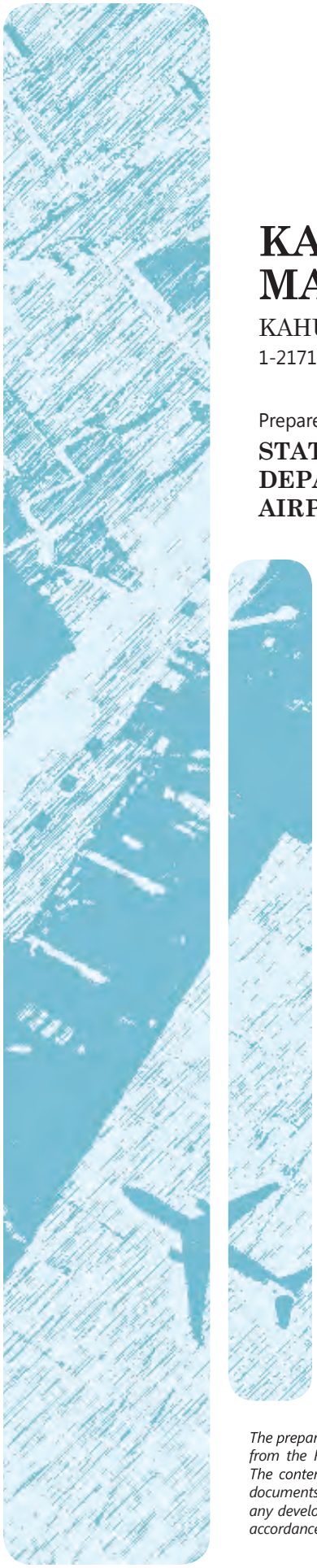
Kahului Airport Master Plan Update

DECEMBER, 2016

State of Hawai'i
Department of Transportation,
Airports Division



KAHULUI AIRPORT MASTER PLAN UPDATE

KAHULUI, MAUI, HAWAIʻI

1-21713-06P

Prepared For The

STATE OF HAWAIʻI
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

December, 2016

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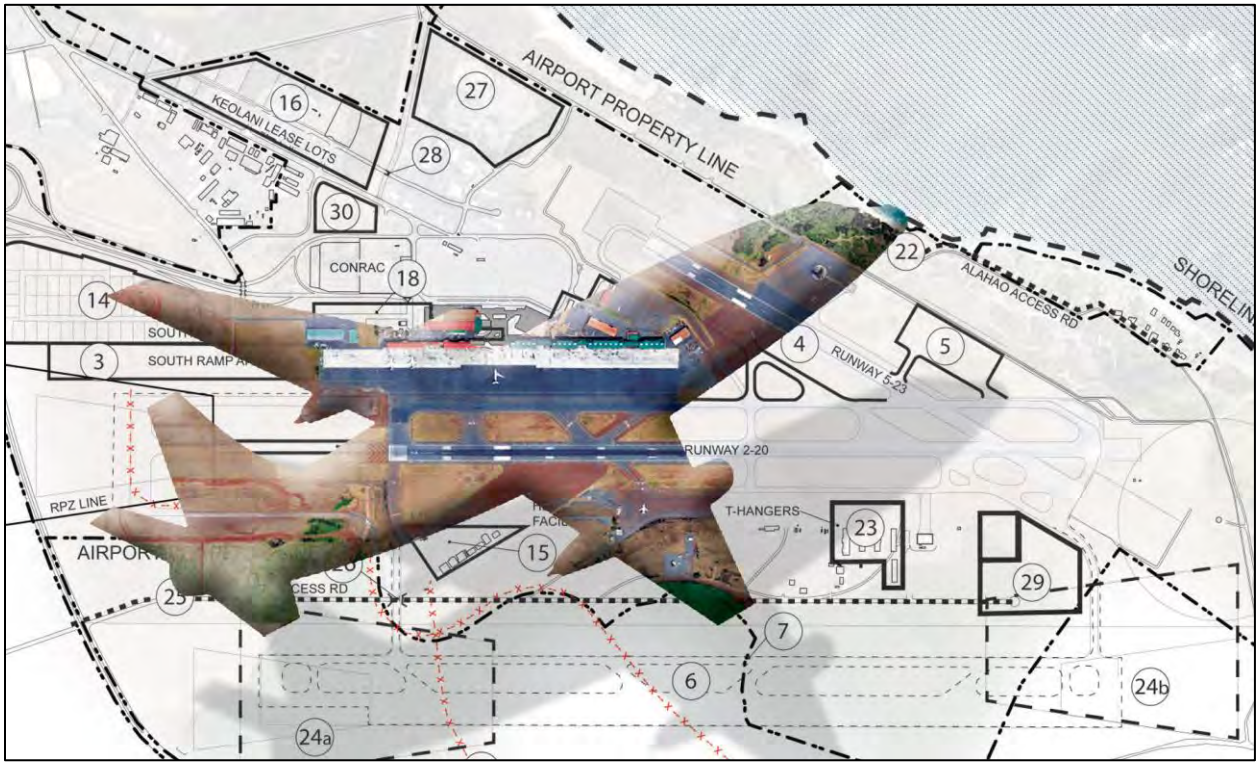
ACRONYMS

AC	Advisory Circular/Asphaltic Concrete
AAC	Aircraft Approach Category
A&B	Alexander & Baldwin, Inc.
ACH	Airlines Committee of Hawai'i
ADG	Aircraft Design Group
ACH	Airlines Committee of Hawai'i
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ARFF	Aircraft Rescue and Fire Fighting
ARTCC	Air Route Traffic Control Center
ASIF	Alien Species Inspection Facility
ASR	Airport Surveillance Radar
ASV	Annual Service Volume
ATC	Airport Traffic Control
ATCT	Airport Traffic Control Tower
BRL	Building Restriction Lines
CFC	Customer Facilities Charges
CH_4	Methane
CO2	Carbon Dioxide
CONRAC	Consolidated Car Rental
DBEDT	Department of Business, Economic Development and Tourism, State of Hawai'i
DLNR	Department of Land and Natural Resources
DOA	Department of Agriculture
DOD	Department of Defense, U.S. of America
DOT	Department of Transportation, State of Hawai'i
DOTA	Department of Transportation- Airports Division
DOTH	Department of Transportation, Highways, State of Hawai'i
EO	Executive Order
EPA	Environmental Protection Agency
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FATO	Final Approach and Takeoff Area
FBO	Fixed Base Operator
FIS	Federal Inspection Service
FOD	Foreign Object Debris
ft.	Feet
FY	Fiscal Year
GA	General Aviation
GHG	Greenhouse Gas Emissions
GSE	General Service Equipment
HAR	Hawai'i Administrative Rule
HC&S	Hawaiian Commercial & Sugar Company
HCF	Honolulu Control Facility

HDOT	Department of Transportation, State of Hawai'i
HIRL	High Intensity Runway Lights
HNL	Honolulu International Airport
HRS	Hawai'i Revised Statutes
HTA	Hawai'i Tourism Authority
IFR	Instrument Flight Rule
ILS	Instrument Landing System
kWh	Kilowatt Hour
lbs.	Pounds
LOS	Level of Service
LUC	Land Use Commission
MACTEC	MACTEC Engineering and Consulting, Inc.
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
mil.	Million
MIP	Maui Island Plan
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MOU	Memorandum of Understanding
MP	Master Plan
mph	Miles Per Hour
MSL	Mean Sea Level
MTOW	Maximum Takeoff Weight
NAVAIDS	Navigational Aids
N2O	Nitris Oxide
NOAA	National Oceanic and Atmospheric Administration
NPIAS	National Plan of Integrated Airport Systems
O3	Ozone
OGG	Kahului Airport
OTW	Operational Takeoff Weight
PAPI	Precision Approach Path Indicators
PCS	Pacific Chart Supplement
PFC	Passenger Facility Charges
RAC	Rent-A-Car
REIL	Runway End Identifier Lights
ROFA	Runway Object Free Area
RON	Remain Overnight
RPZ	Runway Protection Zone
RSA	Runway Safety Area
s.f.	Square Feet
SLH	Session Laws of Hawai'i
SMA	Special Management Area
TAF	Terminal Area Forecast
TDG	Taxiway Design Group
TERPS	Terminal Instrument Procedures
TLOF	Touchdown and Lift Off Area
UPS	United Parcel Service
USDA	U.S. Department of Agriculture
USPS	United States Postal Service
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rule
VORTAC	Very High Frequency Omni Directional Range-Tactical Air Navigation

EXECUTIVE SUMMARY
KAHULUI AIRPORT MASTER PLAN UPDATE



1. PLAN OBJECTIVES

The Kahului Airport Master Plan (OGG MP) Update is part of an ongoing planning process of the Department of Transportation, Airports Division (DOTA), to build upon previously prepared airport master plans and development plans based on identified needs. The role of the MP update is to guide future airport development which will satisfy forecast aviation demands in a financially sound manner and in harmony with community, environmental, and socioeconomic issues and concerns. This MP Update is based on a 20-year planning horizon (2015-2035). Subsequent development plans will provide greater detail for implementation. Because of changing needs and priorities, the MP should be updated every five (5) to 10 years.

The objectives of this OGG MP Update are to provide the following for DOTA, government agencies, airport users, and public consideration:

- A graphic representation of future OGG development within the context of current and anticipated land uses in its vicinity
- A capital improvement program and schedule for development proposed in the MP

- The technical rationale and documentation of procedures used to formulate and assess alternatives in determining the proposed facilities and land use plan

- Reaffirmation of the ongoing master planning process that includes the input of airport users, Federal, State, and local agencies, and the community

2. PROJECT LOCATION

The Kahului Airport (OGG) occupies approximately 1,540 acres of land on the northeastern side of Kahului Town. See **Figure ES-1** on Page *es-iii*. The main passenger terminal, commuter airline terminal, airline offices, air cargo facilities, airline ground maintenance facilities, aircraft rescue and firefighting (ARFF) facilities, DOTA maintenance baseyard, ground transportation subdivision, and airport industrial areas are located on the west side of the Airport's primary runway (Runway 2-20). Facilities for general aviation (e.g., aircraft maintenance facilities, hangars, based and itinerant aircraft parking apron, and fixed base operators), helicopter and air taxis (including scenic air tour operations), and the Federal Aviation Administration (FAA) Airport Traffic Control Tower (ATCT) are located on the northeastern side of Runway 2-20. The ARFF training area is located on the north side of Runway 5-23.

3. METHODOLOGY

The OGG MP was prepared by the DOTA in consultation and participation with the FAA, Technical Advisory Committee, Citizens Advisory Committee, and the general public. The Technical and Citizens Advisory Committees were organized for the purpose of reviewing and commenting on detailed aspects of the MP as it related to their areas of interest or concern. Its membership represented various OGG users and governmental agencies. In addition, a series of public information meetings were held during the course of the OGG MP Update to inform and obtain input from interested parties in the community.

4. ALTERNATIVES

Alternative land use plans were prepared to explore land use options, and include:

- Construction of a Parallel Taxiway to be used as a temporary runway during reconstruction of Runway 2-20
- Extension of Runway 2-20 to 8,530 feet
- Terminal Improvements
- Land Acquisition

5. PLAN EVALUATION

The alternatives evaluation process was an iterative process rather than an empirical selection process. As stated previously, many individuals and organizations provided input into the process and as a result, an important goal was to achieve consensus, where feasible, and did not compromise operational safety. It should be noted that the final selection of a particular plan component was not always unanimous. Ultimately, the selection of particular plan components was based on the criteria of "what was best for the Airport and island of Maui."

The evaluation led to the selection of the preferred or recommended MP. The plan evaluation methodology can be summarized in the following steps:

1. Preliminary proposals were developed based on airport staff interviews, projects completed since 1993, airport stakeholder comments, passenger forecasts, and operation forecasts.
2. The preliminary proposals were presented to DOTA staff for comment and approval for presentation to the public.
3. The Technical Advisory Committee and Citizen Advisory Committee reviewed and commented on proposals at public meetings.

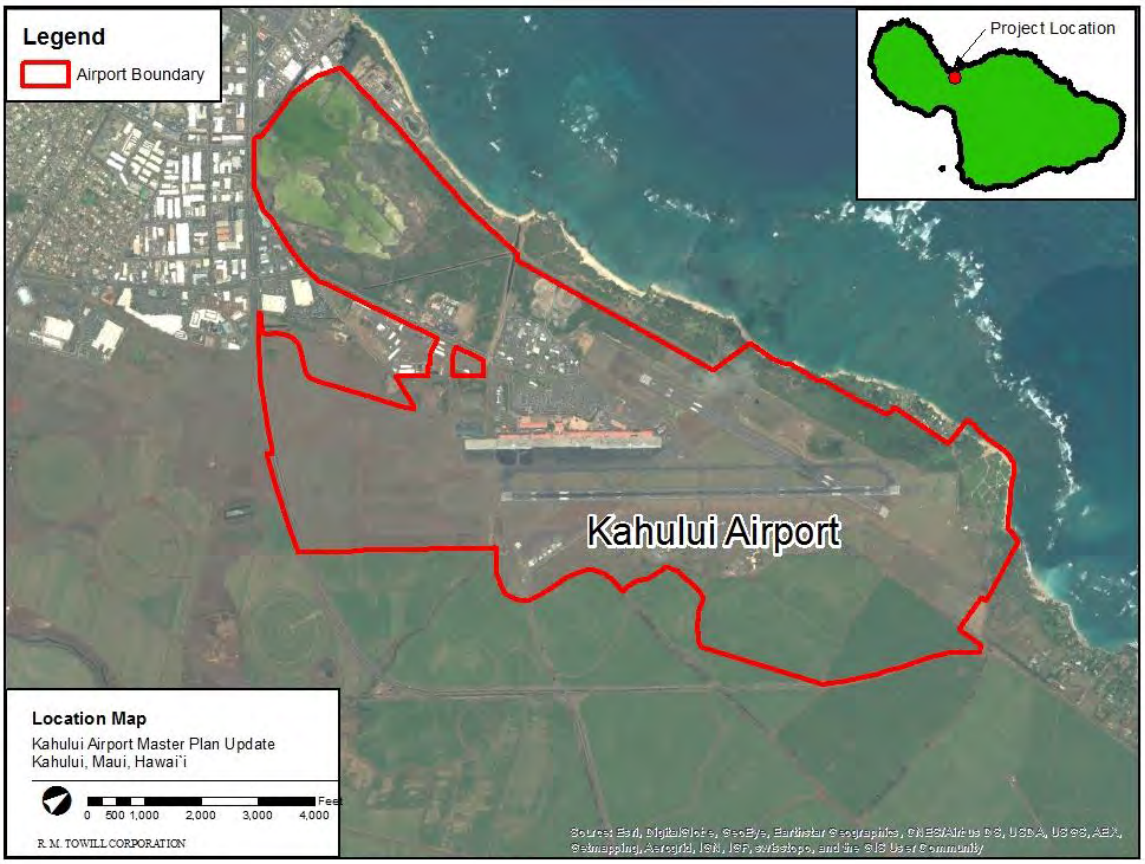


Figure ES-1 Location Map

4. Comments from public meetings were used to refine proposals through the addition or removal of projects.

5. Refined proposals were reviewed again with DOTA staff to ensure FAA regulations were met and there was compatibility with existing development, future and existing capacity, future and existing operational needs.

The process of plan review was fluid; often there was no clear delineation of stages of progress leading up to the recommended MP. This is because the planning process balances future scenarios with ever changing existing conditions. For example, neighboring land owners such as Alexander & Baldwin (A&B) Properties have evolving plans for an industrial park south of the airport property. Their proposals necessitated the need to react and reanalyze the MP proposals to ensure compatible land use while maintaining airport operational needs. Much effort was directed towards maintaining communication and distribution of information between DOTA staff, consulting staff, and public stakeholders as alternative proposals evolved.

6. OGG MASTER PLAN

The proposed OGG MP forecasts an anticipated increase in passengers and operations in the planning period, and identifies the locations of existing, relocated, and new airfield and terminal facilities recommended through the year 2035 in **Figure ES-2** on Page *es-vii*. The plan was prepared in the context of the design aircraft, the B-737-800, which accounts for 64% of the total overseas operations. Furthermore, the plan identifies on going improvements on airport property and outside of the airport, such as a new airport access road with its direct linkage to

Hāna Highway. The highway improvements will facilitate vehicular access to and from the airport.

Inter-island passenger counts are projected to increase to over 3 million (mil.) while overseas passengers are expected to increase to 3.5 mil. by 2035. Inter-island operations are projected to increase to 25,000 annually while overseas operations are expected to increase to 11,000 annually. The new consolidated rent-a-car (CONRAC) facility, which is currently under construction, is located adjacent to the terminal building and will further enhance visitor services at the airport. The new facility will provide customer servicing, car return and pick-up, and vehicle servicing for car rental companies. Additional terminal improvements currently scheduled include modernization improvements to infrastructure and passenger screening services. All improvements described below will add to the facilities and services available at the airport to airlines and passengers.

Airfield Plan

Airfield facilities include the reconstruction of Runway 2-20, development of a parallel taxiway/interim runway east of Runway 2-20, lengthening of Runway 2-20 to 8,530 feet (ft.), providing for a future (beyond the planning period) parallel runway east of runway 2-20, additional taxiways, holding apron areas, shoulders, blast pads, navigational aids, and associated runway safety areas and protection zones. The proposed improvements are projected to meet the forecasted operations demand increase of 13% in the planning period. The proposed airfield improvements will provide the air carriers with another level of operational flexibility, capacity and safety. The recommended airfield facilities are described below. They include the proposed Runway 2-20 extension and taxiway improvements to meet short-term runway reconstruction needs and long-term operational needs. These facilities will accommodate forecast activity through the 20-year MP period.

Runway 2-20 Extension

The existing Runway 2-20 is 6,995 ft. long and is planned for an extension of length of 1,535 ft. for a total of 8,530 ft., retaining its present width of 150 ft. See **Figure ES-2** on Page *es-vii*. The length of the runway extension was defined by the selected design aircraft (B-737-800), the location of the Hāna Highway, and the area needed for the Runway Protection Zone (RPZ), where the runway is within the sponsor's control.

The objective of lengthening the runway was motivated by market demands to serve the West Coast and some Midwest (e.g., Chicago, Dallas, and Denver) markets on the continental U.S. where the design aircraft departing OGG would be able to take off at maximum takeoff weight (MTOW), thereby incurring minimal to no weight penalties. See **Chapter 4**, **Section 4.3.6.8** *Runway Length*. Aircraft performance data shows that the maximum runway length should be 8,400 ft. to allow a B-737-800 to takeoff at MTOW. See **Chapter 4**, **Table 4-11** for calculations. Furthermore, the maximum runway length for a B-777-200 would require a runway length of 8,500 ft. Therefore, extending Runway 2-20 to 8,530 ft. would allow the design aircraft and larger aircraft such as the B-777-200 to takeoff at MTOW with little or no weight penalties.

Currently, aircraft taking off at MTOW on the shortened runway must do so with a reduced amount of fuel, thus requiring the aircraft to land in Honolulu to refuel before proceeding to a mainland destination. Extending the runway would allow aircraft to takeoff at MTOW with the required amount of fuel needed to get to the destination without making additional stops.

The runway extension could potentially increase revenues by approximately 4% per aircraft by allowing the airline companies to increase the load factor in arriving and departing aircraft. This will lead to greater airline operational efficiency.

All alternatives assess and propose an extension to Runway 2-20 by 1,535 ft. to the south towards Hāna Highway, for a total length of 8,530 ft. See

Figure ES-2 on Page *es-vii*. However, the alternatives with runway extension lengths greater than 1,535 ft. would require that the RPZ be further extended over Hāna Highway and into neighboring properties. An extension greater than 1,535 ft. would require land acquisition, and would require vehicular access along the Hāna Highway to be moved into a tunnel located beneath the RPZ. Alternatively, the Hāna Highway would be relocated south to address the runway extension and RPZ. The latter requirements were considered costly and not feasible for further consideration.

Similarly, extension of the runway to the north was deemed not feasible because it would require extensive land acquisition and the relocation of an existing resident and a senior center. Extending the runway will further require the permanent closure of Haleakalā Highway between Hāna Highway and Keolani Place, improvement to the existing drainage system, relocation of navigational aids, and utility upgrades. Additional taxiways are also recommended for this runway to expedite aircraft ground movement and reduce aircraft delay times, particularly during periods of peak activity.

Runway 2-20 Reconstruction

Runway 2-20 is currently in need of reconstruction due to its failing pavement structure where slippage has been detected in the 18+-inch deep structure. Several alternatives to reconstruct Runway 2-20 were considered without closing the airport. Of the alternatives, the DOTA considered a plan that would utilize an existing apron taxiway located east of Runway 2-20 to serve as a temporary runway while Runway 2-20 is reconstructed. Once the reconstruction work is completed, all operations would resume at Runway 2-20. Uses that were relocated as a result of the temporary runway will return to previous locations.

Without the Runway 2-20 reconstruction, the economic loss from a forced closure of the runway due to repair issues could total approximately $8.4 mil. per day for a period of up to approximately 16 weeks (URS, 2014). See **Table 4-1**.

Runway 2R-20L New Parallel Runway

The OGG MP Update also recommends that a new 7,000-ft. long, 150-ft. wide parallel Runway 2R-20L be built 2,500 ft. to the east (centerline-to-centerline separation) of the existing Runway 2-20. See **Figure ES-2** on Page *es-vii*. The 7,000-ft. length will allow for simultaneous operations (takeoffs and landings) and serve as an alternative to the primary runway should it be taken out of service. The parallel runway is proposed to have nearly the same operational features as the primary runway. The centerline-to-centerline runway separation will allow for simultaneous Visual Flight Rule (VFR) operations by heavy aircraft (e.g., B-737, B-757, and B-767) as well as some staggered parallel instrument operations under certain conditions and with precision instrument landing systems (ILS) on both runways. The planned runway is constrained to 7,000 ft. by Hāna Highway to the south and residential development to the north. This runway is proposed beyond the planning period; however, land acquisition will be an essential first step. Furthermore, additional airfield capacity as measured by the annual service volume (ASV) is not required construction of the parallel runway during the planning period.

Passenger Terminal

The 13 existing aircraft parking positions fronting the main passenger terminal are currently insufficient to support projected aircraft operations towards the end of the 2035 planning period. Overseas passenger arrivals and departures are projected to increase from 2.9 mil. to 3.6 mil. The 13 aircraft parking positions are sized for operations by three inter-island and 10 overseas aircraft. Space is proposed to be provided for two additional aircraft parking positions on the apron to the north for expansion beyond the 2035 planning period. Depending on airline scheduling practices (e.g.,

overlapping of inter-island and overseas peak hours and, turnaround time for overseas flights), there may be a need for additional aircraft parking positions for infrequent during extremely busy periods by the end of the planning period. In recognition of this, the plan preserves space to the south of the existing aircraft parking apron and recommends additional gates at this end to support the increase in flights. The proposed MP accommodates power-in/push back operations within each aircraft parking position.

Terminal – North-End Expansion

The north end of the terminal currently houses 22 departure gates with nine (9) aircraft parking positions. With the relocation of the cargo, General Service Equipment (GSE), car rental customer service and customer pick-up and drop-off area, this area will be available for additional terminal functions such as aircraft parking position and/or additional terminal holdrooms. See **Figure ES-2** on Page *es-vii*. An additional exit from the north end to the baggage claim is proposed. Terminal expansion to the north is constrained by the runways; therefore it is proposed that new gates be added to the south end of the terminal complex. The north end would be reserved for aircraft movement and parking, and airline operations. Additional operations by Island Air and 'Ohana could be accommodated here rather than along the main aircraft ramp.

Terminal – South-End Expansion

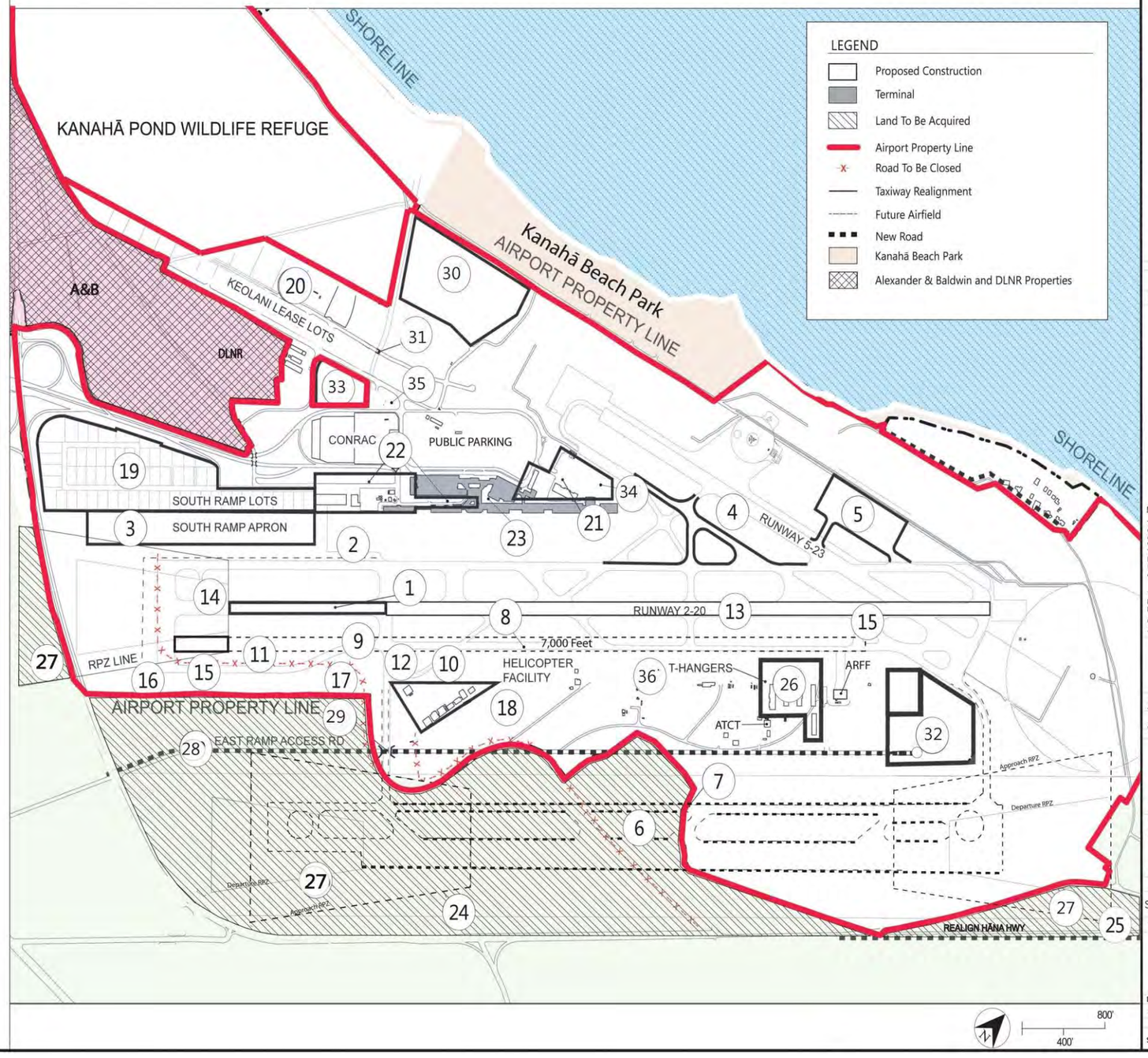
There are six (6) holding areas on the second level of the terminal on the south end that services gates 1–16. There are four (4) aircraft parking positions available (one (1) inter-island and three (3) overseas). The utility of the gates are limited by the size of the holdrooms, with each holdroom nearly half the area required as compared to holdrooms for gates 17-39. The holdrooms are proposed to be tripled in size by building over the ground-level vehicular access way and by connecting with the terminal building footprint on the other side. Currently, Building 345 which contains three (3) holdrooms, Gates 2-7, two (2) ticketing areas, a U.S. Department of Agriculture (USDA) Inspection station, and two (2) restrooms, has a combined approximate footprint of 21,780 square foot (s.f.). Building 341 which contains three holdrooms, Gates 9-15, two (2) ticketing areas, an ice cream shop, two (2) restrooms, and two (2) airline offices has a combined footprint of 22,740 s.f. Also, the walkway that connects the two (2) buildings will be doubled; it currently has a footprint of approximately 5,830 s.f. The total expansion would be approximately two (2) acres. During the expansion of facilities to the south, the central terminal area is proposed to be expanded by covering the open areas to provide for additional retail opportunities, i.e., a central mall concept. Due to the concern that airlines are adding flights and will continue to do so warrants the necessity to extend the terminal building to the south. The existing air cargo and alien species inspection facility (ASIF) will be relocated to the industrial lots on the south ramp when space becomes available. The terminal extension to the south would support more passenger holding areas and gates to serve additional aircraft. See **Figure ES-2** on Page *es-vii*. This may be done at a later phase than other projects and could have a potential area of approximately eight (8) acres.

AIRFIELD

1. Runway 2-20 Extension (1535 lf.) (Grade, Pave, Navaids)
2. Taxiway A Extension
3. South Ramp Apron 27ac.
4. Taxiway Realignment (Twy B, F and G)
5. Transient Aircraft Parking (9 ac.)
6. Runway 2R-20L (Parallel Runway) 7000ft.
7. Parallel Taxiway for Parallel Runway 2R-20L
8. Temporary Runway 2-20 (using Twy 'L') plus Navaids at 7000ft.
9. Kalialinui Channel Improvements
10. Parallel Taxiway "M" plus Service Road
11. Navigational and Landing Aids - Replacement
12. FATO Relocation
13. Runway 2-20 Reconstruction
14. Crossover T/W Connecting Taxiway A to RWY 2T
15. Temp. Runway 2-20 Blast Pads
16. Temp. Runway 2-20 RSA Improvements
17. Drainage Improvements

FACILITIES

18. Helicopter Facility Expansion (Grade and Pave)
19. South Ramp Aviation Lease Lots (Grade, Pave, Utilities)
20. Keolani Lease Lots (Clear and Grade)
21. Terminal North - New Gates (Clear and Demo)
22. Terminal South - Holdrooms
23. Terminal 2nd Level Improvements
24. Haleakalā Highway (To Be Closed)
25. Realign Hāna Highway (Grade and Pave)
26. GA T-hangars – East Ramp
27. Land To Be Acquired
28. East Ramp Access Road
29. East Ramp Access Road Tunnel
30. RAC Overflow Parking (19 ac.)
31. Bridge to RAC subd.
32. Industrial Aviation Lots East Ramp 20 ac.
33. Employee Parking (5 ac.)
34. Demolish Existing GSE & Cargo
35. Cell Phone Parking Lot
36. East Ramp Temp. Relocation of Services



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

STATE OF HAWAII

LOCATION MAP

DSGN.	DRWN.	CHKD.

KEY PLAN / NOTES :

NOTE:

THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

OFF AIRPORT BUILDING LOCATIONS ARE FROM AN AERIAL PHOTOGRAPH AND ARE APPROXIMATE.

NO.	DATE	REVISIONS

R. M. TOWILL CORPORATION
SINCE 1930

PROJECT TITLE :
KAHULUI AIRPORT
MASTER PLAN UPDATE

KAHULUI, MAUI, HAWAII
PROJECT NO.: 3-15-0006-44
STATE PROJECT NO. AM1011-09

SHEET TITLE :
MASTER PLAN
KAHULUI AIRPORT

DATE:
11/2016

SHEET OF

Figure ES-2. OGG Master Plan

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Terminal – Relocation of Art Work

The existing statue of Maui, the Sun God, is proposed to be relocated from its current position to the baggage claim area, where the current skylight is located. The cost to relocate the statue will be determined at a later date.

Cost Estimate by Phase (Subject to Change)

The proposed projects identified in this MP Update have been divided into development phases based on need, timing and availability of development funds. The cost estimates are presented for guidance only and do not represent actual contractors bid prices. The prices have been further modified to assume design costs, contractors' markups, project management, and a project contingency to account for unanticipated costs. Local fees and taxes or price escalation from 2015 have been included.

Project costs summarized in **Table ES-1** on Page *es-x* by development phases are as follows:

Phase 1 (2015-2021)	$ 403.4 mil.
Phase 2 (2022 – 2027)	$ 136.5 mil.
Phase 3 (2030 +)	$ 2,424.8 mil.
TOTAL	$ 2,964.7 mil.

No.	Airfield	PHASE 1 2015-2021	PHASE 2 2022-2030	PHASE 3 2035 +
1	Runway 2-20 - Extension 1535 lf. (grade, pave, exclude utilities/NAVAIDS)	$96,000,000		
2	Taxiway A Extension (excludes utilities and NAVAIDS)	$12,121,212		
3	South Ramp Apron 27 ac.	$5,184,000		
4	Taxiway Realignment (Twy B, F and G)			$3,008,264
5	Transient Aircraft Parking 9 ac,			$4,320,000
6	Runway 2R-20L (Parallel Runway) 7000 ft.			$768,000,000
7	Parallel Taxiway for Runway 2R-20L			$703,680,000
8	Temporary Runway 2-20T	$74,513,280		
9	Kalialinui Channel Improvements	$25,564,738		
10	Taxiway `M` Expansion and Upgrade	$37,152,000		
11	Navigational and Landing Aids - Replacement	TBD by FAA		
12	FATO Relocation	$960,000		
13	Runway 2-20 Reconstruction	$104,355,840		
14	Connecting Taxiways Between 2-20 and 2R-20L.			$19,200,000
15	Temp Runway 2-20 Blast Pads	$5,760,000		
16	Temp Runway 2-20 RSA Improvements	$3,840,000		
17	Drainage Improvement			$9,600,000
	Terminal			
18	Helicopter Facility Expansion (grade)	$5,000,000		
19	South Ramp Aviation Lease Lots (grade, pave, utilities)	$32,976,000		
20	Keolani Lease Lots (Clear and Grade)		$17,760,000	
21	Terminal North - New Gates (clean and demo)		$7,200,000	
22	Terminal South - Holdrooms		$48,000,000	$48,000,000
23	Terminal South - 2nd Level Improvements			$773,625,600
24	Haleakalā Highway Closure		$6,363,636	
25	Realign Hāna Highway (Grade and Pave)			$19,365,289
26	GA T-Hangars – East Ramp		$16,726,911	
27	Land to be acquired			$24,499,200
28	East Ramp Access Road		$11,520,000	
29	East Ramp Access Road Tunnel			$21,600,000
30	RAC Overflow Parking (19 ac.)			$9,120,000
31	Kalialinui Bridge at RAC			$19,200,000
32	Industrial Aviation Lots East Ramp 20 acs.			$1,536,000
33	Employee Parking (5 ac.)		$14,400,000	
34	Demolish Existing GSE, Cargo		$960,000	
35	Cell Phone Parking Lot		$4,800,000	
36	East Ramp Temporary Relocation of Services		$8,795,520	
	TOTALS	**$403,427,070**	**$136,526,068**	**$2,424,754,353**

Table ES-1 Project Cost Estimate (subject to change)

CHAPTER 1
INTRODUCTION

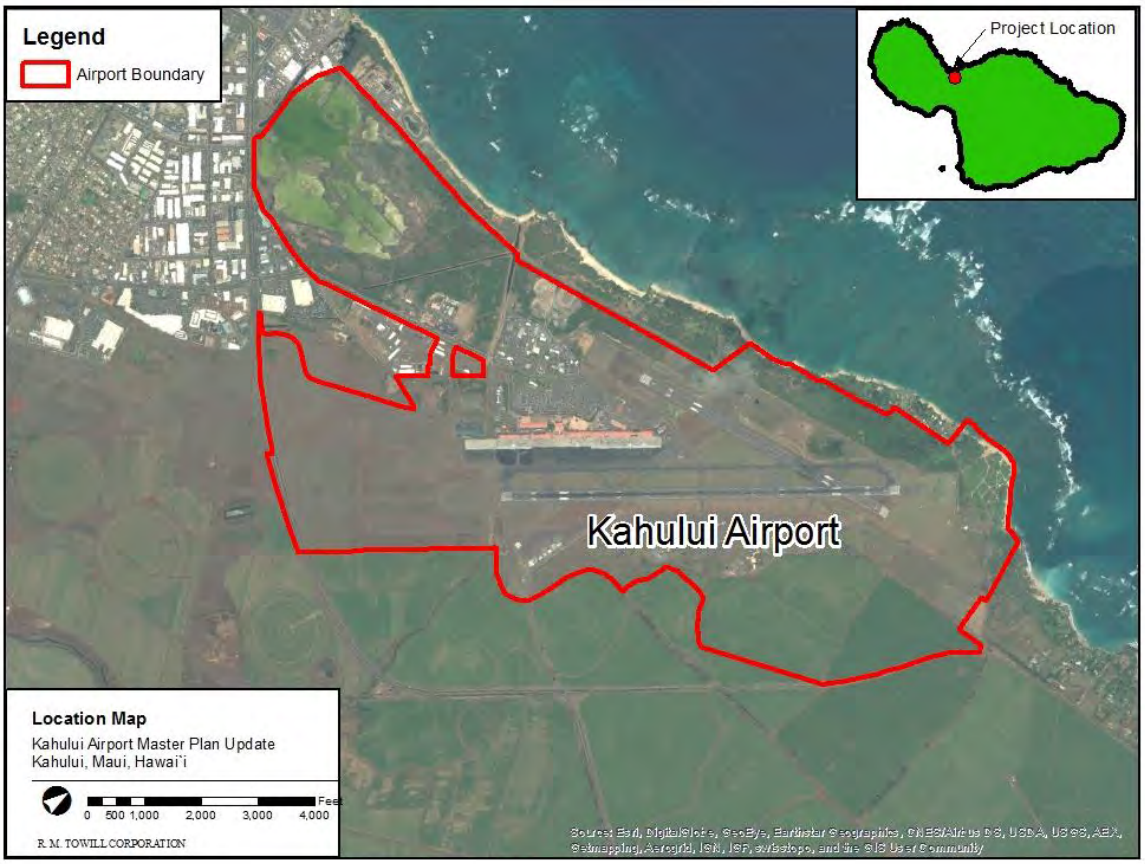

Figure 1-1 Location Map

1.1 OVERVIEW

The Kahului Airport (OGG) is the primary commercial airport on the island of Maui. It occupies 1,540.51 acres of land located on the northeastern side of Kahului Town. See **Figure 1-1**. The airport is owned and operated by the State of Hawai'i Department of Transportation, Airports Division (DOTA) as part of its state-wide airport system. The current OGG Master Plan (MP) was completed in 1993.

1.2 1993 MASTER PLAN

The 1993 OGG MP identified 30 improvement projects for implementation. **Table 1-1** summarizes the status of the 30 improvement projects. To date five (5) projects have been completed, four (4) projects are partially completed, three (3) projects have been removed from consideration, and 18 projects are pending. Pending projects are still needed and will be included as part of this MP Update.

PROJECT	1993 PROPOSAL NUMBER	STATUS	COMMENT
Terminal Expansion to South	A	pending	To be included in MP Update
New Gates North End	A	pending	To be included in MP Update
New Aircraft Rescue and Fire Fighting (ARFF)	AA	completed	
Parallel Runway - 8,500 feet (ft.)	B	pending	To be included in MP Update at 7,000 ft.
New Fuel Line	BB	partial	Portion to harbor removed from plan
Connecting Taxiways for Parallel Runway	C	pending	To be included in MP Update
Realign Hāna Highway	CC	pending	To be included in MP Update
Runway 2-20 Extension to 9,600 ft.	D	pending	To be included in MP Update at 8,530 ft.
Access Road From Hāna Highway	E	partial	Schedule for completion in 2016
Alahao Emergency Access	F	pending	To be included in MP Update
Expand Rent-a-Car (RAC) Parking	G	partial	Scheduled completion in 2017
U.S. Postal Service Facility (USPS)	H	pending	To be included in MP Update at new location
USPS Office Access Ramp	I	removed	
Cargo Expansion East Ramp	J	pending	South ramp work completed
General Aviation (GA) T-Hangers East Ramp	K	pending	To be included in MP Update
Commercial Lease Lots	L	pending	To be included in MP Update
New Scenic Tour	M	pending	To be included in MP Update
Helicopter Facility Expand	N	pending	To be included in MP Update
Cargo Expansion South Ramp	O	partial	To be included in MP Update
Transient Aircraft Parking	P	pending	To be included in MP Update
New Airline Ground Service Equipment (GSE)	Q	pending	To be included in MP Update
ARFF Training Facility	R	completed	
Flight Kitchen	S	removed	
Keolani Place Lease Lots	T	pending	To be included in MP Update
Bulk Fuel Storage	U	completed	
Relocate Existing Parking	V	pending	To be included in MP Update
Kanahā Beach Park	W	completed	
Taxiway F-G Realignment (Rwy 5-23)	X	removed	
East Ramp Access Road	Y	pending	To be included in MP Update
Relocated Very High Frequency Omni-Directional Radio Range with Tactical Air Navigation (VORTAC) Site	Z	completed	

Table 1-1 1993 OGG MP Proposed Improvements Projects

Since the completion of the OGG MP in 1993, land use and infrastructure development surrounding the airport has continued at a pace consistent with the economy. North of the OGG is the Kanahā Beach Park, and the beginning of the North Shore Greenway, a seven (7) mile pedestrian bicycling path stretching from Kahului to Pāʻia. Southwest of the OGG in Kahului Town, significant changes have occurred along Dairy Road where new light industrial and retail operations now dominate. Construction also commenced on the new airport access road into the OGG from Hāna Highway. To the east of the OGG, agricultural uses predominate, however, with the cessation of sugarcane production future land uses are uncertain.

1.3 MASTER PLAN PROCESS

This update of the OGG MP is part of DOTA's ongoing planning process to meet current and future aviation demands. It builds upon the 1993 OGG MP and provides guidance for future airport development. The MP Update covers a 20-year planning horizon and includes short-, medium-, and long-term development phases. This MP Update and the Airport Layout Plan (ALP) update are products of the planning process.

Guidance for the preparation of airport master plans is provided by the Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*. It states that the goal of an airport master plan is "…to provide guidelines for future airport development which will satisfy aviation demand in a financially feasible manner, while at the same time addressing aviation, environmental, and socioeconomic issues existing in the community."

The MP Update is designed to result in the following:

A graphical representation of future airport development within the context of current and anticipated land uses in the vicinity of the OGG
A prioritized capital improvement program and schedule for improvement projects proposed in the MP
An alternatives assessment for the proposed facilities and land use plan
Reaffirm the existing framework of the master planning process for the OGG, including the valued input of airport users and the community, and Federal, State, and local agencies
An improved Level of Service (LOS) for customers and users of the OGG
An improved level of airport safety and security for customers and users of the OGG
An efficient use of property and facilities
A balance of passenger volumes and operations among OGG facilities
Improved tenant facilities
Enhanced airport access as part of the region's transportation system
Measured and incremental improvements that are cost effective and respond to the region's forecast for air service for passengers and cargo
Compatibility with surrounding land uses

Implementation guidance is provided by the FAA via the ACs. Since the last OGG MP in 1993, a number of changes have been made by the FAA to ACs that affect airport planning and design. The ACs that provide guidance for this MP Update are listed in the following table:

Advisory Circular ID	Advisory Circular Title
150/5300 13A	Airport Design
150/5070 6B	Airport Master Plans
150/5325 4B	Runway Length Requirements for Airport Design
150/5100	Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects
150/5200 33B	Hazardous Wildlife Attractants on or Near Airports
150/5300-16A	General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Controls and Submission to the National Geodetic Survey
150/5200-17b	General Guidance and Specifications for Aeronautical Survey Airport Imagery Acquisition and Submission to the National Geodetic Survey
150/5200-18b	General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards

Pictured Above: Ticketing Lobby

1.4 GOALS AND OBJECTIVES

The two (2) principal goals of this MP Update are to:

- Identify the facilities needed to accommodate forecast air service demand through 2035 while improving LOS, airport safety and security, and enhancing airport access.
- Propose locations and configurations for facilities that efficiently utilize the existing airport property and facilities, are compatible with surrounding land uses, and are cost effective.

The objectives of this MP Update are to:

- Provide a graphical representation of future airport development within the context of current and anticipated land uses in the vicinity of the OGG.
- Outline a prioritized capital improvement program and schedule for improvement projects described in the MP Update.
- Present the technical rationale and documentation of procedures used to formulate and assess alternatives in determining the proposed facilities and land use plan.
- Provide input from airport users, members of the public, and government agencies.

1.5 COORDINATION

This MP Update was prepared by the DOTA in consultation and participation with the FAA, Technical and Citizen Advisory Committees, and members of the general public. The Technical and Citizen Advisory Committees were organized to review and comment on detailed aspects of the MP Update relating to their specific areas of interest or concern. Members of each advisory committee were selected to represent various airport users, special interest groups, and government agencies. To inform and obtain input from the general public, DOTA held a series of public information meetings.

The following individuals and organizations served on the Technical and Citizen Advisory Committees:

Technical Advisory Committee

- A & B Properties, Inc.
- Advantage Rent a Car
- Alika Aviation, Inc.
- American Airlines
- Alaska Airlines
- Air Canada
- Air Maui Helicopter Tours
- Airlines Committee of Hawaii
- Aloha Air Cargo
- Aris Inc.
- Avis Budget Group
- Bradley Pacific Aviation
- Blue Hawaiian Helicopters
- Blind Vendors Ohana, Inc.
- Continental Airlines
- Delta Airlines
- DOTA Maui District
- Dollar Rent a Car
- DFS Hawaii Kahului Airport
- Enterprise Rent-A-Car
- Edward K. Noda and Associates
- Federal Aviation Administration
- FedEx
- Hawaiian Airlines
- Haliiamaile Pineapple
- State Department of Agriculture, Land and Natural Resources
- Hawai'i Tourism Authority
- State Department of Transportation, Harbors Division
- Hertz

- HMSHost
- Island Air
- Kahului Taxi Service
- Kahului Airport Coalition
- County of Maui Planning, Water Supply and Public Works Departments
- Office of the Mayor (Maui)
- County of Maui Council (Chair)
- County of Maui Police Department
- Maui Land and Pineapple, Inc.
- Maui Visitors Bureau
- Maui Chamber of Commerce
- Maui Aviators Aircraft Rental Flight Training, Inc.
- Mokulele Airlines
- National Car Rental
- Pacific Air Cargo
- Pacific Helicopters
- Roberts Hawaii
- Securitas, Inc.
- Sunshine Helicopters
- Transair and Rhodes Aviation, Inc.
- Transportation Security Administration
- United Airlines
- U.S. Airways
- U.S. Department of Homeland Security, Customs and Border Protection
- U.S. Department of Agriculture
- U.S. Postal Service
- United Parcel Service
- WestJet
- Windward Aviation, Inc.

Citizen Advisory Committee

- DOT Office of Civil Rights
- Greg and Masako Westcott
- EarthJustice
- Grand Wailea Resort
- Haleakalā National Park
- Hyatt Regency Maui Resort and Spa
- Kahului Town Association
- Kahului Airport Coalition
- Queen Ka'ahumanu Center
- Marriott Wailea Beach Resort and Spa
- Life of the Land
- Maui Chamber of Commerce
- Maui Contractors Association
- Maui County Farm Bureau
- Maui Disposal Co., Inc.
- Maui Economic Opportunity, Inc.
- Maui Hotel and Lodging Association
- Maui Realtors Association – Maui, Inc.
- Maui Tomorrow Foundation, Inc.
- Maui Visitors Bureau
- Maui Economic Opportunity
- Dick Mayer
- Nature Conservancy
- Office of Hawaiian Affairs
- Office of the Governor
- Sierra Club, Maui Group
- Spreckelsville Community Association
- Hawaii State Legislators
    - Representative Angus McKelvey
    - Representative Gilbert Agaran
    - Representative Kaniela Ing
    - Representative Joseph Souki
    - Representative Kyle Yamashita
    - Senator Rosalyn Baker
    - Senator Kalani English
- U.S. Legislators
    - U.S. Representative Tulsi Gabbard
    - U.S. Senator Mazie Hirono

- U.S. Senator Brian Shatz
- State Office of Planning
- Sandy Szymanski
- The Maui Farm, Inc.
- T S Restaurants
- The Westin Maui Resort and Spa
- Marsha Wienert

Airport Staff

- Deputy Director of Transportation – Ross M. Higashi
- Airport District Manager – Marvin Moniz
- Assistant Airport Superintendent – Dale Tsubaki
- Engineering Program Manager – Jeff Chang
- Construction Engineer – Gene Matsushige
- Planning Section – Herman Tuiolosega and Lynette Kawaoka

Lead Consultant

- R. M. Towill Corporation

1.6 REPORT CONTENT

This MP Update is organized into eight (8) chapters that generally follow the sequence of the planning process. An implementation plan for the recommended improvements is also included within each chapter. MP Update is organized as follows:

Chapter 1, Introduction – Describes the framework guiding the MP Update, identifies goals and objectives, and summarizes implementation of the 1993 OGG MP projects.

Chapter 2, Existing Conditions – Provides an overview of the regional setting, existing State and County land use designations, surrounding land uses and ownership, and existing airport operations and facilities. It also identifies and discusses environmental policy and regulatory requirements relating to the 1993 OGG MP and current MP Update.

Chapter 3, Aviation and Passenger Forecast (2010-2035) – Analyzes historical air traffic activity and presents aviation demand forecasts through 2035 for passenger, cargo mail, and aircraft operations.

Chapter 4, Facility Requirements – Identifies airfield, terminal, airport access, and support facilities required to meet the projected aviation demands identified in **Chapter 3**.

Chapter 5, Airport Development Alternatives – Presents and evaluates alternative development concepts and plans to meet airfield, terminal, and access requirements.

Chapter 6, Master Plan – Presents the preferred development plan, ALP, airspace plan, and project cost estimate.

Chapter 7, Implementation Plan and Economic Implications – Presents a phased capital improvement project program plan and related cost data.

Chapter 8, References – Identifies the references used to prepare the MP Update.

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CHAPTER 2
EXISTING CONDITIONS

2.1 OVERVIEW

This chapter presents the regional setting, inventory of existing facilities, land use controls and ownership, environmental considerations, and development trends associated with the OGG.

The existing OGG facilities, services, operations and programs are divided into the following categories:

- Airfield
- Terminal Area
- Air Cargo and Mail
- General Aviation (GA)
- Access/Ground Transportation
- Airport Support
- Airport Industrial
- Airspace, Airport Traffic Control (ATC) & Noise Abatement Procedures
- Airport Management

2.2 REGIONAL SETTING

The OGG occupies 1,540.51 acres of land located on the Central Maui isthmus, along the northeastern side of Kahului Town. The Central Maui isthmus, formed by the meeting of lava flows, connects the Haleakalā Volcano and West Maui Mountains by broad flat lands. See **Figure 1-1** on Page 2-2. The area within the OGG includes the 246.9 acre Kanahā Pond State Wildlife Sanctuary, managed by the State of Hawai'i Department of Land and Natural Resources (DLNR) via a Memorandum of Understanding (MOU).

Kahului Town is Maui's major commercial and industrial center and home to Maui's principal commercial harbor and the OGG. Kahului is also composed of residential neighborhoods with large suburban lots and wide curvilinear streets

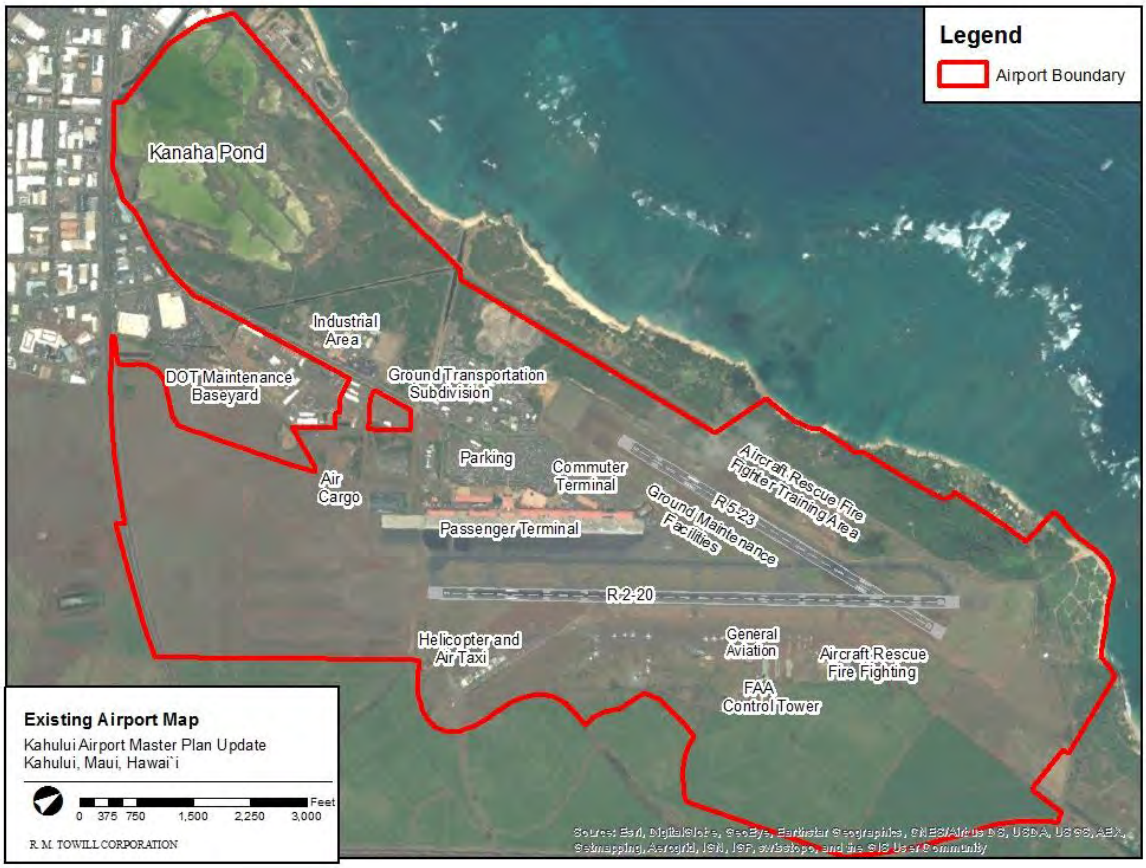

Figure 2-1 Location Map

Source: ESRI, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP swisstoppo, and GIS User Community

that are separated from the commercial and industrial uses in the area.

Land uses surrounding the OGG include single-family residences to the north; single-family residences and active agricultural lands to the east; the Hāna Highway, the Haleakalā Highway, and active agricultural lands to the south; and Kahului Harbor, Wailuku Wastewater Reclamation Facility, Kanahā Beach Park, and light industrial, commercial, and retail uses to the west.

2.3 INVENTORY OF EXISTING FACILITIES

Two (2) runways serve the airport: Runway 2-20 and Runway 5-23. See **Figure 2-1** and **Section 2.3.3** on Page 2-5 for a discussion on Runway 5-23.

The facilities located west of Runway 2-20 include:

- Main Passenger Terminal
- Commuter Airline Terminal
- Airline Offices
- Air Cargo Facilities
- Airline Ground Maintenance Facilities
- DOTA Maintenance Baseyard
- Ground Transportation Subdivision
- ARFF Training Facility
- Airport Industrial Area

The facilities located east of Runway 2-20 include:

- GA Area
- Aircraft Maintenance Facilities
- Hangars
- Based and Itinerant Aircraft Parking Apron
- Fixed Base Operator (FBO) Area
- Helicopter and Air Taxi Facilities Including Scenic Air Tour Operations
- Aircraft Rescue and Fire Fighting (ARFF) Facility
- FAA Airport Traffic Control Tower (ATCT)

The relationship of these facilities to each other is shown on **Figure 2-1** on Page 2-2.

2.3.1 AIRFIELD

According to the National Plan of Integrated Airport Systems (NPIAS) the OGG would be classified as a Primary, Medium Hub airport. A Primary airport is defined as having more than 10,000 passenger enplanements each year. A Medium Hub airport is defined as having between 0.25 and 1.0 percent (%) of the total annual passenger boardings within the U. S. in the current fiscal year.

Aircraft in use at the OGG are classified by the FAA in AC 150/5300-13A *Airport Design* (2014), as Aircraft Approach Categories (AAC) C or D (i.e., aircraft with approach speeds of 121 to 165 knots, inclusive). Examples of Category C and D aircraft include the B-737, B-747, B-757, B-767, B-777, A-330, and most business jet aircraft.

The OGG is primarily used by aircraft in the Aircraft Design Group (ADG) III with wingspans ranging from 79 feet (ft.) to 117 ft. (e.g., B-717 and B-737). It is also frequently used by aircraft such as the B-757 and B-767 that are in ADG IV. Aircraft in ADG V (i.e., B-747 and B-777) and ADG VI (i.e., C-5A) occasionally use the OGG but their operations account for an insignificant percentage of total operations. Between 2010 and 2015 the OGG had 118,896 and 123,587 aircraft operations respectively.

The OGG's two (2) runways, Runway 2-20 and Runway 5-23, intersect at the northern end of the airfield. Information on their physical characteristics is summarized in **Table 2-1** on Page 2-5.

2.3.2 RUNWAY 2-20

Runway 2-20 is 6,995 ft. long, 150 ft. wide, and constructed of grooved asphalt with 35 ft. wide stabilized asphalt concrete (AC) shoulders. The Runway Safety Area (RSA) is 500 ft. wide and extends 1,000 ft. in both directions beyond the ends of the runway. Elevations at Runway 2-20 ends are 54 and 12 ft., respectively, above Mean Sea Level (MSL). The average gradient from north to south is 0.59%.

Runway 2 has an Instrument Landing System (ILS), Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), and Visual Approach Slope Indicator (VASI-4), while Runway 20 has Precision Approach Path Indicator (PAPI-4) approach aids. In addition, Runway 2 has High-Intensity Runway Lights (HIRL), while Runway 20 has Medium Intensity Runway Lights (MIRL).

Runway 2-20 Reconstruction

Runway 2-20 serves as the OGG's primary runway. This runway is currently experiencing pavement distress and is in need of reconstruction.

Pavement distress results in increased AC deterioration in the form of cracks, joint deterioration, and other forms of pavement stresses. Although the runways at OGG are safe in their current condition, because of recent resurfacing, this has led to a slow but steady rise in the presence of foreign object debris (FOD). FOD has the ability to severely damage aircraft when there is an accidental intake of FOD into jet aircraft engines. The rise in FOD has led OGG staff to increase safety inspections prior to the departure of aircraft.

In 2008, the DOTA investigated this issue and commissioned two separate reports that had

similar findings concerning the cause of the pavement distress.

The first report, *Runway 2-20 and Taxiway Pavement Evaluation, Kahului, Maui, Hawai'i,* was prepared by MACTEC Engineering and Consulting, Inc. (MACTEC) in September 2008. The report investigated pavement conditions, potential problems, and recommended possible solutions to repair the runway while considering the runway's active use and importance to the economy of Maui.

MACTEC indicated that the existing pavement structure generally has about 17 inches of AC over four (4) to eight (8) inches of aggregate base, with some areas having 14 inches of AC over nine (9) inches of base, and 16 inches of AC over eight (8) inches of base. Shear testing of the pavement indicated weak to no bonding of the layers. The report concluded that the pavement problems resulted from slippage between the pavement layers caused principally by the braking and turning actions of heavy aircraft while slowing and exiting the runway after landing. The report hypothesized that "…the separation of the layers is due to a weak bond resulting from low or weak bond strength of the tack coat."

The second report, *Statewide Pavement Management System Update for Kahului Airport,* was prepared by URS Corporation, Inc., 2008, and similarly concluded "…pavement distress is from slippage between the existing AC layer which is placed over the aggregate base." A supplemental pavement evaluation, *Runway 2-20 & Taxiway Structural Improvements at OGG, State Project No. AM1022-14: Concrete Construction*, URS Corporation, Inc., 2010, further suggested that the runway surface be converted from asphalt to concrete.

The prevention of FOD caused by airfield pavement deterioration is among one of the DOTA and FAA's top safety priorities. Since 1942 when Runway 2-20 was originally constructed, there have been five (5) subsequent AC overlays constructed to maintain the use of the runway. These occurred in 1969, 1972, 1981, 1995, and 2000, at an overall approximate cost of $4.2 mil. Later, in 2006, a partial 3-inch AC mill and overlay project was constructed for approximately $3.4 mil.

The need for unscheduled intermittent pavement repairs to Runway 2-20 has been required since 2008. Funding for the pavement repair was from the airports special maintenance budget: 2008-2010, $1.3 mil. and 2011, $1 mil.

Pavement distress and proposed rehabilitation and/or reconstruction are a priority concern for both the DOTA and FAA. The intermediate repairs undertaken over the past several years have provided some relief but have not addressed the need for a permanent fix or remedy providing a durable, safe runway with a design life of not less than 20 years. The continued use of intermediate repairs constitutes an inefficient use of airport funds as recurring problems with FOD can be expected to result in aircraft delays and a higher potential for accidents when intermediate construction activities disrupt airfield operations.

During the OGG MP Update, the DOTA commissioned the *Kahului Airport Runway 2-20 Reconstruction Feasibility Study,* URS Corporation, Inc., 2012, to identify and evaluate reasonable and practical alternatives for Runway 2-20 reconstruction. Alternatives were evaluated using a three (3) step screening process that met the following purpose and need criteria:

- Reconstruct Runway 2-20 at its current length with a 20-year pavement life.
- Maintain airfield capability to adequately accommodate the current and projected levels of air carrier and cargo operations, as well as the current and potential fleet mix of transpacific flights.

Runway 2-20 Extension

Increasing the operational capacity of the OGG has been under consideration since 1993 when the last update of the OGG MP took place. Many

of the aircraft serving OGG in the 1990s are no longer being utilized and new markets are now being served. The aircraft now serving OGG are more efficient and larger. At its existing length of 6,995 ft., Runway 2-20 does not allow airlines to operate unrestricted at maximum takeoff weight (MTOW). See **Chapter 4**, **Section 4.3.6.8** *Runway Length* for details. Currently, the B-737-800 aircraft requires 8,400 ft. to takeoff at MTOW on a standard day + 27°C with zero wind and runway gradient. This is in contrast to the 6,995 ft. currently available. The B-767-300 requires on a similar standard day 10,600 ft. of runway to takeoff (Boeing, 2016).

2.3.3 RUNWAY 5-23

Runway 5-23 is 4,990 ft. long, 150 ft. wide, and constructed of grooved asphalt. The RSA is 500 ft. wide and extends 1,000 ft. in both directions from the ends of the runway. The average gradient from west to east is 0.08%. Runway 5 has VASI-4 approach aids.

Runway 5-23 primarily serves commuter and general aviation traffic. Occasionally the runway serves as a crosswind runway when there are "Kona" wind conditions from the south and southwest directions.

CHARACTERISTIC	RUNWAY 2-20	RUNWAY 5-23
Approach Category	C - D	A - C
Aircraft Design Group	IV-V	I-IV
Length (ft.)	6,995 ft.	4,990 ft.
Width (ft.)	150 ft.	150 ft.
Surface Type	ASPH-G	ASPH-G
Surface Treatment	Grooved	Grooved
Pavement Strength		
- Double Dual Tandem	750,000 lbs.	N/A
- Dual Tandem	360,000 lbs.	270,000 lbs.
- Dual Wheeled	170,000 lbs.	170,000 lbs.
- Single Wheeled	N/A	130,000 lbs.
Runway Protection Zone Dimensions (ft.)	1,000 ft. x 1,750 ft.	500 ft. x 1,010 ft.
Runway Safety Area Dimensions	500 ft. x 1,000 ft.	500 ft. x 1,000 ft.
Elevations (Above MSL) (ft.)	54/12 ft. MSL.	20/16 ft. MSL.
Stripping	Precision Approach	Non-Precision Approach

Table 2-1 Kahului Airport Runway 2-20 and Runway 5-23 Data

AIRCRAFT CLASS	PERCENT OF OPERATIONS BY YEAR		PERCENT CHANGE
	2010	2014	
Class A and B	65	62	-3
Class C and D	35	38	+3

Table 2-2 Percent of Total Aircraft Operations 2010 and 2014

RUNWAY	PERCENT OF OPERATIONS BY AIRCRAFT APPROACH CATEGORY	
	A and B	C and D
2	6.7	40.9
20	0.7	5.6
5	40.7	0.1
23	5.3	0.0

Table 2-3 Percent Aircraft Utilization by Runway

TAXIWAY	DESCRIPTION	WIDTH
A	Parallel taxiway to Runway 2-20 on west side of asphalt concrete pavement.	75 ft., with 25 ft. shoulders
B	Diagonal connecting taxiway from a point 2,000 ft. from the southern end of Runway 2-20 to the main passenger terminal apron and Runway 5-23.	50 - 75 ft.
C	Exit taxiway at the end of Runway 2 that connects to the helicopter operating area.	75 ft.
D	Exit taxiway that connects the passenger terminal apron with Runway 2-20 approximately 1,000 ft. from the southern end of the runway.	200 ft.
E	The portion northwest of Runway 2-20 is a diagonal exit taxiway connecting the passenger terminal apron with Runway 2-20 approximately 2,000 ft. from its southern end. This portion's pavement is approximately 125 ft. wide. The portion southeast of Runway 2-20 is a diagonal exit taxiway connecting the southern end of the air taxi apron with Runway 2-20. This portion's pavement is 75 ft. wide with 20 ft. wide asphalt concrete shoulders.	75 – 125 ft.
F	Exit taxiway connecting Runway 2-20 with Taxiway "B" and Taxiway "H" at the western end of Runway 5-23. A portion of the taxiway connects the general aviation apron with Runway 2-20. Pavement width is 75 ft. between Runway 2-20 and Taxiway "A," and between the GA apron and Runway 2-20; 50 ft. between Taxiway "A" and Taxiway "B"; and varies between Taxiway "B" and Runway 5-23.	50- 75 ft.
G	Exit taxiway connecting northern part of Runway 2-20 with Taxiway "A." Pavement width varies from 125 to 400 ft.	124 – 400 ft.
K	Exit taxiway connecting northern part of Runway 2-20.	Varies
L (Temporary)	Taxiway parallel and east of Runway 2-20 in front GA facilities, currently "apron-edge taxiway". This proposed taxiway will be the temporary runway during Runway 2-20 reconstruction.	Varies 50 ft. +

Table 2-4 Designated Taxiways at Kahului Airport

2.3.4 AIRCRAFT FLEET MIX

The aircraft fleet mix is the relative percentage of operations conducted by fixed wing aircraft within the following aircraft approach categories (AAC):

- Category A: Small single-engine aircraft with a maximum certificated takeoff weight of 12,500 lbs. or less and an approach speed of less than 91 knots.
- Category B: Small twin-engine aircraft (including small business jets) with a maximum certificated takeoff weight of 12,500 lbs. or less and an approach speed of 91 knots or more, but less than 121 knots.
- Category C: Large aircraft with a maximum certificated takeoff weight greater than 12,500 lbs. but less than 300,000 lbs. (includes B-717, B-737, CRJ passenger aircraft, C-130 military aircraft, and larger business jets) and an approach speed of 121 knots or more, but less than 141 knots.
- Category D: Heavy aircraft with a maximum certificated takeoff weight greater than 300,000 lbs. (includes B-757, B-767, B-777, A-330, B-747, and C-5A aircraft) and an approach speed of 141 knots or more, but less than 166 knots.
- Category E: Heavy and special military aircraft with an approach speed of 166 knots or more.

In 1990, Category A and B aircraft comprised 57.6% of operations while Category C and D aircraft comprised 42.7% of operations. In 2010,

Category A and B aircraft comprised 65%of operations while Category C and D aircraft comprised 35% of operations. A summary is provided in **Table 2-2** on Page 2-5, and example of aircraft types by AAC is provided in **Figure 2-3** on Page 2-8.

2.3.5 RUNWAY USE PATTERNS

An airport's runway use pattern is defined by the number, location, and orientation of active runways, and by the directions and types of operations on each runway. Runway 5-23 is utilized mainly by Category A and B aircraft. Runway 2-20 is utilized mainly by Category C and D aircraft. Runway use percentages by type of aircraft are summarized in **Table 2-3** on Page 2-5.

2.3.6 ARRIVAL/DEPARTURE AND TOUCH-AND-GO OPERATIONS

Hourly capacity is influenced by the split between arrivals and departures. As discussed in **Chapter 3**, peak-hour arrivals and departures are roughly equal at the OGG. They are forecasted to remain roughly equal throughout the planning period. Airfield capacity is also affected by touch-and-go operations by GA and military aircraft. Presently, touch-and-go operations (including low approaches) account for about 15% of the total operations based on FAA ATCT counts. The touch-and-go operations and low approaches at the OGG are forecast to remain constant throughout the planning period.

2.3.7 TAXIWAYS

The characteristics of the taxiways at OGG are summarized in **Table 2-4** on Page 2-6. Taxiways "B", "E", "F", "G", and "K" have variable widths ranging from 50 to 400 ft. Taxiways "A" and "C" are each 75 ft. wide, while Taxiway "D" is approximately 200 ft. wide. The apron edge taxiway that runs parallel and east of Runway 2-20 is 50+ ft. wide. The pavement strengths of Taxiways "A through K" are indicated on FAA Form 5335-1 for single-wheel, dual-wheel, and dual-tandem-wheel aircraft and are 130,000, 170,000, and 270,000 lbs, respectively. The corresponding values for portions of Taxiway "F" are 30,000 lbs., 40,000 lbs., and 65,000 lbs., respectively (1993).

2.3.8 AIRCRAFT PARKING APRONS

The OGG has several aircraft parking aprons including:

- Passenger
- Commuter
- East

The passenger terminal apron is the main apron and is located between the passenger terminal building and Taxiway "A." The commuter terminal aircraft parking apron is located northeast of the commuter terminal building on the inland side of Runway 5-23. The "East Ramp" apron (east of Runway 2-20) serves OGG based and itinerant GA aircraft, helicopters, and air taxi operations. The characteristics of these aprons are described below.

Aircraft	Pavement Strength Capacity	Main Landing Gear Configuration
B-777-200	450,000 lbs.	Triple Dual Tandem
B-767-300ER	520,000 lbs.	Single Tricycle
B-757-300	450,000 lbs.	Dual Tandem

Table 2-5 Pavement Strength Capacity for Passenger Terminal Apron

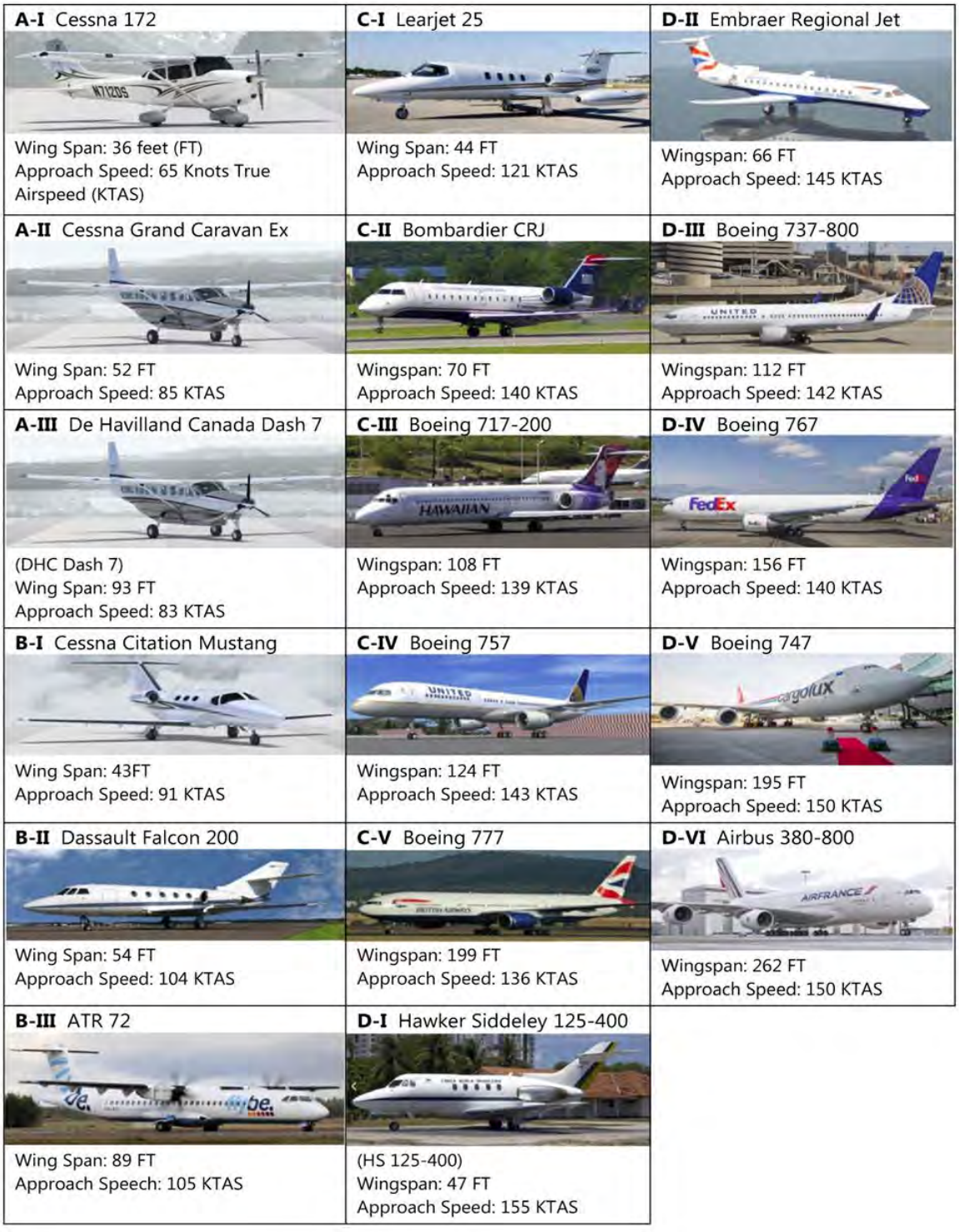

Figure 2-3 Aircraft Type Examples by Approach Category

2.3.8.1 PASSENGER TERMINAL APRON

The passenger terminal apron measures approximately 3,500 ft. long by 500 ft. wide. The concrete hardstand portion of the apron is approximately 3,450 ft. long and 150 ft. wide, and supports 13 aircraft parking positions as presently configured. The hardstand and apron were expanded to serve the Alien Species Inspection Facility (ASIF) and air cargo facilities. The DOTA has calculated pavement strengths based on aircraft types for the passenger terminal apron (*Hawai'i Airports and Flying Guide, 2012-2013)*. The DOTA identified the gross load capacities shown in **Table 2-5** on Page 2-7 for aircraft using the passenger terminal apron

2.3.8.2 COMMUTER TERMINAL APRON

The commuter terminal apron measures approximately 600 ft. long by 400 ft. wide. The OGG records indicate that the apron was designed to accommodate single-wheel aircraft with gross weights up to 75,000 lbs. and dual-wheel type landing gear aircraft with gross weights up to 145,000 lbs. This is more than adequate to accommodate the type of aircraft that currently use the commuter terminal.

2.3.8.3 EAST RAMP APRON

The "East Ramp" apron consists of two distinct areas. The first area consists of the southern end of an abandoned runway (formerly Runway 17-35). This area measures approximately 1,200 ft. long by 400 ft. wide and is now used for helicopter operations. The second area parallels Runway 2-20. It is approximately 3,400 ft. long by 200 ft. wide and is used for GA and air taxi aircraft parking. According to the latest information available from DOTA, the pavement strength for single-, dual-, and dual-tandem-landing gear aircraft for most of the East Ramp apron are 30,000, 40,000, and 65,000 lbs., respectively.

2.3.9 RUNWAY PROTECTION ZONES

Runway protection zones (RPZ) are determined by FAA Advisory Circular AC 150/5300-13A Airport Design (2014) and are approach surface dimensions out to the point at which the approach surface is 50 ft. above the runway threshold or 50 ft. above the underlying terrain, whichever is less. The width of the runway end of the RPZ is determined by the most precise approach standard applicable to the runway. For example, if an Instrument Flight Rules (IFR) approach is maintained at one end and a Visual Flight Rules (VFR) approach at the other, the IFR inner minimum is applicable at both ends.

