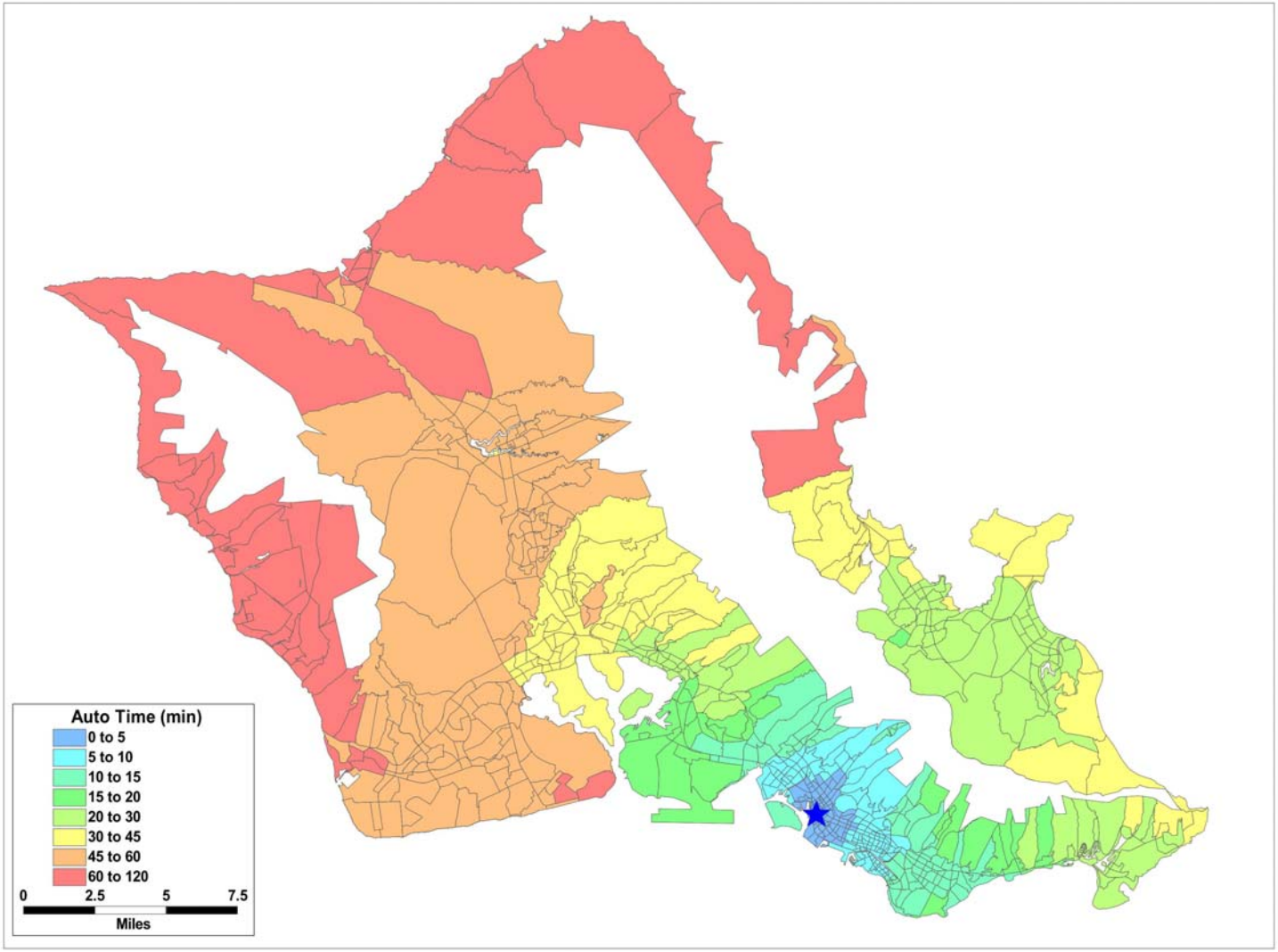


Figure 5-2: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Airport

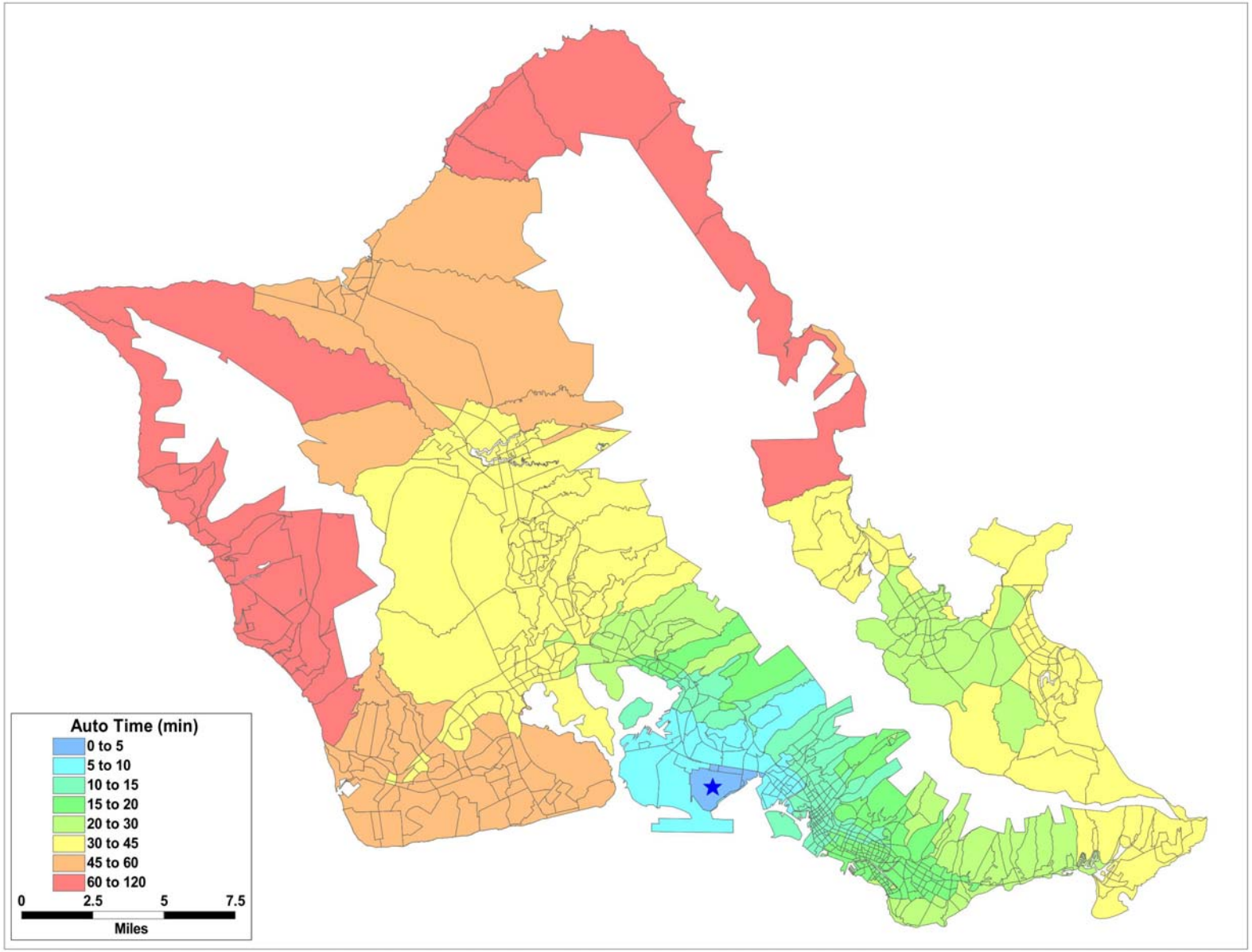


Figure 5-3: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Ewa

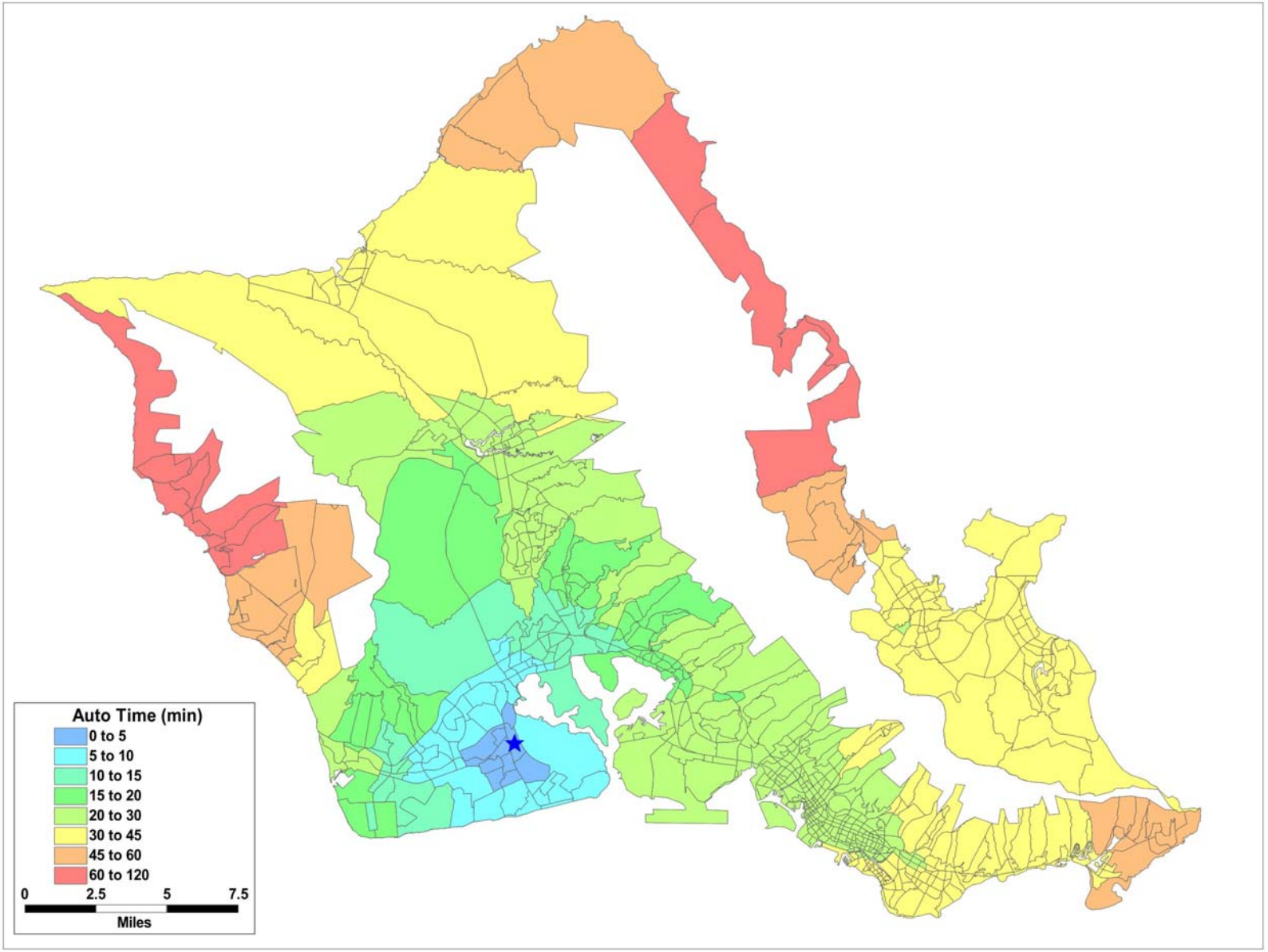


Figure 5-4: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Kapolei

