Hawaii Statewide Freight Plan




State of Hawaii
Department of Transportation
Highways Division

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Acronyms

AADT	annual average daily traffic
AADTT	annual average daily truck traffic
AM	morning peak period
CIP	Capital Improvement Program
CRFC	Critical Rural Freight Corridor
CUFC	Critical Urban Freight Corridor
CVSP	Commercial Vehicle Safety Plan
DBEDT	Department of Business, Economic Development & Tourism
EB	eastbound
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FAC	Freight Advisory Committee
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FTA	Federal Transit Administration
FY	fiscal year
GDP	gross domestic product
HART	Honolulu Authority for Rapid Transportation
HDOT	Hawaii Department of Transportation
HDOT-Airports	Hawaii Department of Transportation, Airports Division
HDOT-Harbors	Hawaii Department of Transportation, Harbors Division
HDOT-Highways	Hawaii Department of Transportation, Highways Division
HI	Hawaii
HNL	Daniel K. Inouye International Airport
HPMS	Highway Pavement Management System
HSFP	Hawaii Statewide Freight Plan
HSHSP	Hawaii Strategic Highway Safety Plan
HSIP	Highway Safety Improvement Program
IC	Interchange
ID	identification
INFRA	Infrastructure for Rebuilding America
ITO	Hilo International Airport
JHM	Kapalua Airport
KBPH	Kalaeloa Barbers Point Harbor
KCT	Kapalama Container Terminal
KOA	Ellison Onizuka Kona International Airport at Keahole
LAX	Los Angeles International Airport
LIH	Lihue Airport

LNY	Lanai Airport
LOS	level of service
LUP	Kalaupapa Airport
MAP-21	Moving Ahead for Progress in the 21st Century Act
MARAD	Maritime Administration
MH	Marine Highway
MKK	Molokai Airport
mph	miles per hour
MPO	Metropolitan Planning Organization
MRTP	Mid-Range Transportation Plan
n/a	not applicable
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
OahuMPO	Oahu Metropolitan Planning Organization
OGG	Kahului Airport
OL	Obligation Limitation
ORTP	Oahu Regional Transportation Plan
PHFS	Primary Highway Freight System
PM	evening peak period
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SLR-XA	Sea Level Rise Exposure Area
SMP	Special Maintenance Program
STIP	Statewide Transportation Improvement Program
STRAHNET	Strategic Highway Network
TAC	Technical Advisory Committee
TEU	20-foot equivalent unit
TIP	Transportation Improvement Program
TTTR	truck travel time reliability
U.S.	United States
U.S.C.	United States Code
UH	University of Hawaii
USDOT	United States Department of Transportation
VMT	vehicle miles traveled
WB	westbound

1 Hawaii Strategic Freight Goals

Recognizing the critical nature of freight mobility to the economic vitality of the islands, the State of Hawaii Department of Transportation (HDOT) initiated the development of a statewide freight plan. The Hawaii Statewide Freight Plan (HSFP) builds on previous work completed by the HDOT, including the Hawaii Statewide Transportation Plan, Statewide and Regional Long-Range Land Transportation Plans, and other pertinent plans and studies that identify existing mobility conditions and issues for the state and major county road network in Hawaii. Significant stakeholder involvement (described in Chapter 6), including meetings and interviews with more than 45 participants from approximately 40 public agencies and private organizations, provided important input during development of the HSFP.

A. Purpose of this Plan

The health of Hawaii's economy depends on the reliable and efficient movement of freight. Hawaii's freight network is a major component of the state's economic success: Freight supports jobs in freight-dependent businesses such as tourism and retail trade. Approximately one-third of Hawaii's economic output is directly dependent on freight—primarily the accommodation and food service sector, retail trade, and construction. These freight-dependent sectors of the economy employ nearly 350,000 people, representing 38 percent of the total employment in Hawaii.

In addition, the freight network is needed to deliver the goods necessary for our island's survival. In Puerto Rico, for example, after Hurricane Maria, 10,000 containers of supplies with food, water, and medicine were stranded at the San Juan port. A diesel fuel shortage, blocked infrastructure, and lack of ability to contact truck drivers (because of downed cell towers) prevented the necessary distribution of goods and supplies (Gillespie et al., 2017). Similar to Puerto Rico, more than 80 percent of all goods consumed in Hawaii are imported. The state is highly dependent on the efficient distribution of goods for survival.

Most of the important freight corridors experience significant congestion. These include major freight corridors such as Lunalilo Freeway (H-1) and Nimitz Highway, whose actual morning peak speed is about half of the speed limit.

These same corridors experience an extreme amount of variability in travel times for trucks. The variation of truck speeds over a long period of time is a measure of reliability—a critical operational issue for shippers and truck fleet operators. Unreliability means trucks must build in a significant buffer time to their delivery windows to ensure that they meet the desired level of on-time performance for their shipments. This unreliability can also affect receivers, who may need to keep their employees longer to receive the goods.

Several other themes and freight issues have been identified throughout the islands, including the following:

- Poor pavement conditions
- Needed geometric improvements (for example, interchange off- and on-ramps and weaving near interchanges)
- Development or proposal of policies that overlook freight needs
- Limited operating hours of shipping operators

- Lack of alternative routes
- Inadequate loading zones
- Shoreline erosion (climate change)
- Rapid growth
- Lack of funding for improvements

The HSFP addresses these concerns and thereby supports the efficient movement of goods throughout the state. The HSFP also meets the federal requirements of the Fixing America's Surface Transportation Act of 2015 (FAST), 23 United States Code (U.S.C.) §167, and 49 U.S.C. 70202, and supports the National Goals (23 U.S.C. §150(b)), National Multimodal Freight Policy goals (49 U.S.C. §70101), and National Highway Freight Program (NHFP) goals (23 U.S.C. §167(b)).

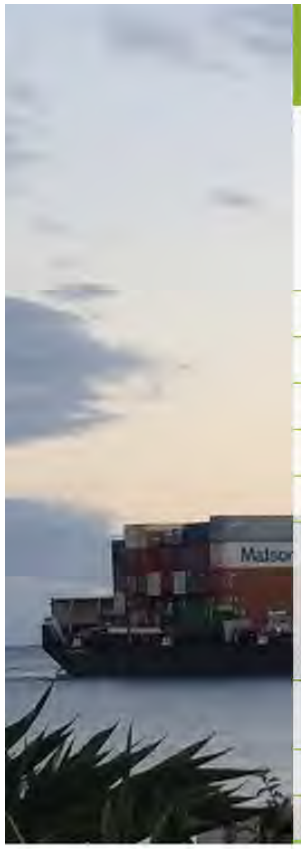
B. Organization of this Plan

The HSFP is organized into the following chapters:

- **Chapter 1** provides the purpose and organization of this plan and presents the national freight goals and the goals of the HSFP.
- **Chapter 2** describes the economic context of freight transportation planning in Hawaii. This chapter shares the key industry sectors and commodity flow and movement.
- **Chapter 3** defines the existing freight transportation infrastructure in Hawaii.
- **Chapter 4** shares the performance-based planning and programming approach to the HSFP.
- **Chapter 5** describes freight trends, needs and issues that are designed to improve freight efficiency.
- **Chapter 6** describes the stakeholder approach and decision-making process used to develop the HSFP.
- **Chapter 7** presents an implementation strategy that supports the goals and objectives for the HSFP.
- **Chapter 8** includes a fiscally constrained investment plan and describes how the State will move forward to implement the recommendations of the HSFP.

C. FAST Act and National Freight Goals

It is the policy of the United States to maintain and improve the condition and performance of the National Multimodal Freight Network established under 49 U.S.C. §70103 to ensure that the Network provides a foundation for the United States to compete in the global economy. In addition, 23 U.S.C 167 of the FAST Act states that, "It is the policy of the United States to improve the condition and performance of the National Highway Freight Network established under this section to ensure that the Network provides the foundation for the United States to compete in the global economy and achieve the goals described in subsection (b)" (see Figure 1-2). Furthermore, the FAST Act requires "each state that receives NHFP funding to develop a comprehensive freight plan that provides for the immediate and long-range planning activities and investments of the State with respect to freight" ("FAST Act Section 1116 Implementation Guidance," accessed June 28, 2018, from https://ops.fhwa.dot.gov/freight/pol_plng_finance/policy/fastact/s1116nhfpguidance/). The goals of each statewide freight plan should be consistent with the national goals established for the National Multimodal Freight Network shown on Figure 1-1 and those for the National Highway Freight Program (23 U.S.C. §167(b)) shown on Figure 1-2.



National Freight Goals

Develop a State freight network that provides for the safety of people, infrastructure, and goods movement.

1. To identify infrastructure improvements, policies, and operational innovations that—
   - Strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States
   - Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network; and
   - Increase productivity, particularly for domestic industries and businesses that create high-value jobs
2. To improve the safety, security, efficiency, and resiliency of multimodal freight transportation;
3. To achieve and maintain a state of good repair on the National Multimodal Freight Network;
4. To use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network;
5. To improve the economic efficiency and productivity of the National Multimodal Freight Network;
6. To improve the reliability of freight transportation;
7. To improve the short- and long-distance movement of goods that—
   - Travel across rural areas between population centers;
   - Travel between rural areas and population centers; and
   - Travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network
8. To improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity;
9. To reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network; and
10. To pursue the goals described in this subsection in a manner that is not burdensome to State and local governments.

Figure 1-1. National Multimodal Freight Goals

Figure 1-2. National Highway Freight Program Goals

D. Hawaii Statewide Freight Plan Goals

The Mission Statement for the HDOT (Figure 1-3) encapsulates the vision for freight within the state. Six overarching goals were identified for freight movement in Hawaii, which fulfill the federal requirement for a statewide freight plan and meet all the elements, national goals, and requirements of the 2015 FAST Act (Figure 1-4).

The HSFP also supports the freight-related goals identified in the HDOT's Hawaii Statewide Transportation Plan and Statewide Federal-Aid Highways 2035 Transportation Plans, the Oahu Metropolitan Planning Organization's Long-Range Transportation Plan, and critical success factors as identified by the HSFP project management team. The goals were further refined with input from the HSFP's stakeholders.

> To provide a safe, efficient, accessible, and sustainable inter-modal transportation system that ensures the mobility of people and goods, and enhances and/or preserves economic prosperity and the quality of life.
>
> HDOT Mission Statement

Figure 1-3. HDOT Mission Statement

1. Consistency with other Statewide Plans

It is important for the goals and objectives of the HSFP to be aligned and consistent with relevant federal and state plans and policies. As previously reflected, the goals established for the HSFP are consistent with federal laws and policies. The following plans, programs, and policies were also reviewed and evaluated for relevance to this HSFP's development process. The HSFP supports the freight-related goals and policies of these plans (Figure 1-5).

- Hawaii Statewide Transportation Plan
- Statewide Federal-Aid Highways 2035 Transportation Plan
- 2035 Transportation Plan for the District of Kauai
- 2035 Transportation Plan for the District of Maui
- 2035 Transportation Plan for the District of Hawaii
- Oahu Regional Transportation Plan 2035

Figure 1-4. Hawaii State Freight Plan Goals

Figure 1-5. Statewide Transportation Plans

2. Relationship to the Statewide Transportation Planning Process

This HSFP is integrated with the HDOT planning and programming process. The HSFP accomplishes a specific component of the overall statewide transportation planning process. A summary of the planning process and hierarchy of components is shown on Figure 1-6. The top row of the figure, *Planning*, represents high-level planning efforts. It includes the Hawaii Statewide Transportation Plan, which focuses on broad policy, goals, and objectives for all transportation modes. It provides guidance to system level and facility master plans of the three primary modes of transportation—the air, water, and land systems—as well as the nonmotorized modes and intermodal connections.

The next component in the Planning level is the statewide modal plans that set forth overarching goals and ensures equity and consistency among the regional plans. This includes the Statewide Federal-Aid Highways 2035 Transportation Plan, Harbors Master Plan, and Airports Master Plan.

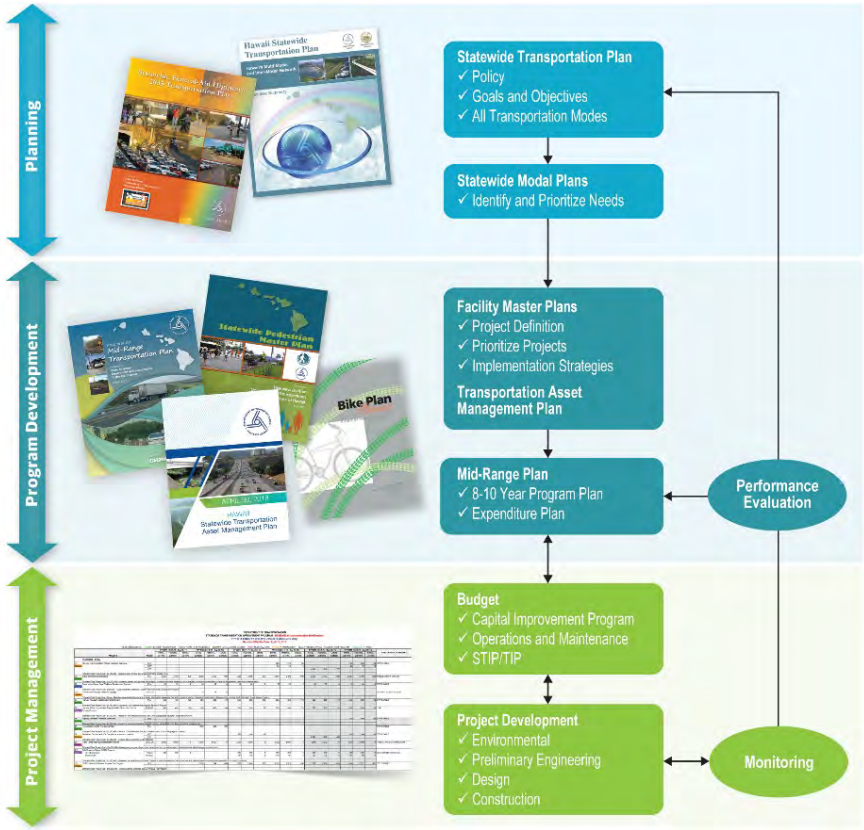


Figure 1-6. Statewide Integrated Transportation Planning

The middle row of the figure, *Program Development*, is where the HSFP fits within the planning process as a facility master plan. It presents recommendations, prioritizations, and documentation for freight facilities. The Program Development level also includes the following plans:

- Bike Plan Hawaii
- Statewide Pedestrian Master Plan
- Regional Federal-Aid Highways 2035 Transportation Plans
- Oahu Regional Transportation Plan
- Hawaii Strategic Highway Safety Plan
- Transportation Asset Management Plan

The next component in the Program Development level is the Mid-Range Transportation Plan (MRTP). The MRTP will includes trade off analysis and will be fiscally constrained. It will ensure that the investments in the Statewide Transportation Improvement Program (STIP), Transportation Improvement Program (TIP), Capital Improvement Program (CIP), and Special Maintenance Program (SMP) are consistent with the HDOT's long-term vision and mission.

The bottom row of the figure is *Project Management*. This includes budgeting (STIP, TIP, CIP, and SMP) and Project Development. It is at this last step of the overall process where individual projects are permitted, designed, and constructed.

3. Plan Development Process

The HSFP was formulated through a series of milestones in an open and comprehensive process that developed goals, objectives, and strategies before identifying potential solutions. This process allowed the planning team to objectively evaluate alternative solutions and assess how well they met the goals and objectives defined by stakeholders. Decisionmakers, advisory committees, and freight industry stakeholders were included throughout the process to ensure quality decisions. Clearly identifying plan milestones allowed stakeholders to visualize the entire process and identify points at which to provide input. The major plan milestones for the HSFP are shown on Figure 1-7.

Task 1: Kick-off Meeting/Team Chartering

This task focused on defining the project and participant expectations. It also established the boundaries of the project including goals and objectives, decision-making responsibilities, lines of communication, and commitments for performance.

Task 2: Develop Goals, Objectives, and Evaluation Criteria/Performance Measures

This task included developing goals and objectives that are consistent with the National Multimodal Freight Policy goals, the National Highway Freight Program goals, and the statewide transportation goals. Evaluation criteria and performance measures that are tied to the goals and objectives were used later in the process for assessing the performance of the freight system, and for identifying and prioritizing targeted improvement strategies.

Task 3: Assess and Define Existing and Future Conditions

This task identified existing freight infrastructure, major freight facilities, and freight flows, and developed a list of multimodal critical rural and urban freight corridors and facilities.

Task 4: Identify Needs, Deficiencies, and Potential Projects

This task identified a needs assessment and evaluation process, founded on stakeholder values, that integrated economic and transportation goals that lead to a prioritized schedule of solutions supported by all. This task included the development of a comprehensive list of potential freight improvement strategies and projects based on technical analysis, outreach, and previous studies. The potential projects were evaluated and prioritized by applying the evaluation criteria established in Task 2.

Task 5: Develop the Statewide Freight Plan

The HSFP is the end result of the plan development process and includes a statewide freight plan compliant with federal regulations. The statewide freight plan describes how the plan will improve the ability of the State to meet the national multimodal freight policy goals and the national highway freight program goals.

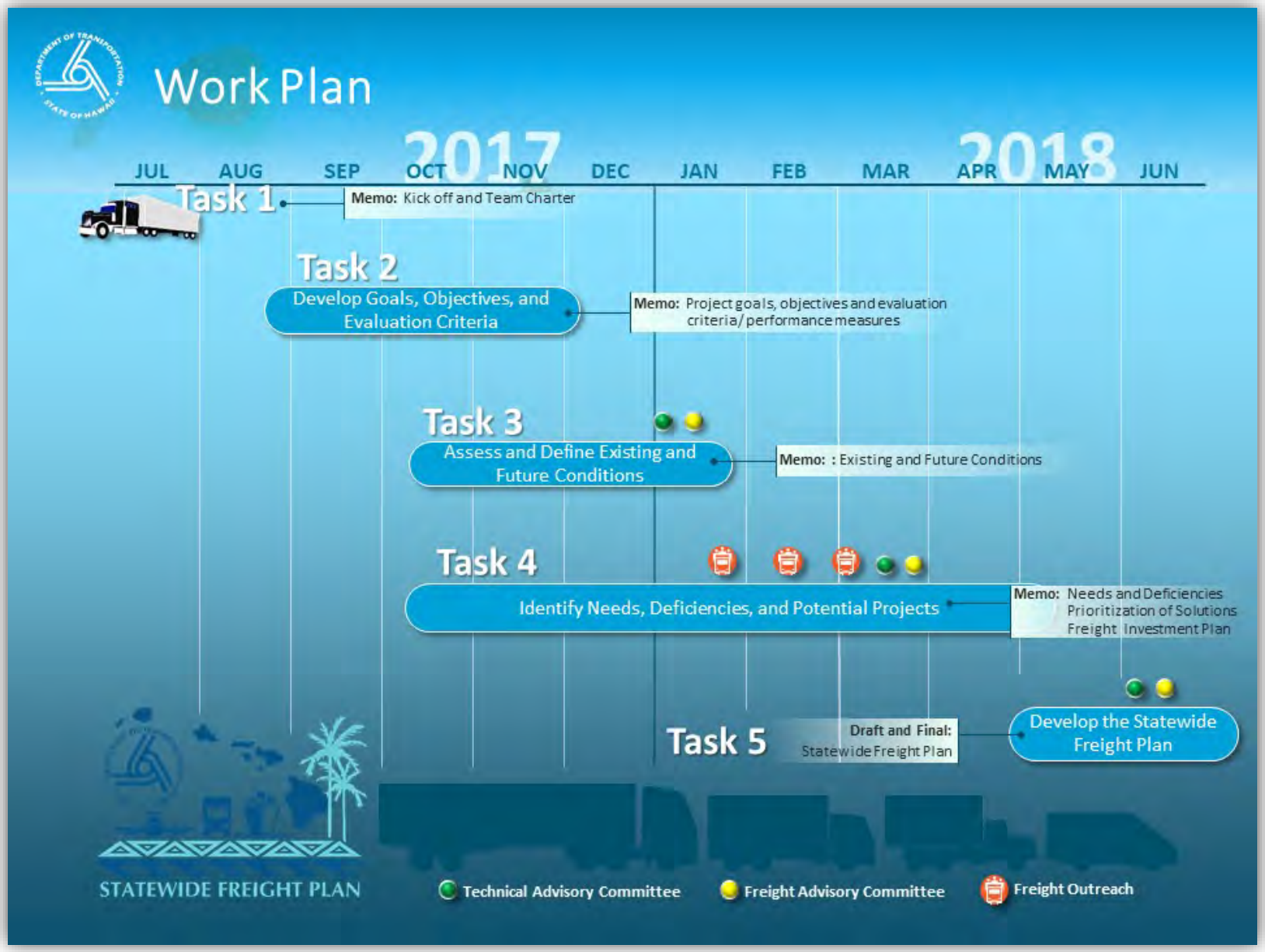


Figure 1-7. Plan Development Process

2 Economic Context of Freight Transportation Planning

Hawaii is the 50th and most recent state to join the U.S. and the only state in the U.S. composed entirely of islands. Hawaii's economy has grown rapidly since statehood, largely due to tourism. As an island state, Hawaii has a unique and relatively complex supply chain. Because of its distant location and resource dependency, Hawaii is entirely dependent on the transport of freight, more than any other state in the union. Its people and its economy must rely on an interconnected freight transportation network between the mainland, abroad, and between the islands themselves, particularly the marine and air freight network. Hawaii must import food, fuel, raw materials, and most consumer goods, not only to support growth, but to maintain its current quality of life. Hawaii has the lowest ratio of interstate outbound to inbound shipments by value in the country, meaning it imports more goods from other states than it exports (USDOT, 2017). Hawaii's incredible natural beauty also makes it one of the most visited places in the nation, further adding to the need for the efficient movement of goods while preserving its natural environment.

This chapter provides an overview of Hawaii's economy, including the freight-related economic output and employment activity in the state.

A. Overview of the Hawaii Economy

Hawaii includes eight major islands, of which six are permanently inhabited. The eight major islands are Niihau, Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui and the Island of Hawaii. The last, the largest island in the group, is often called the Big Island or Hawaii Island to avoid confusion with the state as a whole. The Hawaiian Islands are home to more than 1.4 million people and draw over 8 million visitors each year. Hawaii's population is expected to grow to 1.6 million by 2045 (DBEDT, 2018).

Hawaii generated approximately $84 billion in gross domestic product (GDP) in 2016, which made it the 38th largest state economy in the nation. Hawaii's per capita real GDP was approximately $51,300 in 2016 or 1.4 percent higher than the U.S. average. This puts Hawaii 20th among the 50 states and the District of Columbia (DBEDT, 2016).

Hawaii's economy depends significantly on conditions in the U.S. economy and key international economies, especially Japan. Hawaii's economy is expected to continue positive growth. This outlook is based on the most recent developments in the national and global economies, the performance of Hawaii's tourism

industry, labor market conditions, and the growth of personal income and tax revenues.

Hawaii had a civilian labor force of approximately 680,000 people in 2016 and has one of the lowest unemployment rates in the country, at 2.1 percent. In terms of employment, the top three industries with the largest employment in Hawaii are Accommodation and Food Services (13.6 percent), Retail Trade (11.6 percent), and Healthcare and Social Assistance (11.4 percent) (DBEDT, 2017). The U.S. military is also a significant driver of the state's economy, which is directly tied to manufacturing. The U.S. Department of Defense spends about $2 billion each year on prime contracts and equipment in Hawaii.

1. Employment in Freight-related Sectors

Economic activity is typically divided into two categories: goods-producing sectors and service sectors (Figure 2-1). Goods-producing sectors include those such as manufacturing, mining, construction and agriculture that produce physical goods for later use and consumption. Goods-producing sectors are heavily reliant on the freight industry to receive supplies and deliver products to customers. Other freight-related sectors include wholesale and retail trade sectors, which rely on a network of carriers, shippers, distribution centers, and warehouses to function effectively making these sectors also reliant on freight. Similarly, the accommodation and food services sector, which includes restaurants and hotels with convention center activities, also relies on freight for supplies and inputs. The transportation and warehousing sector is the core industry for the movement and storage of goods and is therefore directly related to the freight industry.

Figure 2-2. Freight-related Sectors

There are nearly 350,000 people employed in freight-related sectors in Hawaii, representing 38 percent of the total employment in the state (Figure 2-2). This substantial percentage of employment in freight-related sectors reinforces the importance of the freight industry in supporting the state's economy.

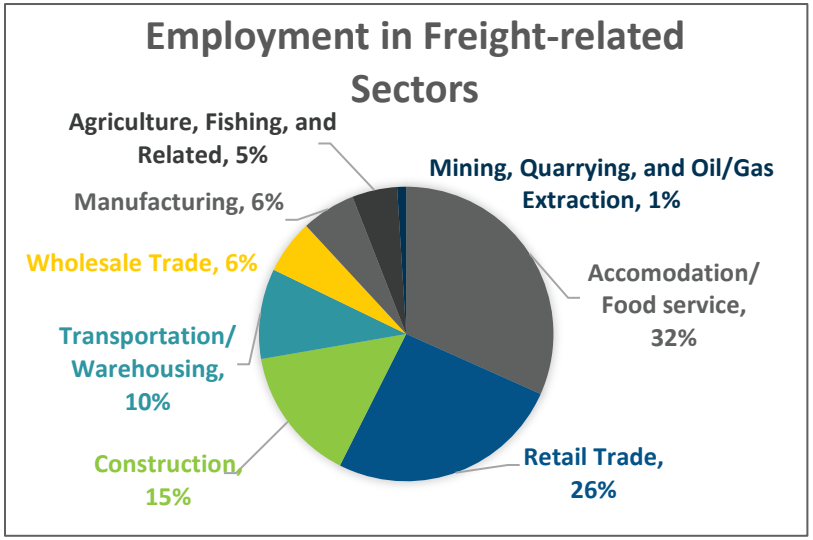


Figure 2-1. Employment in Freight-related Sectors (by Percentage of Employees)

The accommodation and food service sector is the largest freight-related sector, with over 110,000 employees representing 32 percent of the total freight-related employment in Hawaii. This is followed by the retail trade, construction, and transportation and warehousing sectors, which combine for another 180,000 employees or roughly half of the employment in freight-related sectors. The remaining three sectors, manufacturing, agriculture, and mining, equal just 10 percent of the employment.

2. Economic Output in Freight-related Sectors

The economic output of freight-related sectors in Hawaii in 2016 was $23.4 billion, according to the U.S. Bureau of Economic Analysis. This represents 32 percent of the overall economic activity for Hawaii. Table 2-1 shows a breakdown of the freight-related economic output by sector.

Table 2-1. Economic Output in Freight-related Sectors

Freight-related Sectors	Economic Output (billions)	% of Total
Accommodation/Food Services	$6,186	29%
Retail Trade	$5,272	22%
Construction	$4,573	19%
Transportation/Warehousing	$3,075	13%
Wholesale Trade	$2,328	10%
Manufacturing	$1,597	7%
Agriculture, Fishing, and Related	$376	2%
Mining, Quarrying, and Oil/Gas Extraction	$76	< 1%
Total Freight-related Sectors	$23,483 billion	100%

Source: U.S. Department of Commerce, 2016.

The largest freight-related sector is the accommodation and food service sector, which accounts for $6.2 billion of economic output. This is followed by retail trade ($5.3 billion) and construction ($4.6 billion). These sectors are similar because they require a significant amount of inputs and supplies that are provided by the movement of goods. The transportation and warehousing sector has $3.1 billion of annual economic output.

B. Hawaii Key Industry Sectors

According to the Hawaii Department of Business, Economic Development and Tourism (DBEDT), Hawaii's economy is not easily summarized into conventional industry sectors common to economic analysis—that is, those categories that comprise the GDP. The primary source of income for Hawaii is the visitor sector which spreads itself over several industries, such as service, transportation and retail trade. As previously identified, these are also key freight-related sectors, providing significant contributions to the economy and employment in Hawaii.

The DBEDT also identified the top four export industries in terms of expenditures to be visitors, defense, raw sugar and molasses and fresh and processed pineapple (DBEDT, 2018).

C. Commodity Flow and Movement

Figure 2-3 shows the tonnage by type of trade. By far the greatest commodity flow occurs between the islands themselves: imports and domestic inbound traffic are about half the amount of intra-island traffic. Exports and domestic outbound traffic represent less than 10 percent of all trade.

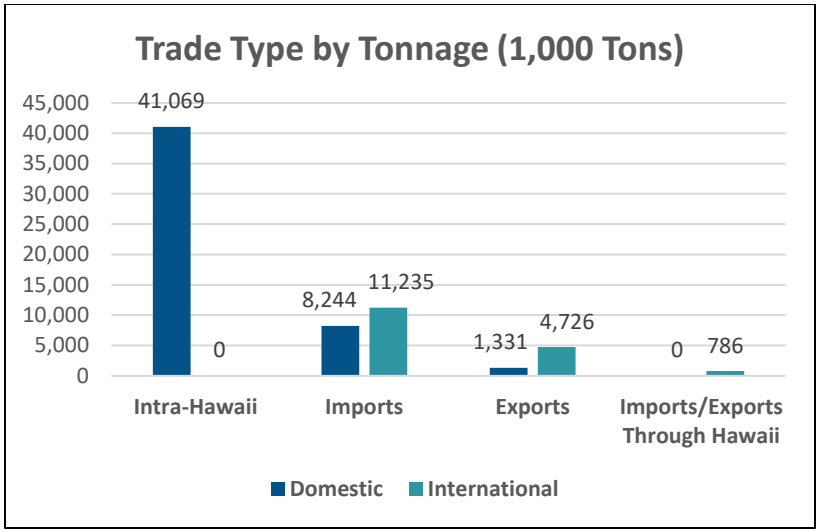


Figure 2-3. Trade Type by Tonnage

Figure 2-3 shows the commodity distribution for both domestic and international trade. Crude petroleum has the highest trade volume, with almost equally domestic and international volumes. Waste and scrap follow closely behind, with a slight majority of it traded domestically. Gravel, fuel oils, and gasoline are mostly domestically traded. Coal, which is the sixth-most-traded commodity, is entirely internationally traded.

Figure 2-5 shows the overall mode distribution for all freight (domestic and international combined). Marine freight and truck freight are nearly equal (at approximately 40 percent each) and comprise the primary mode of freight transport. Domestically, truck freight represents the greatest mode share at 51 percent, while marine freight accounts for 97 percent of the mode distribution for international freight.

Estimates of the origin and destination of these domestic trading partners are presented on Figure 2-6 and Figure 2-7. Domestic goods are mostly coming from the West Coast and Alaska, with California and Alaska being the two major contributors. Goods are shipped to California mostly, with some destined for Washington and Texas. There is some traffic heading farther into the U.S. mainland.

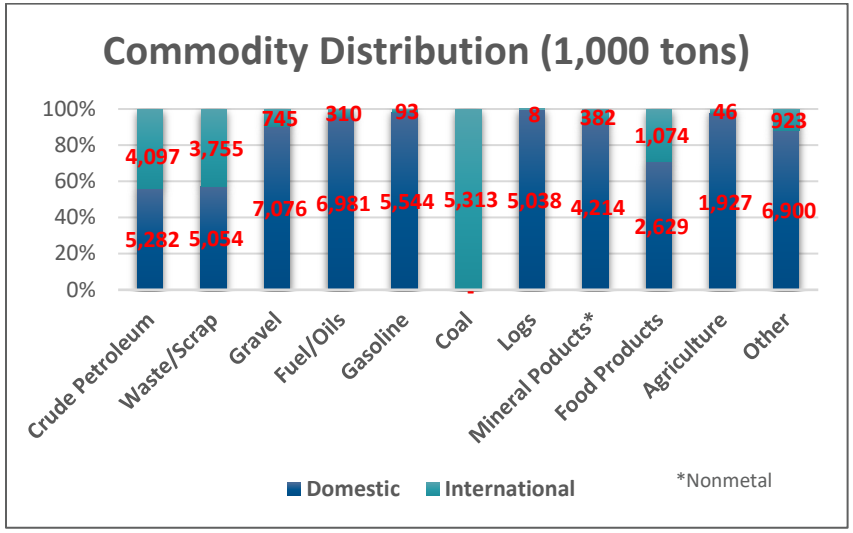


Figure 2-4. Commodity Distribution, 2015

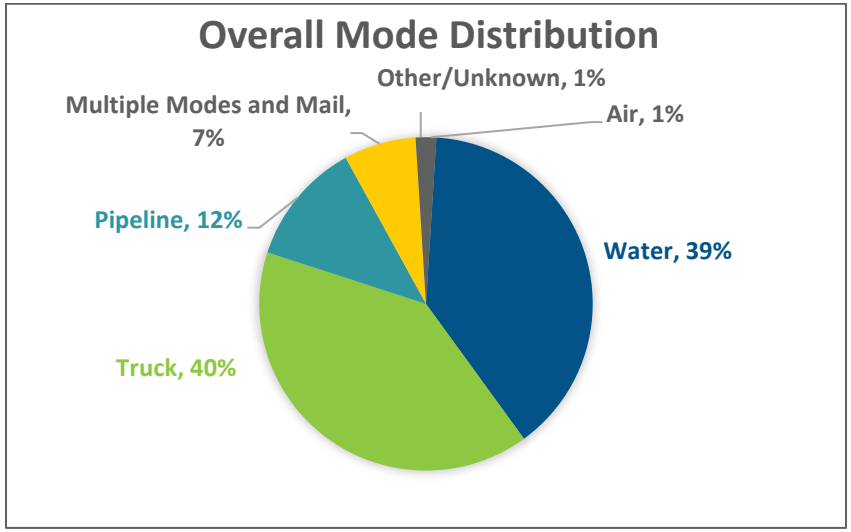


Figure 2-5. Overall Mode Distribution, 2015
Source: USDOT, 2015

Internationally, most goods are coming from, and going to, Asia, Oceania, and Canada; the detailed breakdown of the origin and destination of goods can be seen Appendix A. While overall there is a higher volume of goods imported to Hawaii, there is a higher portion of goods exported to Eastern Asia compared to imports from Eastern Asia. Hawaii serves as the midpoint for goods being imported and exported into the U.S. from Southeast Asia, Oceania, and East Asia. However, this through movement accounts for less than 5 percent of the goods movement in Hawaii.

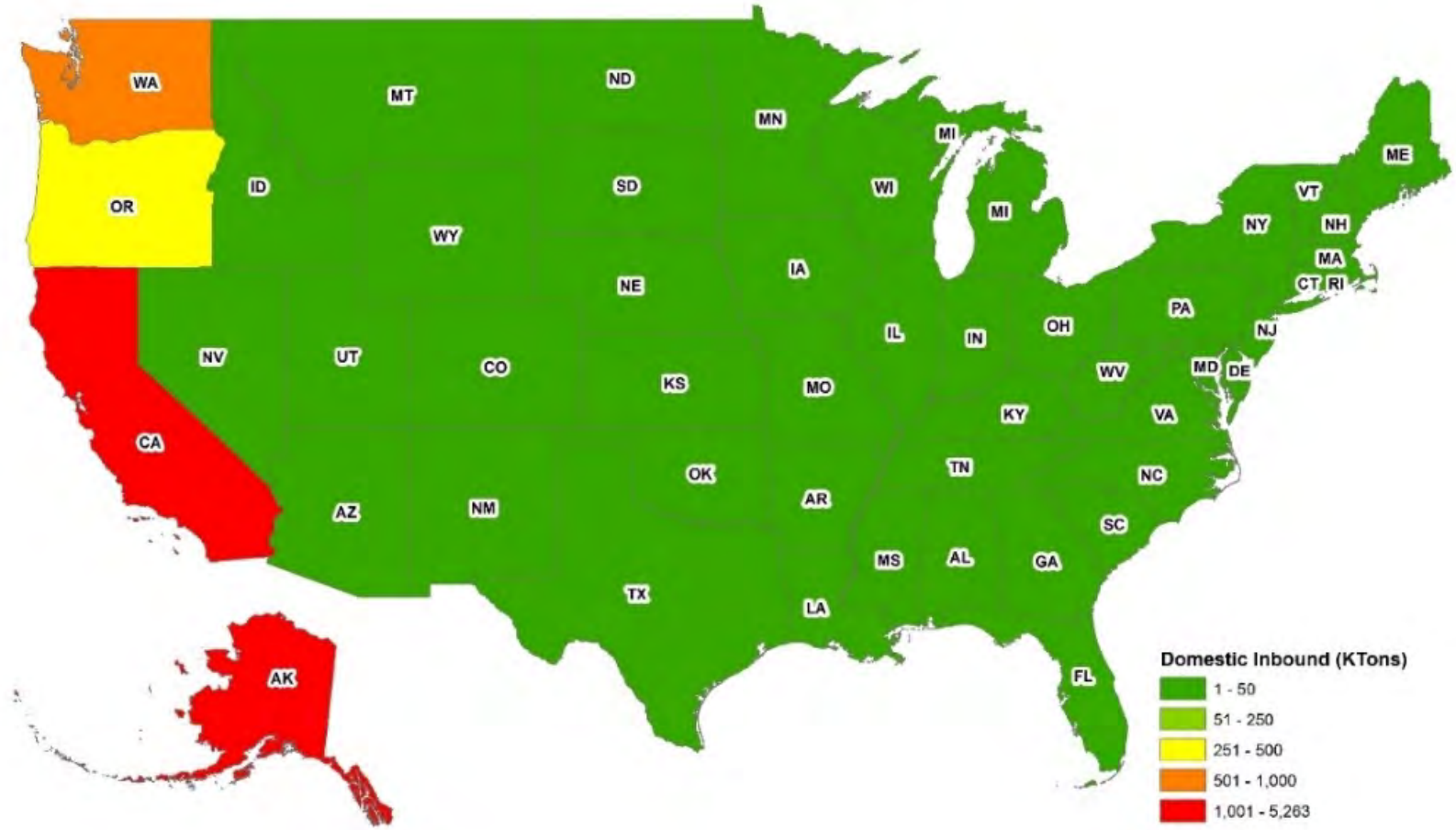


Figure 2-6. Domestic Inbound Trade, 2015 (Thousands of Tons)

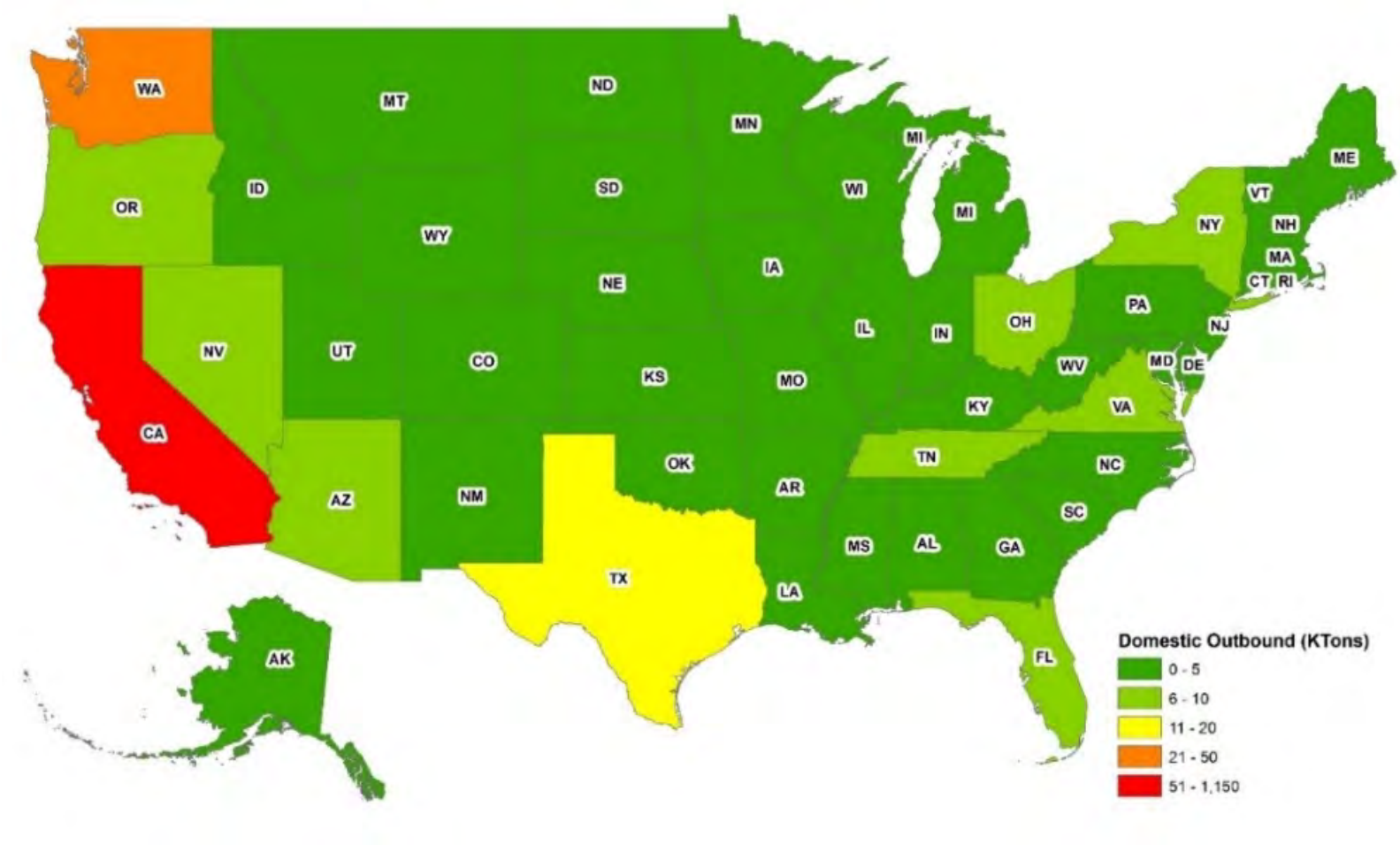


Figure 2-7. Domestic Outbound Trade, 2015 (Thousands of Tons)

3 State Freight Transportation Infrastructure

The economy and the quality of life for Hawaii's residents and visitors alike depend on the transport of millions of tons of goods shipped through the state's multimodal transportation network, including highways, airports, and harbors.