Runway 2 has a precision instrument approach requiring an inner width of 1,000 ft. at both ends of the runway. Based on the most precise approach procedure, only a non-precision instrument RPZ with a 34:1 approach slope is required for Runway 20. However, DOTA maintains the more restrictive instrument RPZ for Runway 2-20. The approach surface slopes for Runways 2 and 20 are both 50:1 for the first 10,000 ft. from the runway threshold. The slope of the remaining 40,000 ft. of these approach surfaces is 40:1. This meets the FAA's standard for precision instrument approaches to runways.

Runway 5-23 has only visual approaches at both ends requiring an inner width of 500 ft. and outer width of 1,010 ft. Based on the most precise approach procedure, only a visual RPZ with a 20:1 approach slope is required for Runway 5-23. However, DOTA maintains a more restrictive non-precision RPZs with a 34:1 approach slope for Runways 5 and 23. This meets the FAA criteria for non-precision approaches for large aircraft with visibility minimums of more than three-quarters of a mile. Because Runway 5-23 is occasionally used by jet air carrier (inter-island) aircraft when Runway 2-20 is not available (e.g., when it is closed for maintenance or when crosswinds preclude its use), the more restrictive approach slope provides an added margin of safety.

Existing RPZ information for each runway (e.g., Runways 2, 20, 5, and 23) approach end is shown in **Table 2-6** on Page 2-10.

All of the RPZs lay entirely within the OGG property, except for portions of the RPZ over the

Figure 2-4 Existing Airport Airfield Facilities

RUNWAY	TYPE OF RPZ	LENGTH (FT.)	INNER WIDTH (FT.)	OUTER WIDTH (FT.)
2	Precision	2,500	1,000	1,750
20	Precision	2,500	1,000	1,750
5	Non-precision	1,700	500	1,010
23	Non-precision	1,700	500	1,010

Table 2-6 Runway Protection Zones

RUNWAY		APPROACH SLOPE		CONTROLLING OBSTACLE/OBSTRUCTION LOCATION FROM END OF RUNWAY PRIMARY SURFACE RELATED TO EXTENDED RUNWAY CENTERLINE		
No.	**Threshold Elevation (AMSL)**	**Standard**	**Actual**	**Type**	**Elevation (AMSL)**	**Location**
2	54 ft.	50:1	48:1	Stack	171	Approx. 9,646 ft. from end (linear distance)
20	12 ft.	50:1	15:1	Trees	Approx. 515 ft. from end (linear distance)	
5	20 ft.	34:1	50:1	Building	101	
23	15 ft.	34:1	50:1	None	NOTE: Actual slope 50:1 is along runway	

Table 2-7 Comparisons of FAR Part 77 Standards for Approach Slopes with Existing Obstructions

Pacific Ocean to the north and a small portion for Runway 23 to the northeast. See Figure 2-4.

2.3.10 ENCROACHMENTS ON THE BUILDING RESTRICTION LINE (BRL)

The existing building restriction lines (BRL) for Runway 2-20 are 1,000 ft. to the west and 750 ft. to the east of the runway centerline. Analysis of a recent aerial photograph of the OGG indicates there are a few existing intrusions into the BRL area. These include a fueling facility occupied by Bradley Pacific Aviation and a GA facility occupied by Air Service Hawai'i, (Dean Sakamoto Architects LLC, 2011).

The BRLs of Runway 5-23 are 553 ft. from the runway centerline. This is based on the centerline of the taxiway serving the runway set back 400 ft. from the runway centerline and the BRL being set back 153 ft. from the taxiway centerline.

No intrusions into the BRL have been identified within the length of Runway 5-23. However, FAA standards (FAA AC 150/5300 13A) call for the BRL to extend past the ends of the runway to the point at which they intersect the RPZs. Several relatively new buildings located in the ground transportation baseyard area, west of the Runway 5-23 threshold, do not meet these criteria. These eight (8) buildings include the Dollar, National, and Thrifty buildings, as well as one abandoned building. Additionally, the existing airline ground equipment maintenance building penetrates the object free area and the BRL for Taxiway "F."

2.3.11 OBSTRUCTIONS

A review of both the FAA Airport Master Record and the Airport Obstruction Chart published by the National Oceanic and Atmospheric Administration (NOAA) was conducted to identify obstructions as defined by Federal Aviation Regulations (FAR) Part 77: "Objects Affecting Navigable Airspace." FAR Part 77 establishes "imaginary surfaces" related to airports and their runways. These imaginary surfaces are used to identify obstructions. **Table 2-7** is a comparison of the standard FAR Part 77 approach slopes and existing obstacles-obstructions in the vicinity of the OGG. This table will be used to update the FAA Airport Master Record and Airport Obstruction Chart.

The Runway 2 imaginary approach surface is penetrated by Kealoloa Ridge of the West Maui Mountains. The ridge penetrates a portion of the 7:1 transitional surface between eight (8) and 10 miles south of the runway threshold. The Runway 20 imaginary approach surface is penetrated by some trees. These trees are approximately 515 ft. off the Runway 20 centerline and are subject to maintenance action

on a periodic basis. Runway 5-23 does not have obstructions.

2.3.12 NAVIGATIONAL FACILITIES AND LIGHTING

The OGG FAA ATCT operates between 6:00 AM and 11:00 PM. There is an Airport Surveillance Radar (ASR) located on the OGG property; it is controlled remotely from the Honolulu Air Route Traffic Control Center (ARTCC). The ARTCC also provides radar approach/departure control services. The FAA radio transmitter/receiver building for the ARTCC is located to the east of Runway 2-20 near the existing ASR facility. Additionally, the OGG is equipped with a lighted wind indicator, a segmented circle, wind cones, and a rotating beacon. A non-directional beacon is located at the middle marker (identification call sign letters "VYI").

The OGG is equipped with a Very High Frequency Omni-Directional Radio Range and Tactical Aircraft Control Navigation (VORTAC) system, designated Maui VORTAC, to assist pilots in determining bearing relative to the facility and azimuth. In July 1996, the Maui VORTAC was relocated adjacent to the intersection of Runway 5-23 and Runway 2-20.

Runway 2-20 has precision runway markings and HIRL. Both ends of the runway are equipped with VASI-4. Runway 2 has an ILS including middle and outer markers and a MALSR.

Runway 5-23 is painted with non-precision runway markings and is equipped with MIRL. Runway 5 has VASI approach aids.

All entry/exit taxiways and parallel taxiways to both runways are equipped with Medium Intensity Taxiway Lights (MITL).

2.3.13 METEOROLOGICAL CONDITIONS

The average annual temperature at the OGG is 74° Fahrenheit (°F). During the summer, the average monthly high is 82°F and the average low is 70°F. Winter temperatures are about ten degrees cooler. The highest temperature on record is 90°F and the lowest is 55°F. The average maximum daily temperature for the hottest month is 84°F.

Rainfall at the OGG is quite low, averaging less than 20 inches per year. The majority of this occurs during the winter as large-scale frontal systems move past the island. The Rainfall Frequency Atlas of the Hawaiian Islands, published by the U.S. Department of Commerce (1962), estimates that the average 24-hour rainfall having a recurrence interval of 50 years is approximately seven (7) inches.

Winds at OGG are influenced by a variety of factors. These include: strong prevailing trade winds; physical presence of large mountain masses to the east (Haleakalā) and west (West Maui Mountains) of the OGG; and nighttime drainage winds that carry cool air from the mountain slopes to the coastal areas of Kahului. These winds have a significant effect on the operations of the OGG.

Data collected at OGG between January 1970 and December 1979, shows that the wind coverage for 13 knots crosswinds is 96.1% for Runway 2-20 and 98.4% for Runway 5-23. The combined coverage for both runways is 99.8% for 13 knot crosswinds. Larger aircraft generally use Runway 2 during trade wind conditions and Runway 20 during Kona wind conditions. A similar use pattern is exhibited by the smaller aircraft that use Runway 5-23, with Runway 5 being used during trade wind conditions and Runway 23 being used when there are Kona winds. Wind direction and percentage of occurrence at OGG are summarized in **Table 2-8** on Page 2-13.

Data collected by the National Weather Service at the OGG between 1949 and 1967 indicates that IFR ceiling and visibility conditions below 1,000 ft. and/or three miles at the OGG occur less than 1% of the time. This value was used in calculating the airfield's annual service volume.

Daytime Wind Direction/Speed	Calm	1-6 knots	7-10 knots	>10 knots
Trade wind	2.0%	8.9%	12.2%	65.2%
Kona	-	6.3%	1.8%	3.8%
Nighttime Wind Direction/Speed	Calm	1-6 knots	7-10 knots	>10 knots
Trade wind	5.4%	17.1%	18.8%	30.7%
Kona	-	25.4%	1.6%	0.9%

Table 2-8 Wind Characteristics at Kahului Airport

2.4 TERMINALS (SEE FIGURE 2-5)

2.4.1 PASSENGER TERMINAL COMPLEX

Major passenger terminal improvements since the completion of the 1993 MP include a renovated ticket lobby, new passenger check-in counter spaces with 24 computerized kiosks, new baggage claim carousels, security screening, and a new generator building.

Terminal improvements currently under construction (2014-2015) through the Hawai'i Airports Modernization program are Phase 1 reroofing and upgrades to security access control and closed circuit TV system. Additional improvements anticipated to commence within 1-6 years under the Hawai'i Airports Modernization program include new flight and baggage information display systems, re-roofing of terminal building Phases 2 and 3, remodeling of passenger holdrooms, and a new family restroom. Most recently, four (4) moving walkways have been constructed on the 2nd floor along the concourses between Gates 22 through 34. Act 158, Session Laws of Hawai'i (SLH) 2008 designated $12.9 mil. for terminal improvements.

The passenger terminal apron can accommodate up to 20 inter-island size (B-717, B-737, and CRJ) aircraft in a single row with power-in/push back operation. According to the Competition Plan Kahului Airport, fiscal year (FY) 2011, there are currently nine (9) gates designated for overseas (B-737, B-757, B-767, and B-777) aircraft. These are gates 1, 5, 7, 23, 27, 29, 33, 35, and 39. Seven (7) gates are currently used for inter-island operations. These are gates 9, 11, 13, 15, 17, 19, 21 (see **Figure 2-5** on Page 2-14). Only gates 17 through 21 are configured to accommodate wide-bodied aircraft such as B-767. When wide-bodied aircraft are parked on the apron, they often occupy two (2) to four (4) gates. Thus, Gates 3, 25, 31, and 37 are rarely used. All aircraft parking (gate) positions have direct access to Taxiway A. Some U.S. Customs operations occur in the terminal side nearest to the older air cargo building and General Service Equipment (GSE) building.

Aircraft are currently and will continue to be fueled from trucks. Though the apron contains provisions for fueling from below-grade hydrants, the fuel storage and supply lines for them have not yet been installed.

2.4.2 COMMUTER TERMINAL

Located northwest of the passenger terminal, the commuter terminal building, opened in 1987, includes space for ticketing, check-in, baggage claim, holding, airline offices, and restrooms. See **Figure 2-5** on Page 2-14. The facilities of the commuter terminal are in good condition. Maui Air, Makani Kai Air, Mokulele Airlines, Island Air, and Paragon Air Tours, use the terminal for ticketing and holding. The commuter aircraft parking apron can accommodate up to 12 commuter-type aircraft. The apron connected to the southern end of Runway 5-23 by Taxiways "F" and "H" and also to Taxiway "B" via Taxiway "F", approximately 1,500 ft. from the approach end of Runway 5. Aircraft are refueled from trucks.

Figure 2-5 Existing Terminal Facilities

2.5 AIR CARGO AND MAIL FACILITIES

A 31,000 square feet (s.f.) air cargo facility is located southwest of the passenger terminal and along the existing apron and concrete hardstand. Currently Hawaiian Air Cargo, Pacific Air Cargo, Trans Air, United Air Cargo, Aloha Air Cargo, American, and Alaska Air Cargo conduct operations at this facility. Next to the air cargo facility is the 7,400 s.f. ASIF operated by the Hawai'i State Department of Agriculture (DOA). United States Postal Service (USPS) operations are presently being conducted from two (2) steel frame buildings along Hemaloa Street, next to Bodell Construction and the cell phone waiting area.

2.6 GENERAL AVIATION FACILITIES

GA facilities are located east of Runway 2-20. These facilities include three (3) T-hangar buildings, with 30 spaces, owned by the State and leased to individual aircraft owners. There are 34 tie downs presently situated on the East Ramp that occupy an 800 ft. by 200 ft. area immediately adjacent to the T-hangars. The tie downs are used by based and itinerant aircraft. See **Figure 2-6** on Page 2-15. Because of the absence of other suitable on-site airport space, the State's guidelines for use of the T-hangars have been broadly interpreted. The tie-down area, however, is not large enough to accommodate larger private jets. These aircraft are accommodated on a first-come first-served basis and are allowed to park along the paved portion of the East Ramp.

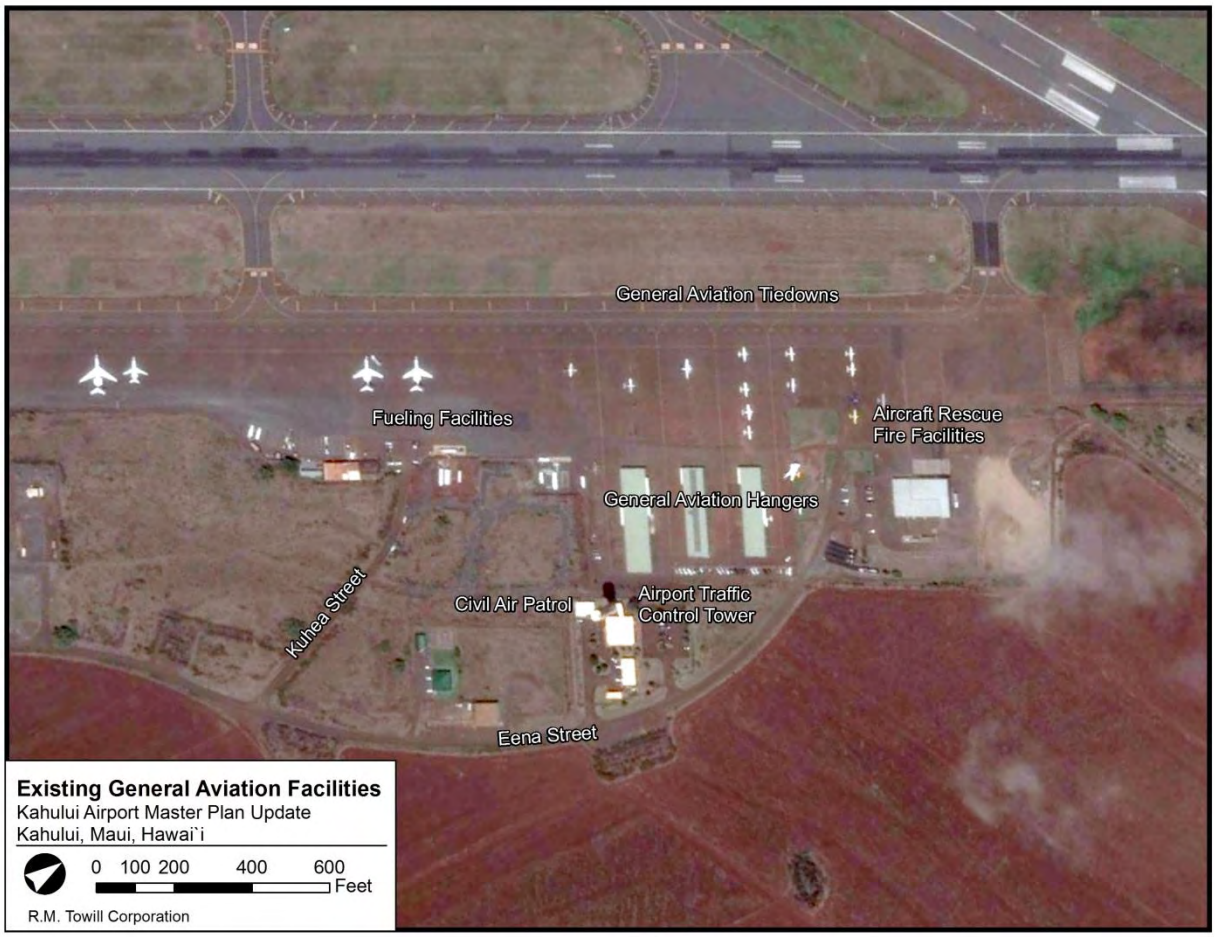

Figure 2-6 Existing General Aviation Facilities

Bradley Pacific Aviation operates a number of facilities on the East Ramp. It is currently the primary fuel vendor at the OGG along with Air Service Hawai'i. In addition to fueling services, Bradley Pacific Aviation also provides a full range of services for corporate (executive) aircraft that visit Kahului. Their facilities consist of a reception office, employee areas, a maintenance shop, a storage shed, and fuel storage tanks.

2.7 AIR TAXI

The scenic air taxi aircraft that visit the OGG park on the East Ramp apron. Aircraft are fueled on the apron by Bradley Pacific Aviation. Parking space is provided adjacent to the apron for tour buses and vans that carry passengers around Maui. A small terminal building, with only basic amenities for passengers, is located on the site and used by Air Service Hawai'i.

2.8 HELICOPTERS

Commercial helicopter operations at the OGG are concentrated at the southeastern corner of the OGG. According to conversations with the DOTA, there are 36 helicopters based at the OGG. Nearly all of these are used for sightseeing/air tour operations. This area includes a landing and takeoff helipad, as well as an apron area for helicopter parking and passenger loading and unloading. See **Figure 2-7** on Page 2-16. However, some helicopters land and takeoff from the passenger loading and unloading positions. Small plots along the edge of the apron are leased to the helicopter operators who have erected buildings containing reception areas, offices, and aircraft storage space. Helicopters are fueled on the apron by Bradley Pacific Aviation or, in some cases, from operator-owned fuel trucks or from the two (2)

underground fueling tanks maintained by Hawai'i Helicopters.

The FAA Maui ATCT, in cooperation with the helicopter air taxi operators regularly fly from the OGG using VFR helicopter arrival/departure procedures. They provide separation between helicopters and fixed-wing aircraft during daylight hours and facilitate the movement of aircraft in and out of OGG's ATCT airspace.

These procedures are primarily for departures and arrivals from the east. They have been established for use when either Runways 2 or 5 are being used in trade wind conditions, or Runways 20 or 23 are being used in Kona wind conditions. For air traffic to and from the west, the departure and arrival instructions, headings, and altitudes are assigned by the FAA Maui Tower controllers to ensure separation between the helicopters and fixed-wing aircraft as the helicopters cross from one side of the OGG to the other.

2.9 AIRPORT ACCESS/GROUND TRANSPORTATION

2.9.1 EXISTING ROADWAYS

Hāna Highway is a State-maintained roadway that carries local traffic within Central Maui, and connects Central Maui with eastern communities along the coast to Hāna. See **Figure 2-8** on Page 2-17. Between Ka'ahumanu Avenue and Dairy Road, Hāna Highway is a four (4) lane facility with a posted speed limit of 30 miles per hour (mph). From its intersection with Dairy Road, Hāna Highway continues as a four (4) lane facility to the signalized intersection with Haleakalā Highway. During peak traffic periods, Hāna Highway has three (3) travel lanes open with the center lane used for contra-flow traffic during the afternoon peak periods.

Figure 2-7 Existing Helicopter Facilities Terminal Complex

Figure 2-8 Airport Access General Aviation

Source: ESRI, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstoppo, and GIS User Community

The posted speed limit is 55 miles per hour (mph). Beyond its intersection with Haleakalā Highway, Hāna Highway is reduced to two (2) lanes with one (1) travel lane in each direction.

Haleakalā Highway is a four (4) lane State roadway linking Central Maui with the upcountry areas of Maui. Within the section surrounding the OGG, Haleakalā Highway has a posted speed limit of 45 mph that increases to 55 mph after the intersection with North Firebreak Road.

Keolani Place, a four (4) lane facility, serves as the primary access to the OGG's terminal facility and has a posted speed limit of 30 mph. It provides vehicular access to the OGG and its facilities. It also provides a direct connection with Hāna Highway for vehicles traveling between the OGG, Wailuku, and Kahului.

Dairy Road is a four (4) lane roadway with a posted speed limit of 30 mph. After Hukilike Street, Dairy Road becomes Kūihelani Highway. The posted speed limit on Kūihelani Highway increases to 55 mph south of its intersection with Pu'unēnē Avenue. Presently, most of the OGG traffic utilizes Dairy Road, Keolani Place, and Haleakalā Highway. Some OGG traffic may use Alahao Street, but this roadway is used primarily by Kanahā Beach Park users.

The facilities adjacent to the East Ramp are accessed from Hāna Highway via Kala Road and Haleakalā Highway. At present, Haleakalā Highway continues around the southern end of

Runway 2-20, terminating at the intersection of Keolani Place and Dairy Road. Therefore, these facilities can also be readily accessed from the west side of the OGG.

While not intended as a major access route, Koeheke Street, which extends to Alahao Street, intersects Keolani Place opposite the main passenger terminal parking area and provides access to rental car baseyards and airport industrial area. Alahao Street is a narrow, two (2) lane roadway that runs along the west side of the OGG and serves the Kanahā recreational areas and other facilities located along the shoreline adjacent to the OGG. At one time Alahao Street crossed what is now OGG property into West Spreckelsville; however, it now ends at a fence along the OGG boundary.

Traffic studies in the area were conducted by Julian Ng, Inc. for the Environmental Assessment of the Kahului Airport Access Road (currently under construction with planned completion in 2016), Phase I project. A summary of this report is provided below.

Historical traffic counts from September 2007 for Hāna Highway and March 2003 for Keolani Place were used to aid the study. These intersections were used because they represent major sources of OGG traffic. The traffic counts found that the morning peak hour for Hāna Highway to be between 7:15 AM and 8:15 AM. The evening peak hour for Hāna Highway was from 4:15 PM to 5:15 PM. The morning peak hour for Keolani Place was from 8:00 AM to 9:00 AM. Two peaks were observed during the afternoon hours for Keolani Place, one between 2:30 PM and 3:30 PM and another between 3:15 PM and 4:15 PM.

The historical data was adjusted for traffic movement changes that will occur when the new access road is constructed. Ultimately, the Airport Access Road would intersect with Dairy Road, Hāna Highway, and Pakaula Road. Future conceptual changes reflecting intersections with the new access road were used for the traffic analysis. The design years for the forecast were 2015 and 2035. A LOS analysis was conducted to identify traffic operating conditions. This methodology represents traffic delays ranging from "A" to "F," with "A" representing free flow with little delay and "F" representing congested, over capacity conditions. LOS conditions "E" and "F" are generally regarded as unacceptable. The 2015 forecast for the intersection of the access road and Hāna Highway indicated an AM and PM peak hour LOS of "D." For this intersection, the 2035 LOS forecast was also "D." For the 2015 forecast for the Dairy Road and Pakaula Road intersection, the AM peak hour LOS was "C" and the PM LOS was "D." For the 2035 forecast, the LOS for this intersection was also "C" and "D," respectively.

2.9.2 TSUNAMI EVACUATION ROUTE

The low-lying land between the west side of Runway 5-23 and the ocean lies within the tsunami hazard area. Residences in West Spreckelsville to the north of the OGG boundary are also located in this area. The current emergency evacuation route for this community is via Old Stable Road to Hāna Highway.

2.9.3 VEHICULAR PARKING

The main parking area is located northwest of the passenger terminal. See **Figure 2-5** on Page 2-14. There are a total of 2,232 parking stalls with 1,437 stalls leased to a concessionaire that are available for use by the public and 742 stalls for use by employees of Federal and State agencies, tenants, concessionaires, and airlines. Nine (9) stalls are reserved for airport administration, while 44 stalls are for handicap parking.

There are additional parking stalls for public use situated away from the main parking area. This includes parking adjacent to the air cargo facility, rental car facilities, commuter terminal, northwest of the passenger terminal, general aviation facilities, and helicopter facilities. Recently, parking immediately in front of the commuter terminal has been prohibited with stalls being painted over with black paint. There are cones guiding traffic for passenger and cargo drop-off directly in front of the commuter terminal.

A paved cell phone waiting area is located adjacent to Hemaloa Street that intersects Keolani Place. It is approximately one (1) acre in size and allows vehicles that are waiting to pick up passengers to temporarily park. This contributes to better traffic circulation on Lanui Circle.

2.9.4 GROUND TRANSPORTATION

Approximately 23 acres of land along the western side of Keolani Place is available for lease by rental car operators. See **Figure 2-5** on Page 2-14. These parcels range in size from one-quarter of an acre to four (4) acres. The State provides improved streets, level lots, and utilities. The operators are responsible for constructing and maintaining their own facilities. Access to the lease sites is provided from Keolani Place and Koeheke Street. Other ground transportation activities are interspersed with rental car activities in this area.

Currently, there are eight (8) rental car companies on the airport property: Alamo, Avis, Budget, Dollar, Enterprise, Hertz, National, and Thrifty. Enterprise and Roberts Hawai'i are located across the bridge over Kalialinui Gulch on Keolani Place. The rental car counters (except for Enterprise) are situated in a State-owned building constructed for that purpose opposite the northern end of the main passenger terminal parking area. A bus and car rental registration area is located adjacent to the terminal and next to the tour group pick-up area on Lanui Circle. There are three (3) unpaved graded lots for rental car overflow parking immediately northwest of the existing rent-a-car (RAC) subdivision. These three (3) lots total about 33.5 acres of open space. A fourth area that is used for overflow parking is off Alahao Street and across the street of the Kanahā Beach Park entrance. This area is about two (2) acres in size. At the time of observation about 700 cars total were observed in these four (4) overflow areas. However, the number of cars present is seasonally dependent and based on traveler demand. Long-term efforts under the Hawai'i Airports Modernization Program will later construct a rental car storage lot at the existing overflow area.

2.10 AIRPORT SUPPORT FACILITIES

2.10.1 FAA AIRPORT TRAFFIC CONTROL TOWER (ATCT)

The FAA ATCT complex is located to the east of the GA T-hangars. It was completed in 1988 and houses the FAA and the National Weather Service offices. Underground communication lines link the FAA's ATCT with the ASR, new Radio Transmitter/Receiver Building, and new Airfield Lighting Vault. See **Figure 2-6** on Page 2-15.

The ATCT has adequate view of all runway ends with a cab height estimated at 187 ft. above msl. However, due to the ATCT's location relative to the East Ramp, controllers cannot see portions of the apron designated for helicopter operations. This complicates the task of controlling the ground movement of these aircraft. Additionally, the northernmost portion of the passenger terminal obstructs the controllers' views of Taxiway "H," portions of Taxiway "F," and the commuter terminal aircraft ramp.

2.10.2 AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

The ARFF facility is located on the East Ramp. There are a total of seven (7) vehicles of which five (5) are used for firefighting. There are two (2) 3,000 gallon capacity trucks, and two (2) 1,500 gallon capacity trucks. A smaller auxiliary vehicle is also used for rescue and firefighting. Two (2) trucks are used as command vehicles with one (1) exclusively used by the ARFF Chief.

The ARFF training area is located west of Runway 5-23. It is a remote area and well-screened from public view by vegetation. Access to the training area is from the aircraft operating area, as well as from Alahao Street. The prevailing winds blow smoke generated by practice operations away from the passenger terminal. There is also an

off-site training area located on Keolani Place used for structural firefighting training.

2.10.3 STATE DEPARTMENT OF TRANSPORTATION (HDOT) MAINTENANCE BASEYARD FACILITY

The State of Hawai'i Department of Transportation (HDOT) maintenance baseyard and associated buildings are located in the industrial area on the east side of Keolani Place. This industrial area has a number of other tenants. These include the HDOT Highways Division, Hawai'i Air National Guard, DLNR, Maui County Water Department, Department of Accounting and General Services, DOA with a vector lab, and various private businesses.

2.10.4 AIRLINE GROUND EQUIPMENT MAINTENANCE

The airlines use a portion of the ramp located to the east of the intersection of Taxiway "B" and Taxiway "F," leading to the commuter aircraft parking apron, to maintain ground support equipment. Maintenance shelters are constructed of wood to minimize electromagnetic interference with navigation aids.

2.10.5 U.S. POSTAL SERVICE

The USPS has title to a 5.1-acre site located along Keolani Place, southwest of the passenger terminal. This facility utilizes about 21,300 s.f. of space for its metal frame tent and loading zones. Currently, the facility has direct road access to the apron via Hemaloa Street and paved roads between the south end of the passenger terminal and the new ASIF building. The office handles all mail processing for the Island of Maui. Mail carrier operations might be relocated to the new industrial lease lots along the new access road currently under construction.

2.10.6 NATIONAL WEATHER SERVICE

The National Weather Service has an office in the lower level of the FAA's ATCT. Weather balloons are launched three times daily from the roof of a small structure located near the control tower.

2.10.7 FUEL STORAGE AND LOADING FACILITIES

Fuel storage and loading at the OGG is currently decentralized. Bradley Pacific Aviation has four (4) storage tanks. The two (2) largest tanks, 23,000-gallon and 28,000-gallon capacity, are used to store jet fuel. The third tank, with a 10,000-gallon capacity, is used for Avgas. The fourth tank, with a capacity of approximately 8,000 gallons, is unused at the present time.

Fuel is brought to these tanks by the company's tanker trucks. Trucks resupplying the tanks travel between the large oil company fuel storage tanks located at Kahului Harbor and the OGG via Hāna Highway, Haleakalā Highway, Kala Road, and E'ena Street. Currently, the tanker trucks used for aircraft refueling are based on the East Ramp. Due to a lack of a suitable airport service road, they must cross Runway 2-20 to reach the aircraft parking apron adjacent to the passenger terminal. This route requires clearance from the FAA's ATCT. The FAA has requested that the practice be terminated at the earliest possible date. However, the only available alternate route would take the tanker trucks out of the OGG along Hāna Highway. This is problematic as the equipment now in service exceeds the load ratings of the roads that would have to be used; this alternative is neither feasible nor permitted.

Presently there is one (1) other large fuel tank on the OGG; a 50,000-gallon capacity tank that Hawaiian Airlines constructed to store fuel for its aircraft. The tank is located at the intersection of A'alele Street and Old Haleakalā Highway and is not currently in use. When the tank was in use, it was resupplied by trucks that followed an A'alele Street/Keolani Place/Hāna Highway route between the harbor storage facilities and the OGG. Hawaiian Airlines refueling trucks traveled via A'alele Street and Keolani Place past the passenger terminal to Gate 1, whereby entering the airport operating area.

In addition to these on-site fuel tanks, two (2) of the helicopter operators based on the East Ramp have their own small fuel storage tanks. These tanks are refilled by trucks that follow essentially the same route used by the Bradley Pacific Aviation tanker trucks to and from the OGG.

Currently, a bulk fuel storage facility east of Keolani Place and adjacent to Kalialinui Gulch has been constructed. A pipeline between the fuel facility and the airfield has also been installed. The connection point is north of the cargo facilities.

2.10.8 AIRPORT INDUSTRIAL AREA

There are two (2) industrial areas within the OGG boundary. The largest area is west of A'alele Street including structures accessed via Haleakalā Highway, Kaonawai Place, and Halai Street. The other area is west of the ground transportation subdivision. This area contains a mixture of activities, many of which are not directly related to airport operations.

2.11 EXISTING LAND USE, CONTROLS, AND OWNERSHIP

2.11.1 EXISTING LAND USES

The lands immediately south and east of the OGG are in agricultural use. This area also includes a built-up area around the Pu'unēnē Sugar Mill. Pu'unēnē once contained many plantation homes for Hawaiian Commercial & Sugar Company (HC&S) workers and their families. The HC&S has finished relocating the families that rented these dwellings and demolished them. Pu'unēnē is now utilized for heavy industry which is compatible with relatively high noise levels. Moderately dense residential development is located southwest of Kūihelani Highway/Dairy Road.

Kanahā Pond State Wildlife Sanctuary and the light industrial area on the OGG's western side separate the OGG from the industrial and commercial uses around Kahului Harbor. The majority of the shoreline northwest of the OGG is located in the Kanahā Beach Park or designated for other public uses. However, a development of single-family homes, known as West Spreckelsville, occupies a narrow strip of privately owned land between the northern boundary of the OGG and the ocean. Additional single family homes, located in East Spreckelsville, are separated from the OGG by a buffer of open space.

The policy of the DOTA has been to allow tenants to lease OGG land when it is not in conflict with aviation use requirements or airport operations. As a result, there are a number of tenants whose activities are classified as non-aviation related.

2.11.2 OWNERSHIP

The DOTA owns and manages all OGG lands with the following exceptions:

- Kanahā Pond State Wildlife Sanctuary. The 246.9 acre sanctuary is managed by DLNR, through a MOU, to provide habitat for native water birds.
- USPS. 5.1 acres of land were exchanged.

Additionally, the DOTA has acquired the following easements for lands located outside of OGG to support airport operation:

- Easement W-3. Waterline easement comprised of 533 s.f.
- Easement W-4. Waterline easement comprised of 4,782 s.f.
- Easement 1. Kahului Airport RPZ comprised of 13.665 acres.

2.11.3 STATE LAND USE LAW

The State Land Use Commission (LUC) regulates land use throughout the State of Hawai'i under the provisions of Chapter 205, LUC, Hawai'i Revised Statutes (HRS). All lands within the State are classified as Urban, Rural, Agricultural, or Conservation in accordance with objectives and policies stated in the HRS, Chapter 266, Hawai'i State Plan. Approximately 840 acres of the OGG lie within the State Urban District, 473 acres lie within the State Agricultural District, and 290

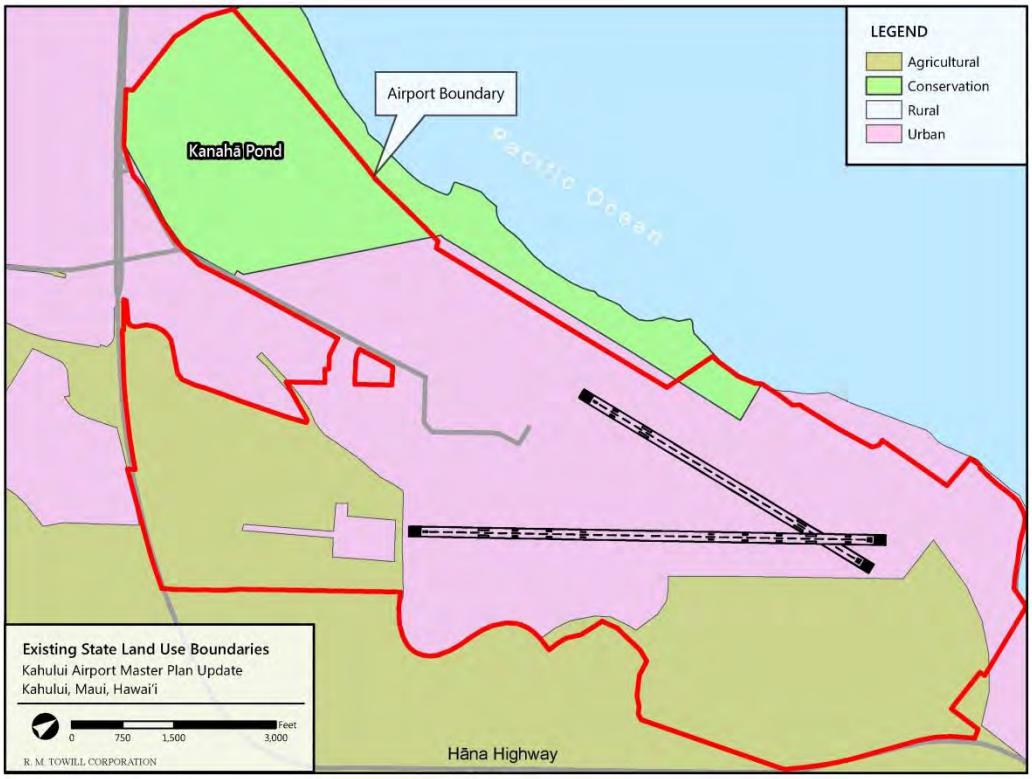

Figure 2-9 State Land Use Boundaries

acres within the State Conservation District. See Figure 2-9.

2.11.4 COUNTY ZONING

Zoning at OGG is regulated by Zoning, Title 19, of the Maui County Code. The majority of the OGG is located in an Airport zone. See **Figure 2-10** on Page 2-23. Areas to the east and the southwest that lie within the OGG boundary and are zoned agricultural and open space. The Kanahā Pond State Wildlife Sanctuary located to the east is zoned as Open Space by the County. In addition to local zoning, the County of Maui regulates lands within their "Special Management Area (SMA)." (see **Figure 2-11** on Page 2-23) The SMA is an overlay regulatory-management zone that manages uses within the County's coastal zone.

2.12 ENVIRONMENT CONSIDERATIONS

2.12.1 CLIMATE CHANGE

Climate change is defined by the United States Environmental Protection Agency (EPA) as "…any significant change in measures of climate lasting for an extended period of time." This includes major changes in temperature, precipitation, or wind patterns that occur over several decades or longer. Both natural and human causes can change Earth's climate. Natural causes of climate change include changes in the sun's intensity, the Earth's rotation around the sun, ocean circulation, and volcanic eruptions. Human activities affecting the Earth's climate is tied to the generation of greenhouse gases from activities such as the burning of fossil fuels. The burning of fossil fuels such as oil and coal generate greenhouse gases that include carbon

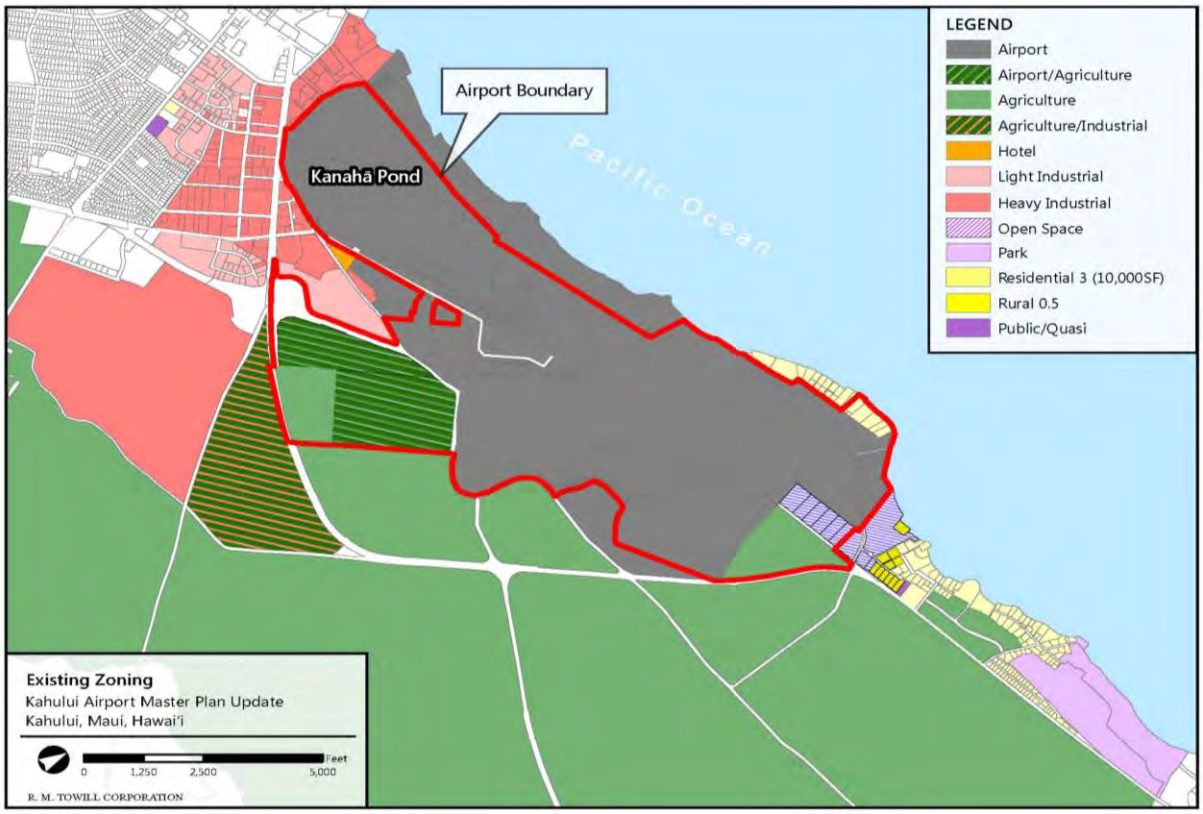

Figure 2-10 Existing Zoning Map

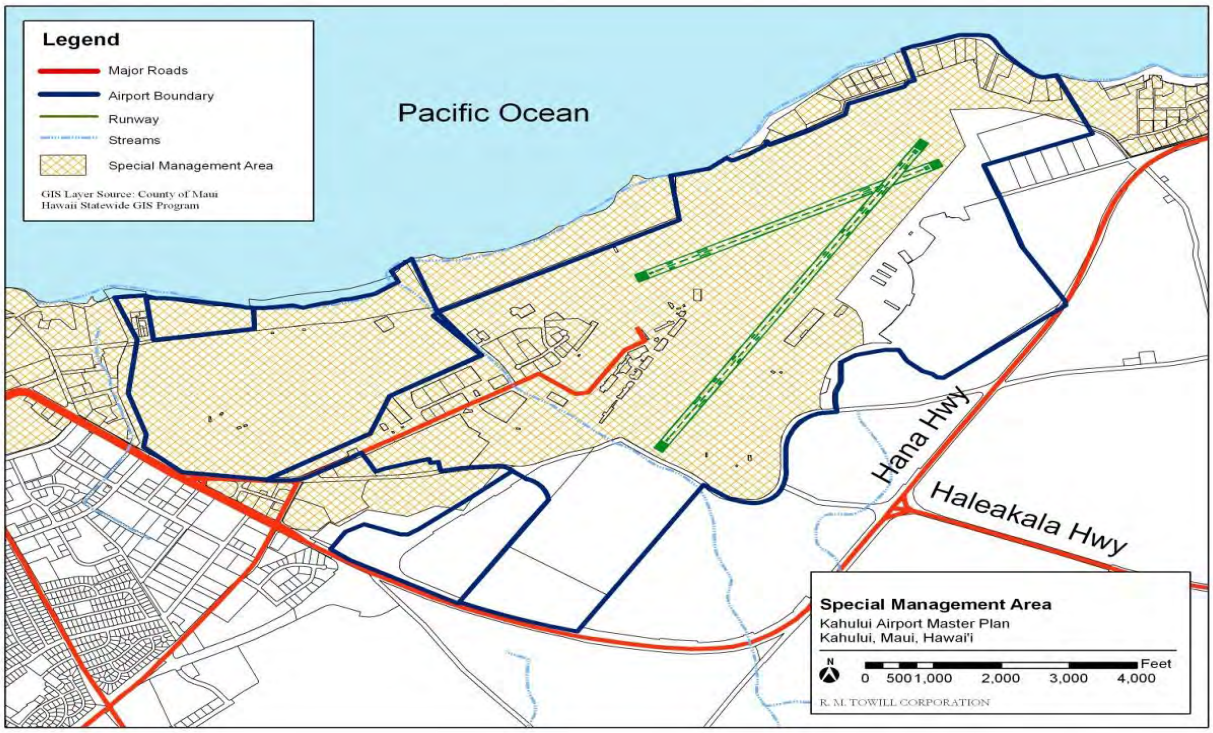

Figure 2-11. SMA Boundary Map

dioxide (CO2), methane (CH4), nitrous oxide (N2O), and ozone (O3). These greenhouse gases absorb incoming sunlight and interfere with the release of heat into space. This heat stays trapped, as it would in a greenhouse, and continues to accumulate in the earth's atmosphere.

Transportation systems in the United States are designed to withstand local weather and climate impacts based on historical records. However, due to climate change, these historical records are no longer a reliable indicator of future impacts.

Climate change is projected to increase the frequency and intensity of extreme weather events. These changes can increase the risk of delays, disruption, damage, and failure across land, air, and marine based transportation systems. Transportation infrastructure under construction today is expected to last 50 years or longer. It is important to understand how changes in climate may affect these investments in the coming decades.

Climate change may affect airplanes, airports, and airstrips, affecting air travel and infrastructure.

Periods of extreme heat may cause airplanes to face cargo restrictions, flight delays, and cancellations. Any increase in rain and flooding may also disrupt air travel. Depending on its size and severity, storms can force entire airports to close. Climate change may increase the frequency of these events and the number of airports that are affected. In addition to causing closures and or delays, flooding may damage existing facilities including the airfield.

In 2012, the State of Hawai'i updated the Hawai'i State Plan with the passage of Act 286 establishing the priority guidelines for climate change adaptation. The guidelines are intended to prepare the State to address impacts associated with climate change that includes the built environment. Guidelines specific to the OGG MP Update included:

- Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies.
- Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environment. This includes future OGG development within the context of the current and anticipated environment.
- Promote sector resilience in areas such as water, roads, airports, and public health, by encouraging the identification of climate change threats, assessing the potential consequences, and evaluating adaptation options.

The University of Hawai'i Coastal Geology Group has predicted that the sea level will rise throughout the coming decades. Estimates prepared by the University suggest the sea level may rise up to one meter by 2100. Projected sea-level rise over the next 20 years would increase at an exponential rate and would impact all coastlines, most severely affecting Mā'alaea, North Kīhei, Lahaina, Kā'anapali, and Kahului on the island of Maui. According to the County of Maui General Plan, prudent planning should consider projected sea-level rise as a variable in planning for each island of the county (Maui County General Plan 2030, 2010). Because the OGG is located on the northeast end of the town of Kahului and located adjacent to the ocean, an increase in sea level rise by one meter would affect portions of the OGG. See **Figure 2-12** on Page 2-26. Because of this effect, public airport facilities should not be located in areas that may be affected. Currently, no facilities accessible to the public are within the area susceptible to the one (1) meter sea level rise.

2.12.2 SUSTAINABILITY

According to the EPA, "sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either

directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which human and nature can exist in productive harmony, which permits fulfilling the social, economic, and other requirements of present and future generations" (http://www.epa.gov/sustainability/learn-about-sustainability#what). Sustainability is an important aspect in ensuring that we have and will continue to have the water and materials necessary to protect human health and the environment. Sustainability has emerged as a result of significant concerns about the unintended social, environmental, and economic consequences of rapid population and economic growth, and consumption of our natural resources. In its early years, the EPA acted primarily as the nation's environmental watchdog, striving to ensure that industries meet legal requirements to control pollution. In subsequent years, the EPA began to develop theory, tools, and practices that enabled it to move from controlling pollution to preventing it.

Today, the EPA aims to make sustainability the next level of environmental protection by drawing on advances in science and technology to protect human health and the environment, and promote innovative green business practices.

Executive Order (EO) 13423, Strengthening Federal Environmental, Energy, and Transportation Management (2007), set forth policy and specific goals for federal agencies to "…conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner."

EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance (October 5, 2009), enhances EO 13423 by noting the intent, "…to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of greenhouse gas emissions (GHG) a priority for Federal agencies. It defines "…sustainability and sustainable: to create and maintain conditions, under which human and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans."

2.12.3 WETLANDS

Wetlands play an integral role in the environment. They prevent erosion in the surrounding area through the presence of wetland-associated plants with root systems that hold soil in place. The plants also serve as a physical barrier and absorb energy from waves. Wetlands also provide a natural filtration system for runoff. Nutrients swept into the wetland from runoff are absorbed by plant roots and microorganisms that live in the soil or stick to the soil particles themselves. Through this process, most of the nutrients and pollution in the water are absorbed, retained, and are prevented from entering the ocean (EPA, 2010). According to the Maui Island General Plan 2030, completed in 2010, a specific policy objective regarding wetlands includes Objective 2.3.3 of the Heritage Resources Element. It states, "No net loss of wetlands, and preserve and restore degraded wetlands." Policies include: "…prohibiting the destruction and degradation of existing upland, mid-elevation, and coastal wetlands." In addition, it states to "… support regulations that require developers to provide a wetland protection buffer around and between development and wetland resources."

There are wetlands to the west of the project site. See **Figure 2-13** on Page 2-26. Kanahā Pond State Wildlife Sanctuary, the largest of the wetlands in the area, is a preserve that provides a nesting site for endangered and migratory birds. The pond is approximately 235 acres and is bounded by Amala Place to the north, A&B Properties ditch to the east, Keolani Place and Hāna Highway to the south, and an old drainage ditch to the west. The FAA, DOTA, and DLNR prepared a MOU for the management of the refuge, dated October 1, 1996, whereby the

Figure 2-12 Sea Level Rise Map

Source: ESRI, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstoppo, and GIS User Community

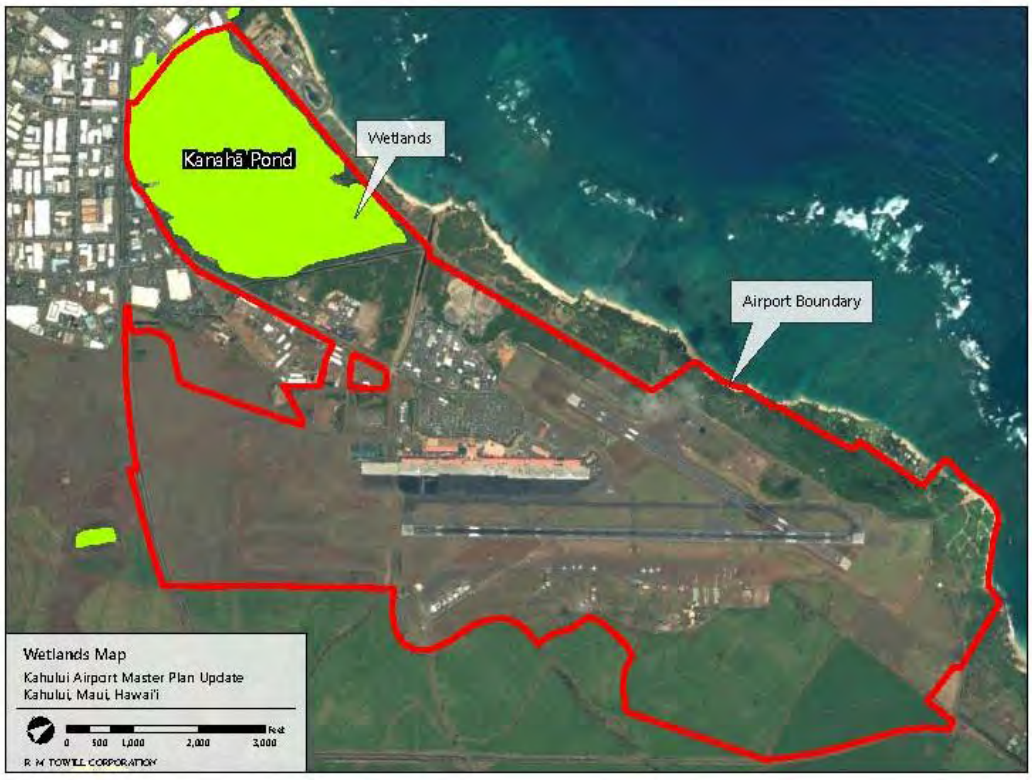

Figure 2-13 Wetlands Map

DLNR shall manage the refuge and its resources, and the DOTA shall be responsible for the primary objective of aeronautical safety. Wildlife surveys are to be conducted along with management efforts to protect endangered avifauna (bird) species. All annual surveys are to be reported to the FAA.

2.12.4 VISUAL RESOURCES

The Maui County 2030 General Plan and Countywide Policy Plan of 2010 identifies the major policy objective of protecting Maui's scenic resources, focusing on the protection of views along coastal lands. Mountain, agricultural, and island-wide panoramas are also significant scenic resources identified in the General Plan.

Throughout the County of Maui, large-lot residential, commercial, industrial, and other land use development sectors have dramatically affected the County's scenic resources. The many view planes that remain, like other valuable natural resources, continue to help define the islands of Hawai'i and require on-going management to protect them from unnecessary degradation or depletion as land that is rich in scenic-resource value is often the same land that is in high demand for recreational, resort, residential and other uses.

The protection of valued scenic and natural resources is a priority for the planning period of this MP Update. The planned runway extension and airport improvements are not anticipated or expected to have an adverse effect on surrounding scenic resources. Airfield improvements may require some conversion of agricultural lands, but should not degrade or deplete coastal, mountain or agricultural views currently seen from the existing terminal building. Terminal and airport improvements should continue to allow scenic coastal, mountain, agricultural, and island-wide views from inside and outside the terminal building, and from aircraft transiting the island of Maui.

2.12.5 ALIEN/INVASIVE SPECIES

Airports can be a point source for the introduction of invasive and/or introduced species. These potential pests can be transported in passenger luggage or cargo. The OGG has the potential for expanding its markets and destinations thus increasing the risk for the introduction of alien species. Maui and all Hawaiian Islands are ecologically vulnerable and many native species have already been lost due to invasive and/or introduced species. The recent addition of the ASIF at the OGG allows for the inspection of incoming cargo and passenger baggage at the OGG terminal.

2.13 DEVELOPMENT TRENDS

Urbanization is occurring on lands surrounding the OGG. The Courtyard by Marriott, a 138 room hotel, recently opened in June 2012 at the intersection of Haleakalā Highway and Keolani Place. A proposed six-story medical building is under environmental review because it is within the SMA and adjacent to the Kanahā Pond State Wildlife Sanctuary. Maui Business Park Phase 2 will be developed south of and adjacent to Hāna Highway as well as the future OGG Access Road. The Phase 2 subdivision will have 65 light industrial zoned lots ranging in size from 0.5 acres to 5.5 acres. This project would also include off-site improvements such as roads, drainage, and landscaping.

2.14 AIRSPACE, AIR TRAFFIC CONTROL, AND NOISE ABATEMENT PROCEDURES

This section describes the airspace and air traffic control facilities, procedures, and operations at OGG. It describes navigational aids at the OGG and identifies existing obstructions within the airport approach and departure areas. The discussion below covers operations under both IFR and VFR conditions.

2.14.1 AIRSPACE AND AIR TRAFFIC CONTROL

The OGG's "terminal area airspace" is within the jurisdiction of the Honolulu Control Facility (HCF). The HCF provides air traffic control for enroute IFR aircraft and the approach and departure of IFR aircraft at the OGG. The OGG ATCT, called the Maui Tower, provides air traffic control for all aircraft within the Airport Traffic Area. OGG's ATCT frequency is designated as the Common Traffic Advisory Frequency for use when the control tower is not operating. Pilots are encouraged to use this frequency to advise each other of their intentions and position while operating in the vicinity of the OGG when the tower is not operating.

"Terminal area airspace" refers to the area around an individual airport that is designated for maneuvering of IFR aircraft. The HCF may exercise control over the approach and departure of IFR aircraft within terminal area airspace, or the HCF may delegate responsibility for control of terminal area airspace to a local ATCT facility. The HCF had delegated airspace to the OGG ATCT for approach and departure control in the past; however, in a program of centralization, the HCF has recently resumed the activities of approach and departure control for the OGG. This program of centralization is on a national scale.

An "Airport Traffic Area" is the portion of the airspace within a terminal area that is under the jurisdiction of the ATCT. The OGG is classified as Class C by the FAA. Airport Traffic Areas are generally defined as the airspace that extends five (5) statute miles outward from an airport with an operating control tower and up to 2,999 ft. above the airport elevation (FAA FAR Part 77).

A "Control Zone" is controlled airspace generally including the area within five (5) statute miles of the airport (plus extensions as necessary for approach and departure paths) and extending upward from the surface of the earth. The OGG control zone includes extensions to the south and to the north to accommodate approach and departure paths from Runway 2-20.

To operate under VFR within a Control Zone, the ceiling must be at least 1,000 ft. above ground level and visibility must be three (3) miles or more, except as provided for Special VFR flights in FAR, Part 91, "General Operating and Flight Rules," Paragraph 155, "Basic VFR Weather Minimums," and Paragraph 157, "Special VFR Weather Minimums." A pilot must receive an appropriate air traffic control clearance, have one (1) mile of visibility, and stay clear of clouds in order to use the provisions of Special VFRs.

2.14.2 EXISTING NOISE ABATEMENT PROCEDURES

Existing noise abatement procedures for the OGG are published in the "Area Notices" section of the FAA's Pacific Chart Supplement (PCS). Under the existing informal Preferential Runway Use Program, Runway 2 is the recommended noise abatement departure runway for large propeller-driven and jet-powered aircraft (*http://www.boeing.com/resources/boeingdotcom/commercial/noise/kahului.html*). These aircraft are over 12,500 lbs. gross weight. Upon departure from Runway 2, the noise abatement procedure is for the aircraft to maintain course while climbing until it is one (1) mile beyond the shoreline before commencing a turn. This is intended to ensure that departing aircraft do not overfly the residential areas in East and West Spreckelsville. However, because the homes are so close to the runway, they experience single event noise levels as a result of jet aircraft departures even when these procedures are followed.

Runway 5 is used primarily by small, propeller-driven aircraft. These types of aircraft are requested to turn left as soon as possible after take-off if they are eastbound or westbound, and remain at least one (1) mile clear of the shoreline. If they are southbound, and traffic permits, the procedures call for them to turn right as soon as possible, otherwise they are requested to turn left. Aircraft overflying existing residences in West Spreckelsville have been the

source of noise complaints from residents of that area, particularly regarding morning cargo flights.

Large aircraft landing at the OGG under Kona (southerly winds) conditions are instructed to use Runway 20. Small propeller aircraft often land on Runway 23 under such conditions. Historically, these south-flow operations have generated some complaints from Spreckelsville residents living near the approach tracks. The same residents, whose homes are only about 1,500 ft. from the northern end of Runway 20, also complain about the noise and odor from jet aircraft waiting at the end of the runway for permission to take off to the south.

Aircraft arriving from Honolulu under trade wind conditions are routed down the windward side of West Maui, turning to fly their downwind leg over Wailuku before turning onto the final approach. This pattern has been replaced with a route that takes aircraft from O'ahu south of Maui, allowing them to make a straight-in approach to Runway 2 under trade wind conditions.

Maui Tower discourages large aircraft from using Runway 5. This is to limit overflights of the residential and other noise-sensitive areas along the shoreline west of the OGG. The noise abatement approach to Runway 5 used by small planes takes them over Kahului Harbor, avoiding adverse noise impacts on residential areas.

2.15 AIRPORT MANAGEMENT, FINANCIAL, AND POLICY & REGULATION

The OGG is part of the Statewide Airport System operated by the DOTA. The system includes all of the major airports in the islands. Administratively, the OGG is part of the Maui District. In addition to the OGG, the District includes Hāna, Kapalua, Lāna'i, Moloka'i, and Kalaupapa Airports. A chart showing the organization of the Maui District airports is shown on **Figure 2-14**.

2.15.1 AIRPORT MANAGEMENT

The OGG currently has 150 authorized positions. They are distributed as follows:

- Administration: 17
- Aircraft Rescue and Firefighting: 25
- Maintenance: 47
- Janitorial: 11
- Vacant/Unclassified: 50

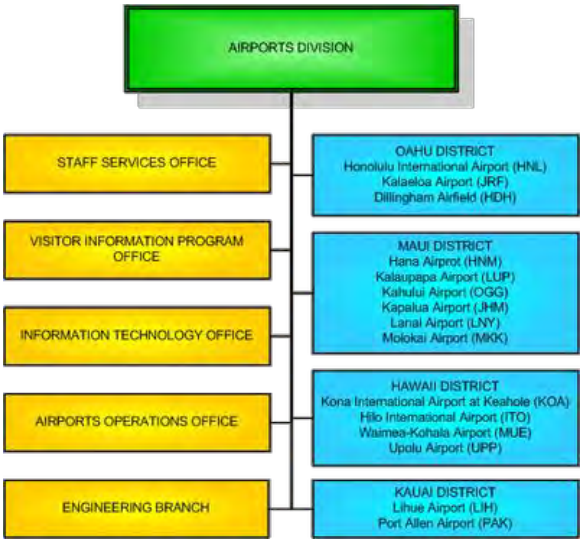

Figure 2-14 Organization Chart - DOTA

2.15.2 AIRPORT OPERATIONS

The Maui District Manager is responsible for the overall administration of all the airports in the Maui District, including day-to-day operations. Day-to-day operations for the airports are administered through four (4) assistants. Three (3) assistant airport superintendents report to the Maui District Manager for operations. The head of the general construction and maintenance section oversees maintenance, janitorial, and grounds keeping operations at the OGG. The Fire Commander oversees the aircraft rescue and firefighting operations there, and the Chief of Operations is responsible for maintaining the security of the OGG.

2.15.3 FINANCIAL OPERATIONS

This section presents operating revenues and expenses for the OGG during the 2010 FY. It also outlines the OGG's leasing policy.

2.15.3.1 OPERATING REVENUES AND EXPENDITURES

Airport revenue is generated by the leasing of land and building space, charges to airport concessionaires and permittees, user fees, and other miscellaneous fees and charges. In FY 2010, net revenues totaled $51.9 mil. See **Table 2-9** on Page 2-31. The OGG's operating expenses during FY 2010 totaled $27.5 mil. It is important to note that expense items do not include the allocated statewide expenses, depreciation, and changes in net assets. Thus, they do not reflect the full cost of maintaining the OGG. If these additional costs were included, it is likely that total expenses would exceed the revenues the OGG generated in 2010.

DOTA guidelines encourage each facility to generate revenues sufficient to meet operating expenses. The updated Airport-Airline leases provide for compensating fees for use of terminal spaces and the airports system support charges. Landing fees will be charged to help recover the cost of operating the airfield.

2.15.3.2 LEASE SPACE

Space at the OGG is leased to corporations and individuals on both a short-term (i.e., month-to-month) and long-term bases. Short-term leases are given for hangar space, aircraft tiedowns, and other temporary airport uses. They are also given for spaces that are planned for some future use or that are available for only a short time. The lease fee is typically based on the type and amount of space that is covered and on other terms of the agreement.

Long-term leases, for five (5) or more years, are generally awarded to lessees who expect to make permanent improvements at the OGG. Tenants in this class include the airlines and car rental companies. The rent for this type of lease is fixed for the term of the agreement and is based on the type and amount of space involved and on the other conditions of the agreement of space involved and on the other conditions of the agreement.

Leases for certain spaces at the OGG, such as those used by concessionaires and airport permittees, are granted through a competitive bidding process. The State establishes the terms of the lease and the criteria, such as the highest minimum guaranteed rent plus a percentage of the gross sales that would be used to evaluate proposals. The lease is then awarded to the offeror who promises the greatest returns to the State. The lengths of leases awarded in this fashion vary, but they generally do not exceed five (5) years.

2.15.3.3 POLICY AND REGULATIONS

The operation of the OGG and other State airports is governed by the provisions of HRS, Chapter 261, Aeronautics; HRS, Chapter 262 Airport Zoning Act; HRS, 263 Uniform Aeronautics Act, and by the Uniform Code, Title 19 of the HAR. In addition to establishing general rules governing the practice and procedures of the DOTA, Title 19 contains specific regulations for airport site approval and licensing, airport zoning, aircraft operations at public airports, airport public areas, airport landing fees, and small aircraft hangars at public airports.

2.15.4 EXISTING AIRPORT DEVELOPMENT PROPOSALS

The State has already planned and budgeted for certain improvements to be made at the OGG. Act 158, SLH 2008, designates $12.9 mil. for terminal improvements; $35.3 mil. for construction of a new access road from Hāna Highway; $250,000 for program management support; $17.1 mil. for parking lot expansion; $5.1 mil. for storm water permit compliance; $1 mil. for elevator and escalator improvements; $3.9 mil. for security access control and close circuit television system; and $5.9 mil. to reconstruct runways and taxiways. (Hawai'i Aviation, 2011).

OPERATING REVENUES	
Fees	$26,434,108
Airport Landing Fees	$9,532,948
Aeronautical Rentals	$11,284,365
Aviation Fuel Tax	$1,129,873
Non-aeronautical Rentals	$2,846,196
Airport system support charges	$40,444
Miscellaneous	$537,716
Allocation of statewide misc. revenue	$58,606
Net Operating Revenues	$51,864,256
OPERATING EXPENSES	
Salaries and Wages	$8,391,364
Other Personal Services	$5,254,223
Utilities	$5,032,760
Special Maintenance	$204,764
Repairs and Maintenance	$1,437,390
Materials and Supplies	$739,960
Insurance	$1,625
Claims and benefits	$207,434
Travel	$49,121
Rent	$31,497
Communication	$53,652
Dues and Subscriptions	$165
Freight and Delivery	$10,067
Miscellaneous	$8,503
Total Operating Expenses	$27,511,332
BALANCE (Revenue-Expenditures)	$24,352,924
Source: State of Hawai'i, Department of Source: Transportation, Financial Statements and Supplemental Schedules, June 30, 2012 and 2011	

Table 2-9 Kahului Airport Operating Revenues and Expenses

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CHAPTER 3
AVIATION AND PASSENGER FORECAST (2015-2035)


3.1 OVERVIEW

This chapter summarizes historical aviation and passenger activity at OGG and presents annual aviation demand forecasts through the 2035 planning period. The base forecast year for this study is 2014. The forecast, together with information on existing and presently planned facilities presented in **Chapter 2** are used in **Chapter 4** to evaluate and identify modifications and/or additions to existing airport facilities that are necessary and appropriate for development.

3.2 PASSENGER ACTIVITY AND FORECAST

Figure 3-1 on Page 3-2 shows total historic inter-island air passenger levels between 1990 and 2014. Data for 2015 (last quarter) is estimated and passenger activity levels are for both enplanements and deplanements.

The events of September 11, 2001 saw a significant decrease in passengers. A second significant decrease occurred in 2007 due to a recession. From 2007 to 2010, an 18% decrease was observed totaling 5,346,694 passengers in 2010. Although this represents an 8.29% increase over a 20-year period from 1990 to 2010, a larger increase was previously seen from 1970 to 1990 which saw a 323% increase. According to passenger forecasts by Martin Associates, LLC, (See **Appendix A, "Passenger and Operations Level Projections, Kahului Airport, October 2011"**), passenger levels will not return to pre-recession (2007) levels until after 2025. Air operations from 2001 to 2007, reflects the decline in passenger counts. See **Figure 3-2** on Page 3-2.

Regularly scheduled direct overseas service to OGG started in January 1983. Prior to this date, overseas flights to OGG were occasionally chartered. The number of overseas flights has increased while inter-island traffic has declined from 1990 to 2014. See **Figure 3-3** on Page 3-3.

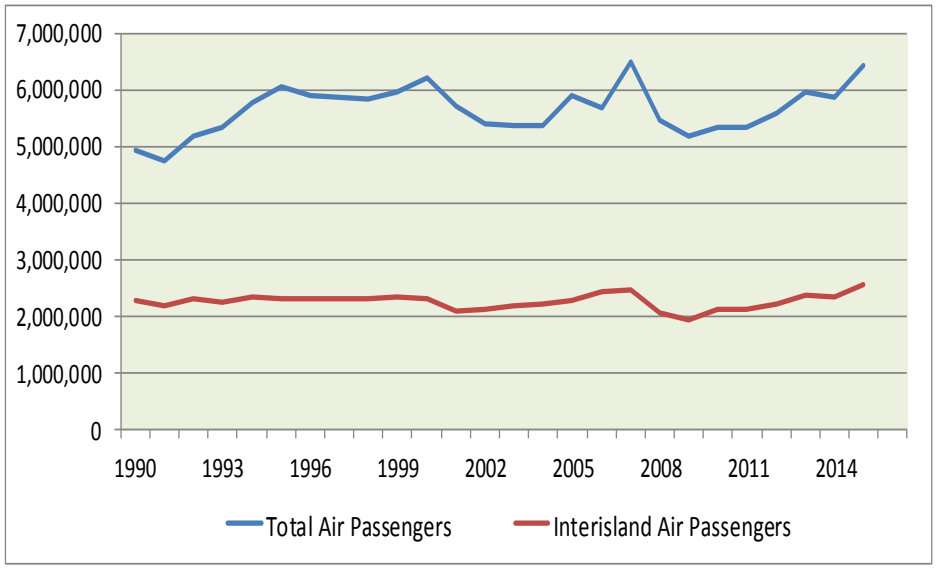


Figure 3-1 Historical Passenger Levels at Kahului and Maui Passenger Levels

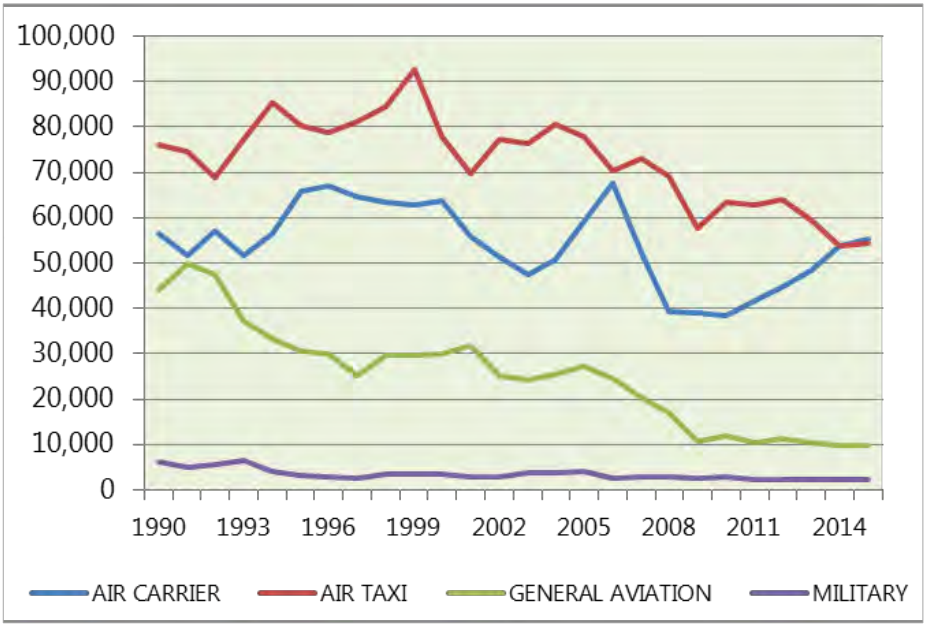


Figure 3-2 Operations at Kahului Airport 1990-2014

Scheduled overseas air carrier service is currently provided by Air Canada, Alaska Airlines, American Airlines, Continental Airlines, Delta Airlines, Hawaiian Airlines, United Airlines, U. S. Airways, and WestJet, using Boeing 737 (B-737), Boeing 757 (B-757), Boeing 767 (B-767), and Boeing 777 (B-777) aircrafts. Non-stop domestic overseas service is provided to Dallas, Denver, Las Vegas, Los Angeles, Oakland, Phoenix, Portland, San Diego, San Francisco, San Jose, Seattle/Tacoma, and Vancouver. Service between the OGG and other domestic and foreign overseas points is provided through the Honolulu International Airport (HNL).

Scheduled inter-island air carrier service is provided primarily by Hawaiian Airlines on Boeing 717 (B-717) aircraft. American Airlines and Continental Airlines offer some passenger flight services to Honolulu.

Hawaiian Airlines, Mokulele Airlines, Island Air, and Makani Kai Air provide regularly scheduled inter-island commuter airline service. Additional

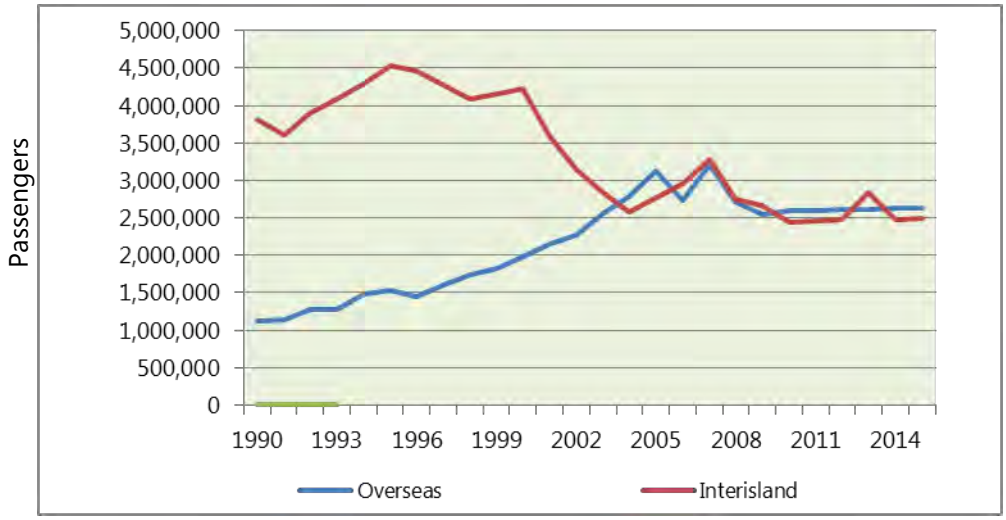


Figure 3-3 Overseas Flights versus Inter-Island Flights to Kahului

inter-island flights are provided by nonscheduled sightseeing air taxis with passenger origins primarily from HNL.

The number of inter-island passengers increased slightly from 1990 to 2001 from 3,343,653 to 3,582,229. Over the last decade, the inter-island passenger volumes presented in **Figure 3-3** include passengers transported by regularly scheduled commuter airlines and nonscheduled, sightseeing air taxis. Most inter-island passengers during this period used regularly scheduled flight services. A number of sightseeing tour operators are based at HNL and park their aircraft at OGG's East Ramp for the duration of the sightseeing tour. Some air taxi flights are also provided by OGG's fixed base operators.

3.2.1 HELICOPTER/AIR TAXI ACTIVITY

In addition to the inter-island sightseeing air taxi services, a number of helicopter sightseeing companies offer tours of Haleakalā, Hāna, 'Iao Valley, and other scenic attractions on Maui from OGG's East Ramp. These companies include Papillon Helicopters, Alex Air, Maui Helicopters, Hawai'i Helicopters, Sunshine Helicopters, Kenai Air of Hawai'i, Cardinal Helicopters, Pacific Helicopter Tours, Makani Kai Helicopters, and Blue Hawaiian Helicopters.

Helicopter operations, categorized as air taxi at OGG, numbered approximately 56,030 in 1990. See **Figure 3-2** on Page 3-2. Air taxi operations increased from 1990 to 1999 by approximately 91,000. There was a sharp decline in 2001, followed by a gradual increase in 2010 to 59,387 operations (Department of Business, Economic Development and Tourism (DBEDT), Hawai'i Tourism Authority (HTA, 2010)).

The helicopter sightseeing tour companies primarily use four (4) to six (6) passenger Bell 206, Hughes 500, and Aerospatiale AS-350 helicopters. These companies do not file passenger data with the State; consequently no official annual passenger counts are available. However, discussions with representatives of the helicopter companies suggest that most flights operate at, or close to, their passenger seating capacity.

3.2.2 INTRA STATE PASSENGER ORIGIN-DESTINATION DATA

Statistics on inter-island and overseas operations between the OGG and other airports from 1990 to 2014 are presented in **Figure 3-3**. During this period, overall aircraft operations have been decreasing for inter-island travel. However, overseas aircraft traffic to OGG increased during the same period.

3.2.3 AIR CARGO ACTIVITY

The historical volume of air cargo, enplaned and deplaned, at OGG are presented in **Figure 3-4**.