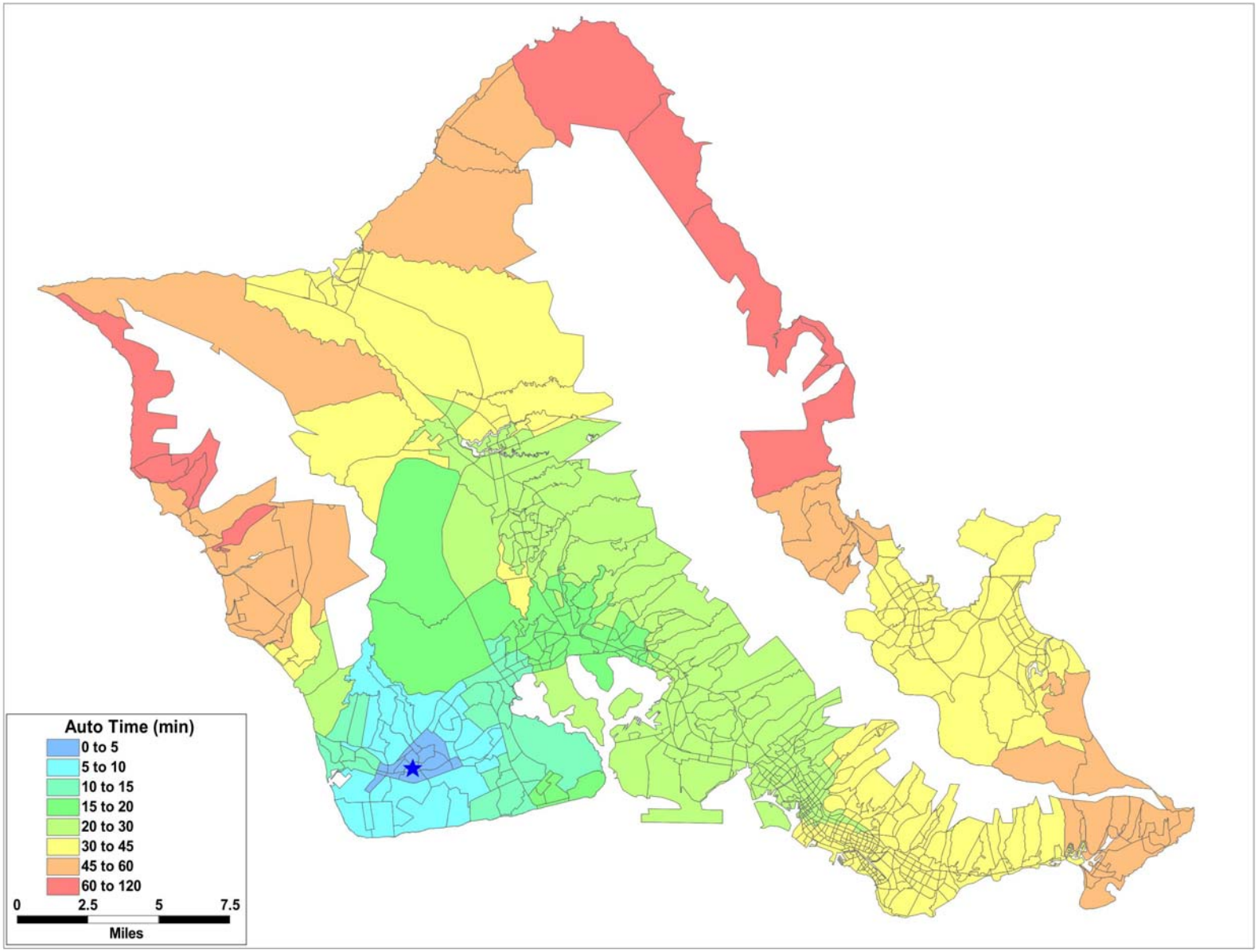


Figure 5-5: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Mililani

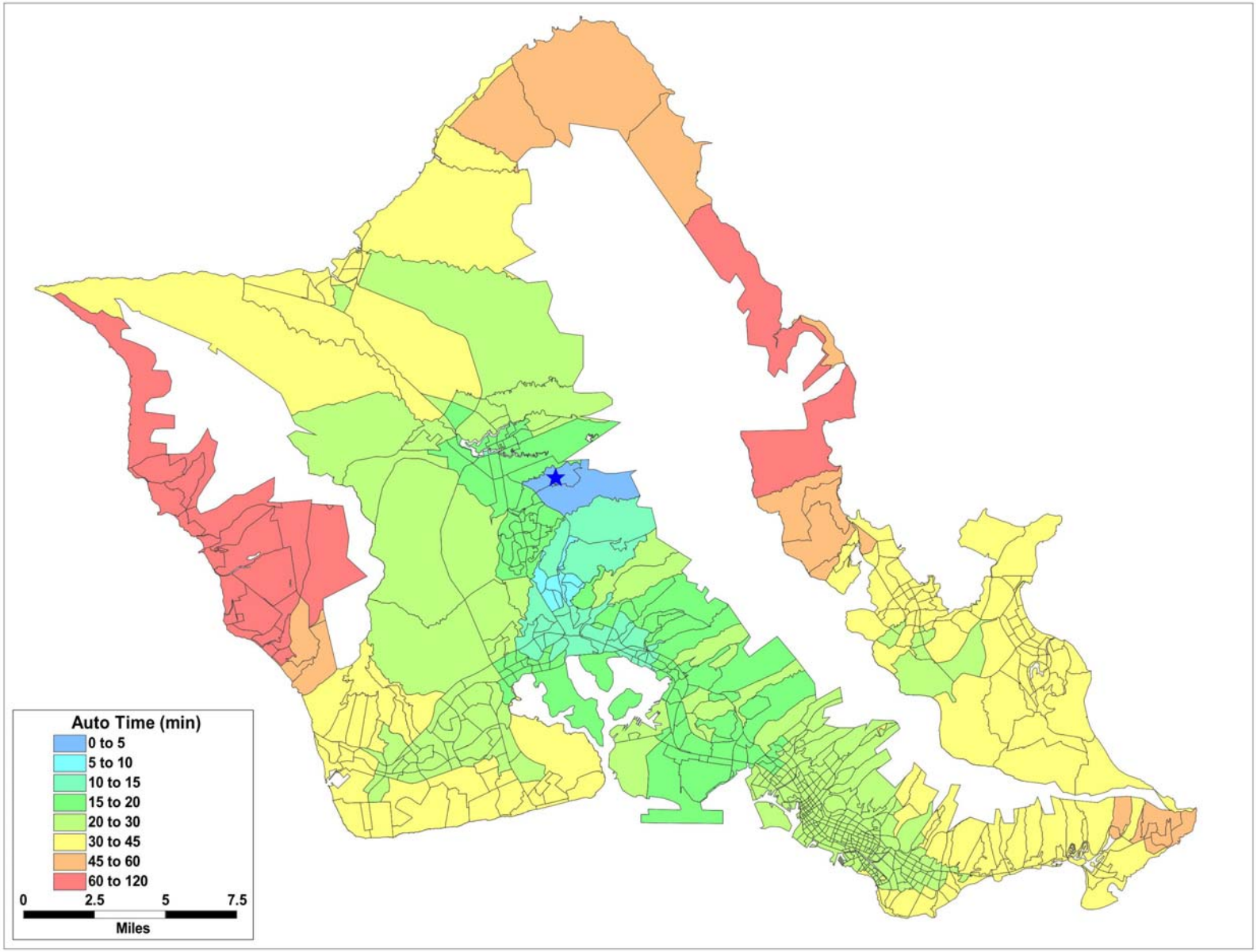


Figure 5-6: 2035 Baseline AM 2-Hour Static Assignment Auto Time to Waikiki

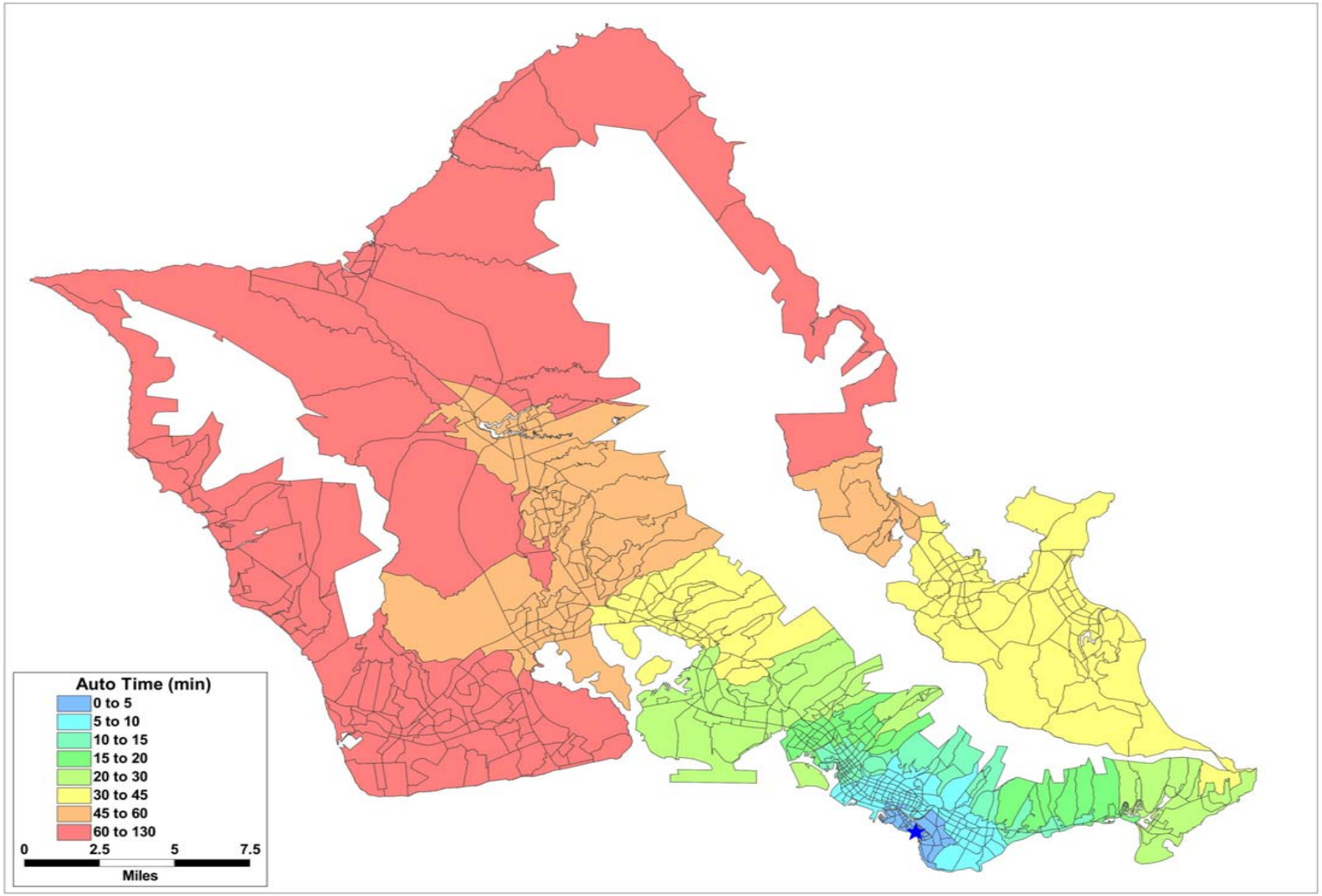


Figure 5-7: 2035 Baseline Static Assignment AM 2-Hour Level-of-Service and Auto Volumes – Oahu