This chapter describes the existing statewide freight transportation infrastructure and conditions. Hawaii's geographic isolation requires almost all imported goods to arrive via cargo vessel. Most goods are delivered to Honolulu Harbor on Oahu and distributed throughout the state via the interisland short-sea and air freight cargo shipping system and each island's ground transportation network.

A. Highway/Trucking

1. Infrastructure

The roadway system is the sole means of surface transportation of goods in Hawaii, because there are no commercial rail corridors or other high-volume transport options. There are approximately 2,400 miles in Hawaii's federal-aid roadway system of interstates, expressways, principal/major arterials, and minor arterials.

All of Hawaii's islands are of volcanic origin, and as such, many of the islands feature one or more mountains or mountain ranges in the interior sections of the island, with flatter eroded topography along the coastline. Most of the major roadways that provide vehicular connectivity and mobility are constructed on these flatter coastline sections. On the islands of Hawaii and Maui, roadway systems completely encircle the island, forming a belt road or beltway. For other islands, roadways systems may encircle only a portion of the island, or roadways may continue along the coastline and end at some point, providing only one major method of access to communities.

Figure 3-1. Honoapiilani Highway on Maui

Unlike other parts of the U.S., the useable land area in Hawaii is very limited. Many of the roadways are confined by developments abutting the facilities or by natural topographic features. Expansion of existing facilities or constructing alternative routes are cost-prohibitive and come with significant environmental impacts. In addition, the high cost of construction is exacerbated by the limited resources (including materials and labor) on the islands. Each island has its own unique system, vital to that island.

The federally designated highway system includes the National Highway System (NHS), the Strategic Highway Network (STRAHNET), the National Highway Freight Network (NHFN), and the Primary Highway Freight System (PHFS). Figure 3-4 through Figure 3-7 show the NHS and PHFS for Oahu, the Big Island, Maui, and Kauai, respectively. There is significant overlap between the NHS and PHFS, with only a few minor differences in Maui as noted on Figure 3-6. A detailed list of the PHFS system in Hawaii can be found in Appendix D.

Figure 3-2. Kuhio Highway in East Kauai

The NHS is a system of critical economic, defense, and mobility routes that consists of interstates, other principal arterials, STRAHNET, major strategic highway network connectors, and freight/passenger intermodal connectors. The NHS has about 55 interstate centerline miles, 310 centerline miles of other road types, 80 miles of the STRAHNET, and approximately 10 miles of intermodal connectors.

Because of Hawaii's limited roadway options due to island geography and topography, the NHS serves many functions in many areas. The reliance on the NHS and the constrained geography may increase traffic and congestion on roadways designated as arterials. Many of these belt roadways carry a large volume of traffic and serve as the primary means to transport freight and goods and are essential to the well-being of the communities they serve. Furthermore, there can be significant adverse effects to those communities in the event of an emergency or other unplanned incident on the roadway system.

Over half of these miles are located on Oahu. Oahu is also the only island with an interstate system – H-1, H-2, H-3, and H-201 provide truck access on limited access facilities around the island.

Figure 3-3. Interstate H-201 on Oahu

The FAST Act requires the designation of a NHFN—a network of roads that are critical to freight movement in the United States. Only projects on the NHFN are eligible for funding from the National Highway Freight Program and the new freight-related discretionary grant program, Infrastructure for Rebuilding America (INFRA) grants. There are four components of NHFN: the PHFS, other interstates not included in the PHFS, critical urban freight corridors, and critical rural freight corridors. The PHFS is defined based on national criteria. The critical urban and rural freight corridors are defined as part of this HSFP and are described in further detail in Chapter 7, Freight Improvement Strategies and Recommendations.

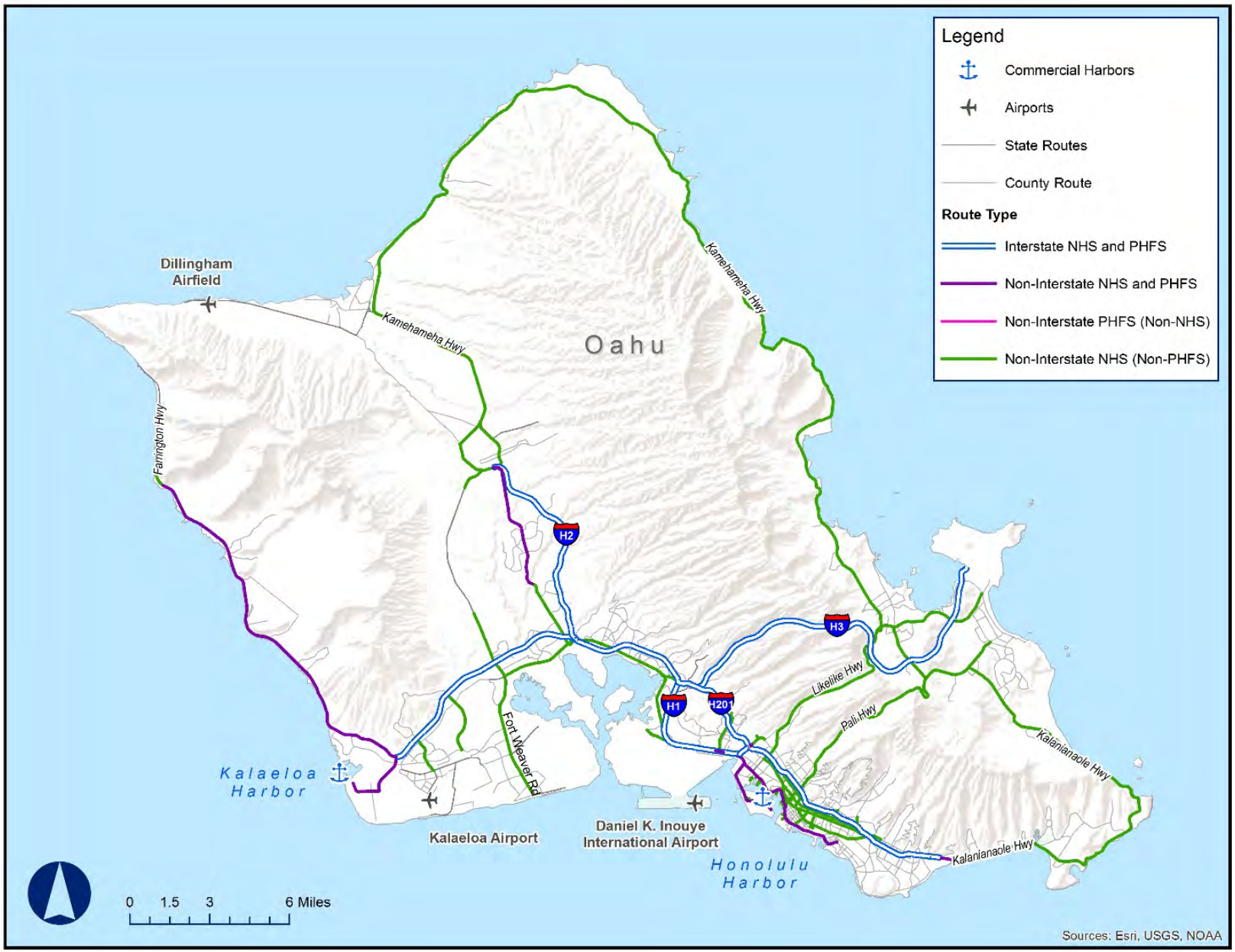


Figure 3-4. National Hawaii System – Oahu

Figure 3-5. National Hawaii System – Big Island

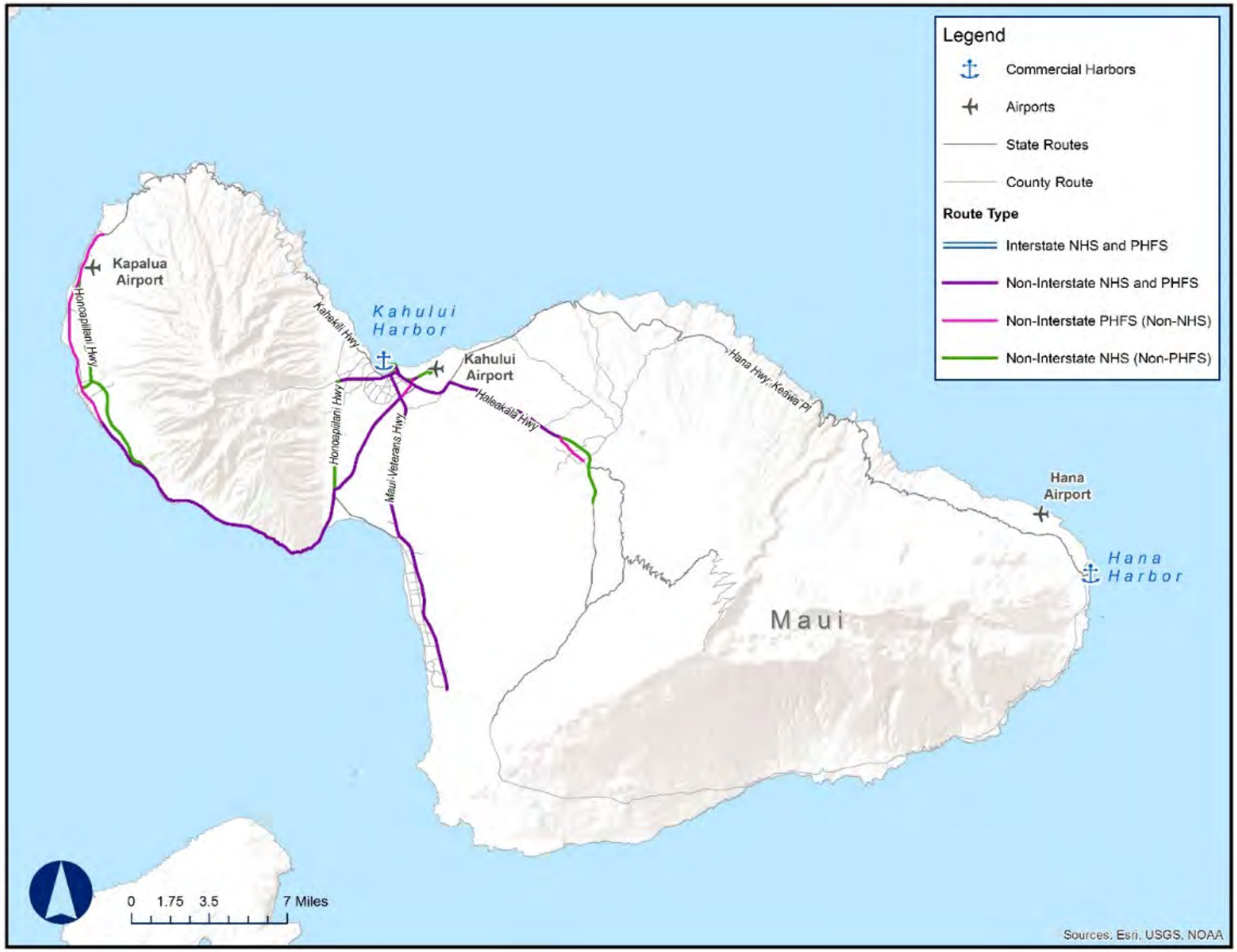


Figure 3-6. National Hawaii System – Maui

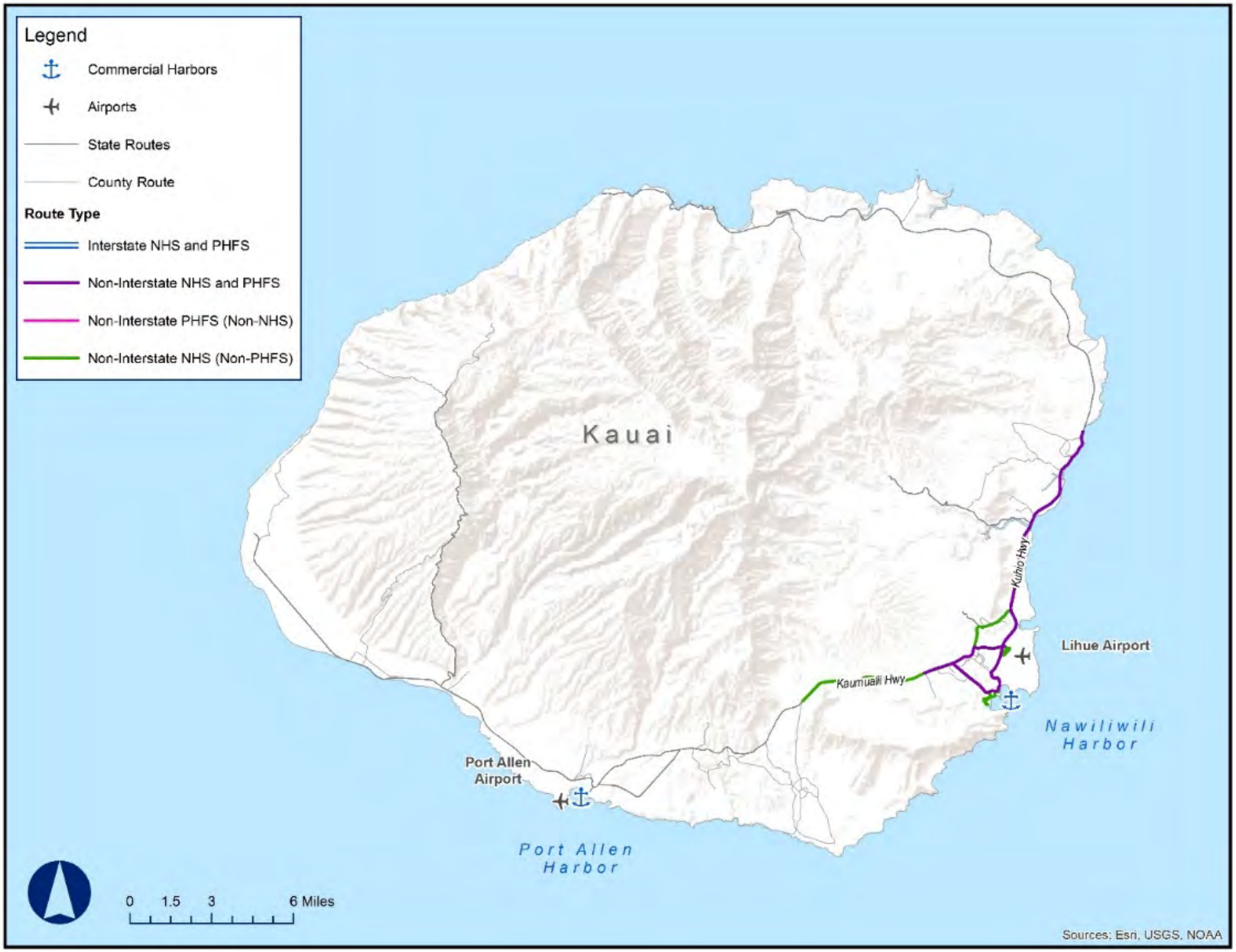


Figure 3-7. National Hawaii System – Kauai

2. Truck Volumes

The locations on the statewide highway network with the highest truck volumes (those at Federal Highway Administration [FHWA] vehicle Class 5 and higher) were identified and are the focus of pavement conditions, congestion, and safety issues. These are locations that are heavily used by trucks and are therefore important for the movement of goods on the highway system.

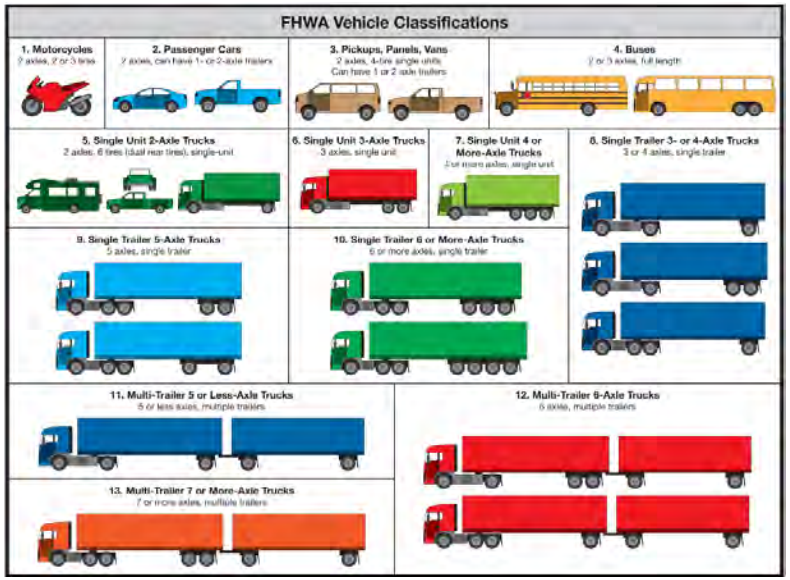


Figure 3-9. FHWA Vehicle Classifications (txt.dot.gov)

Figure 3-10 through Figure 3-14 show the top 50 truck volume locations by island. A clear majority (44 out of 50) of the top truck volume locations are on Oahu. Of the remaining, there are 4 locations on the Big Island, 2 on Kauai, and none on Maui.

The top four locations with the highest truck volumes are on H-1 in Oahu, with estimated daily truck volumes ranging from 5,935 to 20,015. These are followed by two locations on the Nimitz Highway, which both have between 4,500 and 5,000 estimated daily trucks. The highest concentration of locations is in the urbanized section of Honolulu, most notably north and east of the port facilities on Sand Island. West Oahu has high truck volumes on H-1, H-2, and Fort Weaver Road. The Pearl City subregion also has a relatively high number of locations with high truck volumes because of the connecting roads between Central and West Oahu.

On the Big Island, most of the top truck volume locations are on Highway 11 (also called Kanoelehua Avenue). On Kauai, the top truck volume roadways are Kaumualii Highway (Highway 50), Kuhio Highway (Highway 56), and Rice Street/Waapa Road (Highway 51). On Maui, the Honoapiilani Highway Bypass has the most frequent high truck volume locations.

3. Pavement Condition

Pavement condition is closely tied to trucking activity: trucks cause a disproportionate amount of road wear and tear. Conversely, poor pavement condition can cause significant damage to trucks and the goods being transported.

The HDOT classifies roadways as good, fair, and poor based on the

Figure 3.8. Pavement Condition, Good vs. Poor

International Roughness Index. A full description of the methodology used to analyze the HDOT pavement data can be found in Appendix A. Table 3-1 shows a high-level breakdown of

pavement condition by island, with Hawaii Island having some of the best pavement condition. While only small percentages of pavement are considered in good condition for each island, the percentage considered in poor condition is minimal; overall, the vast majority of pavement is considered in fair condition.

Table 3-1. Pavement Condition by Island

Island	Good	Fair	Poor
Oahu	5%	87%	8%
Hawaii	24%	70%	5%
Maui	14%	81%	5%
Kauai	16%	75%	9%
Lanai	19%	81%	0%
Molokai	5%	78%	17%
Total	**14%**	**79%**	**7%**

Source: 2017 HDOT data

Oahu has overall good or fair pavement on its interstate system, other than the very northern section of H-2. However, some of the access roads to the interstates have pavement in poor condition, including Makakilo Drive, Farrington Highway, Old Fort Weaver Road, and Kamehameha Highway parallel to H-1 between H-2 and H-3. Some locations in the urban center of Honolulu also have roadways with poor pavement condition. Streets in poor condition in the area include Pali Highway, Ala Moana Boulevard, Kapiolani Boulevard, South Beretania Street, University Avenue, East Manoa Road, and Kalihi Street. The less urbanized areas have better pavement condition, with poor conditions found only on Farrington Highway in the northwest and Kamehameha Highway in the east by the Heeia State Park.

The poor pavement sections of roads on the Big Island are also clustered in the more urban areas such as Kailua-Kona and Hilo. In Kailua-Kona, the pavement conditions are found on Alii Drive, Nani Kailu Drive, Henry Street, Lako Street, Kealakaa Street, and Hina Lani Street. Hilo has the worst pavement conditions on the island, with higher concentration closer to the coast. These roads include Stainback Highway, Kaumana Drive, Railroad Avenue, Kinoole Street, Kilauea Avenue, Mamalahoa Highway, Mohouli Street, Wainaku Avenue, Kilauea Avenue, Kamehameha Avenue, Hawaii Belt Road, and Kalanianaole Street. The roads in poor condition in the less urbanized areas include Waikoloa Road in the west and Puualaea Street in the northeast.

The remaining islands have sporadic locations of poor pavement, unrelated to urbanization. On Kauai, the roads with the worst pavement include Waimea Canyon Road, Ala Kinoiki Way, Poipu Road near Hanakaape Bay, and the roads leading up to Nawiliwili Harbor.

Pavement Conditions with Biggest Impact on Trucking Activity

Table 3-2 lists the truck count locations with poor pavement condition and 100 or more daily trucks. These are locations where damage to trucks from pavement condition is most significant and, conversely, where pavement damage caused by trucks may require more focus from maintenance programs.

Most of the identified locations are clustered in urbanized areas such as Honolulu and Hilo. Kalihi Street and Pali Highway in Honolulu are the two streets that are listed more than once. In addition to Honolulu, Oahu has a few locations on Geiger Road in the southwest, Kamehameha Highway in the north, Mokapu Saddle Road in the east, and Kalanianaole Highway in the southeast.

In Hilo, Kinoole Street and Kamehameha Avenue have more than one high truck and poor pavement location. There are also a few locations very close to Hilo Harbor and in the downtown center.

The two locations in Maui are on South Kihei Road in Kihei and Makawao Avenue, near Makani Road. In Kauai, the road with the highest truck volume and poor pavement condition is on Waapa Road near the Nawiliwili Harbor.

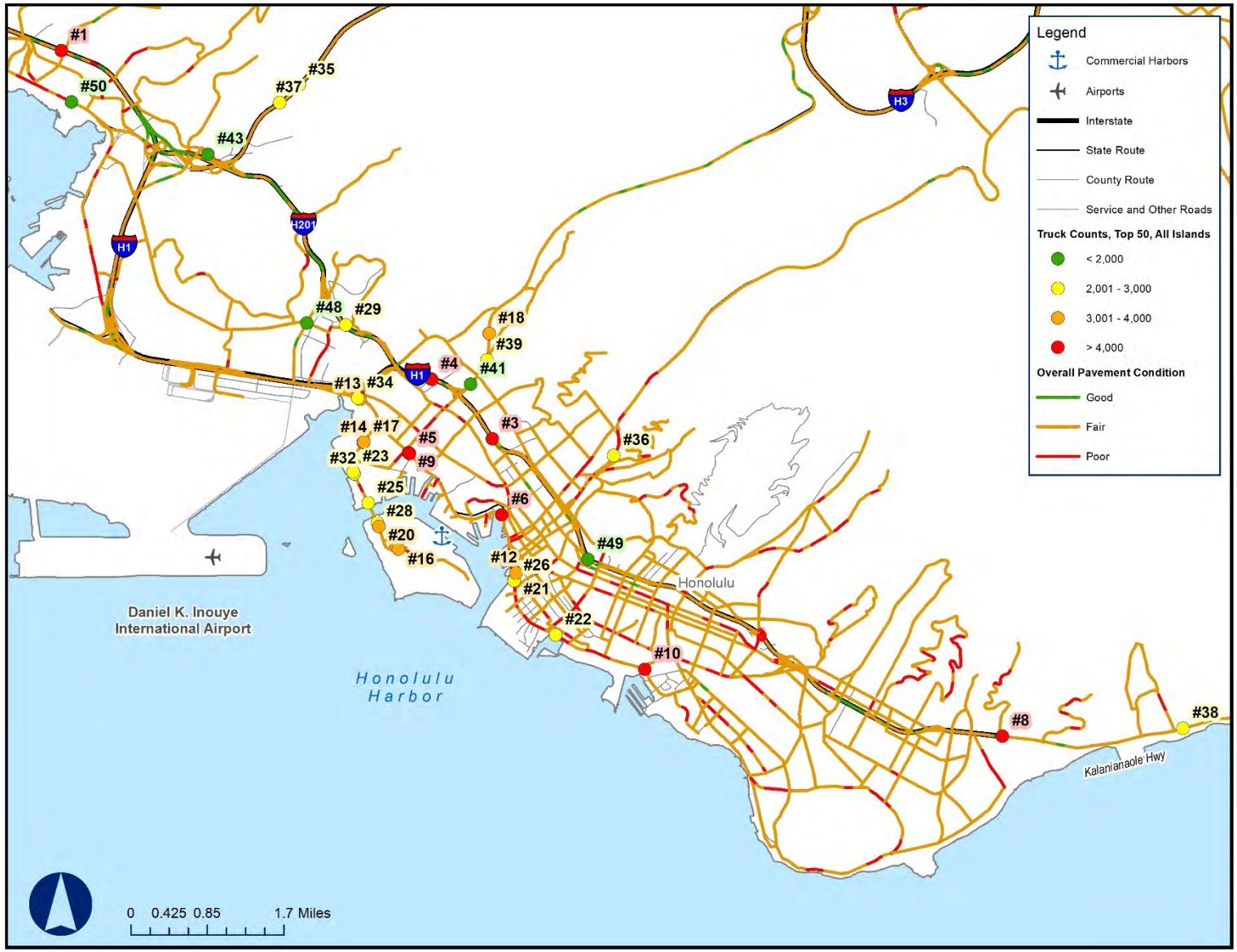


Figure 3-10. Top 50 Truck Count Locations, 2017 – Honolulu, Oahu

Source: 2017 HDOT data

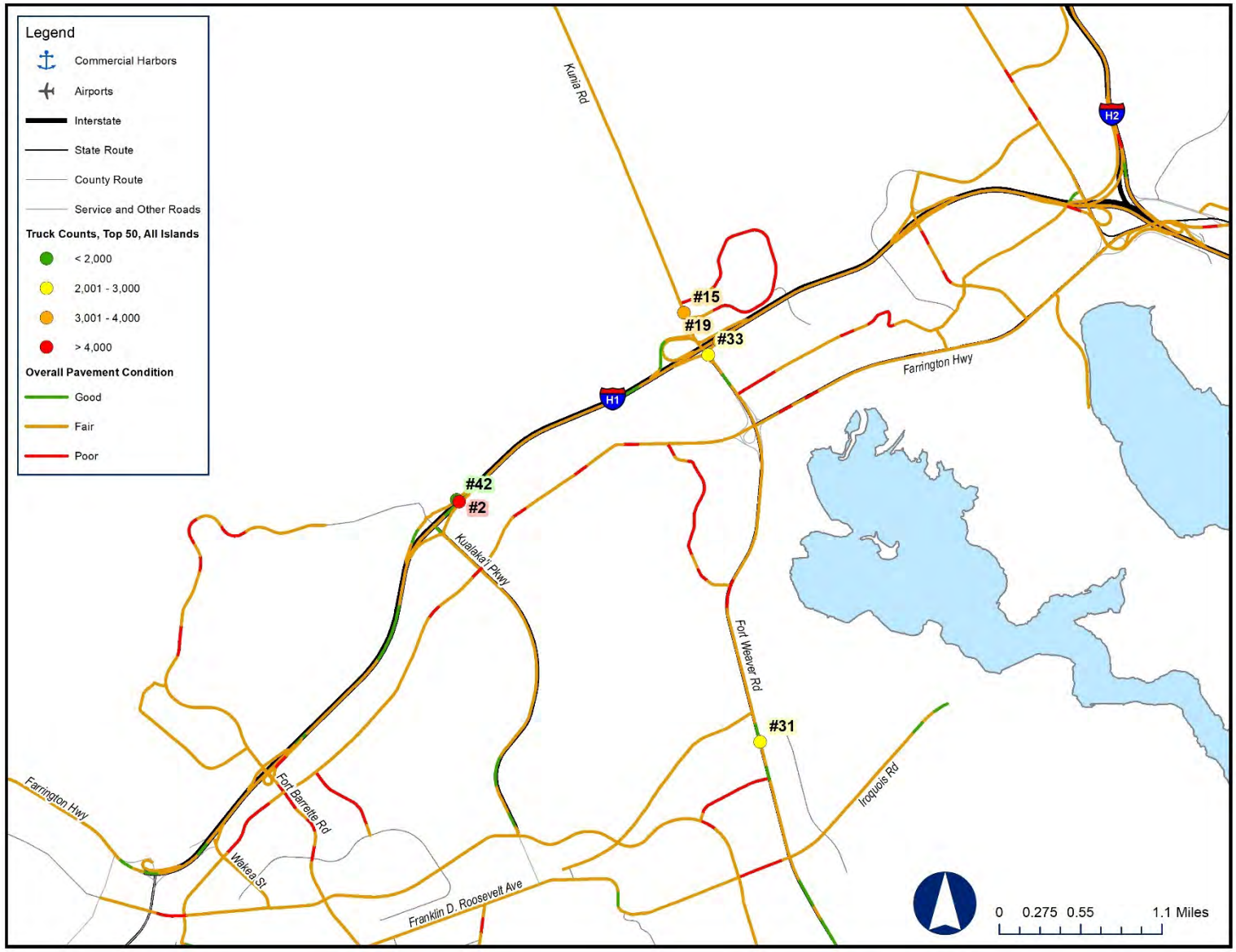


Figure 3-11. Top 50 Truck Count Locations, 2017 – West Oahu, Oahu

Source: 2017 HDOT data

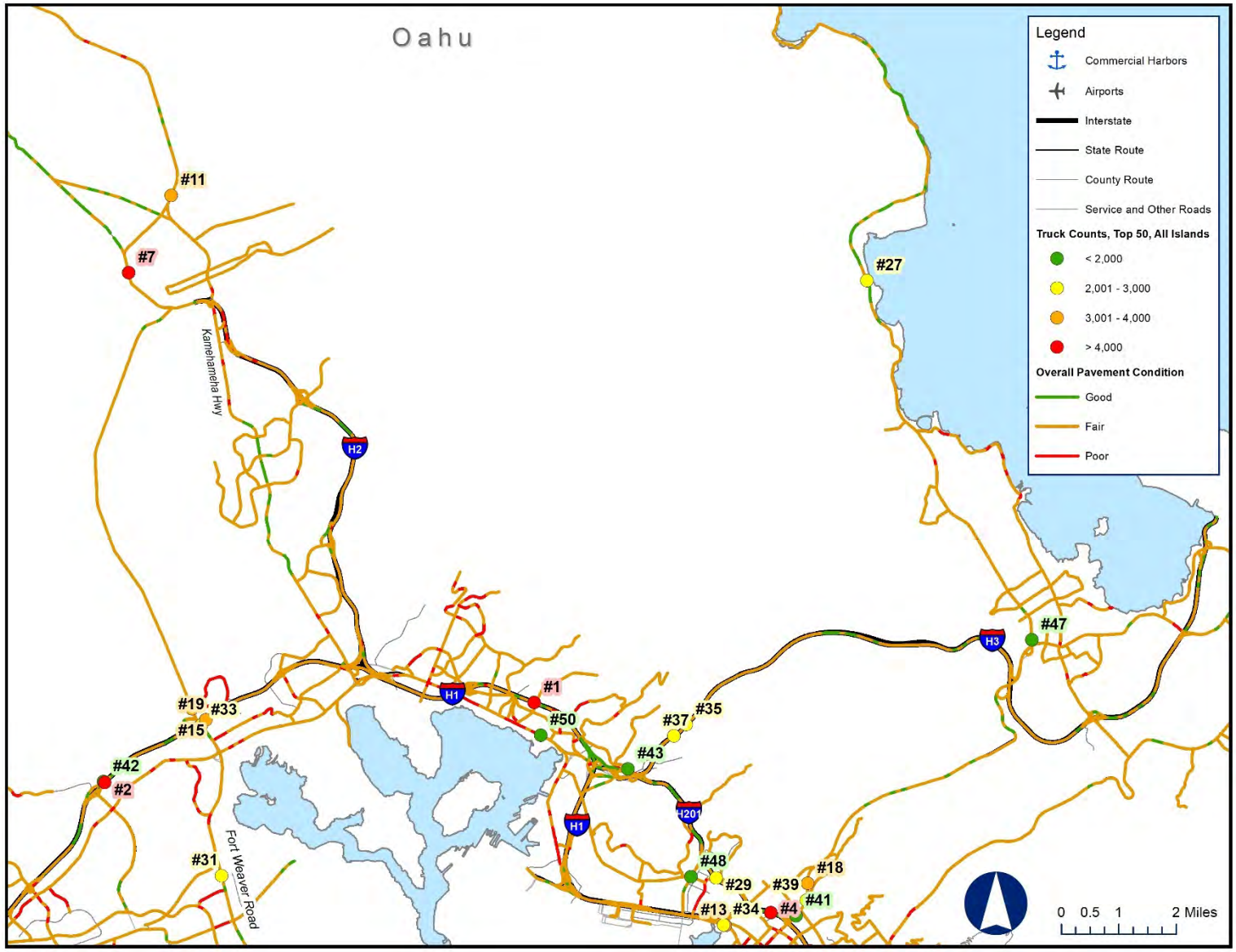


Figure 3-12. Top 50 Truck Count Locations, 2017 – Pearl City Subregion, Oahu

Source: 2017 HDOT data

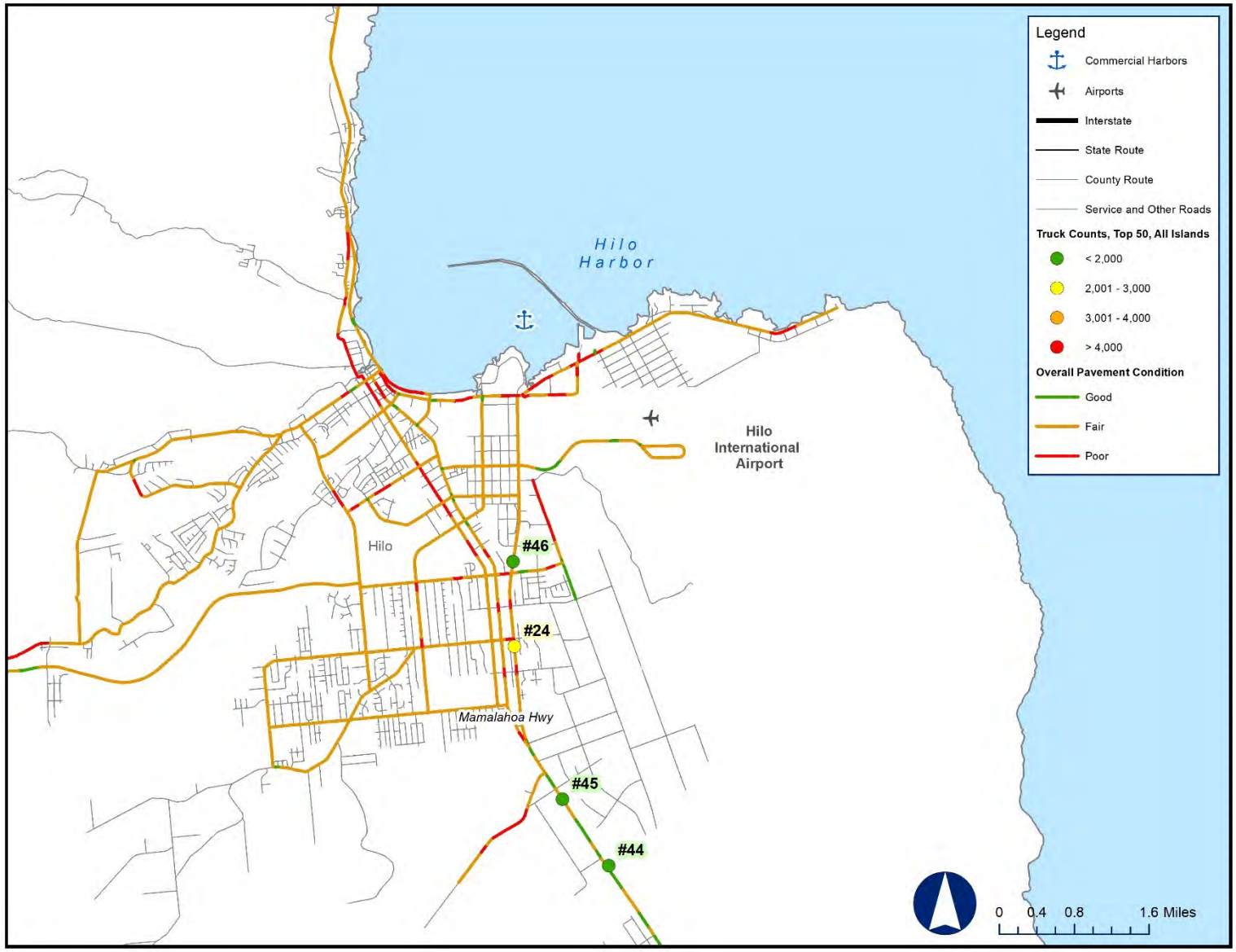


Figure 3-13. Top 50 Truck Count Locations, 2017 –Hilo, Big Island

Source: 2017 HDOT data

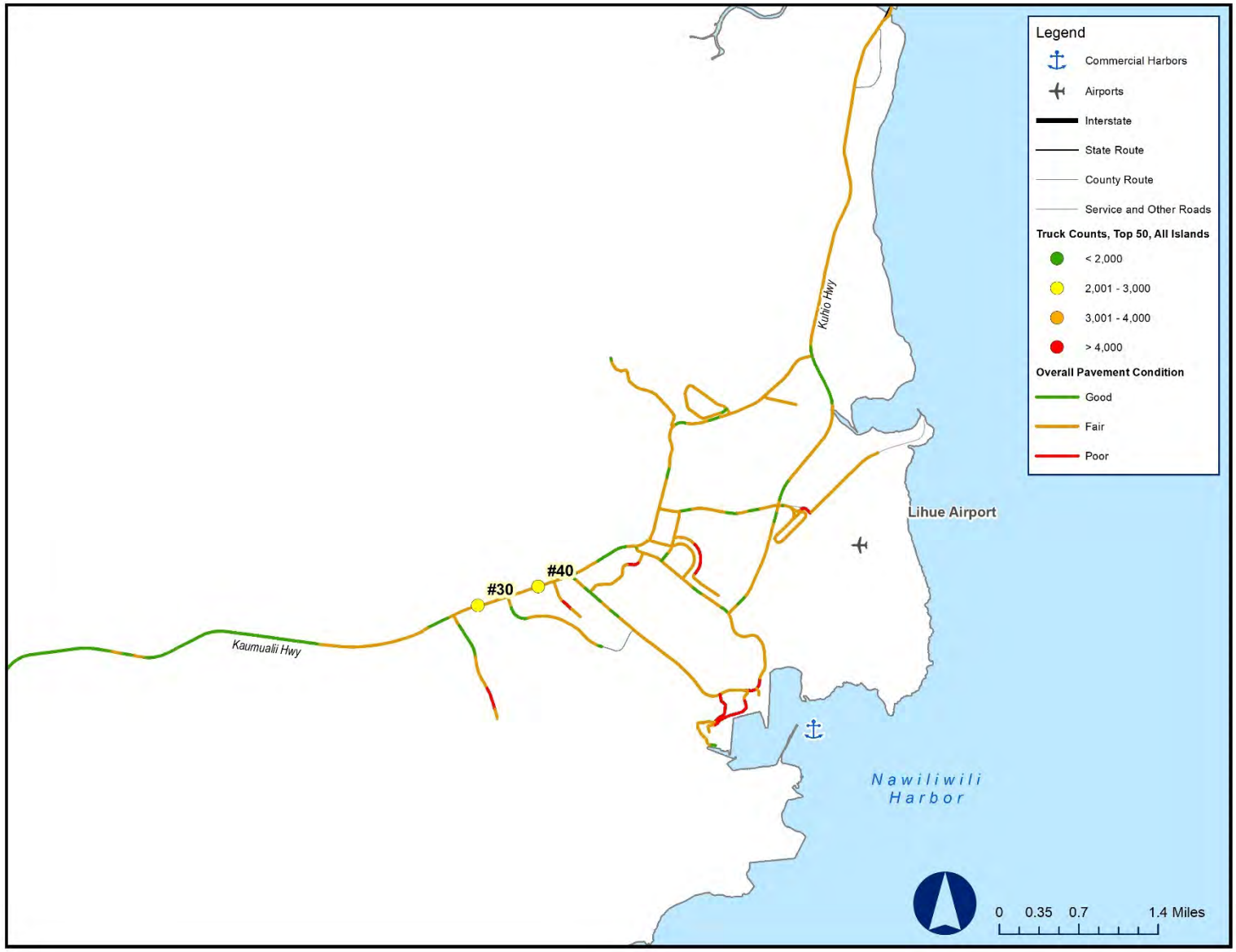


Figure 3-14. Top 50 Truck Count Locations, 2017 – Kauai

Source: 2017 HDOT data

Table 3-2. Locations with Poor Pavement Conditions and 100 or More Daily Trucks

Rank	Island	Overall Rank	Island Rank	Route #	Route Name	Total Volume	Truck Total
1	Oahu	11	11	92	Nimitz Highway	58,011	3,542
2	Oahu	43	40	63	Kalihi Street (at Dillingham)	50,982	1,927
3	Oahu	53	47	99	Kamehameha Highway	49,315	1,654
4	Oahu	71	59	61	Pali Highway	48,604	1,274
5	Hawaii	79	7	270	Kawaihae Road	7,497	1,181
6	Oahu	97	76	63	Kalihi Street (at Nimitz)	14,872	1,032
7	Oahu	98	77	61	Pali Highway	51,373	1,027
8	Hawaii	128	14	2000	Puainako Street	18,000	796
9	Hawaii	160	21	19	Kalanianaole Street	14,973	670
10	Kauai	200	8	51	Waapa Road	10,777	543
11	Oahu	220	155	7402	King Street	25,541	474
12	Oahu	248	173	7502	Beretania Street	21,548	434
13	Oahu	260	181	7341	Ahua Street (near Nimitz)	5,070	418
14	Oahu	301	209	7341	Ahua Street (near H-201)	8,909	355
15	Oahu	311	215	7522	Nuuanu Avenue	2,938	339
16	Hawaii	337	57	1960	Railroad Avenue	8,847	312
17	Hawaii	341	58	190	Mamalahoa Highway	8,306	305
18	Oahu	349	236	7615	University Avenue	21,410	300
19	Oahu	351	238	83	Kamehameha Highway	14,513	300
20	Oahu	352	239	7712	Monsarrat Avenue	7,353	300
21	Hawaii	354	60	19	Bay Front Highway	9,537	299
22	Oahu	367	243	65	Mokapu Saddle Road	17,359	284
23	Hawaii	382	68	190	Mamalahoa Highway	7,700	271
24	Oahu	388	256	7140	Geiger Road	11,030	267
25	Oahu	389	257	7448	Puuhale Road	6,488	266

Table 3-2. Locations with Poor Pavement Conditions and 100 or More Daily Trucks

Rank	Island	Overall Rank	Island Rank	Route #	Route Name	Total Volume	Truck Total
26	Oahu	404	265	7246	Aiea Heights Drive	14,083	252
27	Oahu	411	269	72	Kalanianaole Highway	10,034	249
28	Hawaii	416	74	1930	Kinoole Street	7,730	247
29	Maui	443	44	3100	South Kihei Road	14,723	222
30	Oahu	449	294	7402	King Street	19,455	221
31	Oahu	468	305	7612	Kalakaua Avenue	17,749	205
32	Oahu	472	309	7518	Iolani Avenue	9,341	200
33	Oahu	476	311	65	Mokapu Saddle Road	18,401	195
34	Hawaii	483	80	1910	Kamehameha Avenue	10,059	186
35	Oahu	503	329	7140	Geiger Road	11,993	174
36	Hawaii	506	81	1970	Silva Street	878	170
37	Hawaii	525	84	2760	Kawailani Street	9,184	158
38	Maui	530	55	365	Makawao Avenue	13,574	155
39	Kauai	554	54	520	Poipu Road	8,798	140
40	Kauai	557	57	520	Maluhia Road	11,594	138
41	Hawaii	575	94	191	Waikoloa Road	4,237	128
42	Oahu	576	363	7511	Ward Avenue	8,204	128
43	Kauai	585	61	562	Kilauea Road	6,477	123
44	Hawaii	590	99	1930	Kinoole Street	11,644	120
45	Kauai	608	63	522	Ala Kinoike Way	4,812	110
46	Hawaii	609	104	186	Alii Drive	9,600	109
47	Hawaii	622	108	188	Hualalai Road	6,393	102
48	Oahu	628	392	7863	Kealaolu Avenue	4,572	100

Source: 2017 HDOT data

4. Truck Flows

By identifying the location of freight-related sectors in Hawaii and the distribution of population in Hawaii, the relative number of truck trips to and from subregions of Hawaii can be identified. Table 3-3 identifies the location of warehouse and distribution center space for each of the four main islands based on industrial real estate data, showing that 70 percent of all the warehouse and industrial space in Hawaii is on Oahu. Similarly, 71 percent of Hawaii's population is on Oahu, indicating that most of the truck trips in Hawaii are occurring on Oahu. Both Maui and the Big Island have between 10 and 20 percent of the warehouse and transportation square footage and the population in Hawaii, signifying that they have a much smaller proportion of the truck trips of Hawaii. Kauai has less than 5 percent of the population and warehouse square footage, representing a much smaller proportion of truck trips.