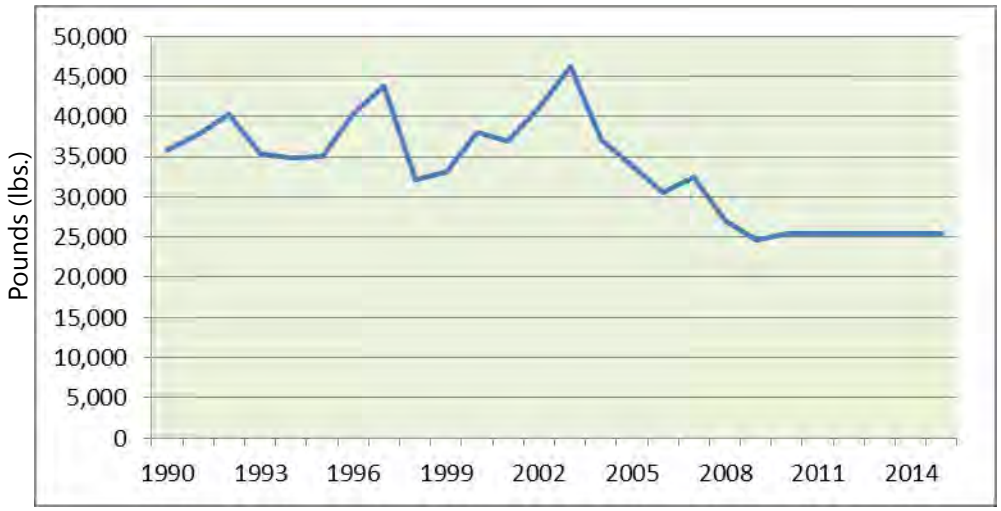


Figure 3-4 Air Cargo Activity at Kahului Airport (1990-2014)

on Page 3-4. The figures include cargo carried by both air taxi and scheduled air carriers

Most of the all-cargo inter-island flights occur at night, with Aloha Air Cargo B-737-200 aircrafts handling the bulk of the loads. Incoming flights to OGG deliver a wide variety of perishable food items, newspapers, and manufactured goods. Outgoing cargo consists primarily of perishables such as fruits and vegetables. United Parcel Service (UPS) is another all-cargo carrier using B-767 aircraft.

From 2010 to 2014, air cargo on signatory inter-island carriers was moved on B-767 aircraft. Non-signatory cargo mainly used B-737-200 and B-737-300 aircraft. In 2010, there were no overseas signatory cargo operations. Cargo tonnage handled at OGG peaked at about 46,000 tons in 2003 and has been steadily decreasing. As shown in **Figure 3-4**, air cargo operations have shown no growth, overall. Some factors inhibiting growth on air cargo operations include the increased use of inter-island maritime shipping as well as decreased pineapple shipments.

3.2.4 MAIL

Figure 3-5 on Page 3-5 shows the volume of mail handled at OGG. Since 1990, there has been a consistent increase in mail volume.

3.2.5 AIRCRAFT OPERATIONS

Total aircraft operations reported at the OGG declined from 182,686 in 1990 to 118,896 in 2010. This constitutes a 35% decrease over a 20 year period. See **Figure 3-6** on Page 3-5. Some of the changes in air carrier, air taxi, and general aviation operations indicated by the data are due to changes in the way aircraft operations are classified rather than to actual changes in the number of aircraft flying. An example of this change is the de Havilland Canada Dash 7 (DHC-7). Since 1989, the FAA counts the DHC-7 aircraft operations as "commuter/air taxi operations", whereas they were previously included in the "air carrier" category.

From 1990 to 2014, air carrier and air taxi operations at OGG have been declining with projected increases occurring after 2015. General aviation operations have been sharply decreasing from 1990 to 2014. However, military aircraft operations have been relatively stable compared to other operations over the last 20 years. The military operations consist primarily of training flights by the Hawai'i Air National Guard and U. S. Navy and Marine Corps aircrafts based on O'ahu. **Figure 3-2** on Page 3-2 shows a breakdown of the total operations, both historical and forecasted, for air carriers, air taxi, general aviation, and military flights.

Figure 3-5 Air Mail Handled at Kahului Airport
Source: DOTA. State of Hawaii Airport Activity Statistics by Calendar Year. (2014)

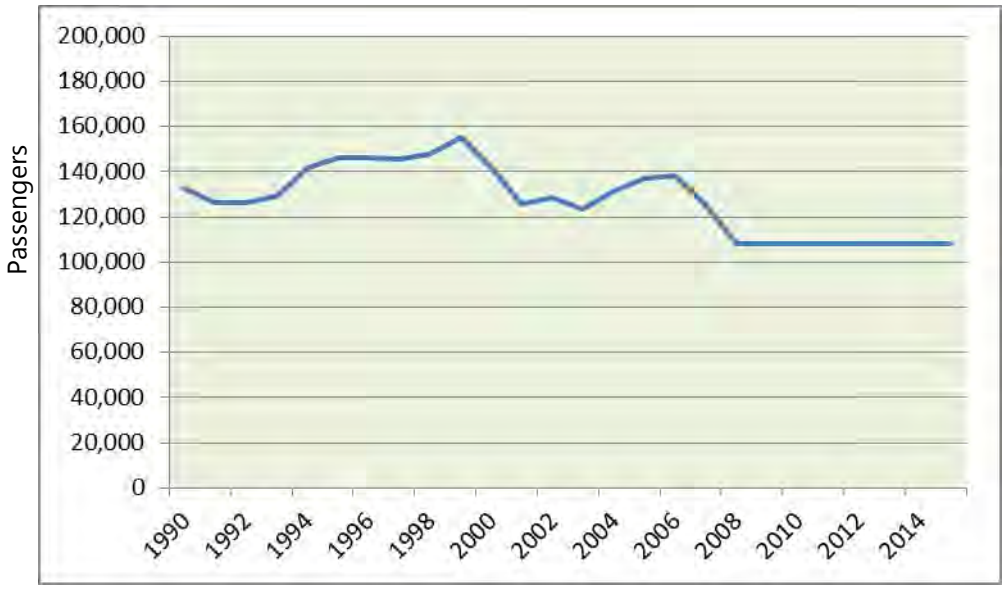


Figure 3-6 Total Annual Operations at Kahului
Source: DOTA. (2014)

3.2.6 BASED AIRCRAFT

There are currently 71 fixed base aircraft operations at OGG; 36 helicopters and 35 fixed wing aircraft, situated along the East Ramp. Aircraft are housed in T-hangars or utilize tiedowns fronting the T-hangars.

3.3 AVIATION DEMAND FORECAST

The DOTA Hawai'i Aviation Demand Forecasts, updated in 2004, provides forecasts for passengers, air cargo and mail, aircraft operations, and based aircraft for all of the major airports in the State. **Appendix A** contains a description of the methodology used in developing the forecasts. It is expected that OGG

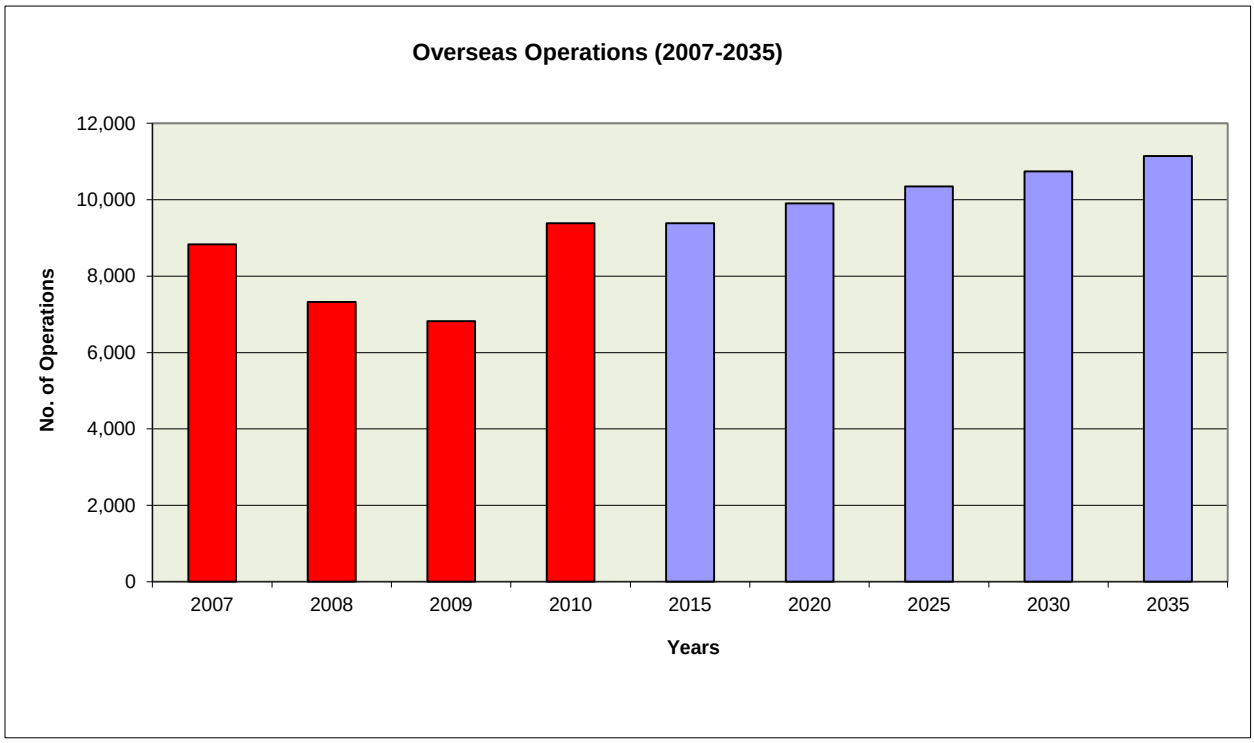


Figure 3-7 Overseas Operations Historical Data from 2007 to 2014 and Forecast Data from 2015 to 2035

Source: Hawaii Aviation Demand Forecasts

will remain the principal airport on the island of Maui and should be expanded as needed to support the island's growth. The aviation activity forecasts for OGG are presented in **Figure 3-7** and **Figure 3-8** on Page 3-7.

3.3.1 Overseas and Inter-island Operations

The aviation demand forecasts contained in this MP Update were prepared by analyzing the historical aviation activity and the State of Hawai'i DBEDT socioeconomic projections. The historical and projected population and visitor data, an overview of Hawai'i's visitor industry, the updated aviation demand forecasts for the State, and the individual counties and the forecast methodology and assumptions are discussed in the *Hawai'i Aviation Demand Forecasts*. See **Appendix A**. The *Hawai'i Aviation Demand Forecasts* represent "unconstrained" demand, i.e., they assume the necessary transportation, visitor accommodations, and other facilities will be available. Other important assumptions include consistent population growth rate increases and that no policies would be implemented to constrain aviation growth. **Figure 3-7** shows historic aviation data (2007–2014) and forecasted overseas operations (2015–2035). **Figure 3-8** on Page 3-7 shows historic data for inter-island operations (2007 – 2014), and forecasted inter-island operations (2015 – 2035).

3.3.2 Passengers

The *Hawaii Aviation Demand Forecasts (*2004) indicates that total statewide passengers would increase from 31,959,439 in 2002 to 43,848,600 by 2025, an annual average increase of 1.4%. County of Maui passengers were forecasted to increase to 5,857,220 in 2025. Overseas domestic passengers were estimated to increase to 7,924,100 by 2025 from 5,416,503 in 2002. This represents a growth rate of 1.7% in County of Maui and an overall increase of 46%. In addition, international passenger service was expected to commence by 2005. In order to accommodate additional international operations, security improvements and passenger handling facilities

will need to be added. OGG will also need to obtain a certification with the U.S. Department of Transportation (DOT) Office of International Aviation.

The economic downturn that began in 2007, severely impacted air travel nationwide. **Figure 3-9** shows historic overseas passenger activity (2007-2014) and forecast passenger activity (2015 – 2035) with a slight increase in passengers by 2035. The forecasted planning period assumed that aircraft arriving at OGG would be operating at a 79% load factor. **Figure 3-10** on Page 3-8 shows historical inter-island passenger activity (2007-2014) and forecasted passenger activity (2015–2035).

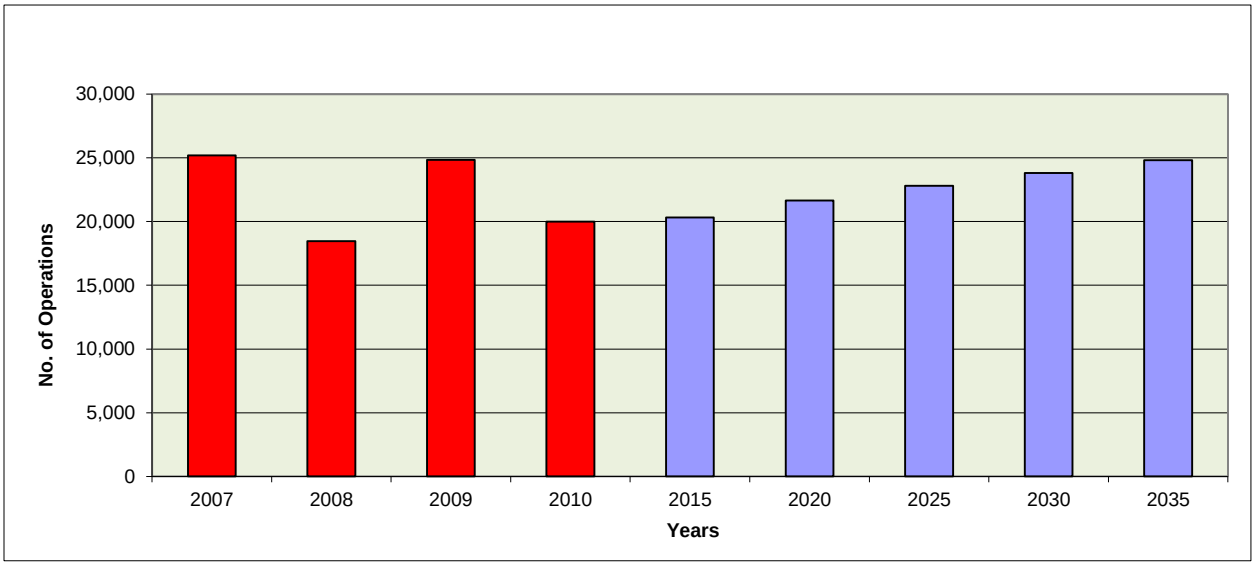


Figure 3-8 Inter-island Operations Historical Data from 2007 to 2014 and Forecasted Data from 2015 to 2035

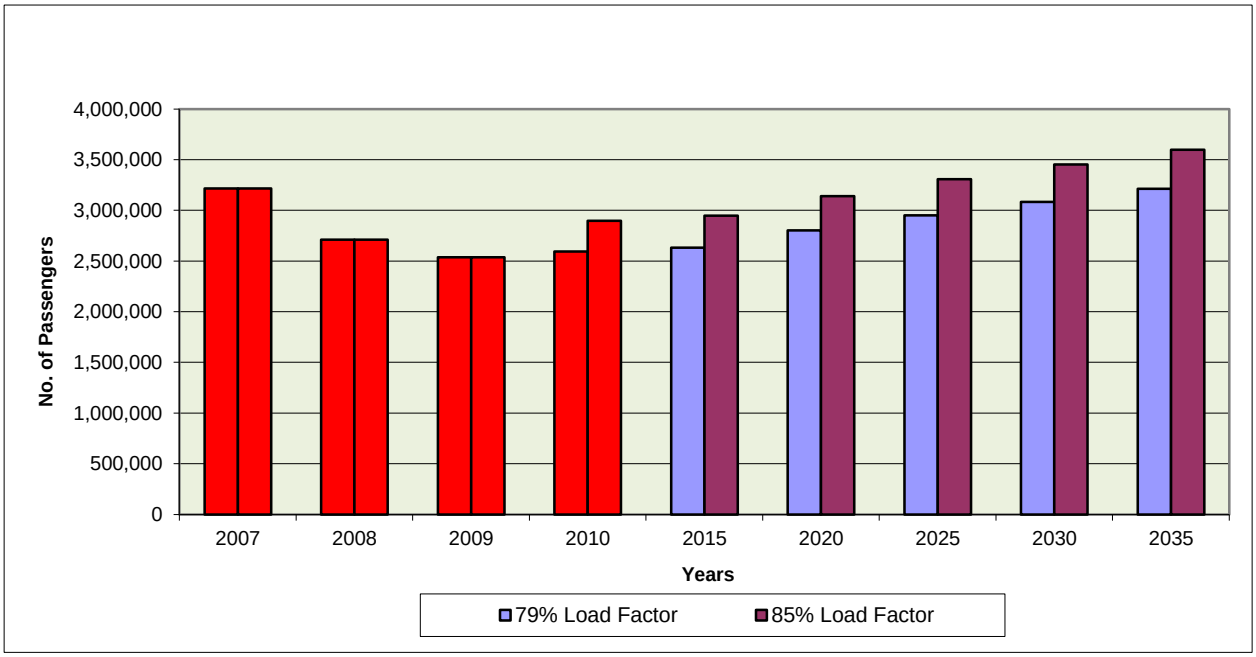


Figure 3-9 Overseas Passengers Historical Data from 2007 to 2014 and Forecasted Data from 2015 to 2035
Source: Hawaii Aviation Demand Forecasts

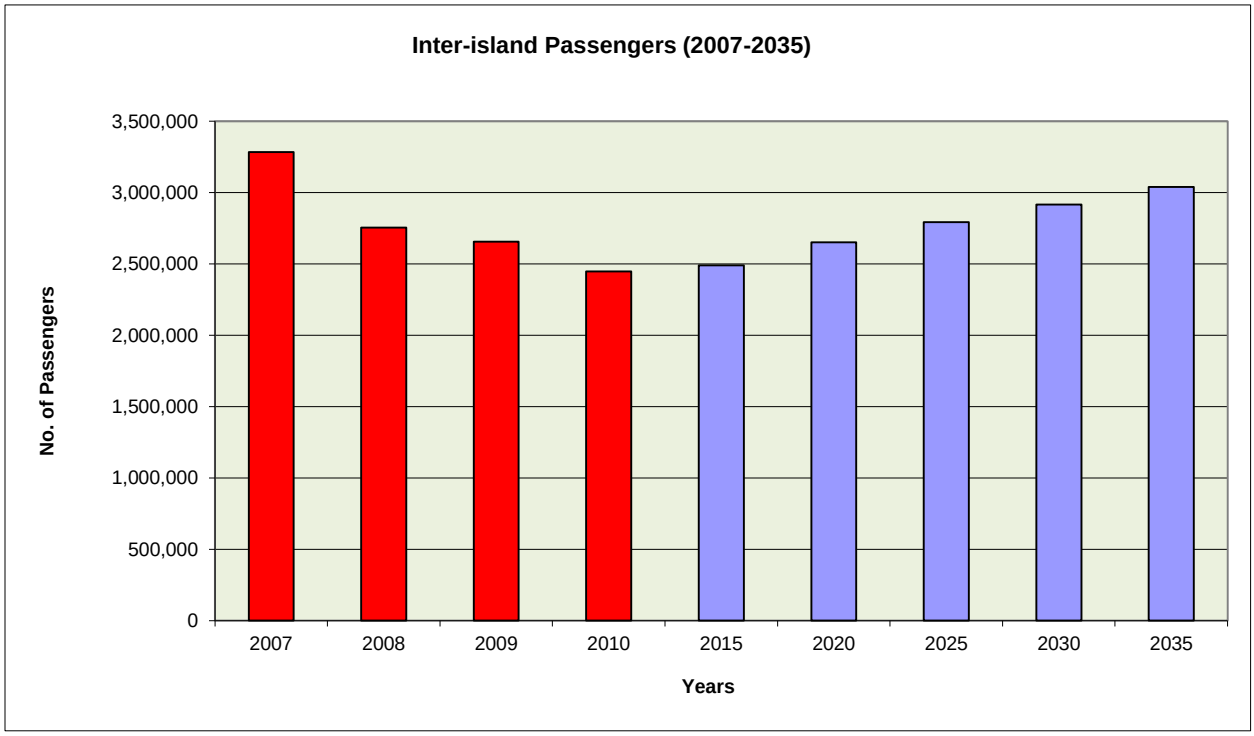


Figure 3-10 Inter-island Passengers Historical Data from 2007 to 2014 and Forecasted Data from 2015 to 2035

3.3.3 AIR CARGO AND MAIL FORECAST ACTIVITY

The total volume of air cargo is anticipated to remain consistent during the forecast period, while mail volumes are projected to increase at an annual rate of 2.5% as shown in **Figure 3-4** on Page 3-4.

3.3.4 POTENTIAL FOR INTERNATIONAL AIR TRAFFIC

Presently, there are no scheduled international flights to or from the OGG, and there are no Federal Inspection Service (FIS) facilities for the processing of arriving international passengers. Consequently, all incoming passengers from international destinations must clear customs and immigration at HNL or mainland airports before flying on to Maui. The historical absence of international flights to and from the OGG is a function of many factors including existing international agreements, airlines' assessments of the market potential for such a service, and a lack of airport facilities.

An exception to this is passengers on charter flights between Canada to Maui. These charters are the principal users of a pre-clearance arrangement between Canada and the United States. This pre-clearance occurs from airports where FIS facilities and personnel are present. Overseas passengers from these flights are included in the "overseas" category in **Table 3-3** on Page 3-10.

3.4 PEAK PERIOD FORECAST

Peak-period passenger and aviation demand forecasts have been prepared for the average day of the busiest month. These forecasts influence airfield, terminal area, access, automobile parking, and infrastructure requirements for the OGG. Peak-hour aviation demand forecasts for enplaned passenger activity, airline activity, and aircraft operations are summarized in **Table 3-1** to **Table 3-6** on Pages 3-10 and 3-11 and are discussed below.

3.4.1 PASSENGER AND AIRLINE ACTIVITY

August is typically the busiest month for airline passenger traffic at the OGG. The peak month's share of the annual total has remained constant over many years. The planning period forecasts for both inter-island and overseas passenger volumes will continue to assume that 10-11% of the annual total will continue to occur in the month of August.

The methodology to estimate the future level of operations by aircraft type for overseas and inter-island flights consists of the following steps:

- The baseline passenger forecasts for inter-island and overseas operations assume the 2010 distribution of passengers are:
  - 54.2% overseas
  - 45.8% inter-island
- An estimate of the number of seats by type of aircraft deployed in 2010 was developed from industry standard aircraft seating configurations. The projected passengers were next allocated across seating capacity by aircraft type for overseas and inter-island flights.

Three (3) scenarios were then developed for the overseas flights as follows.

A. Baseline Scenario 1 consists of the following assumptions:

- The 2010 seating capacity allocation by aircraft type will remain constant over the projection period.
- That 2010 seating capacity utilization of 79% will remain constant over the projection period.

B. Scenario 2 assumes seating capacity utilization increases. The assumptions are:

- The 2010 seating allocation by aircraft type will remain constant over the projection period.
- The seating capacity utilization will increase to 85% by 2011.

C. Scenario 3 assumes the addition of overseas flights based on target markets now under consideration by DOTA. The key assumptions underlying Scenario 3 include:

- In 2012 add one (1) daily Pacific Northwest flight, using B-737-800 series aircraft, to accommodate the growing Canadian market and to provide another U. S. mainland gateway.
- In 2012 add one (1) daily Asian flight using B-767-300 series aircraft, consistent with marketing Maui to the high end Japanese/Korean visitor market.
- In 2014 add one (1) additional daily Pacific Northwest flight and one (1) additional Asian Flight.
- The number of overseas passengers will grow to reflect new added flights with a seating capacity utilization of 85%.

Table 3-1 on Page 3-10 presents the projected landings by aircraft type for the Baseline Scenario 1 for the overseas market. The highlighted rows in the table are actual operations and passenger levels.

The overseas projections under Scenario 2, are presented in **Table 3-2** on Page 3-10.

The overseas projections by aircraft type under Scenario 3 are presented in **Table 3-3** on Page 3-10. The orange shaded rows indicate the result when two (2) daily Pacific Northwest flights and one (1) daily Japanese/Korean flight are added.

Table 3-4 and **3-5** on Page 3-10 show historic and projected inter-island operations and passenger activities through the planning period.

For all tables included in this chapter, 2010 represents actual data and 2015 serves as the base year.

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757-ERL	B767	B767-209	B767-300	B767-300E	B767-CL	B767-ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	192	2,438	1,037	1,188	0	591	952	234	989	6	438	18	448	8,531
2020	5,791,283	3,139,072	204	2,596	1,105	1,265	0	629	1,014	249	1,053	6	467	19	477	9,084
2025	6,099,048	3,305,891	215	2,734	1,164	1,332	0	663	1,068	262	1,109	7	492	21	502	9,569
2030	6,367,786	3,451,556	224	2,855	1,215	1,391	0	692	1,115	274	1,158	7	513	21	524	9,989
2035	6,640,259	3,599,246	234	2,977	1,267	1,451	0	722	1,162	286	1,207	7	535	22	546	10,416

Table 3-1 Projected Overseas Landings and Passengers by Aircraft Type – Scenario 1

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757-ERL	B767	B767-209	B767-300	B767-300E	B767-CL	B767-ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	178	2,266	964	1,104	0	549	885	217	919	6	407	17	416	7,928
2020	5,791,283	3,139,072	190	2,413	1,027	1,176	0	585	942	232	979	6	434	18	443	8,445
2025	6,099,048	3,305,891	200	2,541	1,081	1,238	0	616	992	244	1,031	6	457	19	466	8,891
2030	6,367,786	3,451,556	209	2,653	1,129	1,293	0	643	1,036	255	1,076	7	477	20	487	9,285
2035	6,640,259	3,599,246	218	2,767	1,177	1,348	0	671	1,080	265	1,122	7	497	21	508	9,681

Table 3-2 Projected Overseas Landings, and Passengers, by Aircraft Type – Scenario 2

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757-ERL	B767	B767-209	B767-300	B767-300E	B767-CL	B767-ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	178	2,996	964	1,104	0	549	885	217	1,649	6	407	17	416	9,388
2020	5,791,283	3,139,072	190	3,143	1,027	1,176	0	585	942	232	1,709	6	434	18	443	9,905
2025	6,099,048	3,305,891	200	3,271	1,081	1,238	0	616	992	244	1,761	6	457	19	466	10,351
2030	6,367,786	3,451,556	209	3,383	1,129	1,293	0	643	1,036	255	1,806	7	477	20	487	10,745
2035	6,640,259	3,599,246	218	3,497	1,177	1,348	0	671	1,080	265	1,852	7	497	21	508	11,141

Table 3-3 Projected Overseas Landings and Passengers by Aircraft Type – Scenario 3

Year	Total PAX	Interisl. PAX	B717	B737	B757	B767	B767-300	Cessna 208B	CRJ-200	Embraer 170	Dash 8-100	Total
2007	6,500,384	3,284,598	8,364	6,851	68	24	0	2,540	2,870	0	4,469	25,186
2008	5,463,787	2,754,726	9,214	1,735	0	284	346	0	3,255	0	3,628	18,462
2009	5,192,693	2,656,141	11,609	0	0	5	1	5,514	2,806	1,629	3,286	24,850
2010	5,346,694	2,448,604	10,622	1	0	1	0	4,960	2,604	0	1,796	19,984
2015	5,438,392	2,490,599	10,804	2	0	2	0	5,046	2,649	0	1,827	20,330
2020	5,791,283	2,652,211	11,505	2	0	2	0	5,373	2,821	0	1,946	21,649
2025	6,099,048	2,793,156	12,117	2	0	2	0	5,658	2,971	0	2,049	22,799
2030	6,367,786	2,916,229	12,651	2	0	2	0	5,908	3,102	0	2,139	23,804
2035	6,640,259	3,041,013	13,192	2	0	2	0	6,161	3,235	0	2,231	24,823

Table 3-4 Projected Inter-island Landings and Passengers by Aircraft Type – 77% Seating Utilization

Year	Total PAX	Interisl. PAX	B717	B737	B757	B767	B767-300	Cessna 208B	CRJ-200	Embraer 170	Dash 8-100	Total
2007	6,500,384	3,284,598	8,364	6,851	68	24	0	2,540	2,870	0	4,469	25,186
2008	5,463,787	2,754,726	9,214	1,735	0	284	346	0	3,255	0	3,628	18,462
2009	5,192,693	2,656,141	11,609	0	0	5	1	5,514	2,806	1,629	3,286	24,850
2010	5,346,694	2,448,604	10,622	1	0	1	0	4,960	2,604	0	1,796	19,984
2015	5,438,392	2,490,599	9,913	1	0	1	0	4,629	2,431	0	1,677	18,652
2020	5,791,283	2,652,211	10,557	1	0	1	0	4,930	2,588	0	1,785	19,862
2025	6,099,048	2,793,156	11,118	2	0	2	0	5,192	2,726	0	1,880	20,920
2030	6,367,786	2,916,229	11,608	2	0	2	0	5,420	2,846	0	1,963	21,841
2035	6,640,259	3,041,013	12,104	2	0	2	0	5,652	2,968	0	2,047	22,775

Table 3-5 Projected Inter-island Landings and Passengers by Aircraft Type – 85% Seating Utilization

The recorded 2009 overseas air carrier summer schedules showed that approximately 10-11% of the daily inter-island flights occurred during the peak hour. Since this percentage has also been consistent over the years, the forecasts assume that the peak will continue at this level throughout the forecast period. The forecasts assume that about 15% of total daily inter-island passengers will travel during the busiest hour because passenger load factors are higher during the peak hour than they are during the remainder of the day. Currently, approximately 20% of the daily overseas flights occur during the peak hour. As the number of overseas flights increase, this percentage is forecasted to decrease to 16% by the year 2035.

In 2010, the percentages of enplaning and deplaning passengers were nearly equal. Therefore, this study assumes that the number of enplaned and deplaned passenger volumes will continue to be approximately the same through the year 2035.

3.4.2 AIRCRAFT OPERATIONS AND PASSENGER FORECAST

Table 3-6 presents operations terminal area forecasts (TAF) for passenger enplanements at OGG. As noted earlier, August is typically the busiest month for aircraft operations as well as passengers. Approximately 10-11% of the total operations recorded in previous years occur in August. The forecasts presented in this report assume that this relationship will continue through the year 2035 planning period.

Date	TAF Enplanements	Martin Base Enplanements	Martin Increased PNW and Asian Flights Enplanements	Martin Base/TAF % Difference	Martin Increased PNW and Asian Flights/TAF-% Difference
2010	2,474,597	2,673,347	2,673,347	8.0%	8.0%
2015	2,803,852	2,719,196	2,986,632	-3.0%	6.5%
2020	3,077,040	2,895,642	3,163,077	-5.9%	2.8%
2025	3,379,703	3,049,524	3,316,959	-9.8%	-1.9%
2030	3,715,433	3,183,893	3,451,328	-14.3%	-7.1%

Table 3-6 Comparison of Master Plan Passenger Projections with the FAA Terminal Area Forecasts
Source: Martin and Associates, Passenger and Operations Activity Level Projections for Kahului Airport, October 2011 (Martin) Pacific Northwest (PNW)

Table 3-6 presents a comparison of the MP Update passenger projections for the OGG with those developed by the FAA TAF. As this table indicates, the passenger projections are typically within 5% through the year 2020, under both the baseline and high passenger projection scenarios developed under the current MP. In later years of the projection period, the MP Update projections are within 10% of the TAF projections through 2025 under the baseline and high passenger projections, with the MP projections being lower in the later years of the projection period. Under the increased overseas flight scenario (Scenario 3) developed in this MP Update, the projections are within 8% of the TAF projections in 2010, and in fact, are nearly identical to the TAF projections in the years 2015 through 2021.

Table 3-7 shows the projected aircraft operations from 2010 to 2030. The projected annual total increase in operations is approximately 1% annually. The total change projected to occur between 2015 and 2030 is approximately 14%.

	Itinerant Air Carrier	Itinerant Air Taxi	Itinerant General Aviation	Itinerant Military	Itinerant SubTotal	Local General Aviation	Local Military	Local SubTotal	Total Operations
2010	39,400	59,387	10,989	2,375	112,151	6,298	447	6,745	118,896
2011	38,793	58,472	10,989	2,375	110,629	6,298	447	6,745	117,374
2012	39,914	60,162	10,989	2,375	113,440	6,298	447	6,745	120,185
2013	40,026	60,331	10,989	2,375	113,721	6,298	447	6,745	120,466
2014	41,155	62,032	10,989	2,375	116,550	6,298	447	6,745	123,295
2015	41,271	62,207	10,989	2,375	116,842	6,298	447	6,745	123,587
2016	41,768	62,956	10,989	2,375	118,087	6,298	447	6,745	124,832
2017	42,272	63,716	10,989	2,375	119,353	6,298	447	6,745	126,098
2018	42,782	64,485	10,989	2,375	120,631	6,298	447	6,745	127,376
2019	43,296	65,259	10,989	2,375	121,920	6,298	447	6,745	128,665
2020	43,821	66,050	10,989	2,375	123,235	6,298	447	6,745	129,980
2021	44,254	66,703	10,989	2,375	124,320	6,298	447	6,745	131,065
2022	44,691	67,362	10,989	2,375	125,417	6,298	447	6,745	132,162
2023	45,136	68,033	10,989	2,375	126,532	6,298	447	6,745	133,277
2024	45,585	68,710	10,989	2,375	127,659	6,298	447	6,745	134,404
2025	46,036	69,390	10,989	2,375	128,790	6,298	447	6,745	135,535
2026	46,419	69,967	10,989	2,375	129,751	6,298	447	6,745	136,496
2027	46,804	70,547	10,989	2,375	130,715	6,298	447	6,745	137,460
2028	47,195	71,137	10,989	2,375	131,696	6,298	447	6,745	138,441
2029	47,584	71,722	10,989	2,375	132,670	6,298	447	6,745	139,415
2030	47,979	72,318	10,989	2,375	133,661	6,298	447	6,745	140,406

Table 3-7 Projected Annual Operations by Type of Activity

CHAPTER 4
FACILITY REQUIREMENTS

4.1 OVERVIEW

This chapter identifies the airfield, terminal, ground transportation, and support facilities that are needed at OGG to accommodate the level of aircraft operations, passenger movements, and other activities forecasted through the year 2035. The facilities identified in this section are based on planning criteria established by the FAA for master planning and airport design, and other recognized references on airport planning and facilities use. The design objectives or "facility requirements" that must be addressed in the MP Update only focus on areas where changes are required that were not addressed in previous MPs. This is due, in part, to the rate of growth anticipated, as shown in **Figure 3-7**, in **Chapter 3**. The facility requirements are discussed in the following subsections.

4.2 GOALS AND OBJECTIVES

Guiding the MP Update are the following goals and objectives:

4.2.1 GOALS

The goals of this MP Update are to:

1. Provide adequate facilities to accommodate air service demand (forecast growth through 2035) while improving LOS, airport safety, security, and enhancing airport access.
2. Develop facilities that utilize the current airport property and facilities, are compatible with surrounding land uses, and are cost effective.

The objectives of the MP Update are to provide guidance for the development of airport facilities in a logical and fiscally responsible manner. A series of detailed objectives were also developed to address specific issues related to the airport master-planning process and each airport component. Each objective is a statement about developing the OGG. Accomplished in concert, the detailed objectives will allow the State to meet the goals for the OGG MP Update.

The objectives are organized into four (4) airport master plan components: (1) airfield, (2) terminal, (3) ground transportation, and (4) airport support, that will provide a framework for improving airport facilities and services.

4.2.2 AIRFIELD OBJECTIVES

Airfield objectives provide guidelines for improving the runways and taxiways at the airport. The airfield objectives are:

- Extend Runway 2-20 allowing aircraft to service West Coast and some Midwest destinations, such as Denver, Chicago, and Dallas-Fort Worth, by allowing aircraft to takeoff unrestricted at maximum takeoff weight (MTOW) with little to no weight penalties.
- Improve airfield safety, efficiency, and operational capacity by eliminating the need for runway crossings by taxiing aircraft through the development of a parallel runway.
- Allow the airfield to operate without restrictions to ADG V aircraft, such as the B-777.
- Provide additional parking for commercial aircraft that must remain overnight (RON), preferably adjacent to the terminal area, to reduce runway crossings by taxiing aircraft.
- Provide additional parking for GA aircraft, particularly for private jet aircraft.
- Acquire land for the development of a parallel runway east of the existing Runway 2-20.

4.2.3 TERMINAL OBJECTIVES

Terminal objectives provide a framework for improving the passenger ticketing and check-in facilities, baggage claim facilities, gate facilities, concessions, and other terminal structure components. The terminal facility objectives are:

- Improve LOS for the traveling public in the terminal complex by maximizing passenger services and minimizing inconveniences in the passenger flow from curbside to departure gates and vice versa.
- Provide a functional and efficiently designed terminal with consideration to the following:
  - For departing passengers: Add waiting space in the holdrooms at the aircraft gates.
  - For arriving passengers: Clear orientation from the arrival gate to baggage claim and then to transit and parking.
- Incorporate the demands of the latest airport passenger security screening areas into the terminal design.
- Maintain full operational capability, no loss of gates, and minimize disruption during construction.
- Maximize the efficiency of future facilities through consideration of common use facilities.
- Provide facilities for future air carrier service by expanding existing terminal areas.

4.2.4 GROUND TRANSPORTATION OBJECTIVES

Ground transportation objectives provide guidelines for improving airport access, parking, and vehicle circulation. The ground transportation objectives are:

- Improve airport access for both private vehicles and public transit to meet anticipated passenger growth and vehicular demand.
- Ensure the safe and efficient flow of traffic in and out of the airport.

- Reconfigure the roadway system to avoid congestion points that lead to traffic delays and motorist confusion.
- Organize the ground transportation facilities to provide sufficient terminal parking, remote parking, rental car facilities, commercial vehicles, and taxis/vans/shuttles.

4.2.5 AIRPORT SUPPORT OBJECTIVES

Airport support objectives will provide the framework for improvements to tenant facilities and other airport facilities such as cargo and GA facilities. The airport support objectives are:

- Accommodate improved and expanded air cargo and ASIF that meet air cargo demand and utilize existing ground transportation networks.
- Work with existing tenants to improve GA and air taxi facilities in an organized and efficient manner while recognizing OGG's role as the island's primary commercial service airport.
- Provide adequate facilities for airport maintenance and support.
- Increase ramp access and space for additional FBOs.

4.3 AIRFIELD REQUIREMENTS

4.3.1 HOURLY CAPACITY AND ANNUAL SERVICE VOLUME

The first step in evaluating the need for additional OGG airfield facilities was to calculate the "hourly capacity" and "annual service volumes" (ASV) of the existing runways using the procedures described in FAA AC 150/5060, Airport Capacity and Delay, dated September 23, 1983.

The hourly capacity of an airfield is a measure of the maximum number of aircraft operations (landings and takeoffs) that can be accommodated on the airfield in one (1) hour. This definition contains no assumptions regarding acceptable levels of delay to aircraft; it simply expresses the maximum physical capability of an airfield or any one of its components under a set of specified conditions.

The hourly capacity is a function of a number of factors including: ceiling and visibility; runway use patterns (i.e., the proportion of aircraft using each of the available runways); the type of aircraft that are involved; the split between arrivals and departures; the percent of touch-and-go operations; and the locations and configurations of the exit taxiways. The appropriate value for each of these factors at the OGG was determined on the basis of FAA, State, and military aircraft operations statistics, meteorological records, and conversations with FAA ATCT personnel and airport management.

ASV is used as a reference point in airport planning. It is an estimate of the number of aircraft operations that can be accommodated at a given facility over the course of a year with an average annual aircraft delay on the order of one (1) to four (4) minutes. If the number of annual operations exceeds the ASV, moderate or severe congestion may occur.

The resultant figures were then compared to the forecasts in **Chapter 3** to determine if and when additional runways would be needed. The results of this analysis are described below.

4.3.2 HOURLY CAPACITY

The hourly capacity of the airfield during VFR conditions for the current mix of fixed-wing aircraft and airfield facilities is about 63 operations and is anticipated to remain constant to year 2035. The hourly capacity during IFR conditions for the current mix of aircraft and airfield facilities is about 51 operations and is anticipated to remain constant to year 2035. The busiest day of the year is August 20th with a total of 14 operations occurring between 1300 and 1400 hours. The number and location of exit taxiways influence the hourly capacity of a runway since they affect the time it takes for aircraft to clear the runway after landing. The existing capacity estimates for Runway 2-20 are based on five (5) exit taxiways to the west of Runway 2-20 and three (3) exit taxiways to the east. The existing capacity estimates for Runway

5-23 are based on three (3) exits on the southern side of the runway and none on the northern side.

4.3.3 ANNUAL SERVICE VOLUME

Assuming that runway use patterns and aircraft mix remain the same as at present, the ASV of the existing airfield is estimated to accommodate 123,587 operations for all aircraft types (estimated 2015 value based on the 2010 value).

4.3.4 RUNWAY 2-20 RECONSTRUCTION

As discussed in **Chapter 2**, Runway 2-20 is currently in need of reconstruction. The closing of the runway is not an option because of the vital role OGG plays in the economy of Maui. According to findings prepared by *URS, 2012*, the potential daily economic loss could total up to $8.4 mil. for up to approximately 16 weeks if Runway 2-20 were closed. See **Table 4-1** on Page 4-5.

The DOTA commissioned MACTEC to investigate Runway 2-20 pavement distress. The resulting report, *Runway 2-20 and Taxiway Pavement Evaluation, Kahului, Maui, Hawaii,* September 2008, identified pavement conditions and potential problems, and recommended possible solutions assuming that the runway is actively used and is an important aspect to the economy of Maui

The existing pavement structure generally has about 17 inches of AC over four (4) to eight (8) inches of aggregate base with areas having 14 inches of AC over nine (9) inches of base and 16 inches of AC over eight (8) inches of base. Shear testing indicated a weak or no bond at layer interface, approximately 11 inches of aggregate base.

The report concluded that the pavement problems resulted from slippage between the pavement layers caused principally by the braking and turning actions of heavy aircraft while slowing and exiting the runway after landing. The report hypothesized that "…the separation of the layers is due to a weak bond resulting from low or weak bond strength of the tack coat."

The Statewide Pavement Management System Update for Kahului Airport, by URS Corporation, Inc., in 2008, similarly concluded that "pavement distress is from slippage between the existing AC layers which is placed over the aggregate base." Lastly, a supplemental pavement evaluation, *Runway 2-20 & Taxiway Structural Improvements at Kahului Airport (OGG), State Project No. AM1022-14: Concrete Construction*, URS Corporation, Inc. 2010, further suggested that the runway surface be converted from asphalt to concrete. Pavement distress and proposed rehabilitation and/or reconstruction are an ongoing concern for both the FAA and DOTA. To qualify for FAA funding, improvements to the runway must result in a permanent fix or remedy which is defined as providing a durable, safe runway with a design life of not less than 20 years.

During the MP Update, the *OGG Runway 2-20 Reconstruction Feasibility Study*, URS Corporation Inc., 2012, was commissioned by DOTA to identify and evaluate reasonable and practical alternatives for Runway 2-20 reconstruction. Alternatives were evaluated using a three (3) step screening process described in **Section 5.3.1.1** in **Chapter 5** that met the following purpose and need criteria:

- Reconstruct Runway 2-20 at its current length with a 20-year pavement life
- Maintain airfield capability to adequately accommodate the current and projected levels of air carrier and cargo operations, as well as the current and potential fleet mix of transpacific flights

Eight (8) alternatives and the No-Action Alternative were evaluated using this process. The recommended preferred alternative is to extend Runway 5-23 to 7,000 feet (ft.) and shift Runway 2-20 by 2,605 ft. south, and reconstruct.

AIRCRAFT TYPE	NUMBER OF SEATS	DAILY ARRIVALS	DAILY ARRIVING SEATS	DAILY ARRIVING PASSENGERS	LOST EXPENDITURES
777	300	1	300	240	$319,920
767-300	223	5	1,115	892	$1,189,036
757-200	151	9	1,359	1,087	$1,448,971
737-800	161	7	1,127	902	$1,202,366
717-200	111	29	3,219	2,575	$3,432,745
CRJ	50	6	300	240	$319,920
DHC-8	37	5	185	148	$197,284
Lights	10	28	280	224	$298,592
Total	**1,043**	**90**	**7,885**	**6,308**	**$8,408,834**

Mainland Transpacific Flights (require 7,000 feet of runway); Inter-Island Flights (require 5,000 feet), Notes: (Source URS, 2012)

1 Daily arriving seats represents the total number of seats available on the aircraft arriving at OGG.

2 The daily arriving passengers have been estimated using an average load factor of 80%. Total daily seats X average load factor = daily passengers.

Table 4-1 Daily Economic Impact of Flights at OGG

This alternative would also eliminate the intersection of Runways 5-23 and 2-20. A discussion of the evaluation process is provided in **Chapter 5**. The URS 2012 report evaluated each alternative against the following criteria:

- Meets Purpose and Need
- Airport Safety and Operations
- Compatible with Master Plan and ALP
- Impact on Instrument Approaches
- Airspace Compatibility
- Constructability
- Environmental Factors

In addition, the evaluation of the alternatives included a three-step screening step where an alternative was required to pass one step before proceeding to the next criteria (URS, 2012). See **Table 4-2** on Page 4-7. The Airlines Committee of Hawai'i's (ACH) consultants, AvAirPros and Conway Consulting, prepared the *Proposed Approach to the Reconstruction of Runway 02/20 (2014)*, and provided additional alternatives that maintained existing airport operations, were cost effective, and had a minimal amount of construction time.

The ACH report evaluated two (2) additional alternatives, with five (5) options. The ACH report recommends the construction of a new taxiway that would serve as a temporary runway to the east of Runway 2-20 while it is reconstructed. Once reconstruction of Runway 2-20 is completed, the temporary runway will become parallel Taxiway "L". See **Chapter 5**.

The proposed taxiway "L" (temporary runway) will be designed to serve the existing and future aircraft mix. Proposed Taxiway "L" will be extended to 7,000 ft. with a width of 150 ft., and have a 25 ft. shoulder along its western side. It will be non-precision and have all required navigational aids. Due to the temporary nature of the facility, modifications to the following design standards would be proposed:

- Runway Shoulder
- Helicopter Touchdown and Lift Off Area (TLOF)
- Runway Object Free Area (ROFA) Standards
- East Side Parallel Taxiway Lateral Separation from Runway 2-20

There will be impacts to the existing RPZ and the ROFA during pavement construction. The southern portion of the temporary runway will be located within the RPZ and ROFA. Runway 2-20 will be closed during construction within this area. Additional action along the East Apron required to support the pavement construction include:

- Develop a Taxiway 'A' connection
- Provide drainage ditch improvements

Existing facilities and operations along OGG's East Apron will be impacted in order to address FAA standards for ADG IV regarding runway lateral separation. The specific standards affected are the RSA, ROFA, and FAR Part 77, Primary and Transitional Surfaces.

RSA standards require the RSA to remain clear of temporary and/or permanent aircraft, facilities, and functions. However, ROFA standards may allow "interim permission" for certain activities within the ROFA with proper notifications and awareness of operational conditions. It is proposed that all fixed facilities located greater than 25 ft. inside of the ROFA be demolished or relocated. This would require the following actions:

- Relocation or closure of Haleakalā Highway
- Accommodations for a service road
- Relocation of some helicopter operations and final approach and takeoff area (FATO)
- Relocation of GA facilities and aircraft
- Relocating existing GA tie downs
- Moving existing fuel facilities

To maintain OGG operations, development of interim procedures with the ATCT will be required. Upon the completion of the reconstruction of Runway 2-20, the temporary runway will be converted to parallel Taxiway "L" and Taxiway 'M' used for GA, itinerant, helicopter, and FBO uses.

4.3.5 RUNWAY 5-23

The existing Runway 5-23 will remain at 4,990 ft. in length and no changes are proposed.

4.3.6 RUNWAY 2-20 EXTENSION

During the last update to the OGG MP in 1993, a 2,600 ft. extension of Runway 2-20 to 9,600 ft. was proposed and adopted by the DOTA. Since 1993, a number of changes have occurred to airport operations, the aircraft fleet mix serving Kahului, and airport operational guidance provided by the FAA. In light of the changes that have occurred in the past 20 years, the recommendation to extend the primary runway is re-examined below in accordance with AC 150/5325-4B, Runway Length Requirements for Airport Design.

4.3.6.1 METHODOLOGY

AC 150/5325-4B sets forth the procedures used to determine the appropriate runway length for the OGG. The procedure for determining runway length is as follows:

Step #1: Identify the list of critical design airplanes that will make regular use of the proposed runway for an established planning period of at least five (5) years.

Step #2: Identify the airplanes that will require the longest runway lengths at certificated MTOW. This will be used to determine the method for establishing the recommended runway length. When the MTOW of a listed airplane is over 60,000 pounds (27,200 kg), the recommended runway length is determined according to individual airplanes. The recommended runway length in the latter case is a function of the most critical individual airplane's takeoff and landing operating weights, which depend on wing flap settings, airport elevation and temperature, runway surface conditions (dry or wet), and effective runway gradient.

ALTERNATIVE	DESCRIPTION	ALTERNATIVE PASS TO THE NEXT STEP			RETAINED FOR FURTHER ANALYSIS
		Step 1	Step 2	Step 3	
No-Action	RW 2-20 would not be reconstructed	No			Yes – For baseline comparison
Alternative 1	Close airport during reconstruction	No			No
Alternative 2	Reconstruct existing runway with no other action	No	Yes – For comparison purposes		
Alternative 3	Extend RW 5-23 to 7,000 feet (1,260 feet west and 750 feet east) and use shortened RW 2-20 during construction in intersection	Yes[1]	Yes	Yes	Yes
Alternative 4	Extend RW 5-23 to 7,000 feet (200 feet west and 1,810 feet east) and use shortened RW 2-20 during construction in intersection	Yes[1]	--	No	No
Alternative 5	Extend RW 5-23 to 7,000 feet (1,260 feet west and 750 feet east); shift RW 2-20 by 2,605 feet south and reconstruct; eliminate RWs 5-23 and 2-20 intersection	Yes	Yes[2]	Yes	Yes
Alternative 6	Extend RW 5-23 to 7,000 feet (1,260 feet west and 750 feet east); extend RW 2-20 by 2,605 feet and reconstruct; ultimate RW 2-20 length of 9,600 feet.	Yes	Yes	Yes	No[3]
Alternative 7	Construct a new parallel RW 2R-20L 7,000 feet in length	Yes	Yes[4]	Yes	Yes
Alternative 8	Construct a new replacement RW 2-20 7,000 feet in length	Yes	Yes[4]	Yes	Yes

Source: Adapted by URS, 2012.

1 To the maximum extent practical without extending or relocating Runway 2-20.

2 Assuming the relocation of the Runway 20 threshold is practicable given possible airspace and obstruction factors.

3 Alternative 6 would result in an extension of Runway 2-20 to 9,600 feet. There is presently no documented justification for this runway extension.

4 Assuming the additional cost can be justified in terms of the long-term projected airport layout.

Table 4-2 Summary of Runway 2-20 Reconstruction Alternatives Considered Using Screening Criteria

Step #3: The airplanes identified in **Step #2** will determine the method to be used for establishing the recommended runway length, e.g. MTOW, aircraft performance (range), and airplane weight category.

Step #4: Select the recommended runway length from among the various runway lengths generated by **Step #3** considering aircraft type, aircraft performance, and selected destination (range).

Step #5: Apply any necessary adjustment to the obtained runway length, when instructed by the applicable chapter of the AC, to the runway length generated by **Step #4** to obtain a final recommended runway length.

4.3.6.2 DESIGN AIRCRAFT - CARRIERS SERVING THE AIRPORT

OGG is currently served by seven (7) major airlines, two (2) foreign flag, and two (2) commuter passenger air carriers. **Table 4-3** on Page 4-9 shows the overseas and inter-island airlines serving the OGG (excluding cargo airlines, passenger tour operators, passenger charter airlines, air taxis, helicopters, and fixed base operators).

On a scheduled non-stop basis, service from the OGG is provided to seven (7) inter-island markets (Honolulu, Kona, Hilo, Līhu'e, Moloka'i, Hāna, and Waimea/Kohala), and 13 overseas markets (Dallas/Fort Worth, Denver, Las Vegas, Los Angeles, Oakland, Phoenix, Portland, Sacramento, San Diego, San Francisco, San Jose, Seattle/Tacoma, and Vancouver). There are additional occasional flights to six (6) overseas markets (Anchorage, Calgary, Chicago O'Hare, Edmonton, Oakland, and Orange County).

4.3.6.3 FLEET MIX

The aircraft types that are expected to serve the OGG were examined as part of the runway length analysis. The previous 1995 study relating to runway lengths at OGG included the following types of aircraft for overseas service (note that DC-10 and B-747 aircraft currently do not fly to Kahului Airport):

- MD DC-10-10
- MD DC-10-30
- L-1011-100
- B-747-200
- B-747-400
- B-767-200ER
- B-767-300ER

In the October 2012 feasibility study conducted by URS Corp., the following aircraft types were examined with regards to runway lengths and performance.

- B-777
- B-767
- B-757
- B-737
- B-717

The identified aircraft types represent the current and anticipated aircraft serving the OGG. For overseas analysis, the B-717, ATR-72, and Cessna aircraft types were not considered because their operational needs would be served within the operational parameters of the larger overseas carriers. It should be noted that the airlines utilize a variety of aircraft configurations (seating capacity), operating procedures and engine types, and the findings cannot be generalized to apply to all air carriers. Further, each air carrier has specific operational guidelines for operation in Hawai'i.

A comparison of the existing conditions of Runway 2-20 with the FAA design criteria in **Table 4-4** on Page 4-10, indicates that Runway 2-20 meets the criteria for ADG V (i.e., aircraft with wingspans of 171 ft. to 197 ft., including the B-747-200). The ability of Runway 2-20 to accommodate the aviation demand forecasts presented in **Chapter 3** is discussed below.

4.3.6.4 DESIGN AIRCRAFT

The "design aircraft for the purposes of airport geometric design is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and Taxiway Design Group (TDG) (FAA AC 150/5300-

13A)." Stated in another way, the design aircraft "represent[s] the aircraft that are intended to be accommodated by the airport." In the case of an airport with multiple runways, a design aircraft is selected for each runway. In consideration of the type of aircraft being utilized to service the OGG the following parameters were considered 1) the frequency of operations, and 2) the current fleet mix serving the airport. It is recommended that the B-737-800, be used as the design aircraft to determine runway length because it has 64% of the total overseas operations at OGG. The B-777-200 does have the longest stage length (Kahului to Chicago); however, there is only one (1) flight per week by United Airlines at this time. The B-767-300ER is also used in the Kahului market.

The following factors were examined with regard to the B-737-800 and its performance characteristics to determine the standard measure for runway length at Kahului:

- City Pairs and Stage Lengths
- Major Markets and Hawai'i Visitors
- Aircraft Performance
- Runway Length

4.3.6.5 CITY PAIRS AND STAGE LENGTHS

The markets (cities) served by existing air carriers from OGG are listed in **Table 4-5** on Page 4-11 and shown in **Figure 4-1** on Page 4-12. The number of departures from the OGG to the cities served is shown in **Table 4-6** on Page 4-11. **Table 4-7** on Page 4-12 shows the departures per week and carriers for international overseas non-stop markets.

Along with the increase in the number of markets served, there has also been an increase in the number of markets served by one (1) carrier. The individual carriers seek to establish more direct flights to new and in some cases, smaller markets. Currently, there are 11 cities served by only one (1) carrier for flights from the OGG:

- Anchorage - Alaska Airlines
- Chicago - United Airlines
- Dallas/Fort Worth - American Airlines
- Denver - United Airlines
- Bellingham - Alaska Airlines
- Phoenix – American Airlines
- Sacramento - Alaska Airlines

AIRLINE	AIRCRAFT TYPE
Air Canada	B-767-200
Alaska Airlines	B-737-800
American Airlines	B-767-ER/CL
Continental Airlines	B-737-700/800
Delta Airlines	B-767-300-400/ER; B-757-200
Hawaiian Airlines	B-717, B-767
Island Air	ATR-72
Mokulele Airlines	Cessna 208B
United Airlines	B-767-300ER, B-777-200, B-757-200
Virgin America	A320
WestJet	B-737-800
Source: DOTA, Kahului District, 2014	

Table 4-3 Airlines Serving Kahului Airport

	AIRCRAFT DESIGN GROUP			
FEATURE (ft.)	**III**	**IV**	**V**	
Wingspan	*79 To <118*	*118 To <171*	*171 To <214*	KAHULUI AIRPORT EXISTING CONDITIONS
Runway Length	*See FAA AC 150/5325-4*			
Runway Width	100 (2)	150	150	150
Runway Shoulder Width	20 (2)	25	35	35
Runway Blast Pad Width	140 (2)	200	220	200
Runway Blast Pad Length	200	200	400	400
Runway Safety Area Width	500	500	500	500
Runway Safety Area Length	1,000	1,000	1,000	1,000
SEPARATION STANDARDS (ft.)	**AIRPLANE DESIGN GROUP (1)**			
Runway Centerline To:	**III**	**IV**	**V**	
Taxiway Centerline	400	400	400	400
Aircraft Parking Area	500	500	500	500
Property Or Building Restriction Line	300	750	750	750
Taxiway Centerline To:				
Parallel Taxiway Centerline	152	215	267	450
Fixed Or Moveable Object	93	130	160	160

Source: FAA, 2011. Note: The runway width for Airplane Design Group III aircraft having maximum certificated takeoff weights in excess of 150,000

Table 4-4 FAA Runway Design Standards

- San Diego - Alaska Airlines

This is in sharp contrast to four (4) markets (Oakland, St. Louis, Midway, and Phoenix) served by one (1) carrier during the 2010 reporting period.

Larger markets served by a single carrier include Chicago, Dallas/Fort Worth, Denver, Las Vegas, Phoenix, San Diego, San Francisco, and San Jose. Smaller markets, which have been added, include Anchorage and Sacramento, smaller communities with populations under 500,000. Also, on the inter-island routes, Hilo, Kona, Līhu'e and Moloka'i all fall under the 500,000 population threshold.

4.3.6.6 MAJOR MARKETS AND HAWAI'I VISITORS

The Hawai'i Tourism Authority (HTA) regularly conducts studies pertaining to the visitor market in Hawai'i. For 2011, visitors from nine (9) regions of the country were surveyed. International destinations were not considered in this study. The findings show that more than 50% of all visitors from the continental U. S. are from the West or Pacific coast states that include Alaska (2%), California (76%), Oregon (7%), and Washington (15%) (for the purposes of this analysis, the Midwest states include those in the Central U. S.). See **Table 4-6** on Page 4-11**.**

AIRLINE	MARKET DESTINATIONS
Air Canada	Vancouver, British Columbia. Seasonal: Calgary, Alberta.
Alaska Airlines	Oakland, Sacramento, San Diego, and San Jose, California; Portland, Oregon; and Bellingham and Seattle/Tacoma, Washington. Seasonal: Anchorage, Alaska.
American Airlines	Dallas/Fort Worth, Texas; Phoenix, Arizona; and Los Angeles, California.
Delta Airlines	Los Angeles, California and Seattle/Tacoma, Washington.
Hawaiian Airlines	Hilo, Honolulu, Kona, and Līhu'e, Hawai'i; Oakland, San Jose, San Francisco, and Los Angeles California; Portland, Oregon; and Seattle/Tacoma, Washington.
Island Air	Honolulu, Kona, Līhu'e, Kaunakakai and Lāna'i City, Hawai'i.
Mokulele Airlines	Kona, Kaunakakai, Lāna'i City, Kamuela, Hilo, Hana, Līhu'e, and Kalaeloa, Hawai'i.
United Airlines	Denver, Colorado; Los Angeles and San Francisco, California. Seasonal: Chicago-O'Hare, Illinois; and Kona, Hawai'i.
Virgin America	San Francisco, California
WestJet	Vancouver, British Columbia. Seasonal: Calgary and Edmonton, Alberta
Source: DOTA, Kahului District, 2014	

Table 4-5 Markets Served by Air Carriers Using Kahului Airport

DOMESTIC MARKET DESTINATION	MARCH 2014 – DEPARTURES/WEEK	PERCENT OF TOTAL	CARRIERS	AIRCRAFT TYPE
Anchorage	4	2%	Alaska Airlines	B-737-800
Bellingham	4	2%	Alaska Airlines	B-737-800
Chicago	1	1%	United Airlines	B-777-200
Dallas/Fort Worth	9	5%	American Airlines	B-767-300
Denver	4	2%	United Airlines	B-757-200
Los Angeles	44	23%	American Airlines, Delta Airlines, Hawaiian Airlines, United Airlines	B-757-200; B-757-300; B-737-800; A321; A330-200
Oakland	11	6%	Alaska Airlines, Hawaiian Airlines	B-737-800; A330-200
Phoenix	10	5%	American Airlines	B-757-200
Portland	15	8%	Alaska Airlines	B-737-800
Sacramento	6	3%	Alaska Airlines	B-737-800
San Diego	8	4%	Alaska Airlines	B-737-800
San Francisco	36	19%	Hawaiian Airlines, Virgin Airlines, United Airlines	B-737-800; B-757-200; A320; A330-200
San Jose	12	6%	Alaska Airlines, Hawaiian Airlines	B-737-800; B-767-300
Seattle/Tacoma	27	14%	Alaska Airlines, Delta Airlines, Hawaiian Airlines	B-737-800; B-757-200; A330-200
Total Departures	**191**	**100%**		
Source: HDOT, Airports Division, Kahului District, 2014				

Table 4-6 Departures per Week and Carriers for Domestic Overseas Non-Stop Markets

INTERNATIONAL MARKET DESTINATION	MARCH 2014 – DEPARTURES/WEEK	AIR CARRIERS	AIRCRAFT TYPE
Calgary	8	Air Canada	B-767-300
Edmonton	3	WestJet	B-767-300
Vancouver	22	WestJet, Air Canada	B-737-800; B767-300
Total	**30**		
Source: DOTA, Kahului District, 2014			

Table 4-7 Departures per Week and Carriers for International Overseas Non-Stop Markets

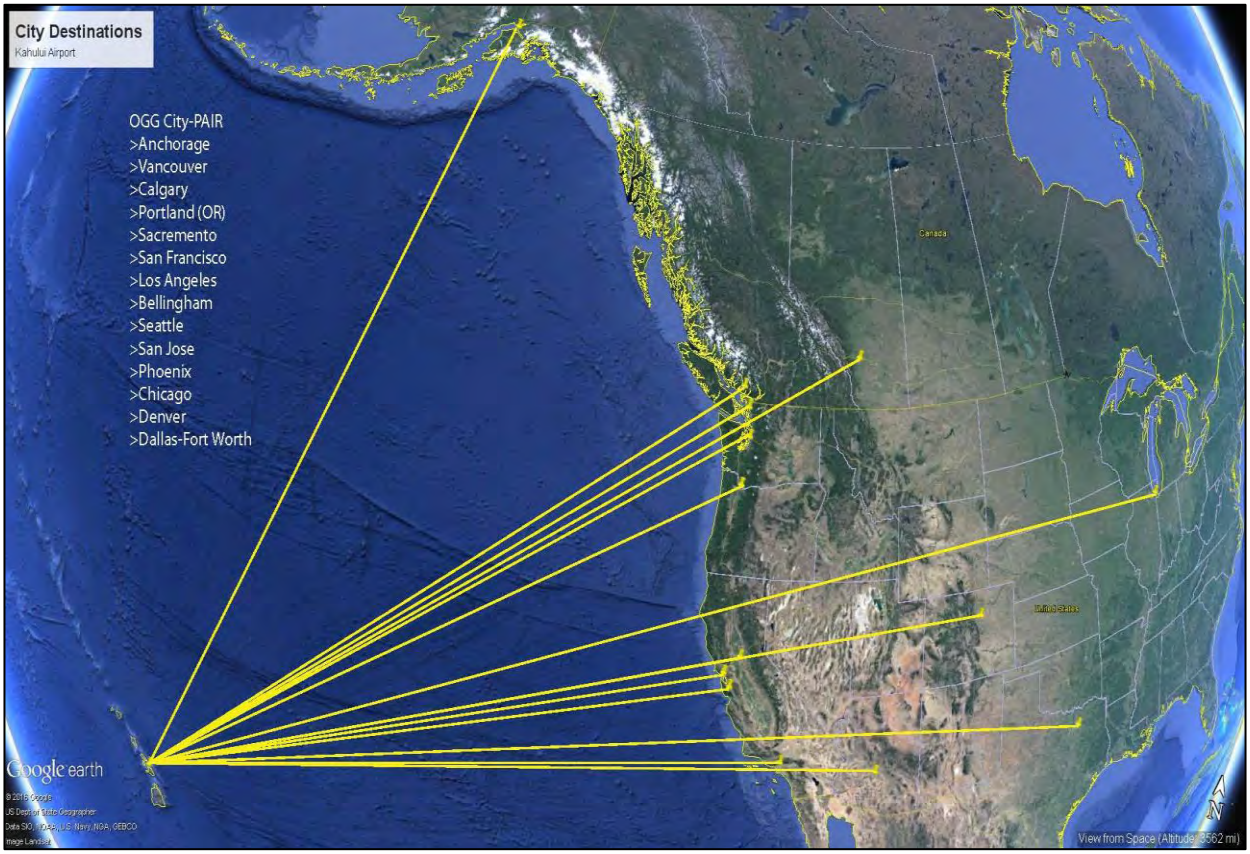


Figure 4-1 City Destinations From OGG

Based on the examination of destinations and markets served and not served, the cities identified in **Table 4-9** will be evaluated with regards to destinations from the OGG. The cities identified also represent hubs for the major air carriers. Examination of a Tokyo destination has been included for comparison purposes; however, the OGG is not scheduled as a facility serving foreign destinations. The DOTA has established that regularly scheduled international arrivals that require clearance by immigration, customs, health, and agriculture at the airport will not be provided by OGG. Pre-cleared flights, those with inspections occurring at the point of origin, will continue. All other flights originating in a foreign country wanting to land at the OGG will be required to fly to the HNL for clearance or arrange for advance federal inspection services at the OGG.

YEAR	2014	2013	2012	2011	2010R	% of 2014
PACIFIC COAST	2,593,041	2,548,978	2,558,886	2,375,475	2,321,329	54%
Alaska	75,447	77,365	79,200	79,218	69,175	
California	1,847,700	1,803,858	1,817,836	1,629,858	1,617,786	
Oregon	202,897	201,869	200,289	204,240	196,533	
Washington	466,997	465,887	461,561	462,160	437,835	
MOUNTAIN	594,719	594,199	574,311	559,924	538,453	12%
Arizona	162,524	165,660	155,940	148,450	147,722	
Colorado	138,265	136,990	140,166	139,448	134,163	
Idaho	44,835	46,097	39,538	38,753	35,261	
Montana	25,090	25,280	23,375	23,572	20,863	
Nevada	90,273	88,646	88,025	81,518	76,986	
New Mexico	24,719	26,066	27,736	26,559	26,953	
Utah	98,976	96,406	90,549	92,049	87,841	
Wyoming	10,037	9,053	8,981	9,574	8,664	
W.N. CENTRAL	200,329	196,435	200,691	200,784	189,866	4%
Iowa	25,992	26,019	27,387	26,102	189,866	
Kansas	24,257	24,059	24,362	26,017	23,443	
Minnesota	72,260	68,742	70,241	71,518	23,888	
Missouri	43,166	43,243	44,377	43,465	66,000	
Nebraska	16,873	17,074	17,558	17,393	42,492	
N. Dakota	9,455	8,785	8,434	16,031	6,004	
S. Dakota	8,326	8,513	8,331	6,947	7,658	
W.S. CENTRAL	300,555	288,044	300,282	286692	282,848	6%
Arkansas	12,763	12,919	13,145	13,487	282,848	
Louisiana	18,220	16,838	17,404	17,435	14,013	
Oklahoma	26,351	26,064	27,621	27,106	17,636	
Texas	243,222	232,224	242,112	228,934	26,122	
E.N. CENTRAL	337,516	335,549	344,260	345,118	330498	7%
Illinois	126,545	126,284	132,958	132,196	330,498	
Indiana	39,305	38,289	39,323	39,743	120,274	
Michigan	61,597	62,270	61,461	60,818	36,477	
Ohio	65,218	64,309	65,183	65,880	57,369	
Wisconsin	44,851	44,397	45,334	46,482	62,085	

YEAR	2014	2013	2012	2011	2010R	% of 2014
E.S. CENTRAL	74,898	74,524	78,110	76,712	79103	2%
Alabama	17,832	17,524	19,321	18,825	79,106	
Kentucky	18,177	18,131	19,238	18,516	18,766	
Mississippi	7,884	7,661	8,323	7,848	18,141	
Tennessee	31,004	31,207	31,227	31,524	7,893	
NEW ENGLAND	106,442	107,911	105,140	102,404	9,8612	2%
Connecticut	24,674	26,292	25,268	23,916	98,612	
Maine	7,529	7,943	7,766	7,171	22,878	
Massachusetts	53,748	53,502	51,946	50,919	7,502	
New Hampshire		9,489	9,267	9,221	48,169	
Rhode Island		6,122	5,980	6,099	8,971	
Vermont	4,880	4,926	4,840	4,940	5,914	
MID ATLANTIC	263,552	270,350	256,818	235,893	235,053	5%
New Jersey		69,960	72,970	68,618	235,053	
New York		125,781	128,832	119,696	62,845	
Pennsylvania	67,811	68,548	68,504	66,502	107,152	
S. ATLANTIC	369,718	355,864	361,396	346,839	344,047	8%
Delaware	5,141	5,075	4,904	4,535	344,047	
Washington, D.C.	9,415	8,977	8,771	9,258	4,565	
Florida	100,536	95,885	95,117	89,414	86,636	
Georgia	57,230	54,563	54,755	52,100	85,249	
Maryland	47,235	46,564	48,971	47,393	51,144	
N. Carolina	46,498	45,659	44,461	42,354	43,604	
S. Carolina	20,459	18,922	19,149	18,300	18,556	
Virginia	77,662	74,498	79,447	77,819	18,556	
West Virginia	5,543	5,721	5,820	5,667	5,891	
UNITED STATES	4,840,769	4,771,854	4,779,893	4530111	4,419,811	
Source: Hawai'i Tourism Authority, 2014						

Table 4-8 Domestic U.S. Visitors by State (Continuation from Page 4-14)

CITY	STATUTE MILES	NAUTICAL MILES
Los Angeles	2525	2192
Denver	3340	2611
Anchorage	2780	2416
Dallas-Fort Worth	3780	3284
Chicago	4270	3703
Atlanta	4502	3908
New York	5000	4339
Miami	6138	5328
Tokyo	4020	3466
Source: Retrieved from www.airnav.com – distance from OGG. 2015.		
Note: Nautical miles to Statute miles converted approximately as one (1) nautical mile = 1.15 statute mile.		

Table 4-9 City Destinations Studied

	AIRCRAFT TYPE[1]			
	B-777-200	**B-767-300**	**B-757-200**	**B-737-800**
Model Configuration	B-777-200	B-767-300 ER	B-757-200	B-737-800
MTOW[2]	545,000	412,000	255,000	174,200
Max Landing Weight (lbs)	445,000	320,000	210,000	146,300
Range (Max.)	5,240 nm	5,990 nm	3,915 nm	3,115 nm
Takeoff Length at MTOW[3] (ft)	8,300	7,900	7,750	7,874
Landing Length at MTOW[3] (ft)	5,600	5,900	5,100	4,500
Source: DOTA.				
Note: Currently operating at OGG, 2016.				
1 Data from Boeing web site www.boeing.com, 2012.				
2 MTOW = maximum takeoff weight in lbs; Nautical Miles in nm				
3 Lengths use standard day, dry runway, and no wind.				

Table 4-10 Aircraft Characteristics – MTOW and Range

4.3.6.7 AIRCRAFT PERFORMANCE

Aircraft performance information is from data published by the aircraft manufacturers. **Table 4-10** summarizes the key elements evaluated for each aircraft type. The data represented in **Table 4-10** is used to calculate the maximum runway length per aircraft type.

4.3.6.8 RUNWAY LENGTH

The runway length needed to allow aircraft to operate at MTOW depends upon the type of aircraft, the distance the aircraft must fly, and the combined weight of fuel, cargo and passengers the aircraft must carry. For the purposes of this study, information provided by the aircraft manufacturers, FAA planning documents, and DOTA, were used to define the four (4) basic options to meet the stated objective of runway

Runway Length Requirements by Aircraft		
Design Aircraft Max temp in Aug Airport Elevation Max Landing Wt Max Takeoff Wt Max Runway Centerline Takeoff Length $_{MTOW(1)}$	**737-800** 87°F 54 ft. 146,300 lbs 174,200 lbs 20 ft. 8,100 ft.	$\boldsymbol{Max\ RW\ Length}$ $= Max\ Takeoff\ Length_{MTOW} + (Centerline * NonZero\ Runway\ Gradient)$ $= 8{,}200\ ft + (20\ ft * 10\ ft)$ $= 8{,}400\ ft$
For Comparison		
Aircraft Model Max temp in Aug Airport Elevation Max Landing Wt Max Takeoff Wt Max Runway Centerline Takeoff Length $_{MTOW}$	777-200 87°F 54 ft. 445,000 lbs 545,000 lbs 20 ft. 8,300 ft.	$\boldsymbol{Max\ RW\ Length}$ $= Max\ Takeoff\ Length_{MTOW} + (Centerline * NonZero\ Runway\ Gradient)$ $= 8{,}300\ ft + (20\ ft * 10\ ft)$ $= 8{,}500\ ft$
Source: AC 150/5325-4B Runway Length Requirements, 2005. (1) At standard day + 27 d. dry runway and no wind.		

Table 4-11 Maximum Runway Takeoff Length Requirements for a B-737-800

lengthening "to allow aircraft services to West Coast and some Midwest destinations, such as Denver, Dallas-Fort Worth and Chicago, by facilitating aircraft serving these travel destinations to take off at MTOW."

Based on the design aircraft (B-737-800) and its performance evaluation, see **Figure 4-2 (Take-off)** on Page 4-17 and **Figure 4-3 (Landing)** on Page 4-18, it can be generally concluded that the B-737-800 will be able to reach the West Coast and some Midwest destinations identified based on the type of aircraft and configured as shown in **Figure 4-2** on Page 4-17.

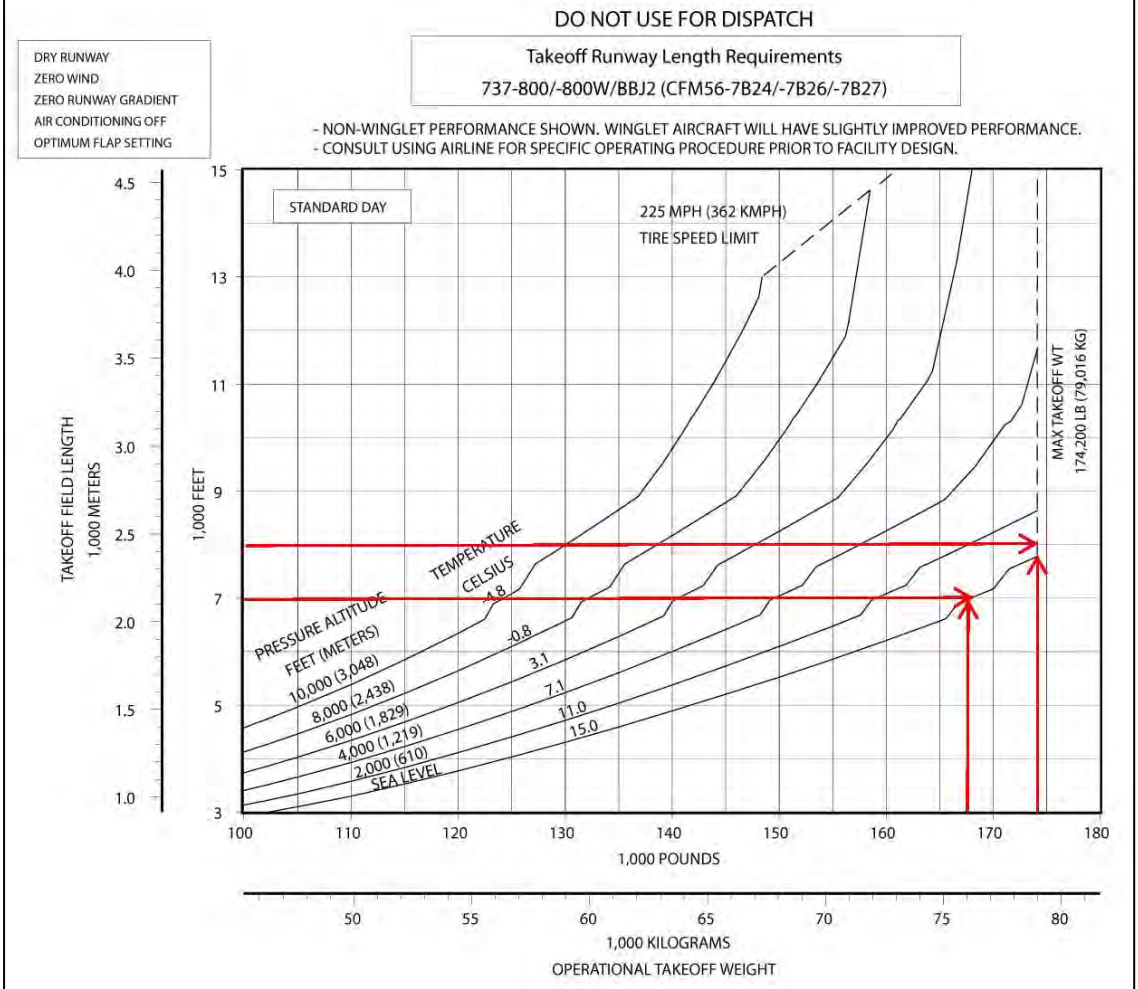
The selection of a runway length that meets the OGG MP Update objectives considers (1) the design aircraft; (2) aircraft performance; and (3) the anticipated market to be served.