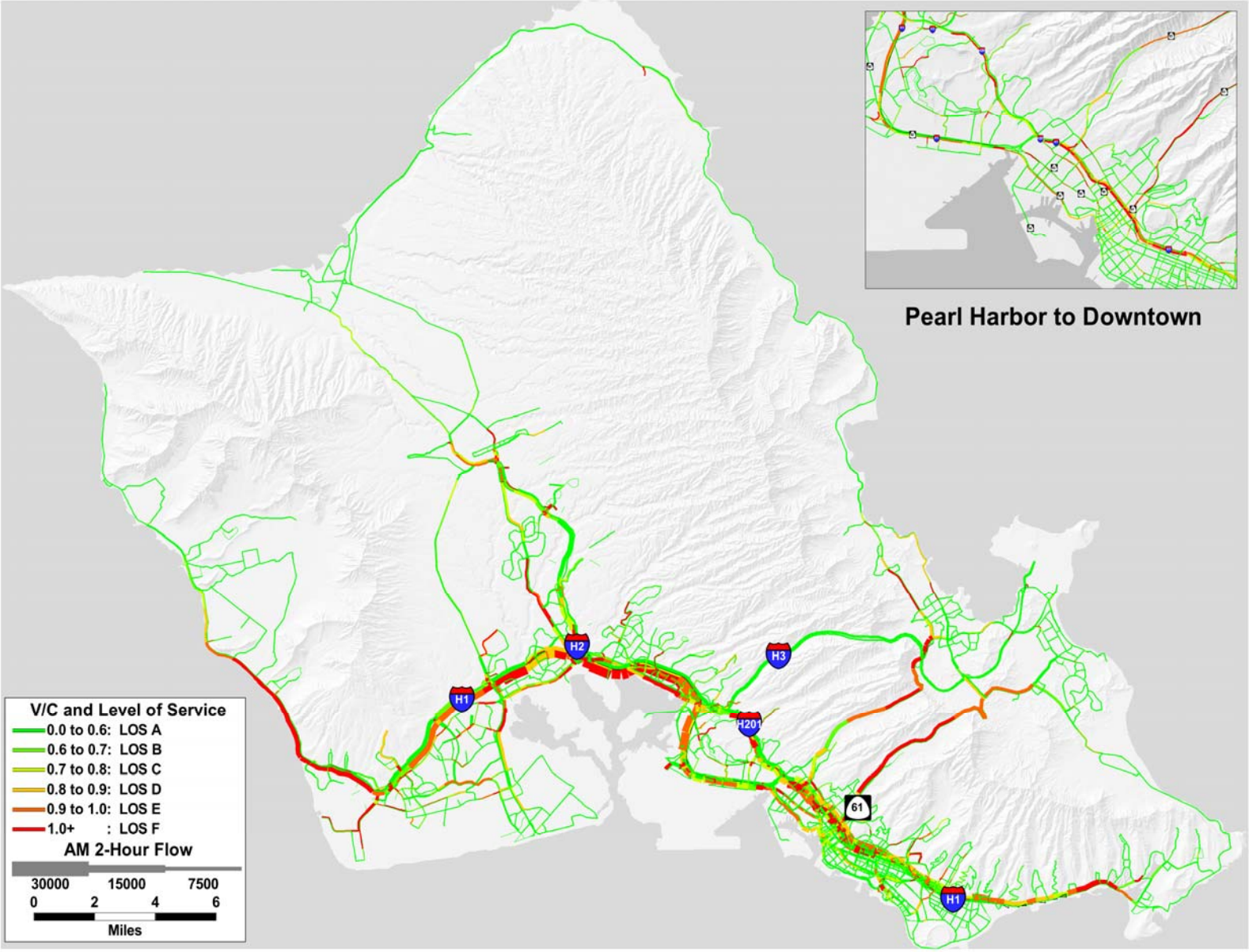


Figure 5-8. 2035 Baseline Static Assignment AM 2-Hour Level-of-Service and Auto Volumes – Kapolei and Ewa Area

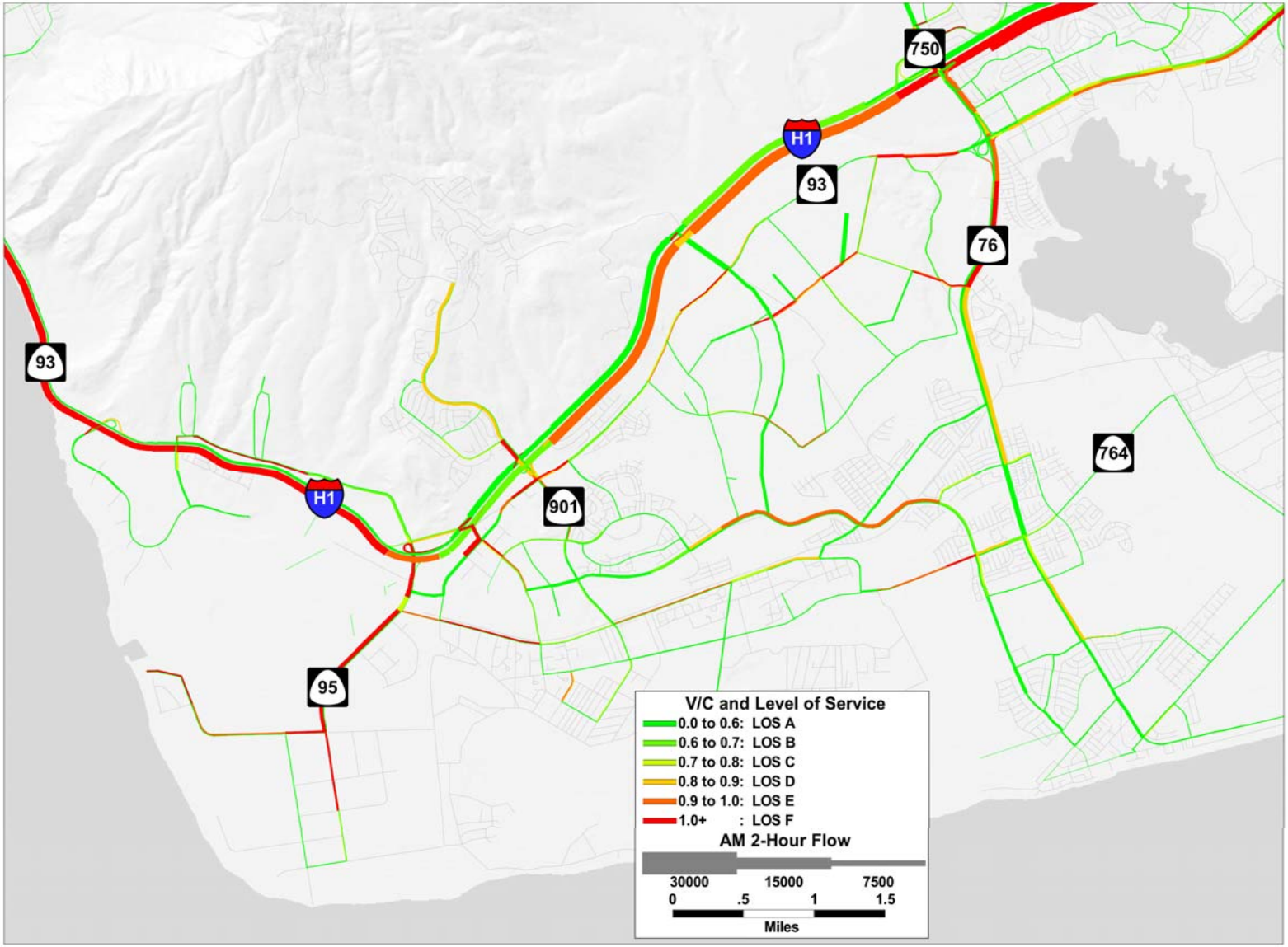


Figure 5-9: 2035 Baseline Static Assignment AM 2-Hour Level-of-Service and Auto Volumes – H1/H2 Merge

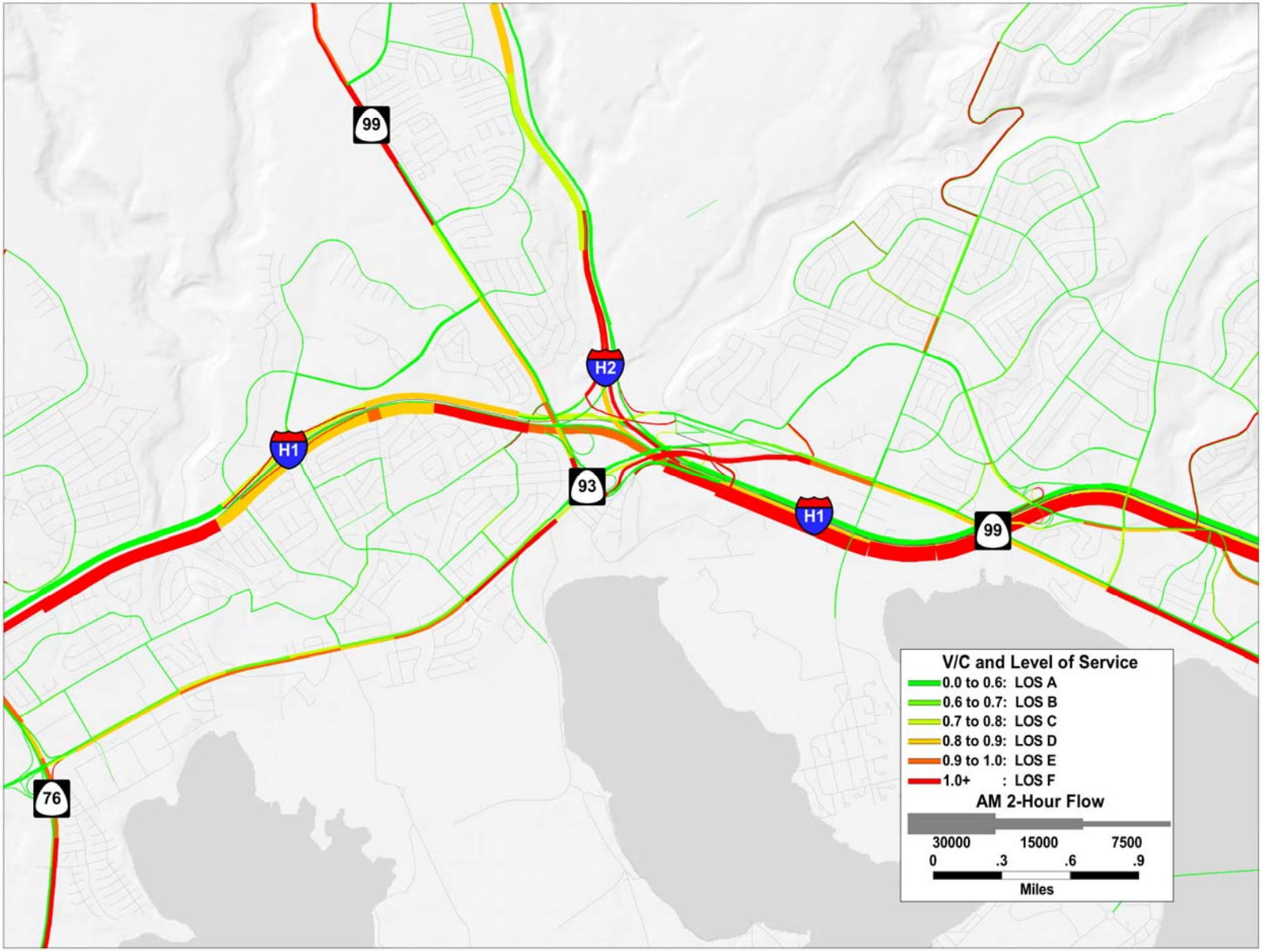


Figure 5-10: 2035 Baseline Static Assignment AM 2-Hour Level-of-Service and Auto Volumes – H1/H201/H3 Merge