Table 3-3. Warehouse and Population Distribution by Island

Island	Warehouse/Dist. Center/ Manufacturing Space (Sq. Ft.)	Sq. Ft. (Percent of Total)	Population	Population (Percent of Total)
Oahu	41,034,661	70%	953,207	71%
Maui	9,729,171	17%	144,444	11%
Big Island	5,950,513	10%	186,738	14%
Kauai	1,848,648	3%	65,689	5%
Total	58,562,993	100%	1,350,078	100%

Source: CBRE, 2017

Figure 3-15 shows the concentration of warehouse and distribution center space for sub regions on Oahu. The Kalihi subregion, located just north of the port-related facilities on Sand Island, has the most industrial square footage space available (9.6 million square feet). This is nearly 25 percent of all the warehouse and square footage space on Oahu. There are three subregions that have between 4 million and 6 million square feet of warehouse and industrial space: Pearl City/Aiea, Waipahu, and Campbell/Kalaeloa subregions. The Pearl City/Area and Waipahu subregions are located northwest of Kalihi, while the Campbell/Kalaeloa subregions are located at the southwestern tip of Oahu near the Barber's Point marine facilities. These subregions have 14.2 million square feet of industrial space representing another 35 percent of the total available space on Oahu. No other subregions have more than 7 percent of the total available space on Oahu; the Airport subregion is the largest of the remaining subregions, with 3.1 million square feet of industrial space. Therefore, freight planning in the Kalihi, Pearl City/Area, Waipahu, and Campbell/Kalaeloa subregions will be the most critical for statewide freight planning efforts.

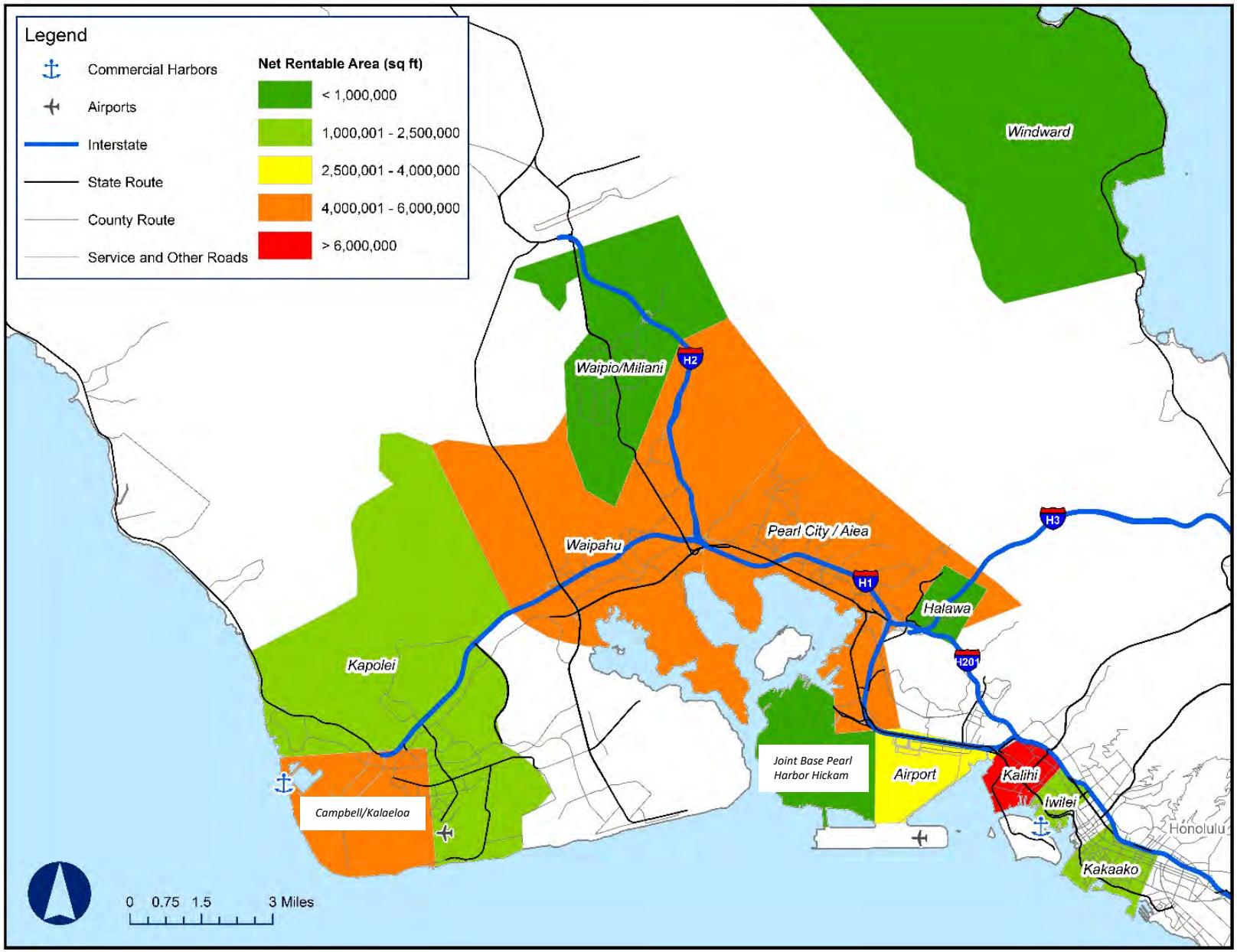


Figure 3-15. Warehouse and Distribution Center Space - Oahu

5. Highway Performance

Understanding the operational performance of the highway network is a critical component in identifying the overall performance of the Hawaii freight system. This includes evaluating truck travel speeds, travel reliability, and congestion.

Truck Speeds

The FHWA National Performance Management Research Data Set (NPMRDS) was used to analyze truck speeds and to identify congested locations in the highway system. It should be noted that low speeds can also represent issues related to poor pavement condition, inadequate roadway design, or steep grades.

Table 3-4 shows the weighted average speed (miles per hour [mph]) by time period and road type. Table 3-5 shows the average speeds by time period (including the summer months of June, July, August) for H-1, H-2, and H-3 on Oahu.

Table 3-4. Weighted Average Truck Speeds by Road Classification

Road Type	AM (6 – 10 am)	Midday (10 am – 4 pm)	PM (4 – 8 pm)	Night (8 pm – 6 am everyday)	Weekends (6 am – 8 pm)
Average Speeds (mph)					
Interstate (NHS)	41	47	37	46	45
H-1 Only (NHS)	37	45	38	47	46
Non-Interstate	24	23	15	26	22
NHS	33	33	33	37	36
Non-NHS	33	32	34	37	35
Total	28	29	20	31	27

Source: HDOT, 2017 (NPMRDS 15-minute interval, Truck, February, March, April, May, September, October 2017)

Table 3-5. Weighted Average Truck Speeds by Interstate

Road Type	AM (6 – 10 am)	Midday (10 am – 4 pm)	PM (4 – 8 pm)	Night (8 pm – 6 am everyday)	Weekends (6 am – 8 pm)
Average Speeds (mph)					
H-1	39	45	36	48	46
H-2	46	51	50	49	49
H-3	46	48	43	46	49
Total	42	47	40	47	48

Source: HDOT, 2017 (NPMRDS 15-minute interval, Truck, February to October 2017)

Interstate truck speeds average 47 mph during the off-peak periods, 41 mph during the morning peak, and 37 mph during the afternoon peak. This indicates that there is consistent peak period congestion on Hawaii's interstate system. Truck speeds on non-interstate NHS roads average 24 mph from the beginning of the morning peak period through the end of the afternoon peak period, demonstrating that there is not systemic congestion during peak periods. However, there is potential for select non-interstate NHS roads to be regularly congested during peak hours. Truck speeds on non-interstate non-NHS roads are similar to their NHS counterparts, with no indication of systemic peak period congestion on these roads.

In Table 3-5, H-1 has the lowest speeds, with speeds reaching 39 and 36 mph during morning and evening peaks, respectively. H-1 also has the largest differential between the midday and afternoon peak period truck speeds, indicating that this interstate has the most recurrent congestion. H-2 has the least amount of recurrent congestion with a slight dip during the morning peak period followed by relatively flat speeds averaging 50 mph during all other times of day and during the weekend. H-3 has moderate congestion

during the morning and afternoon peak periods, but less severe congestion than H-1.

Morning Peak Period Truck Speed Geographic Analysis

An additional detailed geographic analysis was conducted for the morning peak period because it represents one of the most congested times of the day and the Honolulu Harbor port gates are open during this period. Trucks arriving and leaving Honolulu Harbor access the harbor using the general road network, which include some segments that experience peak period congestion.

On Oahu, there are segments of interstate that have average truck speeds of less than 30 mph. There are several non-interstate roads with average speeds of less than 20 mph, with the most concentrated locations of low truck speeds in downtown Honolulu, particularly on the easternmost portions of H-1 and along Nimitz Highway and Ala Moana Boulevard. There are also several portions of H-1 with average speeds between 20 mph and 30 mph throughout Honolulu.

On the Big Island, segments of Mamalahoa Avenue and Kamehameha Avenue in Hilo have average speeds of less than 30 mph. Other segments with relatively slow speeds are Mamalahoa Highway connecting the Kawaihae Harbor and the Waimea-Kohala Airport and Mamalahoa Highway on the southwestern part of the Big Island.

On Kauai, several segments in the Hanamaula urbanized area and along Kuhio Highway north of Hanamaula have slow speeds. On Maui, Hana Highway south and west of the airport have average truck speeds less than 20 mph. There are also slow speed segments on South High Street and Lower Main Street near downtown Wailuku.

Congestion

The top 50 truck count locations statewide were analyzed based on their morning peak truck speed versus their speed limit. This speed percentage difference for the top 50 truck count locations is noted in Table 3-6. The speed differential in a very few locations is negative, showing that the actual morning peak speed is greater than the speed limit. However, most top locations have around 50 percent speed differential between the morning peak period speed and the speed limit. These include major freight corridors such as Lunalilo Freeway and Nimitz Highway, whose actual morning peak speed is about half of the speed limit.

Truck Travel Time Reliability

The reliability of the Hawaii highway network for trucks is a measure of the variation of truck speeds over a long period of time. Truck speed reliability is a critical operational issue for shippers and truck fleet operators. Operators use this information to ensure an adequate buffer is included in their delivery windows to meet the desired level of on-time performance for their shipments. Truck fleet sizes and dispatch systems are typically designed (either formally or informally) to ensure that on-time performance can be met at over 90 percent of travel conditions.

The truck travel time reliability (TTTR) index is a ratio of the time it takes to travel between two locations a certain percentage of time divided by the average travel time for the link. For example, if it is desirable to have a 90 percent on-time performance for a specific trip, then the TTTR would be calculated as the time it takes to successfully travel the link 90 percent of the time divided by the average travel time.

Figure 3-16 through Figure 3-20 show the morning peak hour TTTR index for roadways on each of the islands. On Oahu, the roadways that have a poor reliability index are H-1 and Farrington Highway (both between Kunia Road and H-2), Farrington Highway (north of Kalaeloa Harbor), Kahekili Highway (north of H-3), and Kalanianaole Highway. Within Honolulu, only short segments of roads are unreliable. This includes the junction area of H-1 and H-201, and North Nimitz Highway connecting to that junction. The Pali Highway portion through H-1 is also unreliable, as is Ala Moana Boulevard. In

the southern portions of Honolulu, parts of Kalanianaole Highway are unreliable.

On the Big Island, there are only two areas identified as unreliable: Hawaii Belt Road west of Mamalahoa Highway and Mamalahoa Highway in Hilo from Puainako Street to the coast. Maui also performs well overall when it comes to reliability. Its only unreliable portion is on Hana Highway from Haleakala Highway to West Kaahumanu Avenue. On Kauai, only two small areas near Nawiliwili Harbor have a poor rating: Nawiliwili Road and Kuhio Road.

Table 3-6. Hawaii's Top Truck Bottlenecks by Speed Difference

Rank	Island	Route	Road Name	MP	Truck Volume	Percent Speed Difference
1	Oahu	H-1	Queen Liliuokalani Freeway	11.74	20,015	28%
2	Oahu	H-1	Queen Liliuokalani Freeway	3.43	7,919	n/a
3	Oahu	H-1	Lunalilo Freeway	20.24	6,946	55%
4	Oahu	H-1	Lunalilo Freeway	19.27	5,935	50%
5	Oahu	92	Nimitz Highway	4.49	4,980	56%
6	Oahu	92	Nimitz Highway	5.9	4,647	48%
7	Oahu	99	Wilikina Drive	8.05	4,527	4%
8	Oahu	72	Kalanianaole Highway	18.39	4,125	57%
9	Oahu	92	Nimitz Highway	4.47	4,094	56%
10	Oahu	92	Ala Moana Boulevard	8.59	4,034	67%
11	Oahu	99	Kamehameha Highway	6.38	3,664	-29%
12	Oahu	92	Nimitz Highway	6.58	3,542	69%
13	Oahu	92	Kamehameha Highway/Nimitz Highway	3.65	3,415	57%
14	Oahu	64	Sand Island Access Road	2.31	3,406	32%
15	Oahu	750	Kunia Road	0.26	3,393	-19%
16	Oahu	64	Sand Island Parkway	0.88	3,358	22%
17	Oahu	64	Sand Island Access Road	2.32	3,338	32%
18	Oahu	63	Likelike Highway	1.65	3,264	60%
19	Oahu	H-1_EB_5BB	H-1_EB_5BB	0.18	3,264	n/a
20	Oahu	64	Sand Island Parkway	1.41	3,250	44%
21	Oahu	92	Nimitz Highway	6.67	3,058	69%
22	Oahu	92	Ala Moana Boulevard	7.51	2,984	55%
23	Oahu	64	Sand Island Access Road	1.93	2,970	35%
24	Hawaii	11	Kanoelehua Avenue	2.69	2,938	32%

Table 3-6. Hawaii's Top Truck Bottlenecks by Speed Difference

Rank	Island	Route	Road Name	MP	Truck Volume	Percent Speed Difference
25	Oahu	64	Sand Island Access Road	1.55	2,867	35%
26	Oahu	92	Nimitz Highway	6.68	2,838	69%
27	Oahu	83	Kamehameha Highway	33.28	2,754	15%
28	Oahu	64	Sand Island Parkway	1.31	2,726	35%
29	Oahu	H-201	Moanalua Freeway	3.19	2,656	17%
30	Kauai	50	Kaumualii Highway	1.51	2,653	-19%
31	Oahu	76	Fort Weaver Road	3.76	2,592	42%
32	Oahu	64	Sand Island Access Road	1.91	2,578	35%
33	Oahu	76	Kunia Road	6.55	2,538	n/a
34	Oahu	92	Kamehameha Highway/Nimitz Highway	3.62	2,425	57%
35	Oahu	H-3	John A Burns Freeway	1.28	2,409	n/a
36	Oahu	61	Pali Highway	0.98	2,401	-2%
37	Oahu	H-3	John A Burns Freeway	1.28	2,326	5%
38	Oahu	72	Kalanianaole Highway	16.35	2,234	45%
39	Oahu	63	Likelike Highway	1.35	2,037	72%
40	Kauai	50	Kaumualii Highway	0.95	2,013	-66%
41	Oahu	63	Kalihi Street	1.02	1,927	56%
42	Oahu	H-1_WB_3	H-1_WB_3	0.13	1,910	n/a
43	Oahu	7239	Halawa Valley Road	0.25	1,891	n/a
44	Hawaii	11	Volcano Road	5.29	1,874	40%
45	Hawaii	11	Volcano Road	4.44	1,838	23%
46	Hawaii	11	Kanoelehua Avenue	1.78	1,767	50%
47	Oahu	83	Kahekili Highway	40.6	1,746	33%
48	Oahu	7310	Puuloa Road	0.67	1,744	n/a
49	Oahu	98	Vineyard Boulevard	1.69	1,688	n/a
50	Oahu	99	Kamehameha Highway	20.67	1,654	-40%

Source: HDOT, 2017 (2012-2017; NPMRDS and 2017; HDOT HPMS).

Notes: EB = eastbound; n/a = not applicable; WB = westbound

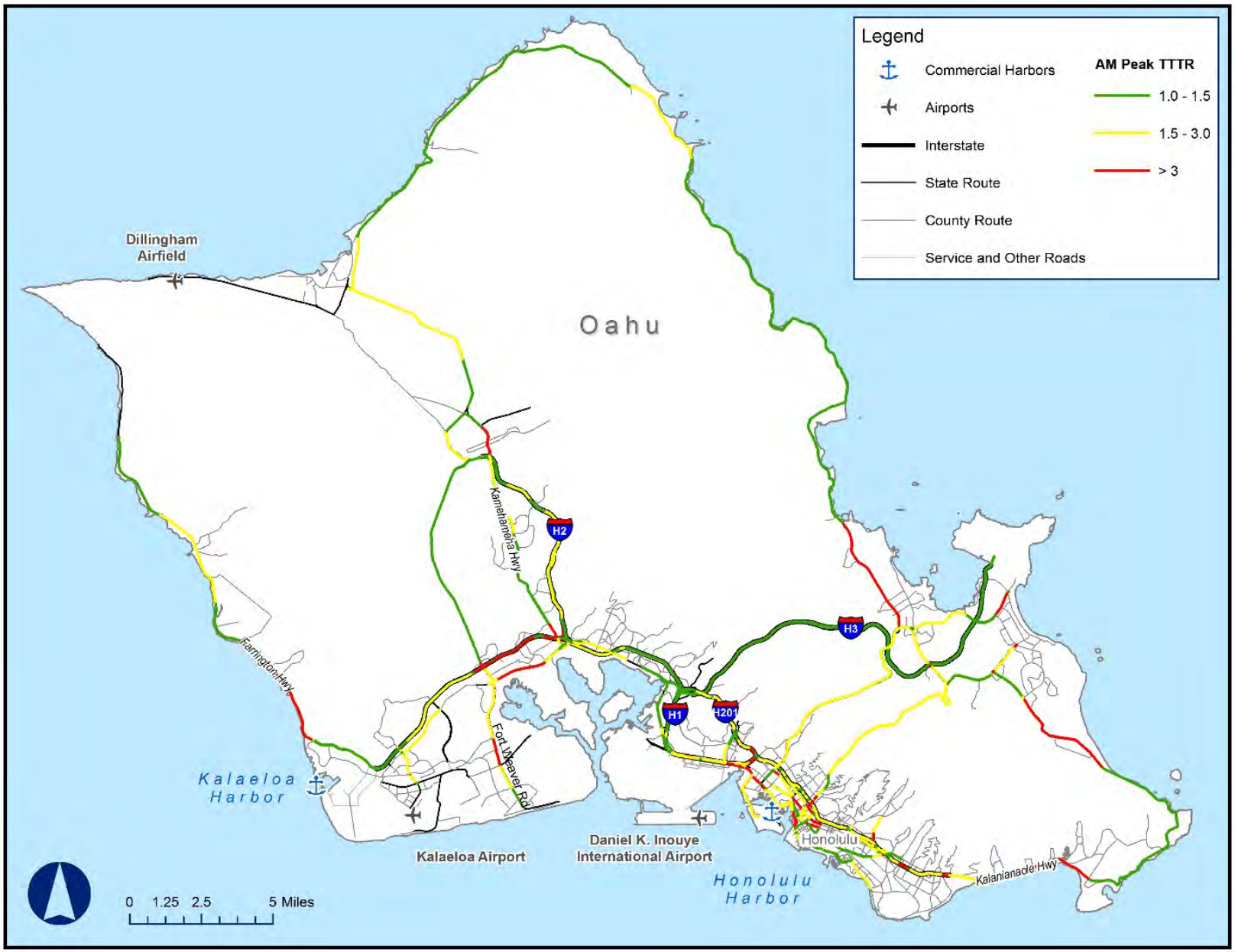


Figure 3-16. Morning Peak Truck Travel Time Reliability Index – Oahu

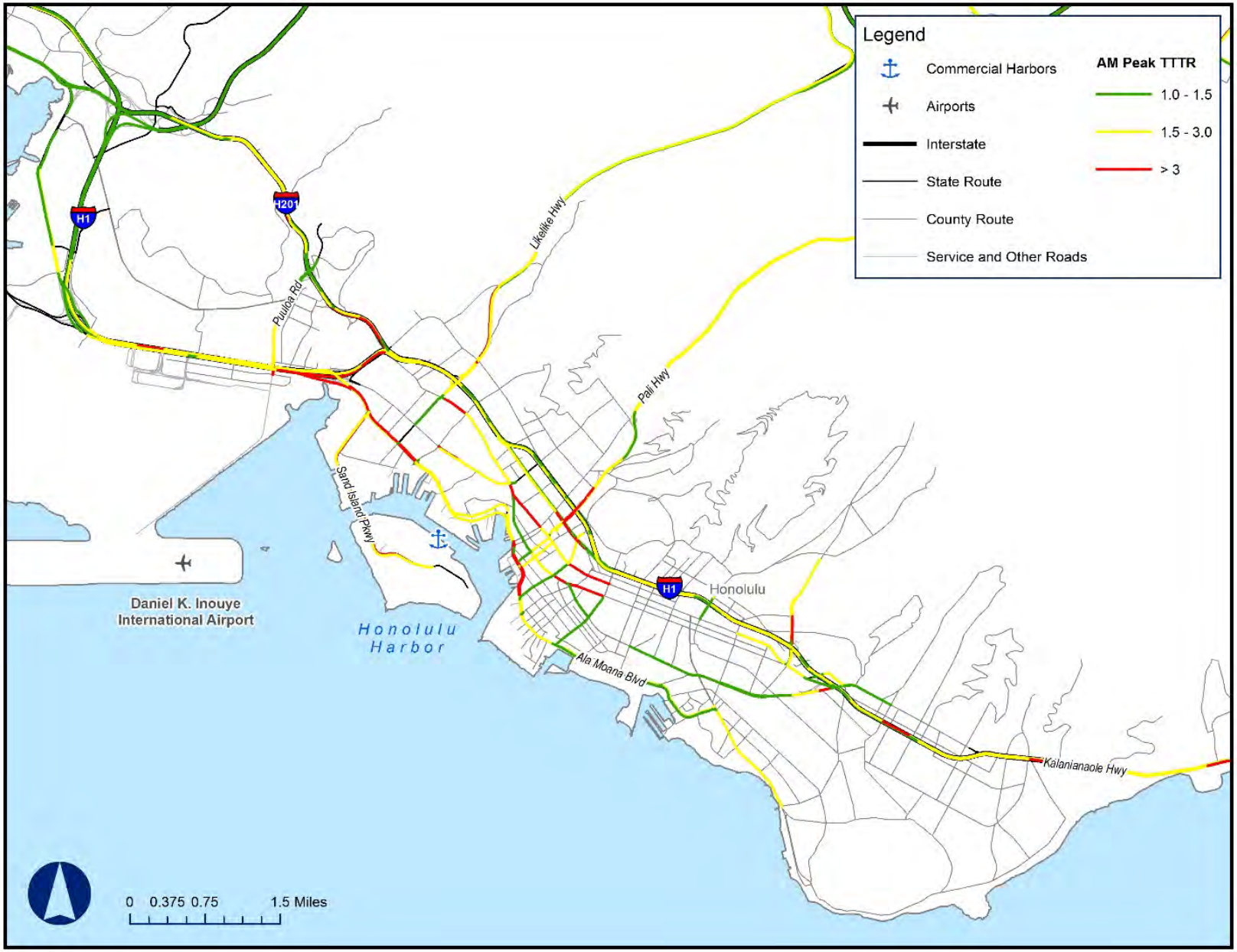


Figure 3-17. Morning Peak Truck Travel Time Reliability Index – Honolulu, Oahu

Figure 3-18. Morning Peak Truck Travel Time Reliability Index – Big Island

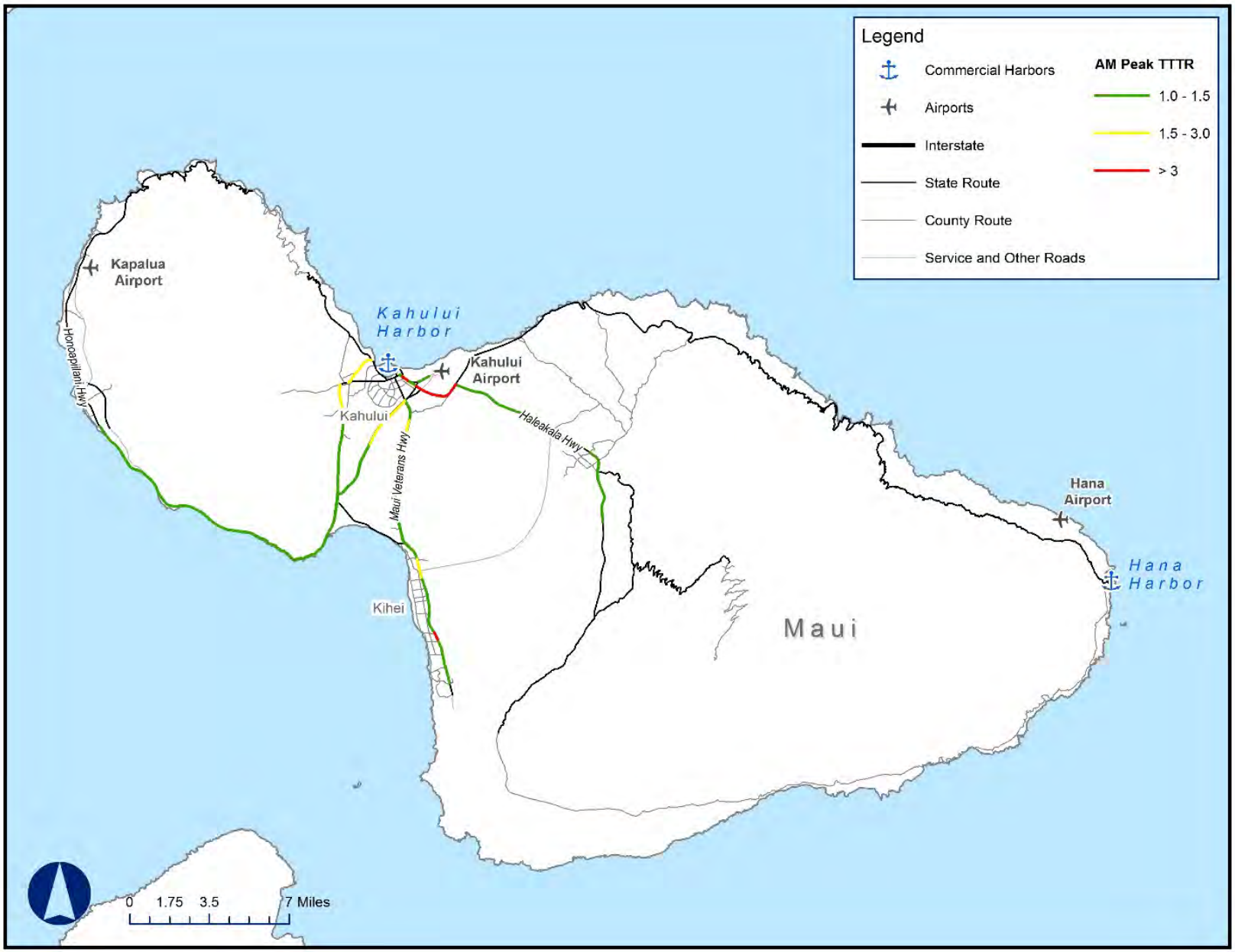


Figure 3-19. Morning Peak Truck Travel Time Reliability Index – Maui

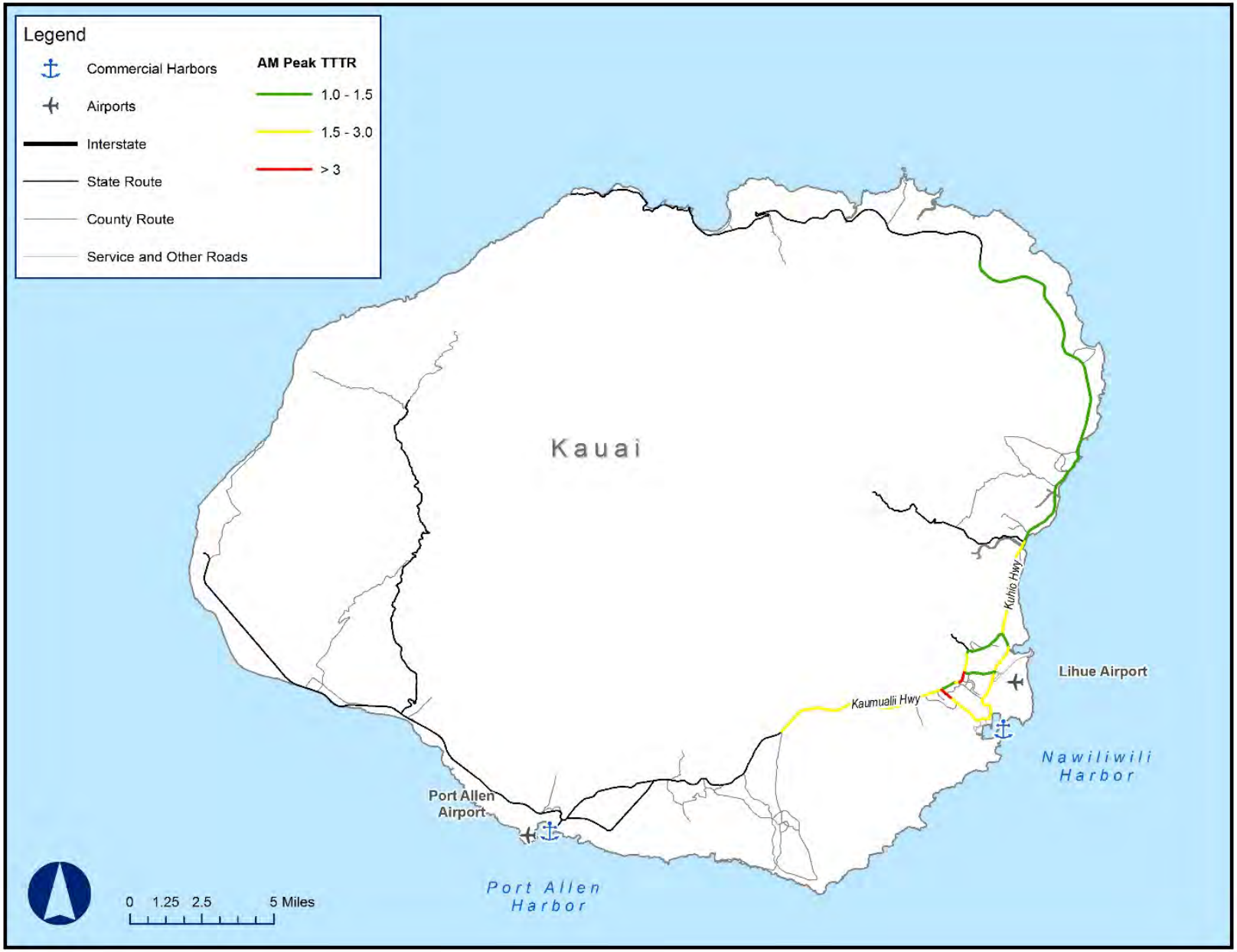


Figure 3-20. Morning Peak Truck Travel Time Reliability Index – Kauai

6. Truck Safety

There were 193 crashes involving trucks in Hawaii in 2014, equal to approximately 5 percent of all crashes in the state. There were 6 truck-involved crashes that resulted in fatalities, which represented 13 percent of all fatal crashes in Hawaii. Approximately 3 percent of truck-involved crashes resulted in fatalities.

Of the crashes involving trucks, 24 percent occurred on the interstate system and 76 percent occurred on the non-interstate system. H-1 had 37 truck-involved crashes, the most of any highway. H-2 and H-3 each had 5 crashes.

Figure 3-21 shows the number of truck-involved crashes by island. Nearly one-third of the crashes occurred on Hawaii, Maui, and Kauai. Truck safety appears to be an issue throughout Hawaii.

Figure 3-22 shows truck-involved crashes on Oahu, illustrating the predominance of crashes on the interstate system in Oahu. It also shows that there are a large proportion of crashes in Honolulu. Figure 3-23 shows that the crashes in the Honolulu area are primarily on H-1 and Ala Moana Boulevard, with a few on Sand Island Parkway. Figure 3-24 and Figure 3-25 show the dispersion of truck-involved crashes on the Big Island and Maui, respectively. Figure 3-26 shows the crashes on Kauai, with most crashes occurring on the main perimeter road on the island. In addition, two of the six truck-involved crash fatalities, or one-third, occurred on Kauai.