The design aircraft was determined to be the B-737-800. See **Section 5.3.3.2**. Aircraft performance data, specifically for the B-737-800, is outlined in **Table 4-10**. The markets to be served are the Pacific Coast and Mountain States. See **Table 4-8**.

The performance of the B-737-800 was evaluated to determine what runway length was required to take-off at its MTOW. **Table 4-11** uses current runway conditions and weather at OGG to calculate the maximum runway length required for the design aircraft, B-737-800. The calculations show that the maximum runway length should be 8,100 ft. to allow a B-737-800 to take-off and land unrestricted at MTOW. Furthermore, the maximum runway length for a B-777-200 would require a runway length of 8,500 ft. Therefore, extending the runway to 8,530 ft. allows the aircraft listed in **Table 4-10** on Page 4-15 to land and takeoff unrestricted at MTOW with no weight penalties. The result of not extending Runway 2-20 requires that approximately 6,800 lbs of aircraft carrying capacity (approximately 31 passenger seats),

Footnote:

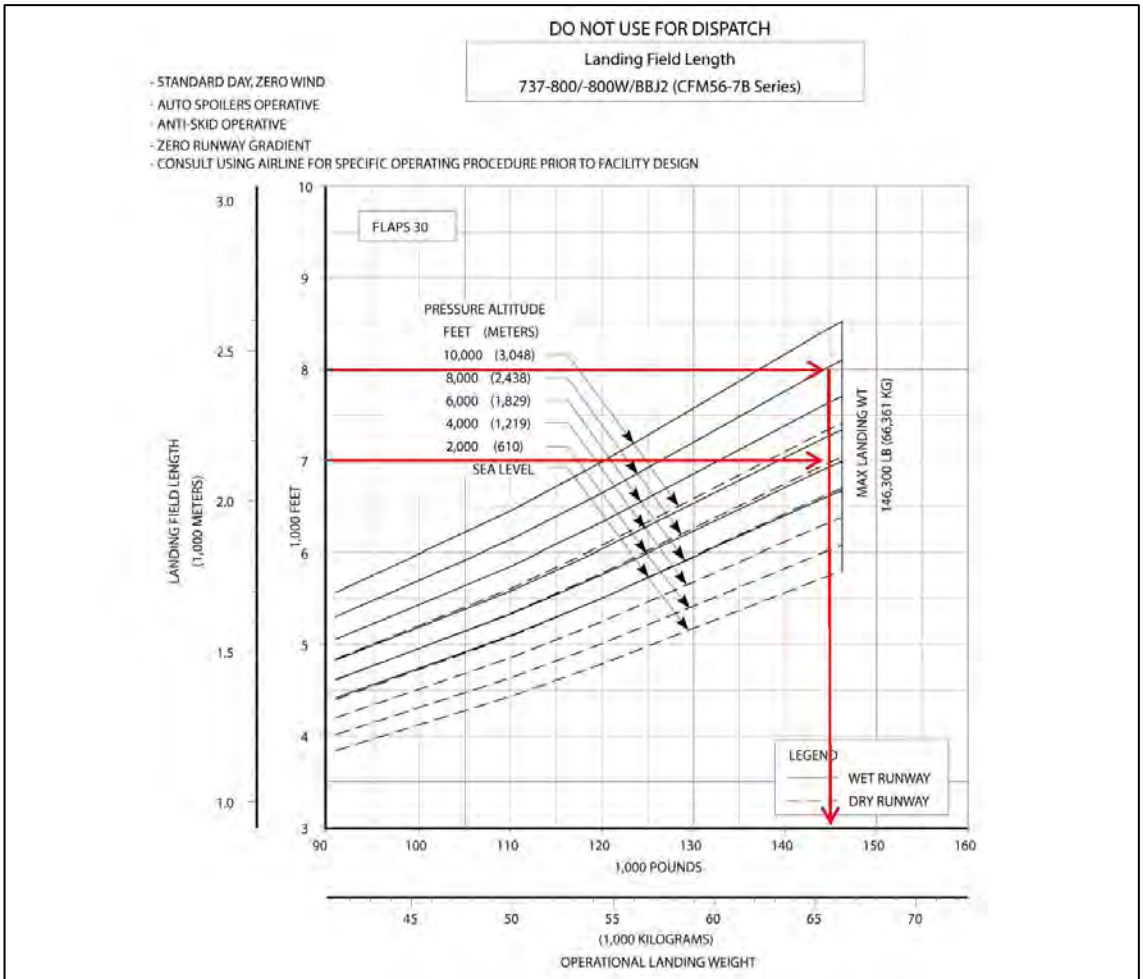
1 The 4% loss in revenue per passenger aircraft was calculated by taking the difference in weight from the MTOW (174,200 lbs) and the OTW (168,000 lbs) at the current Runway 2-20 length of 6,995 ft. The weight difference is 6,800 lbs, which was divided by an average 200 lbs per person resulting in approximately 31 seats remaining empty per aircraft upon takeoff.



Runway Length (ft.)	Operational Takeoff Weight (OTW) (lbs.)	Distance Able To Travel (nm)
3,000	103,000	1,800
4,000	124,000	2,200
5,000	142,000	2,500
6,000	158,000	2,800
7,000	168,000	3,000
7,874	174,200	3,115

Source: F.A.R. Takeoff Runway Length Requirements, Standard Day, Dry Runway at sea level for Model 737-800 with engines at 26,000 LB SLST. AC 150/5300-13A Airport Design, 2012.

Figure 4-2 Boeing 737-800 Runway Length Requirements at MTOW



Dry Runway Conditions		Wet Runway Conditions	
Runway Length (ft.)	**OTW (lbs.)**	**Runway Length (ft.)**	**OTW (lbs.)**
3,800	95,000	–	–
4,000	100,000	–	–
4,200	105,000	4,200	92,000
4,400	110,000	4,400	96,000
4,600	115,000	4,600	100,000
4,800	120,000	4,800	105,000
5,000	125,000	5,000	109,000
5,200	130,000	5,200	113,000
5,400	135,000	5,400	118,000
5,600	140,000	5,600	122,000
5,850	146,300	5,800	127,000
–	–	6,000	131,000
–	–	6,200	135,000
–	–	6,400	140,000
–	–	6,600	144,000
–	–	6,705	146,300

Source: F.A.R. Landing Runway Length Requirements, Standard Day, Flaps 30 at sea level for Model 737-800. AC 150/5300-13A Airport Design, 2012.

Figure 4-3 Boeing 737-800 Landing Field Length

are not utilized. In practical terms, this constitutes an approximately 4% loss of revenue per aircraft[1]. The 4% loss in revenue per passenger aircraft was calculated by taking the difference in weight from the MTOW (174,200 lbs) and the OTW (168,000 lbs) at the current Runway 2-20 length of 6,995 feet. The weight difference is 6,800 pounds, which was divided by an average 200 pounds per person resulting in approximately 31 seats remaining empty per aircraft upon takeoff.)

The extension of Runway 2-20 would address this deficit and allow enhanced load factors for the airlines, while improving operational efficiency and revenues for both the airlines and the State.

The objectives of the runway lengthening improvements focused on the following:

- The economic importance of the OGG on the economy of Maui is highly significant. Approximately 80-90% of all visitors to the island arrive by aircraft, accounting for more than 5.2 mil. visitors annually (2011).
- A second runway, at least 7,000 ft., is a necessity in the event of an accident or incident that requires the closure of Runway 2-20.
- A factor that determines whether a runway can be extended is the availability of land within the existing airport boundaries.

4.3.6.9 RUNWAY 2-20 AT 8,530 FT.

The DOTA proposes the extension of Runway 2-20 to 8,530 ft., 1,535 ft. to the south of Runway 2. This extension would occur after the proposed Temporary Runway/Taxiway 'L' construction is completed and the Runway 2-20 reconstruction can start. This proposal considers the following factors:

- Establishing the design aircraft for OGG as the B-737-800
- The types of aircraft currently serving OGG and proposed cities
- Existing cities being served by OGG
- Number of visitors by U.S. regions capable of being served
- Land availability within the boundaries of the airport

For purposes of this Master Plan Update, the B-737-800 is used as the basis for OGG to set the runway parameters that need to be addressed. The selection of the design aircraft is specified in the FAA Draft AC 150/5000-XX *Critical Aircraft and Regular Use Determination*. Extending Runway 2-20 to 8,530 ft. achieves the objective of allowing aircraft to service all proposed destinations in the West Coast and some Midwest destinations to land and take-off unrestricted at MTOW without weight restrictions (given airframe characteristics and engine type). A runway length of 8,530 ft. would allow unrestricted operations by the design aircraft to be used on non-stop flights between Kahului and the West Coast and some Midwest cities. (Note: The foregoing is based on currently available information provided by the aircraft manufacturer subject to local operating factors, such as weather.)

At 8,530 ft., the extension of the runway remains within the OGG boundaries. However, the runway RPZ extends beyond the airport boundaries and land acquisition will be required for a portion of the RPZ. The RSA remains within airport boundaries.

Based on the foregoing, and DOTA's decision to provide facilities that would make it possible for airlines to provide non-stop service between the OGG and the West Coast and some Mid-West destinations, it is recommended that Runway 2-20 be extended 1,535 ft. to the south for a total runway length of 8,530 ft. The existing 150 ft. width of Runway 2-20 is adequate for all categories of aircraft expected to use the OGG, and the extension should maintain this width.

4.4 AIR SPACE/AIR TRAFFIC CONTROL (AVIGATION)

Avigation considerations include: (1) airspace and air traffic control; (2) approach areas and obstructions; and (3) navigational and landing aids.

4.4.1 AIRSPACE AND AIRPORT TRAFFIC CONTROL

Existing airspace procedures and ATC provide for the safe, orderly, and expeditious flow of air traffic. Airspace and ATC considerations do not limit aviation capacity in the Kahului area, and they are not expected to limit capacity within the 2015-2035 planning period. There are no existing airspace interactions that cause serious airspace problems with the current and projected traffic flow demands.

4.4.2 APPROACH AREAS AND OBSTRUCTIONS

4.4.2.1 RUNWAY PROTECTION ZONES

The existing RPZs for Runways 2-20 and 5-23 are currently within the OGG property. Additional property should be acquired, as necessary, to ensure that the RPZs for future runway improvements remain entirely within the OGG property. The preferred course of action is to obtain fee simple title to the land, as this would provide DOTA with the greatest control over land uses. Where obtaining fee simple title is not feasible, avigation easements should be acquired over the necessary RPZ area. The existing 2,500-ft. long precision instrument RPZs, with 50:1 approach surfaces, should be maintained for Runways 2 and 20. See **Figure 4-4** on Page 4-21. Precision instrument RPZs, 2,500 ft. in length with 50:1 approach surfaces, should also be provided for any new parallel runway that is intended for use by air carrier aircraft.

Based on the most precise approach procedure, only visual RPZs with a 20:1 approach slope would be required for Runway 5-23. However, because of their occasional use by air carrier aircraft and weather related factors, it is recommended that the existing 1,700-ft. long non-precision RPZs with 34:1 approach surfaces be maintained.

4.4.2.2 OBSTRUCTIONS.

As noted in **Chapter 2**, the FAA AC 150-5300-13A, Airport Design, 2014 approach surface to Runway 2 is currently penetrated by the Kealoloa Ridge of the West Maui Mountains, which penetrates a portion of the 7:1 transitional surface between eight (8) and 10 miles south of the runway threshold. Extending Runway 2 by 1,535 ft. to the south would not appreciably affect the penetration of Kealoloa Ridge.

The United States Standard for Terminal Instrument Procedures (TERPS) has less restrictive criteria for approach obstacle clearance. The TERPS approach surface for a 3 degree glide slope for an ILS would be 34:1 for the first 10,000 ft. and 29.5:1 for the additional 40,000 ft. The TERPS approach surface would clear all of the obstructions identified above.

The Kealoloa Ridge will be identified as obstructions and obstruction elevations will be noted on aeronautical charts. However, the FAA as the approving authority may allow an ILS approach to the extended runway without modification to the sugar cane stacks or ridgeline if deemed appropriate, and if no special circumstance, such as precipitous terrain is a factor. The FAA has indicated that if Runway 2-20 were extended by 1,535 ft. to the south (for a total length of 8,530 ft.), the stacks would not have to be lowered.

Because there is presently no clear line-of-sight from the FAA ATCT to the helicopter operating area, special procedures must be used. A clear line-of-sight should be provided for any future helicopter operating area. More specifically, the ground level at the helicopter operating area should not be located behind buildings or other obstructions to the line-of-sight of the ATCT. The controller in the tower cab should be able to see the ground at the helicopter operating area.

Holdroom "F" currently obstructs the controller's view of aircraft operating in the vicinity of the Commuter Terminal. Ideally, this should be corrected by modifying the building. An alternative could be to provide video surveillance equipment to see the commuter terminal.

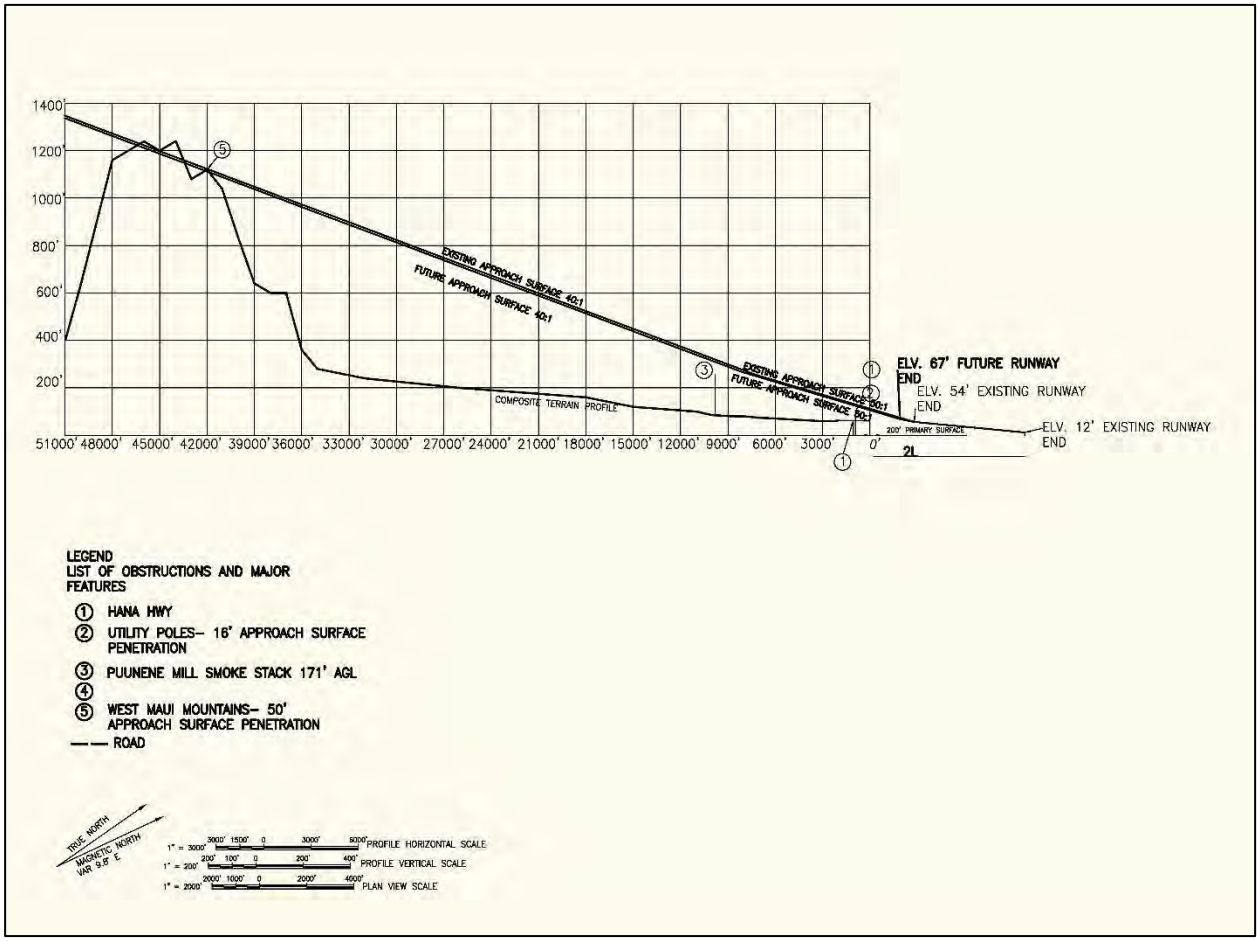


Figure 4-4 Approach Surface Runway 2-20

4.5 PASSENGER TERMINAL COMPLEX

The passenger terminal complex includes the aircraft parking apron and passenger terminal building.

4.5.1 AIR CARRIER AIRCRAFT PARKING APRON

The air carrier aircraft parking apron is located adjacent to the passenger terminal building. See **Figure 4-5** on Page 4-22. The number of aircraft parking positions needed at an airport depends on the number of peak-hour operations, the OGG gate- gate position, and the size of the aircraft. See **Figure 4-6** on Page 4-22. The length of time an aircraft spends in a parking position depends on the type of aircraft, the number of deplaning and enplaning passengers, the amount of baggage and cargo, the fueling and routine services required, and airline schedules. **Figure 4-7** on Page 4-23 shows gate utilization on the peak day using the average month (August).

The existing passenger terminal aircraft parking apron is approximately 3,500 ft. by 500 ft., for a total of 1,750,000 s.f., of which 517,500 s.f. is concrete hardstand. This apron is used for a mix of overseas and inter-island air carrier aircraft operations. At present, there are 20 marked parking spots for power-in/push-back operation by inter-island B-717 and CRJ aircraft even though there are 39 gates. Eight (8) positions are marked for overseas B-757, B-767, B-777, and B-737 aircraft. These overlap the inter-island positions so that the total number of aircraft that can be accommodated is reduced to 13 gates when some of these are in use for overseas aircraft. The area of the apron also includes a hardstand expansion that is meant to accommodate the relatively new air cargo and ASIF.

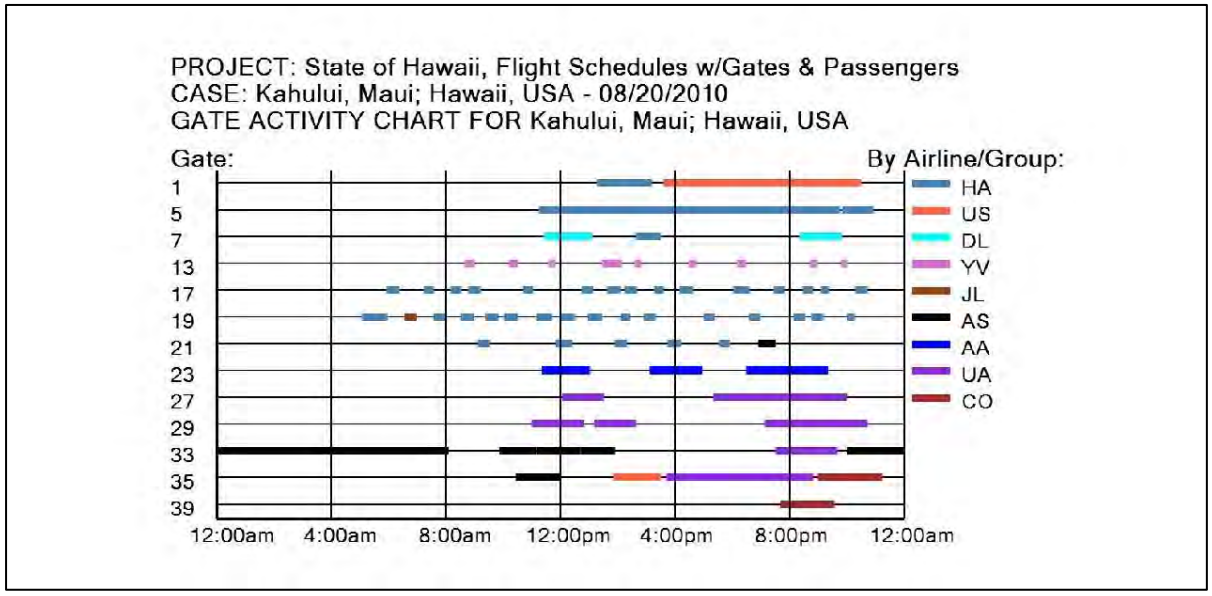


Figure 4-5 Existing Terminal Facilities

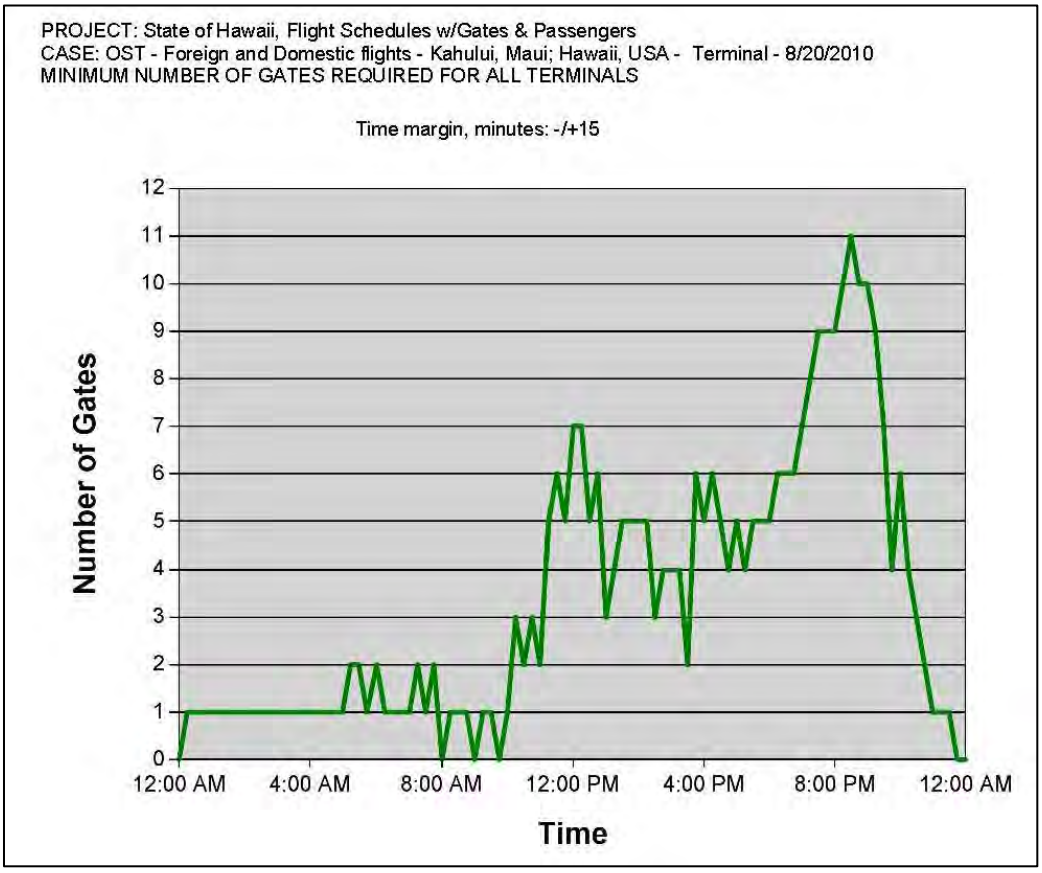


Figure 4-6 Aircraft Gate Time at Kahului Airport

Figure 4-7 Peak Gate Usage at Kahului Airport

The exact number of gates needed in the future depends upon several factors. These include the type of overseas service provided (e.g., nonstop to and from the Mainland or through a Honolulu hub operation); the extent to which overseas and inter-island peak periods overlap; the number of airlines serving the OGG; and the availability of remote parking for aircraft having long turnaround times or remaining overnight.

Based on the aircraft volumes and mix described in **Chapter 3**, it is recommended that parking positions for at least 13 power-in/push-back inter-island and overseas aircraft be provided. Since this amount is already available, no additional air carrier parking positions are needed to accommodate the aviation demand forecast over the next 10 years based on forecasted aircraft operations. Additional air carrier aircraft parking positions will be needed as a result of expanded air operations, increased travel to Maui, and unanticipated changes such as changes in the aircraft fleet mix, the number of airlines operating from the airport, etc. The apron is recommended to be extended to the south by two (2) additional wide-bodied aircraft parking spaces across the Kalialinui Gulch drainage culvert. To expand the apron to the north would require realignment of Taxiways "B" and "F" and would eventually be constrained by the obstruction clearances required for Runway 5-23 and the line-of-sight from the FAA ATCT. The expansion of the gates and apron to the north can be considered if it is decided to close Runway 5-23.

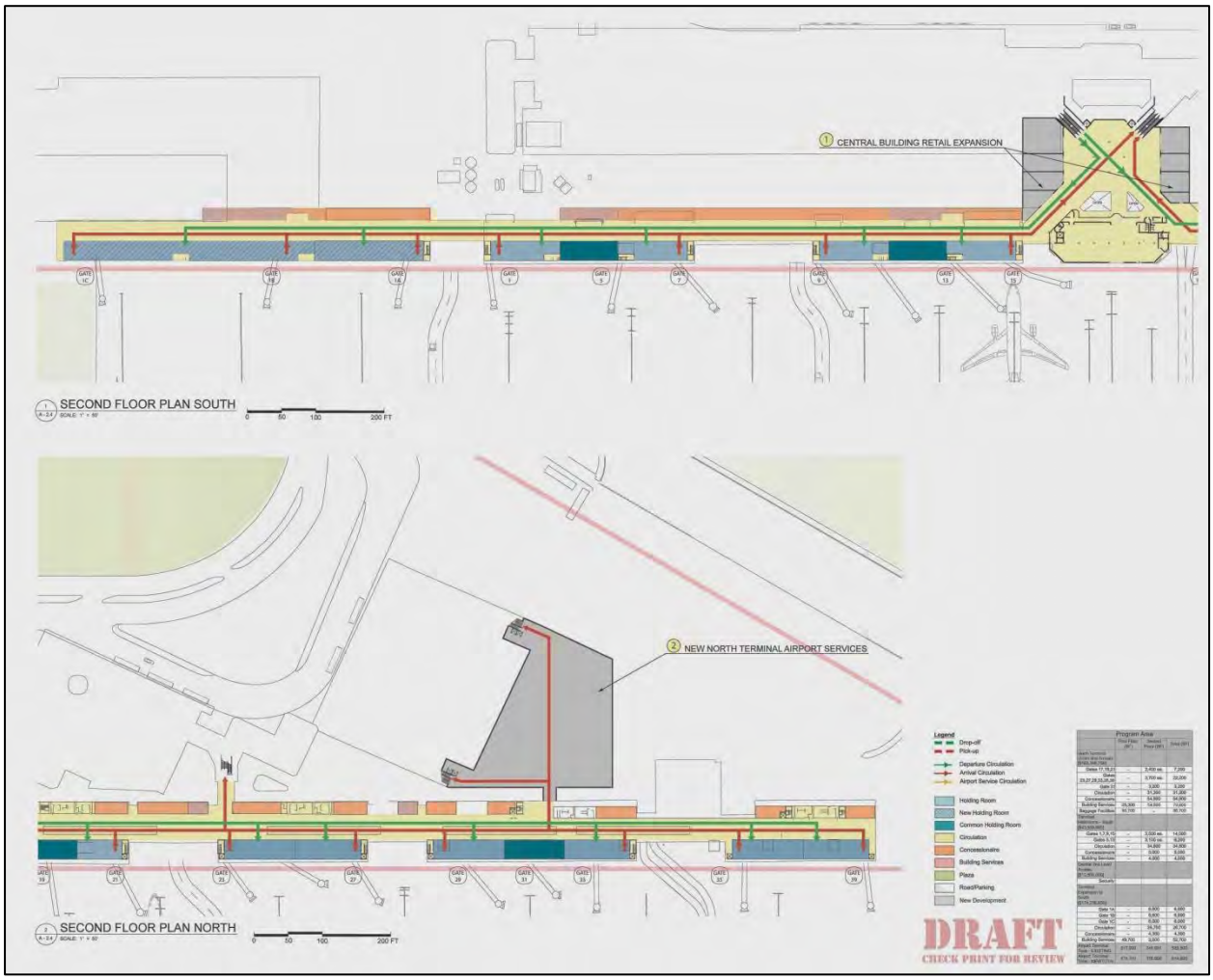


Figure 4-8 Terminal Improvements

4.5.2 PASSENGER TERMINAL BUILDING

The existing terminal building has nearly 480,000 s.f. of gross floor area. Calculations made using the passenger forecasts presented in **Chapter 3** indicate that this space may be adequate for the OGG's needs in the near term. Existing passenger holdrooms total 53,087 s.f. and is currently under capacity because they were not designed to accommodate wide-bodied overseas aircraft. The holdrooms were originally designed for inter-island passenger aircraft, where each passenger is assumed to need 10 s.f. of space, thus a typical B-717 aircraft with 106 passenger capacity will need approximately 1,060 s.f., excluding space for the airline for customer services.

Currently, each of the holding spaces between gates 1 and 16 averages 2,697 s.f. for two (2) gates each. When a B-767 is at the gate, holding space decreases to 2,160 s.f., effectively taking up the hold space for two (2) gates and three (3) aircraft parking positions. During peak operational periods, the total number of gates available between gates 1 and 16 is four (4).

Gates and holding areas between gates 17 and 39 during the August peak is nine (9) gates. Between gates 17-39 there are 11 holdrooms averaging between 1,500 s.f. to 2,100 s.f. If all of the holdrooms were to accommodate B-767s, each of the holdrooms would have insufficient

space to accommodate all passengers. See **Figure 4-8** on Page 4-24.

If non-stop international flights to OGG were ever initiated, it is estimated that about 30,000 s.f. of building space would be required for federal inspection services processing for arriving international passengers. This would be sufficient to process one (1) flight (up to 500 passengers) an hour. Separate ticket counters, holdrooms, and other passenger handling facilities would not be required for departing international flights. International flights could also use the existing aircraft parking apron.

4.6 CARGO AND MAIL FACILITIES

Air cargo at the OGG is carried in the holds of inter-island and overseas air carrier aircraft, by all-cargo jet aircraft operated by Aloha Air Cargo, and by various other operators using a variety of aircraft. The Aloha Air Cargo flights are at night, but a large proportion of cargo carried in the holds of passenger aircraft moves throughout the day.

Some overseas all-cargo operators use large aircraft (e.g. B-767, B-757, and B-777) to serve other State airports, while currently the use of small aircraft (Cessna 208), or contracting with other operators are used to move cargo to and from the OGG; however, there is a potential to serve the OGG with large aircraft for cargo. These overseas cargo flights occur during the day and at night at other airports within the State; however, inter-island all-cargo flights occur only at night.

The existing 38,541 s.f. cargo building located on the South Ramp is currently adequate to meet future demand. Apron space fronting the cargo building is also adequate. Users have requested additional covered areas and refrigerated facilities to handle special cargo requirements. The covered areas are needed to protect cargo from the elements.

4.7 GENERAL AVIATION FACILITIES

The GA facilities are located away from the air carrier, commuter/air taxi, and cargo operations to the maximum extent currently practicable. Based on the GA activity forecasts presented in **Chapter 3**, the existing facilities are adequate to meet current and forecasted demand. Presently, there are 34 tiedowns and 30 hangar spaces on the East Ramp for based aircraft. There is already a waiting list for hangar spaces, and based on experience elsewhere, it is expected that a greater proportion of the based aircraft will desire hangar space in the future. Therefore, it is recommended that sufficient space be set aside for at least 20 additional hangar spaces. Ideally, the additional hangars should be located in the vicinity of the existing hangar and aircraft tiedowns.

4.7.1 ITINERANT AIRCRAFT PARKING

Approximately 240,000 s.f. of apron should be provided for 60 based and itinerant aircraft parking spaces with 27 tiedowns spaces. Most of the GA aircraft are expected to continue to be small single-engine and light twin-engine aircraft of up to 12,500 lbs maximum gross takeoff weight. The area estimates presented above are based on that assumption. Some larger itinerant GA aircraft from 60,000 to 170,000 lbs maximum gross takeoff weight (e.g., B-727, B-737 and Gulfstream IV & V) also use the OGG, and some of the apron pavement should be constructed so that it can support them.

4.8 COMMERCIAL AVIATION/FIXED BASE OPERATOR LEASE LOTS

Spaces for FBOs can be divided into two (2) types: GA and commercial operators. Lease space for commercial aviation activities are proposed on the South Ramp in a new development adjacent to the new airport access road. Lease lots ranging in size from 5,000 s.f. to five (5) acres will be available. Space for GA is

proposed adjacent to the existing hangars on the East Ramp and could include: a 10,000 s.f. aircraft shop and maintenance hangar; a 1,000 s.f. office/administration building; and 40,000 s.f. paved apron area with access to the hangar.

Additionally, space should be provided in the GA area for an aircraft wash rack and automobile parking for aircraft owners and pilots. A pilot's lounge or ready room, could be provided within a commercial aviation FBO hangar and office building. Alternatively, a pilot's lounge could be provided in a new GA terminal, in close proximity to the GA area. Restrooms could be provided at the end of a row of hangars. Utility connections including power, water, sewer, and communications should be provided for all commercial aviation FBO hangars, office buildings, and storage hangars. Taxiways will be required to connect any new aircraft apron and hangar areas to the existing airfield taxiway system. Apron lighting should be provided as well.

4.9 AIRPORT ACCESS AND PARKING

4.9.1 EXISTING AIRPORT ACCESS

Vehicular traffic to and from the OGG is accommodated on Keolani Place, which has four (4) lanes, and to a lesser degree by Haleakalā Highway.

4.9.1.1 NEW AIRPORT ACCESS ROAD

A new airport access road with an interchange at its intersection with Hāna Highway is currently in construction. The access road will provide for the free flowing movement of vehicles from Kūihelani and Hāna Highways into and out of the OGG. It will become the principal vehicular route into and out of the airport. Vehicular access to Keolani Place will remain, providing an alternate route to the OGG in case of accidents and/or obstructions on the new access road. Additionally, it will continue to provide a direct route for vehicles traveling between Kahului (particularly the industrial areas) and OGG.

4.9.1.2 ALAHAO STREET/KOEHEKE STREET (KA'A STREET) ACCESS

Presently, access to the main passenger terminal area from the west side of the OGG is via Alahao Street and Ka'a/Koeheke Street. This route is used infrequently because portions of it are narrow and because it is a circuitous route for most drivers. It is important to maintain the connection because it provides an alternate route into the OGG and is an emergency escape route from the recreational areas along the shoreline. In order to increase its usefulness as a route for trucks moving cargo to and from OGG, the roadway should be upgraded.

4.9.1.3 EAST RAMP ACCESS

The kinds of activities suitable for development on the eastern side of Runway 2-20 generate relatively little traffic. Hence, from a capacity standpoint, the existing two-lane roadways are adequate. Haleakalā Highway is the principal access road to the East Ramp. It would need to be closed to through-traffic while the temporary runway is in use during the Runway 2-20 reconstruction and extension. Also, the portion of Haleakalā Highway between the existing helicopter facilities and Hāna Highway would be eliminated if a parallel runway is constructed. Should this occur, a new spine road would have to be constructed to serve the facilities located between the two (2) runways.

Ideally, this new road would connect with Hāna Highway to the south and Old Stable Road to the north. To do this, it will be necessary to route the road beneath the taxiways connecting the parallel runways, and it would be desirable to limit the road to one (1) underpass. Most of the vehicles travelling to and from the East Ramp arrive from and depart for the Kahului side of the OGG. If only one (1) underpass is to be constructed, the spine road should originate at Hāna Highway and terminate south of the northernmost connecting taxiway. A detailed analysis should be undertaken at the time the spine road is being designed to determine if the Spine Road/Hāna Highway intersection should be signalized.

4.9.1.4 PASSENGER TERMINAL CIRCULATION

In general, traffic circulation in the vicinity of the main passenger terminal is good, and the new access road would connect smoothly to it. Most traffic entering and leaving the OGG would use this new road, significantly reducing volumes on Keolani Place. Presently, trucks carrying cargo to and from the air cargo facilities located near the commuter air taxi terminal mix with the passenger vehicles. If these air cargo facilities are retained, a separate access for trucks that bypass the passenger terminal area should be provided. This could be done by constructing a new road between it and the west segment of Ka'a/Koeheke Streets.

4.9.2 AIRPORT PARKING

The passenger terminal parking area at OGG has a total of 1,914 stalls. The County of Maui has expressed a strong interest in discouraging the use of private automobiles for travel to and from OGG, and DOTA has agreed to take what steps it can to encourage greater use of public transit and carpooling. If these efforts are successful, the existing parking facilities may be adequate through the planning period. If the number of vehicles continues to rise at the historic rate, approximately 400 additional parking stalls will be required to meet the forecasted demand.

The additional parking stalls should be constructed as close as possible to the facilities that they will serve. If the need for additional parking does not occur until new passenger terminal facilities are needed, then they should be constructed adjacent to them. There are three (3) basic approaches that can be taken should the additional stalls be needed prior to terminal expansion. The first is to construct the parking stalls adjacent to the site of future terminal facilities. The second is to establish satellite parking, either for long-term passenger parking or for employee parking, providing a shuttle service between the satellite parking and the terminal. The third is to construct a multi-level parking structure within a portion of the existing parking area or over Kalialinui Gulch, thereby increasing the number of vehicles that can be accommodated on the land already dedicated to that use. The first option might be the most convenient for OGG users and employees, while the second of these options is probably the most cost-effective (at least for the mid-term). In view of the fact that additional facilities can accommodate the forecast demand for many years, additional parking should be constructed only when the need can be more clearly defined.

4.10 AIRPORT SUPPORT

4.10.1 GROUND TRANSPORTATION SUBDIVISION

Presently, approximately 37 acres of land are dedicated for RAC operations and other ground transportation services, including limousines and certain types of buses. The ground transportation lease lots are situated on the western side of Keolani Place, adjacent to the passenger terminal parking area. These lots are leased to private firms providing some type of ground transportation service. The State provides improved streets, graded lots, and utilities to lessees who build the facilities they need to conduct their operations. Majority of the ground space is occupied by rental cars that are awaiting pickup, being returned, or are being serviced.

With the forecasted increase in the number of passengers using the OGG, this will result in more rental cars being used. Therefore, additional land will be needed for the RAC operator baseyards. There is not an unconditional need for ground transportation operators to be based on the OGG property. There are operations that are based off of the property, with most of the on-airport needs being met by counters within the passenger terminal and curb-side pick-up and drop-off areas by buses and vans. However, since DOTA's current policy at the OGG is to attempt to accommodate all of the necessary support facilities, additional land will be required for this purpose.

Assuming continuation of the relationship between passenger volumes and the amount of land that is needed in the ground transportation subdivision, additional land will be needed for this purpose. Since the last update of the OGG MP in 1993, the demand for land has nearly doubled. Much of the additional land is for vehicle storage. To accommodate this demand, the existing area should be supplemented through the acquisition of additional land. Most, if not all of the expansion area should have the same improvements as the existing ground transportation subdivision. Some of the additional requirement could be satisfied by providing fenced areas elsewhere suitable for rental car storage. The lots should be served by water, sewer, electric power, and communications.

4.10.1.1 CONSOLIDATED RENT-A-CAR

In-lieu of expanded surface facilities, the DOTA commissioned the development of consolidated car rental (CONRAC) facilities into a single multi-level facility. The initial study examined five (5) alternative sites and ultimately selected a preferred site south of the existing public parking area. The new facility would house the ready-return, quick turn-around, fueling and customer services spaces and would require 1,175,600 s.f. or 26.988 acres. See **Figure 4-9**. Maintenance facilities would be located elsewhere. The new CONRAC will be two (2) stories with a footprint of approximately ½ of the 26 acres or approximately 13 acres. This total would be substantially less than what is currently provided. An additional benefit to the multi-level facility would be the potential for additional public parking.

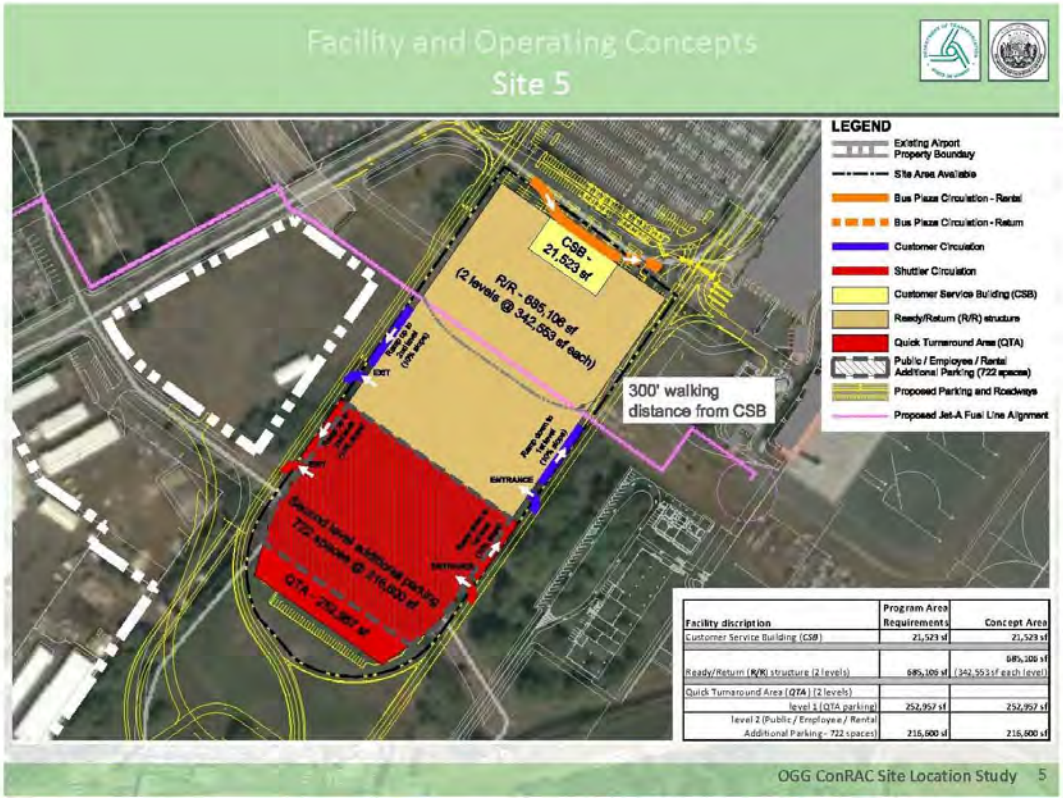


Figure 4-9 Consolidated Rent-a-Car Facilities

4.10.2 AIRLINE GROUND EQUIPMENT MAINTENANCE FACILITIES

The airlines currently use portions of a substandard building located north of the passenger terminal for their ground equipment maintenance activities. The building does not meet code requirements and extends past the building restriction line for Taxiway "F." Because of this, the DOTA plans to remove the structure as soon as alternate facilities can be provided for the current tenants in the new south ramp.

The airlines have indicated a need for an additional area where they can construct one 2,000 s.f., high-bay building to be used for heavy maintenance activities that are difficult or impractical to perform in the restricted spaces beneath the holdrooms. An improved site for this maintenance facility would be provided by the DOTA, with the airlines signing a long-term lease for the property and constructing the building. Water, sewer, electrical, and telecommunications service should be provided to the site. The design should include provisions to prevent spills of flammable and corrosive chemicals from contaminating the airport's storm drainage system. The access should

	Existing 2014	Base Year 2015	Forecast 2020	Forecast 2025	Forecast 2035
AIRFIELD					
Runway 2-20					
Length (ft.)	6,995	6,995	8,530	8,530	8,530
Width (ft.)	150	150	150	150	150
Pavement strength (lbs.)					
Single-wheel aircraft	130,000	130,000	130,000	130,000	130,000
Dual-wheel aircraft	170,000	170,000	170,000	170,000	170,000
Dual-tandem wheel aircraft	360,000	360,000	360,000	360,000	360,000
Double dual-tandem wheel aircraft	550,000	550,000	550,000	550,000	550,000
Temporary Runway					
Length (ft.)	0	0	7,000	7,000	7,000
Width (ft.)	0	0	150	150	150
Pavement strength (lbs.)					
Single-wheel aircraft	0	0	130,000	130,000	130,000
Dual-wheel aircraft	0	0	170,000	170,000	170,000
Dual-tandem wheel aircraft	0	0	360,000	360,000	360,000
Double dual-tandem wheel aircraft	0	0	550,000	550,000	550,000
Runway 20R-20L					
Length (ft.)	0	0	0	7,000	
Width (ft.)	0	0	0	150	
Pavement strength (lbs.)					
Single-wheel aircraft	0	0	0	130,000	130,000
Dual-wheel aircraft	0	0	0	170,000	170,000
Dual-tandem wheel aircraft	0	0	0	500,000	500,000
Double dual-tandem wheel aircraft	0	0	0	900,000	900,000

Table 4-12 Summary of Existing Facilities and Future Requirements (2010-2035) (Continuation on Page 4-30)

designed specifically to accommodate the limitations of the equipment that would be serviced at the facility. Additionally, large semi-tractor-trailer trucks occasionally bring repair machinery and materials to the site, and groundside access should be designed to accommodate them.

4.11 SUMMARY OF FACILITY REQUIREMENTS

Table 4-12 summarizes the facility requirement for the OGG.

	Existing 2014	Base Year 2015	Forecast 2020	Forecast 2025	Forecast 2035
Runway 5-23					
Length (ft.)	4,990	4,990	4,990	4,990	4,990
Width (ft.)	150	150	150	150	150
Pavement strength (lbs.)					
Single-wheel aircraft	130,000	130,000	130,000	130,000	130,000
Dual-wheel aircraft	170,000	170,000	170,000	170,000	170,000
Dual-tandem wheel aircraft	270,000	270,000	270,000	270,000	270,000
HELICOPTER FACILITIES[1]					
Building (GSF)	37,307	37,307	37,307	37,307	37,307
Parking	35	35	35	35	35
FATO	1	1	1	1	1
Helicopter (based aircraft)	25	25	25	25	25
PASSENTER TERMINAL					
Air carrier aircraft apron positions	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)
Passenger terminal building (s.f.)	373,000	478,750	478,750	478,750	478,750
Commuter aircraft apron (240,000 s.f.)	12	12	12	12	12
Commuter terminal (in s.f.)	8,000	8,000	8,000	8,000	8,000
Scenic Air Taxi (parking positions)	20	20	20	20	20
CARGO FACILITY					
Cargo buildings (s.f.)	38,541	38,541	38,541	38,541	38,541
GENERAL AVIATION FACILITY					
Tiedowns	34	34	34	34	34
Hangar spaces	30	30	30	40	40
AIRPORT ACCESS / PARKING[2]					
Access road lanes (each-way)	2	2	2	2	2
Terminal area parking (parking positions)	1,914	1,650	1,900	2,100	2,300
Ground Transportation		New ConRac + Base Yard			

Source: DOTA, R. M. Towill Corporation

1 Operational Issue: 1) a portion of the helicopter operating area at the southern end of the East Ramp, where hangars obstruct views of the nearby apron; 2) the western end of Runway 5-23 and the connecting taxiway, which has recently been obscured by Holdroom "F" in the passenger terminal.

2 Parking: From 2010 to 2015 parking capacity is predicted to temporarily decrease due to the displacement of existing parking stalls by the future realignment of Lanui Circle. Parking capacity is also contingent upon USPS agreeing to relocate from their existing 5 acre site to an improved site in the future Industrial Lots on the south ramp, thereby creating available land for additional parking.

Table 4-12 Summary of Existing Facilities and Future Requirements (2010-2035) (Continuation from Page 4-29)

CHAPTER 5
AIRPORT DEVELOPMENT ALTERNATIVES

5.1 OVERVIEW

This chapter presents alternatives that were developed and evaluated during the MP Update planning process to illustrate and explore the policy and layout options available to the DOTA.

The facility requirements described in **Chapter 4** serves as the basis for the formulation of alternative development concepts for the OGG that meet the development objectives. These alternatives were used to explore the implications of different facility configurations (e.g., runway length, number of runways, etc.) and locations (e.g., East Ramp and South Ramp).

Due to the large number of varied facilities that make up the OGG complex, an almost unlimited number of combinations are possible. At least three (3) formal alternatives were developed for the airfield and terminal, and at least two (2) alternatives for airport access. The access alternatives were developed to complement the alternative projects listed in the airfield and terminal plans.

The airfield plan alternatives were presented to and discussed with airport users, government agencies, members of the community, and DOTA staff. Following this evaluation process, the DOTA selected one (1) airfield development plan as the preferred OGG MP, which is presented in **Chapter 6**.

The alternatives presented in this chapter are discussed at the terminal scale because the majority of the development plan alternative projects are located in the terminal area only.

Most of the components of the recommended OGG MP appear in one (1) or more of the various alternatives considered for this project. However, in a few instances, the final planning solution was arrived at after public, DOTA staff, and FAA review. In all such cases, the solutions proposed in the preferred OGG MP are the result of an analysis of development plans

recommended to the DOTA during consultations. They are intended to resolve potential conflicts and/or inadequacies that were identified by the reviewers of the alternatives described in this chapter.

Portions of airport capital improvement projects are in progress (e.g., property acquisition) or have been completed since the 1993 OGG MP (e.g., relocated VORTAC). Some projects have been removed from consideration altogether for lack of demand, or require further study or review by DOTA (e.g., flight kitchen facilities).

5.2 COMMON ELEMENTS

A number of proposed development projects are included in all three (3) alternative development plans were circulated for public review and evaluation. These "common elements" are described below.

5.3 AIRFIELD

The airfield includes all development elements that have direct contact or association with aircraft including runways, taxiways, aprons, hangers, aircraft parking, and certain navigation aids. Not addressed are airfield lighting and navigational aids. Three (3) separate actions are proposed for Runway 2-20 and include: (1) reconstruction of the runway, (2) extending the runway, and (3) development of a parallel runway.

5.3.1 RUNWAY 2-20

5.3.1.1 RUNWAY RECONSTRUCTION

As discussed in **Chapter 4**, pavement distress requires the reconstruction of Runway 2-20. Reconstruction is a long-term investment in the future of the OGG. It is needed to ensure continued safe operations, the movement of goods and services, and the continued contributions to Maui's economy. The closure of Runway 2-20 is not considered a feasible option due to the potential for severe adverse impacts to the economy. Accordingly, the development of a temporary runway would facilitate the reconstruction of Runway 2-20 and avoid potential negative impacts to the economy.

The DOTA commissioned, *The Kahului Airport Runway 2-20 Reconstruction Feasibility Study* (2012), to identify and evaluate reasonable and practicable alternatives. Eight (8) alternatives and a No-Action Alternative were evaluated using a three (3) step screening process. The following summarizes the process.

Step #1: The proposed alternative must meet the Purpose and Need for the project:

- Provide for the reconstruction of Runway 2-20.
- Maintain the airfield capability to accommodate mainland transpacific flights.

Step #2: Analyze the Operation and Constructability Factor and Cost of each alternative:

- Assess implications for airport safety and operations including compliance with FAA design standards.
- Analyze the complexity of staging, phasing, and construction activities required to implement the alternative.

Step #3: Identify Environmental Considerations:

- Assess impacts to environmental resources that require regulatory response, such as: floodways, wetlands, water quality, noise and Section 4(f) resources; and others including the level of impact, high, medium or low.

Alternatives that meet the Step #1 criteria would progress to the Step #2 analysis. Alternatives meeting Step #2 would progress to the Step #3 analysis. Alternatives meeting the criteria in all three (3) screening steps along with the No-Action Alternative will be used in the future for a more detailed environmental and planning evaluation.

The following alternatives were evaluated:

- No Action Alternative
- Alternative 1 – Close airport runways during reconstruction

- Alternative 2 – Reconstruct existing runway with no other action
- Alternative 3 – Extend Runway 5-23 to 7,000 feet (ft.) (1,260 ft. west and 750 ft. east), and use shortened Runway 2-20 during construction at intersection
- Alternative 4 - Extend Runway 5-23 to 7,000 ft. (200 ft. west and 1,810 ft. east), and use shortened Runway 2-20 during construction at the intersection
- Alternative 5 – Extend Runway 5-23 to 7,000 ft. (1,260 ft. west and 750 ft. east), shift Runway 2-20 by 2,605 ft. south and reconstruct, and eliminate the intersection of Runways 5-23 and 2-20
- Alternative 6 – Extend Runway 5-23 to 7,000 ft. (1,260 ft. west and 750 ft. east), extend Runway 2-20 by 2,605 ft., and reconstruct for an ultimate Runway 2-20 length of 9,600 ft.
- Alternative 7 – Construct a new parallel Runway 2R-20L, 7,000 ft. long
- Alternative 8 – Construct a new replacement Runway 2-20, 7,000 ft. long

Of the alternatives presented, the DOTA initially favored Alternative 5. These improvements would have cost approximately $145.2 mil. This alternative was ultimately not selected by HDOT.

The *Proposed Approach to the Reconstruction of Runway 02/20*, by AvAirPros and Conway Consulting, 2014, was commissioned by the Airlines Committee of Hawai'i (ACH) to provide additional information to supplement the *Kahului Airport Runway 2-20 Reconstruction Feasibility Study*. Four (4) criteria were used to evaluate the options. Two (2) additional approaches with five (5) options were identified. The following is a summary of the evaluation process.

The Evaluation Criteria (also referred to as Fatal Flaws) were used to evaluate the following alternatives. The alternatives that met the following criteria would be considered as having met a Fatal Flaw, and were subsequently eliminated:

- No Airport Closure
- Restrictions of Flight Operations
- Exacerbating Environmental Issues
- Unable to Produce a Solution in Five (5) Years

<u>Alternatives to the Reconstruction of Runway 2-20 include:</u>

Approach A – Temporary Runway. Reuse existing pavement or invest in new pavement following the reconstruction of Runway 2-20 to create an interim Temporary Runway while Runway 2-20 is reconstructed on the existing centerline.

Option 1 – Use Taxiway A as a temporary runway

Option 4 – Temporary Runway on East Apron Taxiway

Option 5 – Interim Runway Construction East Runway 2-20

Approach B – Relocated Runway. Construction of a new runway to replace existing Runway 2-20 which would subsequently be converted for reuse as a taxiway.

- Option 2A – Construction of a new, 9,600 ft. permanent replacement runway located 400 ft. lateral distance east of Runway 2-20;
- Option 2B – Construction of a new, 9,600 ft. permanent replacement runway located 600 ft. lateral distance east of Runway 2-20; and
- Option 3 – Construction of a new permanent replacement runway located 1,000 ft. east of Runway 2-20.

The ACH recommended Approach A, Option 4, involving the construction of a temporary runway scheme on the east apron taxiway. This is the only option that did not meet any of the four (4) evaluation criteria.

The proposed temporary runway will provide Taxiway "L" with a length of 7,000 ft. and will be designed to maintain the existing and future aircraft mix that use Runway 2-20. This

temporary runway will be used as a parallel taxiway once Runway 2-20 reconstruction is completed.

Additional actions required to implement this alternative involve the relocation or closure of Haleakalā Highway, drainage improvements, connection to Taxiway "A", relocation of GA facilities/aircraft/tie downs, relocation of fuel facilities and some helicopter operations, a service road, and development of a parallel taxiway.

In order to allow OGG to expand operations to Midwest destinations and increase the safety of aircraft take offs and landings, the extension of Runway 2-20 was considered.

5.3.1.2 RUNWAY 2-20 EXTENSION

Extending Runway 2-20 has been the subject of discussion since the last update of the OGG MP. The discussion has focused on two (2) primary purposes: (1) to increase operational safety during take-offs and landings, and (2) to increase the operational functionality of the airport for travel to destinations provided by airlines serving OGG. This would be principally accomplished by minimizing weight limitations of the aircraft.

The lengthening objective would extend the length of Runway 2-20 so that aircraft departing from OGG for the West Coast or Midwest destinations would have minimal weight penalties. Therefore, all alternatives propose an extension to Runway 2-20 by 1,535 ft., to the south towards Hāna Highway, for a total length of 8,530 ft. See **Figure 5-1** on Page 5-5. The length of the runway extension was limited by the location of Hāna Highway and the area needed for the RPZ is within the sponsor's control. The alternatives with runway extension lengths of 1,535 ft., required that the RPZ to extend over Hāna Highway and into neighboring properties. An extension greater than 1,535 ft. would require extensive land acquisition, and relocation of Hāna Highway further south or providing vehicular access under an extended runway. These alternatives were rejected due to major additional costs for construction and land acquisition.

Extending Runway 220 south towards Hāna Highway would require the permanent closure of Haleakalā Highway between Hāna Highway and Keolani Place, improvements to the existing drainage system, relocation of navigational aids, and other utility upgrades.

An alternative to handle OGG operations during the reconstruction of Runway 2-20 is to construct a new parallel Runway 2R-20L located east of the existing runway. This alternative was not considered because of the cost and the time needed for land acquisition.

5.3.2 PARALLEL RUNWAY 2R-20L

A new 7,000 ft. parallel runway that is offset by 2,500 ft. from Runway 2-20 along with connecting taxiways is proposed. See **Figure 5-1** on Page 5-5. The new Runway 2R-20L will improve the operational capacity at the OGG in two (2) important ways: (1) it will allow simultaneous operations of the runways, and (2) it will ensure that the airport is always in service in the event that the primary runway is closed. Land acquisition is proposed during the planning period to allow for development options for airport expansion beyond the planning period and prevent the development of incompatible uses adjacent to existing and planned airport improvements.

RUNWAY ALTERNATIVES:

> **Runway 2-20 Extended by 1,535 ft. to South**

> **Future Parallel Runway (2-20) at 7,000 ft.**

> **Runway 5-23 at 4,990 ft.**

> **Temporary Runway at 7,000 ft.**

Figure 5-1 Runway Alternatives

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Figure 5-2 Lands to be Acquired

The new parallel Runway 2R-20L development assumes the need to relocate and/or provide new navigation aids, runway lights, and taxiway lights. Additionally, new and/or realigned BRLs, RSAs, and RPZs will also be required. Although the parallel runway might not be developed until a future date beyond the planning horizon of this study, it is included in the plan so that the scope of projects and alternatives for the OGG as a whole, are not limited.

5.3.3 AIRPORT BOUNDARIES

All alternatives propose the following changes to the Airport boundaries, see **Figure 5-2**:

- Fee simple land acquisition for portions of Parallel Runway 2R, RPZ, Connecting Taxiways, Navigational Aids (NAVAIDS), RSA, and East Ramp Access Road.
- The specific method of land acquisition, e.g., direct purchase, lease, license, or easement, requires additional study outside the scope of this MP Update.

5.3.4 AIRCRAFT PARKING, APRONS, AND TAXIWAYS

Improvements to the apron in front of the existing ASIF building and cargo facility are in progress. New improvements include transient aircraft parking to accommodate military and other non-based aircraft. A new apron with concrete hardstands is proposed south of the existing passenger terminal facilities to accommodate uses in the proposed industrial lots. Realigning the intersection of Taxiway "B" and "F" for Runway 5-23 is proposed to provide a full-length parallel taxiway and minimize turns. Additionally, new connecting taxiways will need to be constructed to support the new Parallel Runway 2R-20L.

5.3.5 EAST RAMP

Expansion of the existing helicopter facility is proposed to allow for an increase in operations. A new GA T-hanger (size and configuration to be determined) is also proposed to be constructed adjacent to existing facilities.

5.4 TERMINAL PLAN ALTERNATIVE

The passenger terminal area includes all development proposals related to passenger handling. This includes proposals for expanding the passenger terminal to the south; adding new gates at the north end, expanding the terminal holdrooms, expanding the central 2nd level, and improving the ticketing area. Development of the passenger terminal is driven by the following factors:

- The need for better passenger flow from ticketing to boarding
- The current shortage of gates and passenger holding capacity to accommodate wide-bodied aircraft

The use of large capacity, wide-bodied aircraft for overseas flights translates to an increase in the number of passengers flying at one time. As discussed in previous chapters, the number of overseas flights is increasing; however, the passenger terminal at the OGG was designed mainly for inter-island travel. With the increased overseas flights, OGG now has a capacity issue for passenger holding areas and gates.

Existing passenger holdroom facilities are currently under capacity for wide-bodied aircraft, particularly between gates 1 through 16. With the increased use of wide-bodied aircraft, existing facilities will continue to be inadequate to accommodate the increased numbers of departing passengers.

The increased use of wide-bodied aircraft has also led to gate shortages because a single wide-bodied aircraft occupies several gates or aircraft parking positions.

Adding gates to the north end of the passenger terminal will require more apron space to accommodate additional parked aircraft. This may result in the relocation of the commuter terminal.

Figure 5-3 on Page 5-9 shows the proposed terminal facilities considered. This is a conservative alternative plan which includes items that have the least amount of impact on existing land use and requires the least amount of projects. The major assumption is that airport operations would not reach pre-2007 recession levels for 15 or more years. The improvements unique to this alternative are summarized in **Table 5-1**.

5.5 AIRPORT SUPPORT FACILITIES

5.5.1 AVIATION SUPPORT AND LEASE LOTS

Additional support facilities are needed for aviation and other industrial activities to encourage growth in operations. On the South Ramp, the proposed industrial lease lots are intended for uses requiring direct airfield and apron access. See **Figure 5-1** on Page 5-5. Potential users are airline mechanic shops, ground support equipment, air cargo carriers, aircraft parts vendors, and other aviation related uses. Aviation lease lots for airlines and their support activities are also proposed at the future industrial lease lots and East Ramp. An additional lease lot subdivision is proposed off Keolani Place for other aviation related tenants, e.g., rent-a-car or cargo distribution.

During the reconstruction of Runway 2-20, uses that required relocation on the East Ramp can be accommodated at the South Ramp.

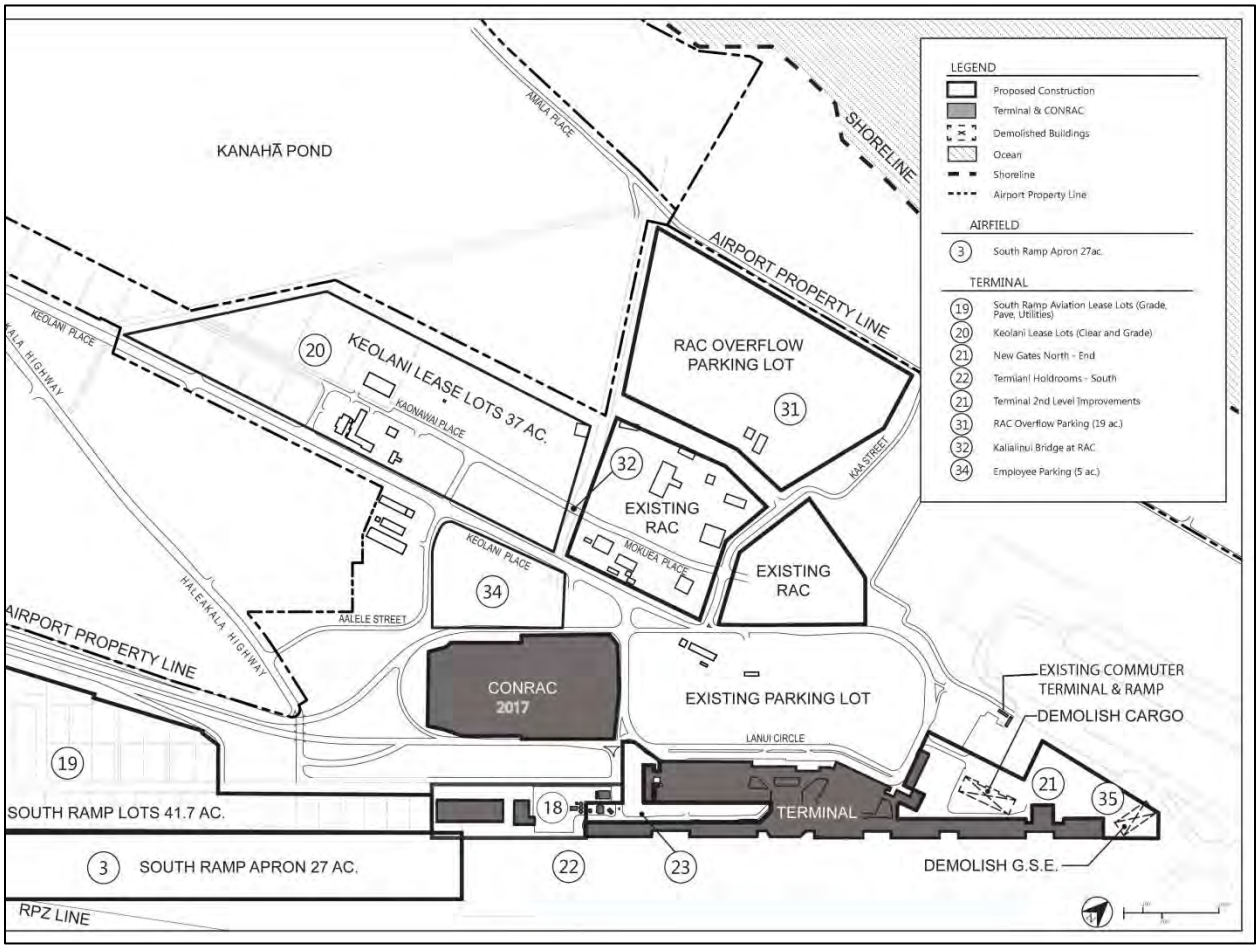

Figure 5-3 Terminal Area Plan

New cargo facilities are proposed south of the main passenger terminal in the South Ramp industrial area. These new facilities will accommodate existing users that require both covered areas and refrigerated spaces. Existing cargo is currently staged on the ramp south of the existing terminal building. A bulk jet fuel storage facility is proposed with a pipeline to the aircraft ramp fronting the passenger terminal. A site has already been prepared off Keolani Place, towards Kanahā Beach Park, to house the fuel storage facility. Construction and operation of this facility would address FAA concerns of fuel trucks making runway crossings. Lastly, additional GA T-hangers have been proposed on the East Ramp to support future growth.

A project is proposed to pave the existing rent-a-car overflow parking lots. This alternative would retain the existing overflow parking area. The existing gravel lots are directly north of the ground transportation subdivision. Rental car companies could potentially retain some of their existing maintenance facilities. Thus, this was the preferred layout but other alternatives were proposed to address potential major land use changes.

5.5.2 NEW POSTAL FACILITY

A new USPS facility is proposed in the industrial lease lots in the South Ramp. The existing USPS facility, located off Keolani Place, will have its access to the airfield cut off by the new airport access road. See **Figure 5-3**. Relocation to the

South Ramp industrial lease lots will provide the required direct access to the airfield.

5.5.3 CONSOLIDATED RENT-A-CAR FACILITY

The new CONRAC facility would replace some functions at the existing ground transportation subdivision. This project was inspired by the need to improve customer service and relieve traffic on Lanui Circle. A multi-level CONRAC facility would provide space for all vendors, their vehicles, customer service offices, ready-return, and quick turn-around areas. However, all maintenance operations and overflow parking would be located outside of the CONRAC on separate lots and baseyards. The CONRAC site would be located south-west of the existing passenger terminal parking lot. This site is presented in each of the alternative development concepts. This particular site was recommended out of a site selection study for the CONRAC for the following reasons. See **Figure 5-4**:

- Customer convenience due to proximity to the passenger terminal
- Rental car operations are optimized because quick-turn-around areas are next to ready/return areas and customer service area
- Busing operations are minimized due to proximity to passenger terminal
- In this location public/employee parking could be funded by Customer Facility Charges instead of DOTA funds

Prior to the start of construction in the second quarter of 2016, existing land uses in the area of the preferred CONRAC site must be relocated to the proposed industrial lease lots on the South Ramp. These existing land uses include USPS and courier services.

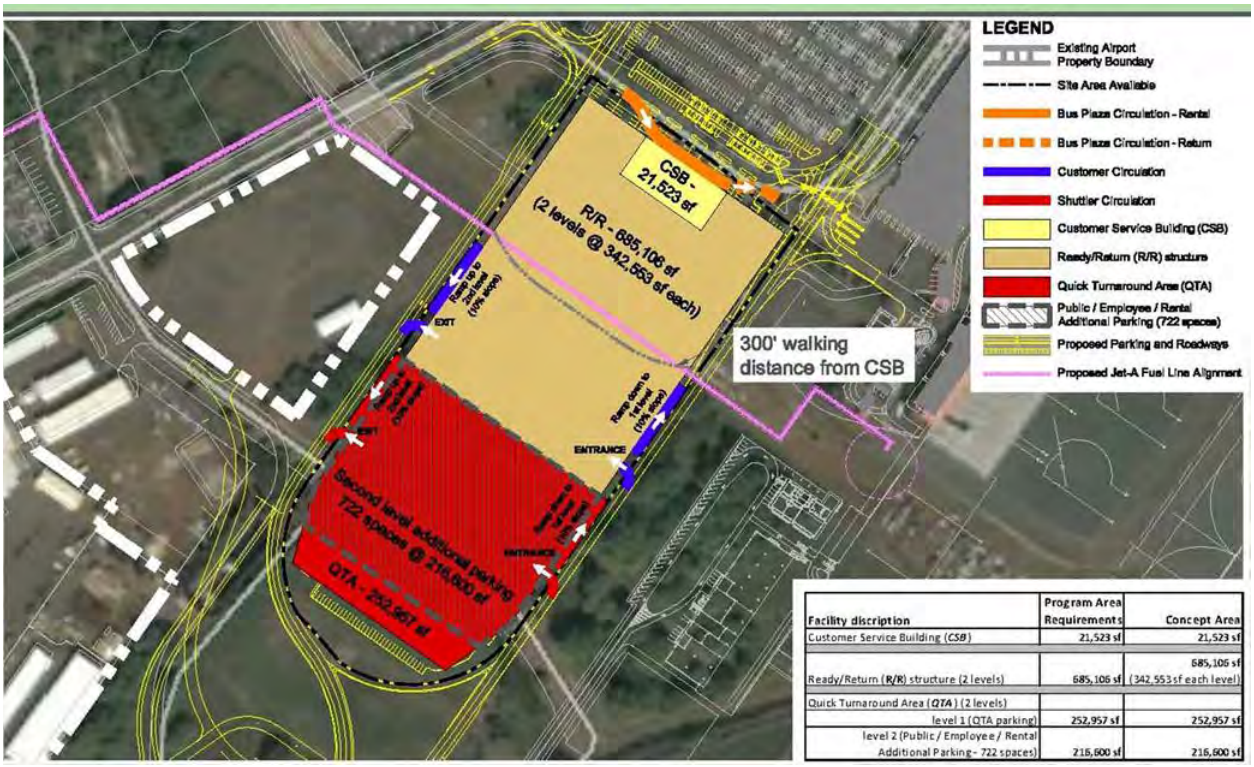

Figure 5-4 CONRAC Plan

AIRFIELD	ALTERNATIVE PLANS
1	Runway 2-20 Extension (1,535 ft. long) (Grade, Pave, Navaids)
2	Taxiway A Extension
3	South Ramp Apron 27 acre (ac.)
4	Taxiway Realignment (Taxiway "B", "F" and "G")
5	Transient Aircraft Parking (9 ac.)
6	Runway 2R-20L (Parallel Runway) 7,000 ft.
7	Parallel Taxiway for Parallel Runway 2R-20L
8	Temporary Runway 2-20 (using Taxiway "L") plus Navaids
9	Kalialinui Channel Improvements
10	Parallel Taxiway "M" plus Service Road
11	Navigational and Landing Aids - Replacement
12	Final Approach and Take Off (FATO) Relocation
13	Runway 2-20 Reconstruction
14	Crossover Taxiway Connecting Taxiway "A" to Runway 2
15	Temporary Runway 2-20 Blast Pads
16	Temporary Runway 2-20 RSA Improvements
17	Drainage Improvements
TERMINAL	**ALTERNATIVE PLANS**
18	Helicopter Facility Expansion (Grade and Pave)
19	South Ramp Aviation Lease Lots (Grade, Pave, Utilities)
20	Keolani Lease Lots (Clear and Grade)
21	Terminal North - New Gates (Clean and Demo)
22	Terminal South - Holdrooms
23	Terminal 2nd Level Improvements
24	Haleakalā Highway (To Be Closed)
25	Realign Hāna Highway (Grade and Pave)

Table 5-1 Terminal Scale Alternative: List of Projects (Continuation on Page 5-12)

TERMINAL	ALTERNATIVE PLANS
26	GA T-hangars – East Ramp
27	Land To Be Acquired
28	East Ramp Access Road
29	East Ramp Access Road Tunnel
30	RAC Overflow Parking (19 ac.)
31	Bridge to Rent a Car (RAC) subdivision
32	Industrial Aviation Lots East Ramp (20 ac.)
33	Employee Parking (5 ac.)
34	Demolish Existing Ground Service Equipment (GSE), Cargo
35	Cell Phone Parking Lot
36	East Ramp Temporary Relocation of Services
Source: R. M. Towill Corporation *Notes: Projects list compiled from terminal and airfield alternative plans.*	

Table 5-1 Terminal Scale Alternative: List of Projects (Continuation from Page 5-11)

5.5.4 SOLAR POWER

Solar power has been proposed to supplement airport energy needs. The use of renewable energy will relieve demand on the county's power grid while helping airport operations to achieve greater self-sufficiency. Approximately 3,420 solar panels have been installed on the roof of the passenger terminal, with an additional 492 solar panels installed at other locations. The capacity of the installed solar panels generate approximately 5,300 kilowatt hours (kWh) per day contributing to the total energy needs of OGG, which is on average 32,909.7 kWh per day.

The installation of solar and other forms of renewable energy at the OGG will continue to be reviewed by the DOTA and FAA to ensure that aviation operations are not impacted.

5.6 AIRPORT ACCESS AND PARKING

A new airport access road is currently under construction and is scheduled for completion in Fall 2016. It will replace the Keolani Place/Dairy Road as the primary access to the passenger terminal facilities. This first phase of roadway construction includes an at-grade, signalized intersection at Hāna Highway. Subsequent phases of the airport access road will ultimately include an at-grade separated interchange at Hāna Highway. The primary beneficiary of this improvement will be the through-traffic on Hāna Highway, which would no longer have to stop for airport-related traffic. Thus, the access road has generally received wide public support. It will complement the improvements the State Department of Transportation Highways Division (DOTH) has already made to Hāna Highway along the boundary of the OGG.

Additional parking is required for the passenger terminal. Other smaller scale improvements considered include additional cell phone waiting areas and supplemental access roads west of Keolani Place to improve traffic flow on Lanui Circle. In particular, the access that includes a bridge over Kalialinui Gulch is meant to facilitate future traffic increases due to the development of the Keolani Place Lease Lots.