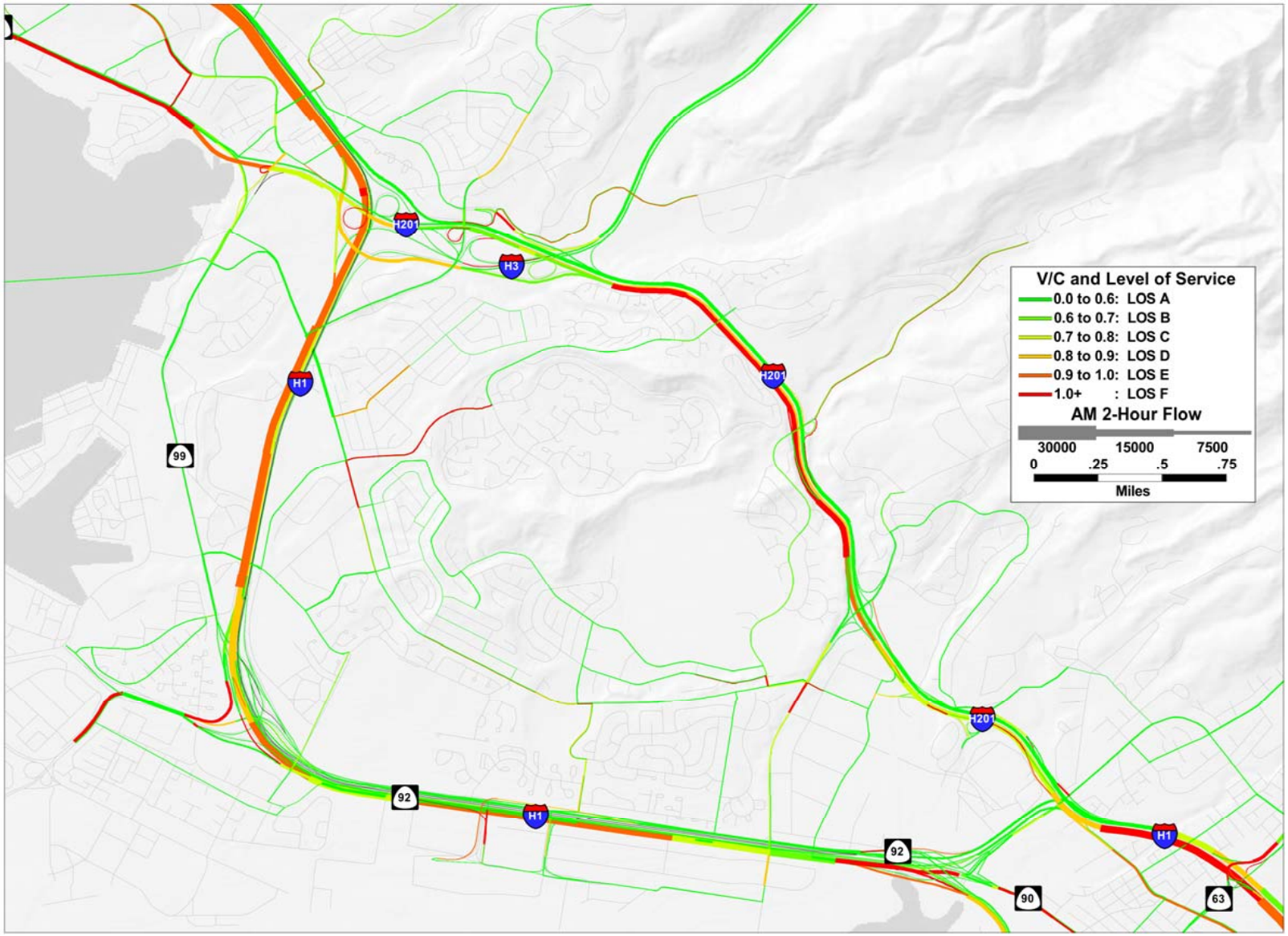


Figure 5-11: 2035 Baseline Static Assignment AM 2-Hour Level-of-Service and Auto Volumes – Downtown

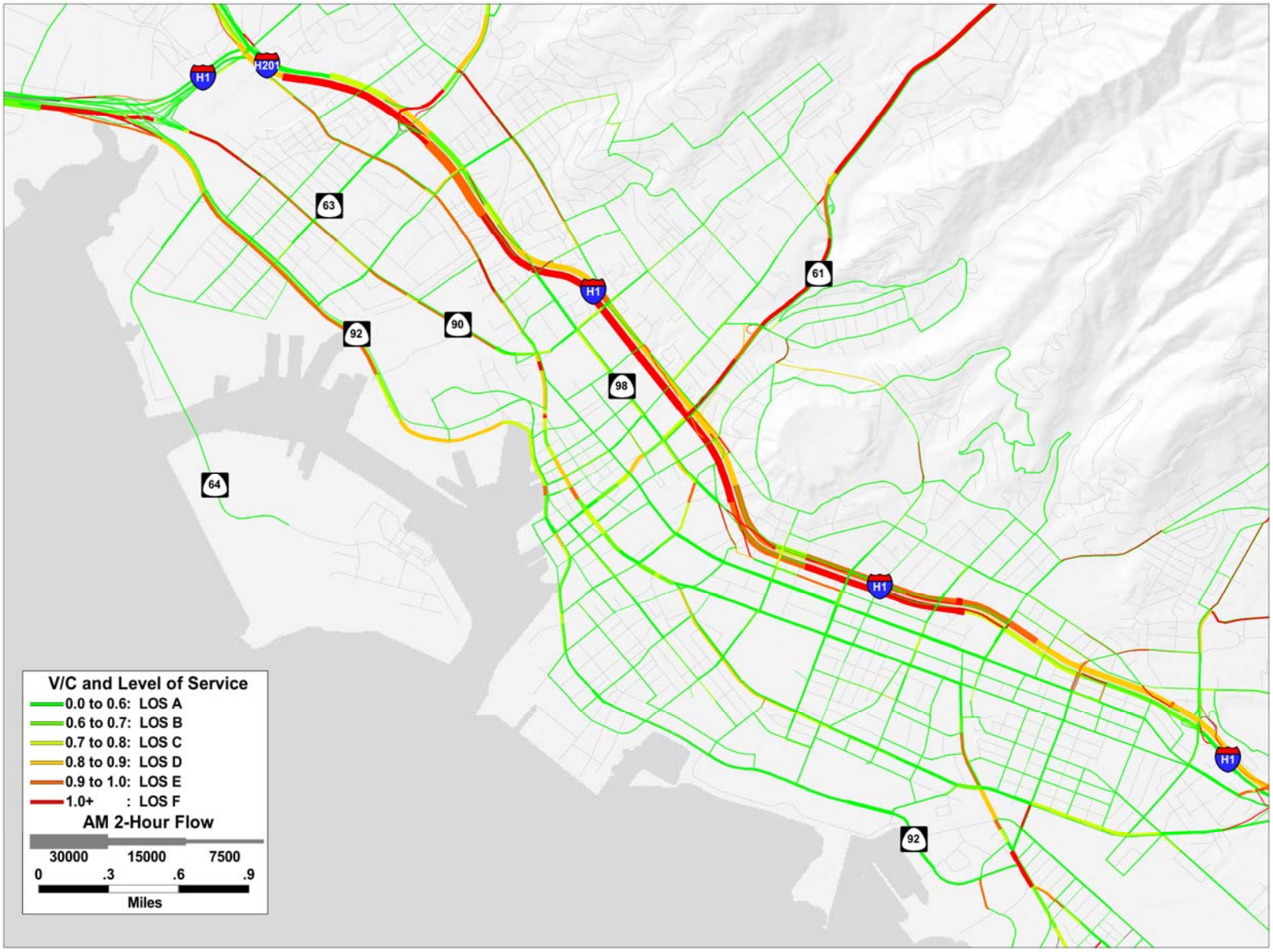


Figure 5-12: 2035 Baseline Dynamic Traffic Assignment Auto Time to Downtown – 7:30 AM