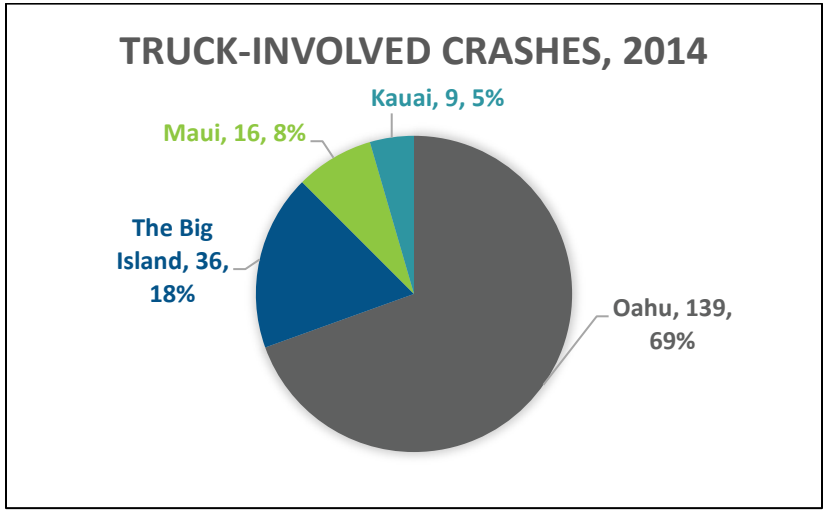


Figure 3-21. Truck-involved Collisions by Island
Source: HDOT, 2014

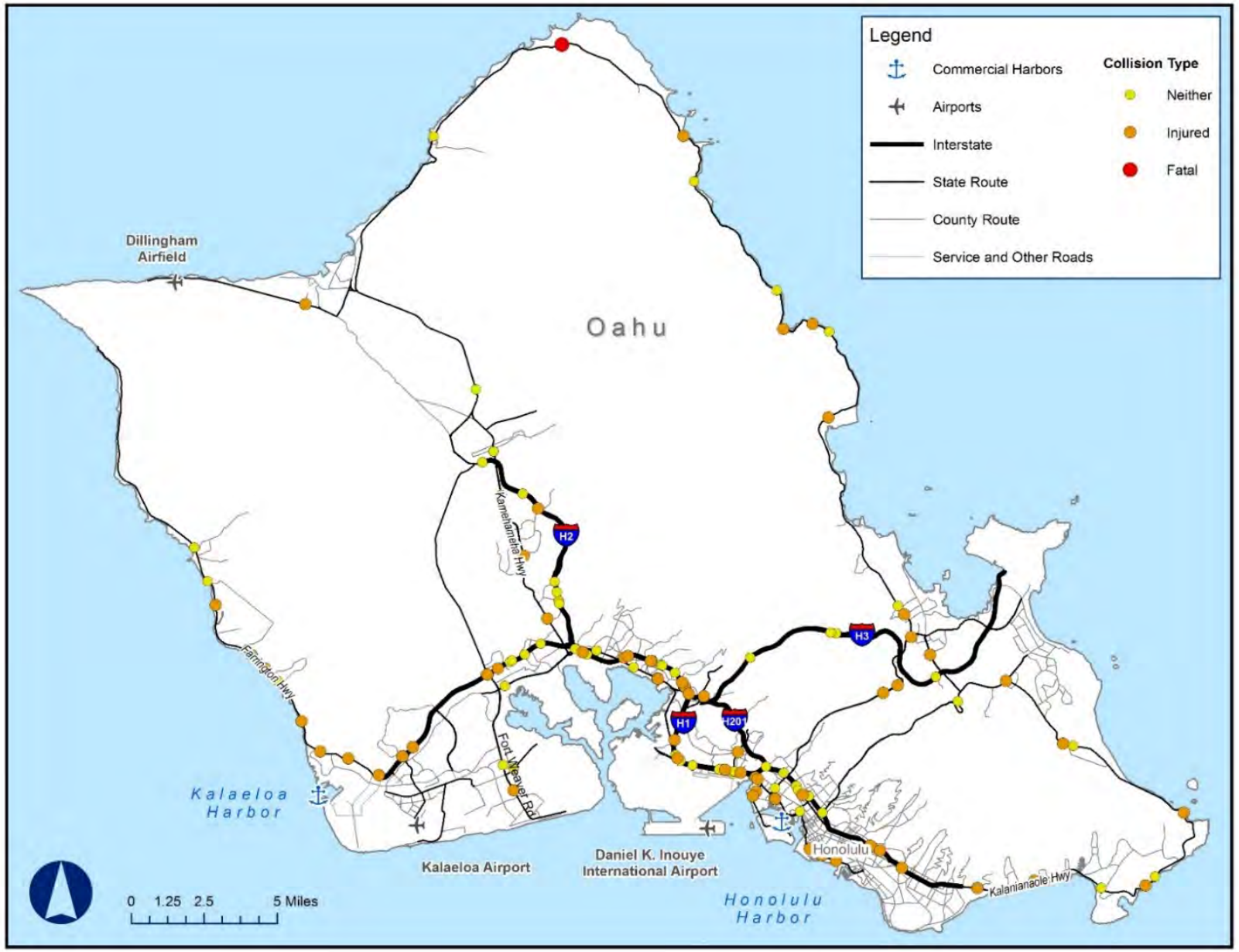


Figure 3-22. Truck-involved Collisions – Oahu

Source: HDOT, 2014

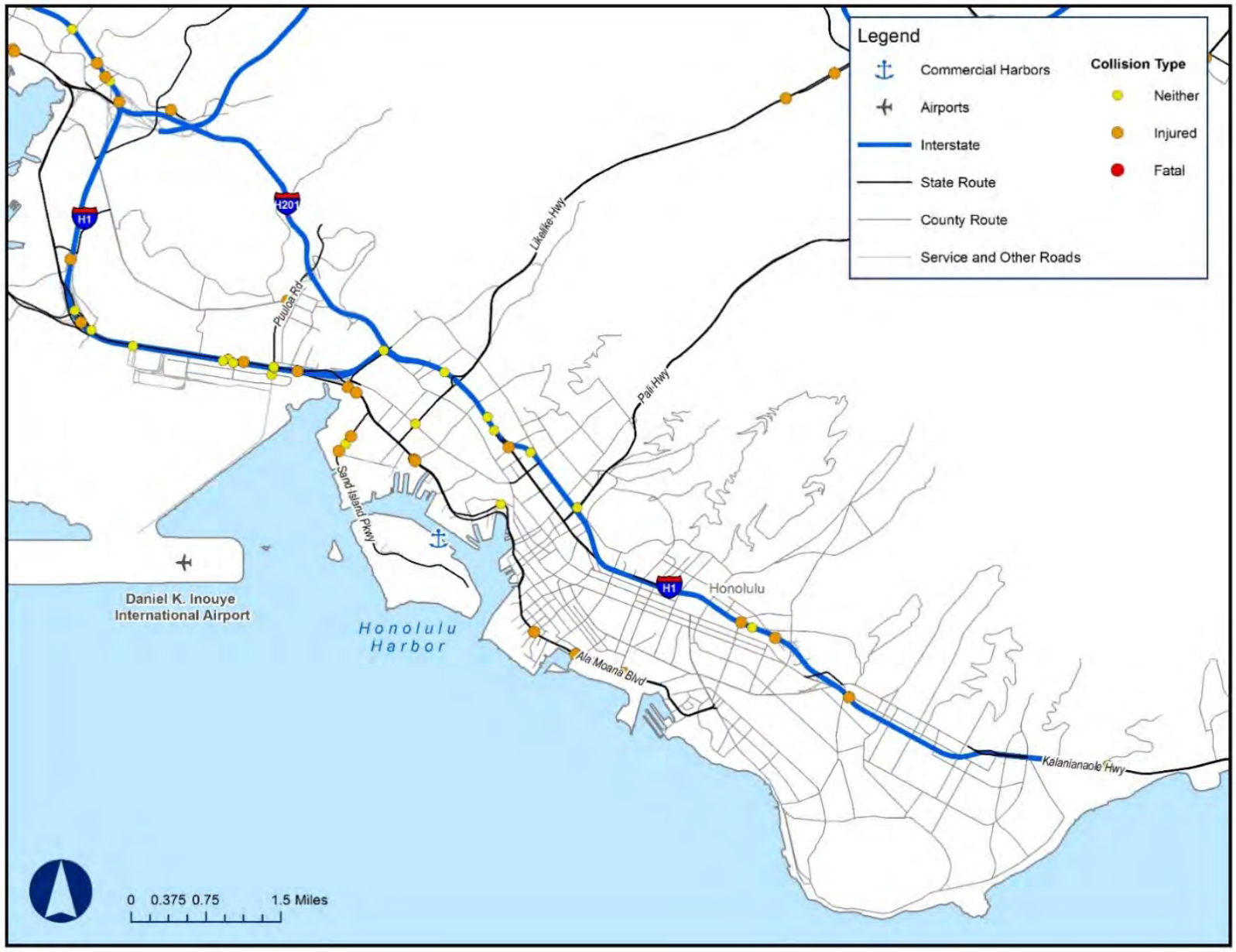


Figure 3-23. Truck-involved Collisions – Honolulu, Oahu

Source: HDOT, 2014

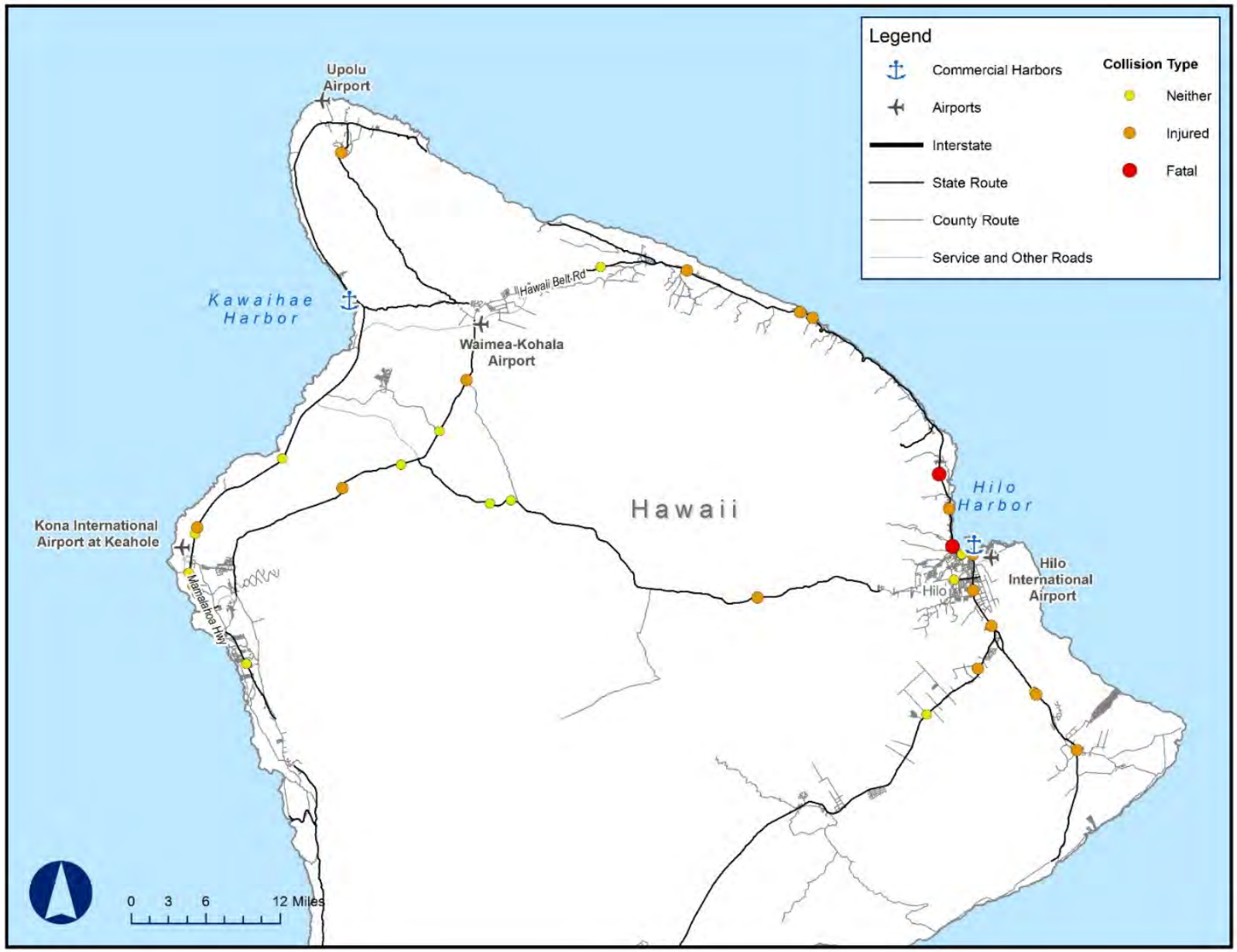


Figure 3-24. Truck-involved Collisions – Big Island

Source: HDOT, 2014

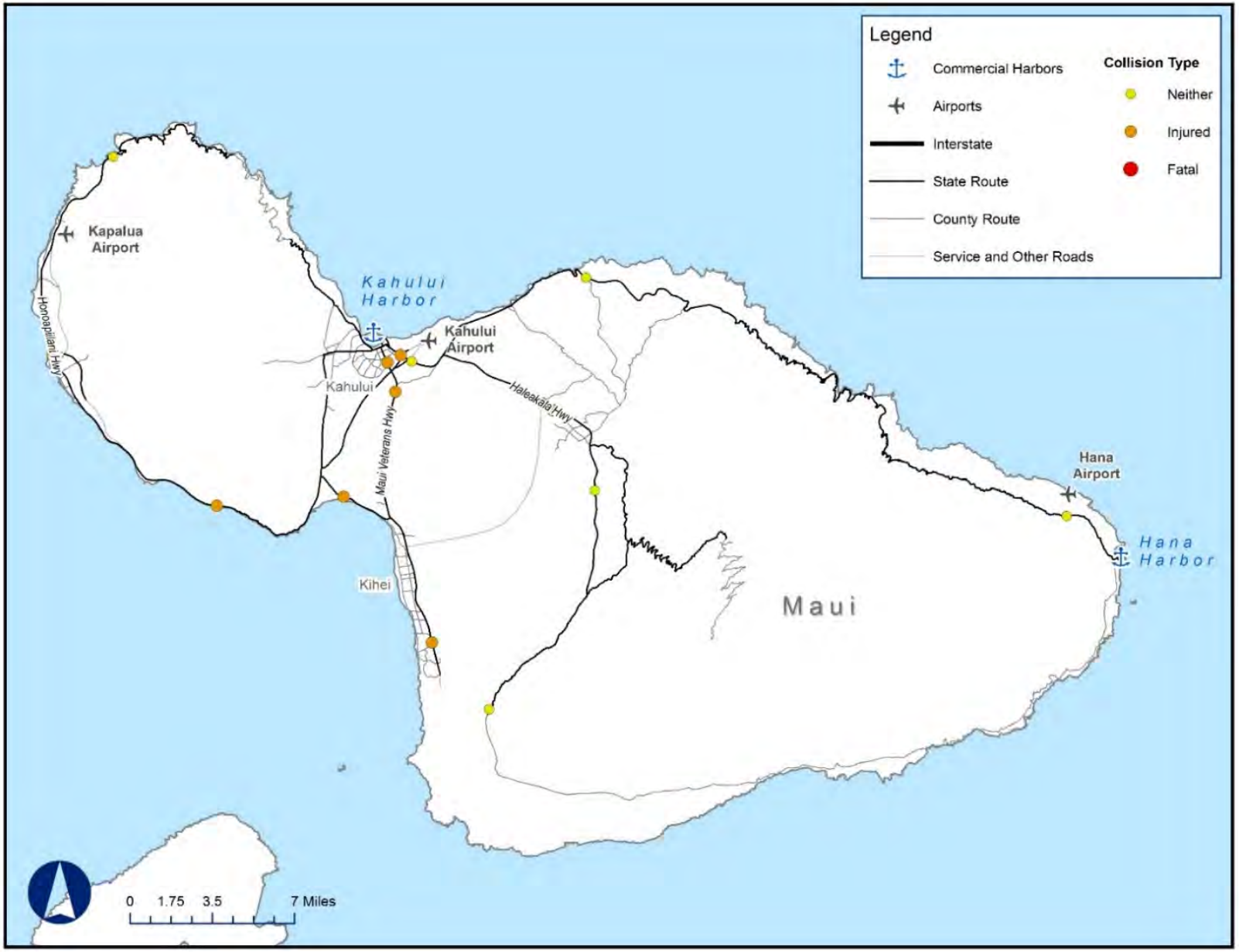


Figure 3-25. Truck-involved Collisions – Maui

Source: HDOT, 2014

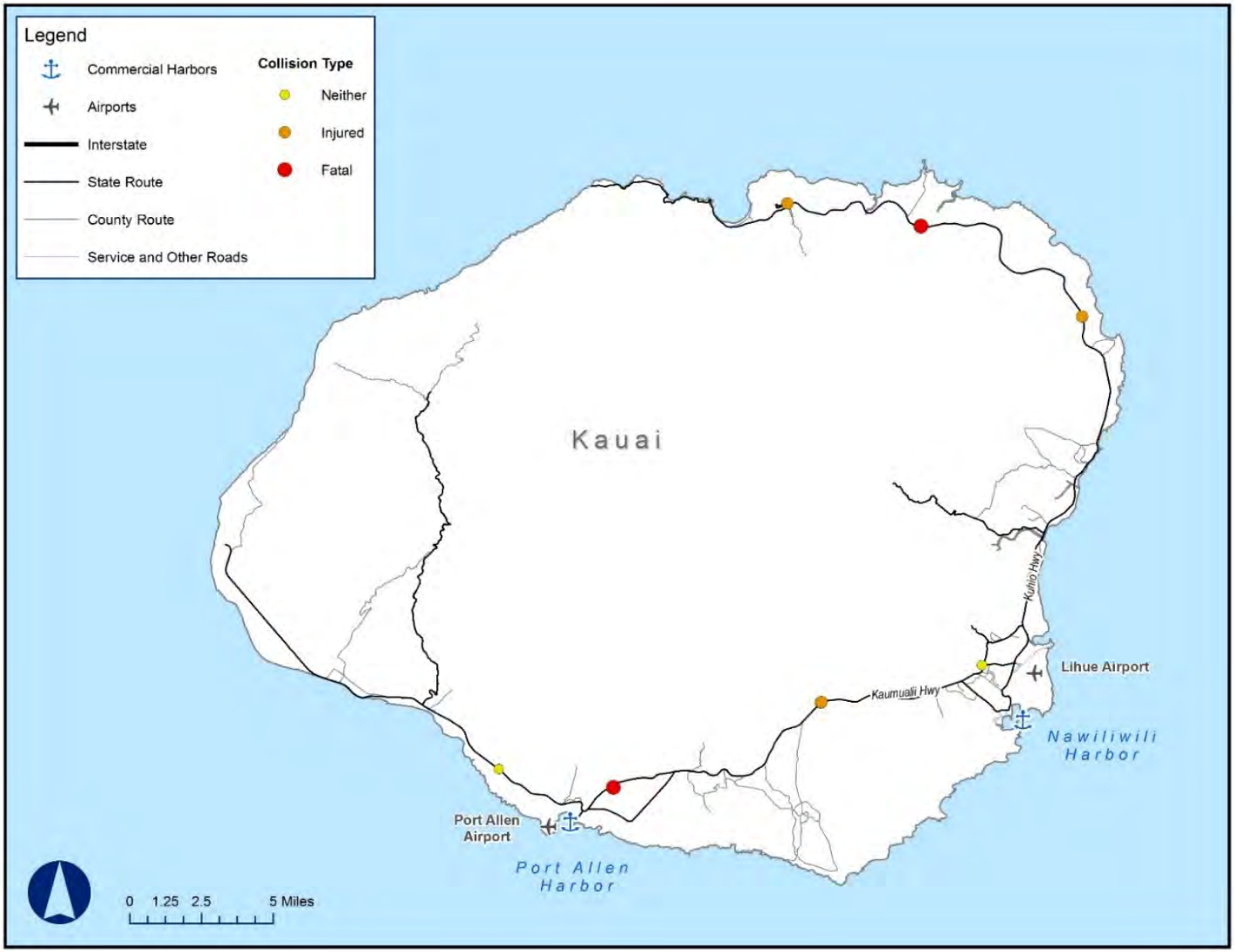


Figure 3-26. Truck-involved Collisions – Kauai

Source: HDOT, 2014

B. Marine Freight

The HDOT, Harbors Division (HDOT-Harbors) manages the statewide commercial harbor system. There are ten commercial harbors across the six Hawaiian Islands; nine are currently active, while Hana Harbor is currently inactive. In March 2018, the Maritime Administration of USDOT officially designated the waters around and between the Hawaiian Islands as Marine Highway MH-1 (recently named the Daniel K. Akaka Marine Highway). This is the state's first Marine Highway designation and it enables the HDOT's participation in the Federal Marine Highways program, which provides federal resources to increase operation efficiency in moving cargo through the State's commercial harbors (HDOT, 2018). This designation reinforces the importance this marine highway as Hawaii's lifeline.

1. Description of System

Figure 3-27 illustrates the locations of the following commercial harbors:

- Honolulu Harbor
- Kalaeloa Barbers Point Harbor
- Hilo Harbor
- Kawaihae Harbor
- Kahului Harbor
- Hana Harbor (inactive)
- Nawiliwili Harbor
- Port Allen Harbor
- Kaumalapau Harbor
- Kaunakakai Harbor

Honolulu Harbor is the largest container port in Hawaii and serves as the hub of port traffic for the state, as it distributes inbound goods that are ultimately destined for other islands and assembles outbound shipments from other islands for shipping to locations around the world. The bulk of the shipments between Honolulu and the mainland U.S. are currently handled by Matson and Pasha Hawaii. The bulk of shipments between Oahu and the other Hawaiian Islands are conducted by Young Brothers using Honolulu Harbor as the hub.

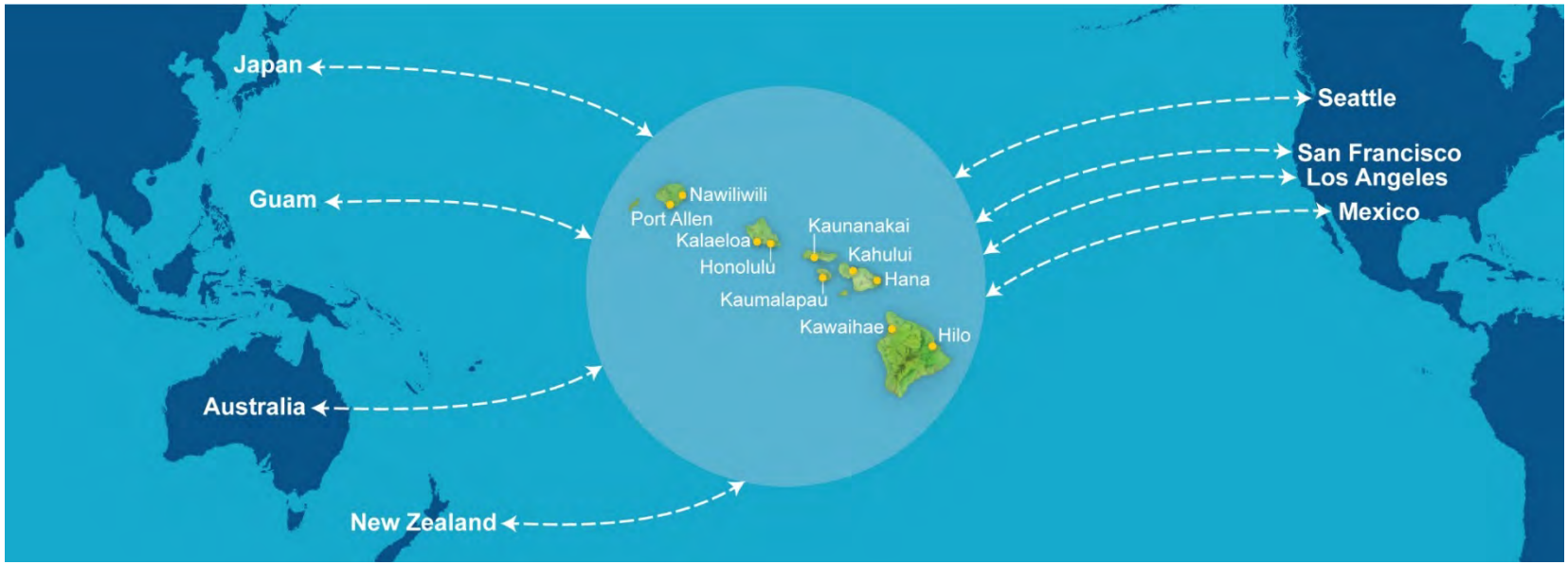


Figure 3-27. Hawaii Commercial Harbors System

Honolulu Harbor consists of 51 piers, as shown on Figure 3-29. The piers and associated back lands are used for a wide range of activities including international and domestic container services, barge services, bulk cargo shipments, auto shipments, roll-on/roll-off services, cruise ship terminals, foreign trade zone activities, small passenger vessels, retail activity, commercial fishing services, and tugboat operations (Figure 3-28). Appendix A provides a summary of the operations at each of the piers, including the type of cargo and use at each pier. Most of Hawaii's containerized cargo is handled in Honolulu. Other commodities handled include bulk products such as petroleum products, aggregates, construction materials, and miscellaneous general cargo.

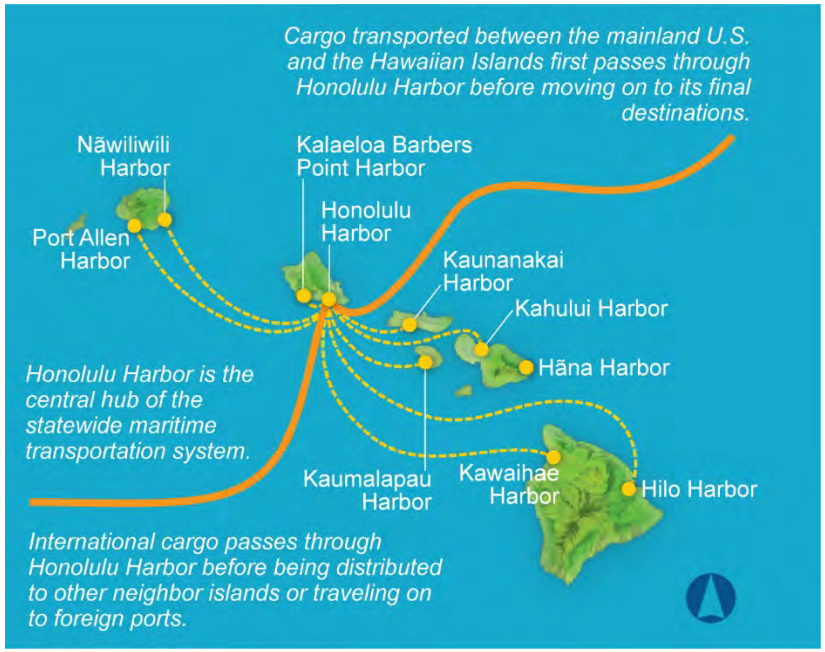


Figure 3-28. Hawaii Ports

HDOT-Harbors is preparing the Honolulu Harbor Master Plan Update (Master Plan), which will update the previous Master Plan completed in 1997. The Master Plan will serve as a critical tool for the strategic development of Honolulu Harbor in terms of its use, infrastructure improvements, and optimization of the port and its facilities to best serve the future cargo handling, storage, and distribution requirements for both overseas and inter-island maritime transportation. Honolulu Harbor is also in the process of developing a new $448 million container terminal, the Kapalama Container Terminal (KCT), which is part of the HDOT-Harbors Modernization Plan. The KCT project will be constructed in two phases over a 4-year period, with a target completion date of 2022.

Kalaeloa Barbers Point Harbor (KBPH) is located on the western side of Oahu. It handles liquid-bulk and dry-bulk cargos, including petroleum products, coal, cement, and scrap metal. It has many specialized cargo-handling facilities not available in Honolulu Harbor, such as a coal bulk unloader system and a pneumatic cement pump system to transfer cement from ship to shore. Figure 3-30 shows the layout of KBPH. The KBPH 2040 Master Plan, completed in 2015, includes a framework for evaluating alternative cargo and fuel demand scenarios along with cargo operation, storage, and channel depth options designed to handle future growth of these products, along with roadside improvements to alleviate traffic congestion.

The remaining islands have limited operations at their respective harbors, with incoming and outgoing shipments by barge to/from Honolulu Harbor received on certain days and times. The Big Island has two harbors, Hilo Harbor on the eastern side of the island and Kawaihae Harbor on the northwestern side of the island. Hilo Harbor handles containerized cargo, autos, and general cargo. Kawaihae Harbor is used for containers, perishables, autos, and general cargo. Kawaihae Harbor has three road entrances, all along the Akoni Pule Highway (U.S. 270).

Maui has a single port (Kahului Harbor), which is used for freight. Kauai has two harbors, Nawiliwili Harbor on the eastern coastline, which is the freight harbor, and Port Allen Harbor on the southern coastline. Lanai has a single port at Kaumalapau Harbor on the southwestern side of the island. Molokai has a single port at Kaunakakai Harbor.

Figure 3-29. Honolulu Harbor, Oahu

Figure 3-30. Kalaeloa Barbers Point Harbor, Oahu

2. Volume and Commodity Flows

Table 3-7 shows the number of 20-foot equivalent units (TEUs) (shipping containers) by harbor for select years. In 2008, prior to the most recent recession, a total of 1.5 million TEUs moved through Hawaii's harbors; it was the state's highest-volume year to date. The TEU volume for Hawaii decreased to a 10-year low of 1.2 million TEUs in 2010. By 2016, TEU volumes returned to slightly exceed the 2008 volumes, and statewide volumes are now at a new high.

Table 3-7. Number of TEUs by Harbor

Harbor	Island	2008	2010	2016
Honolulu Harbor	Oahu	1,124,389	968,313	1,211,997
Kahului Harbor	Maui	147,003	108,155	97,478
Kawaihae Harbor	Big Island	97,591	46,907	81,407
Nawiliwili Harbor	Kauai	59,458	52,421	50,814
Hilo Harbor	Big Island	60,190	48,016	42,731
Kalaeloa Barbers Point	Oahu	5,678	4,376	11,038
Kaumalapau	Lanai	n/a	711	2,836
Kaunakakai	Molokai	3,477	3,322	1,417
Total	**All Islands**	**1,497,787**	**1,232,221**	**1,499,718**

Source: HDOT-Harbors, 2017a

The percentage of total TEUs by harbor is presented on Figure 3-31. Honolulu Harbor has the largest container volume in Hawaii with over 1.2 million TEUs, representing over 80 percent of the total TEUs moved in Hawaii. Kahului Harbor and Kawaihae Harbor are second- and third-highest, with the harbors moving approximately 97,000 and 81,000 TEUs, respectively. Nawiliwili Harbor and Hilo Harbor each move approximately 50,000 TEUs annually, which are each three percent of the total container throughput in Hawaii. The volume of marine traffic at Kahului Harbor, Kawaihae Harbor, Nawiliwili Harbor, and Hilo Harbor are still 20 percent below the 2008 volumes. The remaining three harbors each move less than one percent of the TEUs in Hawaii.

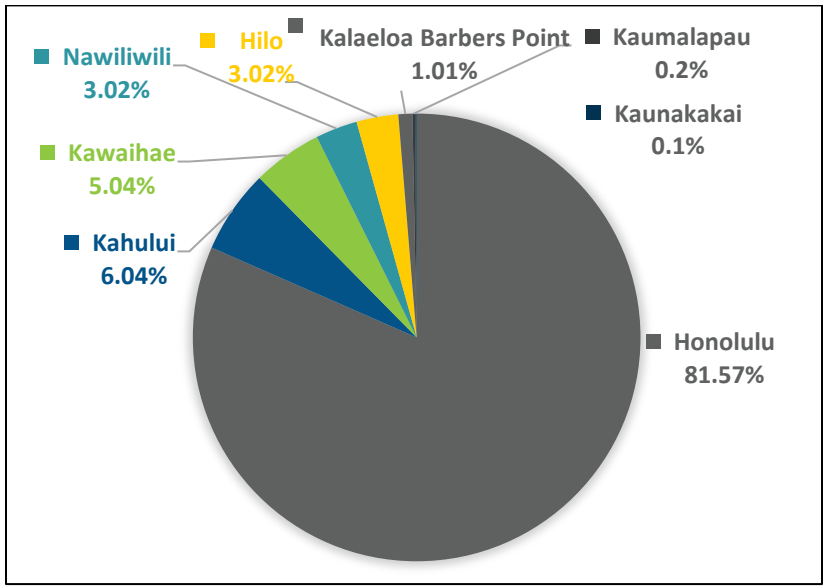


Figure 3-31. Percent of Total TEUs in 2016

Table 3-8 shows the number of short tons by harbor in Hawaii; Figure 3-32 presents the same information by percentage. Like the trends for TEUs, the short tons moved through Hawaii had a 10-year low in 2010 and have only recently rebounded to slightly exceed the 2008 post-recession volumes, with 2016 short tons totaling 21.1 million.

Table 3-8. Number of Short Tons by Harbor

Harbor	Island	2008	2010	2016
Honolulu Harbor	Oahu	10,111,727	8,921,692	11,437,097
Kalaeloa Barbers Point	Oahu	4,214,328	3,483,891	3,876,142
Kahului Harbor	Maui	2,918,106	2,264,810	2,324,924
Hilo Harbor	Big Island	1,592,942	1,280,053	1,308,041
Kawaihae Harbor	Big Island	922,351	725,821	1,061,829
Nawiliwili Harbor	Kauai	918,482	699,126	820,193
Port Allen Harbor	Kauai	296,336	222,964	122,954
Kaumalapau	Lanai	n/a	12,932	98,427
Kaunakakai	Molokai	117,943	94,389	86,420
Total	**All Islands**	**21,092,215**	**17,705,678**	**21,136,026**

Source: HDOT-Harbors, 2017a

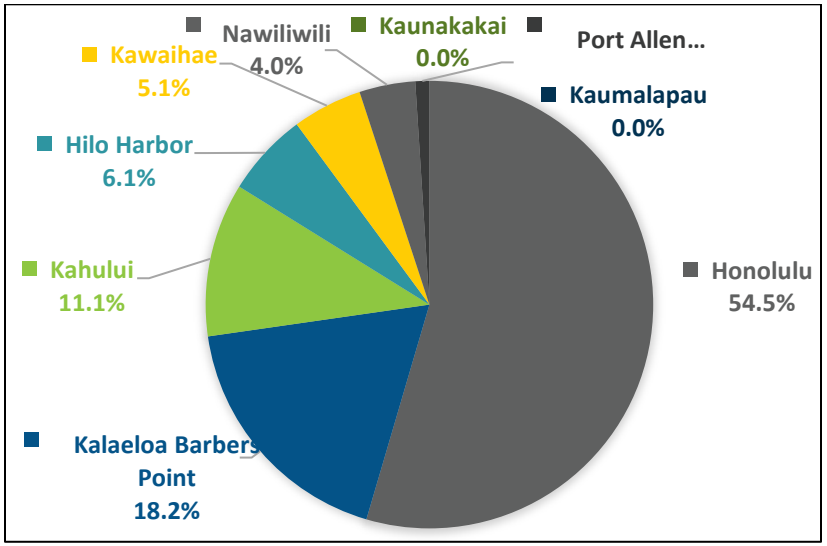


Figure 3-32. Percent of Total Short Tons in 2016

Honolulu Harbor moves the highest amount of marine cargo in terms of weight, with 11.4 million tons moved in 2016. The other harbor on Oahu, KBPH, moved 3.9 million short tons in 2016. This harbor focuses almost exclusively on bulk, breakbulk, and neo-bulk items. Combined, Honolulu Harbor and KBPH handled 72 percent of the total short tons moved, which is comparable to the 82 percent of TEUs that are handled on Oahu. Kahului Harbor on Maui is the third-highest in terms of short tons with 2.3 million tons moved in 2016. No other harbor moves more than 10 percent of cargo tonnage in the state.

3. Intermodal Transfers and Connectors

Intermodal connectors, also known as first-mile connectors, join the main highways with the ports. It is critical that these routes perform well because they are a necessary component of the supply chain—their poor performance can lead to congestion and delays that affect the rest of the supply chain. Hawaii has designated several roadways as connectors as part of the NHS connector system. The NHS intermodal connector system is an acknowledgement that many first- and last-mile connectors are local roads but have national significance. It also allows for NHS funds to be allocated to the local roadways even though they do not qualify to be a part of the NHS under other FHWA criteria. See Chapter 8 for more information about the criteria that qualifies a road or system of roads as a designated NHS intermodal connector.

Table 3-9 lists the NHS intermodal connectors to ports in Hawaii. There are ten intermodal connectors leading to six harbors. Honolulu Harbor has five, while the other five harbors each have one. The truck annual average daily traffic (AADT) of these connectors ranges from just over 100 trucks per day at Kahului Harbor to nearly 6,000 daily trucks on the Sand Island Access Road/Parkway. The pavement condition of most of these roadways is fair.

Table 3-9. NHS Intermodal Connectors and Daily Traffic

Facility ID	Harbor	Region	Connector Description	Truck AADT	AADT	Pavement Condition
HI2P-3*	Honolulu Harbor	Honolulu	Sand Island Access Road/Parkway (Nimitz Highway to military reservation)	5,939	19,000	100% Fair
HI2P-2	Honolulu Harbor	Honolulu	Kukahi St (Iwilei) (Nimitz Highway to Gate)	4,211	68,579	100% Fair
HI2P-1	Honolulu Harbor	Honolulu	Forrest Avenue (Ala Moana Blvd to Pier 1 terminal gate)	2,467	40,501	100% Fair
HI2P-5	Honolulu Harbor	Honolulu	Matson Drive (Sand Island) (Parkway to gate)	2,151	8,900	100% Fair
HI12P-1	Barbers Point Deep Draft Harbor	Honolulu	Malakole Road and Access Road (end of NHS Route 95 to Pier 5 terminal)	2,081	18,226	100% Fair
HI2P-4	Honolulu Harbor	Honolulu	Sealand Drive (Sand Island) (Parkway to gate)	n/a	n/a	100% Fair
HI6P-1	Hilo Harbor	Hawaii	Driveway (Kuhio Street/Harbor Gate to Pier 1 terminal)	1,004	7,900	100% Fair
HI10P-1	Nawiliwili Harbor	Kauai	Wilcox Road, Kanoa Road, and Waapa Road (Nawiliwili Road to Pier 1 and Pier 3 gates)	529	12,297	7% Good, 93% Fair
HI7P-1	Kawaihae Harbor	Hawaii	Access Road (Kawaihae Road to Pier 1 and Pier 2 terminals)	388	5,100	33% Good, 67% Fair
HI4P-1	Kahului Harbor	Maui	Ala Luina Street (Hobron Avenue to Pier 1 terminal)	107	3,915	100% Fair

Source: HDOT, 2017

Note:

* Travel speed on Sand Island Access Road averages 20 to 30 mph during AM peaks.

C. Air Cargo

The air cargo industry is an essential component of Hawaii's economy. High-value products as well as perishable time-sensitive agricultural products and seafood are transported to and from the mainland and global destinations (Figure 3-33).

Figure 3-33. Cargo Plane

1. Description of System

Hawaii has a total of 15 commercial airports, 9 of which service air cargo. Figure 3-34 shows the locations of Hawaii's commercial airports, which are administered by the HDOT, Airports Division (HDOT-Airports). Table 3-10 presents the cargo tonnage by airport for 2015. Daniel K. Inouye International Airport (Honolulu Airport) on Oahu is the largest airport in terms of air cargo, with over 400,000 tons carried each year. It carried 10 times more air cargo than the next biggest airport, Kahului Airport on Maui, with just over 30,000 annual tons serviced. Daniel K. Inouye International Airport has over 1 million square feet of cargo in its ramp area and is supported by over 450,000 square feet of warehouse space adjacent to the airport property and over 3 million square feet of warehouse space in its industrial submarket in Oahu. The airport includes a mix of public and private cargo terminal facilities. The state-owned facilities are currently leased to Continental Airlines, Japan Airlines, Delta Airlines, and American Airlines. Privately owned air cargo facilities include those owned and operated by FedEx, Hawaiian Airlines, Kalitta/Pacific Air Cargo, United Airlines, and UPS.

The Kahului Airport in Maui recently completed a new airport access road and has a new agricultural inspection area. The airport access road connects Hana Highway to Lanai Loop. The Big Island features two airports that service air cargo, Hilo International Airport and Ellison Onizuka Kona International Airport at Keahole. Hilo International Airport is serviced by the all-cargo carrier, Aloha Cargo, along with Hawaiian Airlines. In September 2017, Aloha Air Cargo opened a new cargo facility at Hilo International Airport. The new facility is 19,000 square feet and houses both the cargo and maintenance operations for Aloha Air Cargo on the Big Island. Air cargo in Kauai is moved through Lihue Airport through Aloha Airlines, Hawaiian Airlines, FedEx, and UPS.

Table 3-10. Commercial Airport Summary

Island	Airport	2015 Cargo (U.S. Tons)
Oahu	Daniel K. Inouye International Airport (HNL)	413,401
Maui	Kahului Airport (OGG)	31,217
Big Island	Hilo International Airport (ITO)	20,222
Big Island	Ellison Onizuka Kona International Airport at Keahole (KOA)	19,564
Kauai	Lihue Airport (LIH)	18,194
Maui	Kapalua Airport (JHM)	1,293
Molokai	Molokai Airport (MKK)	1,055
Maui	Lanai Airport (LNY)	885
Molokai	Kalaupapa Airport (LUP)	111

Source: HDOT-Airports, 2015

Figure 3-34. Airports in Hawaii

2. Volume and Commodity Flows

In November 2017, the Hawaii DBEDT prepared a comprehensive analysis of Hawaii's air cargo and its impact on the state's economy (DBEDT, 2017). The DBEDT report is based primarily on data from the Freight Analysis Framework maintained by the U.S. Department of Transportation, which differs from the data reported by the HDOT Airports Division. While the air cargo data differ, the DBEDT report provides valuable insight into the air cargo trends over the last 30 years. According to the report in 2015, just over 715,000 tons of air cargo were transported in, out, and around Hawaii. Figure 3-35 shows that 52 percent of these were inbound shipments, 35 percent were outbound shipments, and 13 percent were inter-island shipments. From a tonnage perspective, air cargo represents 1.6 percent of all goods shipped in Hawaii. Air cargo is a disproportionately small component of inter-island freight traffic, representing just 0.2 percent of these trips. Approximately 18 percent of outbound shipments are air cargo and 8 percent of inbound shipments are air cargo.

The value of air cargo shipped in Hawaii was $19.8 billion in 2015. The distribution of value between inbound, outbound, and inter-island shipments is similar to the distribution for tonnage, with just over half of the value outbound shipments and approximately one-third inbound shipments (Figure 3-35). From a value perspective, air cargo represents 19 percent of all goods shipped in Hawaii.

Figure 3-36 shows the trend of outbound, inbound, and inter-island air cargo volumes from 1990 to 2016. It shows that all movement types remained relatively flat between 1990 and 2001. However, since 2001, inbound air cargo shipments have had the most rapid increase. This increase is likely attributable to the growth in e-commerce starting around 2001. Inter-island air shipments have grown at a moderate amount, while outbound shipments have remained relatively flat.

Figure 3-37 shows the trend of air cargo volume by four carrier types between 1990 and 2016: passenger airlines, all-cargo airlines, military planes, and charter airplanes. There has been a significant increase in specialization for air cargo shipping. In 1990, most of air cargo moved in the belly of passenger airplanes. However, by 2016, the largest share of air cargo was now moved by all-cargo services such as FedEx and UPS. The rise of all-cargo services also coincides with the early 2000s and the rise of e-commerce. FedEx and UPS are the largest carriers for outbound and inbound goods, representing roughly 35 percent of Hawaii's air cargo traffic in 2016. Kalitta Air and Atlas Air represent another 15 percent to 20 percent of outbound and inbound shipments. Virtually all air cargo moving inter-island is done using all-cargo airlines, with Aloha Air Cargo carrying 50 percent of this traffic.

Cargo being moved in the belly of passenger airplanes has decreased somewhat since 1990, while air cargo moved by military planes and charter airplanes remained relatively low from 1990 through 2016.