In addition to the alternatives presented at the terminal scale, access and parking elements were also being considered at a smaller scale. These smaller scale improvements are shown in the terminal scale drawings but are meant to emphasize the visualization of traffic flow, provide a detailed layout of the proposed CONRAC facility, and show smaller projects such as cell phone waiting areas. The access plan alternatives, which were formulated to accommodate the three (3) terminal drawings, focused on facilitating vehicular movement by reducing conflicts, and considering intersection layouts or shuttle routing.

Common elements in the access alternatives include the cell phone waiting area proposed to be adjacent to the inbound traffic lane of the new access road and the lot that belongs to the ASIF and Air Cargo Facility. This location would allow vehicles who are waiting for deplaning passengers to park close to the terminal while not contributing to traffic on the loop road.

The CONRAC facility would generate traffic on the Lanui Circle and new access road loop through the rental car return and pickup, shuttle service, and bus service areas.

With the new access road from Hāna Highway connecting with Lanui Circle, it has been proposed to paint islands in order to separate turning movements to and from Keolani Place. See **Figure 5-5** on Page 5-14. A signal at the intersection of Lanui Circle, Keolani Place, and the new access road was also considered. However, it was determined that future traffic volumes would not warrant such an investment.

This access alternative proposes to re-locate existing employee parking to the south of the CONRAC facility. Therefore, passengers who use public parking would be closer to the passenger terminal. Employees would be able to ride the airport shuttle to and from the terminal facility. This shuttle would also service RAC customers to and from the CONRAC facility.

Comments from public meetings were used to refine proposals, and assisted in the removal or addition of projects. These refined proposals were reviewed again with DOTA staff to ensure compatibility with existing development, future and existing capacity, and future and existing operational needs, all within the need to meet FAA regulations.

The process of plan review was very integrative as the planning process balanced future scenarios with ever changing existing conditions. For example, neighboring land owners such as A&B Properties have been developing plans for an industrial park south of the airport property. Their proposals necessitated the need to reanalyze the MP proposals to ensure compatibility of land use while maintaining airport operational needs. Much effort was directed towards maintaining adequate communication and distribution of information between DOTA staff, consulting staff, and public stakeholders as alternative proposals evolved.

5.7 PLAN EVALUATION

5.7.1 METHODOLOGY

This section presents the methodology for the evaluation of alternative plan proposals, which led to the selection of the preferred OGG MP. The plan evaluation methodology can be summarized in the following steps:

- Preliminary proposals were developed based on airport staff interviews, projects completed since 1993, airport stakeholder comments, passenger forecasts, and operation forecasts
- The preliminary proposals were presented to DOTA staff for comment and approval for presentation to the public

- The Technical Advisory Committee and Citizen Advisory Committee reviewed and commented on the proposals at public meetings

5.7.2 PLAN EVALUATION

The alternatives evaluation process was an iterative process rather than an empirical selection process. As stated previously, many individuals and organizations provided input into the process and as a result, an important goal was to achieve consensus. It should be noted that the final selection of a particular plan component was not always unanimous. Ultimately, the selection of particular plan components was based on the criteria of "what was best for the airport and island of Maui."

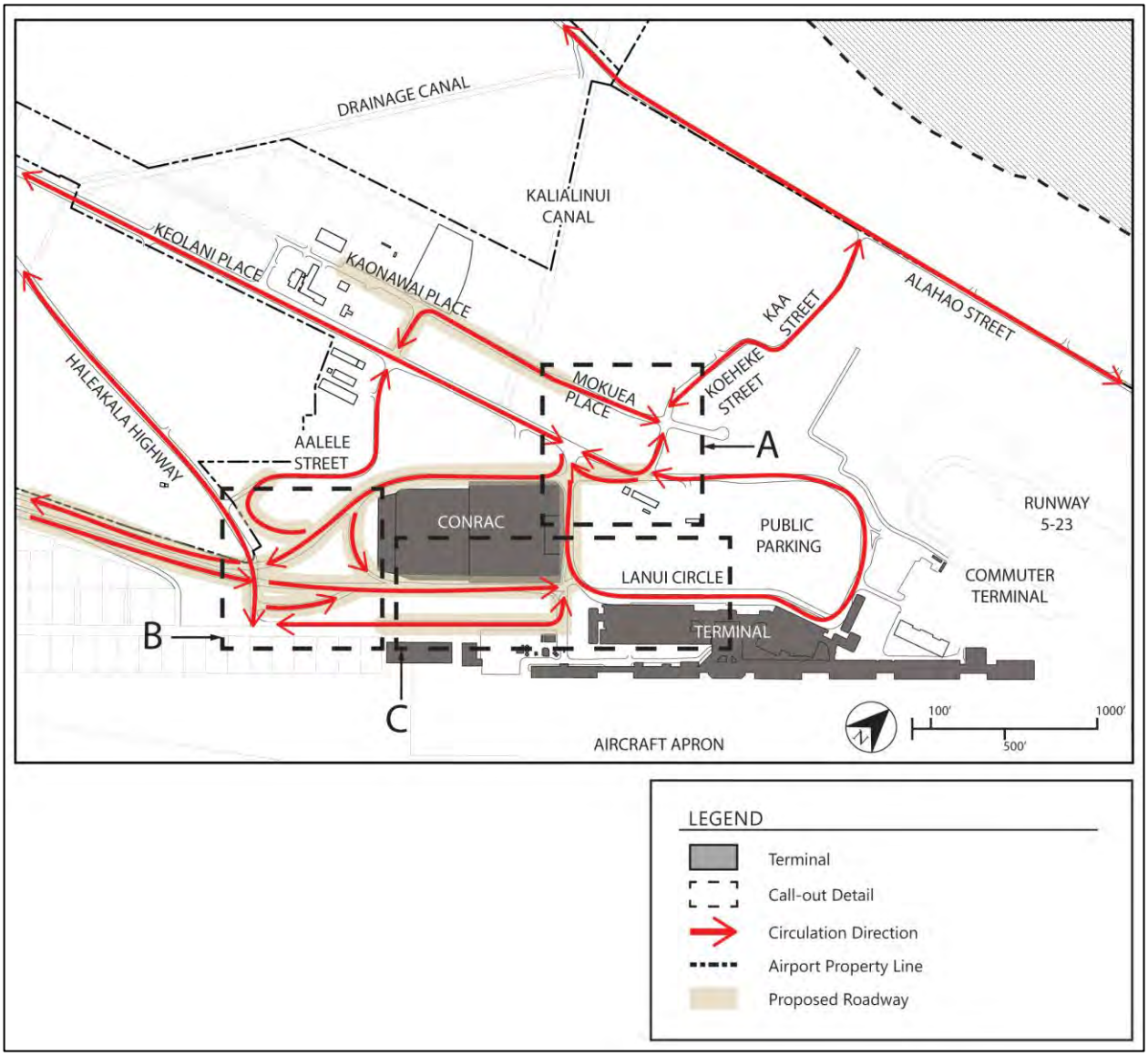

Figure 5-5 Terminal Access Plan

The evaluation led to the selection of the preferred OGG MP. The preferred alternative proposed in the OGG MP includes the following components:

- Runway 2-20 Reconstruction
- Taxiway Upgrade to 7000 ft. (Temporary Runway/Taxiway "L")
- Extension of Runway 2-20 to 8,530 ft.
- Construct Parallel Runway at 7000 ft. and associated taxiways
- East Ramp Projects including new GA Hanger, Itinerant Parking, and GA Lease Facilities.
- South Ramp Industrial Lots
- CONRAC Facility
- Terminal expansion to the North and South of existing passenger terminal.

Table 5-2 shows the result of the evaluation process and **Figure 5-6** on Page 5-17 shows the preferred plan along with the components that collectively make up the MP Update.

PROJECT	AIRFIELD ALTERNATIVE	TERMINAL ALTERNATIVE	ACCESS ALTERNATIVE
Runway 2-20 Re-construction	●	●	N/A
Extend Runway 2-20 to 8,530 ft. (1)	●	●	N/A
Parallel Runway 7,000 ft. (2+3)	●	N/A	N/A
Industrial lots – South Ramp (4)	●	●	●
Consolidated RAC (5)	O	●	●
Terminal expansion to north (6)	N/A	●	N/A
Terminal expansion to south (7)	N/A	●	N/A
Holdroom reconstruction (8)	N/A	●	N/A
East Ramp projects (9)	●	N/A	N/A

Source: R. M. Towill Corporation

Notes: N/A = Not applicable, project not included in alternative

● = Project supported and included as preferred alternative.

O = Project moderately supported and included in preferred alternative.

(1) Includes: connecting taxiway, navigation aids, runway lights, runway safety areas, runway protection zones, land acquisition, Haleakalā Hwy closure between Hāna Highway and Keolani Place.

(2) Includes: rent-a-car relocation, commuter terminal and apron relocation, runway safety area, runway protection zones, navigation aids, perimeter road relocation, Ka'a Street relocation.

(3) Includes: land acquisition, runway safety area, runway protection zones, navigation aids, perimeter road relocation, east ramp access road.

(4) Includes: access from new access road, land use entitlements.

(5) Includes: relocation from existing area to new location and land use entitlements.

(6) Includes: relocation/demolition of GSE and former cargo facilities.

(7) Includes: expansion of 1 additional gate.

(8) Includes: expanding the capacity of gates 1-16 to west.

(9) Includes: new GA hangar, itinerant parking, and GA lease facilities.

Table 5-2 Plan Evaluation

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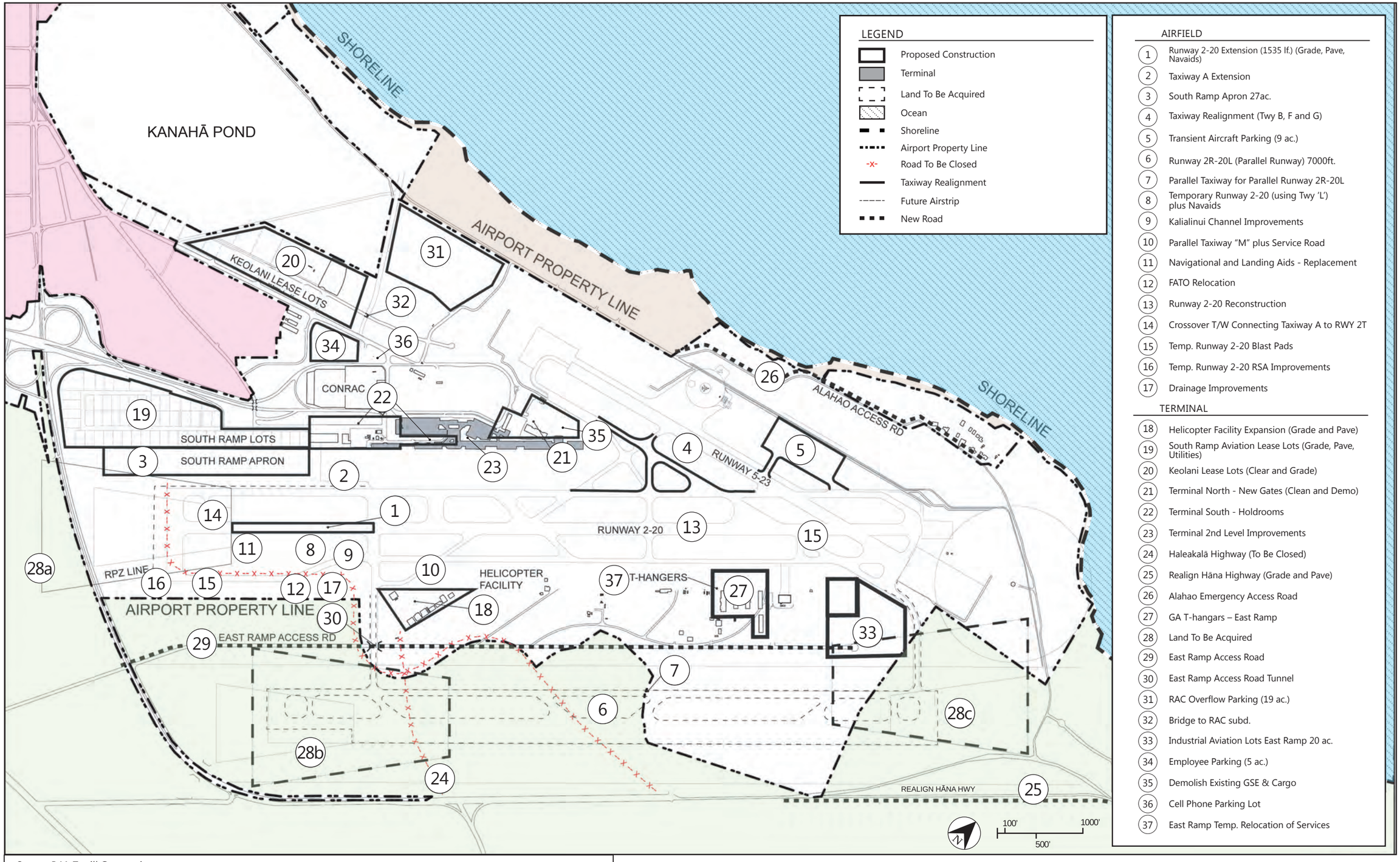

Source: R.M. Towill Corporation

Figure 5-6 Preferred Plan

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CHAPTER 6
MASTER PLAN

6.1 OVERVIEW

This chapter presents the recommended MP for OGG. See **Figure 6-1**. The Plan identifies long-term airfield and terminal area improvements needed to meet forecast aviation demand and operational requirements. It represents a guide for airport development through the year 2035 and indicates possible improvements beyond that date for which land should be reserved.

The recommended OGG MP is the result of a diligent process of study, interaction, and evaluation with OGG users and the general public. Preliminary MP recommendations were prepared based on the comments received on the development concepts presented in **Chapter 5**. These preliminary recommendations were presented to and discussed with the OGG Technical Advisory Committee, the OGG Citizens' Advisory Committee, and the public at informational meetings held by the DOTA. The preliminary recommendations were further refined into the detailed plans presented in this chapter after review by the DOTA, FAA, OGG Technical and Citizens' Advisory Committees, and public.

6.2 LAND USE ADJUSTMENTS

This section describes and illustrates the major land uses proposed within the OGG property. It also identifies the changes in State and County land use designations that will be required to implement the OGG MP recommendations. The land use designations take into account existing and planned uses for the airfield and terminal areas. Additionally, this section identifies lands required for other aviation/non-aviation facilities and airport support activities. The future land use area allocations are based on the projected demands and requirements described in **Chapter 3** of this report.

6.2.1 AIRPORT BOUNDARY

The recommended OGG MP shown in **Figure 6-1** on Page 6-3 identifies the areas needed for the proposed land uses through the year 2035. The most significant land use changes proposed are the development of a parallel Runway 2R-20L on the east side of OGG, the extension of Runway 2-20 and a new airport access road on the west side of the OGG. The recommended plan also provides additional space and/or facilities for passenger terminal, air cargo, GA, commercial aviation, FBOs, ground transportation operator baseyards, bulk jet fuel storage, and other support activities.

The recommended OGG MP implementation will require the acquisition of additional land, particularly for the construction of the parallel runway, as shown in **Figure 6-2** for the ultimate airport development. The description-purpose and acreage of the recommended acquisitions are presented in **Table 6-1**.

LAND ID	DESCRIPTION	APPROX. AREA (Ac.)
L-1	Development of portions of Parallel Runway 2R RPZ, Connecting Taxiways, Navaids, RSA, and East Ramp Access Road.	315.82
L-2	Development of portion of Parallel Runway 20L, Connecting Taxiways, Navaids, RSA, RPZ, and Hāna Highway Realignment.	24.15
TOTAL (acres)/1		339.97
1 Hāna Highway RPZ = 13.87 ac. To be acquired		

Table 6-1 Table of Land Acquisition

6.2.2 RUNWAY 2-20 EXTENSION

The proposed 1,535 ft. extension of Runway 2-20 to the south is located entirely within the existing OGG boundary. Approximately 13 acres of additional land, extending across Hāna Highway will be required for the RPZ. See **Figure 6-2** on Page 6-5.

6.2.3 EAST OF PRESENT AIRPORT BOUNDARY

Construction of the new Runway 2R-20L that is parallel with Runway 2-20 would require land acquisition of approximately 315.8 acres to the east of the present OGG boundary. The proposed parallel runway would be 7,000 ft. long by 150 ft. wide, with 2,500-ft. long precision instrument RPZs at both ends. The land acquisition will also extend to the east of the Hāna Highway to develop the parallel runway and required realignment of the highway near the north end of the parallel runway. Consideration should also be given to acquiring land north of the proposed parallel runway all the way to the shoreline. The recommended acquisition includes several homes in East Spreckelsville that would be adversely affected by aircraft operations on the proposed parallel runway.

Approximately 90+ acres of land, south of Hāna Highway, should be acquired or an avigation easement obtained, for the recommended 2,500-ft. long precision instrument RPZ.

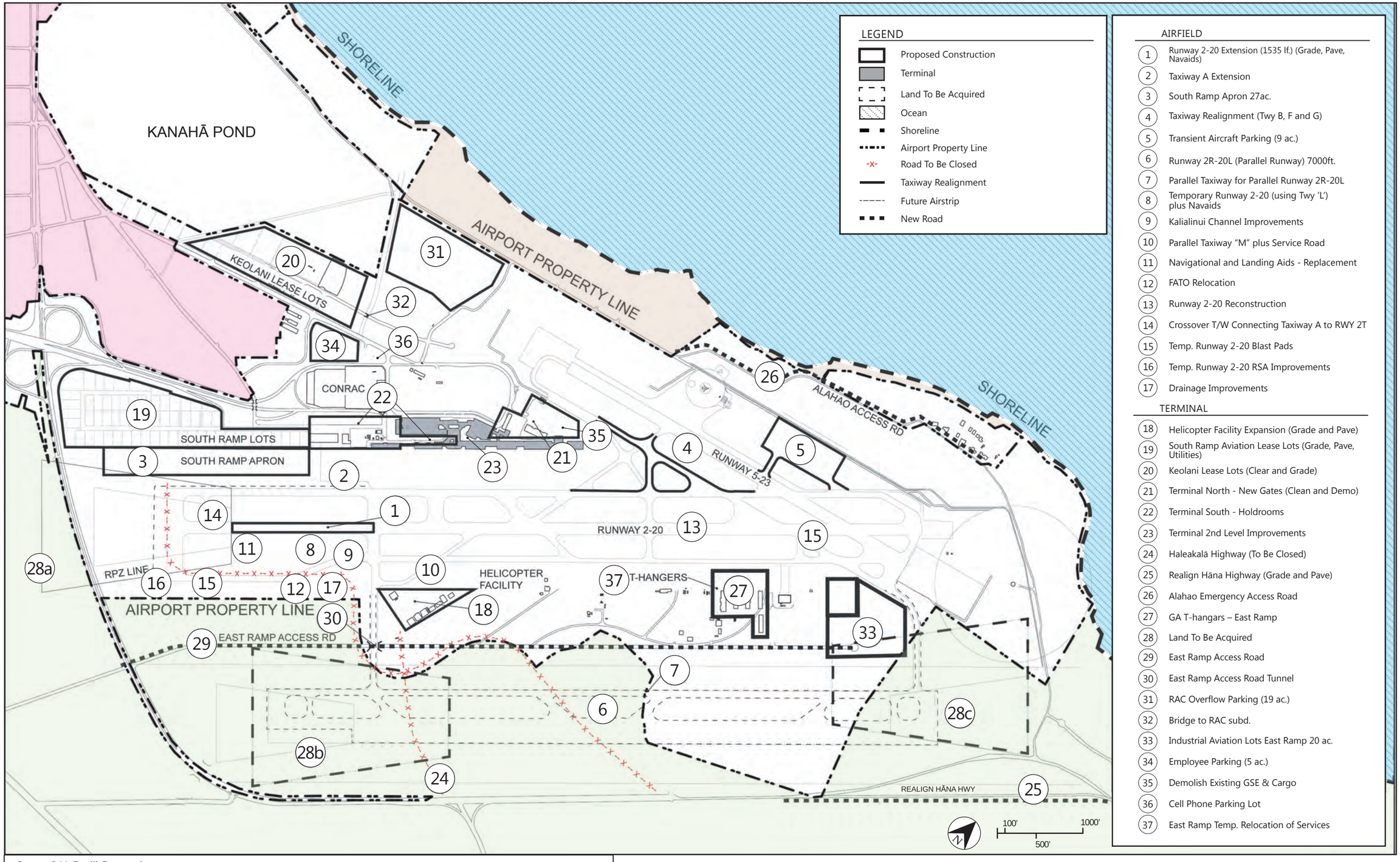
6.2.4 KANAHĀ POND STATE WILDLIFE SANCTUARY

Day-to-day operations of the Kanahā Pond State Wildlife Sanctuary located southwest of Runway 5-23, will continue to be managed by the DLNR. See **Figure 6-3** on Page 6-5. Sanctuary management and operations will continue to operate within the terms and conditions of the executed MOU between the DLNR, DOTA, and FAA.

6.2.5 STATE AND COUNTY LAND USE

6.2.5.1 STATE LAND USE DISTRICT

All lands within the State of Hawai'i are classified as an Agricultural, Conservation, Rural, or Urban district by the State LUC. Airport land uses are generally characterized as industrial uses and therefore require an "Urban" district classification. The existing and proposed State land use district classifications are shown in **Figure 6-3** on Page 6-5. Approximately 872 acres will need to be reclassified from the Agricultural to Urban district to implement the recommended OGG



Source: R.M. Towill Corporation

Figure 6-1 Preferred Plan

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Figure 6-2 Land Acquisition

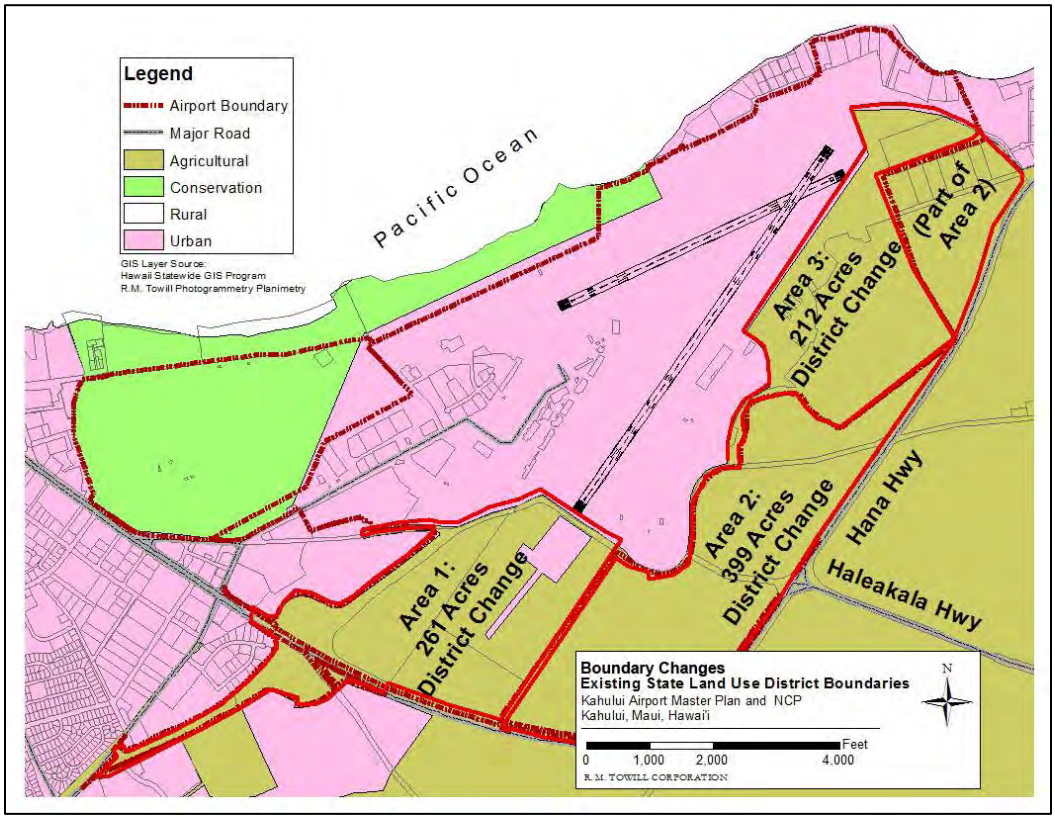


Figure 6-3 State Land Use Boundary Changes

MP. Area 1 lands, which include approximately 261 acres, should be part of the initial reclassification from the Agricultural to the Urban district in order to implement the Runway 2-20 extension and South Ramp industrial lots. See **Figure 6-3** on Page 6-5.

6.2.5.2 MAUI COUNTY GENERAL PLAN

Guiding future development of Maui County is the *Maui County General Plan 2030*. The *General Plan* provides a long range "comprehensive blueprint for the physical, economic, and environmental development, and cultural identity of the county." Three (3) components comprise the *General Plan: the Countywide Policy Plan*, the *Maui Island Plan* (MIP), and nine (9) Community Plans.

The *Countywide Policy Plan* was adopted by the Maui County Council in March 2010. It provides broad goals, objectives, policies, and implementing actions that portray the desired direction of the County's future. This includes: (1) a vision statement and core values for the County to the year 2030; (2) an explanation of the plan-making process; (3) a description and background information regarding Maui County today; (4) identification of guiding principles; and (5) a list of countywide goals, objectives, policies, and implementing actions related to the following core themes:

- Protect the Natural Environment
- Preserve Local Cultures and Traditions
- Improve Education
- Strengthen Social and Healthcare Services
- Expand Housing Opportunities for Residents
- Strengthen the Local Economy
- Improve Parks and Public Facilities
- Diversify Transportation Options
- Improve Physical Infrastructure
- Promote Sustainable Land Use and Growth Management
- Strive for Good Governance

Furthermore, the *Countywide Policy Plan* provides the policy framework for the development of the MIP and the nine (9) Community Plans.

An objective of the Policy Plan is directed at transportation and states:

> *"H. Diversify Transportation Options*
>
> *Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.*
>
> *Objective:*
>
> *3. Improve opportunities for affordable, efficient, safe, and reliable air transportation."*

6.2.5.3 MAUI ISLAND PLAN (MIP)

The MIP was adopted by the Maui County Council on December 28, 2012. The MIP is the second component of the *General Plan Update* providing direction and guidance for future growth of the economy, and social and environmental decisions for the island through 2030.

The MIP will be used by the Maui County Council, Maui Planning Commission, Maui County Staff, and community as a policy foundation for day-to-day decision making by:

- Developing, implementing, and applying policies and regulations (e.g., zoning and other ordinances, including the Community Plans, that describe the kind of development that is allowed); and
- Determining the appropriateness of discretionary development proposals.

A key component of the MIP is the adoption of a Directed Growth Plan establishing the desired location of future growth.

The proposed airport boundary expansion is located outside of the urban growth boundary shown in the MIP.

6.2.5.4 WAILUKU-KAHULUI COMMUNITY PLAN

The OGG is located within the *Wailuku-Kahului Community Plan* region. **Figure 6-4** shows the community plan land use designations from the *Wailuku-Kahului Community Plan* Land Use Map dated 2002. The OGG lands are designated "Airport" while adjacent lands identified for acquisition are designated "Agriculture." Approximately 580+ acres of land adjacent to the airport identified for acquisition will require a community plan land use map amendment from "Agriculture" to "Airport."

6.2.5.5 MAUI COUNTY ZONING

Figure 6-5 shows the current zoning for OGG lands. As discussed in **Chapter 2**, changes in zoning will be required to implement the recommended OGG MP projects for the airfield. The OGG lands are zoned "Airport" and "Airport/Agriculture." Adjacent lands identified for acquisition are zoned "Agriculture." Approximately 720 acres of adjacent land will need to be rezoned to "Airport" to implement the recommended OGG MP. See **Figure 6-5** on Page 6-8.

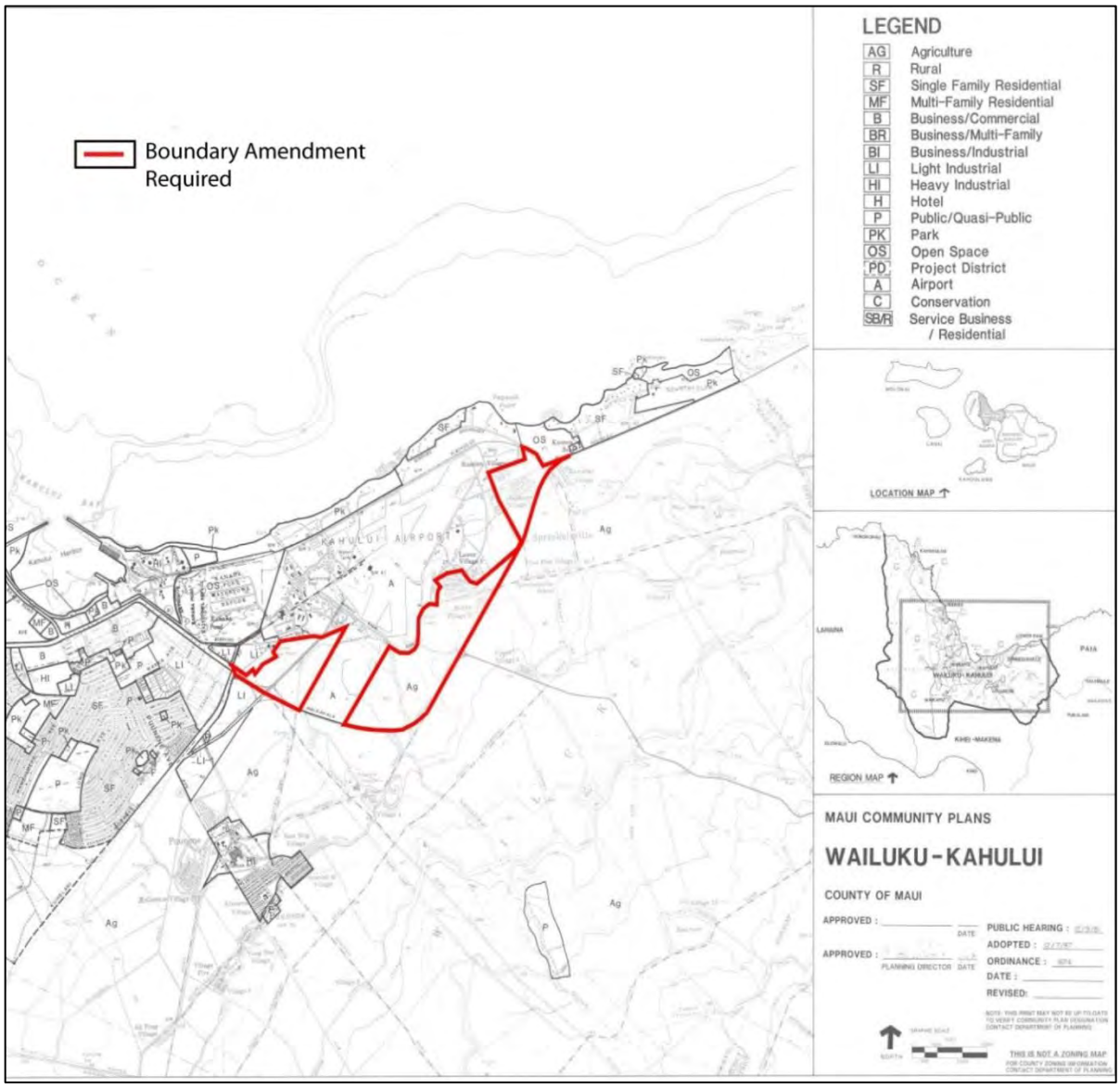
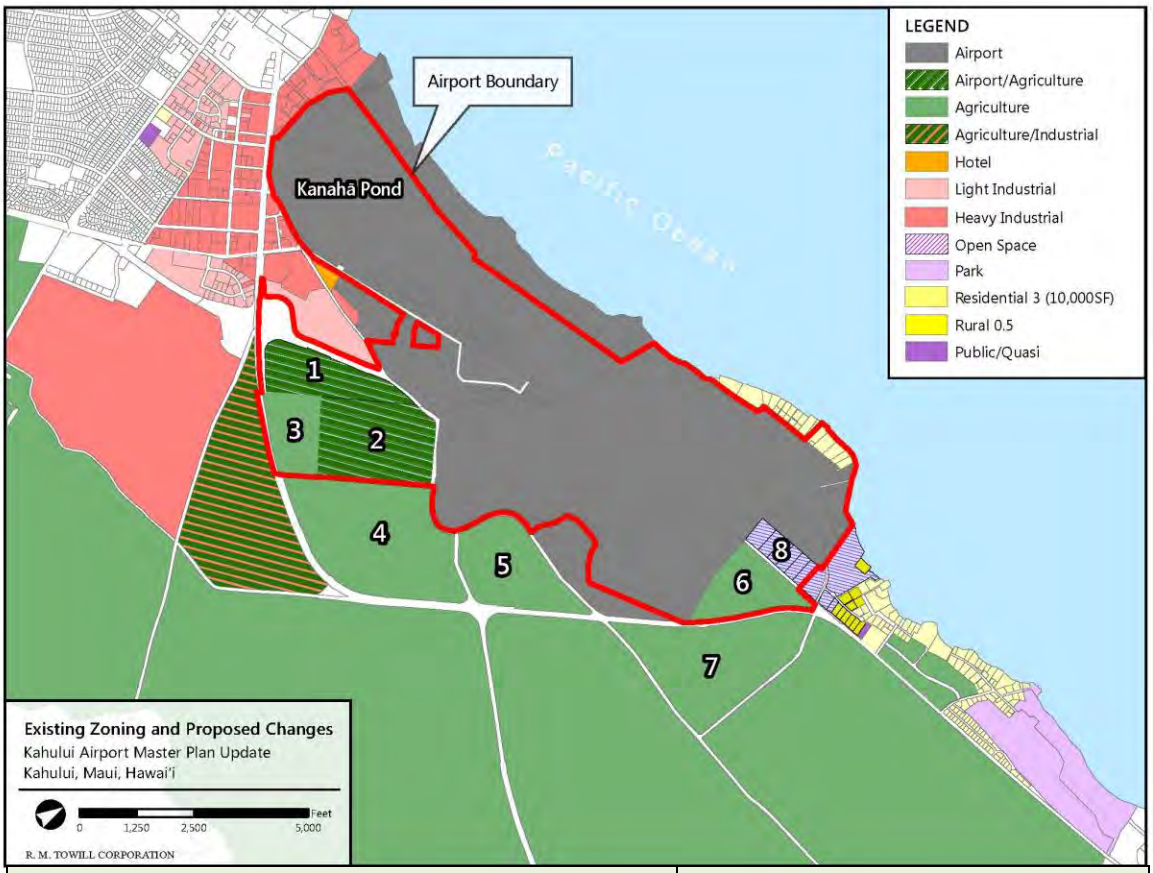


Figure 6-4 Community Plan Area Amendments



AREA ID	ACREAGE
1	86
2	100
3	43
4	165
5	84
6	55
7	141
8	46
Total (ac.)	720

Figure 6-5 County Zone Change Areas

6.3 AIRFIELD

The runways, taxiways, holding apron areas, shoulders, blast pads, NAVAIDS, associated RSAs, and RPZs are shown in **Figure 6-1** on Page 6-5. The recommended airfield improvements include the proposed 1,535 ft. Runway 2-20 extension, proposed Taxiway "L" to a temporary 7,000 ft. runway with parallel and connecting taxiways, a new parallel 7,000 ft. Runway 2R-20L, and taxiway improvements. These projects will accommodate forecast activity through the 20-year planning period of this recommended OGG MP. The recommended improvements are described below.

6.3.1 RUNWAY 2-20

Runway 2-20 is planned for a maximum length of 8,530 ft. with no change to its present 150-ft. width. See **Figure 6-1**. To establish the 8,530-ft. length, the runway will be extended 1,535 ft. south of Runway 2 of the present Runway 2-20. The recommended runway length provides additional length for essentially unrestricted overseas passenger aircraft operations without weight penalties to the U. S. West Coast and some Midwest destinations such as Chicago, Dallas, and Denver. A 1,000-ft. long by 500-ft. wide RSA is recommended to the south of the extended Runway 2 threshold and north of the existing Runway 20 threshold. Additional taxiways are also recommended for this runway to facilitate aircraft ground movement and reduce aircraft delay times, particularly during periods of peak activity.

6.3.2 TAXIWAY "L" AND TEMPORARY RUNWAY

Taxiway "L" will be developed parallel and east for the entire length of Runway 2-20. The proposed taxiway will be developed in phases, first to facilitate the reconstruction of Runway 2-20 by serving as a temporary runway, and secondly as a taxiway that extends the entire length of Runway 2-20. The taxiway should be built to accommodate aircraft in ADG IV and V with runway-taxiway separation of 400 ft. During the period when the taxiway serves as a temporary runway navigational aids will be required. Utilization of an existing taxiway (Taxiway "L" as referenced in this MP) is considered a cost efficient alternative to closing the primary runway. The use of Taxiway "L" will, however, require the following actions during the period that the Runway 2-20 reconstruction takes place:

- Extending the taxiway to 7,000 ft. with all required navigational aids and airfield lighting
- Developing a parallel taxiway east of Taxiway "L"
- Accommodating a service road east of the taxiway
- Relocating some helicopter operations and final approach and takeoff area (FATO)
- Relocating GA facilities and aircraft
- Relocating GA tie downs
- Moving existing fuel facilities
- Developing a Taxiway "A" connection
- Improving a drainage ditch
- Closing Haleakalā Highway

It is anticipated that once the reconstruction is completed, services and functions that were located on the east ramp will be returned to their former locations.

6.3.3 RUNWAY 2R-20L (PARALLEL RUNWAY)

A 7,000 ft. long, 150 ft. wide parallel Runway 2R-20L is recommended 2,500 ft. to the east (centerline-to-centerline separation) of the existing Runway 2-20. See **Figure 6-1** on Page 6-5. The 7,000 ft. long runway would accommodate take-off and landing of flights from the West Coast of the United States. The centerline-to-centerline runway separation will allow for simultaneous VFR operations by heavy aircraft (e.g., B-737, B-757, B-767, and B-777) as well as some staggered parallel instrument

operations under certain conditions and with precision instrument landing systems on both runways. A 1,000 ft. long by 500 ft. wide RSA area should be provided beyond both ends of this runway. Land acquisition is proposed only during the planning period for the purpose of preserving future development options and to prevent airport incompatible uses from being developed on lands adjacent to the airport.

6.3.4 RUNWAY 5-23

Runway 5-23 will continue to operate 'as-is' without any changes to its 4,990 ft. length and 150 ft. width. See **Figure 6-1** on Page 6-5. The runway will continue to be a non-precision-non-instrument runway that is used by GA and commuter/air taxi aircraft.

6.3.5 BUILDING RESTRICTION LINES AND OBJECT FREE ZONES

The recommended OGG MP retains the BRL at 1,000 ft. to the west and 750 ft. to the east of the centerline of existing Runway 2-20. The BRLs would extend past the ends of the runways to the point where they intersect the new RPZs that would accommodate the runway extensions. Both of these provisions are consistent with current FAA recommendations.

The OGG MP also recommends the establishment of a BRL of at least 750 ft. to the east and west of the centerline of the future parallel Runway 2R-20L.

The existing BRL for Runway 5-23 is situated 553 ft. on either side of the runway centerline and the plan recommends that this be retained. The existing ground transportation support buildings that are within the RPZ for Runway 5 should be relocated to comply with the latest FAA criteria.

6.3.6 TAXIWAYS

The recommended 1,535 ft. extension of Runway 2-20, construction of the 7,000 ft. parallel Runway 2R-20L, and other recommended projects will require the development of new and extended taxiways to provide access to and from the airfield as shown on **Figure 6-1** on Page 6-5. A proposed Taxiway "L" (proposed temporary runway) and Taxiway "A" are recommended to be located south to the proposed extended end of Runway 2. New entry exit taxiways are proposed to connect the extended Runway 2-20 to Taxiway "A" and "L."

Taxiway "F" will be extended northeast of Taxiway "A" at the end of Runway 5 to provide a full-length parallel taxiway on the southeast side of Runway 5-23. A centerline separation distance of 400 ft. is recommended between the taxiway and the centerline of Runway 5-23 to accommodate Group III aircraft (e.g., B-717 and B-737). These aircraft use the runway on an infrequent basis when Runway 2-20 is not available for use. Additional entry and exit taxiways are recommended which would include portions of the connecting taxiways that would accompany the proposed parallel runway.

New taxiways should be constructed to connect: (1) the future parallel runway and associated taxiways to the existing airfield, (2) the large transient aircraft parking apron to Taxiway "A," and (3) the future GA and commercial aviation areas to the extended Taxiway "G." Additional taxiway fillets are recommended near the runway taxiway intersections to expedite aircraft movement onto the exit taxiways. The exact dimensions and placement of these fillets are to be determined during the design phase.

The taxiways serving air carrier aircraft should be 75 ft. wide. A width of 35 ft. should be considered for taxiways serving areas such as the GA area east of Runway 2-20 which would be used only by small aircraft (i.e., those with gross weights of 12,500 lbs or less).

6.3.7 APRONS

A new approximately 27 acre apron is proposed to serve the new industrial lots on the South Ramp. Future tenants of these lots will provide services or uses requiring direct airfield and apron access. A new, approximately one (1) acre, apron will be needed to service additional gates on the north end of the passenger terminal discussed in **Section 6.4.1**. This would include extending the existing apron over the existing bus parking. A holding apron is also

recommended between the proposed extended Taxiway "L" and the proposed parallel Runway 2R-20L. It would be similar in size to the new extended South Ramp apron. A transient aircraft parking apron is proposed near the intersection of Runway 2-20 and Runway 5-23. It would be approximately 9.5 acres and include paved connections to Taxiway "A" and Runway 5-23.

6.3.8 NAVIGATION AND LANDING AIDS

Existing NAVAIDS under the purview of the FAA are proposed for continued uninterrupted operations. They include runway and taxiway lighting, precision instrument approach system, glide slope facility, middle marker, and high and MALSR approach lights, clear zone of 1,000 ft. for the VORTAC, clear zone of 1,500 ft. for the ASR east of Runway 2-20 to protect the facility from encroachment by structures or other objects that could adversely impact the radar. Similar facilities are proposed for the parallel Runway 2R-20L.

For the Runway 2 extension, new navigational aids will be placed along the 1,540 ft. extension which will include relocated VASI-4, Glide Slope Facility, Wind Sock, and Runway End Indicator Lights (REIL). At the ends of the future parallel runway and extending 2500 ft., future MALSR approach lights and a Middle Marker will be also be constructed . Runway 20 would continue to utilize PAPI-4 and Runway 5-23 will continue with current navigational aids.

6.4 TERMINAL AREA PLAN

This section describes the terminal projects recommended for the OGG. See **Figure 6-6** on Page 6-13. These include the passenger terminal, commuter air taxi terminal, air cargo facilities, ground transportation subdivision, bulk fuel storage tanks, new CONRAC facilities, new aviation lease lots, and other facilities. The projects described should be phased to ensure that they are constructed only as needed and that their construction does not disrupt on-going OGG operations.

6.4.1 PASSENGER TERMINAL

The 20 existing aircraft parking positions fronting the passenger terminal are currently insufficient to support projected aircraft operations through the year 2035. Of the 20 aircraft parking positions only 13 parking positions are sized for operations by three (3) inter-island and 10 overseas aircraft. Additional parking spaces are required to support projected additional flights preventing gate shortages currently affecting operations. In addition, the DOTA and the air carriers should coordinate the reassignment of gates and facilitate the re-marking of the ramp to further maximize the use of the aircraft parking ramp.

Terminal – North-end Expansion. The north end second level of the terminal currently houses 23 departure gates, gates 17-39, with nine (9) aircraft parking positions. Expansion in this area is constrained by the runways and taxiways to the north. Space could be provided for two (2) additional air carrier aircraft parking positions on the apron to the north for expansion beyond the 2035 planning period. With the relocation of the air cargo, GSE, car rental customer windows, and customer pick-up area, this area would be available for additional terminal functions – aircraft parking positions and/or additional terminal holding areas. See **Figure 6-6**. An additional exit from the north end to the baggage claim area is proposed.

Terminal – South-end Expansion. There are six (6) holdrooms on the second level of the terminal that service gates 1–16. See **Figure 6-6** on Page 6-13. There are four (4) aircraft parking positions available (one (1) inter-island and three (3) overseas). The utility of the gates are limited by the size of the holdrooms (holding area), where each holdroom is nearly one-half of the area provided by gates 17-39. The holdrooms are proposed to be tripled in size by building over the ground-level vehicular access way and connecting with the terminal building footprint on the other side. Currently, Building 345 with a combined footprint of approximately 21,780 s.f. contains three (3) holdrooms, Gates 2-7, two (2) ticketing areas, a U. S. Department of Agriculture

(USDA) Inspection station, and two (2) restrooms. Building 341 with a combined footprint of 22,740 s.f. contains three (3) holdrooms, Gates 9-15, two (2) ticketing areas, an ice cream shop, two (2) restrooms, and two (2) airline offices. The walkway that connects the two (2) buildings would be doubled from its current footprint of approximately 5,830 s.f. The total expansion would be approximately two (2) acres. It is possible that a few additional aircraft parking positions will be required infrequently during extremely busy periods by the end of the planning period due to future airline scheduling practices, overlapping of inter-island and overseas peak hours, and turnaround time for overseas flights. To address this, the recommended OGG MP preserves space to the south of the existing aircraft parking apron and recommends additional gates to support the planned increase in Hawaiian Airlines flights. The recommended OGG MP accommodates power-in/push back operations at each aircraft parking position.

Extension of the terminal building to the south over the existing air cargo and ASIF facility is proposed once the South Ramp is developed. The terminal extension to the south would support more passenger holding areas and gates to serve additional aircraft. This may be done at a later phase and would have a potential area of approximately eight (8) acres. When completed, the ASIF and air cargo buildings will be relocated to the industrial lots on the South Ramp.

Terminal – Relocation of Art Work. The existing statue of Maui the Sun God is proposed to be relocated from its current position adjacent to the security check-point to the baggage claim area (where the current skylight is located).

6.4.2 COMMUTER AIRLINE FACILITIES

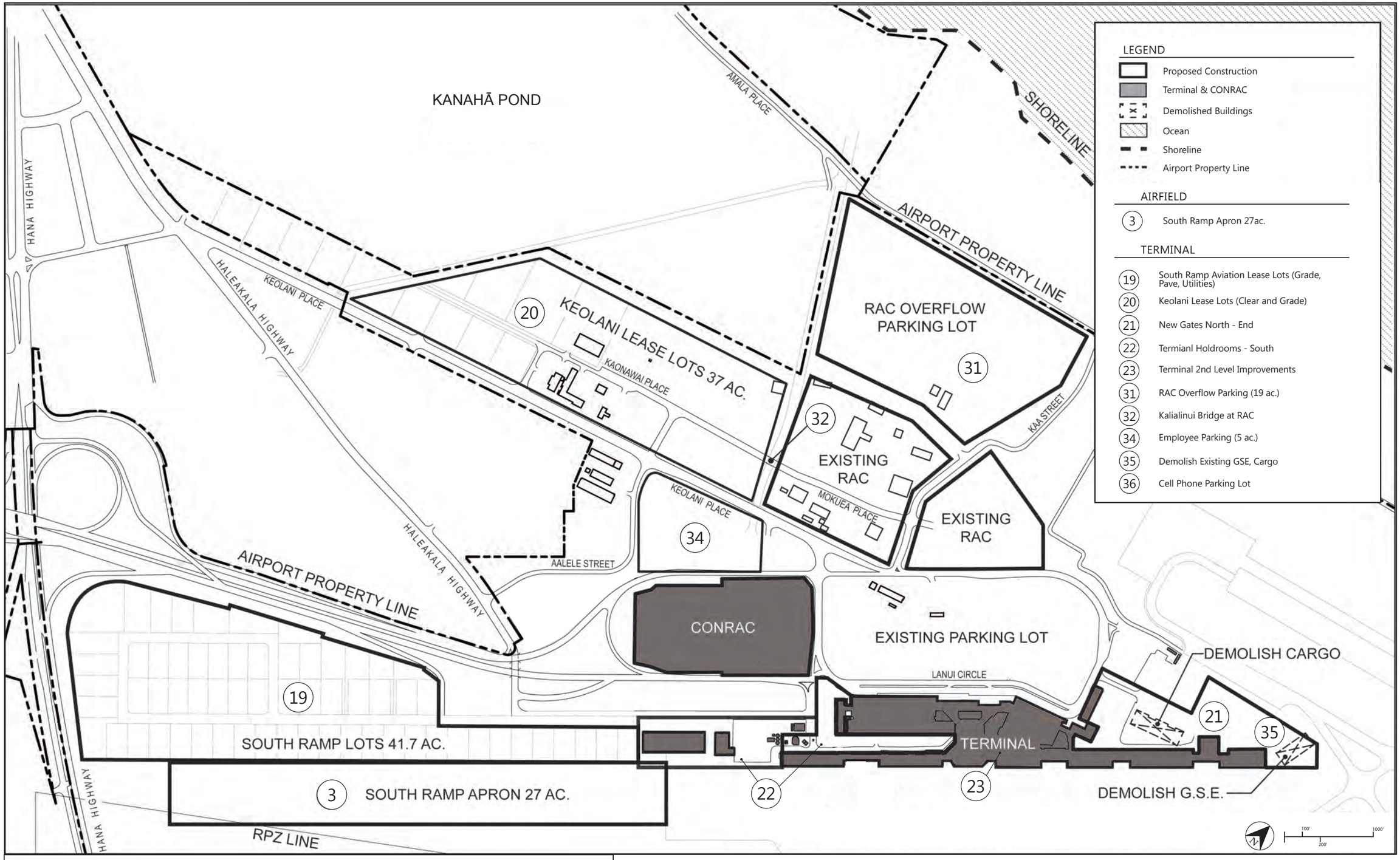
The existing commuter terminal and ramp facilities would continue as currently configured. Terminal facilities for four (4) airlines are recommended and would accommodate the following: passenger ticketing and check-in, baggage claim, waiting area, airline operations, restrooms, and concessions. Approximately 10,000 s.f. of building area will be allocated along with space for approximately 100+ vehicles or three (3) acres of parking for customers.

6.4.3 U.S. POSTAL SERVICE FACILITIES

The USPS owns and operates facilities located on a five (5) acre parcel of land adjacent to Keolani Place. The utilities needed to serve this site are already in place. The disadvantage of this location is that the USPS will not have direct access to the aircraft ramp once the new airport access road is completed. Access will be via the public roads. The USPS will be offered the option to relocate to the new aviation lease lots in the South Ramp to allow the organization to have direct access to aircraft. A decision on the relocation is pending, but USPS would likely occupy approximately three (3) acres based on the offer of an improved site. If USPS decides to move, the existing five (5) acre area would be used for employee parking and a cell phone waiting lot.

6.4.4 AIR CARGO AND ASIF FACILITIES

In 2007, new air cargo facilities were developed south of the main passenger terminal primarily for cargo carried by passenger aircraft. The total area of the air cargo and ASIF facility is approximately 3.6 acres. The area includes space for vehicle circulation, stockpiling of cargo, and parking. This cargo is often referred to as belly-cargo because it is carried in the bellies of passenger aircraft. Cargo carried by all-cargo aircraft (such as Aloha Air Cargo and other all-cargo carriers) are typically referred to as hold-cargo and is also being handled there. With the development of the South Ramp, the two facilities should be relocated to this location, thus freeing space for terminal expansion.



Source: R.M. Towill Corporation

Figure 6-6 Preferred Terminal Plan - North and South

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6.4.5 FUEL STORAGE AND LOADING FACILITIES

The bulk fuel storage facilities at the OGG are located west of Keolani Place, adjacent of Kalialinui Drainage Channel. Fuel will be trucked from the storage tanks to the apron over the near term, but the OGG MP calls for a fuel pipeline to be installed between the storage tanks and the south end of the air passenger terminal building.

6.4.6 AIRLINE GROUND EQUIPMENT MAINTENANCE FACILITIES

The recommended OGG MP envisions much of the ground equipment maintenance work continuing to be done in the airlines' individual bays beneath the passenger holding rooms. However, additional space is needed for more extensive maintenance work. The OGG MP designates one (1) of the aviation lease lots in the South Ramp (approximately 0.6 acre) for this use. The existing GSE Building will be demolished to make way for the proposed north end terminal expansion.

6.4.7 STATE DOT AIRPORT MAINTENANCE FACILITIES

The DOTA maintenance baseyard is planned to remain in its present location throughout the planning period.

6.4.8 SOUTH RAMP – AVIATION LEASE LOTS

The OGG MP reserves approximately 42 acres adjacent to the South Ramp for aviation uses such as: USPS, bulk fuel storage, GSE, air cargo expansion, freight forwarders and handlers (e.g., UPS and FedEx), fixed base operators, etc. This area can be subdivided into lots ranging from one-half (0.5) acre to five (5) acres. The total available area for future leases is 41+ acres. Approximately 27 acres of new apron space will be provided to serve these lots. See **Figure 6-7** on Page 6-16.

6.4.9 CONSOLIDATED RENT-A-CAR (CONRAC)

This new facility (in progress) will provide for the following RAC functions: ready-return, quick turn-around (plus fueling), and customer service desks. Maintenance facilities are to be located in the Keolani Place lease lots. Overflow parking which currently occupies over 30 acres of space northwest of the existing ground transportation subdivision could be distributed north of the Keolani Place lease lots in a 19 acre area and in the South Ramp industrial lots. As discussed previously, there are seven (7) RAC companies located at the OGG: Alamo, Avis, Budget, DTG Operations Inc., Enterprise, Hertz, and National. See **Figure 6-8** on Page 6-18. The following acreages reflect each RAC companies parking and garage/service station facilities uses only within the existing ground transportation subdivision. As previously discussed, these RAC operations will be relocated at the Keolani Place lease lots location. Other facilities such as customer service areas will be located in the CONRAC facility. Alamo has approximately three (3) acres, Avis has two (2) acres, Budget has two and a half (2.5) acres, Enterprise has two (2) acres, Hertz has three (3) acres, and National has one-half (0.5) acre. Dollar and Thrifty are owned and operated by DTG Operations, Inc. Therefore, they would share the same facilities including a garage and parking in the proposed Keolani lease lots. Their existing space is approximately four (4) acres.

In summary, the existing RAC spaces off of Koeheke Street would need to be consolidated and functions, except maintenance, would be in the new multi-level CONRAC facility south of the existing public parking lot. Actual space leased to each company would need to be determined at a later date.

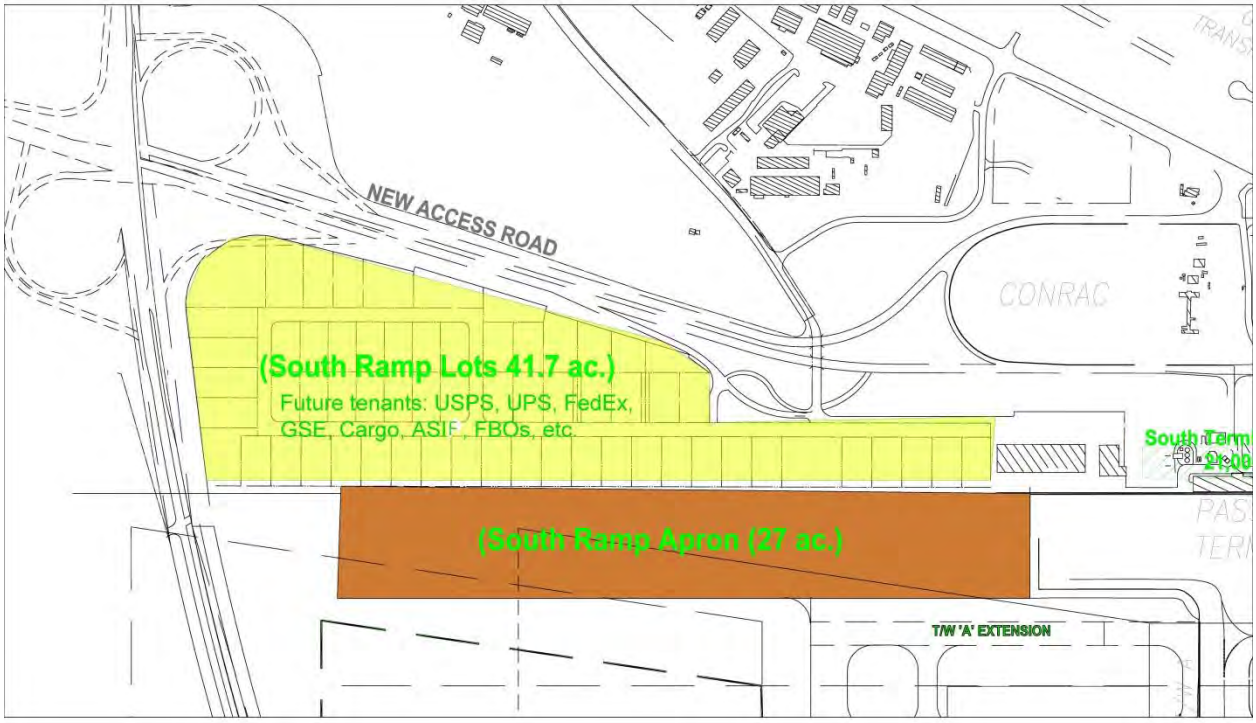


Figure 6-7 Terminal Area –South Ramp

6.4.10 EAST-SIDE TERMINAL FACILITIES

6.4.10.1 GENERAL AVIATION

The recommended OGG MP proposes the continued operation of existing GA facilities east of Runway 2-20 to accommodate the 35 based fixed-wing aircraft as well as itinerant fixed-wing aircraft.

The construction of two (2) additional T-hangars for GA, approximately 12,000 s.f. in size are recommended. The recommended OGG MP also provides space for individual executive-type hangars to be developed by lessees, as needed, and for future expansion.

Each lot would have access to both the airfield and roadway system. Space should also be provided within each lease lot for automobile parking for employees and visitors. The DOTAs current property development standards call for two (2) acre minimum lot sizes for commercial aviation and FBO lots. However, in order to meet the needs of the small GA operators in the State, it is recommended that the subdivision layout provide some one (1) acre lease lots. The lease lots should be assigned so that GA operators who need a larger area can lease contiguous parcels. The recommended OGG MP provides space in the GA area for a future aircraft wash rack. A pilots' lounge or ready room could be provided within a FBOs hangar and office building at the end of a row of hangars. Apron lighting should be provided in the general aviation apron and hangar area. New taxiways would be provided to connect the expanded GA aircraft apron and hangar areas. East Ramp project elements are identified in **Figure 6-9** on Page 6-19.

6.4.10.2 AIR CARGO FACILITIES

A second new air cargo area is proposed in the recommended OGG MP and situated at the northern end of the East Ramp. A four (4) acre area that is part of the proposed new East Ramp lease lots will be made available to air cargo operators for their facilities. Unlike the air cargo facilities proposed for the western side of the OGG, these are intended for use by all cargo aircraft. Initially, access to the new facilities would be via existing roads; ultimately this area

would be serviced by the proposed new East Ramp spine road.

6.4.10.3 HELICOPTER FACILITIES

The existing helicopter facilities are poorly situated with respect to apron surveillance from the FAA ATCT. Its present location will place it between two (2) active runways once the recommended parallel Runway 2R-20L is constructed. This would increase the frequency of undesirable interactions between helicopter and fixed-wing aircraft operations. Consequently, relocation of these facilities is recommended. A number of OGG locations were evaluated during the master planning process, but all had significant limitations. These limitations included increased cross-runway overflights, proximity to nearby residential or recreational areas, and limited land area. In view of the foregoing, it is recommended that most facilities supporting helicopter operations eventually be relocated to a new site outside the existing OGG boundary. Possible locations include a site on the eastern side of Hāna Highway near its intersection with Haleakalā Highway. The exact size and location of these new helicopter facilities should be determined after further study.

6.4.10.4 MILITARY OPERATIONS

Several times each year the OGG is used by groups of large military transport aircraft and helicopters. It is proposed that these aircraft use the itinerant apron that is part of the East Ramp or the vacant 20 acres north of the GA facilities. The DOTA should cooperate with the U. S. Department of Defense (DOD) to provide a facility that is suitable for use as a temporary troop shelter transportation coordination office adjacent to the transient aircraft parking apron.

6.4.10.5 FAA AIRPORT TRAFFIC CONTROL TOWER

The FAA ATCT adjacent to the East Ramp is adequate with two (2) exceptions. The first exception is that hangers in the helicopter operating area at the southern end of the East Ramp obstruct FAA ATCT views of the apron. The relocation of the FATO area should alleviate this situation. The second is that the passenger terminal obscures the FAA ATCT views of the western end of Runway 5-23 and the connecting taxiway. Aircraft operating procedures have been developed to deal with the restricted visibility. The tower has adequate communication and utility links and requires no further improvement within the time frame of this MP.

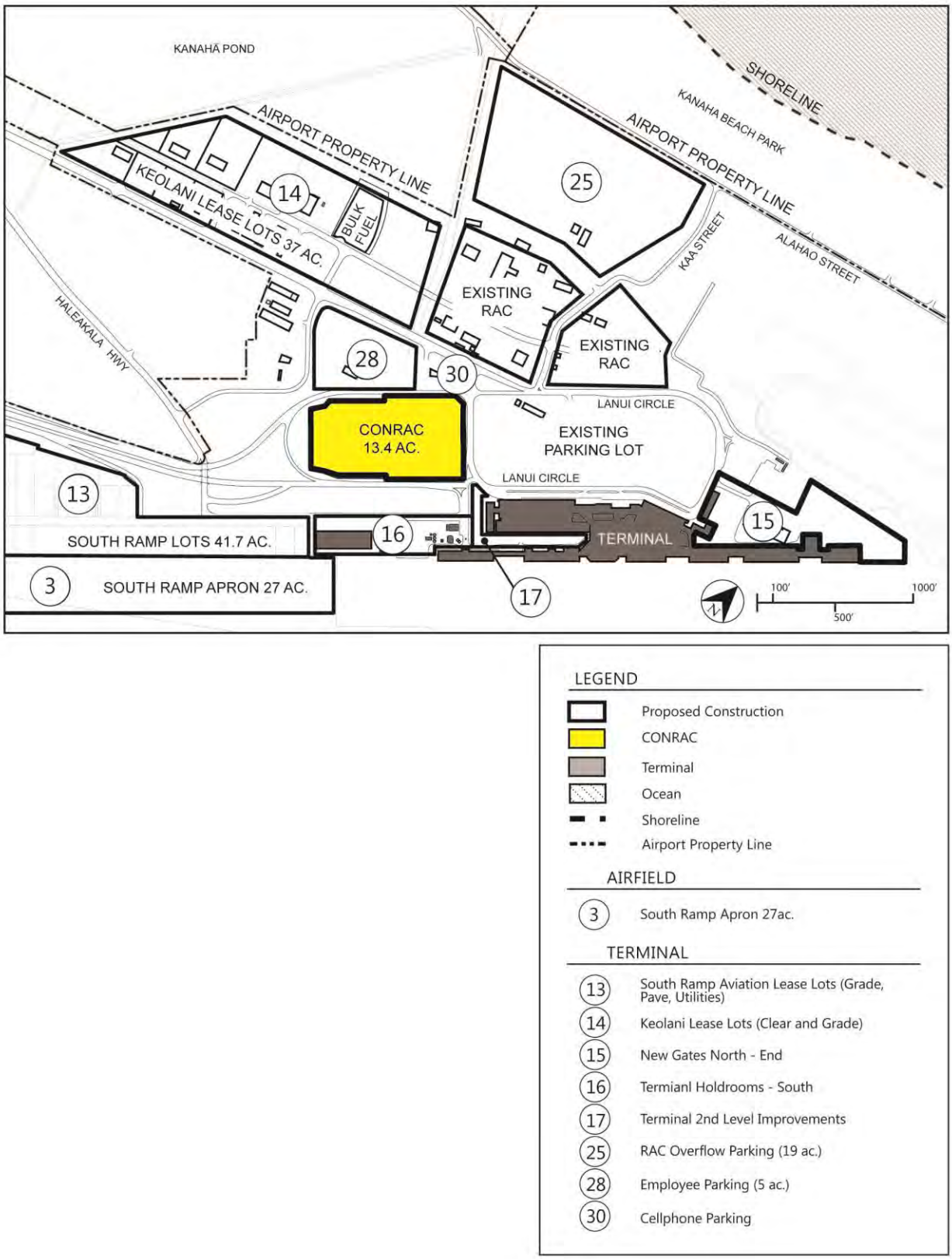


Figure 6-8 Terminal Area Rent-A-Car Facilities

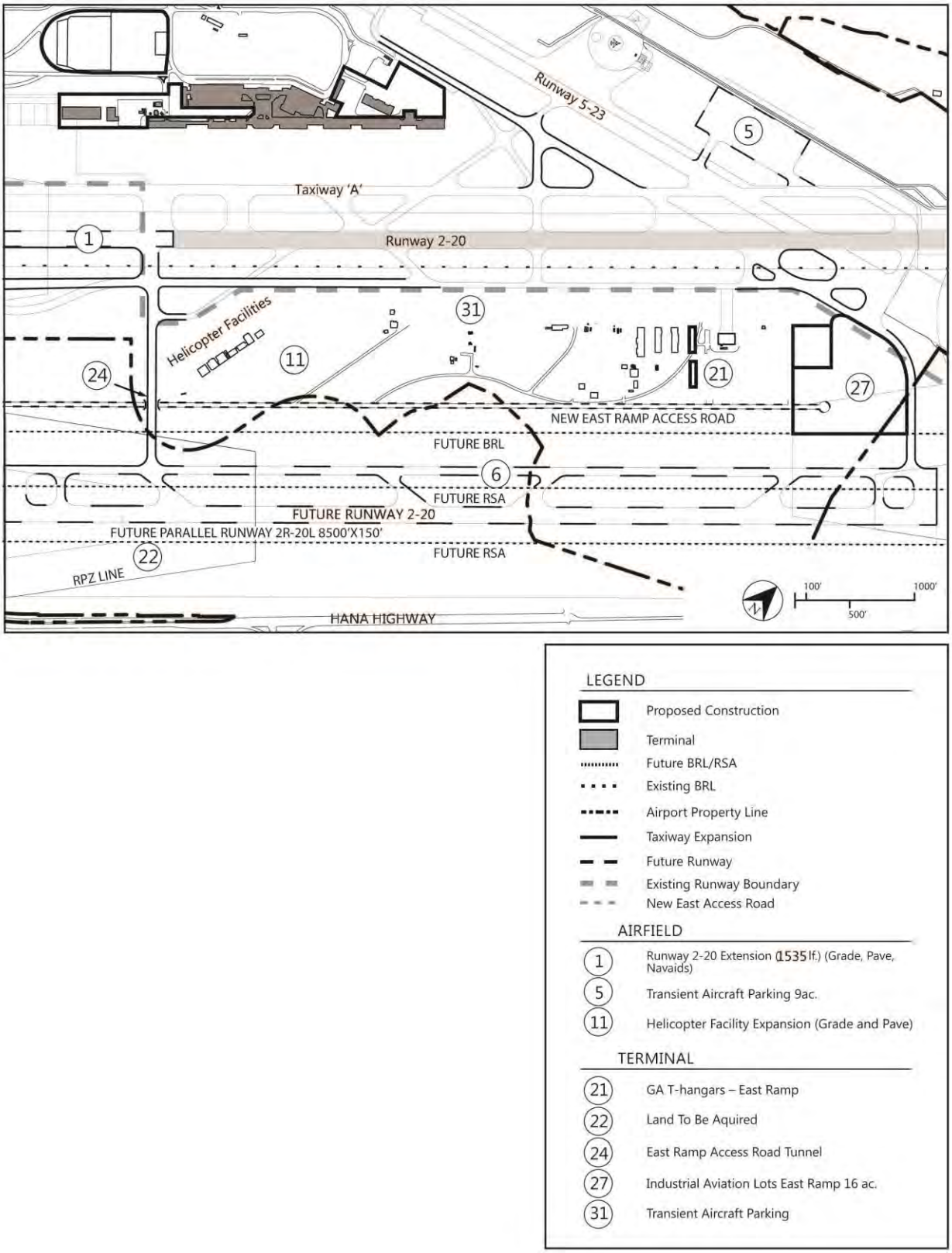


Figure 6-9 East Ramp Plan

6.5 AIRPORT AIRSPACE PLAN

The Airport Airspace Plan for the recommended airport layout is shown on **Figure 6-10** on Page 6-21. It is a graphic illustration of the imaginary surfaces as defined in the FAR Part 77, Objects Affecting Navigable Airspace.

The purpose of the Airport Airspace Plan is to identify existing and ultimate approach surfaces as well as surrounding physical and community features which may affect aircraft operations. The primary objectives in establishing the imaginary approach surfaces and RPZs are to:

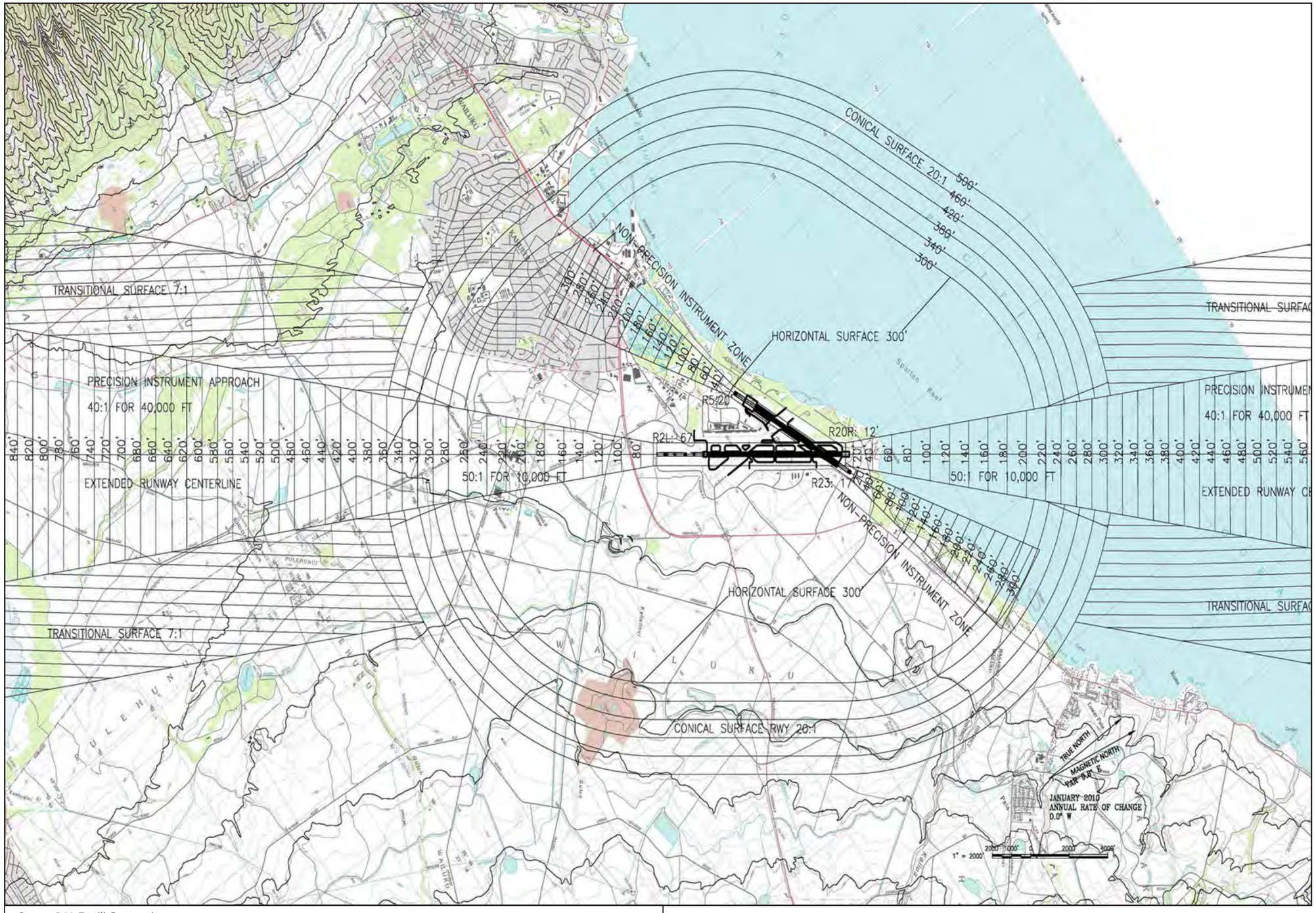
- Identify surrounding terrain or objects that penetrate the imaginary surfaces
- Regulate the height of development near the OGG
- Prevent the erection of possible obstructions to navigable airspace

The recommended Airport Airspace Plan provides for the approach slope surfaces described below and illustrated in **Figure 6-10** on Page 6-21.

A precision instrument approach is to be retained for the extended Runway 2. A 50:1 approach slope extends out 10,000 ft. from the end of the Runway 2 primary surface (measured along the extended runway centerline). A 40:1 approach slope extends outward from the end of the 50:1 approach slope at 10,000 ft. for an additional 40,000 ft. beyond the end of the runway primary surface. A precision instrument RPZ currently exists for Runway 2 and should be relocated with the proposed extension of the runway to the south. A precision instrument RPZ is currently provided on Runway 20 and should be maintained. A precision instrument approach, with 50:1 approach slope for 10,000 ft. and precision instrument RPZ should be protected for both ends of the proposed parallel Runway 2R-20L.

A non-precision instrument approach, with 34:1 approach slope, should be retained for both ends of Runway 5-23. It is recommended that non-precision instrument RPZs be maintained for Runways 5-23. The Airport Airspace Plan shows that a portion of the OGG horizontal and conical surfaces are penetrated by the terrain southeast of the OGG. These penetrations have been accounted for in the approach and departure procedures established for the OGG.

Currently, there are no new development projects proposed which would penetrate the runway approach surfaces.