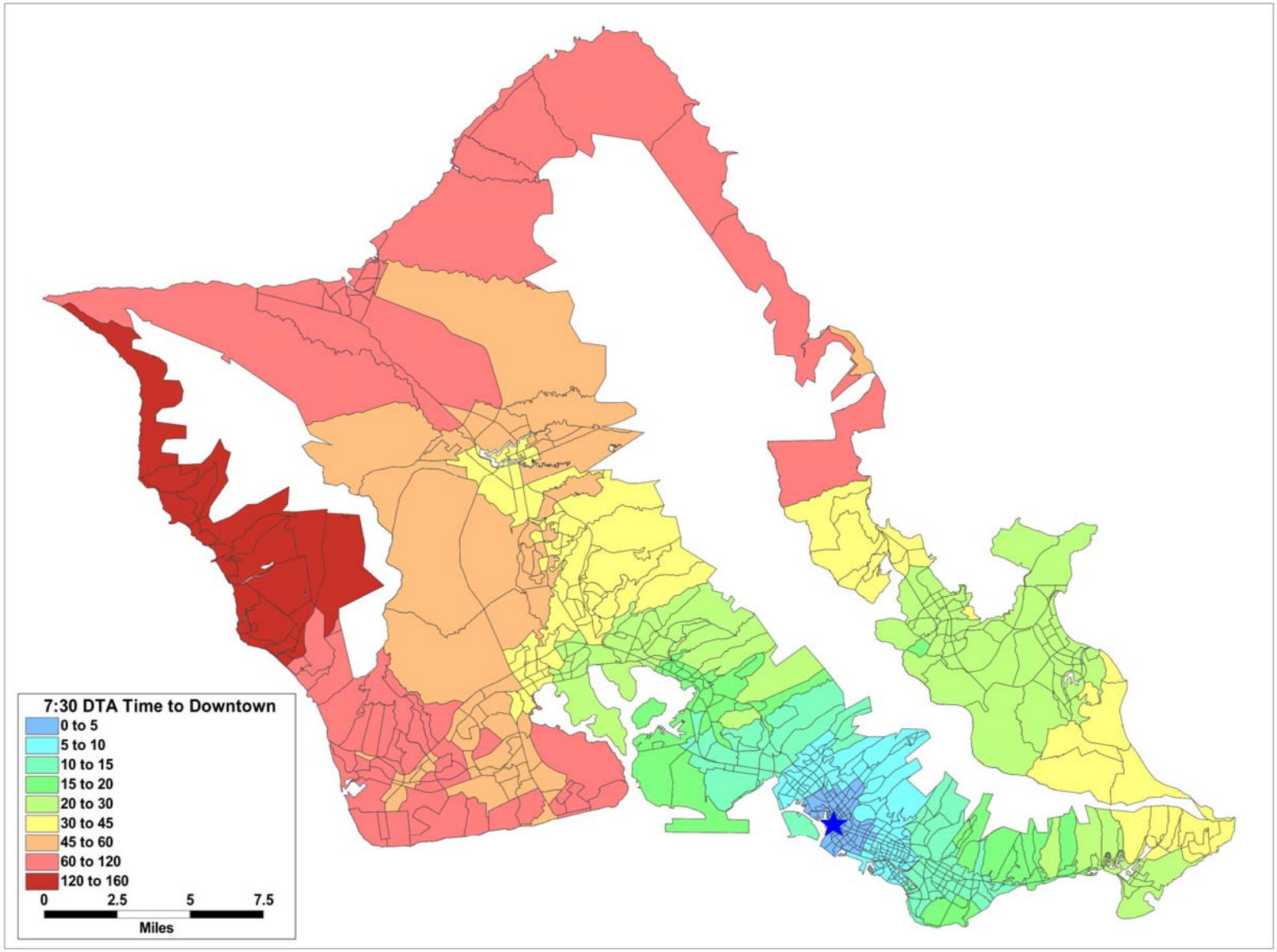


Figure 5-13: 2035 Baseline Dynamic Traffic Assignment Auto Time to Airport – 7:30 AM

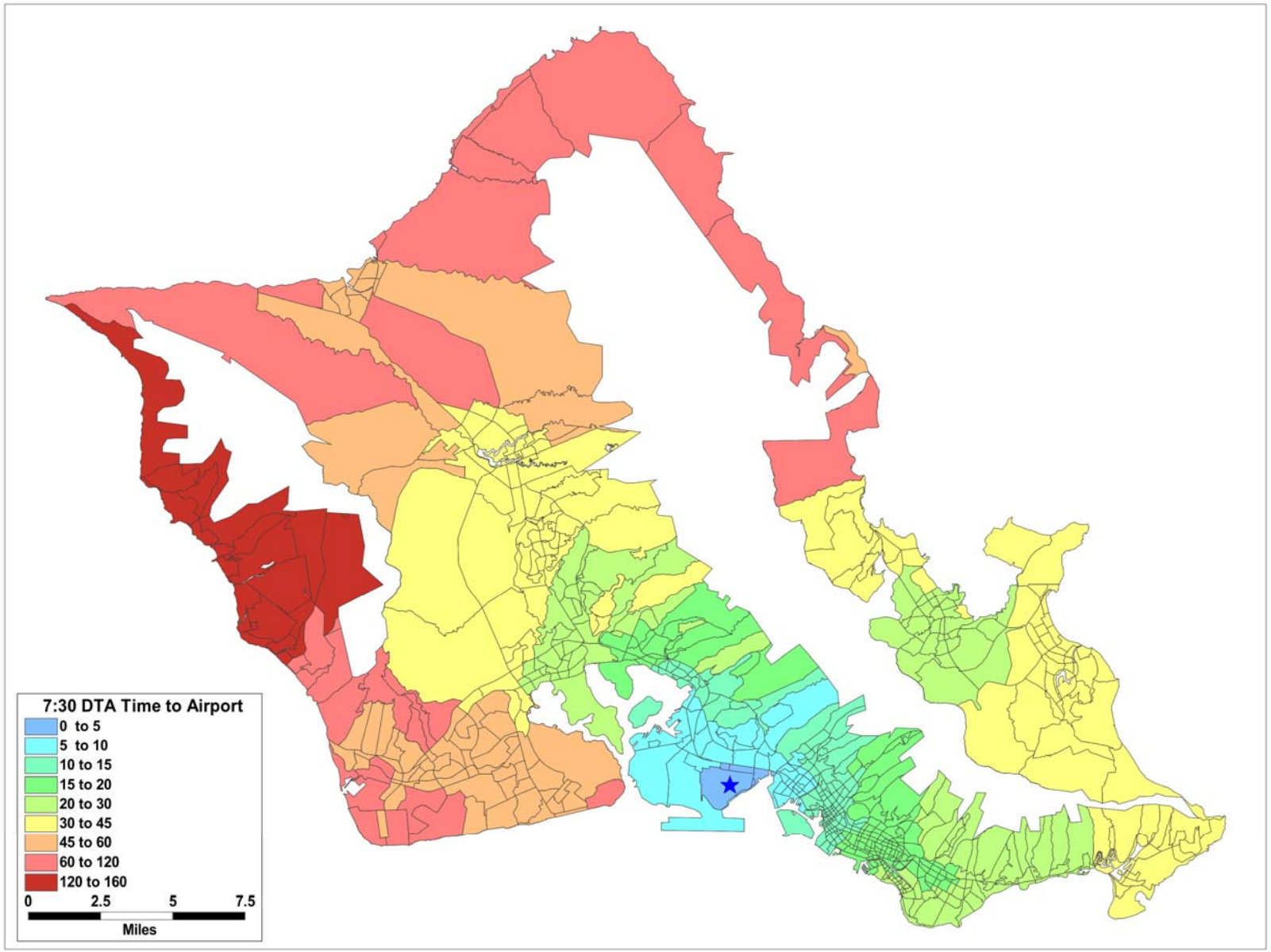


Figure 5-14: 2035 Baseline Dynamic Traffic Assignment Auto Time to Ewa – 7:30 AM

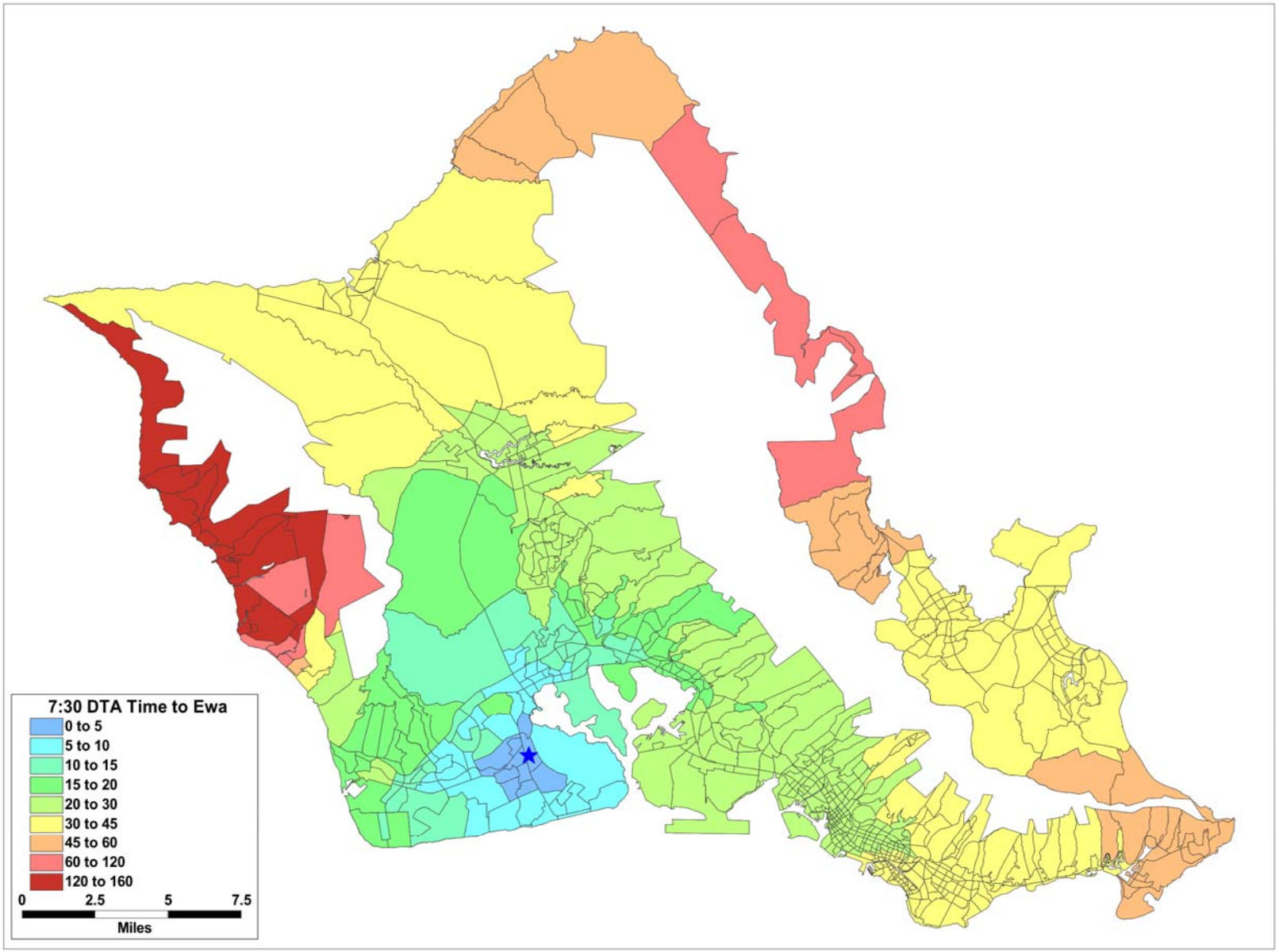


Figure 5-15: 2035 Baseline Dynamic Traffic Assignment Auto Time to Kapolei – 7:30 AM