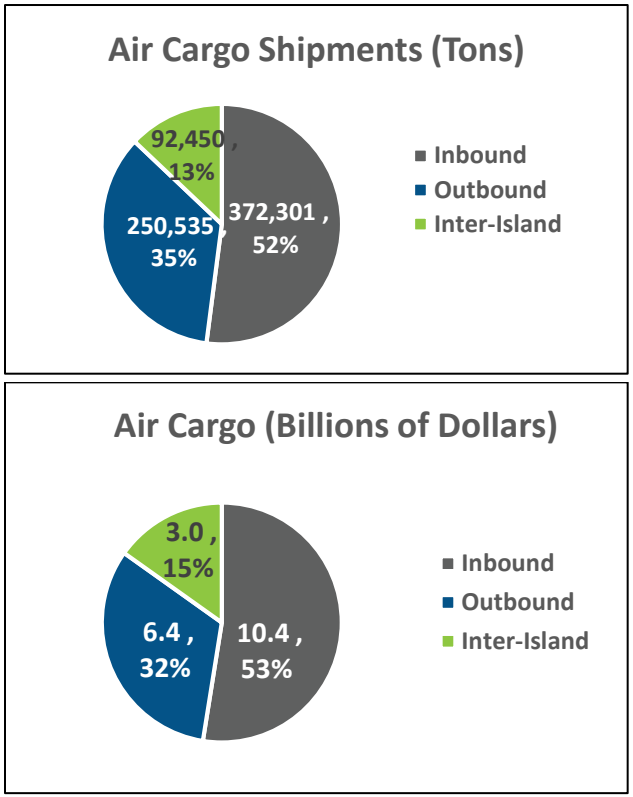


Figure 3-35. Hawaii Air Cargo Shipments, 2015
Source: DBEDT, 2017

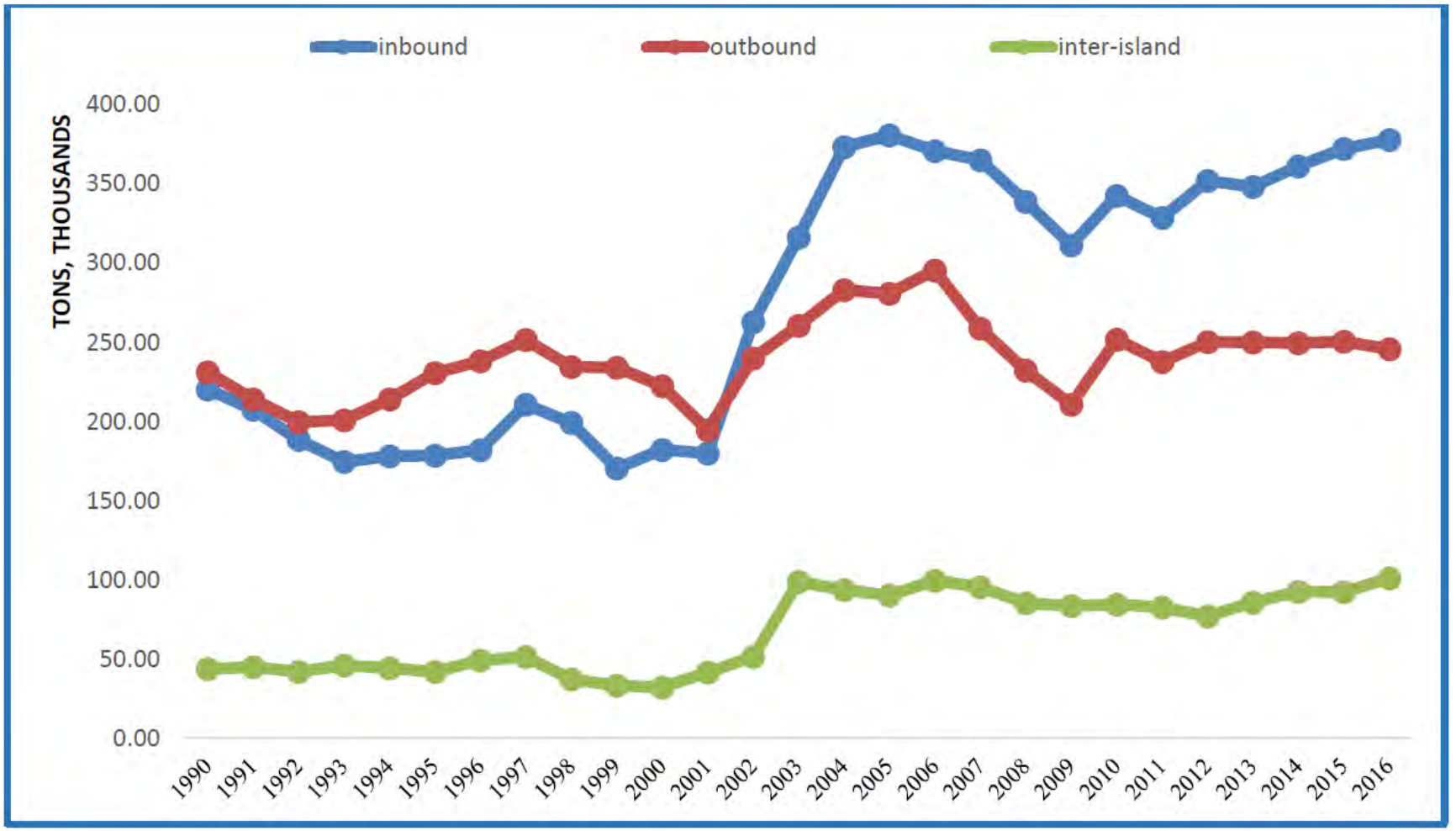


Figure 3-36. Air Cargo Tonnage by Direction, 1990–2016

Source: DBEDT, 2017

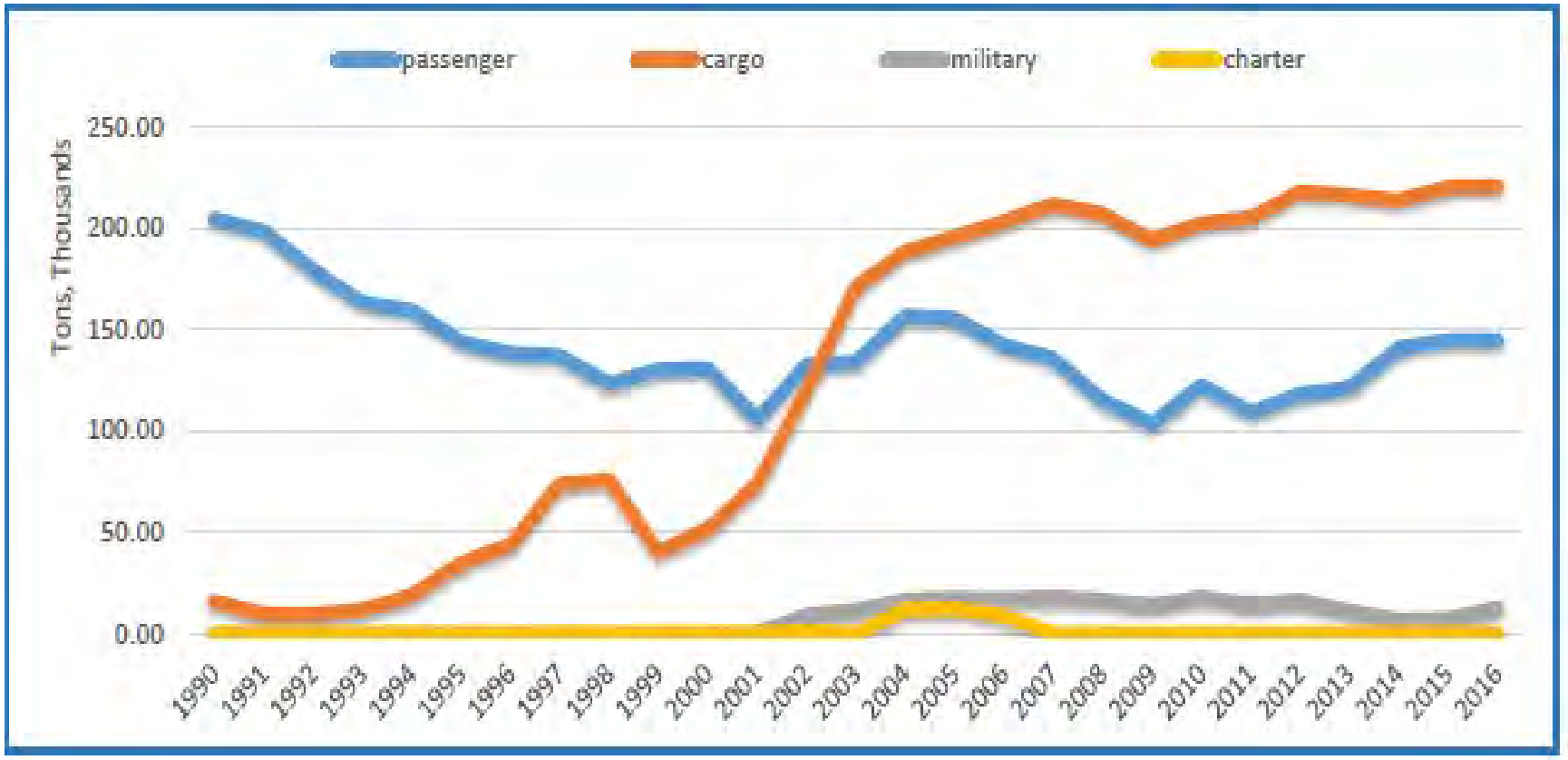


Figure 3-37. Air Cargo Tonnage by Type of Carrier, 1990–2016

Source: DBEDT, 2017

Air cargo carriers specialize in moving high-value, low-weight goods. They also tend to carry items that lose their value rapidly over time, such as perishables. Table 3-11 shows the top ten domestic and international commodities shipped into Hawaii. For domestic inbound goods, the top six commodities are all high-value items such as electronics, precision instruments, miscellaneous manufactured products, machinery, and transport vehicles. International inbound goods are much smaller in total quantity. The top four commodities for these shipments are returned or repaired items and apparel accessories. The total value for domestic inbound goods was $3,109,647,700, and the total value for international inbound goods was $143,606,107.

Table 3-12 shows the top ten domestic and international commodities shipped outbound from Hawaii. Domestic outbound shipments include a high proportion of goods shipped by the agricultural and food industry in Hawaii. This includes foodstuffs, meat/seafood, and agricultural products, and it shows Hawaii's reliance on air cargo to support its local agricultural and food processing industries. Pharmaceutical products are the second-highest domestic outbound shipment. Mixed shipments, which can include a wide range of specific products, are the single largest commodity shipped out of Hawaii to the other states. By far the largest commodity for international outbound shipments (exports) is aircraft parts. The second-highest exported commodity from Hawaii is less than 10 percent as large as aircraft parts and is a related commodity: turbojets and turbo-propellers. Several other top Hawaiian air cargo exports are also parts-related, including electric telephone parts, aircraft engines and parts, and parts and accessories. Industries creating these products also appear to be reliant on the air cargo mode for reliable and fast shipments.

Table 3-11. Top 10 Inbound Air Cargo Commodities

Rank	Domestic Goods	Value	International Goods	Value
1	Electronics	$730,065,100	Exports of Repaired/ Returned Imports	$42,348,152
2	Precision instruments	$570,044,100	Handbags, Wallets, Jewelry Cases	$23,363,259
3	Manufactured products (misc.)	$399,529,200	Jewelry & Precious Metal	$21,486,086
4	Machinery	$330,066,300	Watches	$14,690,462
5	Motorized vehicles	$278,462,500	Fish, Fresh or Chilled	$13,497,163
6	Transport equipment	$258,786,900	Computers and Parts	$8,118,879
7	Textiles/leather	$175,352,100	Art Paintings, Drawings	$6,467,420
8	Pharmaceuticals	$163,068,800	Seats and Parts	$4,697,050
9	Articles-base metal	$102,334,600	Medical, Surgical, Dental Equipment	$4,485,567
10	Meat/seafood	$101,938,200	Pearls, Natural or Cultured	$4,452,069
	Top 10 Total	$3,109,647,700	Top 10 Total	$143,606,107

Source: DBEDT, 2017

Table 3-12. Top 10 Outbound Air Cargo Commodities

Rank	Domestic Goods	Value	International Goods	Value
1	Mixed Freight	$343,643,000	Parts of Aircraft	$396,962,737
2	Pharmaceuticals	$253,758,300	Turbojets, Turbo-propellers	$32,165,982
3	Other foodstuffs	$241,557,600	Electric Telephone Parts	$19,976,303
4	Meat/seafood	$113,385,000	Crustaceans Live Fresh	$19,950,092
5	Other ag products	$87,202,300	Aircraft, Engines, And Parts	$11,909,737
6	Textiles/leather	$86,370,000	Military Apparel & Equipment	$10,858,591
7	Alcoholic beverages	$81,891,800	Parts & Accessories	$9,583,937
8	Other foodstuffs	$77,889,500	Tank & Armored Fight Vehicles	$8,159,265
9	Printed products	$75,709,000	Melons and Papayas, Fresh	$7,557,203
10	Electronics	$65,834,500	Coffee/Coffee Husks	$6,857,073
	Top 10 Total	$1,427,241,000	Top 10 Total	$523,980,920

Source: DBEDT, 2017

Trading Partners

Figure 3-38 shows the top airports of origin and destinations for air cargo in Hawaii. Los Angeles International Airport (LAX) is the top destination of outbound domestic air cargo from Hawaii, with nearly 65,000 tons shipped annually into LAX. This is approximately half of all the domestic outbound air cargo shipments for Hawaii. LAX is followed by airports in Oakland, Ontario, and San Francisco in California, and Dallas, Texas, which combine to receive another 39,000 tons of air cargo. LAX and Ontario are also the top two airport origins for goods shipped into Hawaii. They are followed by Memphis, Tennessee, and Louisville, Kentucky, which are hubs for FedEx and UPS, respectively; this reinforces the importance of the all-cargo airlines for Hawaii air shipments.

For international shipments, Sydney, Australia, is the largest recipient of air cargo goods exported from Hawaii, representing approximately half of all international outbound shipments. This is followed by the Auckland, New Zealand; Hong Kong; Tokyo, Japan; and Vancouver, Canada, airports. The top air cargo origins for international shipments include four airports in Japan and one in South Korea.

3. Intermodal Transfers and Connectors

There are five roadway connectors to airports that are designated NHS intermodal connectors (Figure 3-39 and Table 3-13). The designated NHS connector to Daniel K. Inouye International Airport is a freeway on-ramp between H-1 and the airport. This connector has an estimated 633 daily trucks and fair pavement condition. On Maui, the designated NHS connector road is the Haleakala Highway and Keolani Place. This connector road has 954 daily trucks and pavement in fair condition.

The current NHS connector on Hilo is Kekuanaoa Street, with 961 daily trucks; most of Kekuanaoa Street is in fair pavement condition. This designation will need to be updated with the opening of the new access road at Hilo International Airport. The Big Island NHS intermodal connector has the highest number of trucks of all the air connectors with over 1,000 daily trucks, while Lihue Airport has the fewest number of trucks. The pavement condition of these connectors is also primarily fair.

Figure 3-38. Top Airports of Origins and Destinations for Hawaii Air Cargo, 2016
Source: DBEDT, 2017

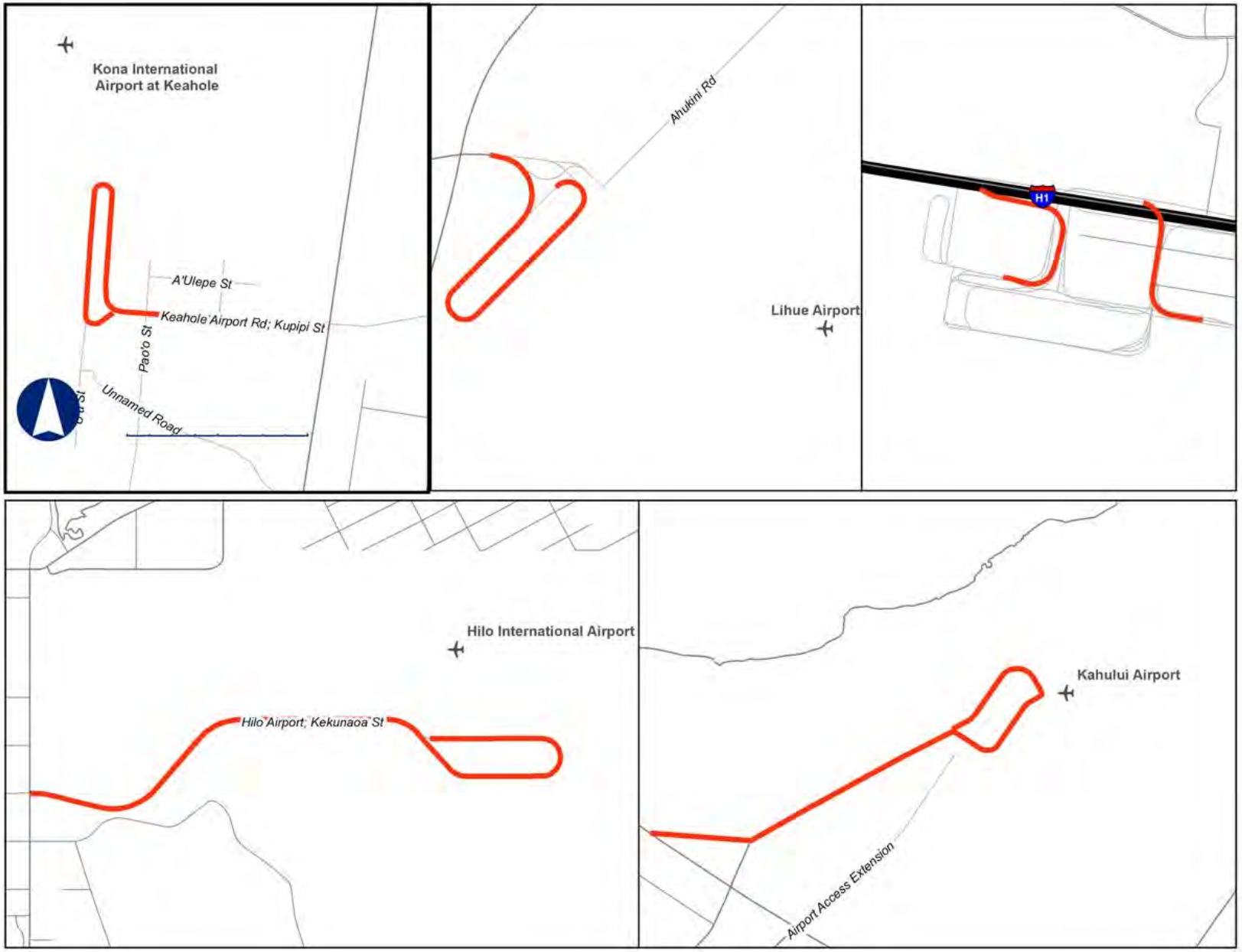


Figure 3-39. Existing NHS Intermodal Connectors

Table 3-13. NHS Intermodal Connectors and Daily Traffic

Facility ID	Airport	Region	Connector Description	Truck AADT	AADT	Pavement Condition
HI1A	Daniel K. Inouye International Airport	Honolulu	H-1 Freeway on-ramp to Terminal	633	9,400	Fair
HI3A	Kahului Airport	Maui	Haleakala Highway and Keolani Place (Hana Highway and terminal)	954	14,400	Fair
HI5A	Hilo International Airport	Big Island	Kekuanaoa Street (Kanoelehua Avenue to terminal)	961	35,200	19% Good, 81% Fair
HI8A	Ellison Onizuka Kona International Airport at Keahole	Big Island	Airport Access Road (Queen Kaahumanu Highway to Terminal)	1,032	27,500	13% Good, 87% Fair
HI9A	Lihue Airport	Kauai	Ahukini Road (End of NHS Route to terminal)	208	9,494	Fair

Source: HDOT, 2017.

4 Performance Measures and Baseline

A. Mission Statement

The HSFP builds on previous work completed by the HDOT, including the Hawaii Statewide Transportation Plan, Statewide and Regional Long-Range Land Transportation Plans, and other pertinent plans and studies.

The theme of the Hawaii Statewide Transportation Plan is "Making Connections"—not just connections among transportation modes such as air, water, and land transportation, but also to other jurisdictions in the global economy. It reflects making connections between transportation and other issues important to Hawaii including protecting the natural environment, complementing land use, supporting the economy, and improving the quality of life. Like the Hawaii Statewide Transportation Plan and consistent with the HDOT Mission Statement (Figure 4-1), the HSFP lays out a well-connected multimodal global freight transportation system that moves people and goods in a manner that supports and improves the state's economic vitality, natural beauty, and high quality of life.

B. Performance-based Planning

Performance-based planning and programming is a strategic approach that uses performance data to inform decision-making and outcomes. Practitioners have found that a performance-based approach to planning promotes the following:

> To provide a safe, efficient, accessible, and sustainable inter-modal transportation system that ensures the mobility of people and goods, and enhances and/or preserves economic prosperity and the quality of life.
>
> HDOT Mission Statement

Figure 4-1. HDOT Mission Statement

- Greater accountability of how funds are spent
- Improved transparency to ensure public involvement and understanding
- An assessment of system performance, rather than individual projects
- Refocusing of decision-making on outcomes
- Increased attention to cost-effectiveness

The performance management process is illustrated on Figure 4-2. It begins with shared goals and objectives, then moves to performance measures and targets for gauging progress, strategies for achieving the goals, and finally reporting to periodically assess and revise goals and objectives as needed.

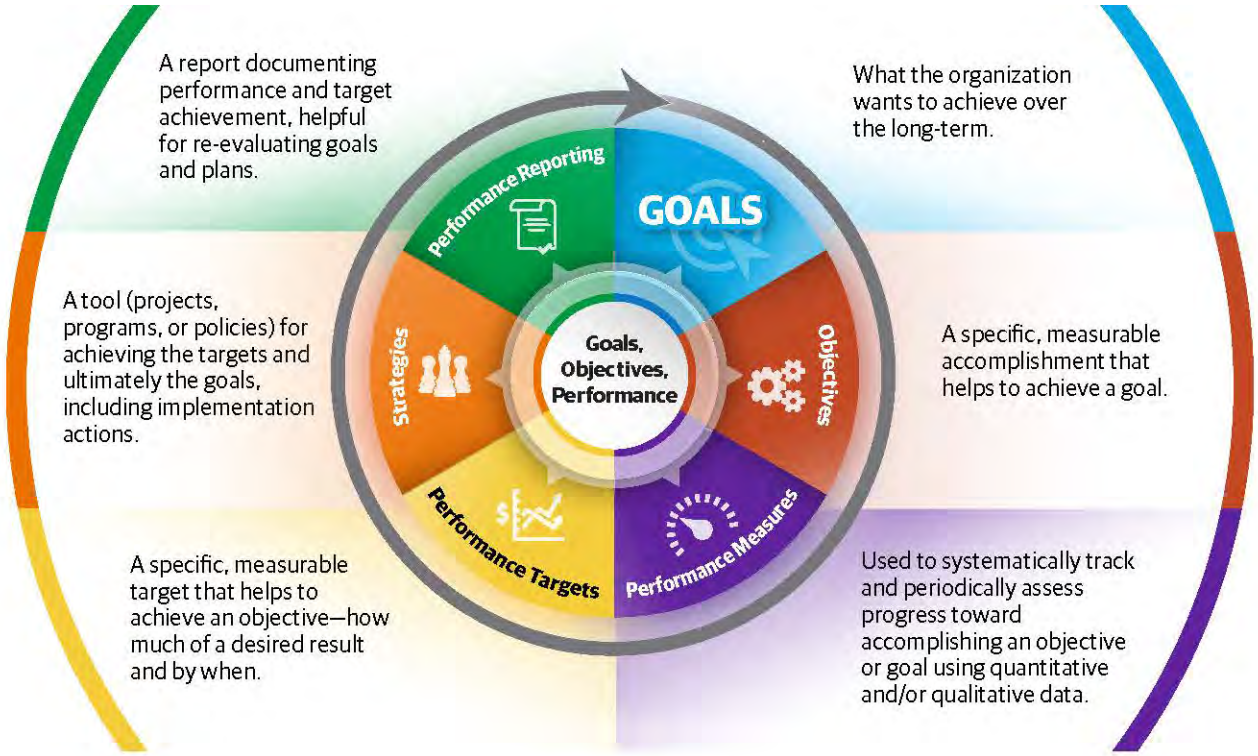


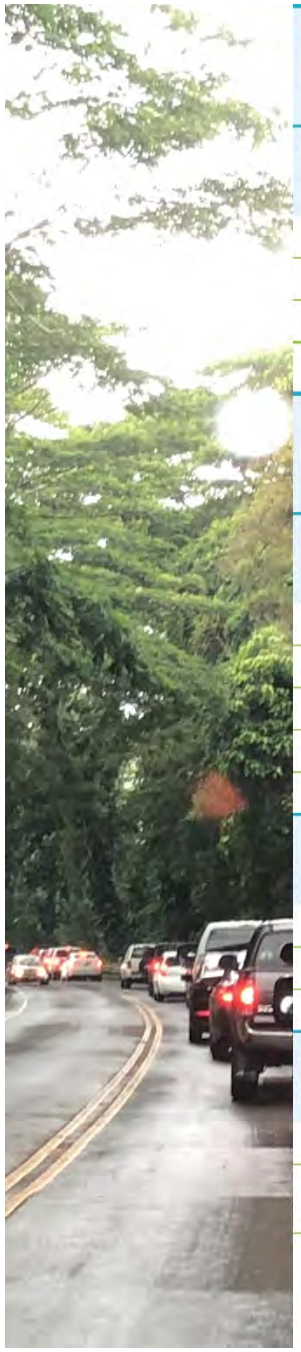
Figure 4-2. Performance-based Planning

C. Goals, Objectives, and Performance Measures

Through the project teams' research and outreach efforts, six overarching goals were identified for freight movement in Hawaii: Safety, Infrastructure Preservation, Infrastructure Improvements, Reliable Freight Network, Minimize Environmental Impacts, and Resiliency to Global Climate Change.

In addition to identifying goals and objectives for the HSFP, performance measures and performance goals are defined for each objective as a method of tracking the State's performance against the objectives and of revealing trends over time. The performance measures and performance goals were developed based on state and federal performance management techniques and federal guidance. These performance measures are intended to carry out the NHFP and assess the condition, performance, effectiveness, and progress of the HSFP at a state, regional, and national level.

Figure 4-3 lists the goals and associated objectives, performance measures, current conditions (baseline), and performance goals.



Safety

Develop a State freight network that provides for the safety of people, infrastructure, and goods movement.

OBJECTIVE

Provide a safe transportation system for all users.

PERFORMANCE MEASURES	CURRENT CONDITION (2017)	PERFORMANCE GOALS
Total number of truck-involved crashes	193	100
Total number of fatalities from truck-involved crashes	6	5

Infrastructure Preservation

Maintain and improve the state of good repair of the freight transportation system.

OBJECTIVE

Sufficiently maintain the condition of pavement to facilitate the free-flow movement of freight.

PERFORMANCE MEASURES	CURRENT CONDITION (2016)	PERFORMANCE GOALS (4-YEAR)*
Percentage of pavements on the Interstate in **good** condition	6%	7%
Percentage of pavements on the Interstate in **poor** condition	4%	4%
Percentage of non-Interstate NHS pavements in **good** condition	16%	15%
Percentage of non-Interstate NHS pavements in **poor** condition	3%	4%

OBJECTIVE

Sufficiently maintain the condition of bridges to facilitate the free-flow movement of freight.

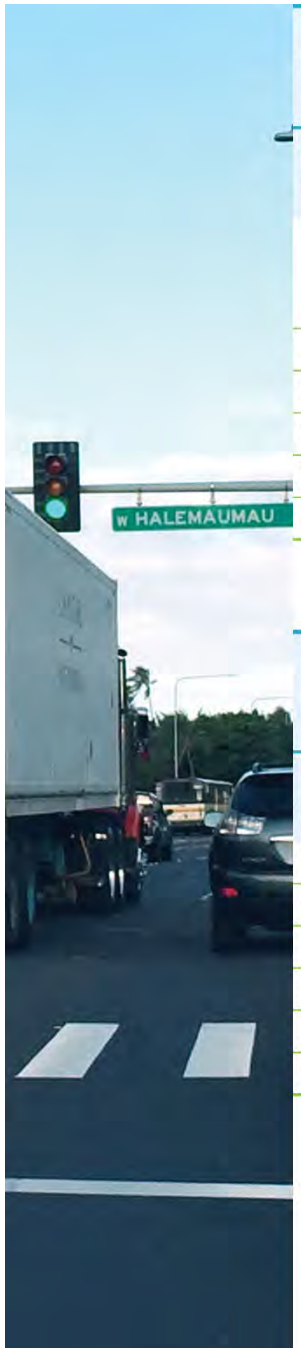
PERFORMANCE MEASURES	CURRENT CONDITION (2016)	PERFORMANCE GOALS (4-YEAR)*
Percentage of NHS bridges classified in good condition	23%	20%
Percentage of NHS bridges classified in poor condition	2%	2%

OBJECTIVE

Use life-cycle cost assessments in the prioritization of freight improvements.

PERFORMANCE MEASURES	CURRENT CONDITION (2016)	PERFORMANCE GOALS (4-YEAR)
All planning level cost estimates for freight-related projects or projects on the State freight network should have a life-cycle cost assessment as a component.	n/a	n/a

** This performance goal represents an actual FHWA 4-year performance target.*



Infrastructure Mobility Improvements

Improve the multimodal freight infrastructure to provide mobility and connectivity for freight, and to support the needs of the local economy, including the tourism industry and military.

OBJECTIVE

Reduce congestion and eliminate bottlenecks on all Interstate (NHS), HI Only (NHS), and Non-Interstate.

	CURRENT CONDITION (2017)			PERFORMANCE GOALS*		
PERFORMANCE MEASURES	INTERSTATE (NHS)	HI ONLY (NHS)	NON-INTERSTATE	INTERSTATE (NHS)	HI ONLY (NHS)	NON-INTERSTATE
Weekday Morning Peak Truck Speeds (6 – 10 am)	41 mph	37 mph	24 mph	41 mph	37 mph	24 mph
Weekday Mid-Day Truck Speeds (10 am – 4 pm)	47 mph	45 mph	23 mph	47 mph	45 mph	23 mph
Weekday Afternoon Peak Truck Speeds (4 pm – 8 pm)	37 mph	38 mph	15 mph	37 mph	38 mph	15 mph
Weekend Truck Speeds (6 am – 8 pm)	45 mph	46 mph	22 mph	45 mph	46 mph	22 mph
Daily Night Truck Speeds (8 pm – 6 am)	46 mph	47 mph	26 mph	46 mph	47 mph	26 mph

** The performance goal is to maintain the current condition with the anticipated future growth in population.*

Reliable Freight Network

Create a reliable freight network that allows shippers and receivers to plan around predictable travel times.

OBJECTIVE

Optimize truck travel time reliability (TTTR) of the NHS.

PERFORMANCE MEASURES	CURRENT CONDITION (2017)	PERFORMANCE GOALS (4-YEAR)*
Weekday Morning Peak TTTR (6 – 10 am)	1.80	1.80
Weekday Mid-Day TTTR (10 am – 4 pm)	1.60	1.60
Weekday Afternoon Peak TTTR (4 pm – 8 pm)	1.70	1.70
Weekend TTTR (6 am – 8 pm)	1.40	1.40
Daily Night TTTR (8 pm – 6 am)	1.30	1.30

** This performance goal represents an actual FHWA 4-year performance target.*

Minimize Environmental Impacts

Minimize the environmental impacts of freight movement on the State freight network to surrounding communities and the natural environment.

OBJECTIVE

Reduce environmental impacts of freight movement on the State freight network on surrounding communities and the natural environment.

PERFORMANCE MEASURES	CURRENT CONDITION	PERFORMANCE GOALS
See truck travel time reliability measure (reducing travel time at a system level will reduce carbon emissions).		

OBJECTIVE

Select freight projects identified in the HSFP that align with the State's environmental goals.

PERFORMANCE MEASURES	CURRENT CONDITION	PERFORMANCE GOALS
n/a	n/a	n/a

OBJECTIVE

Hawaii will continue to implement the Hawaii Environmental Policy Act (HEPA) and National Environmental Policy Act (NEPA) to provide the necessary environmental review process and identify and minimize the impacts and apply applicable mitigation measures of Freight Network Projects.

PERFORMANCE MEASURES	CURRENT CONDITION (2016)	PERFORMANCE GOALS (4-YEAR)
n/a	n/a	n/a

Resiliency to Global Climate Change

Create and maintain resilient freight infrastructure able to withstand the effects of global climate change.

OBJECTIVE

Reduce the future impacts of damage caused by changing weather patterns by use of innovative technology and infrastructure improvements.

PERFORMANCE MEASURES	CURRENT CONDITION	PERFORMANCE GOALS
Improve resiliency to global climate change by creating redundancy in the transportation system and improving shoreline and rockfall roads at risk.	Within the Shoreline Protection Program and Rockfall Protection Program, identify the roads on the Hawaii Freight Network.	Within the Shoreline Protection Program and Rockfall Protection Program, give the roads on the Hawaii Freight Network a higher project priority.

Figure 4-3. Goals, Objectives, and Performance Measures of Hawaii's Freight System

5 Freight Trends, Needs, and Issues

Understanding likely trends in population and economic activity helps the State with infrastructure and economic planning needs, as well as developing sustained growth strategies.

Current and projected growth and economic expansion have a direct effect on the state's roads, airports, and harbors, and thus freight mobility and capacity. Likewise, insufficient freight capacity and the movement and handling of cargo have substantial impacts on Hawaii's economy, including loss of jobs and income, foregone business revenues and taxes, and potential shortages of goods. The cargo distribution and delivery system involves a large network of sub-industries, including trucking companies, wholesalers, packaging operations, and distribution centers. These businesses employ workers and pay business taxes. Notably, cargo congestion creates uncertain and substantial delays and increased operational costs that hinder Hawaii's economy and increases the cost of our goods.

A. Trends

1. Demographics and Employment

The population of Hawaii is projected to increase from 1.43 million in 2016 to 1.65 million in 2045, an average growth rate of 0.5 percent per year over the projection period (DBEDT, 2018). As the population grows, so does the demand for consumer goods and the shipment of goods. Population aging is one of the most prominent features of Hawaii's population trend, which could contribute to changing trends in workforce availability.

Hawaii's economic growth is expected to be gradual over the coming decades. The prospects for more rapid growth is limited by the structural factor of an aging population. The DBEDT reports that Hawaii's economy, as measured by real GDP, is expected to grow at 1.7 percent per year between 2016 and 2045; this is lower than the previous 30 years at 1.9 percent between 1986 to 2016. The growth of GDP depends on demand from outside the region as well as local consumption and investment. This projection considers a slowdown in construction activities, as well as an overall reduction in the long-term growth of investment. Another factor that contributes to the moderate level of GDP growth is an anticipation of slow tourism growth.

Visitor arrivals in Hawaii have gone through several different growth phases over the last 7 decades. It is projected that long-term visitor growth in Hawaii will be affected not only by the demand for Hawaii tourism but also the supply constraints in the state. Given the maturity of Hawaii's tourism industry and the increasing competition from other destinations, Hawaii's visitor arrivals are expected to grow at a slower rate into the long-term future: at a 1.1 percent annual rate.

Statewide total civilian jobs will grow at an annual rate of 0.8 percent between 2016 and 2045, lower than the 1.5 percent experienced during the 30 years before 2016. The statewide share of self-employed jobs is expected to continue to increase in the future, but at a more moderate rate than observed in the past.

Sectors with higher job growth rate include Health Services (1.3 percent annual growth rate), Educational Services (1.3 percent annual growth), Business Services (1.2 percent annual growth), Professional Services (1.1 percent annual growth), and Eating and Drinking Places (1 percent annual growth) between 2016 and 2045.

2. Freight Trends

Nationally and globally, the freight industry continues to evolve in response to economic, political, demographic, and technological trends. Despite a trend toward slower growth, the long-term economic and population growth for Hawaii translates to long-term increased demand for consumer goods and the shipment of these goods. Hawaii will continue to rely on marine and air freight to import the necessary basics to support its growth, such as food, clothing, consumer goods, fuel, and raw materials.

Growth in Overall Freight

The FHWA Freight Analysis Framework is a national freight flow database that provides projections of goods movement by mode for 2015 and 2035. Figure 5-1 shows the tons moved by mode for Hawaii for 2015 and 2035. The figure shows that significant growth is projected for all three modes: 54 percent growth for trucking, 69 percent for marine flows, and 109 percent for air cargo.

The Kapalama Container Terminal and Tenant Relocations Environmental Impact Statement (EIS), for example, found that the capacity of container terminals at Honolulu Harbor, the largest and most active harbor in the state, must increase by approximately 58 percent over current levels to meet anticipated future demand (HDOT-Harbors, 2014). Investments in transportation infrastructure, technology, and services are needed to ensure that the flow of freight remains efficient.

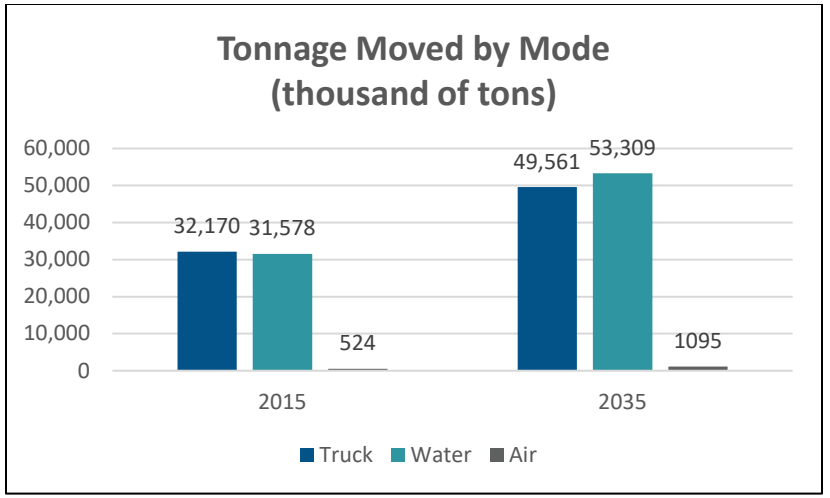


Figure 5-1. Tonnage Moved by Mode, 2015 and 2035
Source: USDOT, 2015

*Note that base year estimates are generated from a survey of shippers in Hawaii and therefore do not match the totals that are generated from other sources.

Globalization

One of the most significant economic trends affecting marine and air cargo in Hawaii is the close link between these industries and global trade and industrial production. Large companies have come to rely on worldwide markets to source raw materials and to conduct manufacturing and assembling operations on a global basis. According to a DBEDT report on the air cargo industry and the Hawaii economy, the reason for the sluggish air cargo growth between 2011 and 2015 was a direct tie to a weak global economy, which inhibited global trade growth (DBEDT, 2017).

Boeing predicts that over the next 20 years, world air cargo traffic will grow 4.2 percent per year, more than doubling in its size over the next 20 years (DBEDT, 2017). Air cargo markets linked to Asia, especially the Pacific Rim, with Hawaii serving as a link to these destinations, will lead all other international markets in average annual growth between 2015 and 2035. Boeing predicts markets in Asia will continue to lead the world for average annual air cargo

growth, with domestic China and intra-Asia markets expanding 6.2 percent and 5.5 percent, respectively. Hawaii benefits from being a key link between North America and Asia Pacific (DBEDT, 2017).

This globalization trend is a major consideration in developing both the air and marine cargo industry, particularly at Daniel K. Inouye International Airport, Ellison Onizuka Kona International Airport at Keahole, and Honolulu Harbor.

E-Commerce

The use of the Internet for buying and selling items (e-commerce) is a major trend affecting the freight industry, particularly for air and marine freight to Hawaii. These industries will have significant roles in the future long-term success of the e-commerce industry. Global e-commerce is expected to more than double between 2015 to 2020, from $1.7 trillion to $3.6 trillion and e-commerce sales in the U.S. have grown by nearly 28 percent per year on average of the last 15 years (DBEDT, 2017).

Evolution in Technology and Services

Other trends in the freight industry are advances in technology and the increased availability of data. For instance, marine freight shippers have greater visibility into market and pricing trends, which is helping minimize the dramatic boom-and-bust cycles that have traditionally plagued this industry. This includes more insight than previous systems into where ships are operating, loading, and discharging cargo. The availability of such data-driven analytics improves strategic decisions, allowing decision-makers to choose optimal routes, considering weather conditions, fuel consumption, and piracy risk (IHS Markit, 2016).

In the trucking industry, another example is Uber Freight (launched in 2017), which is an application for freight that operates like Uber's ride-sharing service, contributing to a fundamental change in freight logistics. Autonomous vehicles and drone delivery services are also examples of emerging technologies that will affect the way freight is operated and delivered.

In the air cargo industry, mainland distributors are looking for trucking operators that have a warehouse and can handle their logistics. A large amount of air cargo freight is perishable, with a limited shelf life, and must comply with U.S. Department of Agriculture temperature guidelines. There is a need for trucking operators that can provide direct delivery services of shipments (that is, receive, break down, and deliver) in a time-sensitive and temperature-sensitive manner.

Aging Workforce

According to industry data, an aging workforce is affecting both the marine, air cargo, and trucking freight industries. Fewer mariners are joining the marine freight industry; as employees age, finding replacement staff for ships will continue to be a challenge (Knichel, 2018). The Air Cargo Association of Hawaii mentioned that one of their industry's biggest challenges is finding workers. Likewise, there is tightened capacity in the freight trucking industry, where there is a low truck supply and high freight demand. This is due in part to an ongoing shortage of drivers. As older drivers are retiring, fewer younger drivers are replacing them. Hawaii's aging population could contribute to this challenge in workforce hiring.

Fuel Prices and Operating Costs

A potential risk for the air cargo and trucking industry is the potential rise in fuel prices. Oil prices fluctuated significantly over the past few years but have been relatively stable recently. Lower fuel prices decrease operating costs, which improves operating margins. While there are various price forecasts, some expect crude oil prices to rise gradually in the next few years which could hinder operating margins for air cargo carriers.

Figure 5-2. Multimodal Freight System

Competition between modes of transportation, with their varying operating costs, is another major issue that could affect trends in how goods are shipped. For example, greater efficiencies in the container-ship industry have attracted more shippers to move their freight by water, instead of air. It is generally 10 to 20 times less expensive to ship a container by water than by air as measured in per unit weight, but transit times are longer and less reliable than air cargo. To continue to compete effectively with container ships, the air cargo industry must ensure that the service benefits of air transportation warrant the price premium charged.

B. Needs and Issues

HDOT-Harbors recently kicked off the initial construction phase of the State's Harbor Modernization Plan. Funded by wharfage fees and approved by the State Legislature in 2008 (Act 200), the Harbor Modernization Plan identified key improvements designed to expand harbor system capacity, addresses advancements in containerized cargo handling, alleviates congestion issues and the lack of available operational space, and develops more adaptable and resilient port facilities. HDOT-Airports Division has a $3 billion Statewide Airports Modernization Plan to add gate capacity, modernization all of its facilities, and upgrade the airfields. As part of the modernization plan, a new Aloha Air Cargo facility is being built that will consolidate existing cargo operations, aircraft maintenance, loading docks, support offices, and customer service operations into an integrated facility on the west side of the airport.