Source: R.M. Towill Corporation

Figure 6-10 Airspace Plan

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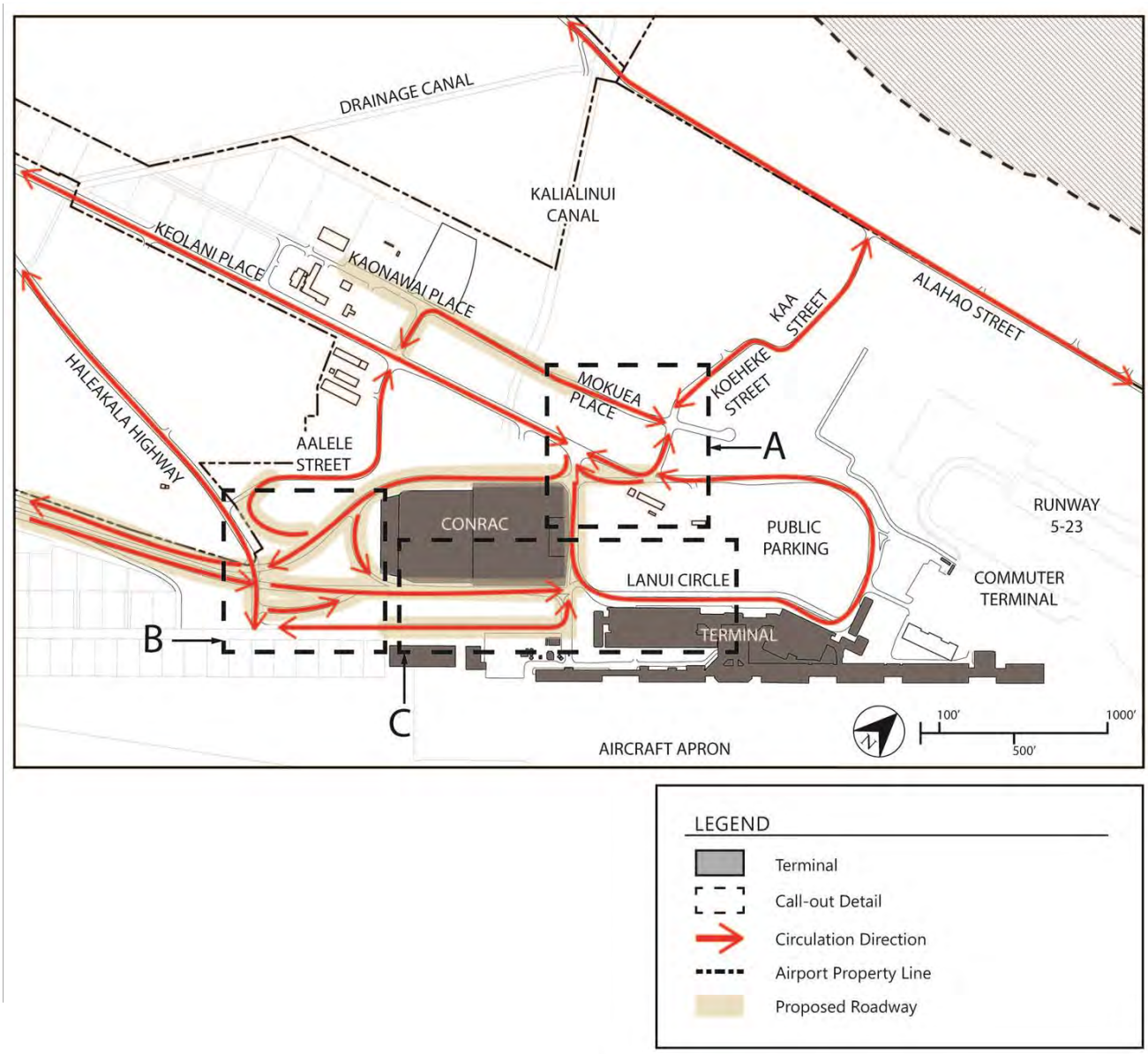

Figure 6-11 Terminal Access Plan

6.6 AIRPORT ACCESS AND CIRCULATION PLAN

This section describes facilities and measures taken to ensure that OGG facilities are accessible to users and employees, that adequate parking is provided, and that adequate provisions are made for apron access and vehicular movement within the airport operating area. See **Figure 6-11**.

6.6.1 PRIMARY AIRPORT ACCESS

The new airport access road proposed in the 1993 OGG MP is currently under construction. This new road will improve access into the OGG and better serve regional transportation needs by providing access from Hāna Highway without having to encounter the congestion on Dairy Road. This initial construction phase will utilize an at-grade signalized intersection.

The other recommended OGG MP project affecting Hāna Highway is the realignment of a

portion of the Highway adjacent to the northeastern corner of the OGG. A new highway alignment is needed to keep the RPZ, associated with the proposed parallel Runway 2R-20L, entirely within the OGG property. The land for the realignment must be acquired from A&B., which uses the land for sugarcane cultivation.

Due to the relatively low volume of traffic that is generated by existing and proposed uses on the eastern side of Runway 2-20, the existing roadways serving that area are adequate. However, Haleakalā Highway will need to be closed to through-traffic when Runway 2-20 is extended to the south. Access from Hāna Highway to the East Ramp facilities can continue on the existing roadways, Kala Street and the remnant of Haleakalā Highway, until the proposed parallel Runway 2R-20L is constructed. At that time, a new access road must be constructed between, and generally parallel to, the runways.

Because the majority of the traffic to and from the facilities planned for this area is from the Kahului side of the OGG, the recommended OGG MP Update calls for the construction of a spine road to intersect Hāna Highway at the south end of the East Ramp near the existing intersection with Pulehu Road. The recommendations in this OGG MP Update does not propose connecting the spine road to the external road network at its northern end due to the relatively low volume of traffic that is anticipated to and from the north and east, and the high cost of tunneling beneath the connecting taxiways.

6.6.2 OTHER ON-AIRPORT PUBLIC ROADS

The recommendations in this OGG MP Update propose the construction of new internal roadways to serve new and/or reconfigured development. The areas that would be served by these new roads include the additional lots for ground transportation operators, bulk fuel storage facilities, the South Ramp lease lots, and the lease lots along the northwestern side of Keolani Place. These streets should meet commercial development quality standards with curbs, lighting, sidewalks and a storm drain system. They should be designed to accommodate moderate traffic volumes with a design speed of 25 miles per hour (mph). Most of the traffic on these roads will consist of passenger cars, vans, buses, trucks, and other vehicles. The roadway geometrics and pavement should be designed accordingly.

6.6.3 ON-AIRPORT SERVICE ROADS

In addition to public streets, the recommendations in this OGG MP Update also call for the construction of new internal service roads. These include a new perimeter road fronting the south end of Runway 5, and additional service roads to the new facilities. A service road should be constructed linking the South Ramp lease lots with the new Airport Access Road which is under construction. The volume of traffic moving along this road will be low throughout the planning period and anticipated speeds will be well below 25 mph. The pavement geometry, load carrying capability, vertical grades, and vertical clearances at the grade separated underpass beneath the proposed Airport Access Road should be designed and constructed with these requirements in mind.

When Runway 2-20 is extended, the portion of Haleakalā Highway west of the runway will terminate at the proposed new South Ramp lease lots. Public access to the cargo buildings will be provided from the south via the new access road. The apron storage areas on one (1) side of each cargo building will be included within the OGG operating area.

6.6.4 VEHICLE PARKING

As discussed in **Chapter 4**, preliminary calculations indicate that additional vehicular parking may be needed near the main passenger terminal if present vehicle usage rates continue and passenger volumes increase as forecasted. This airport parking deficiency may not appear for well over a decade. However, there are many factors that could exacerbate the parking shortfall even further. It is acknowledged,

however, that on occasional peak periods, the existing parking facilities are utilized to the limit. Because of this, construction of additional parking spaces to increase capacity before 2017 was not recommended. Instead, the recommended course of action is to develop the CONRAC and reserve land south of the existing parking lot for possible future development of additional parking facilities.

It has been recommended that all employee parking be relocated to the former USPS site. Thus, the parking lot to the north will be completely available to the public. The DOTA should monitor parking lot usage on an annual basis using data collected by the parking lot concessionaire. The data should be reviewed at least every other year and the DOTA should begin developing plans for additional facilities when daily use of the existing facilities exceeds 80% of capacity more than seven (7) times in any one (1) year. In addition, the development of an employee parking lot should be considered. This lot can be located west of Lanui Circle.

6.7 GROUND TRANSPORTATION FACILITIES

Concentrating all of the RAC customer service operations in one (1) location at the OGG will assist passengers with finding the facilities and simplify transport between the passenger terminal and baseyards. It is recommended that the existing subdivision be expanded southward across Kalialinui Gulch. From an operational standpoint, the preferred arrangement would be to extend Mokuea Place across Kalialinui Gulch.

A portion of the land in the area south of the gulch has already been improved, and all of the existing lots are currently leased for various purposes. The future development of ground transportation lots in this area must be done in two (2) increments, with each increment on either side of the existing improved lots. In order to ensure the availability of land needed for this, the renegotiation of lot leases presently used for non-airport related will allow the DOTA to terminate the leases if/when the land is determined to be needed for airport purposes. The terms of renegotiated leases within the ground transportation development lots will provide sufficient advance notification of lease termination to avoid undue disruption to the lessees who may be required to relocate.

Existing tenants who might be affected by this policy include the Coral Factory, Enterprise, and Roberts Hawai'i. The future Keolani Place lease lots will have approximately 37 acres of available space for the relocated ground transportation uses. As discussed, it is also recommended that the ground transportation facilities within the RPZ for Runway 5 be relocated to the CONRAC and/or Keolani Place lease lots.

Lastly, some of the existing structures that are outside of the future and existing BRL and RPZ could potentially be retained by the airport for other uses. An additional 19 acres west of the RAC subdivision is proposed for the future development of RAC overflow parking.

6.8 UTILITIES

The existing utility systems are currently adequate to meet current demands; however, as the improvements described above are implemented, specific utilities will need to be upgraded to meet the anticipated demand.

With the rise in electrical costs, the DOTA is exploring the feasibility of further expanding renewable energy generation at the OGG to reduce its operational costs. The DOTA has specifically explored the use of additional solar panels to generate electricity and have commissioned studies for its implementation. Currently OGG has installed 3,420 solar panels on the roof of the passenger terminal and is awaiting approval from the Maui Electric Company to inter-connect with the electrical utility grid.

6.9 PROJECT COST ESTIMATE

Project costs are shown in **Table 6-2** on Page 6-26. Estimates are in 2015 dollars. The total amounts include cost of construction, contractors overhead, design services, and contingency to account for unanticipated costs.

The cost estimates that are presented are for guidance only and do not represent an actual contractors' bid. Local fees and taxes have not been included.

Airfield		TOTAL
1	Runway 2-20 - Extension 1535 linear feet (lf.) (grade, pave, exclude utilities/NAVAIDS)	$96,000,000
2	Taxiway A Extension (excludes utilities and NAVAIDS)	$12,121,212
3	South Ramp Apron 27 acres	$5,184,000
4	Taxiway Realignment (Taxiways "B", "F" and "G")	$3,008,264
5	Transient Aircraft Parking 9 acres	$4,320,000
6	Runway 2-20 (Parallel Runway) 7000 ft.	$768,000,000
7	Parallel Taxiway for Runway 2R-20L	$703,680,000
8	Temporary Runway 2-20	$74,513,280
9	Kalialinui Channel Improvements	$25,564,738
10	Taxiway "M" Expansion and Upgrade	$37,152,000
11	Navigational and Landing Aids - Replacement	TBD by FAA
12	FATO Relocation	$960,000
13	Runway 2-20 Reconstruction	$104,355,840
14	Connecting Taxiways Between Runways 2-20 and Temporary Runway 2-20.	$19,200,000
15	Temp Runway 2-20 Blast Pads	$5,760,000
16	Temp Runway 2-20 RSA Improvements	$3,840,000
17	Drainage Improvement	$9,600,000
Terminal		
18	Helicopter Facility Expansion	$5,000,000
19	South Ramp Aviation Lease Lots (grade, pave, utilities)	$32,976,000
20	Keolani Lease Lots (clear and grade)	$17,760,000
21	Terminal North - New Gates (clean and demo)	$7,200,000
22	Terminal South - Holdrooms	$96,000,000
23	Terminal South - 2nd Level Improvements	$773,625,600
24	Haleakalā Highway Closure	$6,363,636
25	Realign Hāna Highway (grade and pave)	$19,365,289
26	GA T-Hangars – East Ramp	$16,726,911
27	Land to be acquired	$24,499,200
28	East Ramp Access Road	$11,520,000
29	East Ramp Access Road Tunnel	$21,600,000
30	RAC Overflow Parking (19 acres)	$9,120,000
31	Kalialinui Bridge at RAC	$19,200,000
32	Industrial Aviation Lots East Ramp 20 acres	$1,536,000
33	Employee Parking (5 acres)	$14,400,000
34	Demolish Existing GSE & Cargo	$960,000
35	Cell Phone Parking Lot	$4,800,000
36	East Ramp Temporary Relocation of Services	$8,795,520
TOTAL (rounded)		**$2,964,707,492**

Source: R. M. Towill Corporation

Notes: Total includes design fees, indirect construction costs, inspection and contingency. Fee does not include contractors' markup and taxes and required utilities. Further, costs do not include Runway 2-20 required relocation and navaids

Table 6-2 Cost Estimate (subject to change)

CHAPTER 7
IMPLEMENTATION PLAN & ECONOMIC IMPLICATIONS

7.1 OVERVIEW

This chapter presents the recommended development phasing and estimated development costs to implement the recommended OGG MP. The development phasing plan is divided into a three (3) phase capital improvement program: Phase 1 (2015-2021), Phase 2 (2022-2027), and Phase 3 (Beyond 2035). Actual development of these facilities within each phase may vary due to funding limitations and/or changes in administrative priorities and policies. In addition, land use entitlement and environmental permitting requirements will need to be addressed before a specific project can proceed.

This chapter also describes the economic and financial implications of the recommended OGG MP. The historical financing of major capital improvement programs at the airport and the major documents that provide the framework for the financial operations of the State airport system are discussed. Base year cost estimates for the three (3) phase capital improvement program recommended for the airport are summarized, and the economic and financial implications of implementation are discussed in this chapter.

7.1.1 METHODOLOGY

Cost estimates are based on the State's experience with actual construction projects

completed or in progress at the OGG and other airports in the State that are also used. It is important to note that these figures are intended only as order-of-magnitude cost estimates and are for planning purposes only. These figures should be refined during design phases when specific quantities and unit costs that can be more accurately determined. The land acquisition costs are based on the tax assessed land values for residential, industrial, and agriculturally zoned areas surrounding the OGG. Where possible, the land values agreed upon in recent negotiations between the State and surrounding property owners have been used.

7.1.2 CURRENTLY PLANNED IMPROVEMENTS

As discussed in **Chapter 1**, the State has already planned and budgeted for certain improvements to be made at the OGG through Act 158, SLH 2008. Monies have been provided for both the new airport access road and the CONRAC facilities. Construction of the new airport access road and CONRAC is in progress.

7.2 DEVELOPMENT PHASING AND MASTER PLAN COST ESTIMATES

The recommended projects in **Chapter 6** are proposed for implementation in three (3) phases, allowing costs to be spread over a number of years and ensure a smooth transition to the new facilities. **Figure 7-1** on Page 7-3 identifies and shows the location of the recommended projects in each of the three (3) development phases. The projects listed in Phase 3 are outside of the planning time horizon and indicate "nice to have, but not essential in the project time horizon." **Table 7-1** summarizes the anticipated costs of the recommended capital improvement program; and cost breakdowns for each project. **Sections 7.2.1 through 7.2.3** identify the projects and total costs for each phase. The dollar amount is based on 2015 values.

7.2.1 PHASE 1 (2015-2021)	7.2.2 PHASE 2 (2022-2030)	7.2.3 PHASE 3 (Beyond 2035)
Estimated Project Cost: $403,427,000	**Estimated Project Cost: $136,526,068**	**Estimated Project Costs: $2,424,754,000**
• Runway 2-20 Extension plus taxiway upgrades and navigational aids	• North – Terminal Expansion	• Runway 2-20 Parallel Runway & Taxiway
• Taxiway "A" Extension	• Taxiway Realignment ("B", "F" & "G"	• East Ramp Access Road
• Temporary Runway 2-20, plus navaids	• Cell Phone/Employee Parking	• Helicopter Facilities
• Runway 2-20 Reconstruction	• Keolani Lease Lots	• Land Acquisition (for Runway 2-20 Parallel)
• Taxiway "M" Improvements	• Close Haleakalā Highway	• Cargo Expansion – East Ramp
• South Ramp Aviation Lease Lots	• Terminal Holdrooms – South	• Re-Align Hāna Highway
• Land Use Entitlements (State & County)		• Transient Aircraft Parking
• Relocate Terminal Art Work		• West of Runway 5-23
• East Ramp Relocation and Restoration		• Hāna Highway Realignment
		• Terminal Expansion – South
		• Keolani Bridge (over Kalialinui Canal)
Note: Colors correspond to Figure 7-1 Projects by Development Phase		

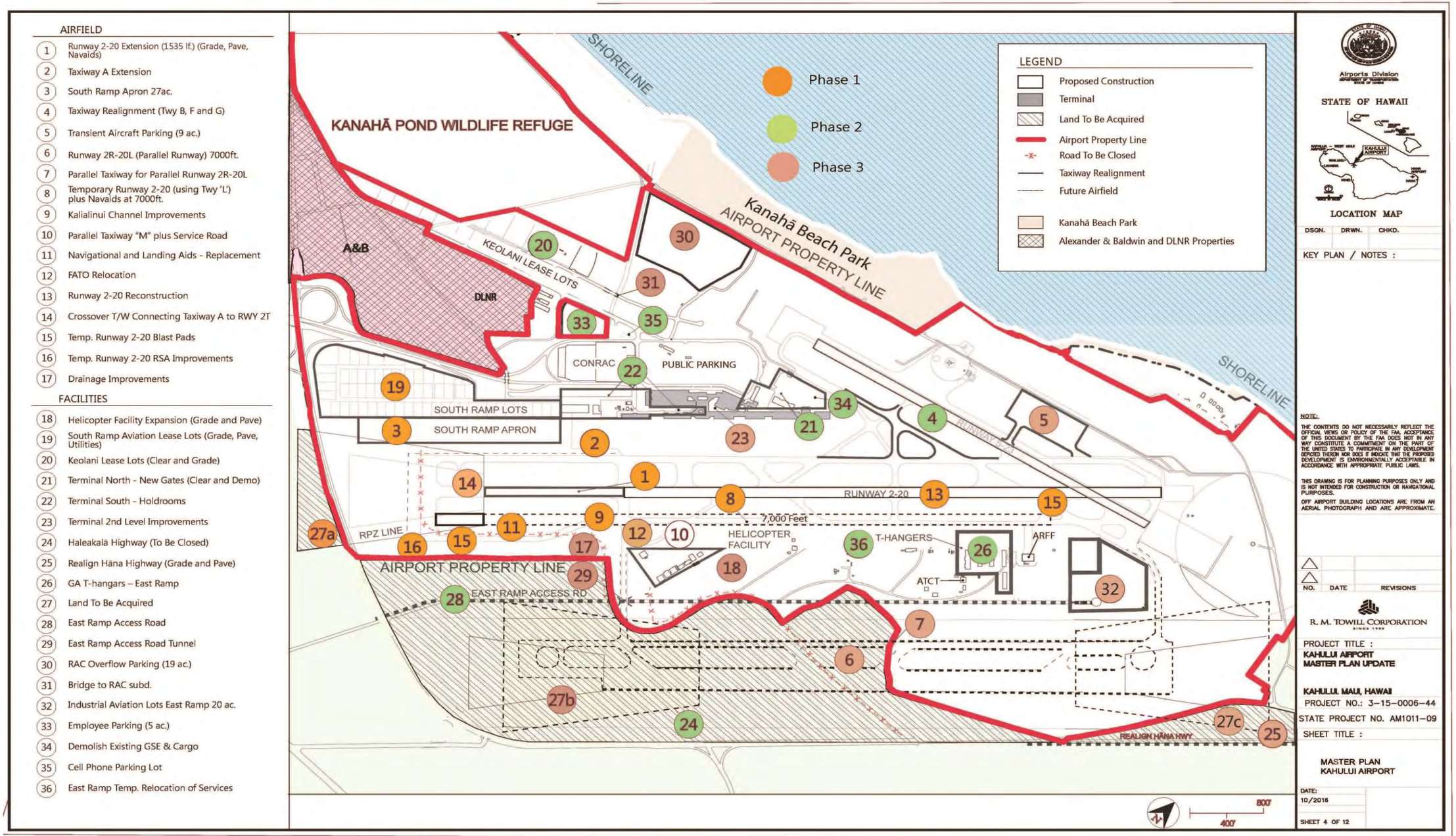

Figure 7-1` Project Phasing Plan

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		PHASE 1	PHASE 2	PHASE 3
		2015-2021	2022-2030	2035 +
Airfield				
1	Runway 2-20 - Extension 1535 lf. (grade, pave, exclude utilities/navaids)	$96,000,000		
2	Taxiway A Extension (excludes utilities and navaids)	$12,121,212		
3	South Ramp Apron 27 ac.	$5,184,000		
4	Taxiway Realignment (Twy B, F and G)			$3,008,264
5	Transient Aircraft Parking 9 ac,			$4,320,000
6	Runway 2R-20L (Parallel Runway) 7000 ft.			$768,000,000
7	Parallel Taxiway for Runway 2R-20L			$703,680,000
8	Temporary Runway 2-20T	$74,513,280		
9	Kalialinui Channel Improvements	$25,564,738		
10	Taxiway `M` Expansion and Upgrade	$37,152,000		
11	Navigational and Landing Aids - Replacement	TBD by FAA		
12	FATO Relocation	$960,000		
13	Runway 2-20 Reconstruction	$104,355,840		
14	Connecting Taxiways Between 2-20 and 2R-20L.			$19,200,000
15	Temp Runway 2-20 Blast Pads	$5,760,000		
16	Temp Runway 2-20 RSA Improvements	$3,840,000		
17	Drainage Improvement			$9,600,000
Terminal				
18	Helicopter Facility Expansion	$5,000,000		
19	South Ramp Aviation Lease Lots (grade, pave, utilities)	$32,976,000		
20	Keolani Lease Lots (Clear and Grade)		$17,760,000	
21	Terminal North - New Gates (clean and demo)		$7,200,000	
22	Terminal South - Holdrooms		$48,000,000	$48,000,000
23	Terminal South - 2nd Level Improvements			$773,625,600
24	Haleakalā Highway Closure		$6,363,636	
25	Realign Hāna Highway (Grade and Pave)			$19,365,289
26	GA T-Hangars – East Ramp		$16,726,911	
27	Land to be acquired			$24,499,200
28	East Ramp Access Road		$11,520,000	
29	East Ramp Access Road Tunnel			$21,600,000
30	RAC Overflow Parking (19 ac.)			$9,120,000
31	Kalialinui Bridge at RAC			$19,200,000
32	Industrial Aviation Lots East Ramp 20 acs.			$1,536,000
33	Employee Parking (5 ac.)		$14,400,000	
34	Demolish Existing GSE, Cargo		$960,000	
35	Cell Phone Parking Lot		$4,800,000	
36	East Ramp Temporary Relocation of Services		$8,795,520	
	TOTAL	**$403,427,070**	**$136,526,068**	**$2,424,754,353**

Table 7-1. Project Cost Estimate (subject to change)

7.3 AIRPORT FINANCING

7.3.1 BACKGROUND

The Statewide airport system is unique in that it is administered as a single, financially self-sustaining entity encompassing 15 airports. The DOTA is responsible for administering the system. No State general fund monies are used to support the operation of the airport system. Instead, user fees provide the primary source of revenue. Continuing operation of the system requires substantial, recurring capital expenditures. The primary sources of funds for capital improvements to the airport system include the following:

- Airport system revenue bonds
- Federal grants-in-aid
- User fees
- Passenger Facility Charges (PFC)
- Customer Facility Charges (CFC)

Historically, the State's long-term lease agreements with the airlines and other airport tenants has ensured a stable revenue flow which has allowed the DOTA to finance airport improvement projects at the airports and the key documents that provide the framework for the financial operation of the airport system.

7.3.2 AIRPORT SYSTEM REVENUE BONDS

The State issues airport system revenue bonds to finance capital improvements to the airport system under the provision of (1) the general bonding law for the issuance of revenue bonds by the State, and (2) the Certificate of the Director of Transportation providing for the issuance of State of Hawai'i airport system revenue bonds. All bonds must be authorized by a majority vote of the members of each house of the Legislature.

These revenue bonds are payable from and collateralized solely by the revenues generated by the State airport system, including all aviation fuel taxes levied. The Certificate established the following priority list for the use of these revenues as follows:

- Pay interest and principal on all bonds
- Payer provides for the payment of the costs of operation, maintenance and repair of the airport system properties
- Fund the major maintenance, renewal and replacement account
- Reimburse the General Fund of the State of Hawai'i for general obligation bonds used to fund projects intended to directly serve or benefit the airport system
- Provide for improvements to the airport system
- Provide special reserve funds and other special funds required by law
- Provide for any other purpose connected with or pertaining to the bonds or the airport system authorized by law

7.3.3 FEDERAL AVIATION AGENCY GRANTS-IN-AID

7.3.3.1 OVERVIEW OF THE FEDERAL PROGRAM

In 1970, Public Law 91-258 was enacted. This law was composed of Title 1, known as The Airport and Airway Development Act of 1970, and Title II, known as the Airport and Airway Revenue Act of 1970. These two (2) acts were passed to assist in meeting the modernization needs of the airways system. The Airport and Airway Development Act details the airport assistance programs and established the Airport and Airway Trust Fund and a financing program for airport grants. The Airport and Airway Revenue Act authorized aviation fuel, international departure, and waybill taxes required to furnish the financial resources with which to carry out the Title I programs. The Trust Fund provided revenues to the Airport Improvement Programs (AIP). Administered by the FAA, this freed airport and airway development from having to compete for General Treasury Funds.

The State airport system annually receives funds from the AIP. The apportionment of these funds is based on the following:

- Entitlements for the airports (based on the FAA's enplaned passenger formula)
- Cargo entitlements for several airports in the airport system
- "Statewide allocations" intended primarily for GA airport projects

The State collects these funds from airport users for eligible airport related projects. The State is also eligible to receive discretionary AIP funds.

The DOTA is contemplating certain projects for funding through the AIP listed in **Table 7-1** on Page 7-5. Projects that are under consideration for funding in the AIP are listed below.

- Runway 2-20 Extension
- Parallel Runway 2R-20L
- Taxiway Upgrade (Temporary Runway)

Further assessment of these projects before listing on the AIP may be required. This may include assessments such as a cost-benefit analysis.

7.3.3.2 PROJECT ELIGIBILITY AT OGG

The NPIAS is a nationwide plan published every two (2) years by the FAA, pursuant to Section 504 of the Airport and Airway Improvement Act of 1982. Classification and listing of an airport in the NPIAS makes it eligible to receive financial assistance for airport planning and development under the Airport and Airway Improvement Act of 1982. The OGG has been classified as a "Medium Hub-Primary Airport" in the NPIAS. Airports with this designation experience more than 10,000 enplaned passengers annually and are apportioned an entitlement grant based on the number of annually enplaned passengers, with a minimum entitlement of $300,000.

In addition to the entitlement grant, the airport is eligible to compete for discretionary funds.

7.3.4 USER FEES

User fees are received from airlines and other users conducting business at the airport. These businesses include services to the airlines and air cargo operators, and airline passengers. Examples of revenue generated from these forms of user fees include the following:

- Aircraft landing and takeoff fees
- Terminal space rentals to:
  - Airlines
  - Concessionaires
  - Retail businesses

7.3.5 PASSENGER FACILITY CHARGES

The Aviation Safety and Capacity Expansion Act of 1990, authorizes the Secretary of Transportation to approve a locally-imposed PFC of up to $4.50 per enplaned passenger. The proceeds from PFCs are to be used to finance eligible airport-related projects that preserve or enhance capacity, safety, or security; reduce noise or mitigate noise impacts resulting from an airport; or furnish opportunities for enhanced airline competition. PFCs may also be used to pay debt service related to the financing of eligible projects including debt service of bonds used for PFC-eligible projects at the airport.

7.3.6 CUSTOMER FACILITY CHARGES

Customer facility charges are fees paid by customers for services at the airport. Some examples of charges that are included in service fees are in the handing of airline baggage, and the rental of cars.

7.3.7 AIRLINE LEASE AGREEMENTS

Section 261-5, HRS, requires that "the Department [of Transportation]... generate sufficient revenues from its airport properties to meet all of the expenditures of the Statewide system of airports..." This mandates that the airport system operate on a self-sufficient basis, and is the principle underlying the fees that have been negotiated with airlines for use of the

airports in the State system. These are referred to as "Airline Agreements."

The DOTA has entered into Airport Airline Lease Agreements (Agreements) with 25 major air carriers. These Agreements, which remain in effect through amendments, provide the signatory airlines with the non-exclusive right to use the airport system facilities, equipment, improvements, and services, in addition to occupying certain premises and facilities.

The signatory airlines pay an "Airport Use Charge" based on a computed rate per 1,000-pound unit of approved maximum landing weight for each aircraft used in revenue landings. The rate is calculated by dividing the excess of estimated airport expenses over estimated airport revenues (both defined in the agreements) by the estimated approved maximum landing weight for all the Signatory Airlines for the fiscal year.

Allowable airport expenses to be used in calculating the Airport Use Charge include the following:

- Maintenance and operating expenses at the airports
- Administrative expenses relating to the operation of the airport system
- Bond debt service and coverage for all revenue bonds applicable to the airport system, including any reserves required [coverage is defined to be 0.35 times the principal and interest due on all airport revenue bonds issued subsequent to January 1, 1969]
- Write-offs in lieu of depreciation
- Any payments necessary to bring the balance of the Major Maintenance, Renewal, and Replacement Fund up to $6 mil.
- Central service charges required by Section 36-28.5, HRS
- Incurred or projected deficits at the other airports in the airport system

Airport revenues identified for the purpose of computing the Airport Use Charge consist of all rents, fees, interest income, aviation fuel taxes (less any credit or rebates), and other charges received during the fiscal year, excluding the following:

- Airport Use Charges paid by the Signatory Airlines
- Federal AIP grants or similar payments from public agencies that are restricted to a specific purpose or are reimbursements for prior expenditures or transfers
- Net rental (special facility) lease payments
- Interest income on monies received as AIP grants and certain unexpended bond proceeds to the extent that such interest income is applied to construction

7.4 ECONOMIC AND FINANCIAL IMPLICATIONS

To carry out Phase 1 of the recommended OGG MP, estimated to be $403 mil., together with other planned airport system capital improvement program projects, the State will likely have to: (1) incur new revenue bond debt; (2) dedicate the use of all of its coverage funds to pay for the cost of such capital projects; and/or (3) substantially increase building space rentals and Airport Use Charges to be paid by the Signatory Airlines serving the OGG. Therefore, the State needs to carefully consider the economic and financial implications of each individual project before proceeding.

7.4.1 ECONOMIC IMPLICATIONS

The economic aspects of a proposed project are usually considered in terms of costs and benefits. The potential financial costs associated with the recommended OGG MP and other capital improvement program projects have been documented herein. Most of the benefits derived from such projects, however, are subjective, and not readily quantified in dollar terms. Such benefits include the following:

- Benefits to Maui County residents visitors, and agricultural interests via employment opportunities and taxes paid
- Significantly greater ability to accommodate air cargo, with potential economic benefits to Maui Island producers and shippers
- Securing the land needed for long-range airport development and protection, including the land for a future parallel runway
- The availability of a longer runway that can accommodate increased aircraft stage lengths, particularly for non-stop passenger and all-cargo aircraft flights to the West Coast and Midwest
- More efficient, comfortable, and convenient passenger terminal operations
- Improved vehicular access, circulation, and parking operations
- Improved and expanded facilities for general aviation and commercial aviation activities
- The runway extension and new parallel runway would increase the load factor at OGG by removing existing penalties caused by limited runway length. The increased load factor would result in the generation of additional funds, which would increase revenue for OGG. (See **Table 4-1** and **Section 4.3.6.8** for the economic effect on OGG operations and how increased seat capacity will enhance the generation of revenue)

The consideration for costs and benefits of a given project depends on the perception of need for the project by the primary users, the traveling public, the airlines, and other airport users. The feasibility of any major program of capital improvements at an airport depends, in part, on the following:

- Establishing and maintaining a viable mechanism for financing the projects
- Negotiating a reasonable basis for adjusting tenant and user rentals, fees, and charges so that sufficient revenues will be available to pay operating expenses and service outstanding debt
- Demonstrating the need for the projects and obtaining the concurrence of the primary users (the airlines) as to that need
- Establishing tenant and user rates and charges that are "reasonable" in relation to the traffic market being served, and the revenues being generated, by those tenants and users

The DOTA has, over the years, consistently pursued a thorough and vigorous planning program for the airport system. The airlines have been involved in, and have made significant contributions to this planning. Future discussions will be particularly important in establishing a consensus as to the most appropriate timing of the specific projects included in this Master Plan Update.

7.4.2 FINANCIAL IMPLICATIONS

In any major program of airport capital improvements, it is important to consider the potential effect of the program on the future financial operations of the airport system, in particular, its effect on future user fees and charges. The existing mechanism for financing airport capital improvements are from airport system revenue bonds issued pursuant to the airport's Certificate and are secured, in part, by the Agreements. The use of these instruments have been successful and should serve the needs of the State in the future. The funding of 35% debt service coverage through Airport Use Charges and other airport system revenues provides the State with a substantial pay-as-you-go financing capability. This capability should be preserved in the future.

7.4.3 SUMMARY

As part of this MP Update, Martin Associates developed a baseline economic analysis of the OGG operations in 2010. The purpose of the study was to quantify the economic impacts

generated by passenger, freight, and GA activity at the OGG for the most recent year complete operational data was available, or 2010. In order to measure the impacts in the most defensible manner possible, the methodology utilized was based on interviews, local economic data, and airport statistics.

The impacts were quantified in terms of:

- Jobs
- Employee earnings
- Business revenue
- State and local taxes and Federal airport-specific taxes

The impacts were estimated for total OGG activity for calendar year 2010. In addition to the baseline impacts, an economic impact model was developed to estimate the impacts associated with capital construction and expansion projects identified in the recommended OGG MP. The model can be used for annual updates of the impacts as well as to test the sensitivity of impacts to changes in:

- Passenger levels
- Domestic versus international passengers
- Passenger trip purpose
- Peak hour flight levels and mix of aircraft
- Labor productivity and work rules
- Freight levels

This methodology was used by Martin Associates to estimate the economic impacts generated by airport activity. This methodology has been consistently applied in the analysis of other airports that have included:

- Hartsfield Atlanta International Airport (ATL)
- Miami International Airport (MIA)
- Denver's Stapleton International Airport (DEN)
- San Francisco International Airport (SFO)
- Portland International Airport (PDX)
- Minneapolis/St. Paul International Airport (MSP)
- Milwaukee's General Mitchell International Airport (MKE)
- Seattle-Tacoma International Airport (SEA)
- Toronto's Lester B. Pearson International Airport (YYZ)
- Washington Dulles International and Reagan National Airports (IAD)
- San Jose International Airport (STJ)
- Sacramento International Airport (SMF)
- Oakland International Airport (OAK)
- Bellingham, Washington International Airport (BDI)
- Harrisburg International Airport (MDT)

GA and Commuter Airports in:

- Harrisburg, Pennsylvania
- Lancaster, Pennsylvania
- Carlisle, Pennsylvania
- Milwaukee, Wisconsin
- San Jose, California
- Hillsboro, Oregon
- Troutdale, Oregon
- Mulino, Oregon
- 34 GA Airports in the State of Maryland

7.4.4 IMPACTS CREATED BY AIRPORT ACTIVITY IN 2011

In 2011, passenger and air freight activity at the OGG had the following impacts:

- Generated 2,682 direct, induced, and indirect jobs for residents of Maui and the state of Hawai'i. Of the 2,682 jobs, 1,824 were direct jobs, while 635 jobs were induced throughout the region to support the purchase of goods and services by the 1,824 directly dependent employees. An additional 222 indirect jobs were generated in the local economy due to $34.5 mil.

of local purchases by firms directly dependent on the airport.

- Generated $132.3 mil. of direct, induced and indirect personal income and consumption expenditures in Maui as a result of airport activity.
- Generated nearly $1.1 billion of business sales by airport activity, including $21.1 mil. of business revenue by air cargo activity.
- Provided $82.0 mil. to the Federal Government in airport-specific taxes from airport activity.
- Provided $12.7 mil. to State and local governments in tax revenues from airport activity.

In addition to these airport-generated impacts, it is estimated that 44,025 direct, induced, and indirect jobs were supported in the Maui visitor industry due to expenditures by the 2.1 mil. visitors to the region who arrived via the OGG. These visitors, who include both domestic as well as international travelers, spent about $2.8 billion on Maui-island hotels, restaurants, retail stores and entertainment establishments, which in turn generated jobs in the Maui visitor industry. As the result of visitors arriving via the OGG, $119.3 mil. of State and local tax revenues were generated.

With a combined economic impact of nearly 47,000 direct, induced, and indirect jobs, it is critical to maintain and invest in the airport infrastructure in order to sustain and grow the Maui economy.

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Chapter 8
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Appendix

A. Passenger and Operations Activity level Projections, October 23, 2011
B. The Economic Impacts of Kahului Airport, 2010
C. Description of Temporary Runway, Technical Paper No. 1 (June 2014)

APPENDIX

A. Passenger and Operations Activity level Projections, October 23, 2011

B. The Economic Impacts of Kahului Airport, 2010

C. Description of Temporary Runway, Technical Paper No. 1 (June 2014)

APPENDIX A

PASSENGER AND OPERATIONS ACTIVITY LEVEL PROJECTIONS

OCTOBER 23, 2011

PASSENGER AND OPERATIONS ACTIVITY LEVEL PROJECTIONS

KAHULUI AIRPORT

Prepared for:

State of Hawai‘i

Department of Transportation

Airports Division

October 23, 2011

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The purpose of this report is to provide an historical overview of the demographic and economic conditions that form the basis of Kahului Airport's activity forecasts. Section 1 of the report describes the economic and demographic trends in Maui, while Section 2 describes the methodology used to develop the passenger air cargo and activity projections for the Kahului Airport. The projections are also presented in Section 2.

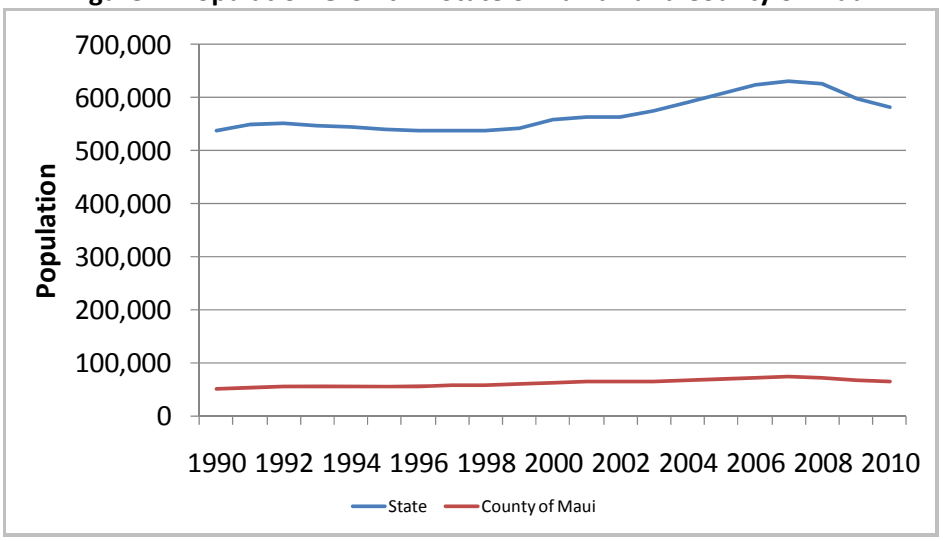
Economic and Demographic Characteristics

Historically, airport activity is driven by the underlying structure of the economy in which an airport operates, including population, economic activity, and visitor activity. Because of the importance of tourism to the State of Hawaii, and to Maui County, factors driving visitors to the State and subsequently to Maui, are critical in explaining and projecting the airport activity at Kahului Airport. Because of these relationships, the first section of the report provides an overall description of the trends in population, economic activity and visitor activity in Maui.

Population

Overall, the State of Hawaii's population has not experienced significant growth, increasing at a compounded annual growth rate (CAGR) of 0.8% over the past two decades. In comparison, the population of Maui has grown at a 1.9% CAGR, more than twice the Statewide rate. Figure I graphically presents the trends in population at the State and Maui County level.

Figure 1: Population Growth – State of Hawaii and County of Maui

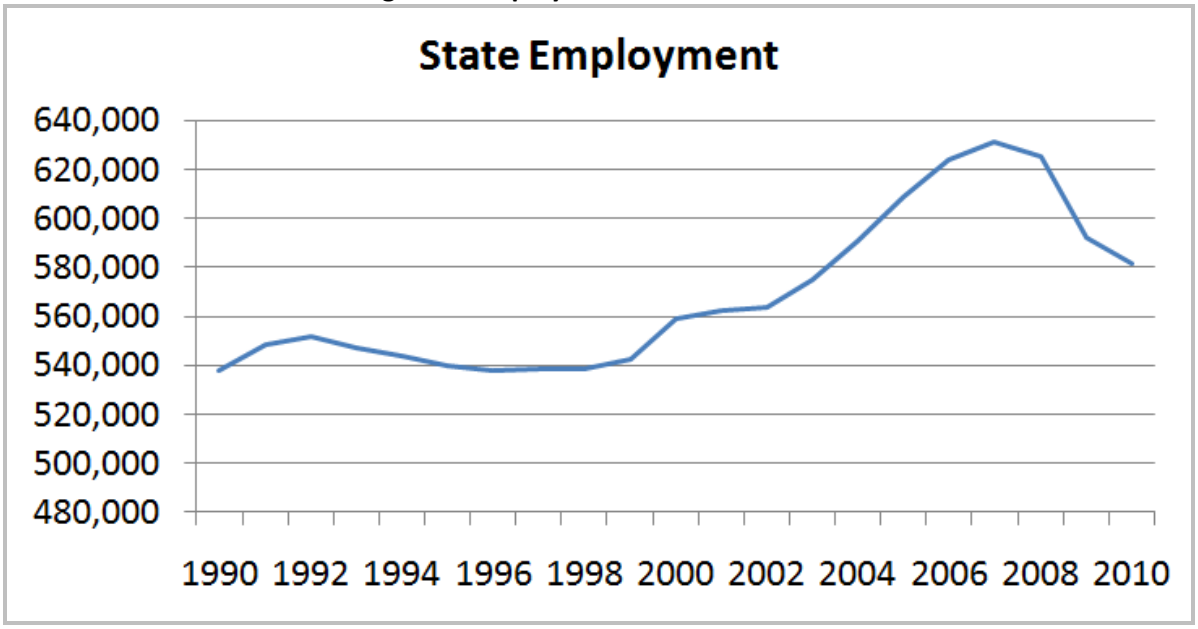


Source: Department of Business, Economic Development and Tourism (DBEDT), State of Hawaii Data Book Time Series, 2010.

Employment

Since 1990, employment throughout the State of Hawaii has experienced a negative growth rate of -0.04% CAGR. The employment levels peaked in 2007 at 631,350, but, as seen in Figure 2, the State experienced an 8% job loss through 2010, where employment reached 581,910.

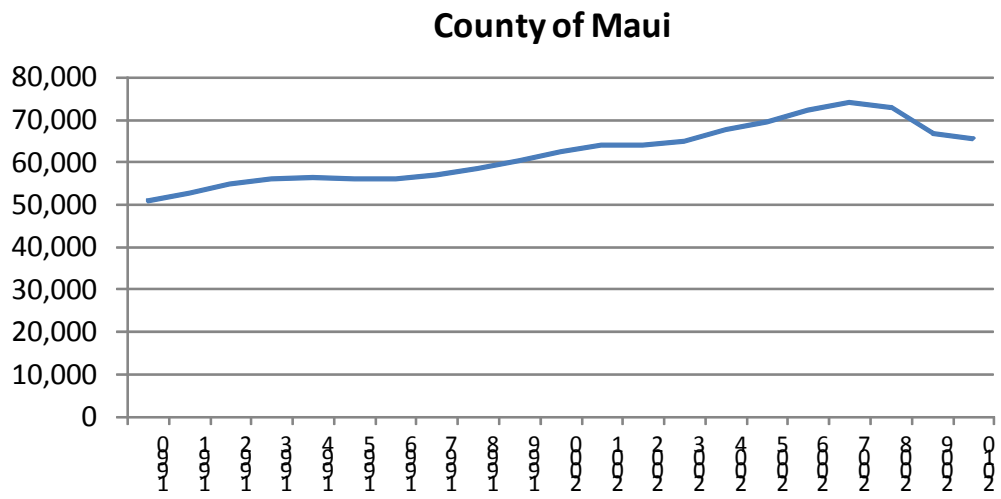
Figure 2: Employment - State of Hawaii



Source: Local Employment Dynamics. Department of Business, Economic Development and Tourism; Hawaii Tourism Association, November, 2010.

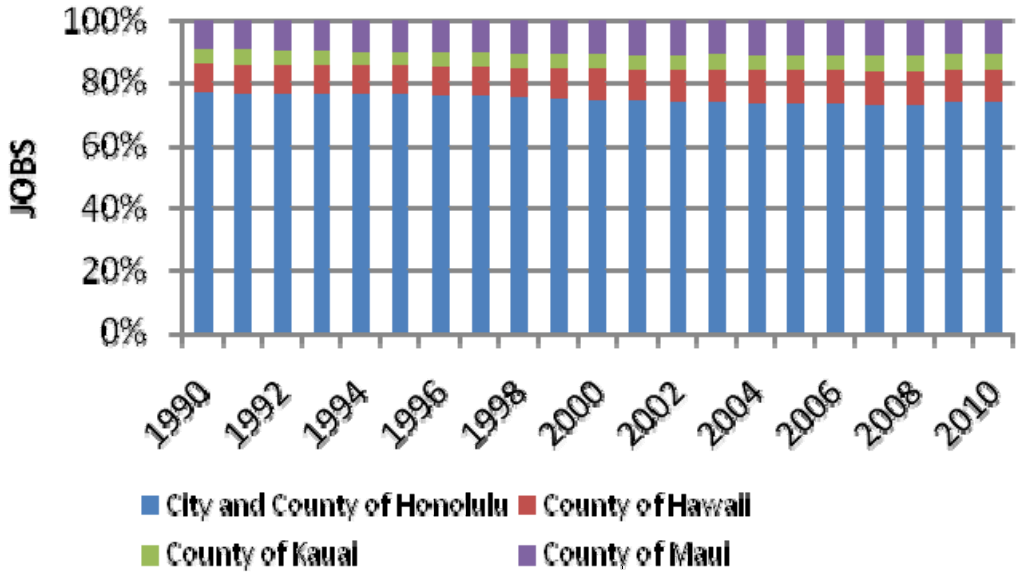
While a Statewide decline in employment is depicted, individual counties were not as severely impacted. Figure 3 shows that Maui experienced a 1.3% CAGR in employment, and has continued to increase its share of employment relative to the other counties in the State as seen in Figure 4. This was followed by the County of Hawaii, with a 1.1% growth, Kauai with 0.5% growth, and the City and County of Honolulu with the slowest growth at 0.17%.

Figure 3: Employment in Maui County



Source: Local Employment Dynamics. Department of Business, Economic Development and Tourism; Hawaii Tourism Association, November, 2010.

Figure 4: Share of Statewide Employment by County

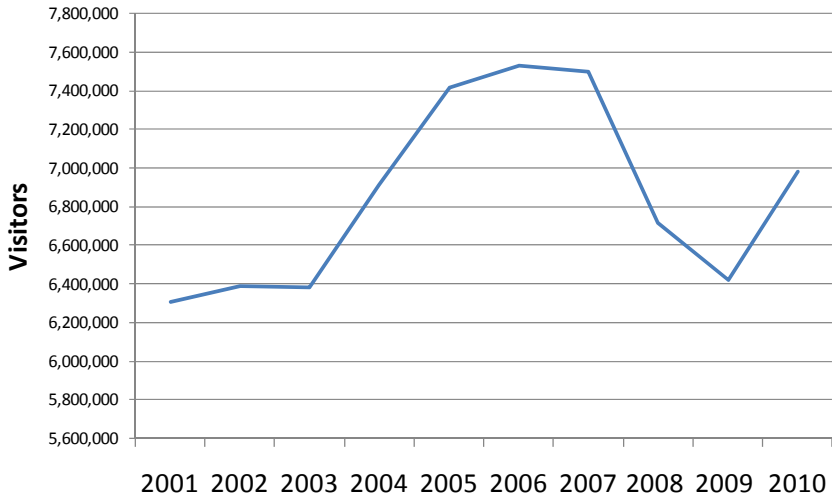


Source: Local Employment Dynamics. Department of Business, Economic Development and Tourism; Hawaii Tourism Association, November, 2010.

Visitor Trends

Total visitor arrivals by air to the State of Hawaii peaked in 2006-2007, but have been impacted by the economic recession that began in 2007. Visitor activity to the State fell by 15% between 2007-2009 and since 2005, the State has experienced a 15% decline in visitors through 2009, with a small increase in activity in 2010. Figure 5 graphically displays the visitor activity for the State of Hawaii. Individual Islands have experienced various visitor growth rates, such as Maui, with an 18% decline in visitors since 2005, as well as the Island of Hawaii, which experienced a loss of 20% over the same period.

Figure 5: Visitors to the State of Hawaii



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Of the total visitors in the State of Hawaii, the US Mainland visitors are the largest market and account for 68% of the total visitors. The majority of these visitors, 99%, arrive by air. This share of visitors is broken down in Table 1. Figure 6 illustrates that out of the various visitor origins, the three largest markets are the US Mainland, Japan and Canada. The US market has continued to grow since 2001; however, as seen in Figure 6 and 7, the share of Japanese visitors has declined since 2001. In fact in 2009, Japanese visitors to the State of Hawaii were 26% lower than in 2001. Additionally, the volume of tourists from Japan is likely to be even lower in 2011 due to the natural disasters experienced in Japan.

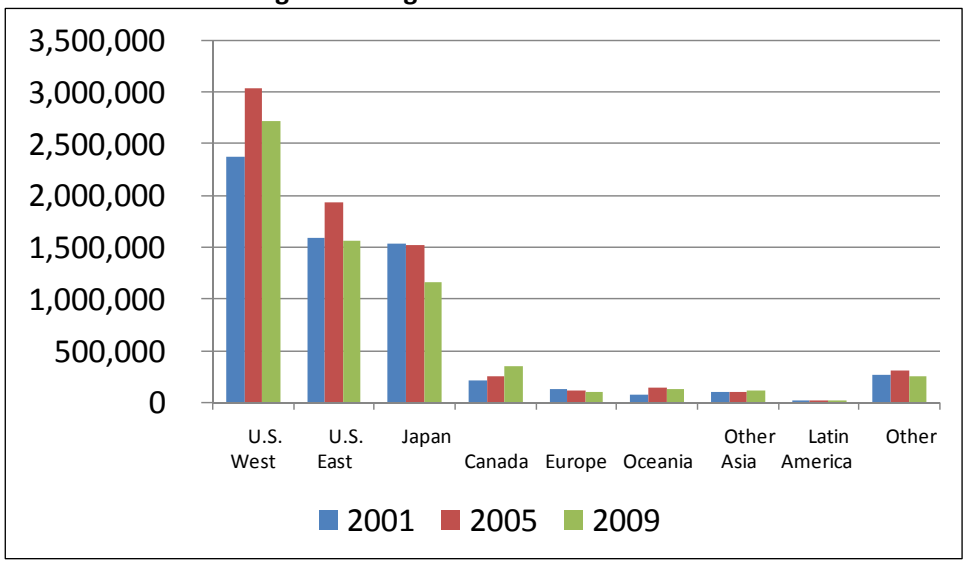
Table 1

Share of Visitors by Origin

	US	Japan	Canada	Europe	Oceania	Other Asia	Latin America	Other
2001	**63%**	**24%**	**3%**	**2%**	**1%**	**2%**	**0.2%**	**4%**
2005	**67%**	**20%**	**3%**	**2%**	**2%**	**1%**	**0.2%**	**4%**
2009	**68%**	**18%**	**5%**	**2%**	**2%**	**2%**	**0.3%**	**4%**

Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Figure 6: Origins of Visitors to Hawai'i

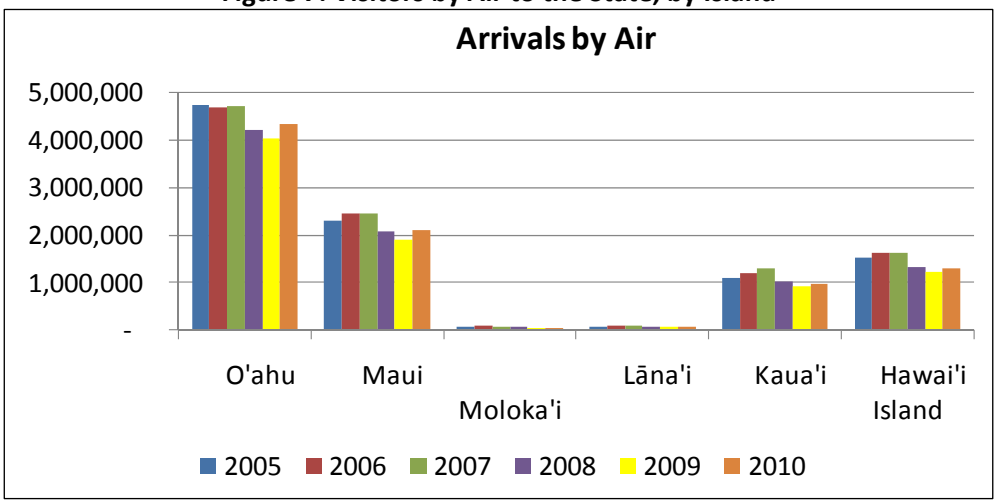


Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Maui Visitor Profile

Figure 7 shows that of the Islands in the State of Hawaii, Maui follows O'ahu as the second most visited island. For both O'ahu and Maui, visitors slightly grew in 2010, but are well below the levels of 2007.

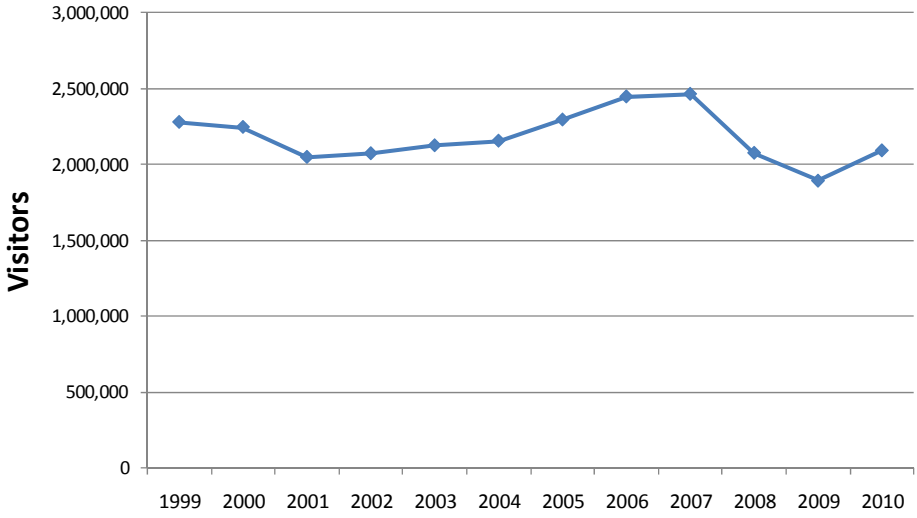
Figure 7: Visitors by Air to the State, by Island



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Figure 8 presents the overall trend in visitors to Maui, and as this exhibit demonstrates, Maui has been experiencing a decline in visitors reflecting the economic situation. However, even prior to 2007, visitors to Maui showed limited growth.

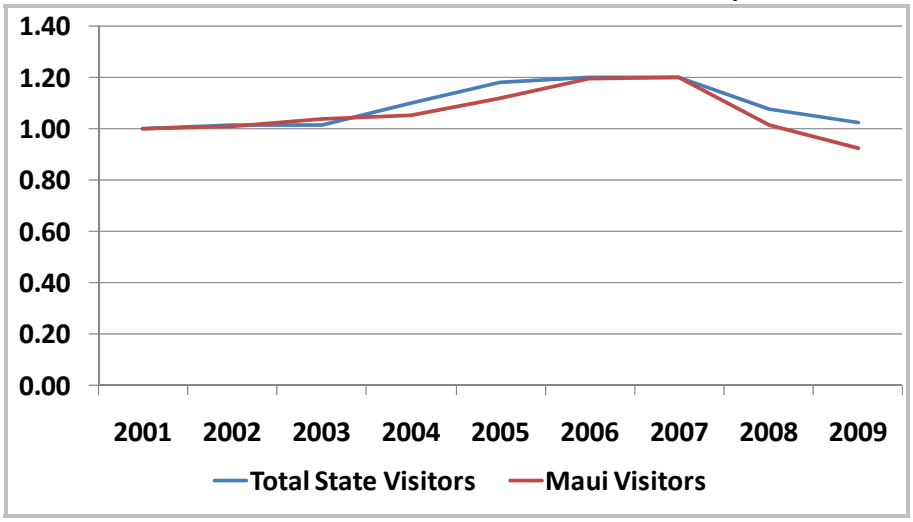
Figure 8: Visitors to Maui



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Figure 9 shows that the growth rate in visitors to Maui has historically lagged behind the growth in visitors to the State, and this decline in growth is more pronounced after 2007.

Figure 9: Indexed Growth in Visitors – State of Hawaii vs. Maui (2001 is Base Year)



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

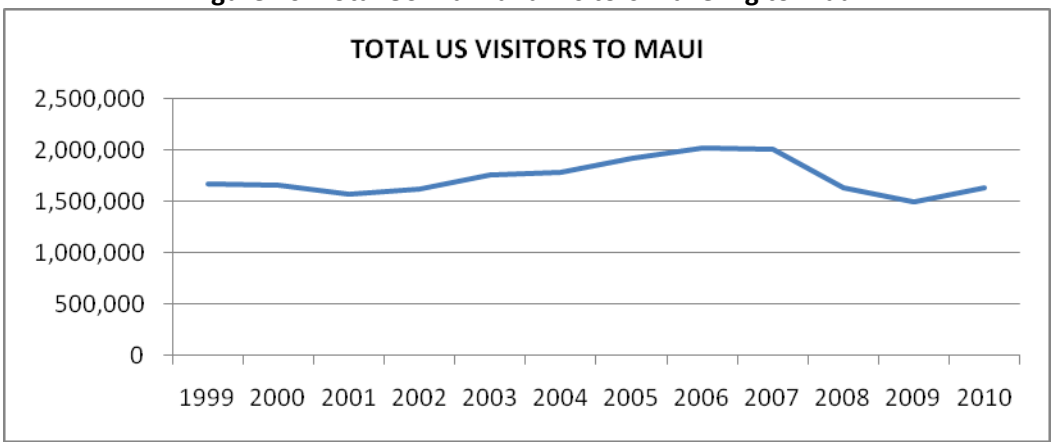
These historical trends suggest that visitor activity in Maui has lagged the growth in Statewide visitors, and this trend appears to have accelerated since 2007.

Major Market Visitor Profiles

US Visitors

US Mainland visitors have been the largest group of visitors arriving in Maui. However, as seen in Figure 10, the number of visitors has decreased since 2007 and has reached its lowest number of visitors since before 1999.

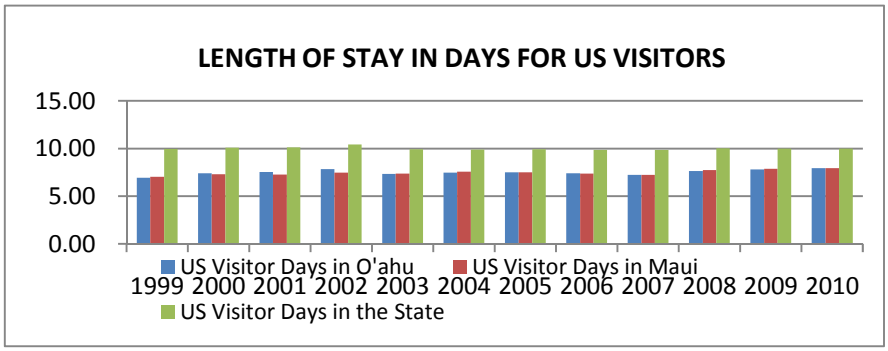
Figure 10: Total US Mainland Visitors Traveling to Maui



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

The average party size for US visitors is three or more people. Most visitors spend around 10 days in the State of Hawaii. On average, 7 days are spent in both O'ahu and Maui; however the number of days spent in Maui has experienced a slight increase. These visitor characteristics of US mainland visitors to Hawaii are shown in Figure 11.

Figure 11: Average Number of Days Spent by US Visitors



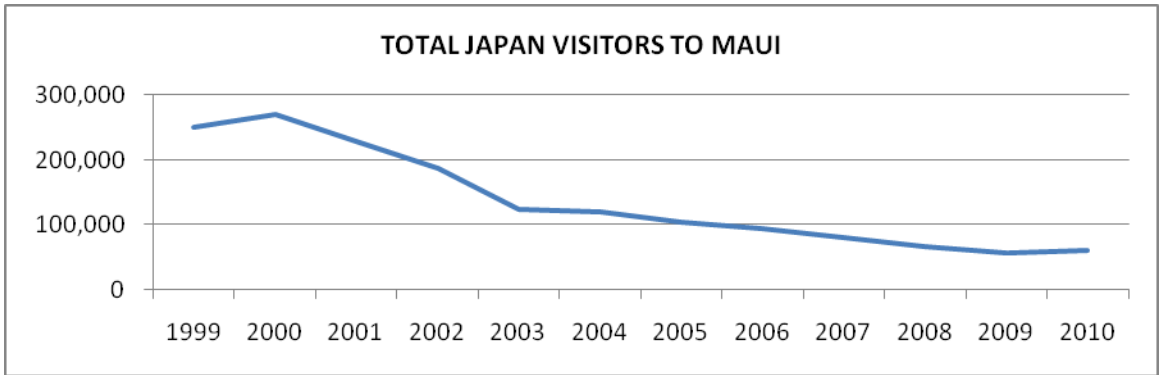
Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Japanese Visitors

The number of Japanese visitors arriving in the State has continually dropped from 1.8 million in 1999, to 1.24 million in 2010. As previously mentioned and as illustrated in Figure 12, Maui experienced a significant loss of Japanese visitors. While the average party size for these visitors has historically been three or more people, parties of two are becoming more prevalent. Of the Major Market Area visitors, the Japanese visitors stay in the State of Hawaii for the shortest amount of time. The average length of stay for these visitors is six days in the State, and they primarily remain in O'ahu for their entire stay. Only three days are normally spent in Maui, the shortest length of stay of all visitors for the Island of Maui.

Figure 12: Total Japanese Visitors to Maui

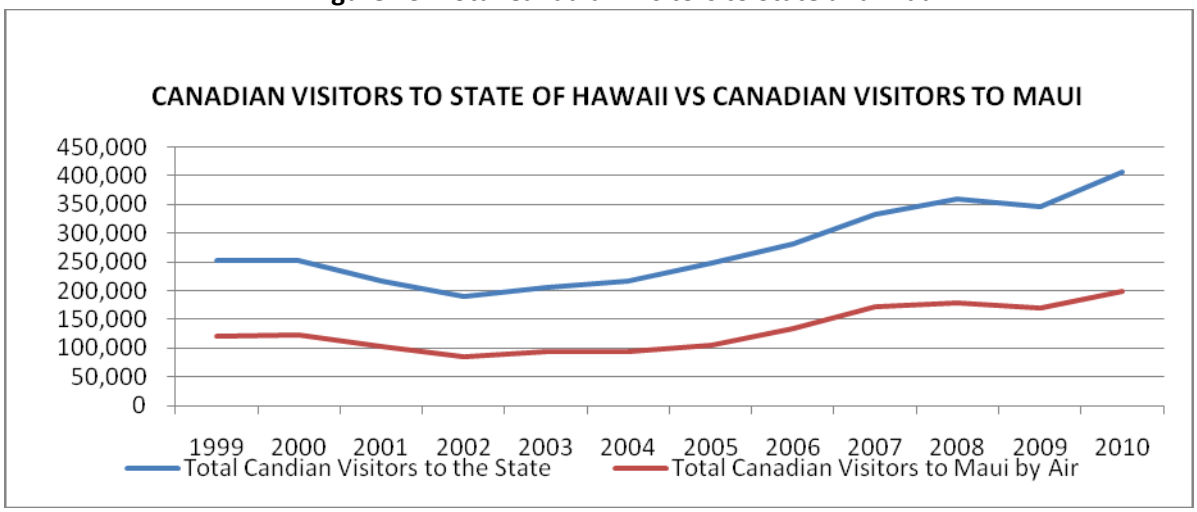
Source: Annual Visitor Research Reports 1999-2010 Table 20. DBEDT and HTA



Canadian Visitors

The number of Canadian visitors in the State of Hawaii has increased over the past 10 years; however, these visitors account for a much smaller share of the total visitors. Figure 13 shows the increase from 253,000 visitors in 2001 to 406,452 visitors in 2010. Of these visitors, around 50% travel to Maui.

Figure 13: Total Canadian Visitors to State and Maui



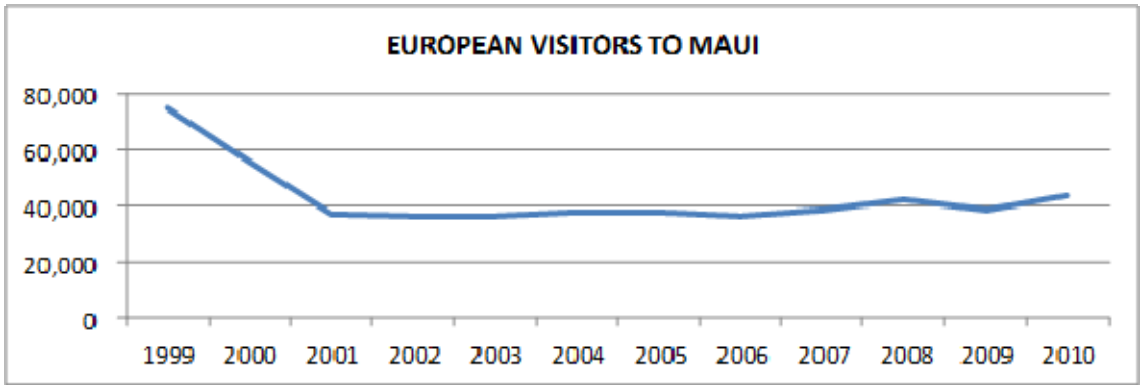
Source: Annual Visitor Research Reports 1999-2010, Table 22. DBEDT and HTA

The average party size for Canadian visitors is two people and these visitors stay in the State of Hawaii for around two weeks. This is longer than most other visitors. An average of 10 days in both O'ahu and Maui is the normal length of time for Canadian visitors. However, since 2007, there has been an increase in the amount of days spent by Canadians in Maui in comparison to O'ahu.

European Visitors

Visitor arrivals from Europe have been declining since 1999. European visitors totaled 114,568 in 2009. Europeans that visited Maui declined sharply in 1999 from 75,418 to 40,000 in 2001, reflecting the terrorist attacks on September 11, 2001, but have maintained these numbers through the past several years (Figure 14). The average party size for these visitors is two people and other party sizes are almost nonexistent. The length of stay for these visitors is similar to the Canadians. Europeans' stays average around 13 days in the State, around 10 days for Maui and nine days for O'ahu.

Figure 14: European Visitors to Maui

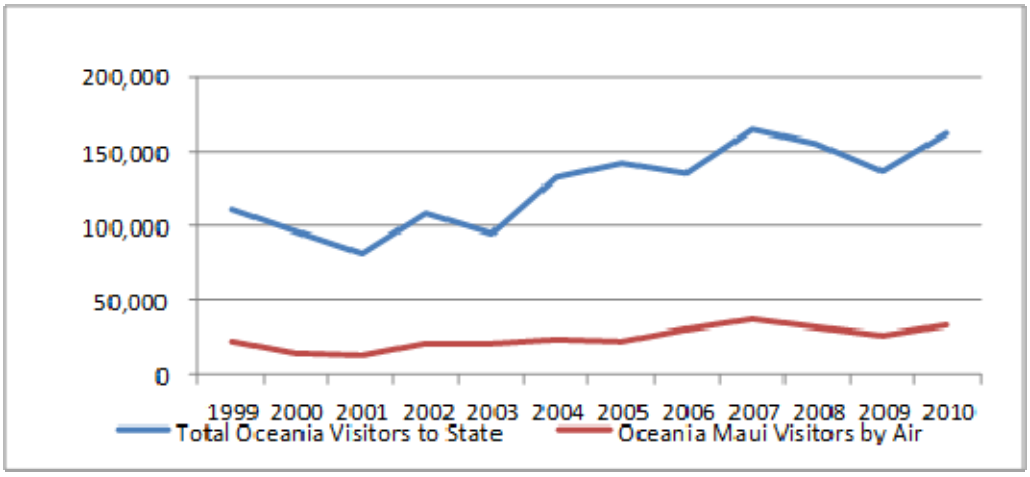


Source: Annual Visitor Research Reports 1999-2010, Table 23. DBEDT and HTA

Oceania Visitors

Visitors from Oceania, while a smaller market, have been growing since 2001. Oceania visitors peaked in 2007 for the State of Hawaii as well as the island of Maui, with 164,151 visitors and 37,591 visitors respectively. However, Maui visitors have declined to 32,675 in 2009. As seen in Figure 15, the number of Oceania visitors in 2010 still remains higher than the visitor numbers in 1999, demonstrating an overall growth in this market. The average party size is two people and the average length of stay in the State is nine days. Most Oceania visitors spend seven days on average in O'ahu and five days in Maui. The number of days spent in O'ahu has been increasing since 2001, while the number of days spent in Maui has been decreasing.

Figure 15: Oceania Visitors to State of Hawaii and Island of Maui

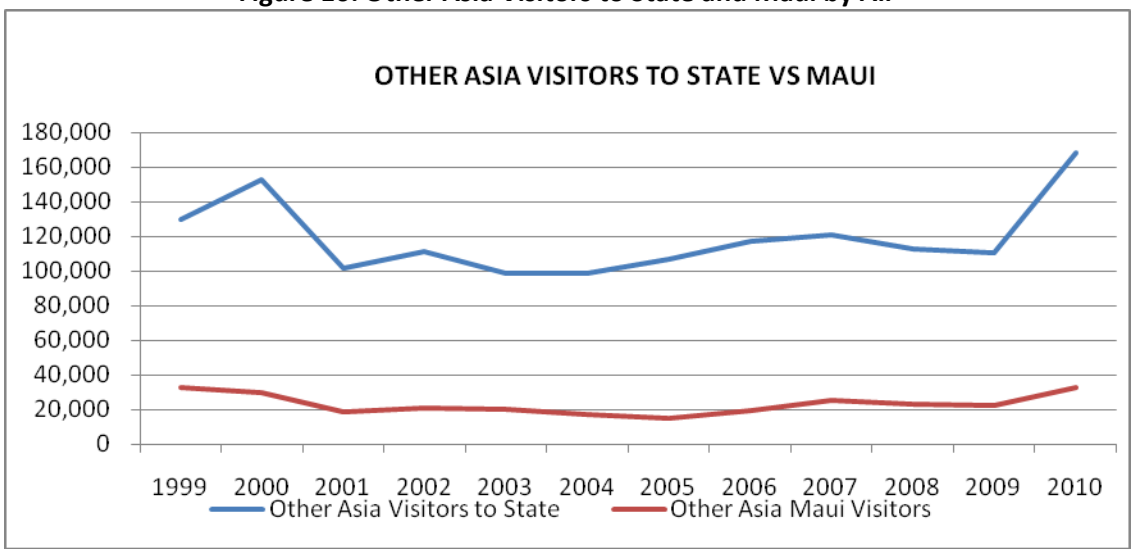


Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Other Asia Visitors

Air visitors from other Asian markets have remained at a steady number of around 110,000 as seen in Figure 16. This stable visitation is similar for Maui; however, these visitors only amount to 25,000 visitors. The average party size is three or more people, but parties of two are becoming more prevalent. In 2010, the average length of stay for these visitors in the State was around seven and a half days. This peaked at 10 days in 2007, and has been slowly growing since 2008. These visitors spend more days in O'ahu than in Maui, with seven days in O'ahu and only three and a half days in Maui.

Figure 16: Other Asia Visitors to State and Maui by Air

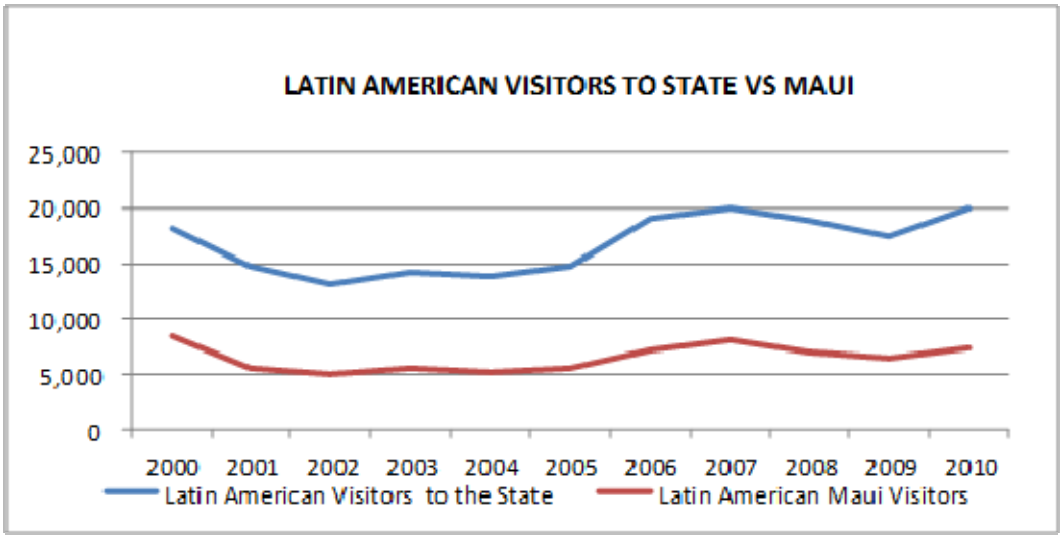


Source: Annual Visitor Research Reports 1999-2010, Table 29. DBEDT and HTA

Latin American Visitors

With only 20,000 visitors in 2010, Latin Americans are a small market for the State of Hawaii. Figure 17 shows that the number of visitors has remained around 110,000 visitors, but has reached its largest number of visitors in 2010. The total Latin American Maui visitors by air has actually reached the same number of visitors in 2010 that it experienced in 1999. The average party size for this market is two people. The average length of stay in the State has increased from around 10 days in 2000, peaked at 13 days in 2008, and dropped to 12 days in 2010. The number of days spent in O'ahu has continuously grown from seven to nine days, while the number of days that are spent in Maui has decreased from 10 to seven days between 2008 and 2009.

Figure 17: Latin American Visitors to the State and to Maui by Air

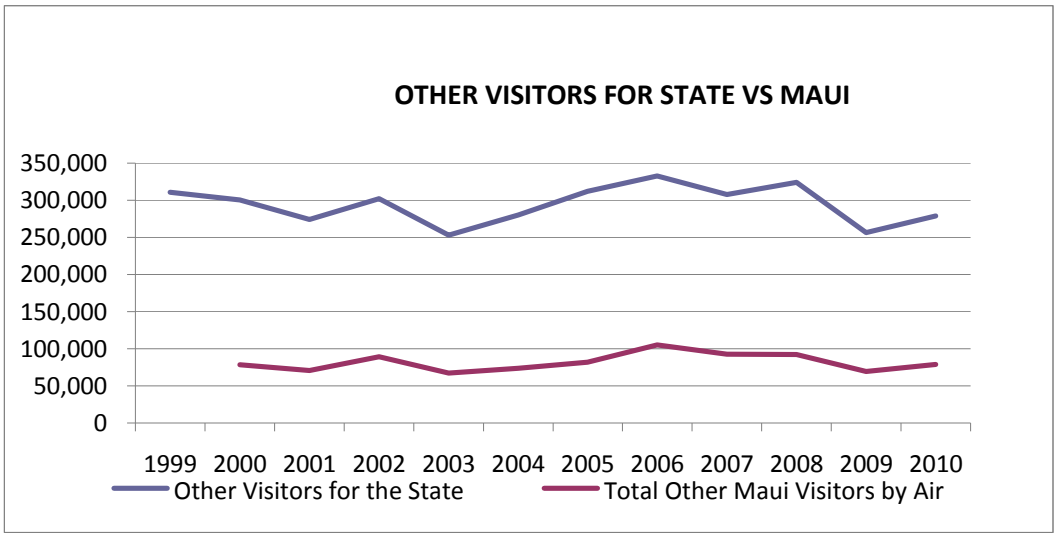


Source: Annual Visitor Research Reports 1999-2010, Table 32. DBEDT and HTA

Other Market Visitors

The number of visitors for this market has remained steady, and while experiencing a decline in 2009, the visitor numbers are on the rise as seen in Figure 18. These visitors that travelled to Maui also declined from 2006, but are also experiencing an increase in visitors. The average party sizes are either two people, or three or more people. These visitors stay for around 12 days in the State, 10 days in O'ahu, and eight days in Maui. Both O'ahu and Maui have experienced an increase of days spent by this party since 1999.