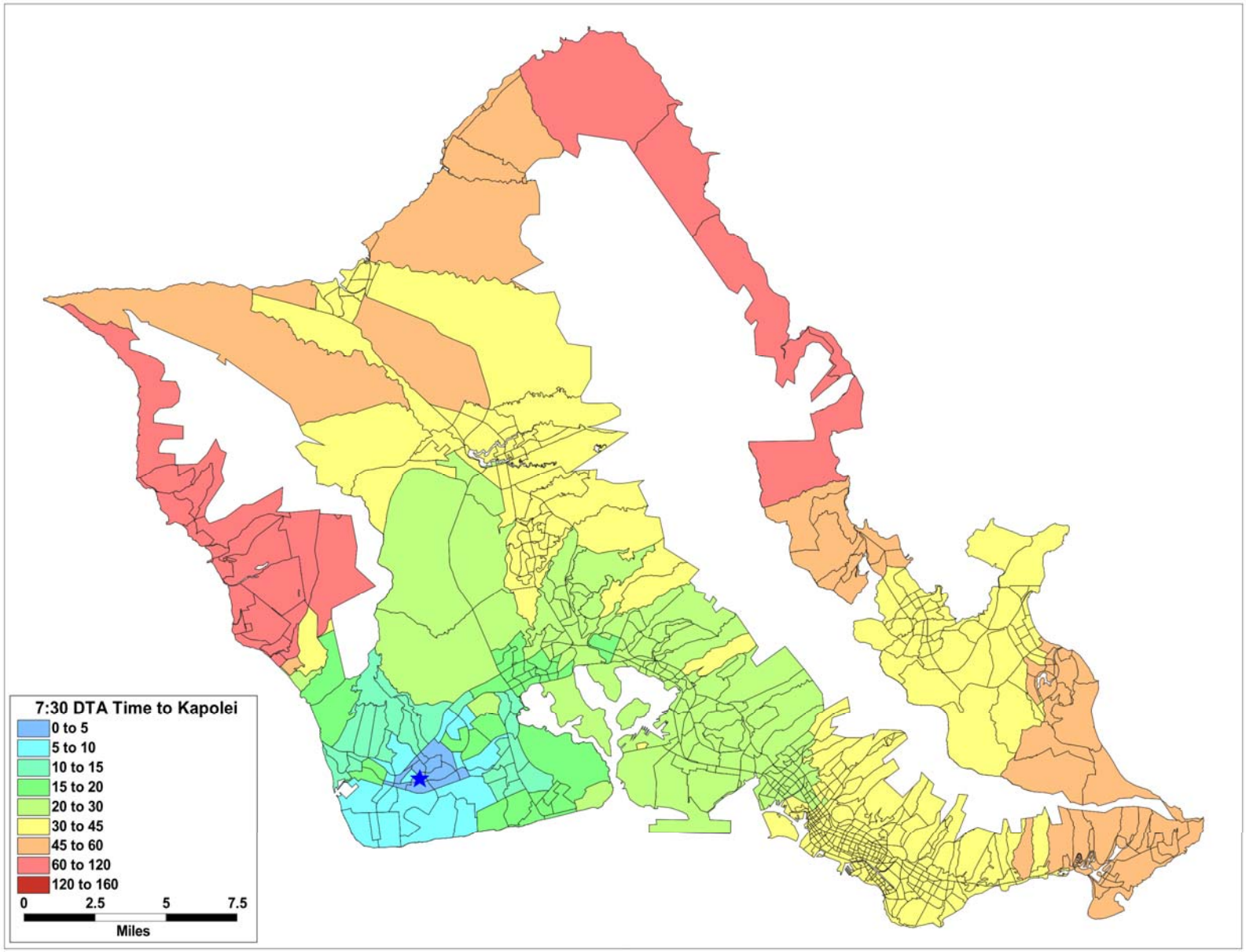


Figure 5-16: 2035 Baseline Dynamic Traffic Assignment Auto Time to Mililani – 7:30 AM

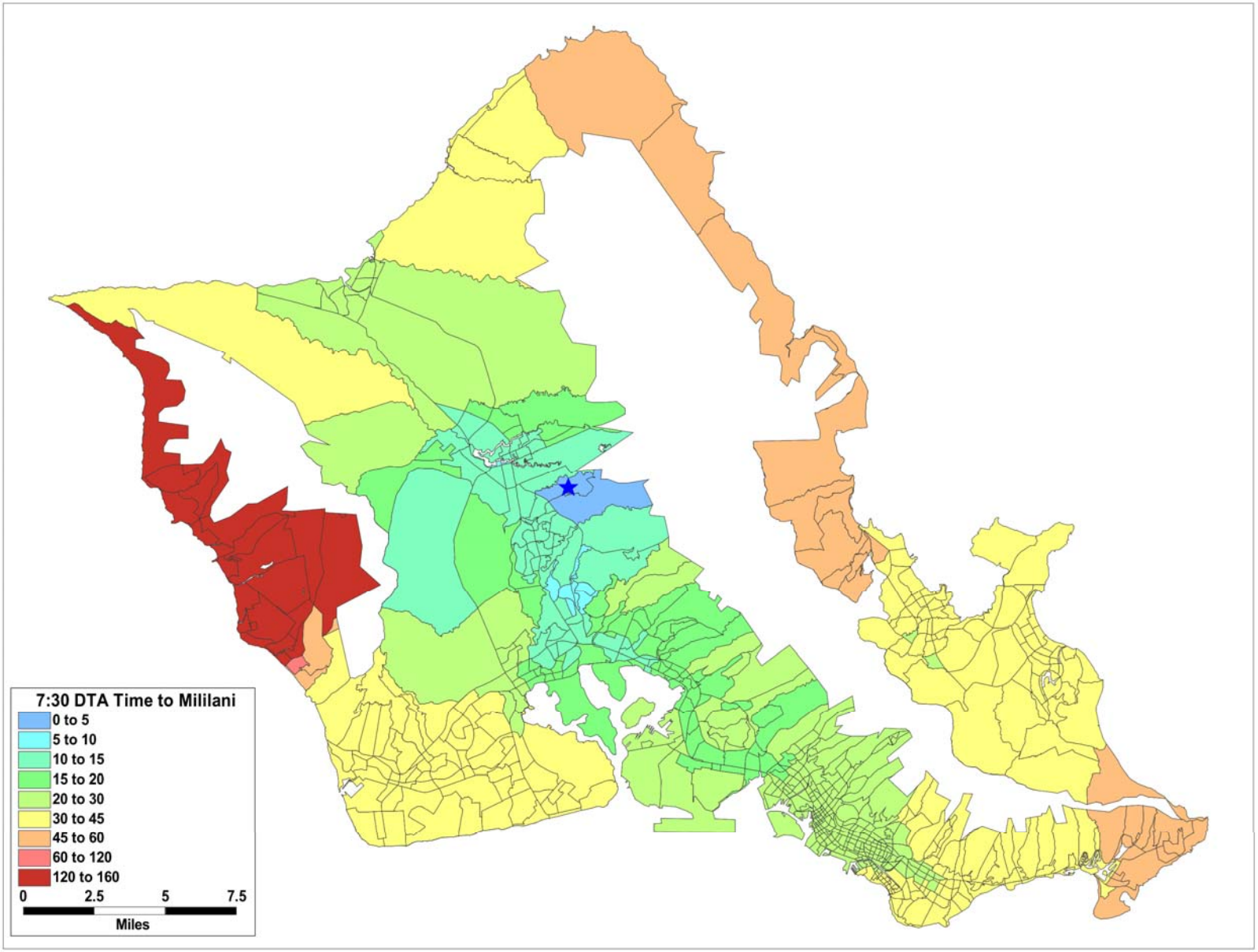


Figure 5-17: 2035 Baseline Dynamic Traffic Assignment Auto Time to Waikiki – 7:30 AM