As required by the FAST Act and supportive of the National Freight Goals, this HSFP focuses on the land transportation system of moving freight and the intermodal connectors with the Harbors and Airports. Specific needs of the highway freight system were identified through the technical analysis described in Chapter 3, stakeholder outreach, and a review of previous transportation and freight-related plans and studies for Hawaii. The needs are summarized in the following sections.

1. Needs and Issues Identified Through Technical Analysis

The needs of the freight transportation network identified through technical analysis considered infrastructure, pavement conditions, congestion and reliability, safety, and intermodal connectivity. Specific locations identified throughout the islands are potential impediments to Hawaii's freight system and therefore to the state's economy. Using these locations for reference, projects and programs can be tailored to address these issues to optimize the state's economy and growth. Figure 5-6 through Figure 5-10 map the needs identified by island based on the technical analysis conducted and shared in Chapter 3.

2. Needs and Issues Identified Through Stakeholder Outreach

While the technical analysis provides a helpful overview of the system's needs, there are issues that cannot be deduced from the

data alone. With additional outreach completed through individual interviews with air cargo, shipping, and trucking operators and a truckers' forum, a further level of insight was made into the system's needs.

Needs and Issues Identified through Interviews

The stakeholder interviews gave an overview of needs for the freight system, particularly around the airports, ports, and network connecting to the ports. General needs that were discussed are similar to those identified in the technical analysis and are summarized on Figure 5-3.

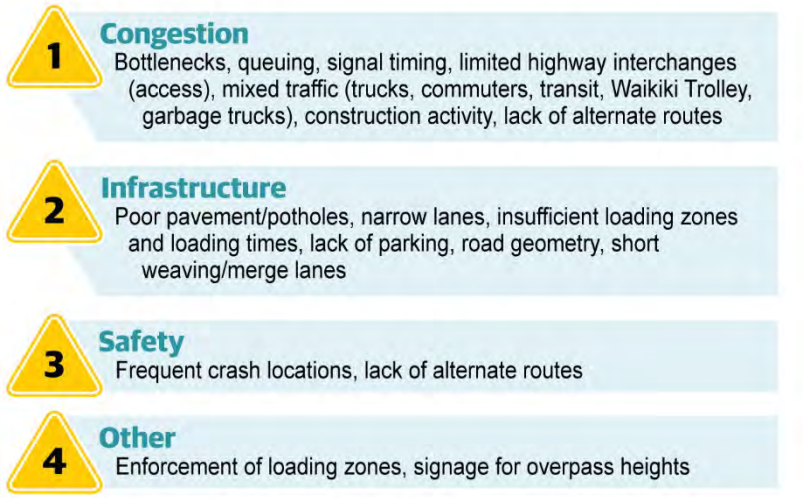


Figure 5-3. Summary of Issues Identified During Stakeholder Interviews

Needs and Issues Identified through Truckers' Forum

A truckers' forum was organized to receive input from local trucking companies. During the forum, needs came to light for the islands of Oahu, Hawaii, and Maui. Overall, on Oahu, the issues include congestion on the interstate and in the Waikiki area, poor pavement, overall connectivity issues and some issues with road geometry. While there were also issues identified during the truckers' forum for Hawaii and Kauai, the amount is only a fraction of the number of issues identified in Oahu. The needs revolve mostly around congestion, poor pavement, narrow lanes, and access. A detailed list of the issues identified is provided in Appendix B.

Figure 5-4. Marked-up Map from Truckers' Forum

Figure 5-5. Stakeholder Outreach

3. Needs and Issues Identified from Previous Studies

Statewide Long-Range Land Transportation Plans

The Statewide Federal-Aid Highways 2035 Transportation Plan identifies freight mobility as a critical component of economic vitality of the state. The plan stresses the importance of the existing roadway system as the sole means of surface transportation of goods in Hawaii, and its circulation, access and reliability for freight vehicles as extremely critical to statewide economic development. Potential statewide solutions pertaining to freight movement discussed in the plan include:

- Perform regular maintenance and upkeep of existing facilities to preserve and maintain continuous highway system operations
- Provide emergency access options and improve resiliency and security of road network
- Identify and develop specific congestion relief strategies within the existing highway infrastructure on each island to improve system efficiency

The Federal-Aid Highways 2035 Transportation Plans for the District of Maui, Hawaii, and Kauai provide further insight to existing conditions within each district, outlining specific problems regarding system preservation, congestion, safety, and lack of capacity faced by each island. These Districts move traffic via belt roads, mostly principle arterials, around the island's perimeters. Because of their unique geography, Hawaii and Kauai (and to a certain extent, Maui) have limited roadway options available to move traffic across or through the island.

The transportation plans for all Districts consistently discuss the projected economic growth and increase in cargo tonnage into and out of each island by 2035. With the increase in cargo, a significant number of additional freight vehicles are expected to be on the roads of each island to deliver necessary goods in the future. The plans identify improvement of traffic operations as a need to avoid further congestion on existing roadways and to avoid costly delays and economic impacts to freight.

The Oahu Regional Transportation Plan (ORTP) 2040 discusses the major transportation challenges and opportunities that the island of Oahu faces. While most of Oahu's existing development is along the southern portion of the island, future population and job growth are projected to occur on the western side of the island, in Central Oahu, and in the Kakaako area. Analysis of traffic conditions projected until 2040 shows continued worsening of the already congested conditions found along the H-1 corridor and at the H-1 and H-2 merge, and in transit reliability. Capital projects identified in the ORTP that pertain to freight movement include the following:

- Congestion mitigation and alternative projects to increase the efficiency of the existing transportation network
- Modernization projects, including roadway capacity improvements (adding lanes or new/reconfigured interchanges) along Interstate Route H-1 and in the developing areas of Oahu

- Operations, maintenance, preservation, and safety improvements to improve traffic flow and safety

Kapalama Container Terminal and Tenant Relocations Environmental Impact Statement

The Kapalama Container Terminal and Tenant Relocation EIS was prepared in 2014 for the proposed development of a new overseas container terminal in Honolulu Harbor. Roadways and traffic near the project area were evaluated by analyzing a total of 11 key intersections, primarily north and west of the Kapalama site. Traffic conditions were characterized by using the Level of Service (LOS) methodology, which provides a quantitative means to describe traffic flow. The LOS range from excellent free-flowing conditions (LOS A) to very congested (LOS F). As shown below, most of the key intersections are forecasted to operate at poor levels of service during peak hours.

Future (2035) Intersection LOS (AM/PM):

- Nimitz Highway at:
  - Sand Island Access Road (LOS E/D)
  - Puuhale Road (LOS D/F)
  - Mokauea Street (LOS D/F)
  - Kalihi Street (LOS E/F)
  - Waiakamilo Road (LOS E/D)
- Sand Island Access Road at:
  - Auiki Street (LOS D/D)
  - Road No. 2 (LOS E/C)
  - University of Hawaii (UH) Snug Harbor Access (LOS D/C)
- Auiki Street and:
  - Puuhale Road (LOS C/E)
  - Mokauea Street (LOS A/B)

Kalaeloa Barbers Point Harbor Fuel Pier & Harbor Improvements Volume I: Final Environmental Impact Statement

As part of the EIS prepared in 2017 for the proposed improvements at KBPH, including adding berthing, yard space and other infrastructure to optimize operational efficiencies, a traffic study of local roads near the port facilities was conducted. This study included conducting traffic analysis at three key intersections near the harbor: (1) Hanua Street and Malakole Street, (2) Malakole Street and Kalaeloa Boulevard, and (3) Kalaeloa Boulevard and Kapolei Parkway.

The analysis showed that the existing stop-controlled Hanua Street and Malakole Street intersection operates at LOS C or better on all approaches during both the AM and PM peak hours of traffic. All movements at the signalized intersection of Kalaeloa Boulevard and Malakole Street operate at LOS E or better during peak hours. LOS drops to F at the Kalaeloa Boulevard/Kapolei Parkway intersection for northbound and east-west traffic (leaving KBPH and James Campbell Industrial Park). Traffic generally degrades as it moves away from KBPH.

The traffic study concluded that intersection operations will remain similar to conditions without the proposed improvements in 2040 and that the proposed project would contribute approximately 0.6 to 2 percent of the traffic at the major intersections along Kalaeloa Boulevard and Kapolei Parkway. The EIS lists proposed mitigation measures that are anticipated to be required at the three key intersections by 2040.

H-1 Corridor Study

The H-1 Corridor Study, published by the HDOT Highways Division (HDOT-Highways) in 2016, aims to identify potential projects to help improve the mobility, safety, and efficiency of the system. The study included the four phases of work described in the following sections.

Phase 1

During Phase 1, a preliminary list of candidate projects was developed based on review of previous studies and identification of existing problems along the study corridor. Both broad and specific problem areas were identified, with corridor-wide improvements, multi-segment improvements, and individual projects included in the preliminary list as potential solutions to the issues identified. The issues identified during Phase 1 were summarized into four categories: corridor-wide, insufficient capacity, safety, and asset preservation.

Corridor-wide issues on H-1 include narrow side and median shoulders and a general lack of continuity. Construction causes exacerbated disruptions due to the lack of alternate routing for the interstate.

The insufficient capacity on the interstate is also a corridor-wide issue, especially during the peak commutes times, which tend to be very unpredictable due to the nature of the traffic. The lack of capacity is also intensified by the lack of alternate routing available. Based on the study the following segments have the lowest LOS in the morning commuting peak period:

- Westbound H-1 between the H-1/H-2 merge and Paiwa Street
- Westbound H-1 between Fifth Avenue and Middle Street
- Eastbound H-1 between Kapolei Interchange at Kalaeloa Boulevard to Halawa Interchange
- Eastbound H-1 from Middle Street merge to Punahou Street

The congestion near the on- and off-ramps creates bottlenecks for the mainline as well as the traffic merging onto the interstate. The on- and off-ramps with congestion issues include:

- Fort Weaver/Kunia Road to and from the east
- Eastbound merge of H-1 with *makai*-bound H-2
- Middle Street merge
- Eastbound off-ramp to Punchbowl Street
- Eastbound Punahou Street off-ramp
- Westbound off-ramp to Pali Highway
- University Avenue Interchange, all ramps

Safety is always a prime concern of any state. H-1 has safety issues due to narrow lanes, narrow shoulders, non-existent shoulders, reduced vertical and horizontal curve radii, insufficient stopping sight distance, inadequate space for merging, inappropriate lane utilization, and low bridge clearance.

Asset preservation identified for H-1 includes maintaining adequate bridge and pavement conditions and implementation of proper Intelligent Transportation Systems.

Phase 2 and Phase 3

During Phase 2, data collection that included counts and time-speed studies was performed to determine how each of the 127 candidate projects would perform to improve traffic or safety, and to eliminate those with little or no benefit. The refined list of projects was further evaluated during Phase 3 to determine the transportation benefits of the projects either alone or in combination, including operational analysis and simulation. Preliminary costs were also developed for the projects. Several projects were eliminated during this phase as not being effective.

Phase 4

While several large projects on adjacent or parallel facilities to H-1 were assessed during Phase 3, Phase 4 only looked at projects directly on the H-1 mainline or one of its on- or off-ramps, to identify a program for the H-1 facility that can be carried out in stages. Projects included in Phase 4 consists of 7 corridor-wide projects, 12 multi-segment projects, and 44 individual projects. The feasibility, environmental impacts, cost and benefits, and length of time to implement were determined for each project. In addition, Phase 4 included collecting surveys from travelers and commercial drivers to receive feedback on the urgency as reflected by users, as well as a study on the socioeconomic value of the H-1 freeway to Oahu. Phase 4 resulted in ranking or prioritization of the projects based on its measure of effectiveness or the benefits that they provide.

The projects identified for further consideration during Phases 3 and 4 of the H-1 Corridor Study were reviewed and included in the freight needs list as part of the HSFP.

Honolulu Rail Transit Project

The Honolulu Authority for Rapid Transportation (HART) is building America's first fully automated, driverless urban light metro system along a 20-mile corridor that will link key employment centers, visitor destinations, and residential communities along the southern shore of the island of Oahu. The Honolulu Rail Transit Project (rail project) will connect West Oahu with downtown Honolulu and Ala Moana Center via Daniel K. Inouye International Airport, and will include 21 stations along its route. HART estimates the rail project will eliminate approximately 40,000 vehicle trips from the regional and local road system and that by 2030 there will be more than 120,000 passenger trips taken every weekday (HART, 2018).

The purpose of the rail project is to provide high-capacity rapid transit in the highly congested east-west transportation corridor between Kapolei and UH Manoa, as specified in ORTP 2030. Implementation of the rail project, in conjunction with other improvements included in the ORTP, will moderate anticipated traffic congestion in the study corridor. The rail project also supports the goals of the Honolulu General Plan and the ORTP by serving areas designated for urban growth (HART, 2013). The rail project is needed to improve corridor mobility and travel reliability, improve access to planned development to support City and County of Honolulu policy to develop a second urban center, and improve transportation equity.

Improve Corridor Mobility

Consistent with the findings of the HSFP, the environmental studies prepared for the rail project found that motorists and transit users experience substantial traffic congestion and delay in the project study corridor at most times of day, both on weekdays and on weekends. Average weekday peak-period speeds on H-1 are currently less than 20 mph in many places and will degrade even further by 2030. Like freight, transit vehicles are caught in the same congestion. Currently, motorists traveling from West Oahu to downtown experience highly congested traffic during the morning peak period. By 2030, after including all the planned roadway improvements in the ORTP, the level of congestion and travel time are projected to increase further. Average bus speeds in the study corridor have been decreasing steadily as congestion has increased. Within the Honolulu urban core, most major arterial streets will experience increasing peak-period congestion, including Ala Moana Boulevard, Dillingham Boulevard, Kalakaua Avenue, Kapiolani Boulevard, King Street, and Nimitz Highway. Expansion of the roadway system between Kapolei and UH Manoa is constrained by physical barriers and dense urban neighborhoods that abut many existing roadways. Given the current and increasing levels of congestion, the rail project is proposed as an alternative method of travel within the study corridor independent of current and projected highway congestion (HART, 2013).

Improve Corridor Reliability

As previously noted in the freight analysis, as roadways become more congested, they become more susceptible to substantial delays caused by such incidents as traffic accidents or heavy rain. Even a single driver unexpectedly braking can have a ripple effect that delays hundreds of cars, resulting in poor travel time reliability. Current travel times in the rail project study corridor are not reliable for transit, automobile, or freight trips. To arrive at their destination on time, travelers must allow extra time in their schedules to account for the uncertainty of travel time. During the morning peak period, more than one-third of bus service is more than 5 minutes late. This lack of predictability is inefficient and results in lost productivity or free time. Therefore, the proposed rail project is intended to provide more reliable transit services while also providing congestion relief to other road users on the regional road network (HART, 2013).

4. Summary of General Needs

Figure 5-6 through Figure 5-10 map the most common issues and locations identified, by island, through the technical analysis, stakeholder outreach, and previous studies.

The general themes and issues identified throughout all the islands are summarized below:

- Poor pavement conditions
- Congestion
- Geometric improvements (for example, weaving near interchanges)
- Development or proposal of policies that overlook freight needs
- Operating hours of shipping operators
- Lack of alternative routes and overall growth concerns
- Loading zones
- Shoreline erosion (climate change)
- Lack of funding for improvements
- Lack of warehouses and distribution centers

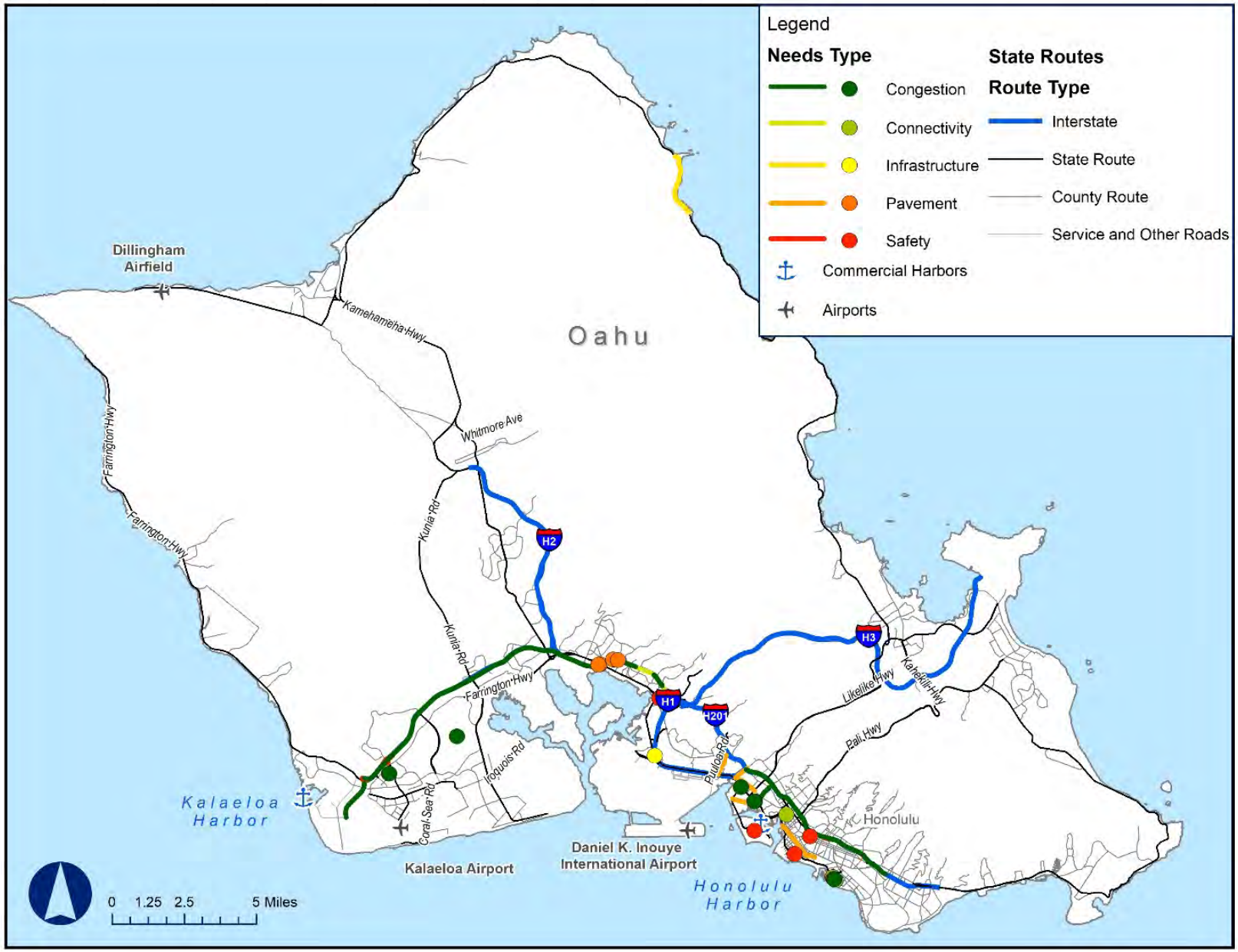


Figure 5-6. Summary of Needs – Oahu

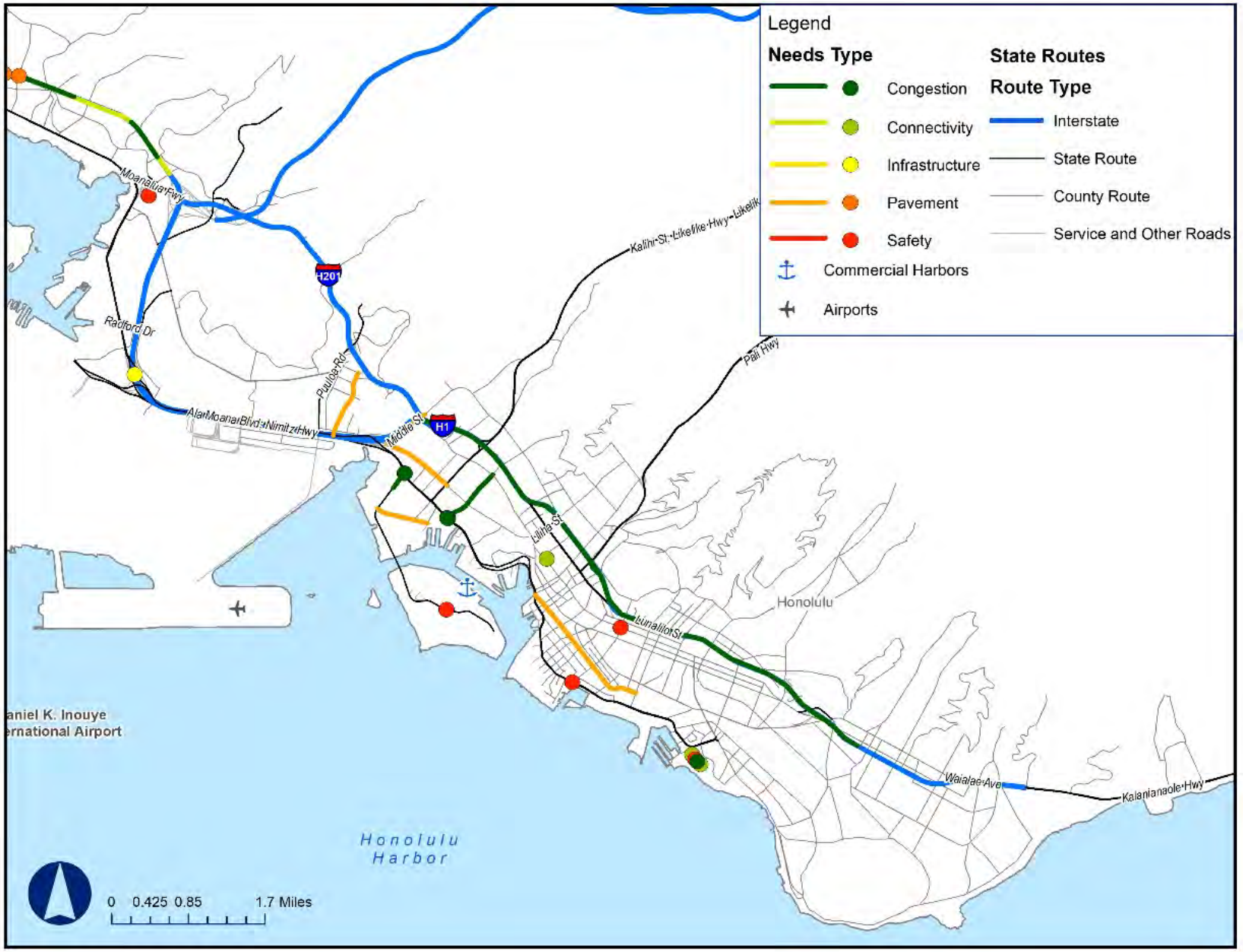


Figure 5-7. Summary of Needs – Honolulu, Oahu

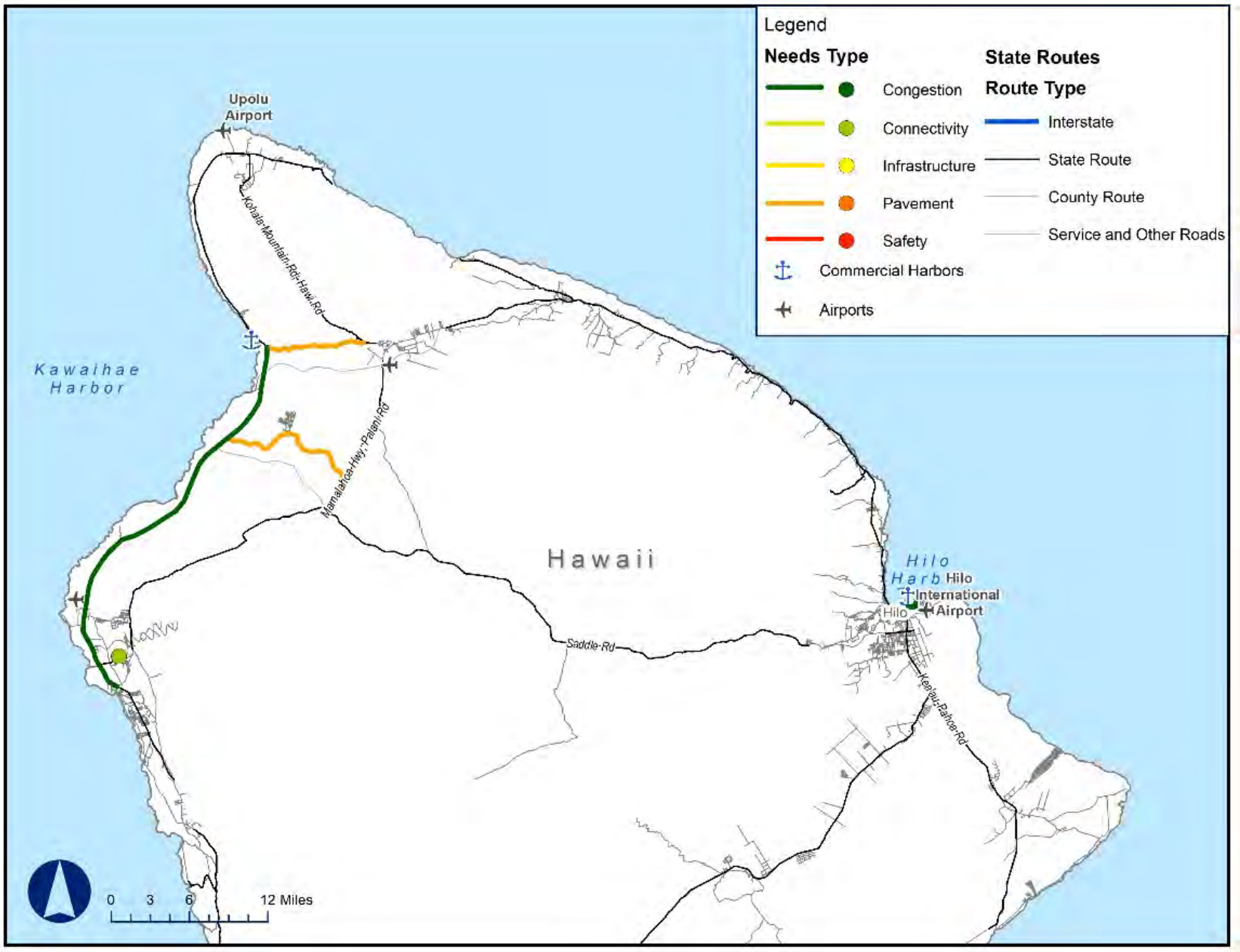


Figure 5-8. Summary of Needs – Big Island

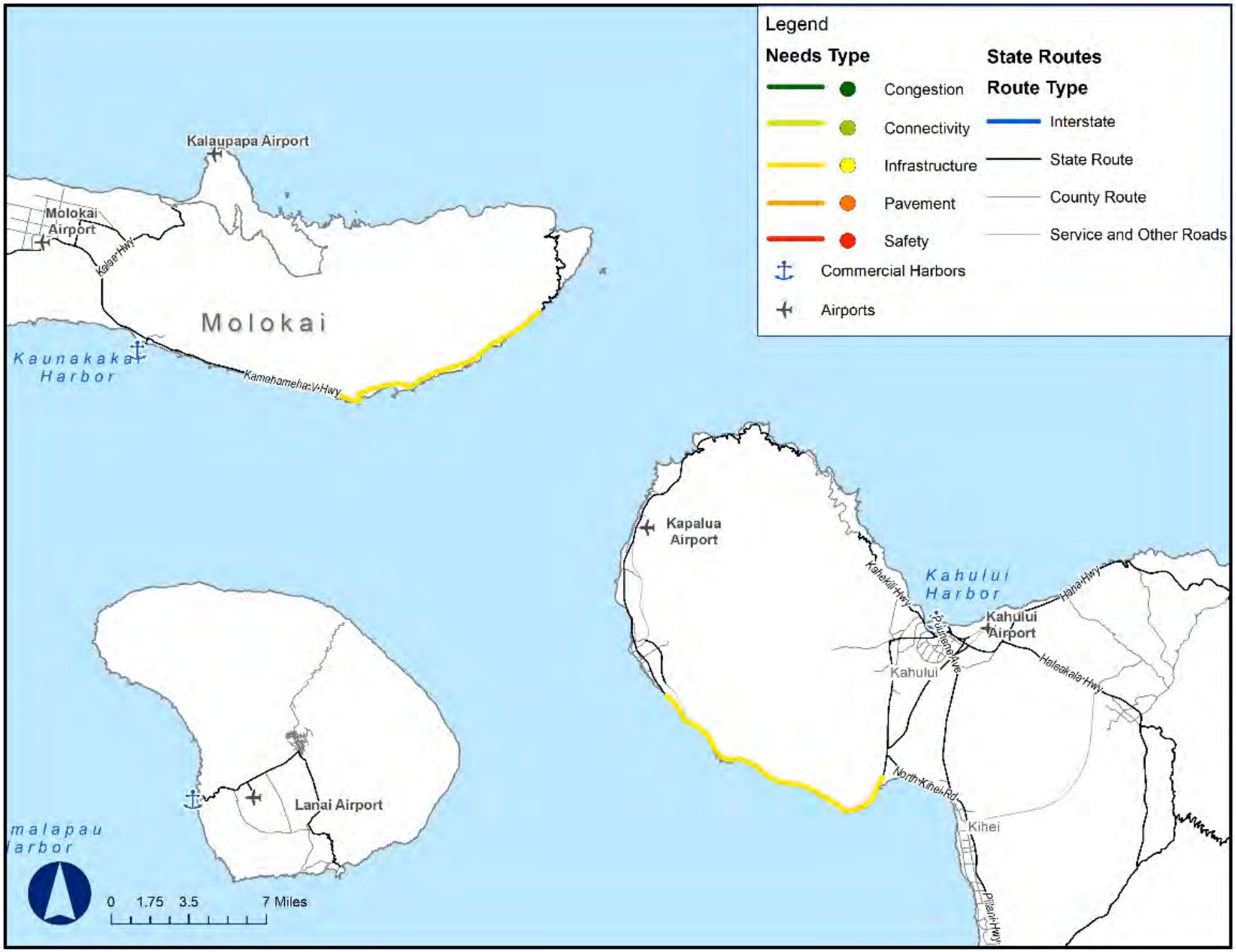


Figure 5-9. Summary of Needs – Maui

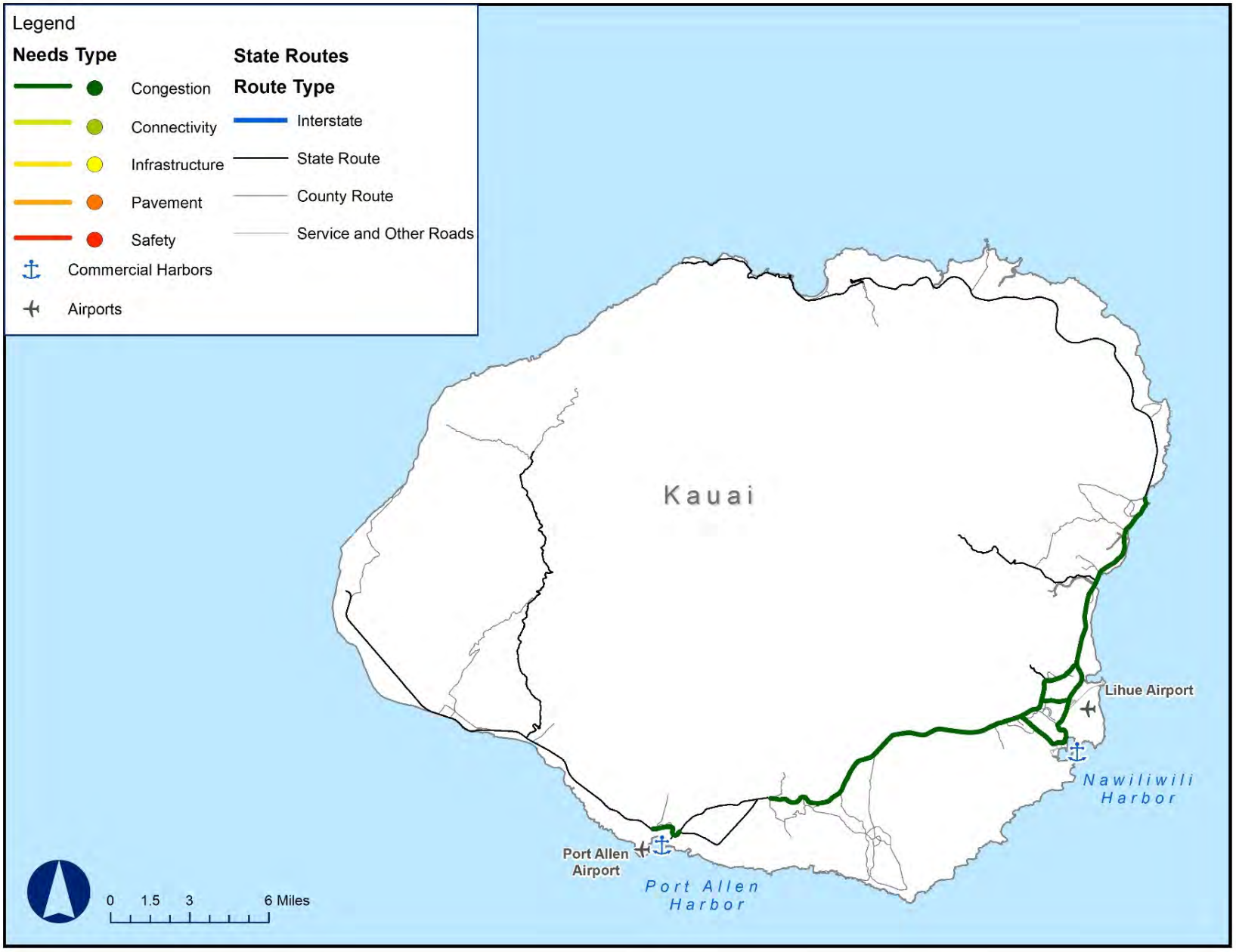


Figure 5-10. Summary of Needs – Kauai

6 State's Outreach and Decision-making Process

This chapter describes the decision-making structure and process for the development of the HSFP. The stakeholder coordination strategy was flexible and adaptable to be appropriate for the range of diverse industries and agencies throughout the state. It was also important to allow flexibility to meet individual island needs. An overarching goal was to engage industry operators in the best way possible.

A. Outreach

The development of the HSFP included extensive public involvement through project committees, stakeholder interviews, and outreach to the shipping and trucking industry. The following section summarizes the public involvement activities.

1. Stakeholder Committees

The public involvement activities for the project included both a Technical Advisory Committee (TAC) and a Freight Advisory committee (FAC). The TAC included technical staff of federal, state, and local agencies and jurisdictions with interest in the project. The TAC provided significant technical input throughout the development of the HSFP and shared the perspectives of their agency (Figure 6-1). Their responsibilities included representing the interests of their agencies or jurisdictions in group deliberations, communicating project progress to their elected or appointed officials, reviewing project deliverables, and providing recommendations to the HDOT.

Membership consisted of senior managers from various agencies. TAC member agencies are shown in Table 6-1.

Table 6-1. Technical Advisory Committee Agencies

TAC Member Agencies
HDOT Statewide Transportation Planning Office
HDOT Highway Planning Branch
HDOT Highway Motor Vehicle Safety Office
HDOT Airports, Engineering Branch, Planning Section
HDOT Airports Districts (Kauai, Oahu, Maui, and Hawaii)
HDOT Harbors Planning Division
HDOT Harbors Districts (Kauai, Oahu, Maui, and Hawaii)
Hawaii State Energy Office
Federal Highway Administration (FHWA)
Federal Motor Carrier Safety Administration (FMCSA)
Federal Aviation Administration (FAA)
Maritime Administration (MARAD)
Federal Transit Administration (FTA)
Federal Emergency Management Agency (FEMA)
Maui Metropolitan Planning Organization (MPO)

The FAC provided a balanced representation of stakeholder interests and affected industries, as well as a communication link between the project team and local interests and communities. Members included the public, affected industry groups, and representatives of local and regional business and labor sectors. Responsibilities of FAC members included representing their constituents' perspectives during group deliberations, communicating project progress with their constituents, providing feedback at key milestones throughout the project, providing recommendations to the HDOT, and acting as ambassadors for the project. The diverse categories of interests represented on the FAC are shown in Table 6-2.

Table 6-2. Freight Advisory Committee Agencies

FAC Member Agencies
HDOT Highways Division
HDOT Highway Motor Vehicle Safety Office
HDOT Airports Division
HDOT Harbors Division
HDOT Highways Districts (Kauai, Oahu, Maui, and Hawaii)
Hawaii Emergency Management Agency
State Department of Business, Economic Development, and Tourism: Office of Planning
Federal Highway Administration
City and County of Honolulu: Department of Transportation Services
County of Hawaii: Planning Department
County of Maui: Department of Public Works
County of Kauai: Planning Department
Oahu Metropolitan Planning Organization (OahuMPO)
Hawaii Transportation Agency
Trucking Operators: Island Movers
Petroleum: Hawaii Gas
Hawaii Harbor Users Group
Shipping Operator: Matson
Short-Sea Shipping: Young Brothers
Air Cargo Association of Hawaii

Multiple stakeholders from the agriculture, manufacturing, tourism, construction, restaurant, grocery store, warehouse distribution (food and building materials), big box retail, retail, private transit, recycle, parcel delivery, and air cargo industries were invited to participate in the FAC, but declined. Some stakeholders chose to participate in separate interviews or in the truckers' forum.

Figure 6-1. Combined FAC and TAC Meeting

2. Stakeholder Interviews and Forum

In addition to the TAC and FAC meetings, smaller stakeholder interviews and a truckers' forum were conducted to share information and help learn about interests, needs, and priorities from the freight industry (see Page 74 for more information about the input received during the truckers' forum). The outreach also helped to coordinate the HSFP with other ongoing efforts.

B. Decision-Making Process

The FAC and the TAC were instrumental in the decision-making process for this plan. Both committees received input from the industry stakeholders and other agencies and made key recommendations to the HDOT about the contents of the HSFP.

Figure 6-2. Decision-Making Structure

Figure 6-2 depicts the overall decision-making structure for the project. As reflected in plan development process Figure 1-7 in Chapter 1, the input from the stakeholder outreach occurred at key milestones in the development of the HSFP.

Figure 6-3 describes the meeting goals for each of the FAC/TAC meetings. The full agenda, presentations, and meeting summary of each FAC/TAC meeting are provided in Appendix C.

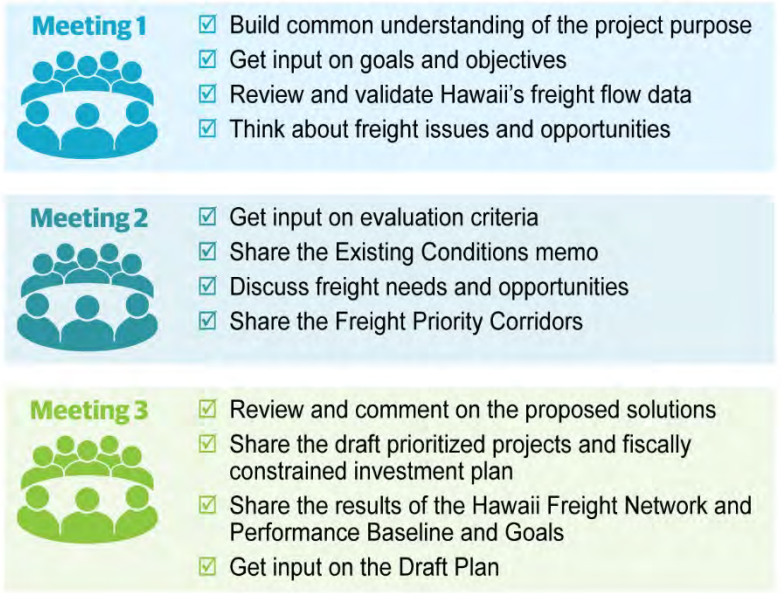


Figure 6-3. FAC/TAC Meeting Goals

C. Evaluation Criteria

Evaluation criteria were used to assess the ability of a proposed solution to best meet the goals and objectives of the HSFP. The evaluation criteria were developed by the project team in conjunction with the FAC and TAC. The criteria show the advantage and disadvantage of the proposed solutions in relation to each other.

Figure 6-4 reflects when the evaluation criteria were developed and when they were applied. It was important to establish the evaluation criteria early in the process before the potential solutions were developed to guarantee that the criteria were not biased or tailored towards a specific project. The application of evaluation criteria to the potential solutions is a tool to assist with decision-making for project prioritization and programming. The HSFP evaluation and project prioritization process are discussed in greater detail below.

Figure 6-4. Evaluation Process

D. Goal Weighting

Because the relative importance or value of each goal varies, the goals were assigned varying weights or values to accurately prioritize the set of projects. In a facilitated group workshop, each member of the FAC and TAC was asked to rank the six goals in order of importance, numbering them 1 through 6. Once all the goals were ranked, each member was asked to assign a weight of 100 points to the top-ranked goal, and then to assign points to the remaining goals in accordance with how important they are relative to the top-ranked goal. For example, if 100 points were assigned to goal 1 and 50 points were assigned to goal 2, then achieving goal 2 was considered about half as important as achieving goal 1. Each member was allowed to assign 0 to 100 points to any goal; the objective was simply to document how important each goal was relative to their top-ranked goal.