Figure 18: Other Visitors for the State of Hawaii and Maui by Air



Source: Annual Visitor Research Reports 1999-2010, Table 33. DBEDT and HTA

Implications of Visitors Demographics

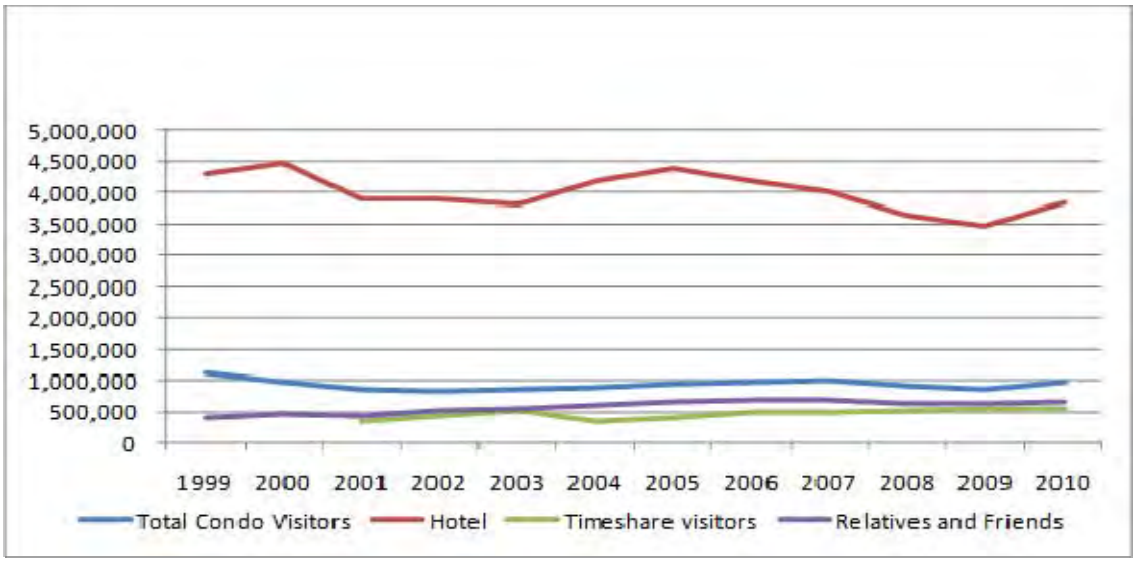
Overall, visitors to Maui have grown very little over time, and there have been significant shifts in the sources of visitors to Maui. Air visitors from the US Mainland account for about 77% of visitors to Maui, which reached a peak in 2005 when US Mainland visitors to Maui accounted for almost 85% of air visitors to Maui. Japanese visitors to Maui have fallen by 75% since 2001, and the share of visitors to Maui from Japan has fallen from 11% in 2001 to 3% in 2009. Visitors from Canada represent an increasing growth market for Maui, as the share of Canadian visitors to Maui has grown from 5% in 2001 to nearly 10% in 2010. Visitors from Oceania and Other Asia are also key growth markets, albeit relatively small in volume.

One factor that may result in the slow growth in visitors to Maui is the supply of available units for visitors. This is the subject of the following section.

Accommodations

As seen in Figure 19, hotels are the most common accommodation for visitors to the State, followed by condominiums, and the use of condominiums by visitors is a growing trend.

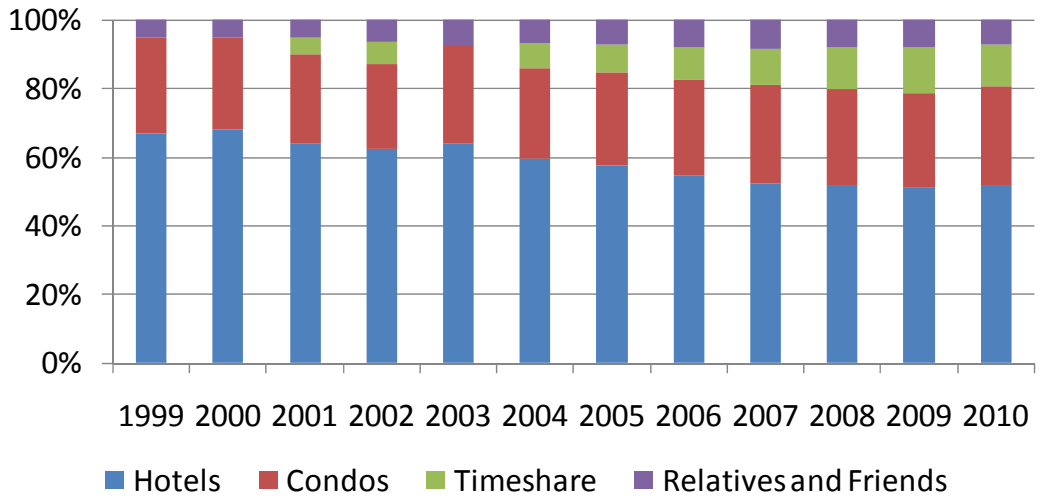
Figure 19: Distribution of Visitors Statewide by Accommodation



Source: Annual Visitor Research Reports 1999-2010, Tables 39, 40, 41, 42. DBEDT and HTA

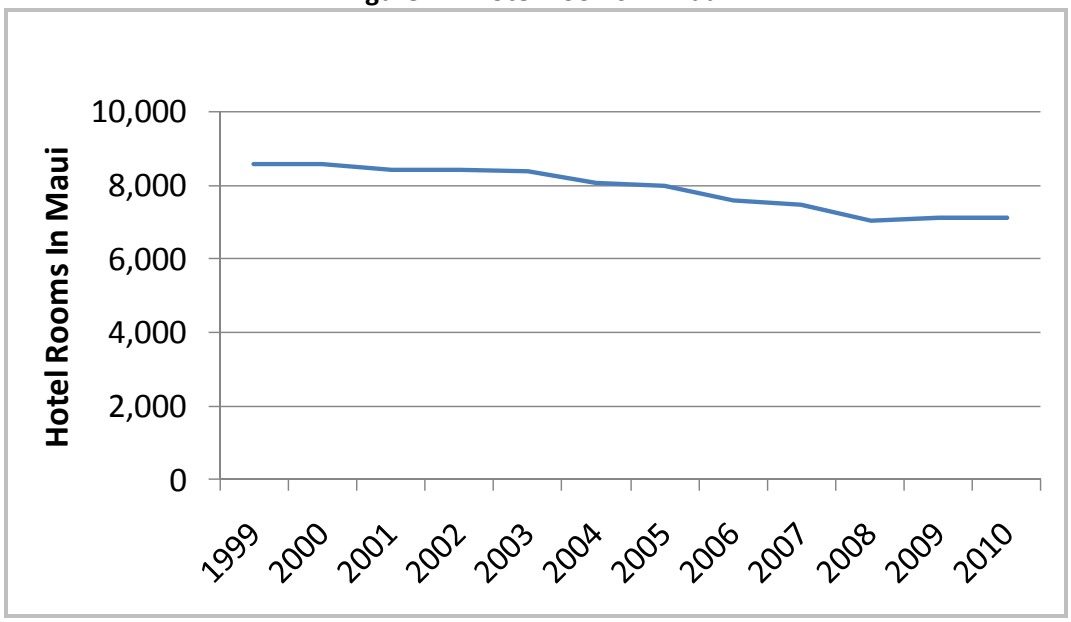
With respect to Maui, the share of visitors using hotels has also been falling, as a greater share of visitors are staying in condominiums (Figure 20). This reflects the decline in hotel rooms in Maui over time, as shown in Figure 21.

Figure 20: Share of Maui Visitors by Accommodation



Source: Annual Visitor Research Reports 1999-2010, Tables 39, 40, 41, 42. DBEDT and HTA

Figure 21: Hotel Rooms in Maui



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

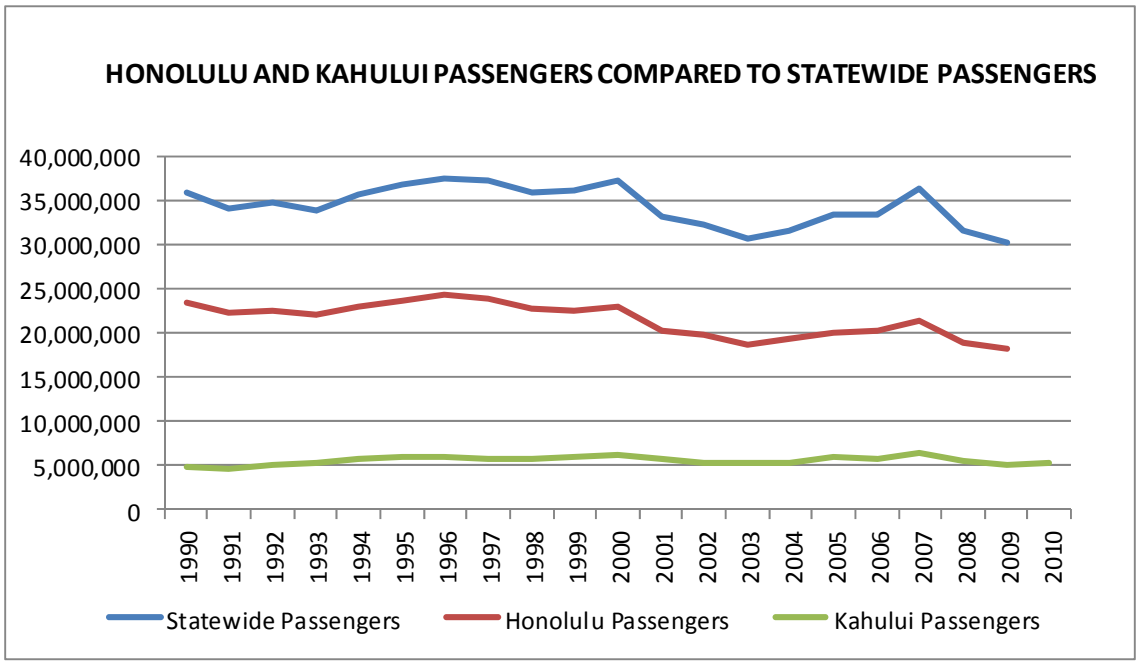
Implications

The relatively slow growth in visitors to Maui reflects the decline in hotel rooms over time, and this may likely be the result of a strict policy towards the development of additional tourism accommodations in Maui. Furthermore, the historical performance of the visitor industry in Maui will most likely have resulted in a low growth or airport activity at Kahului, and the future direction of the visitor industry and tourism in Maui will subsequently impact the future projections of airport activity levels at Kahului.

Airport Operations

There has been an overall 0.8% decline of Statewide passengers of the past 20 years. Honolulu passengers have experienced a 1.3% decline and Kahului passengers have experienced a 0.2% decline. These declines are shown in Figure 22. Despite the differences in annual growth rates, Figure 22 indicates that the passenger activity at Kahului has shown similar trends to the Statewide levels as well as the levels of activity at Honolulu International Airport.

Figure 22: Honolulu and Kahului Air Passengers Compared to Statewide Air Passengers

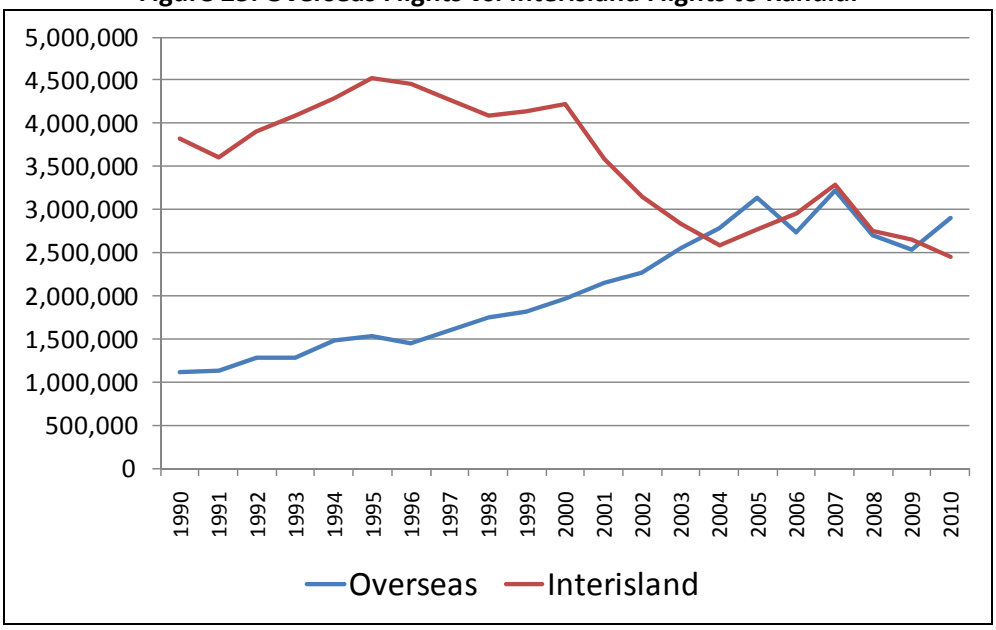


Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Specific to Kahului, there has been an increase in overseas flight passengers and a decrease in interisland traffic over the past 20 years.

An important trend in the composition of service to Kahului is the fact that in 1990, the interisland flight passengers accounted for nearly 80% of the total passengers, but in 2010, the share between interisland and overseas passengers is nearly equal. This distribution of passengers by interisland flights versus overseas flights is presented in Figure 23.

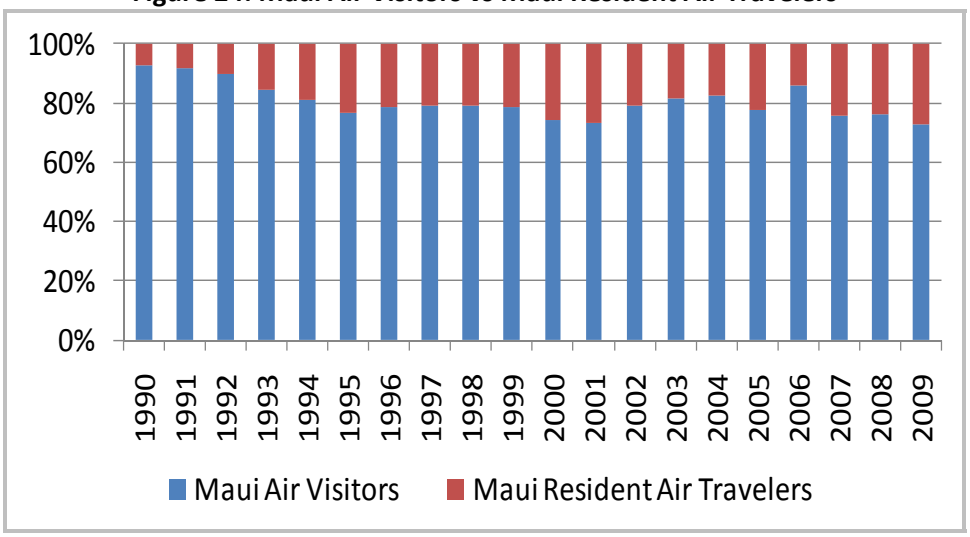
Figure 23: Overseas Flights vs. Interisland Flights to Kahului



Source: DBEDT and HTA; Hawaii Department of Transportation, Airports

Figure 24 shows that the majority of air travelers into Maui are visitors, but the share of resident passengers has been increasing slightly in the more recent years.

Figure 24: Maui Air Visitors vs Maui Resident Air Travelers

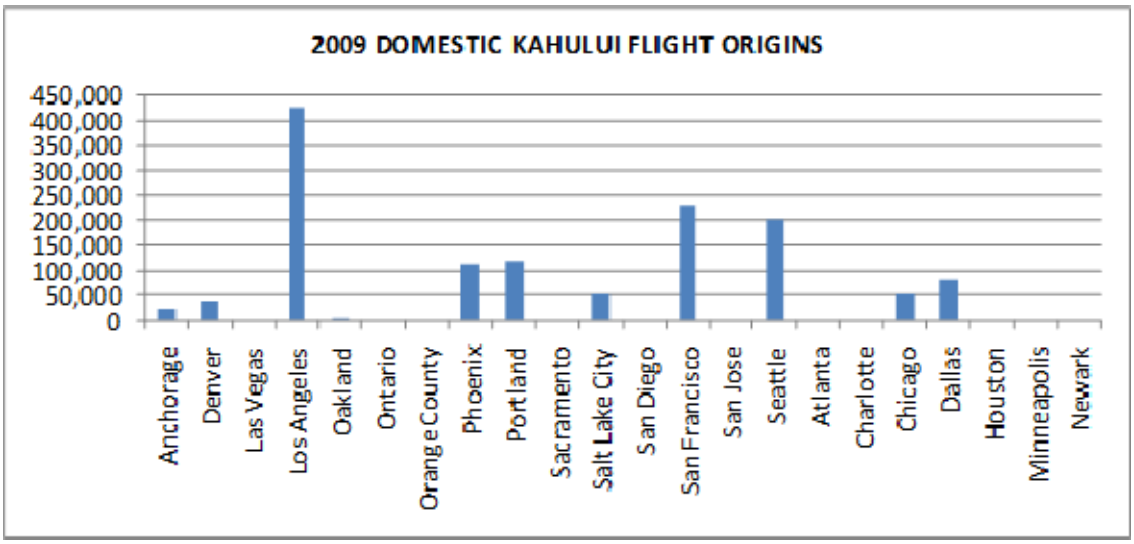


Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Kahului Domestic Flights

Historically, Lost Angeles has been the major gateway for direct overseas flights to Maui, supplying about 500,000 passengers annually, with a loss of 50,000 to 100,000 passengers to the Island in 2008 and 2009. San Francisco has been the second largest gateway to the island, averaging about 300,000 passengers until 2006, after which passengers from SFO fell by about 100,000 passengers. Seattle, Portland and Phoenix have become gateways, with additional non-stop service from Dallas, Chicago, Denver and Anchorage. Figure 25 shows the passengers originating into Maui by gateway.

Figure 25: Domestic Kahului Flight Origins for 2009 (Passengers by Departure Gateway)



Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

International Direct Flights to Kahului

In 2000, the two largest international flight origins for Kahului were Japan and Canada. However, the direct service from Japan was discontinued. This is consistent with the declining Japanese visitors market, but may also be a contributor to the loss of Japanese visitors to Hawaii. Flights from Canada continue to be the only international origin for flights into Kahului, and this reflects the growing Canadian tourism market into Maui. In addition to flights from Vancouver, it is to be emphasized that the Pacific Northwest airports such as Sea-Tac International, Portland International and Bellingham International also provide service to the Canadian market.

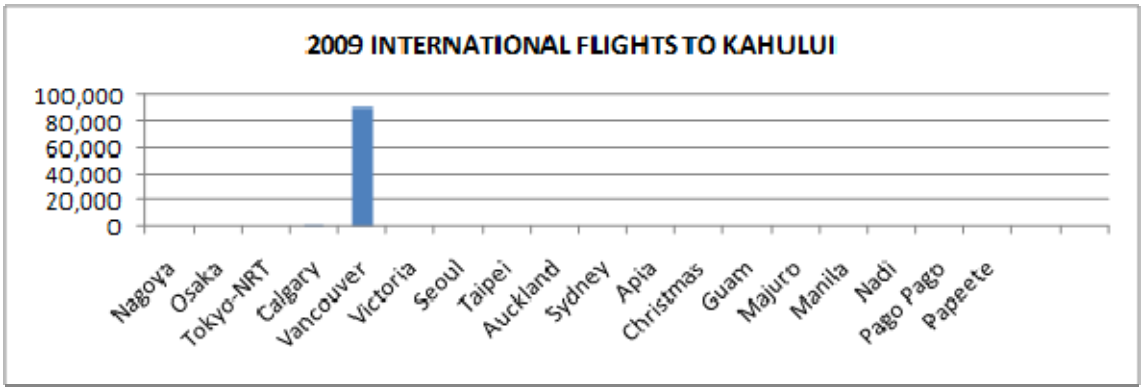


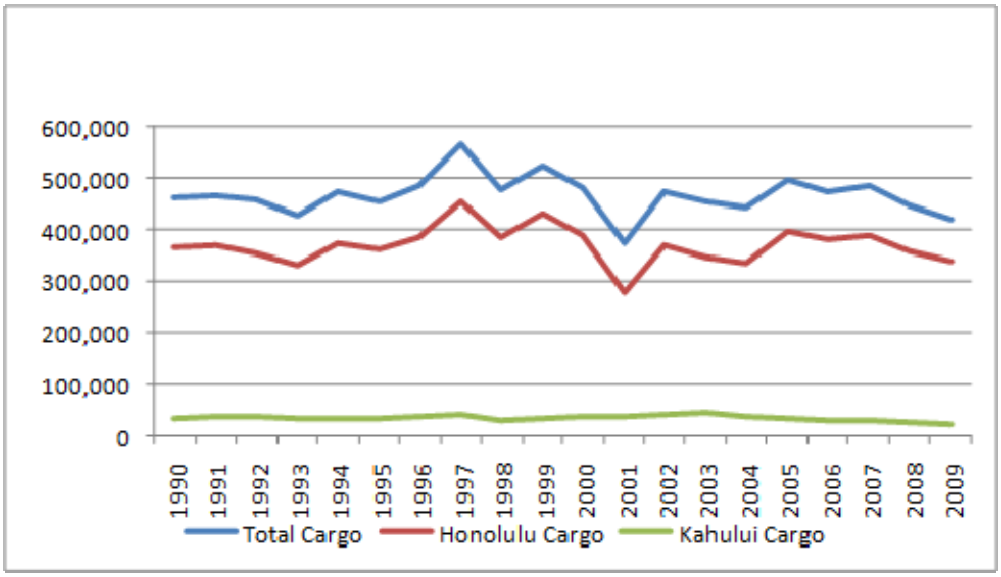
Figure 26: 2009 International Direct Flights to Kahului

Source: Annual Visitor Research Reports 1999-2010. DBEDT and HTA

Air Cargo

Air cargo handled at the Statewide airport system has shown little growth since 1990, and the trend in air cargo at the system level is mirrored by air cargo activity at Honolulu as well as Kahului. Figure 27 shows the trend in Statewide system air cargo, air cargo handled at Honolulu International and air cargo handled at Kahului. Total Statewide air cargo has been declining at a rate of 0.5%, with Honolulu specifically declining at a rate of around 0.4%. Overall, Honolulu's percentage of total Statewide cargo has been declining rapidly. At Kahului, cargo tonnage has been decreasing by 40% since 2003. However, while Kahului's cargo has been decreasing, it has not experienced as great of a decrease compared to the total Statewide cargo.

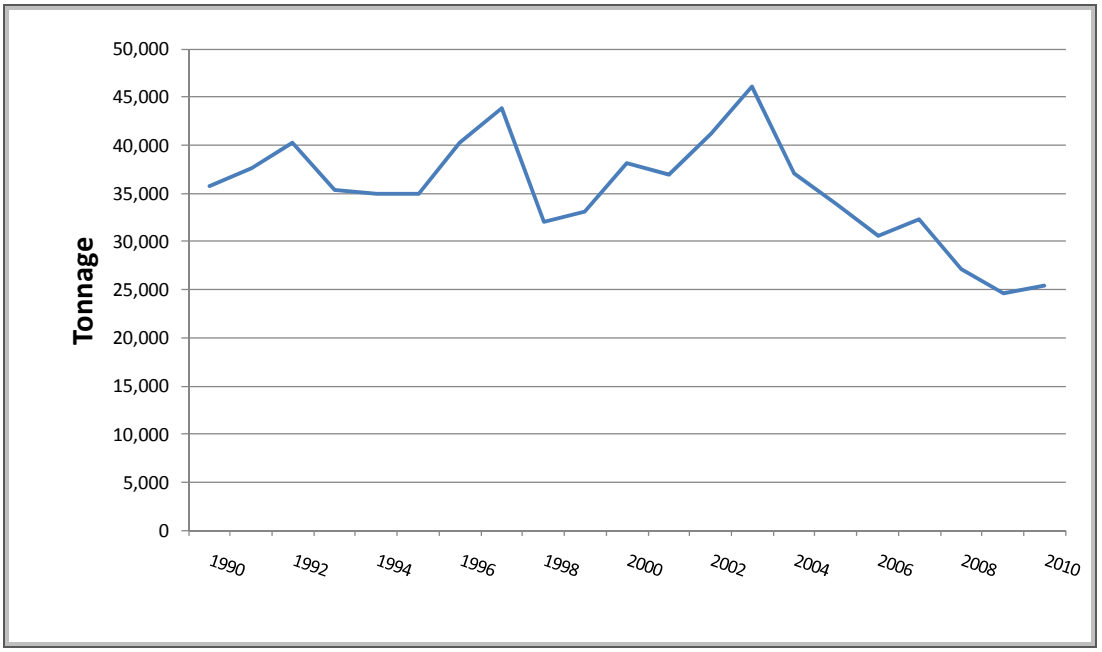
Figure 27: Air Cargo Tonnage Handled - Statewide, Honolulu International and Kahului



Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Figure 28 shows the trend in air cargo for Kahului, and shows that air cargo tonnage fell from a high of 46,116 tons in 2003 to 25,482 tons in 2010, a 55% loss of air cargo tonnage in seven years. Two factors have contributed to this loss of air cargo. First the production of pineapples on Maui has been declining and secondly, there has been increased competition from interisland barge transportation.

Figure 28: Air Cargo Handled at Kahului

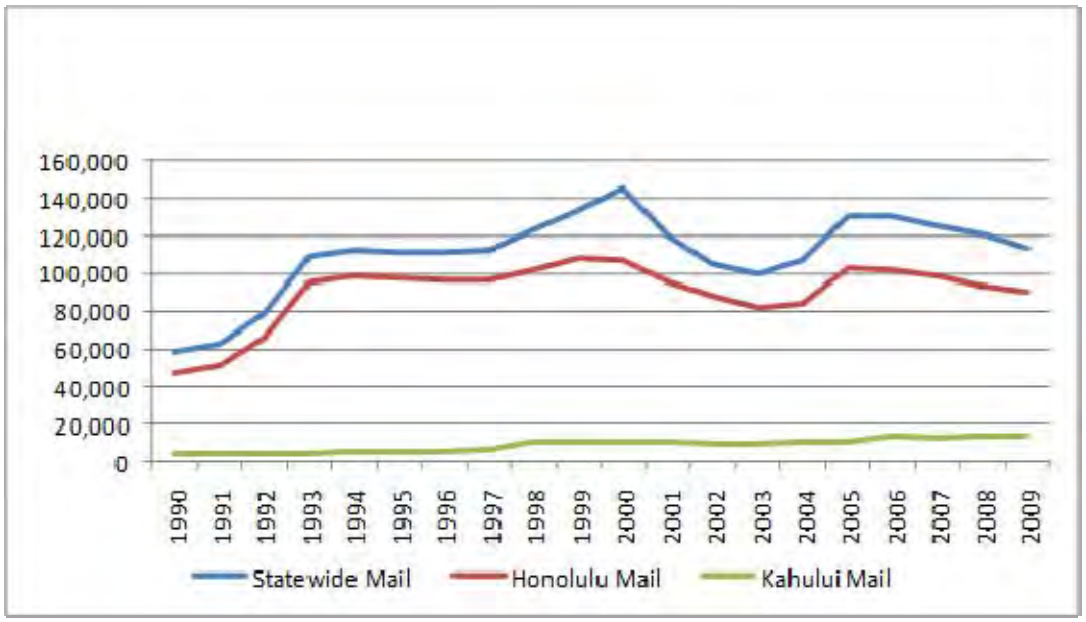


Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Mail

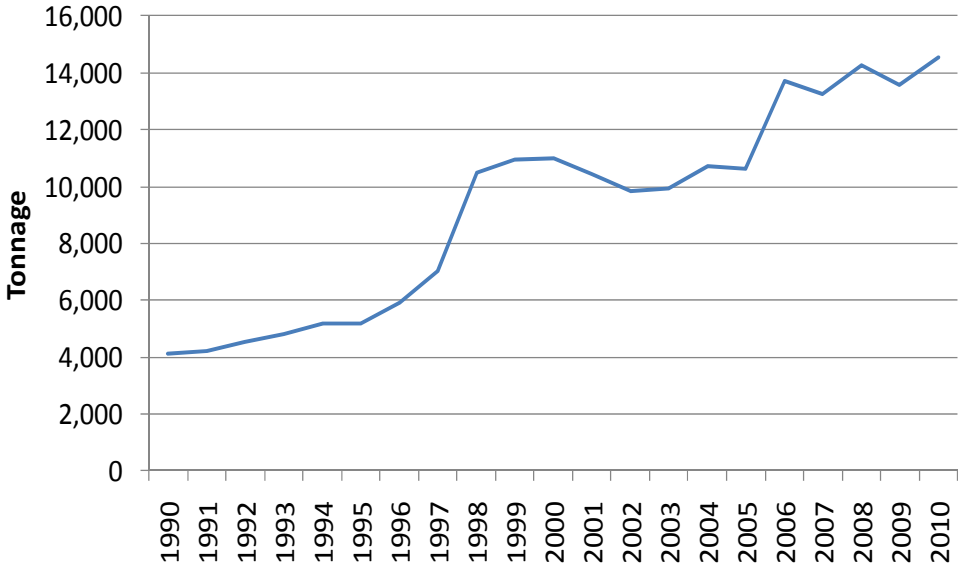
At the Statewide level, the volume of mail carried at the Statewide airports has remained relatively steady (Figure 29). Air mail loaded at Honolulu showed a significant increase between 1990 and 1992, and has remained nearly constant at about 100,000 tons annually. In contrast, mail handled at Kahului has grown at a CAGR of 2.8% since 2000, as shown in Figure 30. The mail handled at Kahului has continued to increase as a percentage of the total Statewide mail handled at all airports in Hawaii. This increase in air mail at Kahului reflects the growth in population in Maui compared to other counties/Islands.

Figure 29: Air Mail Handled Statewide, Honolulu International Airport and Kahului (Tons of Air Mail)



Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Figure 30: Air Mail Handled at Kahului Airport



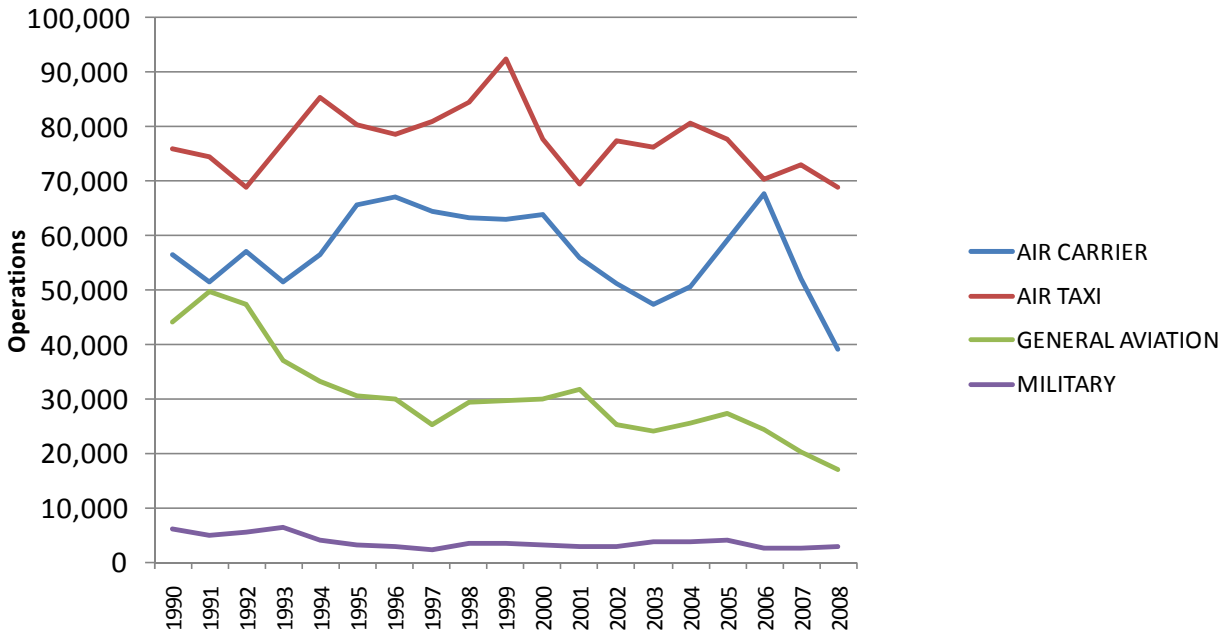
Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Composition of Aircraft Operations

In addition to the analysis and projections of passenger, air cargo and air mail, it is further necessary to project the activity levels by type of aircraft, as the type of aircraft operation impacts gate requirements as well as noise emissions. In this section, the operations at Kahului by type of aircraft are described.

Aircraft operations at Kahului have shown an overall decline, falling from 155,452 operations in 1999 to 118,896 operations in 2010. Figure 31 shows that this downward trend is evident for air carriers, air taxi operations, general aviation activity and military operations. Air carrier operations actually increased from 2003 through 2007, but fell by nearly 50% between 2006 and 2010. The most significant decline is evident for general aviation activity (GA), as GA operations have been on a declining trend since 1991

Figure 31: Historical Operations at Kahului



Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division. The activity in 2009 is an estimate, while 2010 is actual.

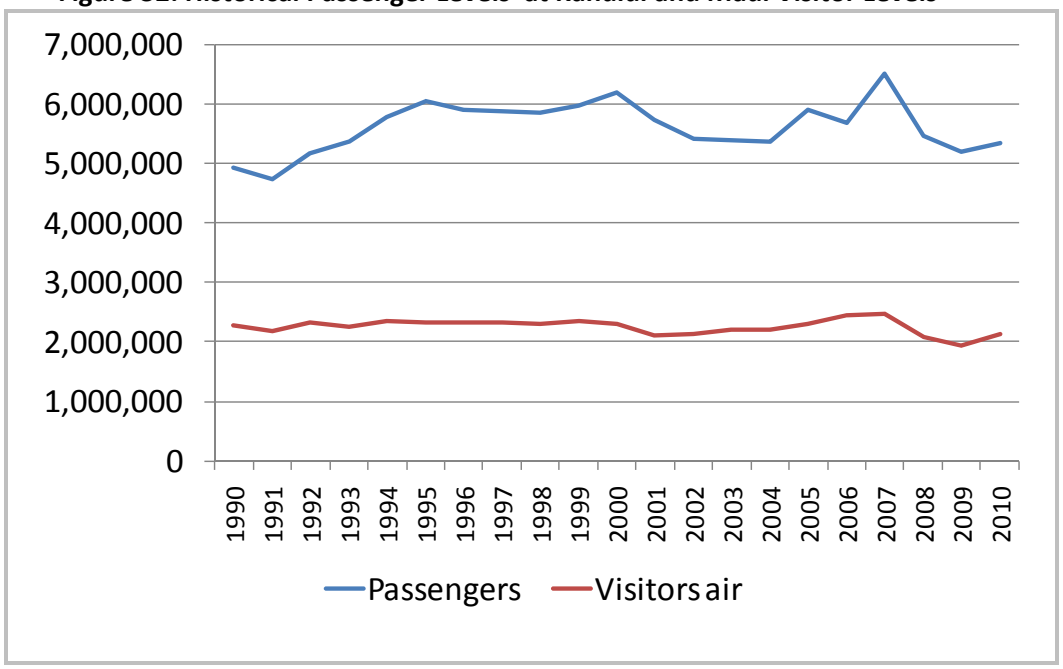
Kahului Passenger and Operations Projections

This section presents the methodology used to develop projections of passenger, operations by type of aircraft, and for air cargo and air mail activity levels at Kahului.

Passenger Activity Projections

The historical analysis of passenger activity and economic factors described in the previous sections suggests that passenger levels at Kahului will be driven by visitor levels, as well as population levels. Figure 32 shows the historical relationship between visitor levels to Maui and passenger levels at Kahului. It is to be emphasized that the passenger levels include enplanements and deplanements, essentially counting a passenger two times.

Figure 32: Historical Passenger Levels at Kahului and Maui Visitor Levels



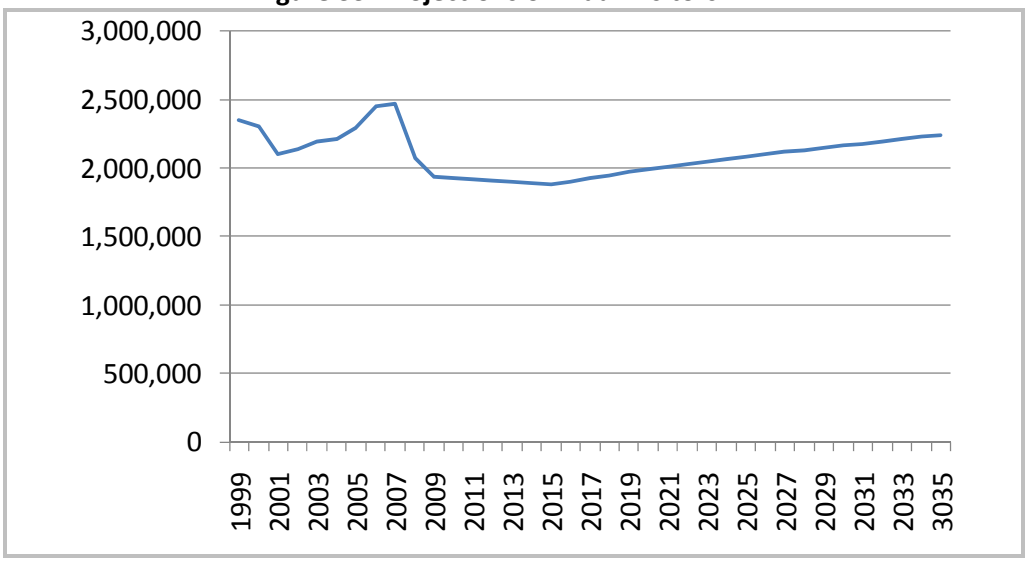
Source: Hawaii Department of Transportation, Airports Division. Hawaii Business, Economic Development and Tourism, Annual Reports 1990-2010.

Multiple regression analysis was used to develop a statistical relationship between passenger levels at Kahului Airport and visitor levels and population in Maui County. Population is included as an explanatory variable to reflect the impact of changes in population levels on resident air travel. As noted previously, resident air travel accounts for about 25% of the total passenger activity at Kahului. Multiple regression analysis was used to establish a relationship between total airline passengers at Kahului against visitors and population for Maui County. The analysis covered the 19 year period of data. The regression model produced an R^2 of 99.8, indicating that the resulting regression model explained more than 99% of the changes in passenger levels at Kahului. The regression model structure is significant at the 99% level of confidence, as indicated by an F-statistic of 3,519. The resulting regression relationship is: Total

passengers=1.69 X Maui Visitors+14.34 X Maui Population. The Hawaii Department of Business, Economic Development and Tourism (DBEDT) produced projections of visitor levels and population levels for Maui County. These projections were then substituted into the regression model to project passenger activity at Kahului.

Projections of visitors to Maui are a presented in Figure 33, and projections of population are shown in Figure 34. Visitors are projected to grow at less than 1% annually over the forecast period, while population in Maui is projected to grow at an annual rate of 1.2%

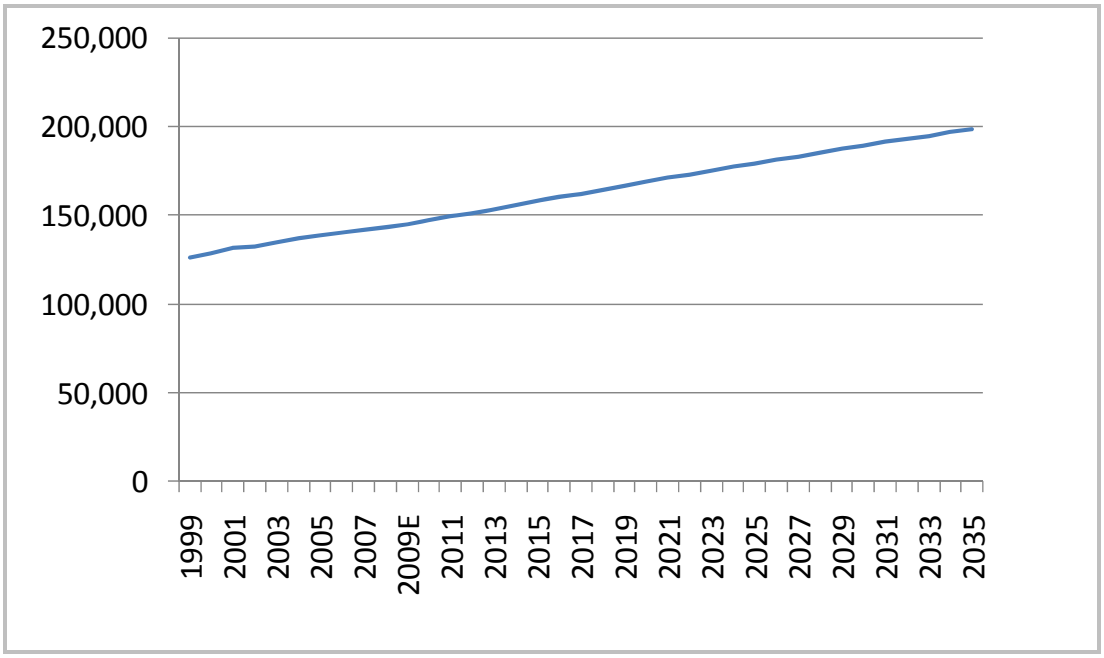
Figure 33: Projections of Maui Visitors



Source: Department of Business, Economic Development and Tourism, Population and Economic Projections for the State of Hawaii 2035- Revised, July 2009

The relatively low growth projected for the Maui visitor industry is based on the fact that future hotel units in Maui are projected to be limited by DBEDT, and the recently completed Maui County Master Plan focuses on limiting tourism growth on the Island. For example, the direct quotes from the master plan underscore the commitment of the County to limiting future tourism:

Figure 34: Maui Population Projections



Source: Source: Department of Business, Economic Development and Tourism, Population and Economic Projections for the State of Hawaii 2035- Revised, July 2009

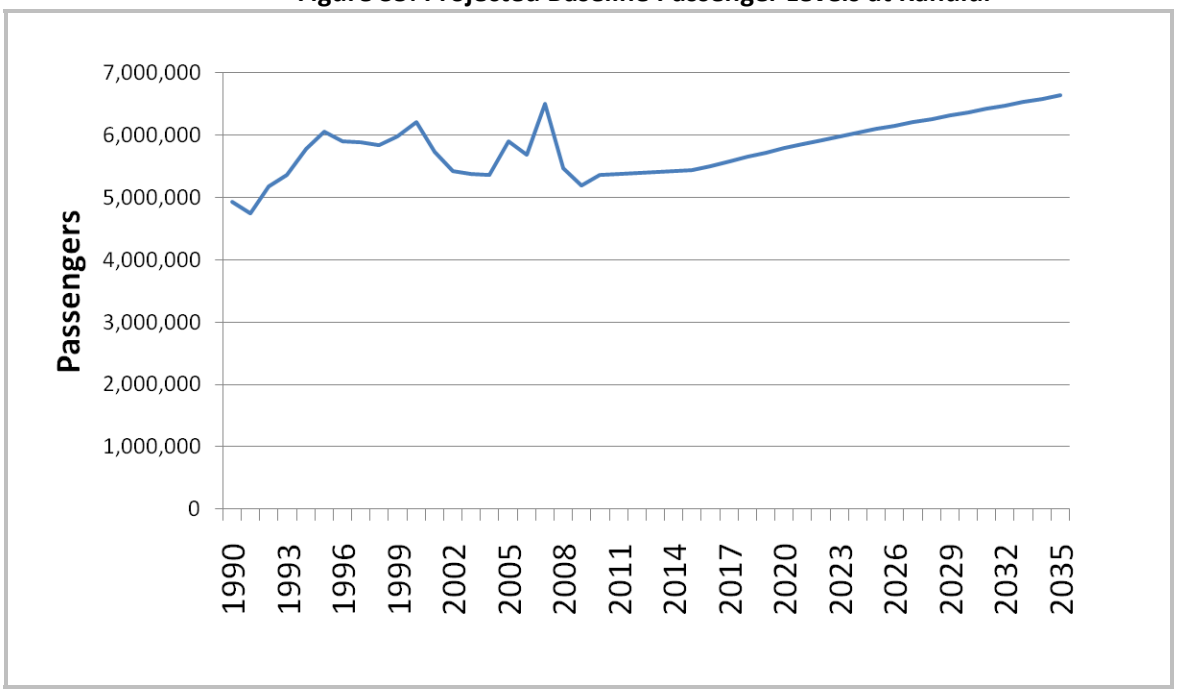
- "the important visitor industry will still grow, but at a comparatively smaller rate so that our economy will be more diversified"
- "The lack of appropriate available land for resort expansion will limit future employment opportunities in the visitor and development industries"

Overall, the Maui County Master Plan places focuses to limit visitor arrivals, but increase per day expenditures of visitors by targeting the "higher spending" tourist market.[1]

Using the Maui County visitor and population projections, the passenger activity levels at Kahului are projected to show growth starting in 2011, and continuing this growth throughout the forecast period. However, the passenger level activity is not projected to return to pre-recession peak levels until 2030. This is the baseline projection from which aircraft operations projections are next developed. To this baseline passenger projection, scenarios will be developed regarding new overseas flights introduced on both US mainland and international routes.

[1]Draft Maui Island Plan, Maui County Master Plan, County of Maui, December 2009.

Figure 35: Projected Baseline Passenger Levels at Kahului

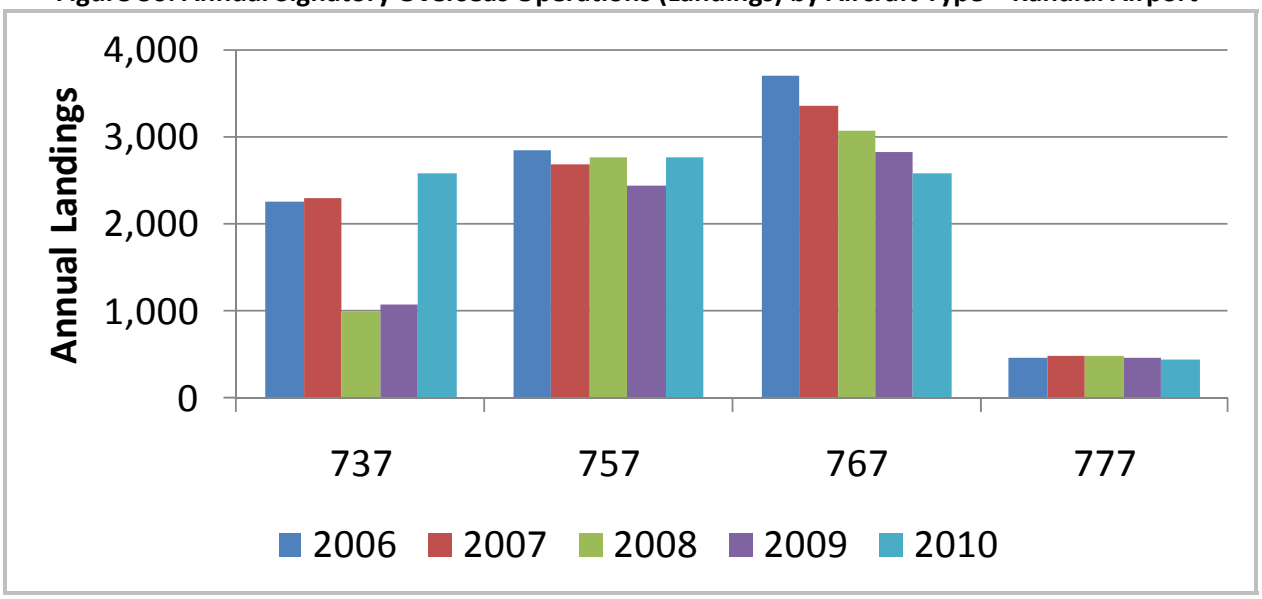


Source: Department of Business, Economic Development and Tourism, Population and Economic Projections for the State of Hawaii 2035- Revised, July 2009 used as inputs

Aircraft Operations Projections – Commercial Aircraft Type

The baseline passenger projections were next used to develop projections of aircraft operations, by type of aircraft. ***Actual 2010 passenger and operation data are used as the baseline in the operations and passenger projections***. The first step in this process is to develop a profile of operations by aircraft type at Kahului. Using this composition of aircraft, as well as the share of interisland vs. overseas flights, the passenger forecasts are allocated to aircraft types. The ultimate projections of activity by aircraft type will then be used in other portions of the Kahului Master Plan for environmental /noise analysis as well as operational and facility planning. As noted previously, the share of Kahului passengers using interisland flights vs. overseas flights has become nearly equal. In 2010, 54.2% of the Kahului passengers traveled on overseas operations, while 45.2% of the passengers traveled on interisland flights. This share has been relatively stable over the past several years, and will be used in the development of the future projections of aircraft operations.

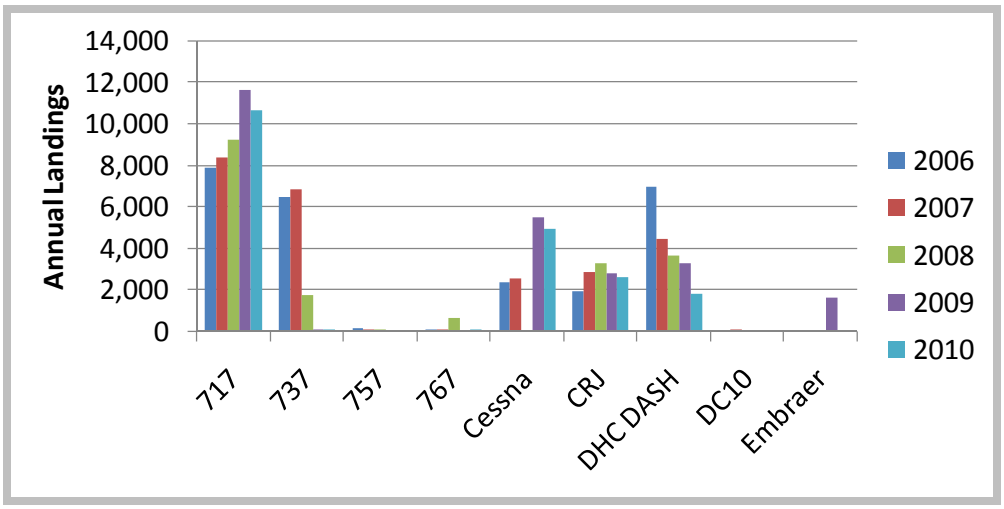
Figure 36: Annual Signatory Overseas Operations (Landings) by Aircraft Type – Kahului Airport



Source: Hawaii Department of Transportation, Airports Division

Figure 36 presents the overseas operations (landings) by the signatory carriers. Over the past four years, the composition of the aircraft type deployed on the Kahului routing has changed to some extent, with the greatest changes occurring in the deployment of 767 and 737 aircraft. The utilization of 767 aircrafts has been declining, but the deployment of 737 aircrafts has increased significantly in 2010 from the previous two years, as the deployment of the 737-800 series increased.

Figure 37: Annual Interisland Operations (Landings) by Aircraft Type – Kahului Airport



Source: Hawaii Department of Transportation, Airports Division

Figure 37 shows that the interisland market to Kahului has historically been served by Boeing 717 aircraft.

The 2010 composition of the overseas and interisland fleet by aircraft type was assumed to remain constant over the projection period. This assumption is based on interviews with the key signatory carriers serving Kahului.

The methodology to estimate the future level of operations by aircraft type for overseas and interisland flights consists of the following steps:

The baseline passenger forecasts for interisland and overseas operations assume the 2010 distribution of passengers by overseas vs. interisland:

- 54.2% overseas
- 45.8% interisland

An estimate of the number of seats by type of aircraft deployed in 2010 was developed from industry standard aircraft seating configurations. The projected passengers (overseas and interisland) were next allocated across seating capacity by aircraft type for overseas and interisland flights.

Three scenarios were then developed for the overseas flights.

The ***Baseline Scenario*** consists of the following assumptions

- Assume 2010 seating capacity allocation by aircraft type remains constant over projection period
- Assume 2010 seating capacity utilization of 79% remains constant over the period

Scenario 2 assumes seating capacity utilization increases. The key assumptions are:

- Assume 2010 seating allocation by aircraft type remains constant over projection period
- Assume seat capacity utilization increases to 85% by 2011

Scenario 3 assumes the addition of overseas flights based on target markets now under consideration by Hawaii Department of Transportation, Airports. The key assumptions underlying Scenario 3 are:

- In 2012 add one daily Pacific Northwest flight, utilizing a Boeing 737- 800 series aircraft to accommodate the growing Canadian market as well as provide another US mainland gateway.
- In 2012 add one daily Asian flight – Japanese/Korean market utilizing a 767-300 Series, which is consistent with marketing Maui to the high end Japanese/Korean visitor market.
- In 2014 add one additional daily Pacific Northwest flight and one additional Asian Flight
- Overseas passengers then grow to reflect the new flights with an 85% seating capacity utilization

Table 2 presents the projected landings by aircraft type for the baseline scenario for the overseas market. ***The highlighted rows in the table are actual operations and passenger levels.***

Table2

Projected Overseas Landings and Passengers by Aircraft Type – Scenario 1

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757ERL	B767	B767-209	B767-300	B767-300E	B767CL	B767ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	192	2,438	1,037	1,188	0	591	952	234	989	6	438	18	448	8,531
2020	5,791,283	3,139,072	204	2,596	1,105	1,265	0	629	1,014	249	1,053	6	467	19	477	9,084
2025	6,099,048	3,305,891	215	2,734	1,164	1,332	0	663	1,068	262	1,109	7	492	21	502	9,569
2030	6,367,786	3,451,556	224	2,855	1,215	1,391	0	692	1,115	274	1,158	7	513	21	524	9,989
2035	6,640,259	3,599,246	234	2,977	1,267	1,451	0	722	1,162	286	1,207	7	535	22	546	10,416

2010 is actual data and serves as the base year

The overseas projections under Scenario 3, increased seat utilization, are presented in Table 2.

Table 3

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757ERL	B767	B767-209	B767-300	B767-300E	B767CL	B767ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	178	2,266	964	1,104	0	549	885	217	919	6	407	17	416	7,928
2020	5,791,283	3,139,072	190	2,413	1,027	1,176	0	585	942	232	979	6	434	18	443	8,445
2025	6,099,048	3,305,891	200	2,541	1,081	1,238	0	616	992	244	1,031	6	457	19	466	8,891
2030	6,367,786	3,451,556	209	2,653	1,129	1,293	0	643	1,036	255	1,076	7	477	20	487	9,285
2035	6,640,259	3,599,246	218	2,767	1,177	1,348	0	671	1,080	265	1,122	7	497	21	508	9,681

Projected Overseas Landings and Passengers by Aircraft Type – Scenario 2

2010 is actual data and serves as the base year

The overseas projections by aircraft type under Scenario 3, the assumptions of additional overseas flights, are presented in Table 4. The orange shaded rows indicate when two daily Pacific Northwest flights are added and two daily Japanese/Korean flights are added.

Table 4

Projected Overseas Landings and Passengers by Aircraft Type – Scenario 3

Year	Total PAX	Overseas PAX	B737-700	B737-800	B757	B757-200	B757-300	B757ERL	B767	B767-209	B767-300	B767-300E	B767CL	B767ER	B777-200A	Total
2007	6,500,384	3,215,786	1,410	897	902	998	578	205	1,236	131	1,018	477	484	8	491	8,835
2008	5,463,787	2,709,061	249	742	1,068	1,069	423	210	982	152	1,320	0	615	8	486	7,324
2009	5,192,693	2,536,552	8	1,075	875	1,020	95	461	732	177	1,478	4	417	11	471	6,824
2010	5,346,694	2,898,090	188	2,397	1,020	1,168	0	581	936	230	972	6	431	18	440	8,387
2015	5,438,392	2,947,793	178	2,996	964	1,104	0	549	885	217	1,649	6	407	17	416	9,388
2020	5,791,283	3,139,072	190	3,143	1,027	1,176	0	585	942	232	1,709	6	434	18	443	9,905
2025	6,099,048	3,305,891	200	3,271	1,081	1,238	0	616	992	244	1,761	6	457	19	466	10,351
2030	6,367,786	3,451,556	209	3,383	1,129	1,293	0	643	1,036	255	1,806	7	477	20	487	10,745
2035	6,640,259	3,599,246	218	3,497	1,177	1,348	0	671	1,080	265	1,852	7	497	21	508	11,141

2010 is actual data and serves as the base year

For the interisland operational projections, two scenarios were developed. The baseline Scenario 1 assumes that seating utilization remains at the current level, 77%, while under scenario 2, it is assumed that the seating utilization increases to 85% in 2011. Under both scenarios for the interisland projections, it is assumed that the current distribution of passengers between interisland flights and overseas flights remains constant over the projection period. It is to be emphasized that the interisland flights include commuters as well as non-signatory activity as well.

Table 5 presents the interisland projections under the 77% percent seat utilization, while Table 6 presents the interisland projections under the improved seat utilization of 85% by 2011. The shaded rows in each table indicate actual levels.

Table 5

Projected Interisland Landings and Passengers by Aircraft Type – 77% Seating Utilization

			Baseline Interisland Forecasts									
Year	Total PAX	Interisland PAX	B717	B737	B757	B767	B767-300	CESSNA 208B	CRJ200	EMBRAER 170	C DASH 8-100	TOTAL
2007	6,500,384	3,284,598	8,364	6,851	68	24	0	2,540	2,870	0	4,469	25,186
2008	5,463,787	2,754,726	9,214	1,735	0	284	346	0	3,255	0	3,628	18,462
2009	5,192,693	2,656,141	11,609	0	0	5	1	5,514	2,806	1,629	3,286	24,850
2010	5,346,694	2,448,604	10,622	1	0	1	0	4,960	2,604	0	1,796	19,984
2015	5,438,392	2,490,599	10,804	2	0	2	0	5,046	2,649	0	1,827	20,330
2020	5,791,283	2,652,211	11,505	2	0	2	0	5,373	2,821	0	1,946	21,649
2025	6,099,048	2,793,156	12,117	2	0	2	0	5,658	2,971	0	2,049	22,799
2030	6,367,786	2,916,229	12,651	2	0	2	0	5,908	3,102	0	2,139	23,804
2035	6,640,259	3,041,013	13,192	2	0	2	0	6,161	3,235	0	2,231	24,823

2010 is actual data and serves as the base year

Table 6

Projected Interisland Landings and Passengers by Aircraft Type – 85% Seating Utilization

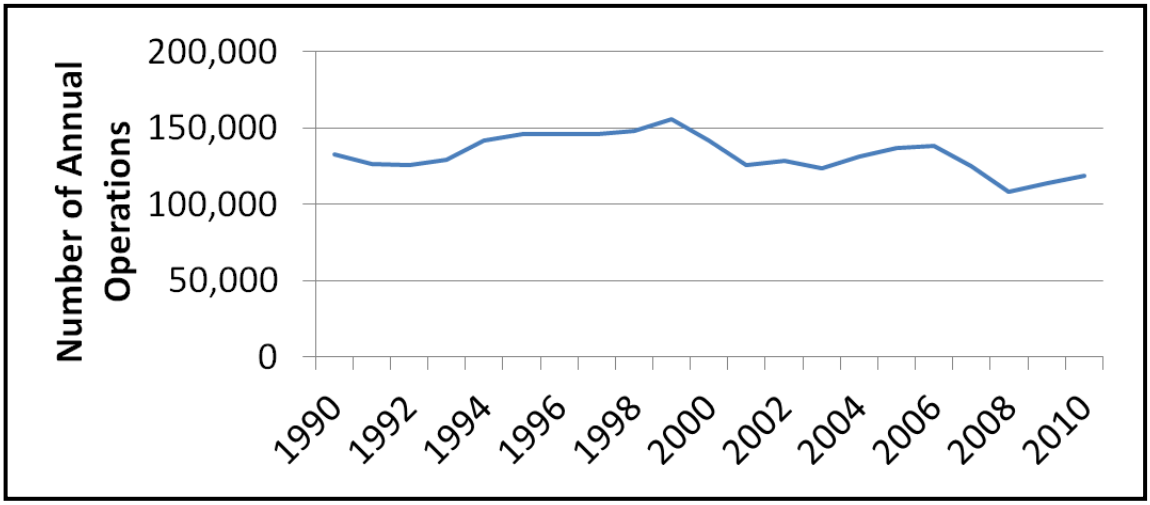
			Baseline Interisland Forecasts									
Year	Total PAX	Interisland PAX	B717	B737	B757	B767	B767-300	CESSNA 208B	CRJ200	EMBRAER 170	C DASH 8-100	TOTAL
2007	6,500,384	3,284,598	8,364	6,851	68	24	0	2,540	2,870	0	4,469	25,186
2008	5,463,787	2,754,726	9,214	1,735	0	284	346	0	3,255	0	3,628	18,462
2009	5,192,693	2,656,141	11,609	0	0	5	1	5,514	2,806	1,629	3,286	24,850
2010	5,346,694	2,448,604	10,622	1	0	1	0	4,960	2,604	0	1,796	19,984
2015	5,438,392	2,490,599	9,913	1	0	1	0	4,629	2,431	0	1,677	18,652
2020	5,791,283	2,652,211	10,557	1	0	1	0	4,930	2,588	0	1,785	19,862
2025	6,099,048	2,793,156	11,118	2	0	2	0	5,192	2,726	0	1,880	20,920
2030	6,367,786	2,916,229	11,608	2	0	2	0	5,420	2,846	0	1,963	21,841
2035	6,640,259	3,041,013	12,104	2	0	2	0	5,652	2,968	0	2,047	22,775

2010 is actual data and serves as the base year

Operations Projections by Activity Category

In addition to the operation activity projected for commercial passenger activity, by type of aircraft, Martin Associates also developed operations projections by categories typically projected by the FAA in the Terminal Area Forecasts for specific Airports. These categories are air carrier, air taxi, general aviation and military operations. Figure 38 shows the total annual operations at Kahului for the period 1990-2010. Aircraft operations at Kahului have shown an overall decline, particularly since 1999, falling from 155,452 operations in 1999 to 118,896 operations in 2010.

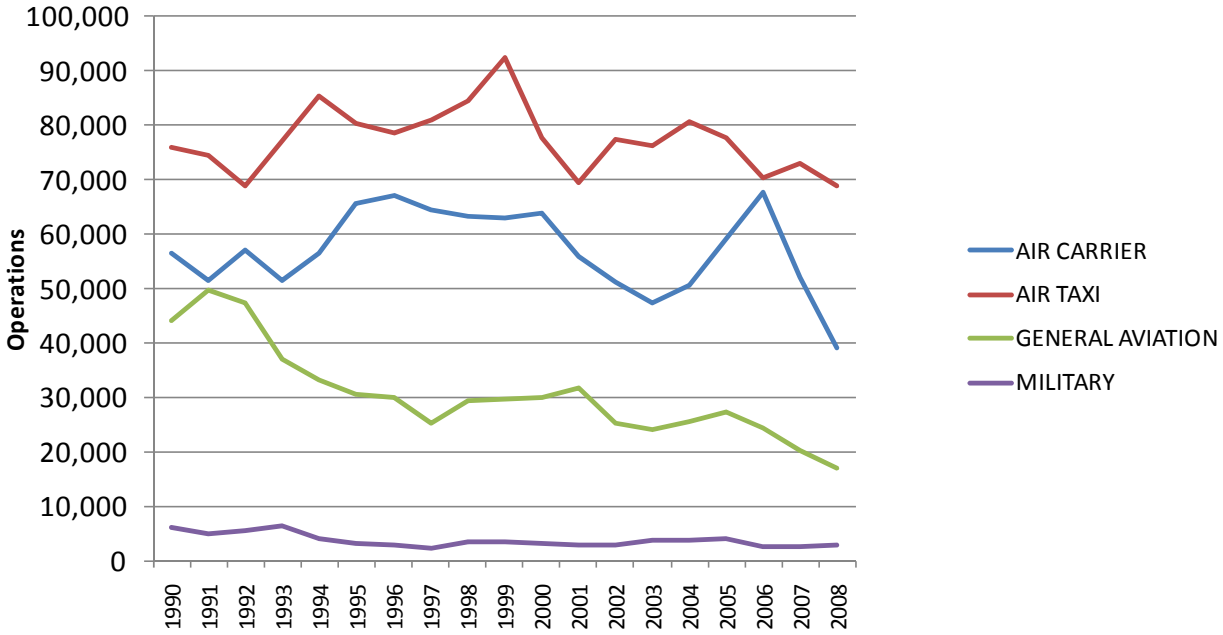
Figure 38: Total Annual Operations at Kahului



Source: Hawaii Department of Transportation, Airports Division

Figure 39 shows annual operations activity by activity category. While operations have been declining for activity types, air taxi and general aviation activity have shown the strongest declines in annual operations.

Figure 39: Historical Operations at Kahului



Source: Department of Transportation, Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division. The activity in 2009 is an estimate, while 2010 is actual.

To develop activity level operations projections, Martin Associates applied the growth in commercial overseas and interisland passenger traffic operations (described in the previous section in Tables 2 through 6) to the actual 2010 operational levels of air carrier and air taxi/commuter operations reported at Kahului, as supplied by Airports. The projected landings estimated under Scenario 3 for overseas operations and the interisland operations under an 85% capacity utilization (Table 6) were used in the commercial air carrier and air commuter/air taxi operations.

For general aviation activity operations projections, it is assumed that the decline in general aviation activity levels (both local and itinerant) has stabilized, and therefore the actual 2010 general aviation activity levels are assumed to remain at the 2010 levels throughout the period. Similarly, military operations (both local and itinerant operations) have shown no growth historically, and as a result, the 2010 activity levels of military operations are projected to remain constant over the forecast period.

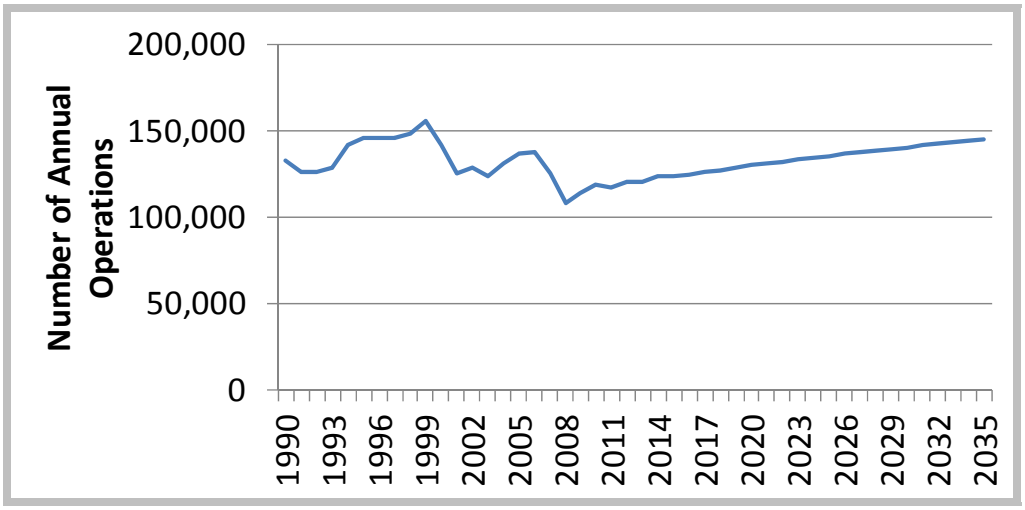
Table 7 shows the projected level of operations by type of activity. It is to be emphasized that 2010 operations by type of activity are actual operations. Overall, operations are projected to increase by 18% over the next twenty years, or about 1.008% annually over the next twenty years. This compares to a 10.2% decline over the 1990-2010 period (a 0.5% annual decline per year over the past twenty years).

Table 7: Projected Annual Operations by Type of Activity

	Itinerant Air Carrier	Itinerant Air Taxi	Itinerant General Aviation	Itinerant Military	Itinerant SubTotal	Local General Aviation	Local Military	Local SubTotal	Total Operations
2010	39,400	59,387	10,989	2,375	112,151	6,298	447	6,745	118,896
2011	38,793	58,472	10,989	2,375	110,629	6,298	447	6,745	117,374
2012	39,914	60,162	10,989	2,375	113,440	6,298	447	6,745	120,185
2013	40,026	60,331	10,989	2,375	113,721	6,298	447	6,745	120,466
2014	41,155	62,032	10,989	2,375	116,550	6,298	447	6,745	123,295
2015	41,271	62,207	10,989	2,375	116,842	6,298	447	6,745	123,587
2016	41,768	62,956	10,989	2,375	118,087	6,298	447	6,745	124,832
2017	42,272	63,716	10,989	2,375	119,353	6,298	447	6,745	126,098
2018	42,782	64,485	10,989	2,375	120,631	6,298	447	6,745	127,376
2019	43,296	65,259	10,989	2,375	121,920	6,298	447	6,745	128,665
2020	43,821	66,050	10,989	2,375	123,235	6,298	447	6,745	129,980
2021	44,254	66,703	10,989	2,375	124,320	6,298	447	6,745	131,065
2022	44,691	67,362	10,989	2,375	125,417	6,298	447	6,745	132,162
2023	45,136	68,033	10,989	2,375	126,532	6,298	447	6,745	133,277
2024	45,585	68,710	10,989	2,375	127,659	6,298	447	6,745	134,404
2025	46,036	69,390	10,989	2,375	128,790	6,298	447	6,745	135,535
2026	46,419	69,967	10,989	2,375	129,751	6,298	447	6,745	136,496
2027	46,804	70,547	10,989	2,375	130,715	6,298	447	6,745	137,460
2028	47,195	71,137	10,989	2,375	131,696	6,298	447	6,745	138,441
2029	47,584	71,722	10,989	2,375	132,670	6,298	447	6,745	139,415
2030	47,979	72,318	10,989	2,375	133,661	6,298	447	6,745	140,406

Figure 40 shows graphically the historical and projected level of total operations for Kahului through the year 2035

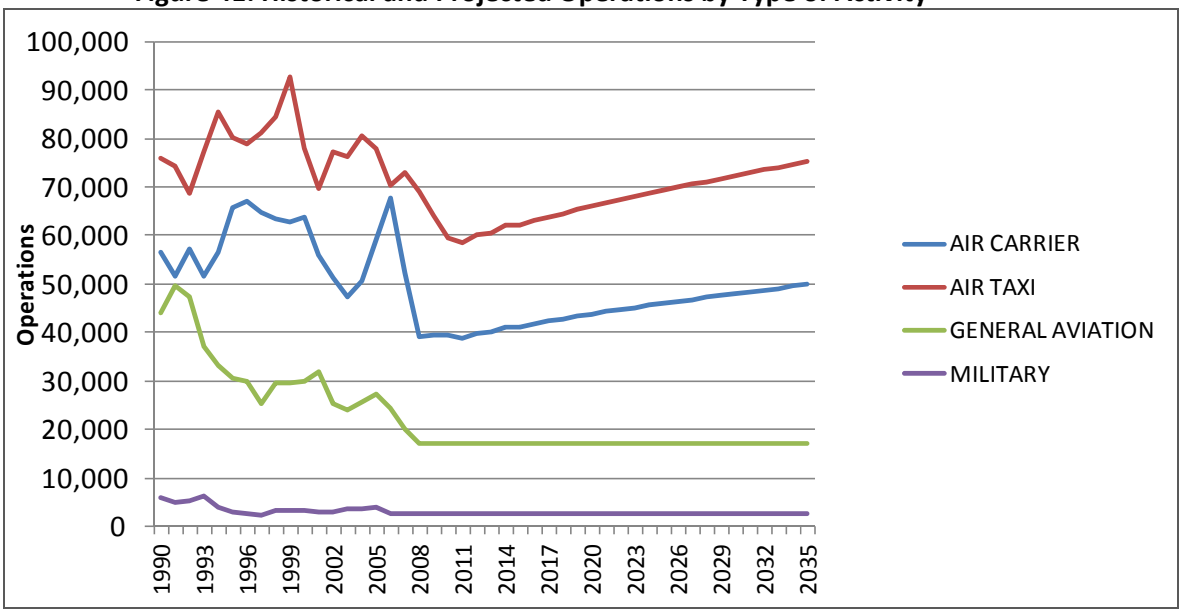
Figure 40: Historical and Projected Annual Operations



Total annual operations are projected to return to early 2000 years levels by 2015.

Figure 41 graphically shows the historical and projected annual operations by type of activity. As this figure shows, the historical decline in GA and military operations are projected to remain stable, while the declines in air carrier and air taxi operations are projected to reverse in 2012, and show an small annual growth.

Figure 41: Historical and Projected Operations by Type of Activity



Comparison of Passenger and Operations Forecasts with FAA and Official Statement

The projected level of passenger enplanement activity developed for Kahului were then compared to the projected levels of passenger enplanement levels developed for Kahului Airport in the Official Statement issued by the Department of Transportation, Airports. Table 8 shows that the enplanement projections developed as part of the Kahului Master Plan and those prepared as part of the Official Statement are on average within 3%. The current passenger projections are higher than those presented in the Official Statement in earlier years, but lower in the later years of the projection period. Under the more aggressive Scenario 3 for overseas flights, the current Master Plan projections are higher than the projections presented in the Official Statement in years after the actual levels shown for 2010. It is important to note that the Official Statement is based on FY 2009 and under states actual CY 2009 passenger activity at Kahului. The Official Statement degree of under-statement becomes more severe when compared to ***actual 2010 enplanements, which are included under the Martin Associates projections in Table 8***. In 2010, actual passenger enplanement s for overseas activity were nearly 12% higher than that projected in the Official Statement for 2010. In contrast, the Official Statement enplanement projections for interisland activity are actually nearly 4% greater than the actual interisland enplanements in 2010. In summary, the Master Plan passenger projections represent a CAGR of 0.84% under the Baseline Scenario, and a 2.19% CAGR under the overseas Scenario 3 with added overseas fights. These growth rates compare to the 1.26% CAGR presented in the Official Statement.

Table 8

Comparison of Master Plan Passenger Projections with Official Statement Projections

	Martin Overseas	Official Statement Overseas	% Difference	Martin Interisland	Official Statement Interisland	% Difference	Martin Total	Official Statement Total	% Difference
2009	1,268,276	1,254,604	1.09%	1,328,071	1,287,718	3.13%	2,596,347	2,542,322	2.13%
2010	1,449,045	1,302,000	11.29%	1,224,302	1,274,000	-3.90%	2,673,347	2,576,000	3.78%
2011	1,456,891	1,341,000	8.64%	1,230,931	1,286,000	-4.28%	2,687,823	2,627,000	2.32%
2012	1,460,933	1,341,000	8.94%	1,234,346	1,299,000	-4.98%	2,695,279	2,640,000	2.09%
2013	1,465,113	1,361,000	7.65%	1,237,878	1,312,000	-5.65%	2,702,991	2,673,000	1.12%
2014	1,469,434	1,382,000	6.33%	1,241,529	1,325,000	-6.30%	2,710,963	2,707,000	0.15%
2015	1,473,897	1,402,000	5.13%	1,245,299	1,339,000	-7.00%	2,719,196	2,741,000	-0.80%
2016	1,492,545	1,423,000	4.89%	1,261,055	1,352,000	-6.73%	2,753,600	2,775,000	-0.77%
CAGR	2.35%	1.82%		-0.74%	0.70%		0.84%	1.26%	

Martin With New PNW and Asian Service

	Martin Overseas	Official Statement Overseas	% Difference	Martin Interisland	Official Statement Interisland	% Difference	Martin Total	Official Statement Total	% Difference
2009	1,268,276	1,254,604	1.09%	1,328,071	1,287,718	3.13%	2,596,347	2,542,322	2.13%
2010	1,449,045	1,302,000	11.29%	1,224,302	1,274,000	-3.90%	2,673,347	2,576,000	3.78%
2011	1,456,891	1,341,000	8.64%	1,230,931	1,286,000	-4.28%	2,687,823	2,627,000	2.32%
2012	1,594,651	1,341,000	18.92%	1,234,346	1,299,000	-4.98%	2,828,997	2,640,000	7.16%
2013	1,598,831	1,361,000	17.47%	1,237,878	1,312,000	-5.65%	2,836,709	2,673,000	6.12%
2014	1,736,869	1,382,000	25.68%	1,241,529	1,325,000	-6.30%	2,978,398	2,707,000	10.03%
2015	1,741,332	1,402,000	24.20%	1,245,299	1,339,000	-7.00%	2,986,632	2,741,000	8.96%
2016	1,759,980	1,423,000	23.68%	1,261,055	1,352,000	-6.73%	3,021,036	2,775,000	8.87%
CAGR	4.79%	1.82%		-0.74%	0.70%		2.19%	1.26%	

Source: Official Statement, March 24, 2010, State of Hawaii, Airports System Revenue Bonds. 2010 enplanements are actual enplanements in Martin Projections

Table 9 presents a comparison of the current Master Plan (Martin Enplanements) passenger projections for Kahului Airport with those developed by the Federal Aviation Administration (FAA), Terminal Area Forecasts (TAF). As this table indicates, the passenger projections are typically within 5% through the year 2020, under both the baseline and high (scenario 3 increased PNW and Asian flights) passenger projection scenarios developed under the current Master Plan. In later years of the projection period, the Master Plan projections are within 10% of the TAF projections through 2025 under the baseline and high projections (scenario 3), with the Master Plan projections being lower in the later years of the projection period. Under the increased overseas flight scenario (Scenario 3) developed in the Master Plan, the projections are within 8% of the TAF projections, and in fact, nearly identical to the TAF projections in the years 2021 through 2025.