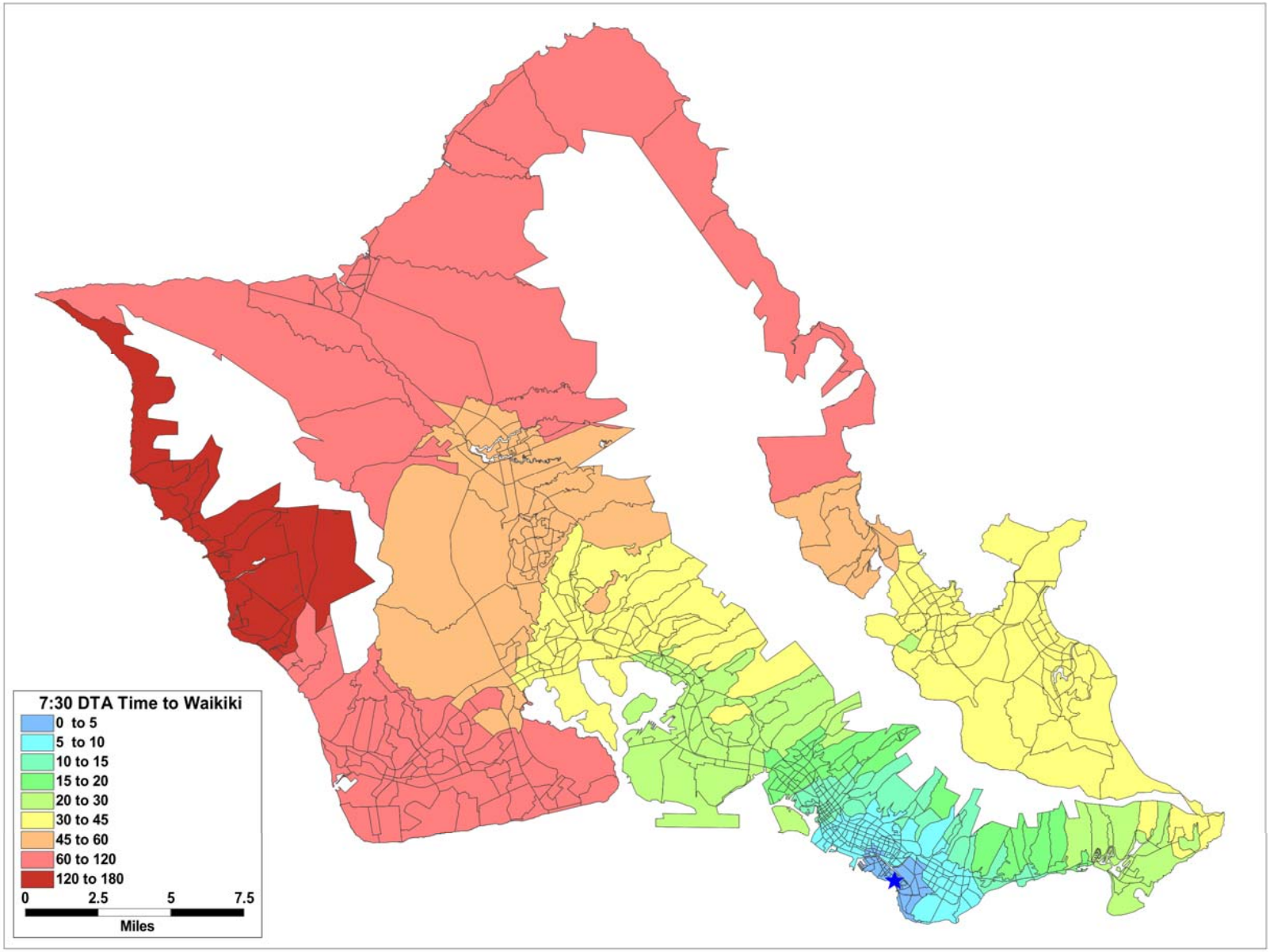


Figure 5-18: 2035 Baseline AM Two-Hour Transit Time to Downtown

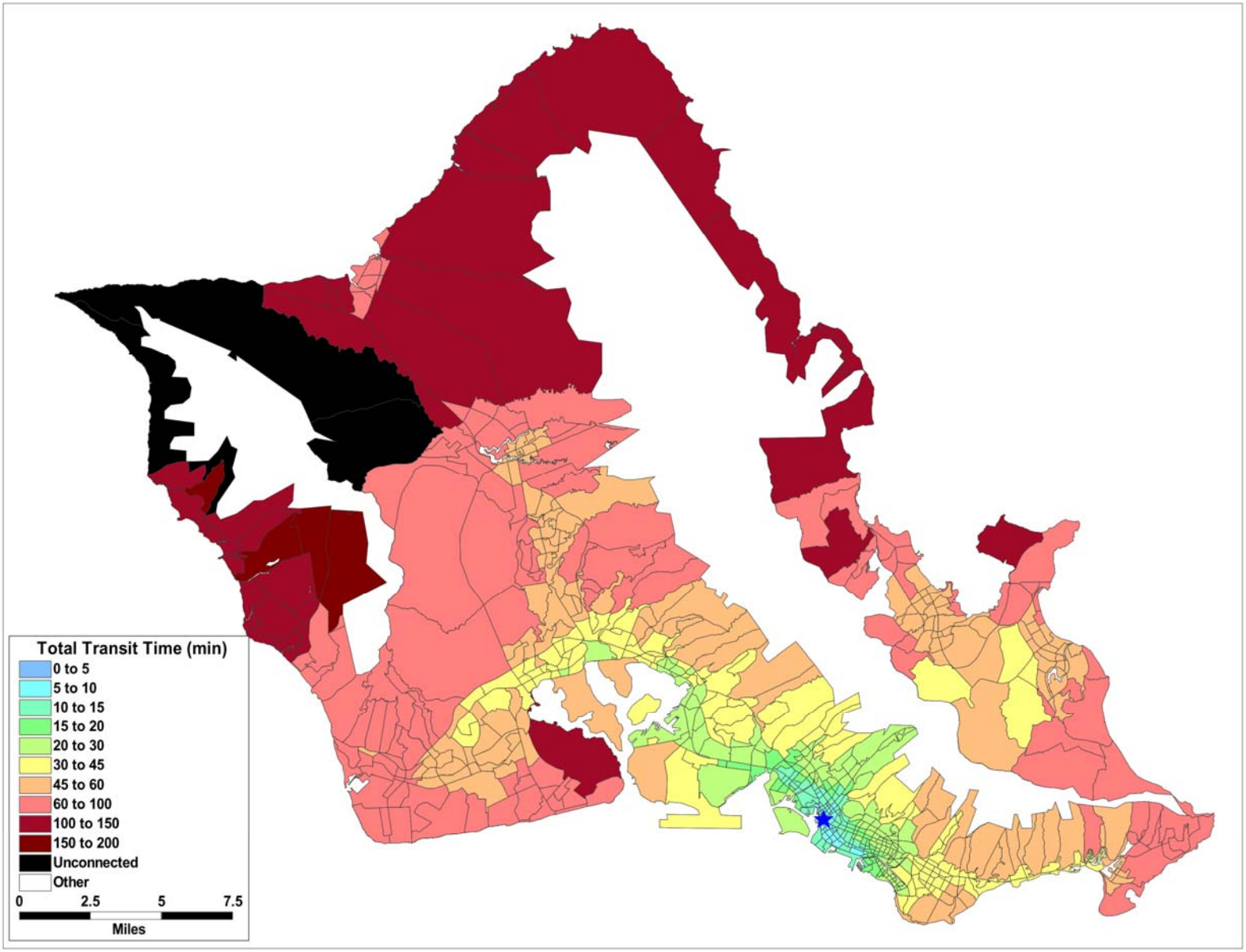


Figure 5-19: 2035 Baseline AM Two-Hour Transit Time to Airport

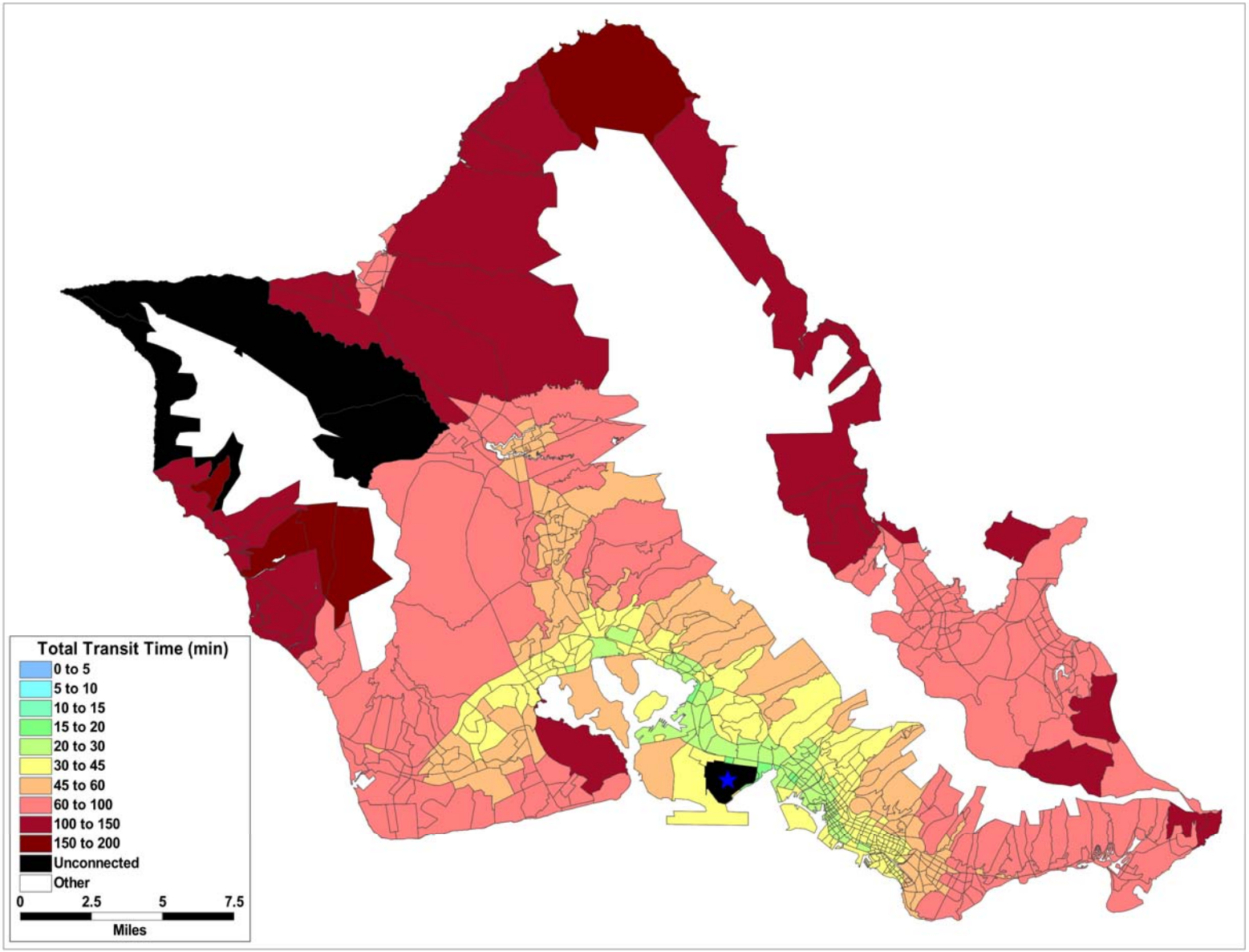


Figure 5-20: 2035 Baseline AM Two-Hour Transit Time to Ewa

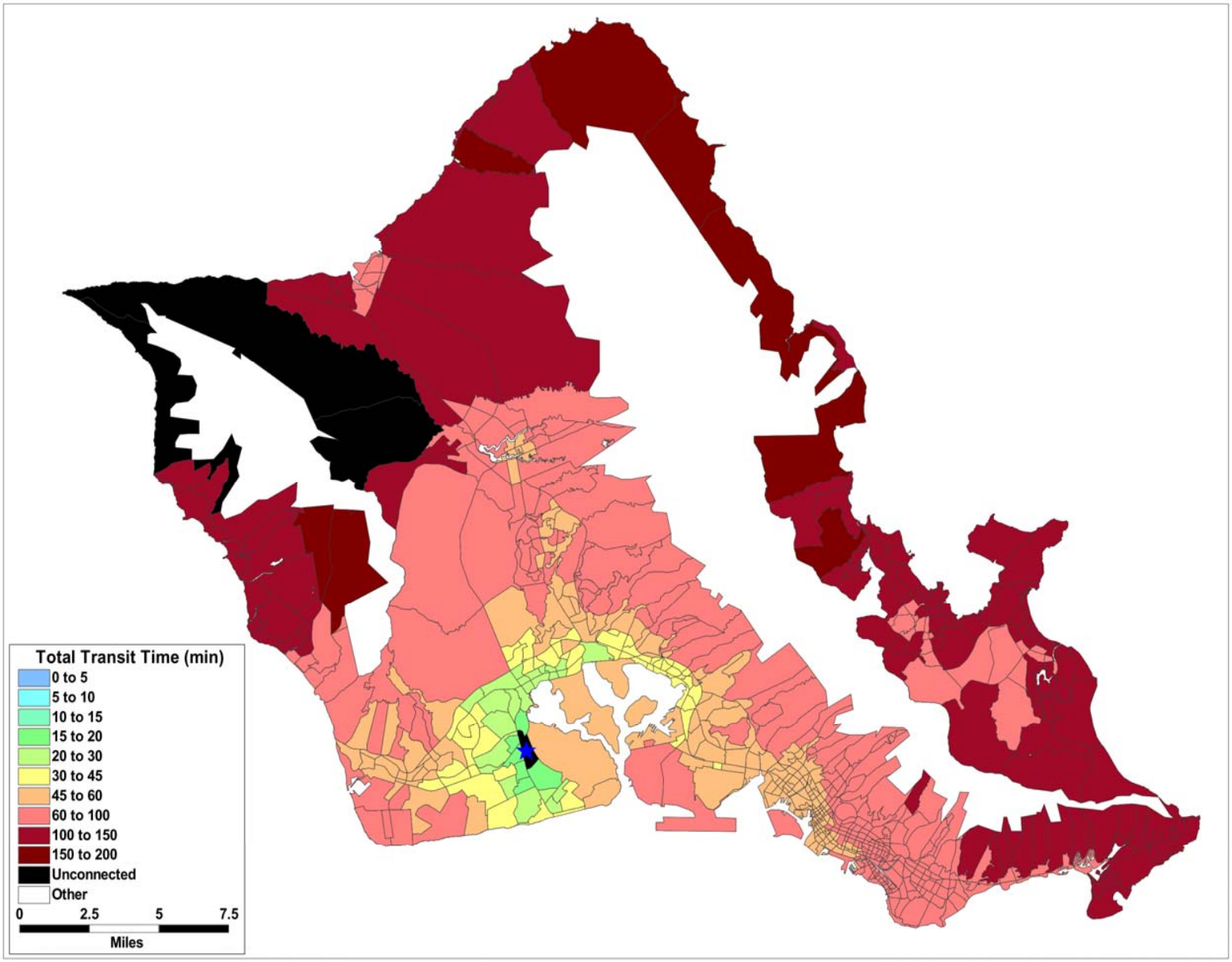


Figure 5-21: 2035 Baseline AM Two-Hour Transit Time to Kapolei

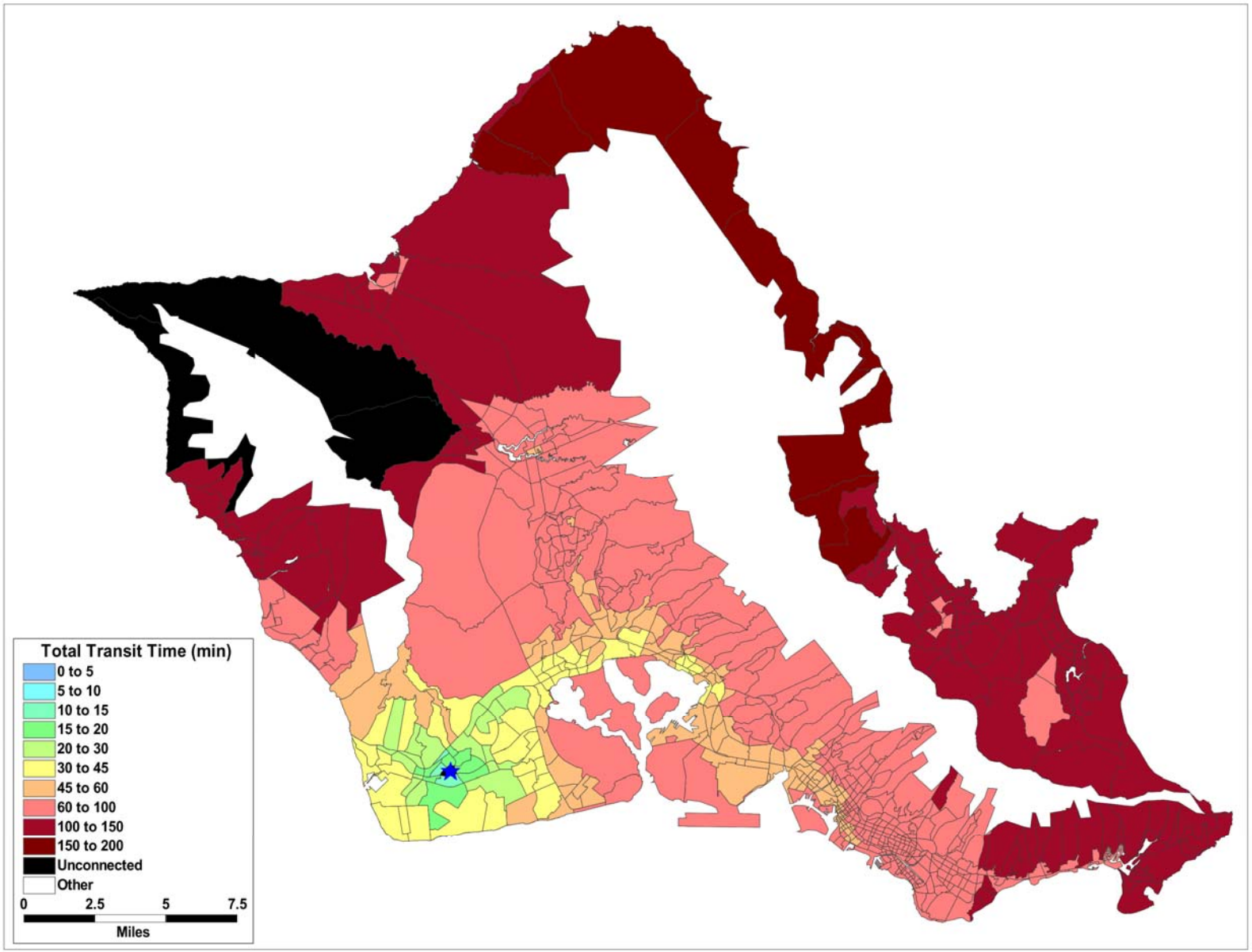


Figure 5-22: 2035 Baseline AM Two-Hour Transit Time to Mililani

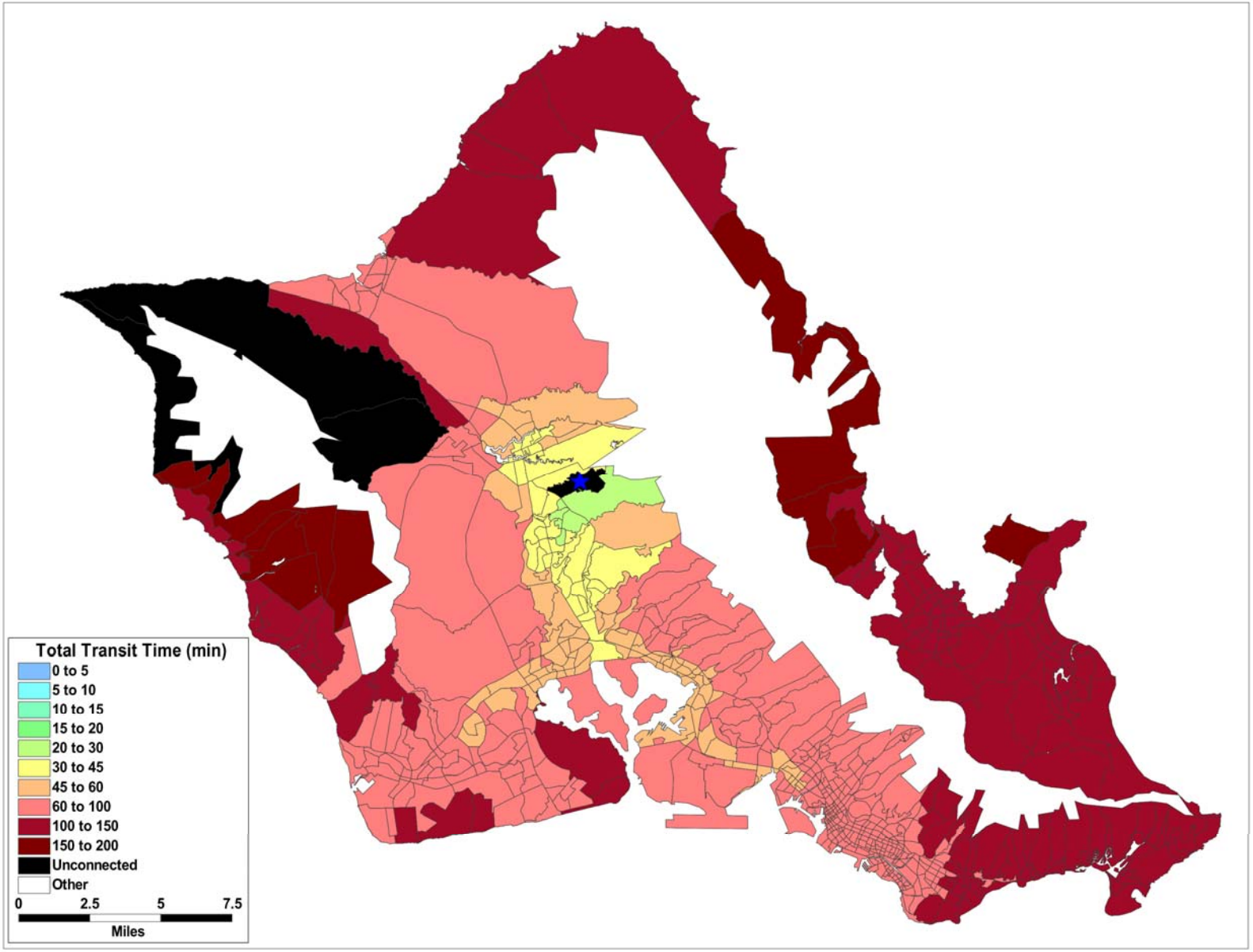
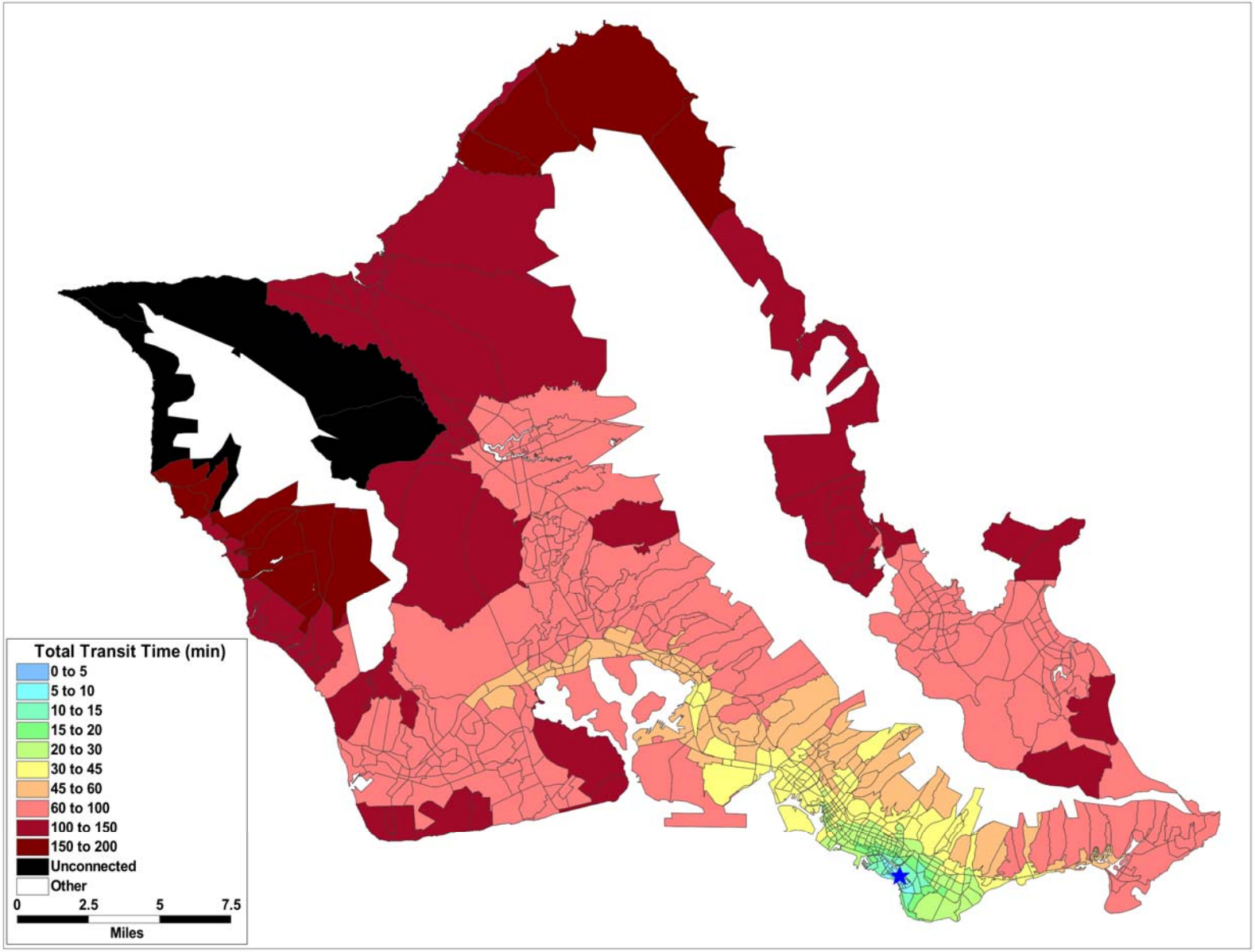


Figure 5-23: 2035 Baseline AM Two-Hour Transit Time to Waikiki



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Appendix

Table A - 1. Area-Type Definitions Based on Population and Employment Densities

Employment Category (Employees per Square Mile)		1 ≤12	2 ≤93	3 ≤397	4 ≤1,615	5 ≤6,202	6 ≤22,630	7 ≤78,500	8 >78,500
Population Category (Population per Square Mile)									
1	0	8	8	7	6	4	4	2	1
2	≤192	8	8	6	6	4	4	2	1
3	≤1,623	7	7	7	6	4	4	2	1
4	≤4,975	7	7	7	7	4	4	2	1
5	≤11,588	5	5	5	5	5	4	2	1
6	≤24,000	5	5	5	5	5	5	2	1
7	≤42,866	3	3	3	3	3	3	3	1
8	>42,866	3	3	3	3	3	3	3	1