The average relative weighting for each goal, calculated by averaging the participant responses, was converted to a percent weighting factor and multiplied to the evaluation criteria total score to create a weighted score.

Table 6-3 shows the weight that was applied to each goal.

Table 6-3. HSFP Goal Weighting Factor

	Average Relative Weight	% Weighting Factor
Safety	100	23%
Infrastructure Preservation	82	19%
Infrastructure Mobility Improvements	74	17%
Reliable Freight Network	74	17%
Minimize Environmental Impacts	59	13%
Resiliency to Global Climate Change	53	12%

E. Project Prioritization Process

Freight solutions are considered first from a strategic perspective to guide long-term policy and project development in Hawaii and then second at the project-level to identify specific freight improvement projects that will be included in the prioritization process. Projects and programs can be tailored to address the freight needs to optimize its economy and growth.

Individual projects in the HSFP were prioritized based on evaluation criteria for the established goals. The process, like most, uses a benefit scale for each goal to describe how well that project will achieve the desired goal, or stated another way, the improvement that would result from the project. This is typically a qualitative score. However, two projects might have the same benefit score, but one will be dramatically more important to the overall improvement of the system because more users benefit from it.

Therefore, the project prioritization criteria for this program of improvements combines a subjective benefit factor with the volume of trucks benefiting from the project.

The Average Annual Daily Truck Traffic (AADTT) is scored on different scales for rural and urban projects, otherwise the prioritization would incorrectly favor urban projects. Rural highways have lower volumes than urban highways, nevertheless they provide critical interregional connectivity. This process normalizes the rural and urban truck volumes. Urban AADTT is assigned a numeric value of 1, 2, or 3 for volumes below 1,000 (low), 1,000 to 5,000 (medium), or over 5,000 (high). Rural AADTT is assigned a numeric value of 1, 2, or 3 for volumes below 350 (low), 350 to 1,000 (medium), or over 1,000 (high).

A numeric value is assigned to each criterion, whether subjective or quantitative, and the total score for each goal area is the product of the Benefit and Usage factors. Goals 1 and 3 are broken into two sub-goals each. A summary description of the criteria for each goal is provided in Table 6-4.

Table 6-4. HSFP Project Prioritization Process Using Evaluation Criteria

Evaluation Criteria	Benefit Factor		Average Annual Daily Truck Traffic		Total Score
	Measure	Scoring (Subjective)	Measure	Scoring (Quantitative)	
Safety *Develop a State freight network that provides for the safety of people, infrastructure, and goods movement.*					
How well does this project improve safety?	The number of crashes occurring at the project location can be used for scoring. For instance, a project in an area with a high number of crashes may provide a greater safety benefit than a project where safety is not an issue.	Low, medium, or high (with corresponding point values of 1, 5.5, or 10).	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score

Table 6-4. HSFP Project Prioritization Process Using Evaluation Criteria

Evaluation Criteria	Benefit Factor		Average Annual Daily Truck Traffic		Total Score
	Measure	Scoring (Subjective)	Measure	Scoring (Quantitative)	
Infrastructure Preservation *Maintain and improve the state of good repair of the freight transportation system*					
Pavements					
What is the type of pavement preservation project?	Type of preservation project	Major projects receive a higher point value than minor projects, as follows: • 1 Point: Chip Seal • 2 Points: Preventive Maintenance • 3 Points: Ultra Thin Overlay • 4 Points: Minor Rehab • 5 Points: Major Rehab • 6 Points: Reconstruction	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score
Bridges					
What is the type of bridge project?	Type of bridge project	Major projects receive a higher point value than minor projects, as follows: • 2 Points: Joint Replace • 3 Points: Deck Seal • 4 Points: Deck Rehab or Bridge Repair • 6 Points: Deck Replace or Bridge Rehab • 8 Points: Replace a box culvert that is less than 20 feet • 10 Points: Bridge Replace	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score
Infrastructure Mobility Improvements *Improve the multimodal freight infrastructure to provide mobility and connectivity for freight, and to support the needs of the local economy, including the tourism industry and military*					
Congestion					
How well does this project reduce congestion?	A congestion factor (Average AM Speed/Speed Limit) can be for scoring. For instance, a project in an area with a high congestion factor may benefit mobility significantly more than a project where congestion is not an issue.	Low, medium, or high (with corresponding point values of 1, 5.5, or 10).	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score

Table 6-4. HSFP Project Prioritization Process Using Evaluation Criteria

Evaluation Criteria	Benefit Factor		Average Annual Daily Truck Traffic		Total Score
	Measure	Scoring (Subjective)	Measure	Scoring (Quantitative)	
Access / Connectivity					
How well does this project provide access or connectivity to freight-dependent land uses?		Low, medium, or high (with corresponding point values of 1, 5.5, or 10).	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score
Reliable Freight Network *Create a reliable freight network that allows shippers and receivers to plan around predictable travel times*					
How well does this project improve truck travel time reliability (TTTR)?	Current TTTR near the project site can be used for scoring. For instance, a project in an area with a high TTTR value (low reliability) may benefit reliability significantly more than a project where reliability is not an issue.	Low, medium, or high (with corresponding point values of 1, 5.5, or 10).	Urban and rural truck volumes scored on different scales	Low, medium, or high (with corresponding point values of 1, 2, or 3).	Benefit Score * AADTT Score
Minimize Environmental Impacts *Minimize the environmental impacts of freight movement on the State freight network to surrounding communities and the natural environment.*					
There are no specific evaluation criteria for this goal since all projects will strive to minimize environmental impacts.					
Resiliency to Global Climate Change *Create and maintain resilient freight infrastructure able to withstand the effects of global climate change.*					
How well does this project improve resiliency to global climate change?		Low, medium, or high (with corresponding point values of 1, 5.5, or 10).	An AADTT factor is not used because projects could have system-wide impacts.		Total Score = Benefit Score

7 Freight Improvement Strategies and Recommendations

Building on the information presented throughout this plan, the next step in the planning process is to develop strategies and recommendations for achieving the State's freight goals described in Chapter 1 and the objectives and performance goals described in Chapter 4.

For the most part, Hawaii's transportation infrastructure was constructed many years ago and the cost to maintain the system continues to increase and the demands on the system continue to grow. Hawaii must find a way to make strategic investments in its freight network that are necessary to support economic growth and survival while ensuring that environmental concerns are also given appropriate consideration.

A. Freight Improvement Strategies

Three broad-based improvement strategies for addressing freight transportation challenges in Hawaii are proposed (Figure 7-1). Within each strategy are specific recommendations that support one or more of the freight goals established in this HSFP, as shown on Figure 1-4. The following freight improvement strategies are proposed:

- **Policies –** Broad policy recommendations to help transform the way freight planning is considered and approached in Hawaii. The policies are consistent with the HDOT's mission and will guide programs and projects and help direct implementation of the plan's recommendations. The policy recommendations are to:
  - Provide an overall framework for freight transportation investment decision-making
  - Provide a basis for aligning freight investment with the Plan's goals
  - Ensure efficient and safe movement of people and goods
- **Programs –** Use and enhance existing programs or establish new initiatives that can be undertaken to achieve and support the policies
- **Projects –** Complete specific infrastructure projects that support the policies and improve freight movement along the Hawaii Freight Network.

Figure 7-1. Freight Improvement Strategies

B. Policy and Program Recommendations

The HSFP policy and program recommendations address freight transportation needs and issues in Hawaii. The primary purpose of the policy recommendations is to provide an overall framework for addressing these issues and to guide freight transportation investment decision-making. The adoption and implementation of these policies will endorse the HDOT's mission to *provide a safe, efficient, accessible, and sustainable inter-modal transportation system that ensures the mobility of people and goods and enhances and/or preserves economic prosperity and the quality of life.* The recommendations are presented below. The project recommendations are the result of development and prioritization of potential solutions.

1. Hawaii Freight Network Designation and Investment

Policy: Prioritize investments located on Hawaii's Freight Network.

An important component of the plan and precursor to aligning prioritized projects with available funding sources is defining the NHFN within Hawaii. The network includes the following subsystems of roadways, as defined by FHWA:

- **Primary Highway Freight System:** This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data.
- **Other Interstate portions not on the PHFS:** These highways consist of the remaining portion of Interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities. (Note: This category is not applicable in Hawaii because all Interstate roads in Hawaii are already included on the PHFS.)
- **Critical Rural Freight Corridors:** Critical Rural Freight Corridors (CRFCs) are public roads not in an urbanized area that provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities.
- **Critical Urban Freight Corridors:** Critical Urban Freight Corridors (CUFCs) are public roads in urbanized areas that provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities.

The HDOT is responsible for defining a maximum of 150 miles of CRFCs and 75 miles of CUFCs in collaboration with the OahuMPO and Maui MPO. Having a defined network is required to apply for certain federal funding opportunities. For instance, only projects on the NHFN are eligible for funding from the NHFP and the new

freight-related discretionary grant program, Infrastructure for Rebuilding America (INFRA).

However, because the mileage cap for the nationally defined system is so low, an additional category for corridors important to Hawaii is proposed to help prioritize state funding for projects not on the NHFN. These additional roads are freight corridors that serve regional and local freight mobility. While these corridors do not qualify for funding from the NHFP, they are eligible for other applicable federal funding sources. The five components of the Hawaii Freight Network are summarized in Table 7-1.

Table 7-1. Summary of the Freight Network in Hawaii (centerline miles)

	Hawaii	Kauai	Maui	Oahu	TOTAL
PHFS	111	17	58	90	**277**
CRFC	122	4	4	19	**150**
CUFC	0	0	4	71	**75**
NHFN (total)	**234**	**21**	**67**	**180**	**501**
HI Freight Network	63	90	72	187	**409**

The following criteria and rationale were used to identify the CRFCs and CUFCs:

- Criteria: NHS Intermodal Freight Connectors (not on the PHFS)

  Rationale: NHS freight connectors are the public roads leading to major intermodal terminals. Access to intermodal transfer locations is key in the efficient movement of raw materials and finished goods.

- Criteria: Access to intermodal facilities (not part of NHS Intermodal Freight Connectors)

  Rationale: Same as above.

- Criteria: Annual Average Daily Truck Traffic (AADTT)

  Rationale: Those corridors (or corridor segments) with higher relative AADTT are serving key connectivity and distribution functions within the existing freight transportation network. Maintaining or improving operational efficiency and functionality of these corridors will be vital to the effectiveness of the overall network.

- Criteria: Access to freight-dependent employment centers

  Rationale: Providing adequate access to existing and planned commercial and industrial developments that serve or have the potential to attract freight-dependent or freight-intensive businesses will be essential to Hawaii's economic development efforts and continued economic growth.

- Criteria: Location of a high priority project

  Rationale: Only projects on the NHFN are eligible for funding from the NHFP and the INFRA grant program. If a high-priority project is identified, the HDOT will want to ensure it's eligible for funding.

The additional corridors, identified to be on the Hawaii Freight Network, were selected by evaluating roads with higher truck volumes that are not already designated on the NHFN—specifically, roads in urban areas with greater than 500 AADTT and roads in rural areas with greater than 100 AADTT. Additional road segments were included if they helped to create a continuous freight network. The complete listing of the Hawaii Freight Network and maps are in Appendix C.

2. Safety of the Hawaii Freight Network

Policy: Prioritize freight investments that improve safety for all users.

The safety goal was weighted the highest by the FAC and the TAC. The HDOT will identify and implement strategies that will improve safety and reduce crash rates, fatalities and injuries associated with freight movement. The HDOT currently prioritizes highway safety and already has a program in place to address it. Freight safety will be incorporated into the existing program.

Program: Highway Safety Improvement Program (HSIP)

The following will help prioritize freight investments that improve safety:

- Within the HDOT's current HSIP, prioritize the Hawaii Freight Network.
- Create an emphasis area for trucks in the Hawaii Strategic Highway Safety Plan (HSHSP).
- Coordinate with the Federal Motor Carrier Safety Administration (FMCSA) and the implementation of the Commercial Vehicle Safety Plan (CVSP).
- Review the locations of high truck crashes and truck rollovers to minimize these incidents.

3. Freight Transportation Asset Management

Policy: Invest in preservation and renewal of Hawaii's highway system at the levels required to sustain good condition and performance.

Pavement condition is closely tied to trucking activity. Trucks cause a disproportionate amount of road wear and tear. Conversely, poor pavement condition can cause significant damage to trucks and the goods being transported by truck.

Areas with poor pavement condition and higher than average daily truck volume are of particular concern. With the limited amount of route redundancy on the islands, it is also important to ensure that the bridges are kept in good condition and do not become weight-restricted with time. The weight restrictions on bridges on Hawaii Freight Network significantly impacts the freight industry.

The HDOT will continue to invest in asset management strategies that facilitate the Hawaii Freight Network's state-of-good repair, maintenance, management, and operational improvements within their existing Pavement and Bridge Programs.

Program: System Preservation (Pavement and Bridge Programs)

The following will help preserve the highway system at the required levels:

- Within the HDOT's current System Preservation Program, prioritize the Hawaii Freight Network.
- Ensure pavement rehabilitation and maintenance of routes that have the highest truck and bus volumes. Review and update pavement design standards to address the heavier weights of trucks.
- Prioritize the replacement of weight-restricted and/or structurally deficient bridges on the Hawaii Freight Network.
- Increase the vertical clearance of bridges over the Hawaii Freight Network to the FHWA standard of 16 feet, 6 inches and consider increasing the standard to 18 feet, 6 inches to accommodate the newer, larger-sized containers.

4. Freight Network Design Guidelines and Implementation

Policy: Evaluate design standards for freight vehicles to facilitate the safe and efficient movement of goods and people.

Many of the freight industry stakeholders raised concerns with policies that impact FHWA standards on the interstate (such as reducing lane widths). Some portions of the H-1 Interstate have been restriped to 10-foot-wide lanes. The 40-foot-long containers can easily drift up to 1 foot on a windy day. The freight industry is moving towards 43-foot-long containers. With the increased container lengths and reduced lane widths, truck operators are concerned with the safe movement of trucks and other motor vehicles. The City and County of Honolulu has also raised similar concerns regarding transit buses and the need to provide a minimum of 11-foot-wide lanes to accommodate bus widths and side mirrors. The HDOT will review and modify design standards on the Hawaii Freight Network to facilitate safe and efficient movement of goods and people, as follows:

- Evaluate the HDOT's geometric standards with respect to commercial vehicle movement on the Hawaii Freight Network (for example, turning radii, lane widths, ramp configurations, and similar) (Figure 7-2).
- Review and update pavement design standards to address the heavier weights of trucks on the Hawaii Freight Network and to accommodate the projected growth in freight.
- Consider increasing the current vertical clearance standard from 16 feet, 6 inches to 18 feet, 6 inches on the Hawaii Freight Network to accommodate oversize or overweight vehicles and military transportation needs.
- Establish a Hawaii Freight Network **Interchange Upgrade Program** for the interstates to address functionally obsolete designs, tight curves, merging lanes, and on- and off-ramps to improve safety and mobility for both passengers and freight.

Figure 7-2. Truck Navigating a Small Radius Curb Return in Downtown Honolulu

5. Freight Transportation, Land Use, and Economic Development Integration Initiative

Policy: Fully integrate freight transportation with land use and economic development planning.

Freight transportation is an enabler of economic development, but not necessarily a driver. Integrating planning for freight transportation, land use, and economic development can position local jurisdictions and the State to determine how and where to serve freight markets. In addition, maintaining a transparent and consistent development review process, including freight-generating land use design standards and requirements, attracts and facilitates more efficient private sector development interest, and a more efficient freight network.

This policy initiative is intended to establish a mechanism to partner with local land use and economic development agencies and private agencies, including manufacturers, shippers, developers, and

trucking companies, to make the best use both of economic development opportunities in the most appropriate locations, and of existing infrastructure. It also seeks to build long-range planning commitments for both freight transportation investments and economic development.

6. Freight Movement Public Education and Awareness

Policy: Promote public education of the importance of freight movement, and trucker education of the importance of adhering to regulatory requirements.

Broad-based public support is needed to implement the strategies outlined in this HSFP. However, all too often, the public considers trucks to be a nuisance and a hindrance to personal mobility and safety.

The following will be used to educate the public and increase awareness:

- Develop a program to educate the public, elected officials, policy makers, and other stakeholders on the economic benefits of freight.
- Establish a program (similar to WalkWise Hawaii) that creates a partnership between the HDOT, City, counties, the freight industry, and federal and state agencies to develop a **freight movement education and public awareness campaign**.
- Develop and implement truck safety awareness to educate drivers on how to drive safely with commercial vehicles and a share the road program.
- Develop and implement strategies to increase public awareness about economic benefits of trucking, ports and airports, warehousing and distribution centers, and other freight-related activities to the state's economy and quality of life.
- Create an emphasis area for trucks in the Hawaii Strategic Highway Safety Plan.
- Encourage more enforcement of overweight vehicles, including enforcing that trucks travel on network routes and enforcing speed limits in areas with reduced lane widths.
- Educate truck drivers on the importance of adhering to routes that were designed (pavement design) for high volumes of trucks.

7. Freight Capacity Growth

As discussed in Chapter 5, the population in Hawaii continues to grow and the need for more goods will therefore also continue to grow. The state will face additional network capacity constraints if the growth in goods movement flows continues to outpace the growth in the transportation network capacity. The continued development of transportation alternatives (for example, transit rail, bus, bike, and pedestrian facilities) for the traveling public will help to reduce congestion by reducing the number of passenger vehicles. However, there is no transportation alternative for the movement of goods in the foreseeable future (Figure 7-3). The HDOT has a Capacity Program to consider the solutions for capacity that will be needed for freight. The capacity needs on the Hawaii Freight Network will be prioritized to help facilitate the efficient movement of goods, as follows:

Program: Capacity Program

- Within the HDOT's current Capacity Program, prioritize the Hawaii Freight Network.
- Focus capacity projects on the routes that have the highest truck volumes.
- Ensure that the increased volume of goods is addressed in the HDOT's long-range planning documents.

- Continue to explore transportation alternatives and transportation demand management strategies for the traveling public.

Figure 7-3. Capacity Needs Continue to Worsen for Trucks as the Volume of Goods Continues to Increase

8. Freight Technology-Based Solutions

Policy: Actively identify, develop, and deploy technologies that improve the safety and efficiency of freight movement.

The freight transportation system is currently undergoing tremendous change, with growing populations, increased demands for goods, and increased congestion at the ports and on the highways.

In addition, several types of vehicle and logistic facility technologies are under testing or in the early stages of adoption. The technologies pertain to alternative fuel uses and emissions reductions, efficiency and safety, and manifold increases in utilization of capacity. Freight planning requires a fundamental understanding of how and when these technology shifts would affect future system usage and needs, and of the tools that may be required to analyze them. The HDOT will continue to gather knowledge on the state of research on vehicle and logistic technologies and their trends.

The HDOT will also develop and implement strategies that enhance freight transportation system management and operations through the deployment of new technologies (such as Intelligent Transportation Systems) through their current Intelligent Transportation Systems program, as follows:

Program: Congestion Management Program

- Develop strategies to improve and facilitate the dissemination of real-time traffic information technologies, including traffic incidents, construction, weather, and special events.
- Adopt, expand, and deploy Intelligent Transportation Systems technologies to improve mobility and safety for both freight and passengers.
- Stay tuned to the development of technology shifts and use autonomous vehicles and trucks.

9. Rural Connectivity

Policy: Develop an equitable project prioritization process that recognizes the importance of rural connectivity.

The most pressing and obvious freight system needs are in the urban centers. Though traveled by fewer trucks, the rural network is almost as important as it may connect the urban centers to each other, to ports, and to natural resources. The rural network also provides access to remote communities and tourist destinations that make Hawaii so attractive to tourists from around the world, supporting the overall economy. The following will help prioritize projects while maintaining rural connectivity:

- Continue to identify freight transportation issues critical to Hawaii's rural areas and invest in infrastructure improvements

to enable the transport of food (agriculture), supplies, and other critical materials.

- Identify key routes on the Hawaii Freight Network that serve as critical connections to rural areas to provide agricultural and freight access to enhance economic vitality.

Figure 7-4. Container Truck Heading East on the Daniel K. Inouye Highway on the Big Island

10. Intermodal Connections

Policy: Create efficient intermodal connections through strategic investments and partnerships between responsible agencies and private operators.

Intermodal connectors, also known as first-mile (or last-mile) connectors, join the main highways with the ports. It is critical that these routes perform well, as they are a necessary portion of the supply chain and their poor performance can lead to congestion and delays that affect the rest of the supply chain (Figure 7-4).

Figure 7-5. New Intermodal Connector Queue Lanes Leading to Young Brothers Gate, Adjacent to Auiki Street

Hawaii has designated several roadways as connectors as part of the nationwide FHWA designated NHS connector system. The NHS intermodal connector system is an acknowledgement that many of these first-mile connectors are local roads but have national significance. It also allows for NHS funds to be allocated to these local roadways even though they do not qualify to be a part of the NHS under other criteria.

The majority of these intermodal connections experience significant congestion during the peak periods (Figure 7-5). Strategies for relieving congestion could include infrastructure improvements (such as roadway widenings), ITS enhancements, and extending the days, times, or both when port gates are open to disperse traffic across a greater time frame, as well as limiting freight delivery hours during the morning and evening peak traffic hours on congested roadways (for example, Lunalilo Freeway, , downtown Honolulu roads, , Ala Moana Boulevard).

11. Last-Mile Freight Connections

Policy: Explore opportunities to improve the last-mile connection and efficiencies when delivering or distributing goods to their destination.

Other last-mile freight connectors include the point where loads and picked up or delivered. In Hawaii, the most important last-mile connectors are those needed for retail and hospitality deliveries in congested tourist corridors. Most establishments do not have dedicated loading zones on property, requiring trucks to park curbside to load and unload. Therefore, deliveries made during peak periods can exacerbate already congested roads and make it difficult for trucks to find convenient places to temporarily park.

As an example, deliveries along Kalakaua Avenue, through the popular Waikiki resort corridor, are limited to the period from 10 pm to 9 am, when traffic is light (see Figure 7-6). HDOT will work to improve other last-mile connections as follows:

- Work with City and County agencies and private sector stakeholders on improving loading zones in congested areas, including ensuring that sufficient off-street loading areas (number and size) are provided. Improvements to loading zones will also consider potential impacts to public transit.
- Collaborate with the private industry on how to improve the last mile connection to help alleviate congestion (for example, extend retail receiving hours and increase port gate operating hours).

Figure 7-6. Kalakaua Avenue Restricted Hours for Deliveries

12. Climate Change and Resiliency

Global climate change is impacting Hawaii and elicits a two-fold response relevant to freight: create a more resilient freight network and reduce Hawaii's carbon footprint.

Create a resilient freight network

Rising sea levels will damage coastal highways and disrupt some critical freight distribution corridors. Hawaii should develop a policy discouraging the development of new highway infrastructure within the Sea Level Rise Exposure Area (SLR-XA) identified in the Hawaii Climate Change Mitigation and Adaptation Commission's December 2017 *Hawaii Sea Level Rise Vulnerability and Adaptation Report*. This report also includes map data on the Hawaii Sea Level Rise Viewer that shows imminent exposure areas and assesses economic vulnerabilities due to rising sea levels. On July 16, 2018, the Mayor of the City and County of Honolulu issued Directive No. 18-01 on the City and County of Honolulu Actions to address Climate Change and

Sea Level Rise. Any policies developed should be consistent with both the State's Hawaii Climate Change Mitigation and Adaption Commission and the City's Climate Change Commission. In addition, improving existing or developing new highways that can serve as alternates to highways at the greatest risk and that carry a large number trucks should be a high priority.

Reduce Hawaii's carbon footprint

Policy: Support the deployment of technologies and infrastructure that improve the fuel-efficiency of commercial vehicles and provide better mode-choice and integration to encourage the most sustainable freight transportation options.

On June 8, 2015, Hawaii Governor David Ige signed a bill that sets the state's renewable energy goal at 100 percent by 2045. In 2017, mayors from all the islands recognized this commitment through a proclamation to transform Hawaii's public and private ground transportation to 100 percent renewable fuel sources by 2045. In their specific proclamations, the City and County of Honolulu, the County of Maui, and the County of Kauai pledged to lead the way by transitioning all of their fleet vehicles to 100 percent renewable power by 2035; the County of Hawaii plans to establish a goal toward the same end. In support of this initiative, the HDOT will also develop and implement strategies to reduce Hawaii's carbon footprint.

The transportation industry continues to advance technologies to improve efficiency, thereby reducing congestion and vehicular emissions, as well as generally decreasing costs of operations. This ranges from more efficient fuels and advances in fuel-efficiency of trucks to exploring new concepts for autonomous and connected trucks. Other technology options explored to date include, but are not limited to, the following:

- Alternative fuels
- Truck and trailer aerodynamics that reduce drag
- Battery-based smart idle systems
- Super-single tires that replace duels and reduce drag
- Automatic tire pressure systems that increase fuel efficiency and eliminate blowouts
- Diesel particulate filters and selective catalytic reduction engines that capture soot
- Naturally aspirated engines

In addition to implementing new freight vehicle technology, other opportunities exist to further optimize freight transport and delivery to positively impact environmental conditions. These include providing supporting infrastructure such as charging and fueling stations and communication systems. Alternative fuel vehicles require charging (for electric-powered vehicles) and fueling (for compressed natural gas-powered vehicles) stations to be located conveniently and within the range of the alternate fuel vehicles. Sources of local sustainable fuels like bio diesel could also be provided. Connected vehicles require communication systems such as automatic vehicle locating systems that range from vehicle to infrastructure, to vehicle to vehicle, to vehicle to everything.

While trucking is and will always remain a critical mode of transport, railroads also provide an opportunity to optimize point-to-point deliveries, such as from a port to a dedicated area for warehouse distribution facilities. This can reduce the impact of heavy trucks on roadway infrastructure, decrease congestion on urban freeway networks, and reduce vehicular emissions.

C. Prioritized Project Recommendations

Policy: Deliver priority freight projects in support of the goals of the HSFP.

A key element of the HSFP was the development of potential projects based on the needs identified in Chapter 5. A comprehensive list of potential projects was developed from

previous studies, long-range needs, stakeholder outreach, and technical analysis of data. The projects were then evaluated against the criteria described in Chapter 6 and prioritized by the total score, as a decision-making tool. The evaluation criteria helped to show the benefits of the different individual project recommendations. These prioritized improvement projects will feed directly into the HDOT's Mid-Range Transportation Plan. The top 15 results of the prioritization of the projects with the evaluation criteria are shared in Table 7-2. The complete listing of projects for each island is included in Appendix E.

Table 7-2. Top 15 Results of Prioritization

Project ID	Route #	Project Title	Program
O61	H-1 EB	H-1, Reconstruction and Repair, Eastbound, Waimalu Interchange to Halawa	Safety and Capacity
H19	200	Saddle Road - existing terminus to West Puainako Street/Iwalani Street Intersection	Safety and Capacity
O45	H-1	Waiawa Interchange Ramp Braid	Safety
O71	H-1 EB	H-1 Eastbound Widening: Ola Lane to Vineyard Boulevard	Safety and Capacity
O12	92	Nimitz/Sand Island Access Road Grade Separation/Interchange	Safety and Capacity
O48	H-1	H-1 and H-2, Operational Improvements, Waiawa Interchange	Safety
O60	H-1 EB	H-1, Waiawa Interchange to Halawa Interchange, Widening, Eastbound	Safety and Capacity
O50	H-1 WB	H-1 Westbound; Waiawa Interchange	Safety
O77	H-1 EB	H-1 Eastbound Braid Ramps between Pali Highway and Kinau Street	Safety
H24	1100	Kuakini Highway - Henry Street to Kamehameha III Road	Capacity
H26	1370	Kalanianaole Avenue - Kanoelehua Avenue to Hilo Harbor	Capacity
K19	56	Kuhio Highway - Kapule Highway to Mailihuna Road	Capacity
M2	30	Honoapiilani Highway - Wailuku to Maalaea	Capacity
M7	32	Kaahumanu Avenue Widening	Capacity
O40	H-1	Ft. Weaver Ramp Modification	Safety and Capacity

8 Implementation Plan

Without effective implementation, plans, visions, and recommendations for alleviating congestion and mobility concerns for freight are just words on a page. One of the key driving factors for the HSFP is providing a path forward for solutions that are both effective and implementable. Implementation not only requires funding commitments, it requires smart investments and the ability to monitor progress over time (performance-based planning and management).

A. Project Prioritization

As described in Chapter 6, a comprehensive list of potential projects was evaluated through a detailed screening process. The purpose of the evaluation was to narrow down a reasonable and feasible range of projects that best meet the purpose, goals, and objectives of the HSFP. It is important to understand that the recommendations presented as part of this HSFP are specifically geared to the HSFP. Many potential projects developed are also important to achieving other goals for the HDOT and the community. And as the projects are further developed, the MPOs, City, and counties are engaged to ensure that the project is consistent with the regional and island community goals and objectives.

B. Project Funding

Transportation funding in the State of Hawaii comes from a combination of federal, state, and local funds, and Hawaii, like many other states, does not have unlimited transportation funding to meet all the transportation needs. As many agencies have experienced, the growing gap between funding needs and availability has severely constrained the HDOT's ability to expand and improve Hawaii's transportation system. Economic realities necessitate strategic investment decisions to improve freight transportation and mobility. When adjusted for inflation, federal and state revenues available for all transportation projects – including operations and maintenance - between FY2011 and FY2035 would total approximately $7.01 billion.

This section discusses potential federal and state funding sources for implementation of the HSFP recommendations. This section is consistent with information included in the Statewide Federal-Aid Highways 2035 Transportation Plan.

1. Federal Funding

The HDOT receives federal funding from the FHWA. Federal land transportation revenues are generated primarily from gasoline and diesel fuel tax: 18.4 cents and 24.4 cents per gallon, respectively. Further to the gasoline and diesel fuel tax, additional means of revenue include special fuel (for example, liquefied petroleum, M85, and compressed natural gas) taxes, truck tire sales tax, truck and trailer sales tax, and heavy vehicle use tax. The above taxes are collected and deposited into the Federal Highway Trust Fund.

Under Moving Ahead for Progress in the 21st Century Act (MAP-21) and the FAST Act, FHWA distributes (apportions) funds to the states based on a formula (Formula Funds) that considers highway statistics under the following seven core programs:

- National Highway Performance Program
- National Highway Freight Program
- Surface Transportation Block Grant Program
- Congestion Mitigation and Air Quality Improvement Program
- Highway Safety Improvement Program
- Railway-Highway Grade Crossings Program
- Metropolitan Planning Program

States have the discretion to implement projects that are eligible under the above program areas.

While federal funds are apportioned to the states by formula or other means, only a percentage of these funds can be committed (obligated) to federal undertakings by a state. This form of control set by Congress is referred to as Obligation Limitation (OL). The OL is determined every fiscal year and can vary year-to-year depending on current federal fiscal policies and economic conditions; historically, the annual OL has been in the low 90 percent range. For example, in 2017, the HDOT received approximately $159 million in formula OL and $174 million in formula funds, reflecting a 91.4 percent ratio.

Because OL is the limiting factor in committing funds to federal undertakings by the HDOT, for the purposes of this plan, all federal formula revenue amounts to the HDOT will reflect OL amounts.

In addition to the seven core programs, states may receive FHWA funds beyond Formula Funds in certain situations. These situations may include the following:

- Emergency relief
- Special or exempt funds
- Special authorizations (for example, the 2009 American Reinvestment and Recovery Act)

In the fourth quarter of every federal fiscal year, states may submit a request for redistribution, a process whereby additional formula OL are provided to states that can demonstrate they have project funding needs that exceed available OL for a given year. Depending on the available redistribution amount available nationwide, redistribution amounts awarded to a state may or may not match the requested amount. Because the redistribution availability and awarded amounts cannot be predicted and are on a case-by-case basis, this HSFP does not include any assumed redistribution amounts. If the HDOT has projects ready to receive funding in a given year that exceeds available OL amounts, the HDOT will weigh all factors and make a decision to request for redistribution.

Figure 8-1 presents the federal revenues (OL funds) received between 2015 and 2017. Funding ranged from $151 million to $160 million in the past 3 years.

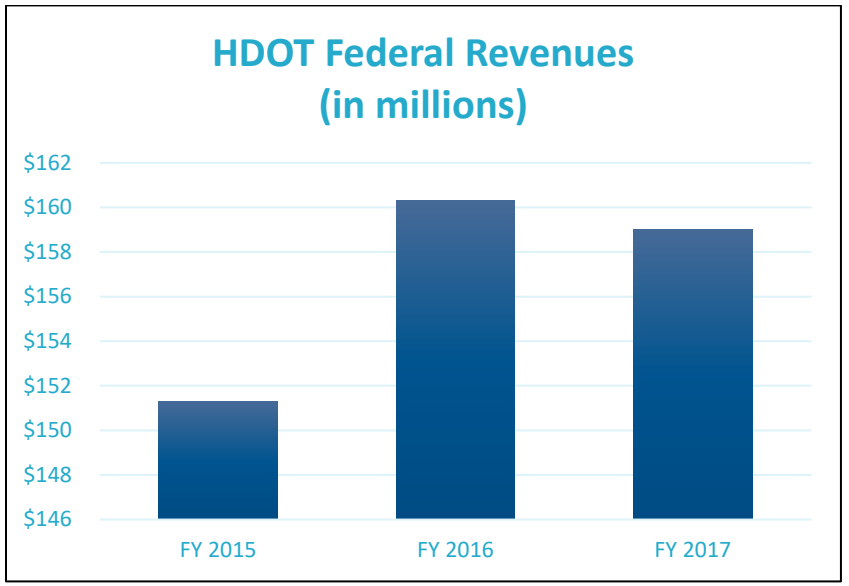


Figure 8-1. HDOT Federal Revenues (2015-2017)

Source: HDOT, Highways Division, 2018.

The adoption of MAP-21 in July 2012 and the FAST Act in December 2015, changed federal funding methods for future fiscal years. MAP-21 changed the way program funding is distributed to individual states. Previously, core federal highway programs distributed funds to states using individual formulas. With new legislation, a proportional lump sum is distributed to states (based on 2012 distributions received under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-LU]), and states are able to distribute funds internally to their core programs, with flexibility to transfer funds from one program to another.

While investing in the transportation system could involve new facilities, MAP-21 guidance is largely focused on improving or

enhancing current assets and preserving and maintaining the condition of existing infrastructure.

The Highway Trust Fund, dependent upon the gas tax, has been decreasing for all states over the past few years as the vehicle fleet becomes more fuel efficient and per capita vehicle miles traveled (VMT) continues to decrease nationwide. The Congressional Budget Office estimates that the Highway Trust Fund will not be able to sustain current levels of expenditure without additional funds.

2. State Funding

The HDOT collects revenues from multiple sources in the form of taxes, fees, and surcharges that are deposited into the State Highways Special Fund. These sources include the following:

- State fuel taxes
- Vehicle registration fees
- Rental / tour vehicle surcharge
- Vehicle weight taxes
- Interest earned from investments
- Miscellaneous income (for example, weight tax penalties, motor vehicle inspection charges, rents from highway properties, and commercial license fees)

The state revenue provided from these sources between 2015 and 2017 is summarized in Table 8-1. Typically, the most significant portion of the HDOT's funding comes from the state fuel tax and the vehicle weight tax. Collected state revenues are expended to pay for the HDOT's operational, routine maintenance, special maintenance, revenue bond debt service, and other expenses.

As shown in Table 8-1, revenues increased between 2015 and 2016 but decreased between 2016 and 2017.

To finance capital improvement projects (CIP), the HDOT sells $80 million in highway revenue bonds approximately every 2 years. Proceeds from the bond sales are used for the 10 or 20 percent matching funds for federal-aid CIP projects, or used to finance 100 percent of the costs for non-federal-aid CIP projects. Authority to expend revenue bond funds are provided in the form of project appropriations by the State Legislature. In certain situations, the HDOT can supplement CIP projects with additional cash from the State Highway Special Fund in the event the CIP revenue bond appropriations provided by the State Legislature are insufficient.

Table 8-1. State Revenue Resources (in millions)

Revenue Source	FY 2015	FY 2016	FY 2017
State Fuel Taxes	$86.6	$87.7	$83.0
Vehicle Registration Fees	$44.5	$44.1	$45.7
Rental Vehicle/Tour Vehicle	$51.9	$54.9	$53.2
Vehicle Weight Taxes	$76.0	$79.4	$81.5
Other Fees and Vehicle Penalties	$9.7	$11.4	$11.8
Total	**$268.7**	**$277.5**	**$275.2**

FY = fiscal year

Figure 8-2 shows the approximate percentage of state funding by source, based on 2017 revenues.

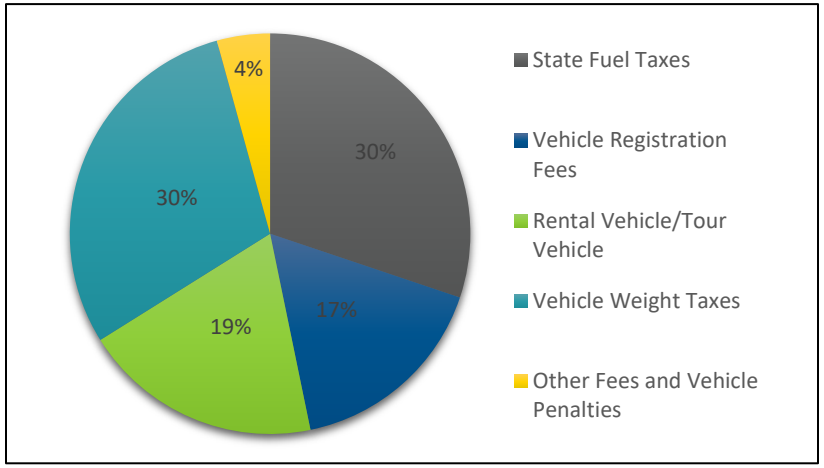


Figure 8-2. State Revenues Sources (2017)

3. Combined Annual Revenue and Funding Needs

Table 8-2 presents the combined state and federal funding received between 2015 and 2017 (based on the data above).

Table 8-2. HDOT Highways Division Annual Revenue (in millions)

Resource	FY 2015	FY 2016	FY 2017
State Revenues	$268.70	$277.50	$275.20
Federal Revenues[1]	$151.30	$160.30	$159.02
Total Revenues	**$420.00**	**$437.80**	**$434.22**

Source: HDOT-Highways, 2018.

[1]Federal fiscal year is October 1 to September 30.

Anticipated Decline in Fuel Tax Revenues

The previously mentioned major contributor to both state and federal revenue is fuel tax. In 2017, about 30 percent of the HDOT's annual revenue was generated from fuel tax. However, there are several factors that could result in a future decline in fuel tax revenues at both the state and federal level. This includes increased fuel efficiency for gasoline and diesel-powered vehicles, the use of hybrid vehicles, policies towards renewable energy resulting in reduced consumption of fossil fuels, and general changes in travel patterns.

Funding Needs and Gaps

The Statewide Federal-Aid Highways 2035 Transportation Plan (HDOT, 2014) identified the growing gap between funding needs and available funds. It has become increasingly difficult to generate revenue from existing and new sources. The challenge is to find sustainable solutions that allow Hawaii's economy and communities to achieve their goals. Table 8-3 from the Statewide Federal-Aid Highways 2035 Transportation Plan shows the expected dollars needed to implement statewide needs versus the project revenue between 2014 and 2035. The statewide funding gap is over $23 billion.

Table 8-3. Statewide Need and Revenue (between 2014 and 2035, in billions)

District	Estimated Need ($B)	Expected Revenue ($B)	Funding Gap ($B)
Oahu	$16.7	$3.6	($13.1)
Maui	$3.7	$1.6	($2.1)
Hawaii	$7.4	$1.2	($6.2)
Kauai	$3.1	$0.6	($2.5)
Total	**$30.2**	**$7.0**	**($23.9)**

Source: Exhibit 4.4, Statewide Federal-Aid Highways 2035 Transportation Plan, July 2014

With the anticipated funding gap, it becomes even more important to prioritize freight projects within the HDOT's current programs as much as possible. Implementing the strategies of Chapter 7 and prioritizing needs on the Hawaii Freight Network will be critical for the HDOT to meet its freight performance goals.

4. Fiscally Constrained Freight Investment Plan

The FAST Act requires the HSFP have a fiscally constrained freight investment plan. The NHFP for the State of Hawaii will receive approximately $27 million to be used between FY2016 and 2020. The funds allocated by fiscal year are shown in Table 8-6. The HDOT has already received funding through 2018.

Table 8-4. NHFP Funds (2016 to 2020)

Fiscal Year	NHFP Allocation (millions)
2016	$4.9
2017	$4.7
2018	$5.1
2019	$5.8
2020	$6.4
Total	**$26.9**

There were two primary considerations used to develop the fiscally constrained freight investment plan:

- **Project Readiness** (because of the need to obligate the FY2016 funds by FY2019)
- **Project Cost** (limited to $5 million)

There are several projects in the STIP that address the freight goals and objectives of the HSFP. The highest priority ones are presented in Table 8-6. These projects will receive the NHFP funds for FY2016 to 2020. The federal aid needed by project is also presented in Table 8-6. The rest of the funding for the projects will be through other federal programs and state funds. As for the remainder of the Federal-aid funds, once the NHFP funds are obligated for these projects, the remainder will come from the National Highway Performance Program (NHPP) and Surface Transportation Block Grant (STBG) programs.

Any NHFP funds used for the projects will be obligated or converted as advance construction according to the amounts identified in the STIP. Any of these projects could use a substantial amount of the existing and future NHFP funds and as advance construction projects, the NHFP funds can be obligated quickly, as appropriate.

Table 8-5. Projects to Receive NHFP Funds

High Priority Freight Project	Estimated Total Cost to Complete	Federal Aid Needed by FY (millions)/ State Local Match			NHFP Allocation (millions)
		2019	2020	2021	
H-1 Eastbound Reconstruction and Shoulder Improvements, Waimalu Interchange to Halawa	$56.25	$24/ $6	$12/ $3	$9/ $2.25	$17.3 (2018, 2019, 2020)
H-1 Kapolei Interchange Complex (Phase 2)*	$19.4	$19.4	-	-	$4.7 (2017)
Pali Highway Resurfacing	$26.25	$11/ $2.75	$10/ $2.5	-	$4.9 (2016)

* The total project cost has a 80% federal and 20% state/private share. The Kapolei Interchange Complex (Phase 2) is now in construction and the match has been taken care of in the previous phases. The remainder of the H-1 Kapolei Interchange Complex (Phase 2) is 100% federal funds.

C. Performance Based Investment

Shortfalls in available funding will continue to be a key factor in planning and prioritizing future transportation investments. The HSFP recognizes the need to make hard investment decisions and includes projects based on a data- and technical-driven prioritization process that will objectively guide investment decisions.

D. Challenges and Opportunities

The HSFP improvement strategies presented in Chapter 7 address the existing and potential future challenges facing Hawaii's freight transportation, while also guiding the freight-related transportation investment decisions for Hawaii.

As discussed in Chapter 1, the HSFP will need to work collaboratively with the HDOT's other planning documents to address the state's transportation challenges, recognizing that much of the state's congestion is caused by single-passenger vehicles. Policies and strategies to reduce congestion by single-passenger vehicles and therefore along freight corridors include transportation demand management, mode shift, land use decisions, and other planning goals and policies identified in the State's long-range planning documents.

E. Identification of Critical Urban and Rural Freight Corridors

As required by the FAST Act, the HDOT has worked with the FAC and TAC to identify CUFCs and CRFCs in the State of Hawaii. Table 8-6 shows the breakdown of the National Highway Freight Network, as well as additional Hawaii freight corridors important to the state. The additional Hawaii freight corridors were identified by selection of roads with higher truck volumes that are not already designated on the NHFN—specifically, roads in urban areas with greater than 500 AADTT and roads in rural areas with greater than 100 AADTT. Additional road segments were included if they helped to create a continuous freight network. However as many of these roads are under the jurisdiction of the counties and cities, HDOT-Highways acknowledges that these jurisdictions have their specific freight street classification systems, and HDOT is committed to working with them in maintaining and improving a continuous freight network. The island maps of the NHFN and Hawaii Freight Network are shown on Figures 8-3 to 8-12. The complete roadway listing of the NHFN and the Hawaii Freight Network is provided in Appendix D.

Table 8-6. HDOT National Highway Freight Network

	Hawaii	Kauai	Maui	Oahu	Total
PHFS	111	17	58	90	**277**
CRFC	122	4	4	19	**150**
CUFC	0	0	4	71	**75**
NHFN (Total)	**234**	**21**	**67**	**180**	**501**
Hawaii Freight Network	**63**	**90**	**71**	**185**	**409**

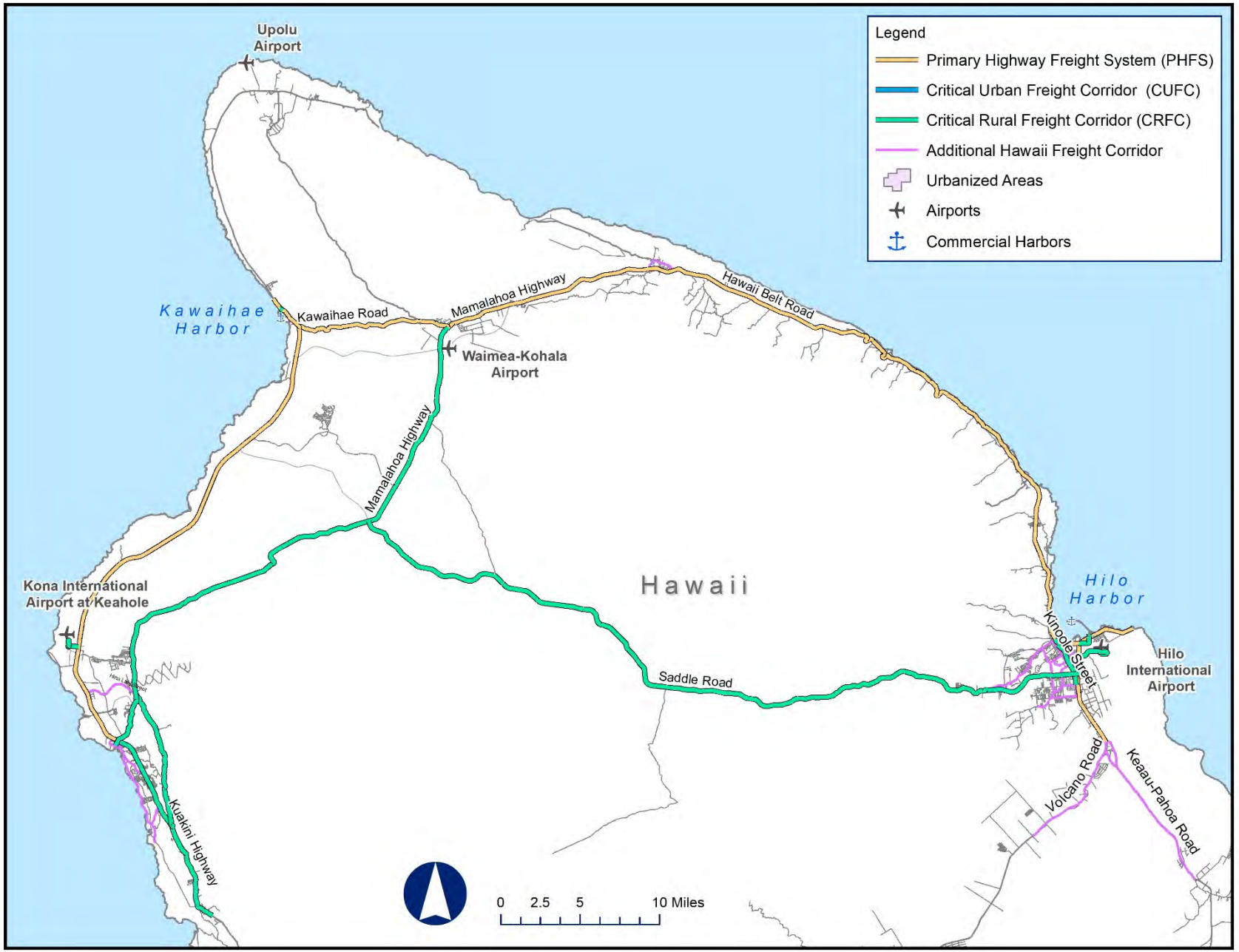


Figure 8-3. NHFN – Hawaii Island

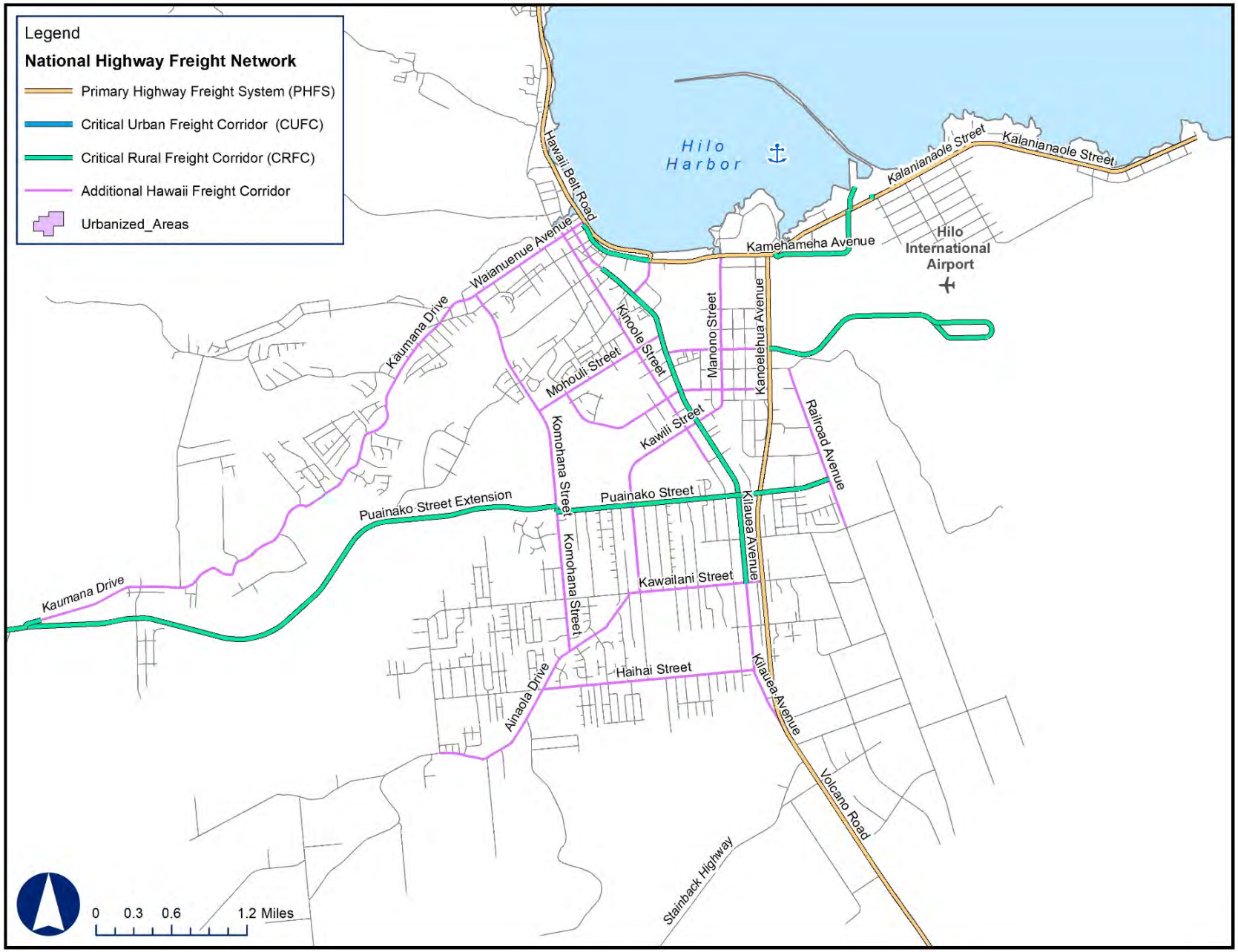


Figure 8-4. NHFN – Hilo

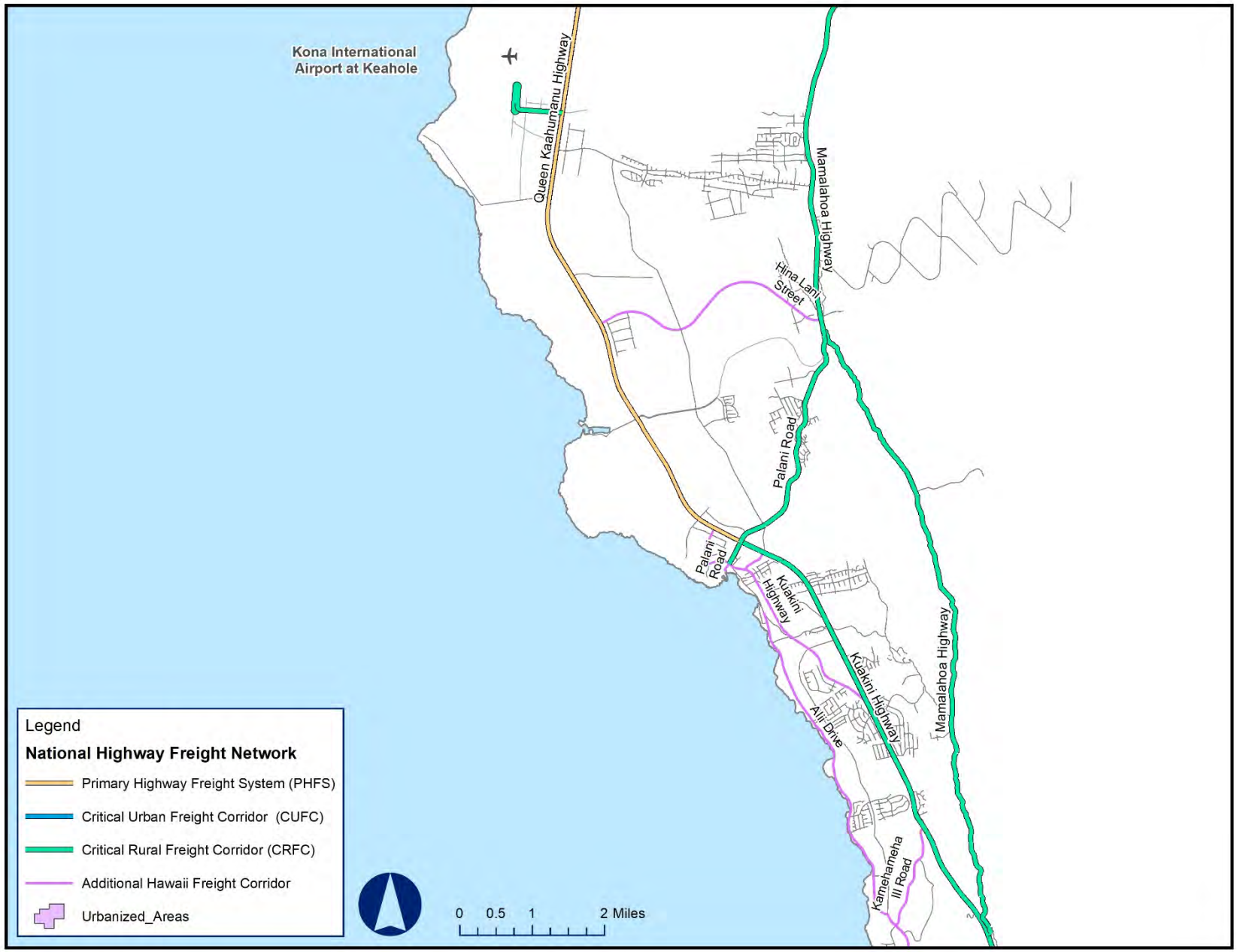


Figure 8-5. NHFN – Kona

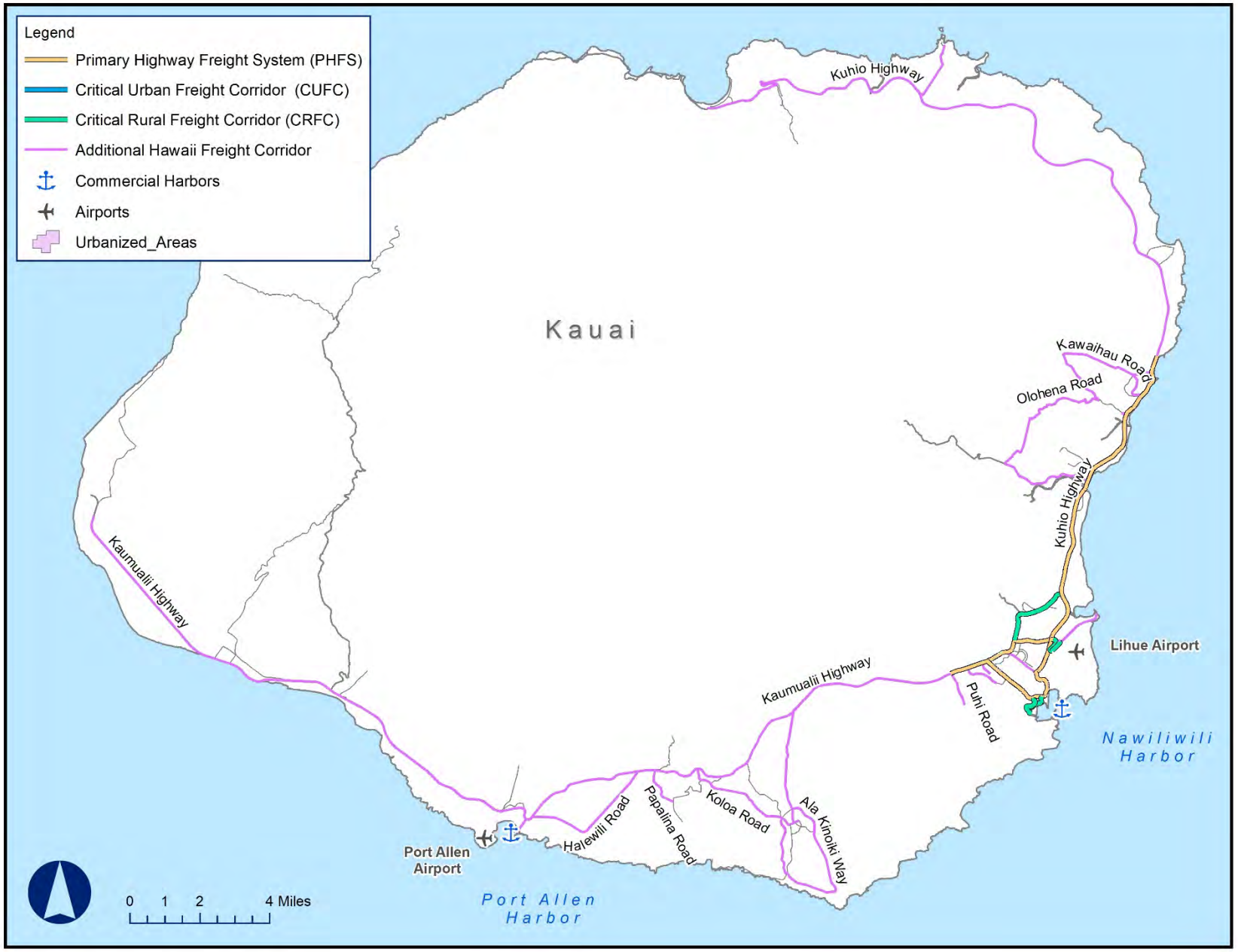


Figure 8-6. NHFN – Kauai

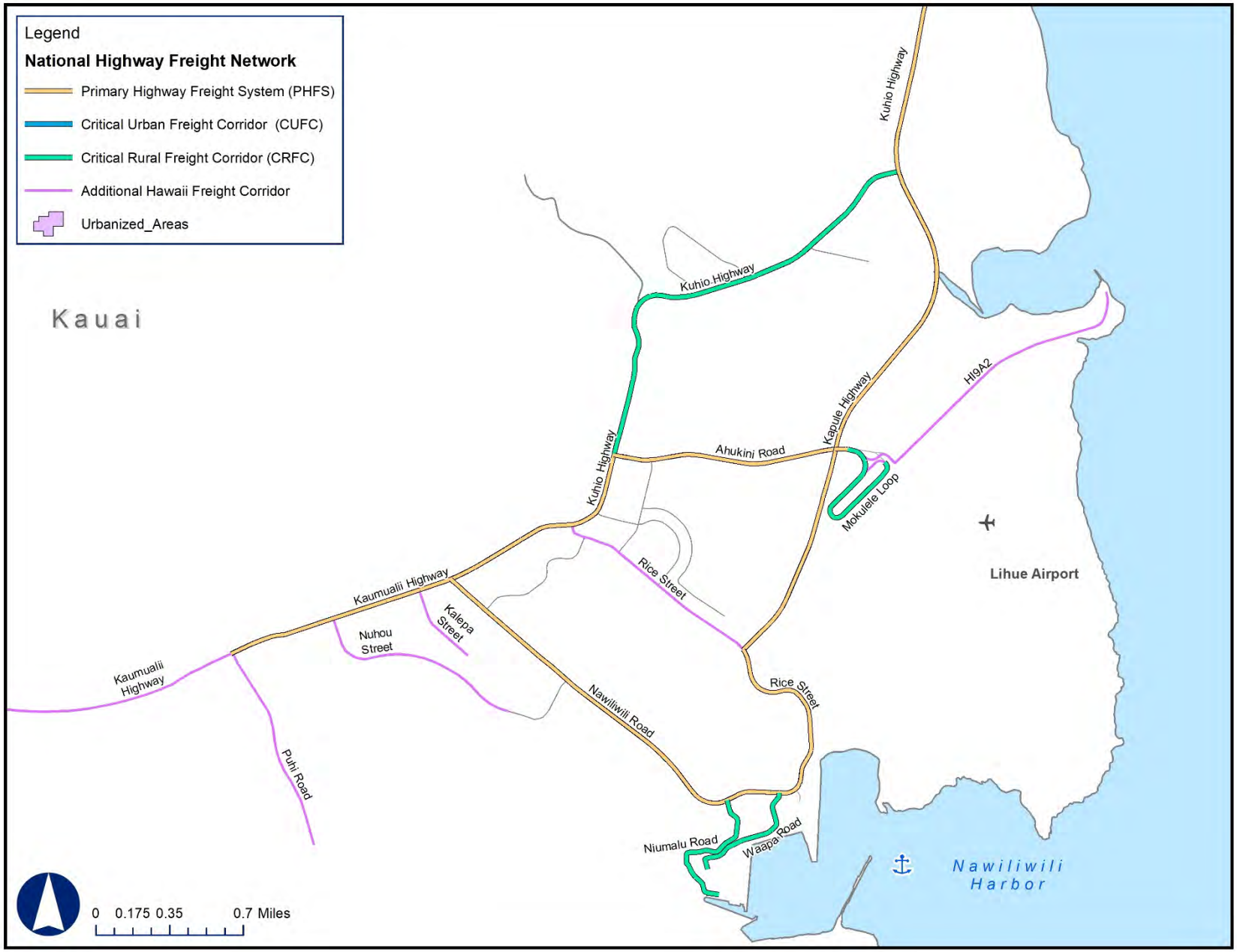


Figure 8-7. NHFN – Lihue

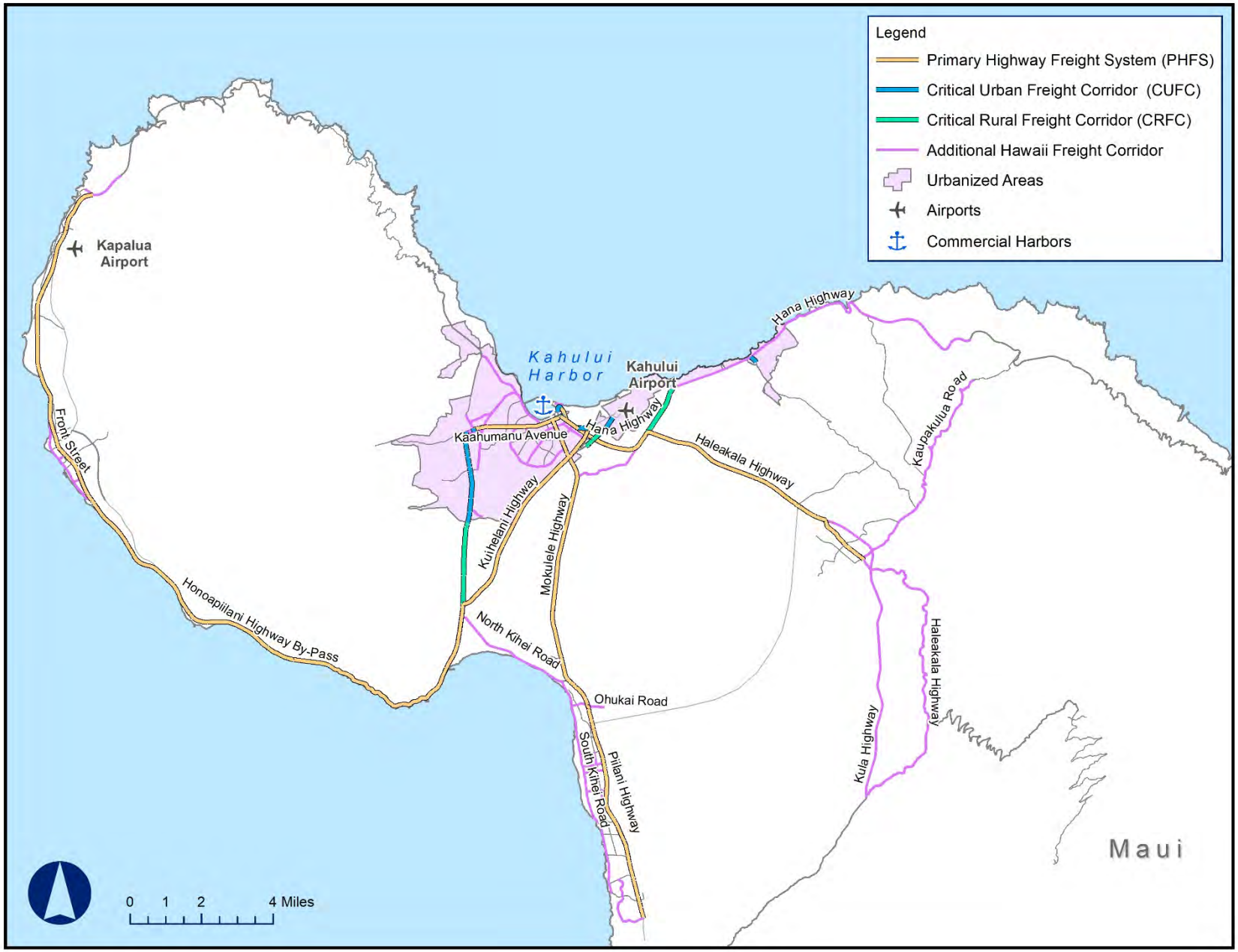


Figure 8-8. NHFN – Maui

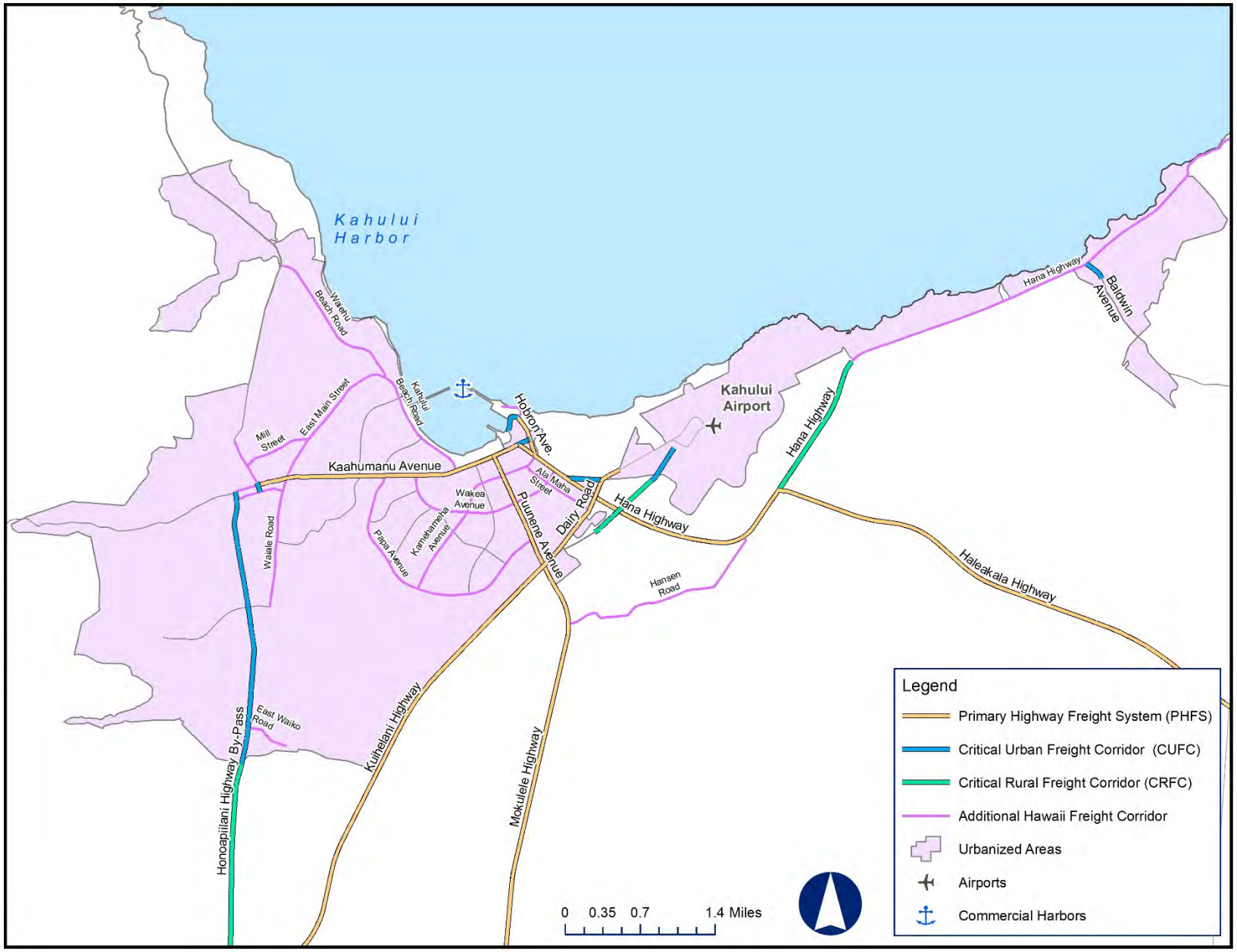


Figure 8-9. NHFN – Kahului

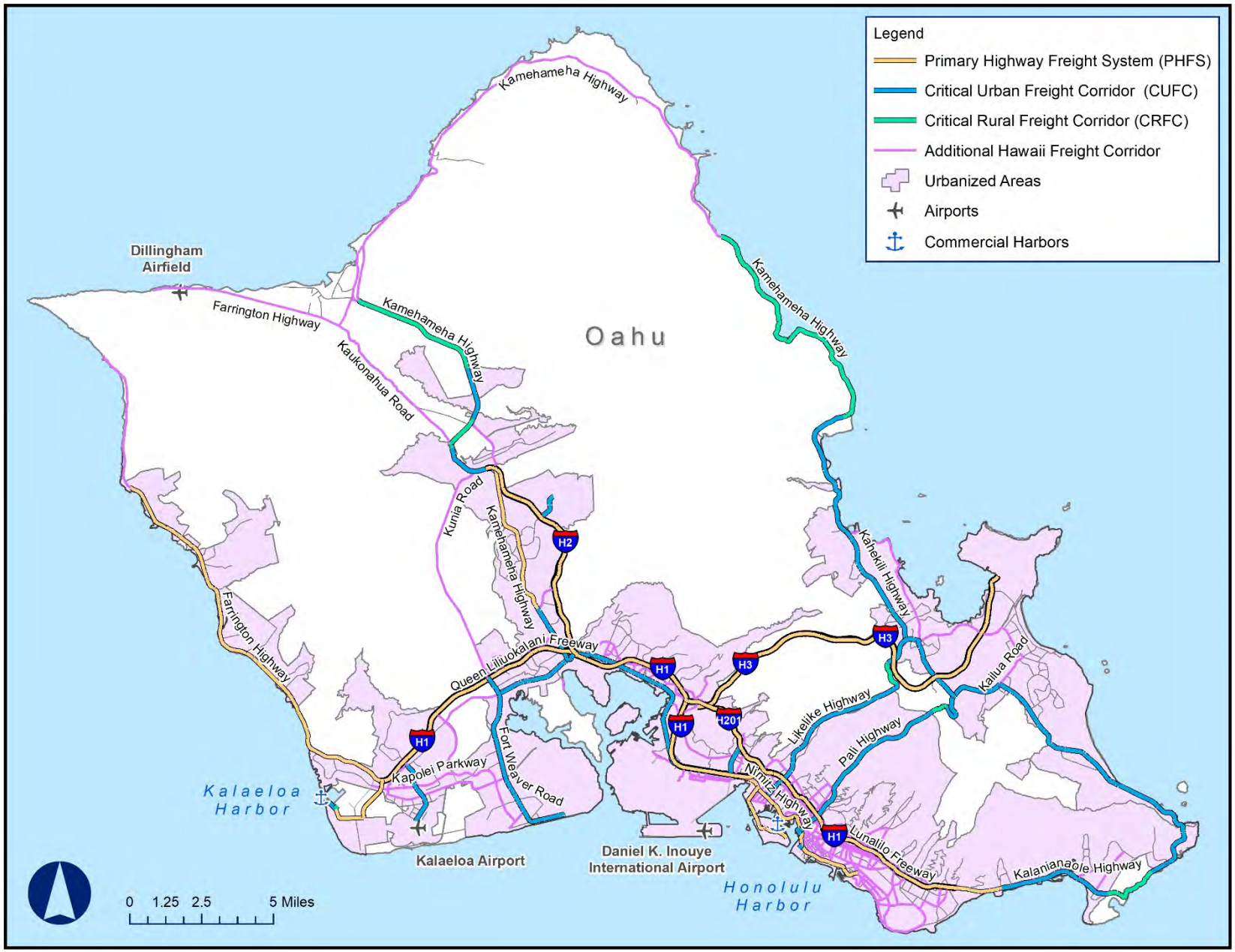


Figure 8-10. NHFN – Oahu

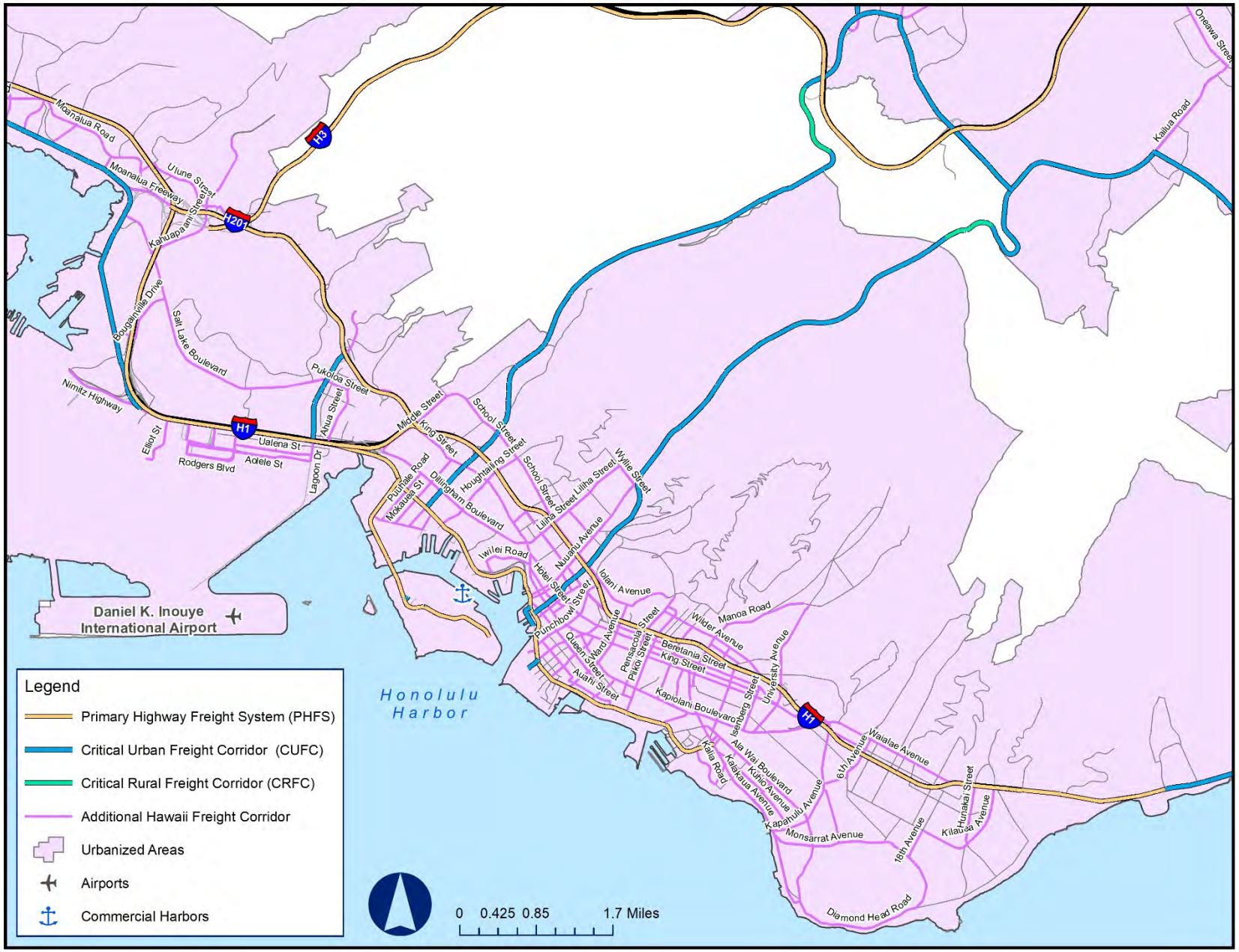


Figure 8-11. NHFN – Honolulu

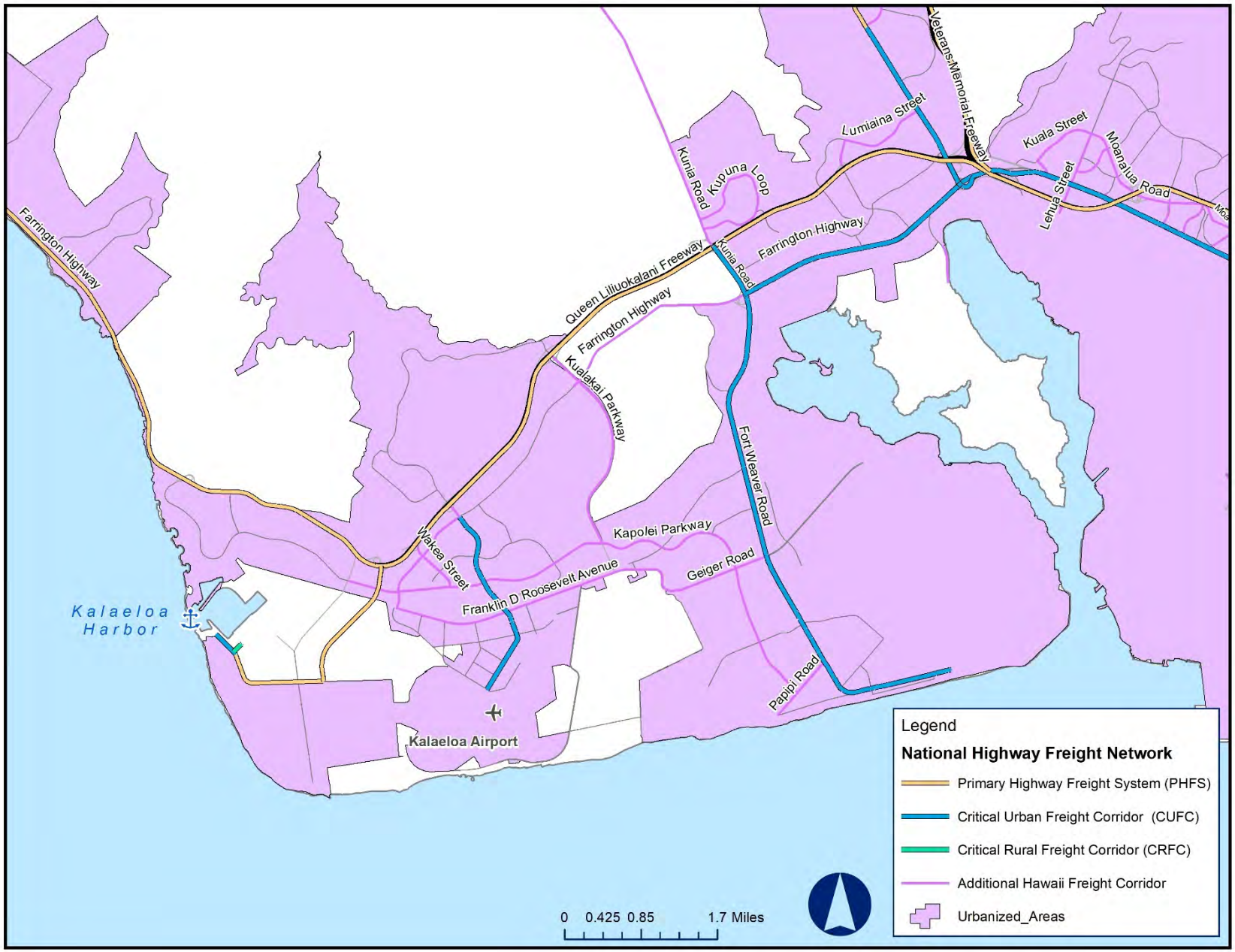


Figure 8-12. NHFN – Kapolei

F. Partnering and Planning

As effective freight network planning requires the coordination of numerous public and private entities, not all the recommendations suggested in this HSFP will be under the jurisdiction of HDOT-Highways. The implementation of many of the recommendations will be the responsibility of other federal and state agencies, MPOs, cities, counties, and private-sector entities, such as trucking and shipping operators. The continued collaboration of the FAC and partnership between agencies and stakeholders will be encouraged for the successful implementation of the HSFP recommendations.

G. Continuous Review

It is recognized that the HSFP will not be static and it is good business practice to continuously re-evaluate goals and strategies for effectiveness. As part of good performance-based planning (and as shown on Figure 8-13), the HDOT will evaluate how well the HDOT is achieving (or not achieving) its performance goals. The HDOT will re-evaluate and update the HSFP implementation strategy and engage with the FAC and TAC stakeholders to update this plan.

Figure 8-13. Performance-based Planning

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