Table 9
Comparison of Master Plan Passenger Projections with the FAA Terminal Area Forecasts for Kahului

Date	TAF Enplanements	Martin Base Enplanements	Martin Increased PNW and Asian Flights Enplanements	Martin Base/TAF % Difference	Martin Increased PNW and Asian Flights/TAF - % Difference
2009	2,480,121	2,596,347	2,596,347	4.69%	4.69%
2010	2,474,597	2,673,347	2,673,347	8.03%	8.03%
2011	2,604,398	2,687,823	2,687,823	3.20%	3.20%
2015	2,803,852	2,719,196	2,986,632	-3.02%	6.52%
2020	3,077,040	2,895,642	3,163,077	-5.90%	2.80%
2025	3,379,703	3,049,524	3,316,959	-9.77%	-1.86%
2030	3,715,433	3,183,893	3,451,328	-14.31%	-7.11%

2010 enplanements are actual enplanements in Martin Projections. Source for FAA projections is the- FAA Terminal Area Forecasts.

Table 10 compares the operational projections developed as part of the Master Plan with those prepared in the Revised FAA TAF report. The FAA TAF report for Kahului was published in 2009 (and the enplanements presented in this 2009 report are presented in Table 9). The report was revised in 2011. The FAA also has also prepared a draft revised TAF forecast for Kahului. As this table shows, the published revised TAF forecasted enplanements for 2010 area 8% below the actual enplanement levels reported at Kahului in 2010. The enplanements projected under the 2011 Revised draft TAF projections are 6.5% below the actual 2010 level of enplanements . The master plan forecasted enplanements are those estimated under Scenario 3, which includes the addition of two PNW and Asian flights, and further assumes that the interisland and overseas flights will operate at an 85% capacity level. Under these assumptions, the revised draft TAF and Master Plan enplanement forecasts for 2015 and 2020 are nearly identical.

However, the Master Plan Operational Forecasts are less than the annual operations projected under both the published revised TAF and the Draft Revised TAF. Under both the revised published TAF and the Draft TAF, the operations are projected to grow at a much greater rate than are enplanements, which is inconsistent with the historical performance of passenger activity and operational levels at Kahului.

Table 10: Comparison of Master Plan Projection Summaries with Revised TAF

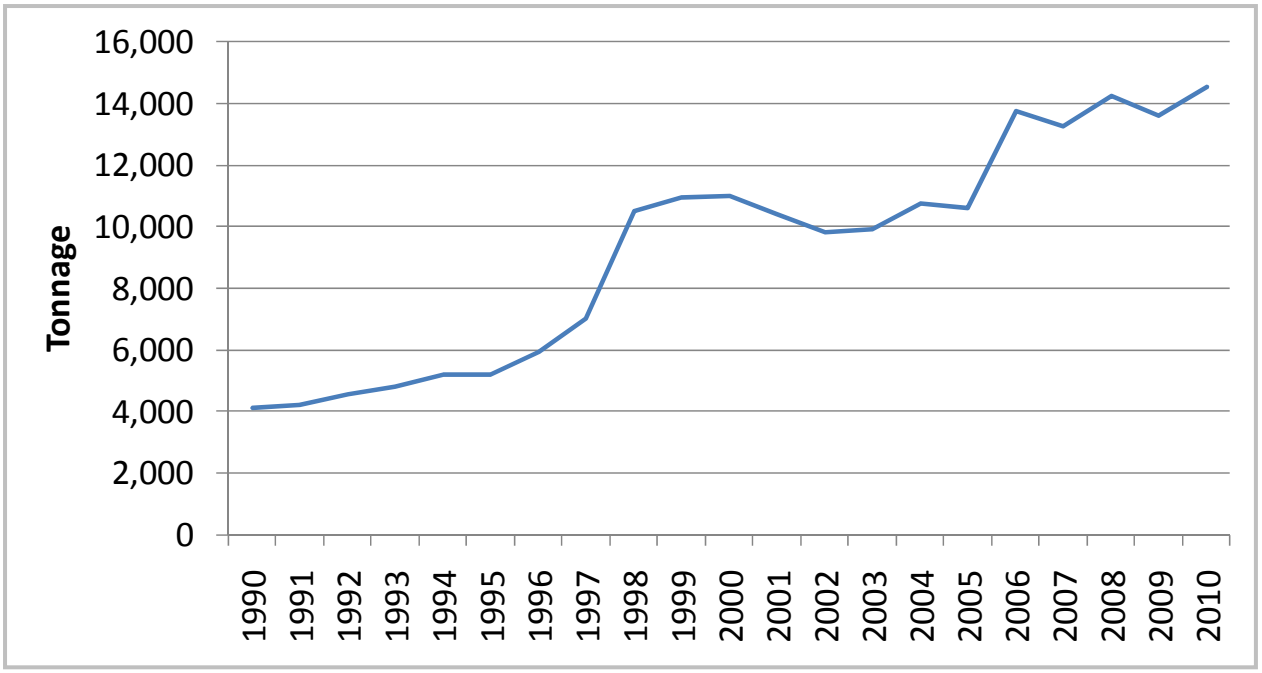
	Year	Master Plan Forecast	Published TAF	MP/TAF (% Difference)
Enplanements				
Base yr. 2010 (actual)	2010	2,673,347	2,474,597	8.0%
Base yr. + 5yrs.	2015	2,719,196	2,803,852	-3.0%
Base yr. + 10yrs.	2020	2,895,642	3,077,040	-5.9%
Commercial Operations				
Base yr. 2010 (actual)	2010	98,787	96,655	2.2%
Base yr. + 5yrs.	2015	103,478	118,351	-12.6%
Base yr. + 10yrs.	2020	109,871	129,300	-15.0%
Total Operations				
Base yr. 2010 (actual)	2010	118,896	116,338	2.2%
Base yr. + 5yrs.	2015	123,587	138,820	-11.0%
Base yr. + 10yrs.	2020	129,980	151,453	-14.2%

	Year	Master Plan Forecast	DRAFT TAF	MP/TAF (% Difference)
Enplanements				
Base yr. 2010 (actual)	2010	2,673,347	2,509,281	6.5%
Base yr. + 5yrs.	2015	2,719,196	2,716,154	0.1%
Base yr. + 10yrs.	2020	2,895,642	2,965,932	-2.4%
Commercial Operations				
Base yr. 2010 (actual)	2010	98,787	96,655	2.2%
Base yr. + 5yrs.	2015	103,478	114,588	-9.7%
Base yr. + 10yrs.	2020	109,871	125,622	-12.5%
Total Operations				
Base yr. 2010 (actual)	2010	118,896	116,338	2.2%
Base yr. + 5yrs.	2015	123,587	135,955	-9.1%
Base yr. + 10yrs.	2020	129,980	147,487	-11.9%

Air Mail Projections

As noted previously, air mail at Kahului has been increasing over time, and appears to be related to the growth in resident population in Maui County. Figure 42 shows that mail handled at Kahului increased by 2.8% CAGR since 2000. Figure 43 shows the historical relationship between air mail at Kahului and Maui County population.

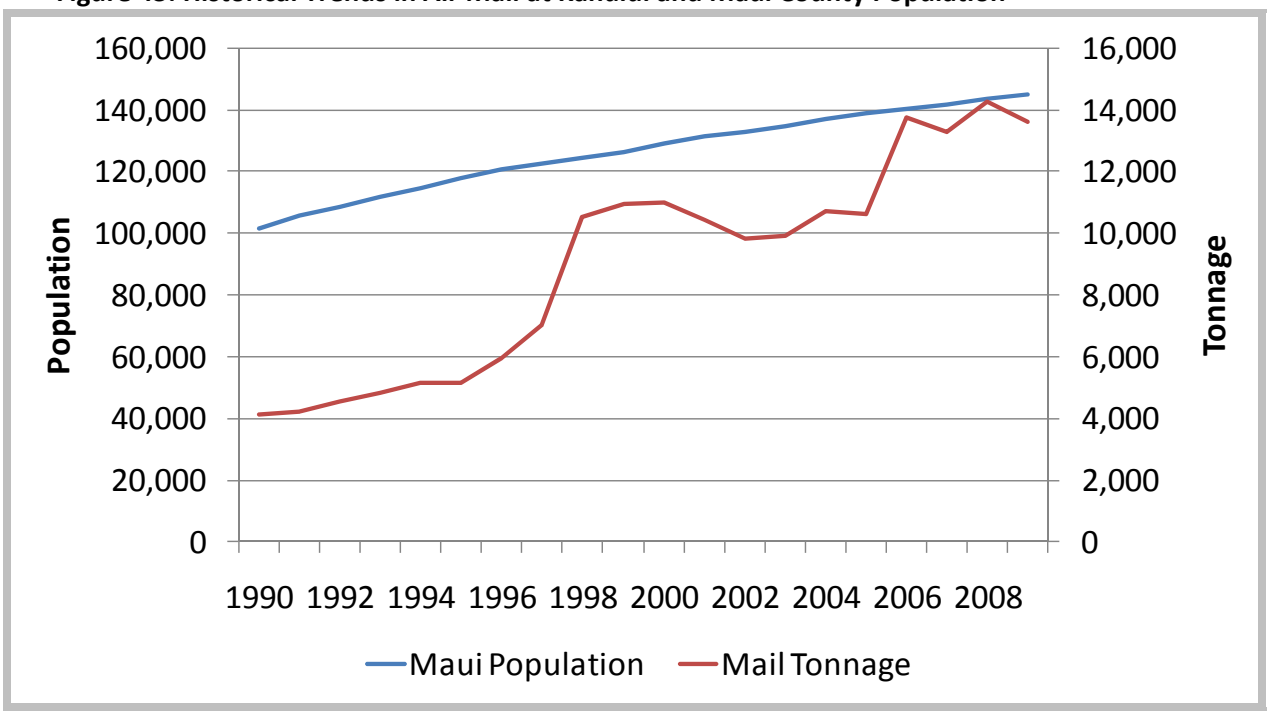
Figure 42: Air Mail Handled at Kahului



Source: Department of Transportation. Airports Division; State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

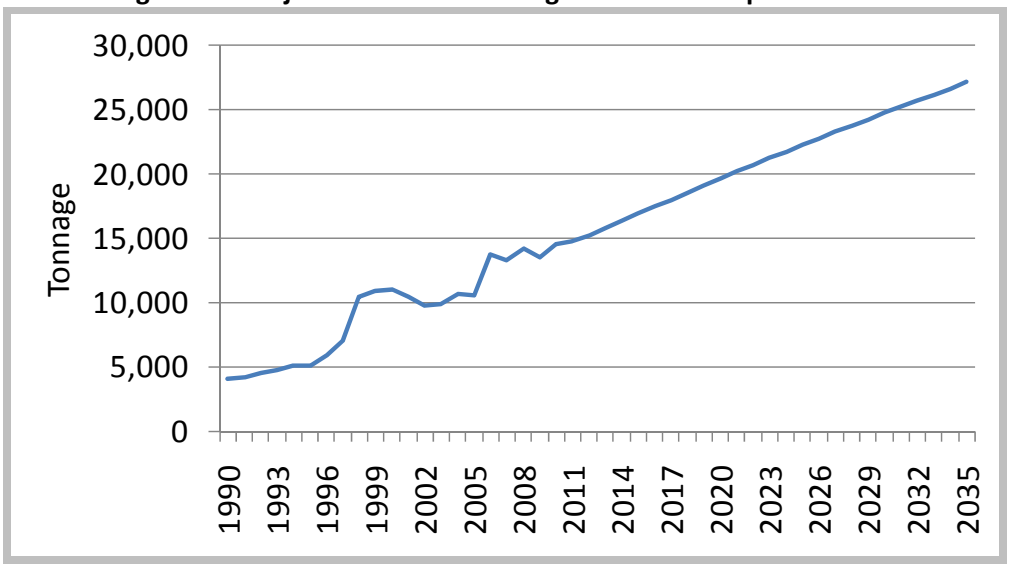
A regression was developed to formulate a statistical relationship between air mail tonnage at Kahului and Maui County population. The regression resulted in an R^2 of .89 and the model is significant at the 99% level of confidence. Projected population for Maui County developed by the Hawaii Department of Business, Economic Development and Tourism was used in the regression model to project annual air mail tonnage levels at Kahului. The projected level of air mail at Kahului is presented in Figure 44. Over the 25 year projection horizon, the air mail is projected to grow at an annual rate of 2.5%. Air mail is carried on commercial and air taxi operations and hence separate air mail operations are not developed as part of this report.

Figure 43: Historical Trends in Air Mail at Kahului and Maui County Population



Source: Department of Transportation. Airports Division; Hawaii Department of Business, Economic Development and Tourism. State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Figure 44: Projected Air Mail Tonnage at Kahului Airport

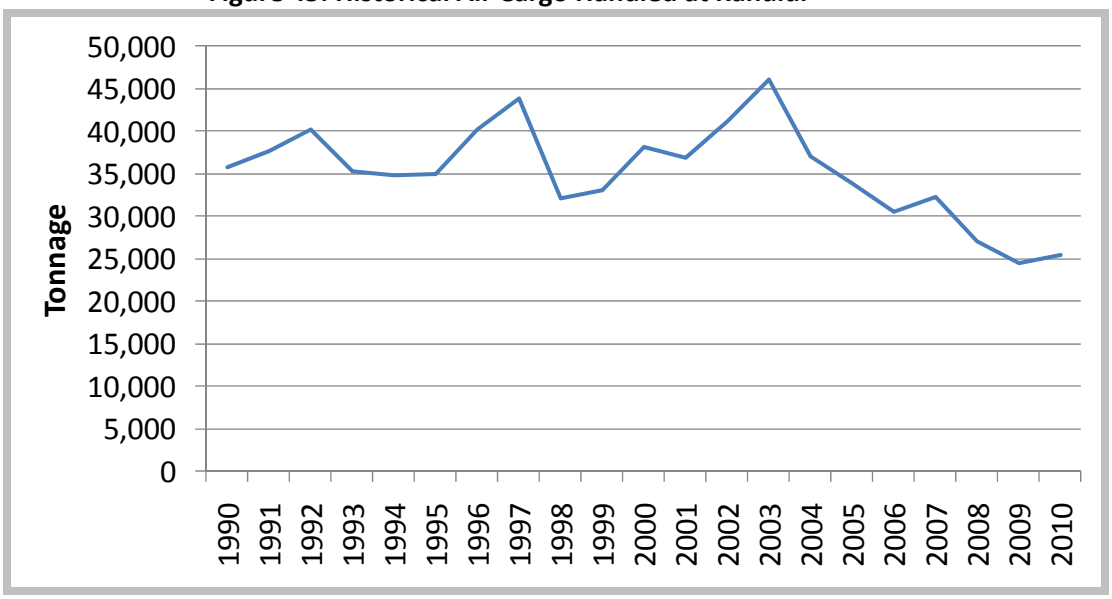


Source: Hawaii Department of Transportation, Airports. State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

Air Cargo Projections

Historically, air cargo at Maui has been declining, as shown in Figure 45.

Figure 45: Historical Air Cargo Handled at Kahului



Source: Hawaii Department of Transportation, Airports. State of Hawaii Airport Activity Statistics by Calendar Year, Hawaii Department of Transportation, Airports Division

The decline in air cargo handled at Kahului is driven by the reduction in pineapple production and acreage in Maui County, as well as rate and capacity competition from interisland barge operations. Because of the overall downward trend in air cargo activity at Kahului, for planning purposes in the Master Plan, current air cargo tonnage at Kahului is held constant throughout the projection period. This represents 5,194 annual operations of dedicated air cargo operations.

GA and Military Operations Projections

Finally, it is assumed that FBO and Tour Operations at Kahului remain constant over the forecast period, and other non-revenue operations including military and general aviation activity are also assumed to remain constant over the forecast period. General aviation activity is projected to remain at 17,287 operations annually and military operations are assumed to remain at 2,822 operations annually.

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Federal Aviation Administration, TAF Forecasts, 2009

APPENDIX B

THE ECONOMIC IMPACTS OF KAHULUI AIRPORT, 2010

THE ECONOMIC IMPACTS OF KAHULUI AIRPORT, 2010

March 6, 2012

Prepared for:

DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

As part of the Master Plan Update for Kahului Airport, Martin Associates developed a baseline economic analysis of the airport operations in 2010. The purpose of the study is to quantify the economic impacts generated by passenger, freight, and general aviation activity at Kahului Airport for the most recent year complete operational data is available, 2010. In order to measure the impacts in the most defensible manner possible, the methodology utilized is based on interviews, local economic data, and airport statistics. The impacts are quantified in terms of:

- Jobs;
- Employee earnings;
- Business revenue; and
- State and local taxes and Federal airport-specific taxes.

The impacts are estimated for total airport activity for calendar year 2010. In addition to the baseline impacts, an economic impact model has been developed which can be used to estimate the impacts associated with capital construction and expansion projects identified in the Kahului Master Plan. Furthermore, the model can be used for annual updates of the impacts as well as to test the sensitivity of impacts to changes in:

- Passenger levels;
- Domestic versus international passengers;
- Passenger trip purpose;
- Peak hour flight levels and mix of aircraft;
- Labor productivity and work rules; and
- Freight levels.

The methodology used in this analysis has been used by Martin Associates to estimate the economic impacts generated by airport activity for the following airports:

- Hartsfield Atlanta International Airport
- Miami International Airport
- Denver's Stapleton International Airport
- San Francisco International Airport
- Portland (PDX) International Airport
- Minneapolis/St. Paul International Airport
- Milwaukee's General Mitchell International Airport
- Seattle-Tacoma International Airport
- Toronto's Lester B. Pearson International Airport

- Washington Dulles International and Reagan National Airports
- San Jose International Airport
- Sacramento International Airport
- Oakland International Airport
- Bellingham (WA) International Airport
- Harrisburg International Airport
- General Aviation and Commuter Airports in:
  - Harrisburg, PA
  - Lancaster, PA
  - Carlisle, PA
  - Milwaukee, WI
  - San Jose, CA
  - Hillsboro, OR
  - Troutdale, OR
  - Mulino, OR
  - 34 GA Airports in the State of Maryland

1. IMPACTS CREATED BY OGG ACTIVITY IN 2011

In 2010, passenger and air freight activity at Kahului Airport had the following impacts:

- 2,682 direct, induced and indirect jobs were generated for residents of Maui and the state of Hawaii. Of the 2,682, jobs 1,824 were direct jobs, while 635 jobs were induced throughout the region to support the purchase of goods and services by the 1,824 directly dependent employees. An additional 222 indirect jobs were generated in the local economy due to $34.5 million of local purchases by firms directly dependent on the airport.

- $132.3 million of direct, induced and indirect personal income and consumption expenditures were generated in Maui as a result of the airport activity in 2011.

- Nearly $1.1 billion of business sales were generated by airport activity, including $21.1 million of business revenue generated by air cargo activity.

- The Federal Government received $82.0 million in airport-specific taxes from activity at Kahului Airport.

- State and local governments received $12.7 million in tax revenues from airport activity.

In addition to these airport-generated impacts, it is estimated that 44,025 direct, induced and indirect jobs were supported in the Maui visitor industry due to expenditures by the 2.1 million visitors to the region who arrived via the Kahului Airport. These visitors, who include both domestic as well as international travelers, spent about $2.8 billion on island hotels, restaurants, retail stores and entertainment establishments, which in turn generated the jobs in the Maui visitor industry. As the result of visitors arriving via the airport, $119.3 million of state and local tax revenues were generated.

With a combined economic impact of nearly 47,000 direct, induced and indirect jobs, it is critical to maintain and invest in the airport infrastructure in order to sustain and grow the economic conditions within Maui.

I. INTRODUCTION, OVERVIEW AND SUMMARY OF RESULTS

As part of the Master Plan Update for Kahului Airport, Martin Associates developed a baseline economic analysis of the airport operations in 2010. The purpose of the study is to quantify the economic impacts generated by passenger, freight, and general aviation activity at Kahului Airport for the most recent year complete operational data is available, 2010. The economic impacts created by the airport are measured in terms of jobs, personal income, state and local taxes, and revenue generated directly by airport activity, including the impact of visitors to Maui who use Kahului Airport.

The methodology used in this analysis has been used to assess the economic impacts created by airport activity at Hartsfield Atlanta International Airport, San Francisco International Airport, Seattle-Tacoma International Airport, Miami International Airport, Milwaukee's General Mitchell International Airport, Minneapolis/St. Paul International Airport, Washington, DC's Reagan National and Dulles International Airports, Oakland International Airport, Baltimore-Washington International Airport, Portland International Airport, San Jose International Airport and Sacramento International Airport.

In order to measure the impacts in the most defensible manner possible, the methodology utilized is based on interviews, local economic data, and airport statistics. An operational model of the airport was also developed to use in updating the impacts on a short term basis, and to measure the incremental changes in airport generated impacts due to changes in such factors as changes in total passenger and air freight levels, changes in the number of flight operations, changes in domestic and international passenger levels, and changes in work rules by airlines. Also, the model is designed to measure the economic impacts of various capital investment and airport expansion projects associated with the current Kahului Master Plan Study.

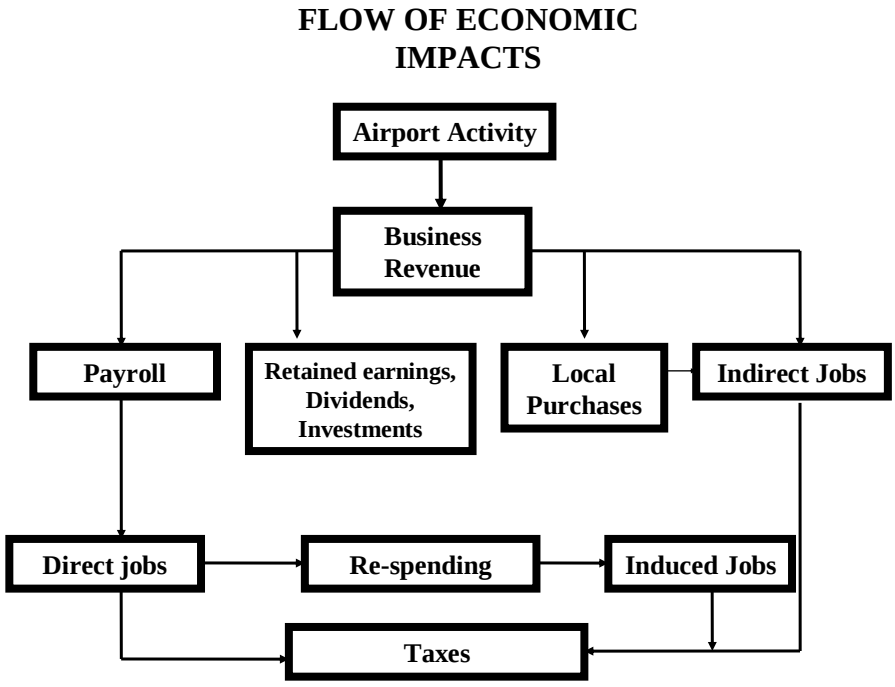
The remainder of this chapter summarizes the methodology, highlights key assumptions, and summarizes the major findings.

1. IMPACT STRUCTURE

Activity at a major airport contributes to the local and state economy by generating business revenue to local and national firms providing air passenger service, freight service and support services to the airport and the airlines. These firms, in turn, provide employment and income to individuals, and pay taxes to state and local governments. Exhibit I-1 shows how air traffic activity at Kahului Airport generates

impacts throughout the local and state economy. As this exhibit indicates, the impact of an airport on a local, state or national economy cannot be reduced to a single number, but instead, airport activity creates several impacts. These are the revenue impact, employment impact, personal income impact, and tax impact. These impacts are not additive. For example, the income impact is a part of the revenue impact, and adding these impacts together would result in double counting. Exhibit I-1 shows how activity at Kahului Airport generates the four impacts.

Exhibit I-1
Flow of Economic Impacts Generated by
Airport Activity



1.1 Revenue Impact

At the outset, activity at the airport generates business revenue for firms which provide air passenger service, freight service and ground support services. This business revenue impact is dispersed throughout the economy in several ways. It is used to hire people to provide the services, to purchase goods and services, to pay for the use of airports and to make federal, state and local tax payments. The remainder is used to pay stockholders, retire debt, make investments, or is held as retained earnings. It is to be emphasized that the only portions of the revenue impact that can be definitely identified as remaining in Maui or the State of Hawaii are those portions paid out in salaries to

direct employees, in state and local taxes, and in payments to the airport itself. Landing fees and terminal rentals paid by airlines provide for some of the costs of operation of the airport and capital costs of new construction.

1.2 Employment Impact

The employment impact of aviation activity consists of three levels of job impacts:

- Direct employment impact - jobs directly generated by airport activity which would vanish if activity at Kahului Airport were to cease;
- Induced employment impact - jobs created throughout Maui and the State's economy because individuals directly employed due to airport activity spend their wages locally on goods and services such as food and housing;
- Indirect employment impact - jobs generated due to the purchase of goods and services by firms dependent upon airport activity;

1.3 Income Impact

The income impact is the measure of personal income received by individuals directly employed due to airport activity. This direct personal income is re-spent throughout Maui by those that are directly employed. This re-spending effect in turn generates additional jobs -- the induced employment impact. This re-spending throughout the island and state is estimated using a regional personal income multiplier, which reflects the percentage of purchases that are made within a region. The re-spending effect varies by region: a larger re-spending effect occurs in regions that produce a relatively large portion of the goods and services consumed by residents, while lower re-spending effects are associated with areas that import a relatively large share of consumer goods and services (since personal income "leaks out" of the region for these purchases). For the purposes of this study, the State of Hawaii is defined as the region.

1.4 Tax Impact

State and local tax impacts are tax payments to the state and local governments by both firms and individuals involved in providing services in support of airport activity. State and local tax impacts include tax revenue from all types of state and local taxes. Also included in the tax impact are Federal aviation-specific taxes generated by air passenger and air cargo activity at the Airport. The four types of impacts outlined above are estimated for 2010 passenger and air cargo activity at Kahului Airport (OGG).

2. ECONOMIC IMPACT SECTORS

An airport is a diverse economic system. The businesses that have employees at OGG cover a spectrum of trade and service sectors. For the purposes of this study, the airport system is divided into four sectors:

- Airline/airport service;
- Freight transportation;
- Passenger ground transportation; and
- Visitor industry services.

Each of these sectors covers a variety of activities. A discussion of these four categories is provided below, with a description of the major participants in each.

2.1 Airline/Airport Service Sector

Airline/airport service sector consists of airlines providing passenger services, general aviation, and firms providing support services to the airlines, passengers, and to the airport. This group consists of the following participants:

- Passenger Airlines;
- General Aviation, (i.e., corporate hangars and business aircraft, not-for-profit aviation services, flying clubs, etc.);
- Airport Administration;
- Catering Firms;
- Janitorial Firms;
- Sky Caps;
- Security Firms;
- Aviation Service Firms (including fixed base operators);

- Airport Retail Tenants (i.e., newsstands, retail shops, and food concessions);
- Federal Government Agencies (i.e., F.A.A., Post Office, and US Customs and Border Protection, TSA);
- Military Bases, including the Air National Guard; and
- Parking and Miscellaneous.

Jobs in this category are typically located on the airport property.

2.2 Freight Transportation Sector

Freight transportation includes freight airlines, freight forwarders, and trucking firms involved in transporting air freight. The air cargo consists of air freight and mail transported on dedicated freight airlines and in the cargo section of passenger airlines. Included in this group are air couriers, freight forwarders, and common carrier trucking firms located throughout Maui. Jobs in this category are located both on and off the airport.

2.3 Passenger Ground Transportation Sector

Passenger ground transportation consists of car rental firms and other ground transportation modes, such as buses, taxis and limousines. This group covers all transportation of individuals to and from Kahului Airport and includes both drivers and supporting reservation and maintenance employees.

2.4 Visitor Industry Services Sector

Both domestic and international passengers arrive in Maui via the Kahului Airport for several purposes, including business, pleasure and conventions. As a result of these out-of-town residents purchasing lodging, food and entertainment, jobs are created in the service and retail industries in Maui. To evaluate the impacts of visitors arriving via air in Maui, the data supplied by the Hawaii Tourism Authority for air passengers in Maui were used to develop expenditure data by air visitors.

3. DATA COLLECTION

Impacts were estimated on the basis of interviews with firms in the economic impact categories described above. Data from 59 firms were included in the analysis. Exhibit I-2 shows the number of firms by type of firm. It is to be emphasized that multiple interviews were conducted with most firms. These firms were identified from

the tenant records of Kahului Airport. A 100% a response rate was achieved from these firms.

Exhibit I-2
Summary of Interview Responses

	Firms
Airlines	13
Rental Cars	6
Concessions	17
Government	9
FBOs	14
Total	**59**

4. SUMMARY OF FINDINGS

The key economic impacts generated by the Kahului Airport are presented in Exhibit I-3. It is to be emphasized that these measures separate and distinct economic impacts generated by airport activity at Kahului and are not additive.

Exhibit I-3
Summary of Impacts Generated by the
Kahului Airport, 2010

IMPACTS	AIRPORT GENERATED	VISITOR INDUSTRY	TOTAL IMPACT
JOBS			
DIRECT	1,824	27,020	28,844
INDUCED	635	8,186	8,821
INDIRECT	222	8,819	9,042
TOTAL	**2,682**	**44,025**	**46,706**
PERSONAL INCOME (MILLIONS)			
DIRECT	$64.9	$712.3	$777.2
INDUCED	$58.9	$530.6	$589.5
INDIRECT	$8.5	$257.9	$266.4
TOTAL	**$132.3**	**$1,500.8**	**$1,633.1**
BUSINESS REVENUE (MILLIONS)	**$1,107.2**	**$2,750.1**	**$3,857.2**
LOCAL PURCHASES (MILLIONS)	**$34.5**	**$464.2**	**$498.7**
STATE AND LOCAL TAXES (MILLIONS)	**$12.7**	**$119.3**	**$132.0**
FEDERAL GOVERNMENT AVIATION - SPECIFIC TAXES (MILLIONS)	**$82.0**	**NA**	**$82.0**

II. EMPLOYMENT IMPACTS

In this chapter, the employment generated by air cargo and passenger activity at Kahului Airport is estimated. The chapter is organized as follows:

- First, employment that is totally or partially dependent on the activities at Kahului Airport is estimated;
- Second, the subset of total employment that is judged to be totally dependent on airport activity is discussed; and
- Induced and indirect jobs are described.

1. TOTAL JOB IMPACTS

As a result of airport activity in 2011, 46,706 Maui residents held jobs that were in some way related to activity at the Kahului Airport. Of these residents:

- 1,824 direct jobs are dependent upon activity at Kahului Airport. These jobs would be discontinued immediately if airport activity ceased. Also, these jobs would be impacted as a result of changes in number of flights and passenger levels.
- 635 induced jobs are created in the region due to the purchases of goods and services within the region by those 1,824 directly dependent upon activity at Kahului Airport.
- 222 indirect jobs are generated in the local economy due to the $34.5 million of local purchases for office supplies, maintenance and repair work, communications and utilities, professional services, fuel, etc., by those firms completely dependent upon the airport.
- 44,025 visitor industry jobs are created in the region as a result of visitors arriving via Kahului Airport. Of these, 27,020 jobs are created with hotels, restaurants, retail outlets, entertainment and recreational establishments due to direct expenditures by visitors in Maui who have arrived via the airport. In addition, 8,186 induced jobs are supported by the regional purchases of the 27,020 individuals holding jobs directly created due to expenditures by visitors using OGG. Finally, another 8,819

jobs are indirect jobs supported by $464.2 million of local purchases by the hotels, restaurants and other visitor industry firms impacted by the visitors arriving via OGG.

Chapter IV presents a more detailed discussion of the job impacts created due to visitor expenditures.

2. DIRECT JOB IMPACTS

As Exhibit II-1 shows, 65% of the 1,824 jobs directly generated by airport activity are concentrated in the airline/airport service category. The number of jobs in the other two categories is small in comparison.

Exhibit II-1
Direct Job Impacts by Sector
Kahului Airport

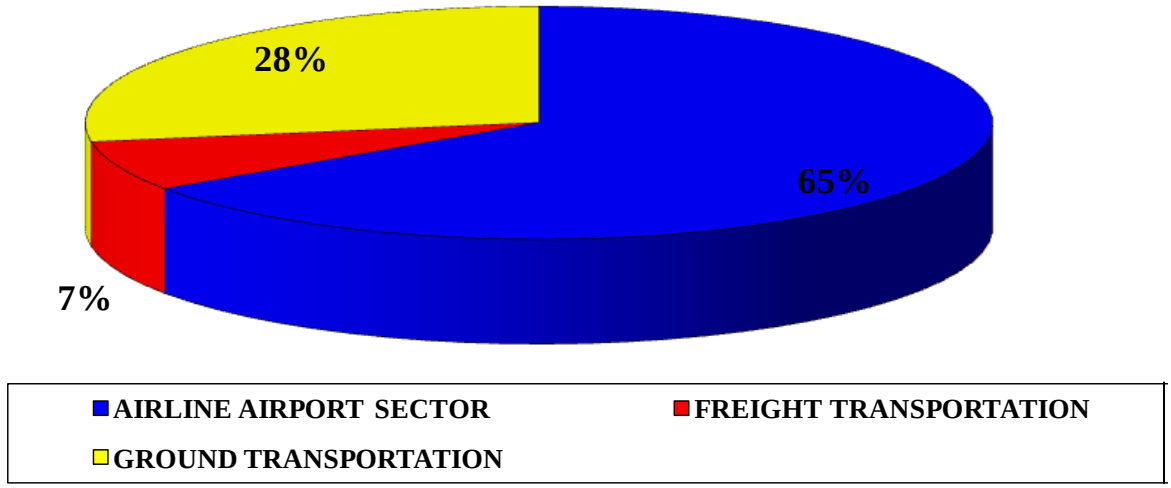


Exhibit II-2 shows the distribution of employment within each major sector. More than 612 jobs with passenger airlines are concentrated in the first category. The jobs include flight crews, administration, ticket agents, ramp employees, and maintenance workers.

Exhibit II-2
Direct Job Impacts by Category

IMPACT CATEGORY	DIRECT JOBS
AIRLINE/AIRPORT SECTOR	
PASSENGER AIRLINES	612
CATERING (NON AIRLINE-OWNED)	55
FEDERAL GOVERNMENT	240
OGG AIRPORT ADMINISTRATION	56
RETAIL CONCESSIONS	103
FIXED BASE OPERATORS/GA	126
SUBTOTAL	**1,192**
FREIGHT TRANSPORTATION SECTOR	
FREIGHT AIRLINES & COURIERS	112
FREIGHT FORWARDERS	15
SUBTOTAL	**127**
GROUND TRANSPORTATION	
RENTAL CARS	290
TAXIS/LIMOS/VANS	214
SUBTOTAL	**504**
TOTAL	**1,824**

Totals may not add due to rounding

4. INDUCED JOB IMPACT

A portion of the income received by those 1,824 directly employed due to airport activity is saved, another portion is used to pay federal, state and local taxes, while another portion is used to purchase goods and services from firms located in Maui and the State, as well as out-of-region firms. The purchase of goods and services from Maui firms creates induced jobs for area residents in the firms supplying the goods and services. Furthermore, those individuals supplying the goods and services also receive income from their employers and use a portion of it for additional purchases from firms located in the area. This "trickle-down" effect of an initial income expenditure results in a multiplier effect throughout Maui and the State of Hawaii known as the personal income multiplier. As a result of this re-spending, 635 additional jobs in other sectors of

the regional economy are supported. These jobs are with state and local government agencies (excluding those state and local government jobs included as direct impacts), financial/business and educational services, retail, housing/construction, transportation services (including service stations, auto parts suppliers, automobile dealers, body shops, etc.), entertainment/recreational services, apparel and healthcare services.

5. INDIRECT IMPACTS

In addition to these induced jobs created due to purchases by the 1,824 individuals directly employed due to activity at Kahului Airport, additional jobs in Maui and State economies will be created indirectly due to the purchase of goods and services by the firms involved in airport activity. For example, airlines purchase such items as fuel, catering services, parts and office supplies from local firms, thereby creating jobs in these supplying industries. Similarly, the airport itself purchases such services as contract construction, utilities, and maintenance services from local suppliers, also creating jobs in the local economy. For the most part, the jobs resulting from such purchases are included in the direct job impacts (see Exhibit II-2). For example, the 55 jobs with caterers, the 126 jobs with suppliers of aircraft services, (including fixed based operators, fuel handlers, and parts suppliers), and the 504 jobs with rental car companies and cab operators are all included as direct job impacts. In some studies, impacts in these supplying industries are included as indirect jobs and measured through the use of a regional input/output model. For the purposes of this study, a more detailed assessment of jobs in the supplying industries was more appropriate since many are located on the airport facility and these impacts are considered as direct job impacts.

In addition to these purchases, another $34.5 million of local purchases were made by the firms' dependent upon the airport. These local purchases include purchases for goods, maintenance and repair services, utilities and communications, transportation and fueling. The $34.5 million of local purchases supported the 222 indirect jobs.

III. REVENUE, INCOME AND TAX IMPACTS

The movement of passengers and freight via Kahului Airport generates revenue for firms in each of the four categories of airport-related activity. For example, in the airline/airport service category, revenue is received by catering firms providing services to the airlines, and by airport tenants who sell retail merchandise to passengers in the airport. In the freight transportation category, airlines receive revenue from moving the air cargo to and from the airport and freight forwarders receive revenue from arranging air transportation for the cargo. Similarly, the rental car agencies and the firms providing ground transportation receive revenue from transporting passengers to and from the airport, while contract construction and consulting firms receive revenue from the airport and airlines that have contracted these services. In the hotel/restaurant/visitors service category, local service and retail firms receive revenue from passengers staying overnight in the Maui area.

Revenue generated by airport activity is dispersed throughout the economy in several ways. For example, gross revenue is used to pay employee salaries and the whole range of taxes, it is distributed to stockholders, and it is used for purchases of goods and services (as described in the discussion of indirect job impacts in the last chapter). Only part of this revenue can be traced geographically with any degree of accuracy, the portion of the revenue paid out in salaries and state and local taxes. These impacts are addressed in separate sections of this chapter.

1. REVENUE IMPACT

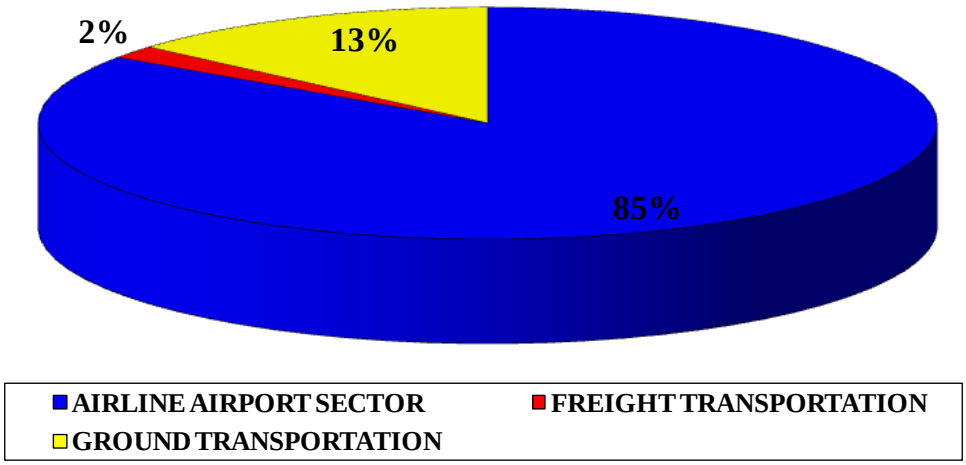
It is useful to estimate the revenue received by each category of firms involved with airport activity because the distribution is quite different from that of employment. However, only a portion of the revenue can be definitely traced to uses within the Maui regional economy. The portion of revenue paid in salaries and re-spent within the Maui regional economy or paid in taxes by individuals, and state and local taxes paid by firms, represents an impact that can be traced as remaining in the regional economy. In addition, airline user fees paid to the airport represent local impacts.

As explained in Chapter II in relation to the indirect job impact, it is unlikely that a large portion of a firm's expenditures on goods and services takes place within the Maui economy. Although to the extent that local products and services are purchased, this represents an additional impact. For example, the majority of air carrier purchases of major equipment are made out of the region. Thus, there is little spin-off effect and the use of an expenditure multiplier would overstate the revenue impact.

1.1 Revenue Impact by Sector

In 2010, passenger and air freight activity generated $1.1 billion of business revenue to firms providing services at the airport. Exhibit III-1 indicates the distribution, by economic impact sector, of the $1.1 billion of revenue generated by airport activity at Kahului Airport.

Exhibit III-1
Distribution of Revenue
by Sector



As with the employment impact, the majority of revenue generated by airport activity is concentrated in the airline/airport service category.

2. PERSONAL WAGE AND SALARY IMPACTS

A total of $132.3 million of direct, induced and indirect wages and salaries were generated in the Maui area as a result of airport activity in 2010. Of this total wage and salary impact, $64.9 million was paid in wages and salaries to the 1,824 direct employees. This income impact is estimated based on the average wage and salaries for each job category multiplied by the corresponding job impact in that category. In addition, $58.9 million of induced income and local consumption expenditures and $8.5 million of indirect income was generated by activity at OGG in 2010.

The spending of the $64.9 million direct personal income within Maui creates the additional employment estimated as induced jobs in Chapter II, which results in an additional $58.9 million of personal income and local consumption purchases. Re-spending of income within a region is measured by a regional income multiplier. The size of the multiplier varies by region depending on the portion of regional goods and services purchased by individuals, the higher this percentage the lower the income leakage out of the region. Based on data provided by the Bureau of Economic Analysis, for every one dollar earned by individuals in the State of Hawaii, another $0.91 is spent in the region. It is to be emphasized that this re-spending effect measures the total re-spending impact in Maui and the State of Hawaii. The induced jobs, which are generated by this re-spending of the direct income, only include jobs generated at the retail and wholesale level due to consumer purchases, since it is assumed that these jobs will most likely occur in Maui. In addition to these induced retail and wholesale jobs, there are also additional induced and indirect jobs created to support purchases by those induced jobs in the wholesale and retail sectors, i.e., a second round of induced and indirect jobs. These second level induced and indirect jobs are not estimated, since it is not possible to identify with any degree of defensibility the geographic location where these second round induced and indirect jobs are created. Because the total number of induced and indirect jobs (second, third and fourth levels, etc.) generated by airport activity is not estimated, it is not possible to divide the induced income and local consumption expenditures ($58.9 million) by the estimated induced jobs to estimate the salary and wage income associated with the estimated induced jobs (635). To do so would result in a gross overestimation of the personal income associated with the induced jobs.

In addition to the induced income, the 222 indirectly employed workers received $8.5 million of indirect wages and salaries.

3. TAX IMPACTS

Airport activity in 2010 generated government revenue through an assortment of tax payments by airport businesses and employees. The tax impacts are estimated at the state and local government levels. Federal aviation-specific taxes are estimated for passengers boarding flights at Kahului Airport and for air cargo loaded on planes at the airport. The Federal aviation-specific taxes on cargo, departing international passengers, and domestic passengers are paid to the Federal Aviation Trust Fund, which is in turn used to finance airport development throughout the US.

To estimate the state and local tax impact, per income tax burdens were developed for the State of Hawaii by the Tax Foundation. The per income tax burden was multiplied by the direct, induced and indirect wage and salary personal income generated as the result of airport activity in 2010.

Using these state and local tax indices, it is estimated that activity at Kahului Airport generated about $12.7 million of state and local tax revenues. The State of Hawaii received about $9.6 million of the tax revenue while local governments received the balance.

Federal aviation-specific taxes were estimated based on the appropriate tax formulas. The domestic passenger tax is based on a 7.5 percent tax on enplaned domestic passenger revenue. The international departure tax is based on $13.20 per enplaning passenger, while the INS/Customs tax is based on a $13.00 tax per deplaning passenger. An additional federal flight segment tax of $3.00 per domestic enplaned passenger and a $2.50 security fee per enplaned passenger are also included in the aviation specific taxes. The Federal Air Cargo Tax is based on a 6.25 percent tax levy on the value of enplaned air cargo. The average transportation value of air cargo was provided to Martin Associates by air cargo carriers. As a result of the airport activity, $82.0 million in tax revenue was paid to the Federal Government.

IV. VISITOR INDUSTRY IMPACTS

The impact of visitors on the Maui economy is measured in terms of jobs, income, revenue and taxes created in the hotels, retail establishments, entertainment activities, and transportation service firms.

Individuals visit Maui for a variety of reasons, including business, pleasure and for participation in conventions. Furthermore, both domestic and international visitors use the airport. These visitors purchase hotel rooms, pay for meals and entertainment, and make retail purchases while in Maui. These purchases of goods and services stimulate the local economy, in turn generating jobs with hotels, restaurants, retail outlets, and local entertainment establishments. Those individuals employed in the Maui visitor industry due to visitors' purchases receive income. This income is re-spent in the local economy generating induced jobs in the regional economy.

The magnitude of the economic impact generated by visitors using Kahului Airport varies directly with the volume of out-of-town visitors and the length of time the visitors stay on Maui. Also, the impacts depend upon the amount of money spent by visitors on a daily basis, as well as the types of purchases made. The volume of air visitors to the area depends upon the number of origin and destination passengers compared to connecting passengers, as well as the number of out-of town airport users versus the number of local resident users of the airport.

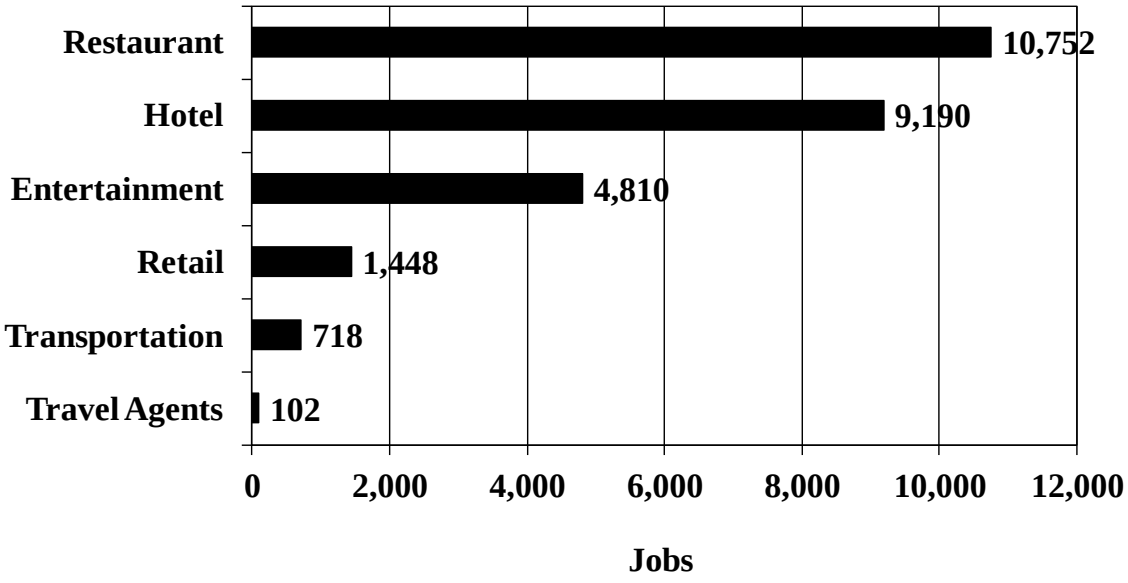
To estimate the economic impact of visitors arriving via Kahului Airport, the results of data collected by the Hawaii Tourism Authority for air visitors to Maui were used to develop passenger characteristics, including area residents versus visitors, as well as expenditure data and length of stay data.

In 2010, 2.7 million passengers boarded commercial aircraft at Kahului Airport. Of the 2.7 million enplaning passengers, 79% of the enplaning passengers were estimated to not be residents of Maui, but instead visitors to the Island. Therefore, of the 2.7 million enplaning passengers at Kahului Airport, about 2.1 million passengers were not residents. It is the travel and spending characteristics of these 2.1 million visitors that will contribute to the Maui economy through lodging, retail purchases, eating in restaurants, and local transportation services. The Hawaii Tourism Authority estimates that in 2010, 94% of air passenger visitors to Maui were on vacation or attending conferences. Furthermore, these individuals visited the Island for about 8 days per trip. On average, and individual visitor to Maui spends about $1,400 per trip.

1. VISITOR INDUSTRY JOB IMPACT

Using the results of the visitor industry data, the 2.1 million visitors arriving via Kahului Airport are estimated to have spent about $2.8 billion in the Maui visitor industry for lodging, food, entertainment, and transportation. This spending supported 27,020 direct jobs on Maui. Exhibit IV-1 summarizes these direct visitor industry impacts.

Exhibit IV-1
Direct Job Impacts Due to Visitors
Arriving Via the Airport



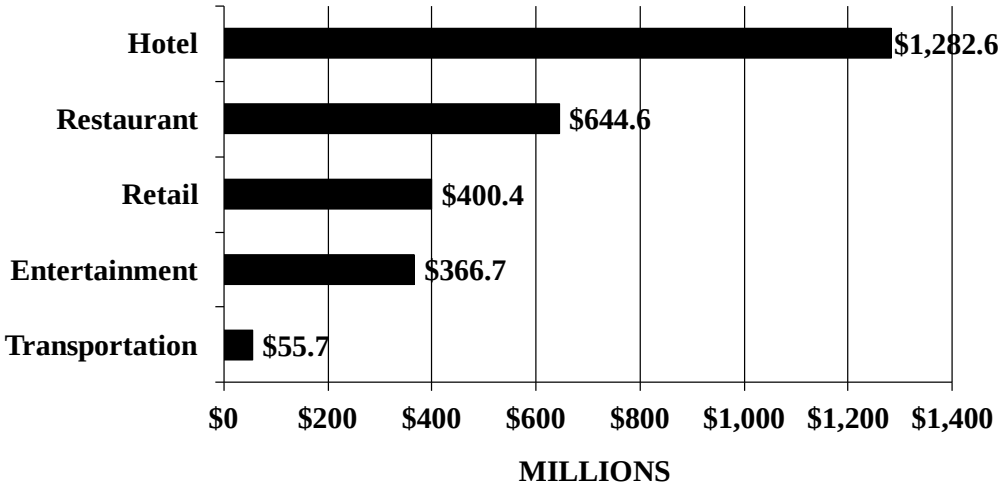
The majority of the impacts are generated in restaurants, followed by jobs with hotels and motels. About 4,810 jobs are generated with local entertainment, recreational and tourism establishments, while 1,448 are created in the retail sectors of the visitors industry. An additional 718 jobs are with local transportation jobs, including gasoline stations and support services.

2. BUSINESS REVENUE IMPACT

The purchases made by air visitors to Maui in 2010 generated $2.8 billion dollars of business revenue to hotels, restaurants, retail outlets, entertainment establishments and local transportation firms. The distribution of the business revenue by visitor sector industry is shown in Exhibit IV-2. As this exhibit demonstrates, local hotels received $1.3 billion due to visitors using the airport, while restaurants received $644.6 million in sales as a result of visitors using Kahului Airport. Another $400.4 million was spent on

local retail purchases by visitors using Kahului Airport, while visitors spent about $366.7 million on local recreational and entertainment activities and $55.7 million on local transportation.

Exhibit IV-4
Distribution of Visitor Industry Purchases
(Millions)



3. PERSONAL INCOME AND TAX IMPACTS

The 27,020 individuals directly employed in the Maui visitor industry as the result of expenditures by the 2.1 million visitors to the area received $712.3 million in wages and salaries. A portion of this personal income is also used for regional purchases of goods and services, creating induced jobs. Applying a personal income multiplier for the tourism industry in State of Hawaii developed by the Bureau of Economic Analysis, Regional Input Output Modeling System, an additional $530.6 million of re-spending and local purchases are made in the local economy. These local purchases by the 27,020 directly employed in the visitors industry support an additional 8,186 induced jobs.

The local hotels, restaurants, retail outlets impacted by the visitors made $464.2 million of local purchases for supplies and support activities. These local purchases supported 8,819 indirect jobs, and received $257.9 million of indirect income.

Finally, as a result of the visitors arriving via the Kahului Airport, $119.3 million of state and local taxes are created, including local hotel tax receipts.

APPENDIX C

DESCRIPTION OF TEMPORARY RUNWAY, TECHNICAL PAPER NO. 1

(JUNE 2014)

Technical Paper No. 1

Description of Proposed Temporary Runway

Kahului Airport

AvAirPros

CONWAY CONSULTING
AIRPORTS & AVIATION

Description of Proposed Temporary Runway
Kahului Airport (OGG)

A "Temporary Runway (T-RWY)" has been proposed to be developed and used for an interim period of time while the existing main Runway 02/20 (E-RWY) is reconstructed. This report is one of a series that describes various aspects of the T-RWY Proposed Plan for the Reconstruction of E-RWY 02/20 that include costs, schedule, East Side Facilities and Operations Accommodations, Runway Extension Options and Alternatives to the proposed project. This report describes the key physical and operational features of the proposed construction and operation of the T-RWY in conjunction with the Reconstruction of the E-RWY. The following are described in this report:

- T-RWY Characteristics and Geometry
- Project Timing Issues
- T-RWY Siting
- T-RWY and E-RWY Operations
- T-RWY and E-RWY Construction Phasing

Each is discussed and described in the Sections that follow.

1. T-RWY Characteristics and Geometry

This section provides a summary listing of the characteristics and geometry of the T-TWY.

Runway Positioning

- Lateral Separation from RWY 02/20 = 400 feet east
- T-RWY 20 threshold located at Taxiway K
- T-RWY 02 threshold located 7,000 south of TXY K (1,530 feet south of E- RWY 02/20 threshold)

Runway Geometrics

- Length = 7,000 feet
- Width = 150 feet
- Shoulders = 25 feet (west side only)
- Runway Entrance/Exits at south threshold, north threshold at TXY G and at intersection with RWY 5/23
- 1,250 feet from TXY K to RWY 05/23 paved (150 foot width)
- Blast Pad = 300 feet by 200 feet
- RSA Area off of south end conforming to grading standards
- T-RWY END 02 Elevation = +/- 60 feet
- T-RWY END 20 Elevation = +/- 15 Feet

Navigational Aids

- Edge lights (HIRL)
- REILs
- Threshold Lights
- Approach Light System (ODALS) T-RWY End 02 only
- Distance to Go Markers
- 4 Box VASI T-RWY 02 End
- E-RWY LOC remains operational for offset approaches
- T-RWY Striping = Non-Precision

Airspace

- T-RWY 02 and 20 Approach = Visual = 20:1
- Departure Surface = 40:1

Materials and Design

- Asphalt Concrete
- Minimum Thickness Design for Use and Duration
- Constant Lateral (transverse) Slope (not crowned)
- Longitudinal Slope similar to E-RWY and East Side Apron Grades

2. Project Timing Issues

The E-RWY condition has deteriorated over the years and the DOT-A has made remedial repairs to maintain operations at a safe level for over 55 years. The frequency of remedial repairs as well as the costs for those repairs has steadily increased over the years to a point where the FAA and DOT-A have agreed that continued remedial repairs are no longer cost effective and a complete reconstruction of E-RWY 02/20 is now a requirement.

Notwithstanding the above, given the current state of disrepair of the E-RWY, and the fact that it will take several years to complete the reconstruction of E-RWY 02/20, the FAA and DOT-A are planning to implement one last remedial repair and resurfacing project. This repair is anticipated to extend the useful life of E-RWY 2/20 for another five years.

The DOT-A expects to begin this project sometime during the summer of 2014. Assuming a design life of approximately five years, reconstruction of E-RWY 02/20 must be initiated on or before summer of 2019. To enable this, the proposed T-RWY must be in operation on or before the start of E-RWY 2-20 reconstruction. The timing of the need for beginning reconstruction of E-RWY 2/20 within the timeframe described above is one of several important aspects for recommending development of a T-RWY as part of the proposed approach to reconstruct E-RWY 02/20.

3. T-RWY Siting

The T-RWY is defined to have a length of 7,000 feet to provide equivalent capability as the E-RWY 02/20 for operational consistency during the reconstruction of E-RWY 02/20.

3.1 Lateral Separation

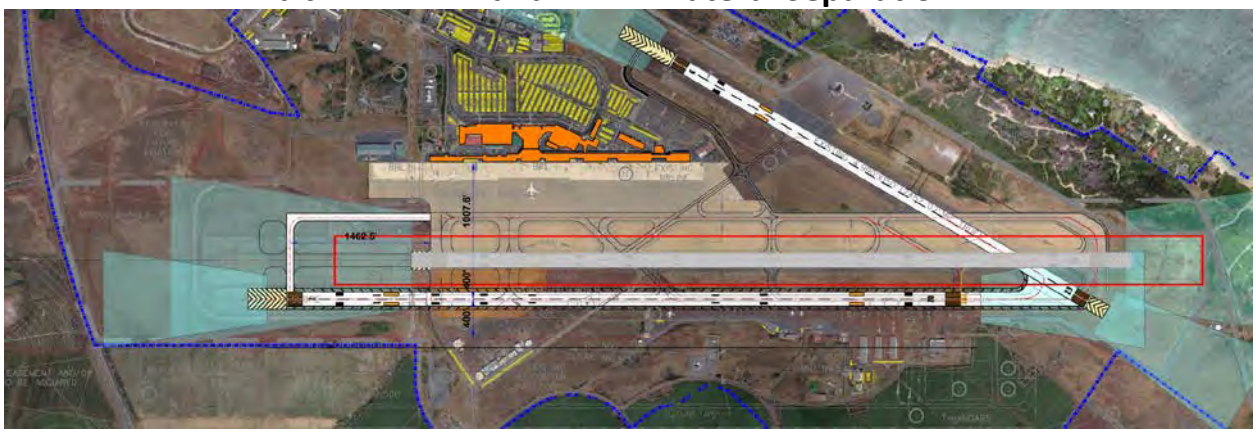
The lateral separation is defined to be 400 feet in recognition of the following key factors:

- Impacts to East Side facilities and operations
- Terrain issues to the east
- Potential reuse of T-RWY investments in paving as a parallel taxiway
- FAA construction standards

Significant among the lateral separation options, are the impacts to the East Side facilities and operations. Lateral separation distances greater than 400 feet negatively impact critical functions such as the existing ARFF Station and the ATCT, necessitating relocation which is both a significant expense but more importantly a significant time requirement.

Lesser lateral separations negatively impact the construction operations area as well as the reuse of pavement following completion of the E-RWY reconstruction. On the positive side, some of the facility and operational impacts to the east side facilities are alleviated by lateral separations less than 400 feet. Exhibit 1 shows the lateral relationship of the E-RWY and the T-RWY, keeping in mind that the two runways are neither proposed nor capable of being operated simultaneously at any time.

Exhibit 1 – E-RWY and T-RWY Lateral Separation

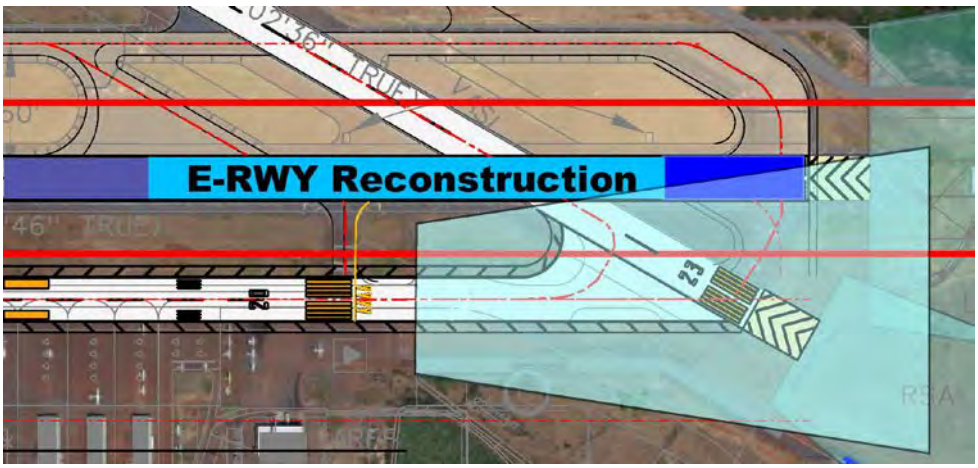


3.2 Longitudinal Placement

Considering the need to provide a totally independent interim operation during the reconstruction of E-RWY 02/20, it is necessary to first consider access to and egress from the proposed T-RWY. For arrivals it is necessary to define an exit location for the dominant north flow arrivals that facilitates clearing aircraft from the T-RWY. TXY K is a logical location for the north end of the T-RWY as it is independent of RWY 05/23 and provides access via TXY G to the passenger terminal and potential interim GA facilities to the west.

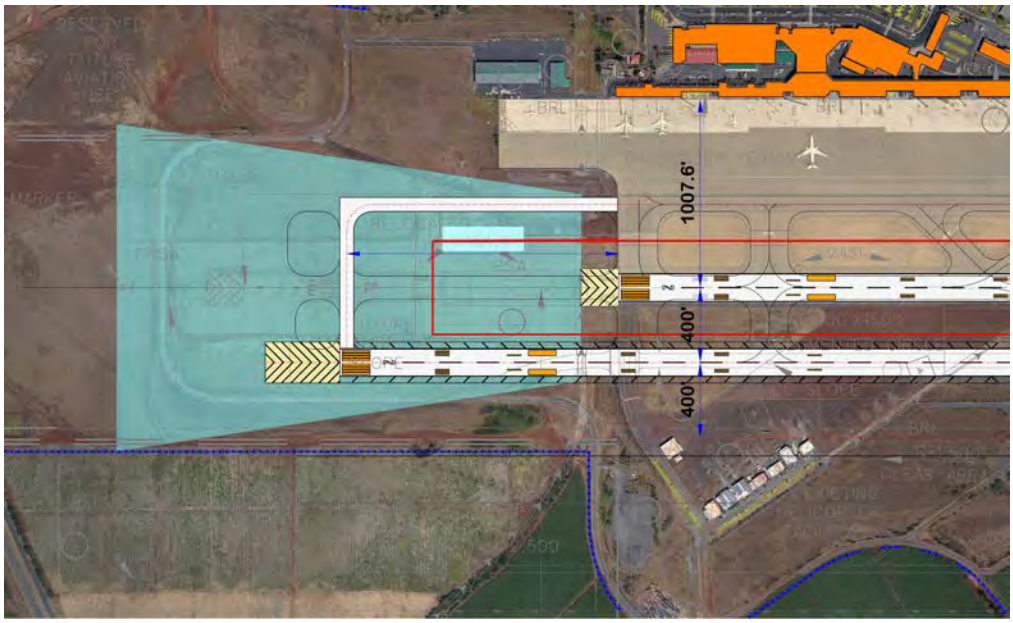
Construction phasing for the E-RWY reconstruction is a factor in this threshold location as well. An alternative location is needed to exit the T-RWY when construction is either at TXY K or at the end of the E-RWY 20 End. As a result of these considerations, the T-RWY is extended to intersect with RWY End 23. This facilitates aircraft exits when TXY K/TXY G is being reconstructed, and maintains exits when E-RWY 2/20 is being reconstructed. Creating an intersection of the T-RWY with RWY End 23 will result in a closure of RWY 05/23 while the T-RWY pavement inside of the RWY 05/23 RSA is being constructed. Exhibit 2 shows the T-RWY south threshold positioning.

Exhibit 2 – T-RWY North Threshold Location



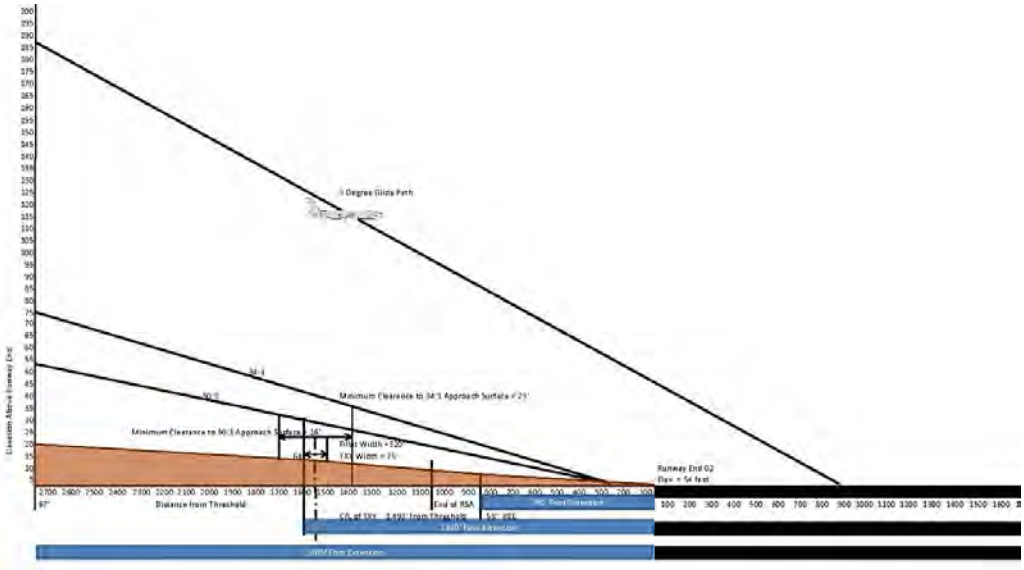
If TXY K is used as the north threshold location for the T-RWY, the south threshold would be located approximately 1,530 feet south of the existing threshold. This is a minimum distance from the E-RWY End 02 threshold to construct needed access taxiways to the T-RWY without altering E-RWY operations for a relocated threshold. The T-RWY south threshold position using TXY K as the north threshold location and a length of 7,000 feet is shown in Exhibit 3. As shown, the south threshold would be 1,530 feet south of the existing threshold, a distance that locates the needed access taxiway outside of the E-RWY 02/20 RSA.

Exhibit 3 – T-RWY South Threshold Location



In addition, the location of the needed crossover taxiway (to connect TXY A extended to the T-RWY), is sufficiently far from the E-RWY 02 threshold to allow construction under the RPZ. Exhibit 4 shows the potential construction clearances under the E-RWY End 02 approach surface (changed from precision to non-precision).

Exhibit 4 – T-RWY South Threshold Location



As shown, the ground elevation rises to the south and is higher than the E-RWY 02 threshold. The change to a non-precision runway alters the applicable approach slope to one that is more beneficial for the construction under the RPZ. The actual flight path

for a 3 degree descent path and a touchdown point about 1,500 feet down the runway is also shown in relation to the RPZ for perspective on the RPZ definition.

All dimensions will require confirmation during the design process. The dimensions defined in this document are planning level values derived from available secondary sources, the accuracy of which is acceptable for this level of planning but not for design. All values are expected to change within a limited range but not enough to affect the viability of the concept.

4. T-RWY and E-RWY Operations

The approach to the proposed project is to construct a "temporary runway" for use only during the time needed to reconstruct the E-RWY 02/20. The T-RWY is positioned such that portions of the investments made in the T-RWY have value as elements usable for future planned projects per the Airport Master Plan. The proposed project includes the following operational phases to implement:

- Phase 1
  - Complete enabling projects
  - Construct T-RWY
- Phase 2
  - Operate T-RWY and Reconstruct E-RWY 02/20
  - Transition operations back to E-RWY 02/20 and close T-RWY
  - Restore East Side Facilities

The operational Phases are described in the sections that follow.

4.1 Phase 1 Operations

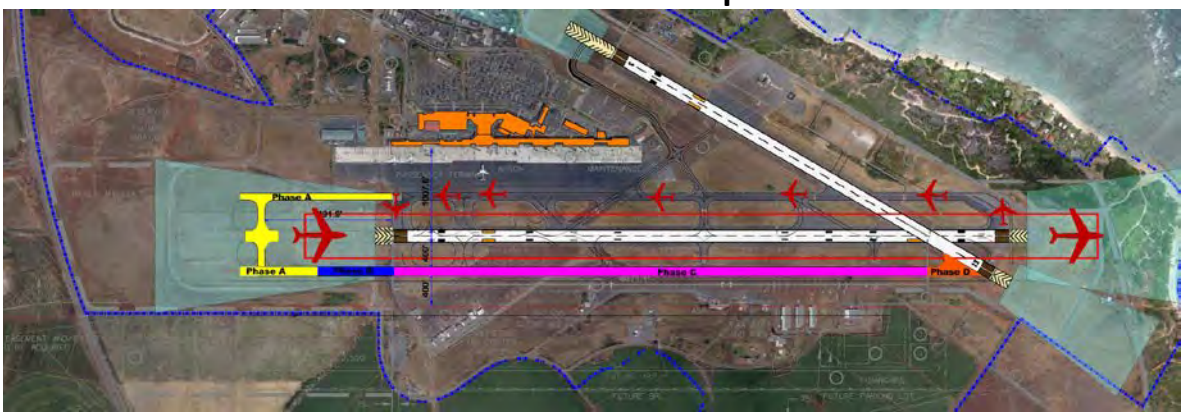
In order to construct the T-RWY, operations on the E-RWY 02/20 will be impacted by the need to construct taxiway and T-RWY pavements adjacent to and under the E-RWY 02 RPZ. These T-RWY pavement areas can be constructed while the E-RWY is operated with some limitations. These limitations are that the existing E-RWY 02 glide slope (GS) and the approach light system (ALS) will be taken out of service, resulting in a loss of precision approach capability to a non-precision approach capability. The existing localizer will remain in operation and offer non-precision arrival capability with vertical guidance provided by the existing VASI/PAPI.

Runway operations with the exception of the loss of precision arrival capability will remain largely unchanged on E-RWY 02/20 but RWY 05/23 will be either closed or restricted at some point in time during the Phase 1 operational period. The following impacts will be incurred by the users of OGG:

- Air Carrier operations – no change
- Commuter operations – RWY 05 closed for departures, increased taxi distance to E-RWY End 02
- Helicopter Operations – amended procedures to relocated TLOF
- Large GA – altered taxi patterns from interim relocation, increased taxi distance to E-RWY End 02
- Small GA (Tie-down and transient) - altered taxi patterns from interim relocation, increased taxi distance to E-RWY End 02
- T-Hangar Users – altered taxi patterns

Construction of the T-RWY north of TXY C will be phased to maintain aircraft access/egress to the E-RWY by the users permitted to remain on the East Side. Exhibit 5 shows the Phase 1 arrival/departure and taxi patterns.

Exhibit 5 – Phase 1 E-RWY Operations



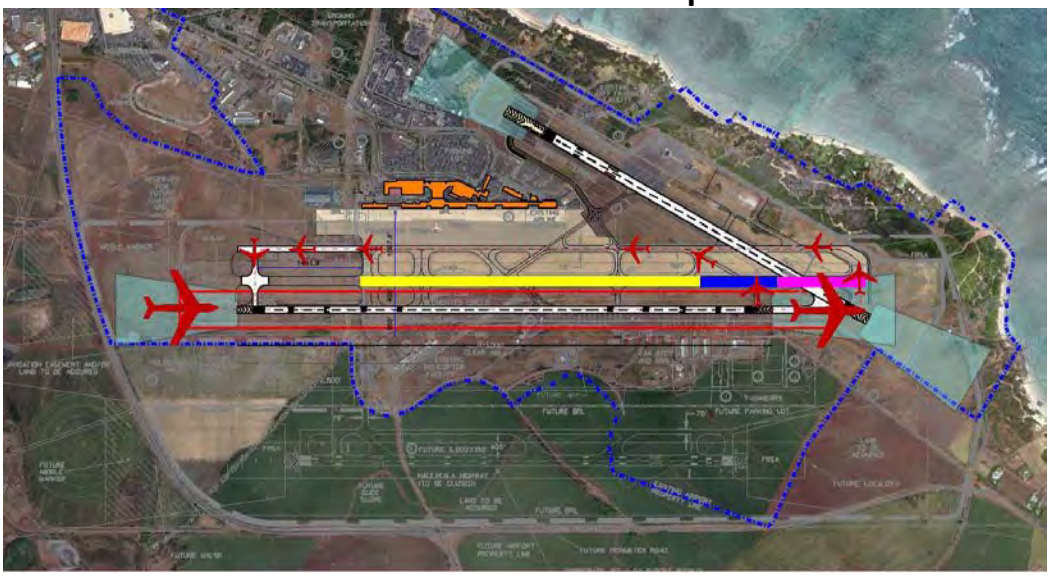
4.2 Phase 2 Operations

Upon completion and commissioning of the T-RWY, operations will be transferred to the T-RWY and E-RWY 02/20 will closed for reconstruction. Operations on the T-RWY will, at a minimum, be limited to a visual approach. Day and night operations are expected. The following impacts will be incurred by the users of OGG:

- Air Carrier operations – nominally longer outbound and inbound taxi distances
- Commuter operations – increased taxi distance to T-RWY
- Helicopter Operations – amended procedures to include amended separation requirements to relocated TLOF, may result in delays not experienced today
- Large GA – altered taxi patterns from interim relocation, increased taxi distance to T-RWY
- Small GA (Tie-down and transient) - altered taxi patterns from interim relocation, increased taxi distance to T-RWY
- T-Hangar Users – altered taxi patterns, and potential outbound delays for taxi clearance

Exhibit 6 shows the arrival/departure and taxi patterns for the Phase 2 operations.

Exhibit 6 – Phase 2 T-RWY Operations



5. T-RWY and E-RWY Construction Operations and Phasing

Considering the operational phases defined in Section 4 of this Report, the construction phases are consistently defined. The Phase 1 and Phase 2 preliminary definition of the construction phasing and issues are discussed in the sections that follow.

5.1 Phase 1 Construction Phasing

Phase 1 includes the completion of the enabling projects as well as the construction of the T-RWY and all related support structures and systems, including all Navigational Aids and associated aircraft operational procedures. The construction phasing also requires consideration of all aircraft movements. Construction for the T-RWY requires new pavement area south of the E-RWY 02 threshold and its operational surfaces to maintain continuous operations while construction is completed. Key elements of the T-RWY construction south of the E-RWY 02 threshold included:

- Extension to TXY A
- Crossover from TXY A to T-RWY south threshold
- T-RWY segment up to TXY C

Also included are enabling projects that include the infill of low terrain south and east of the E-RWY 02 threshold. This low area accommodated drainage structures that tunnel under the E-RWY 02 RSA. An extension of the drainage structure to be located under

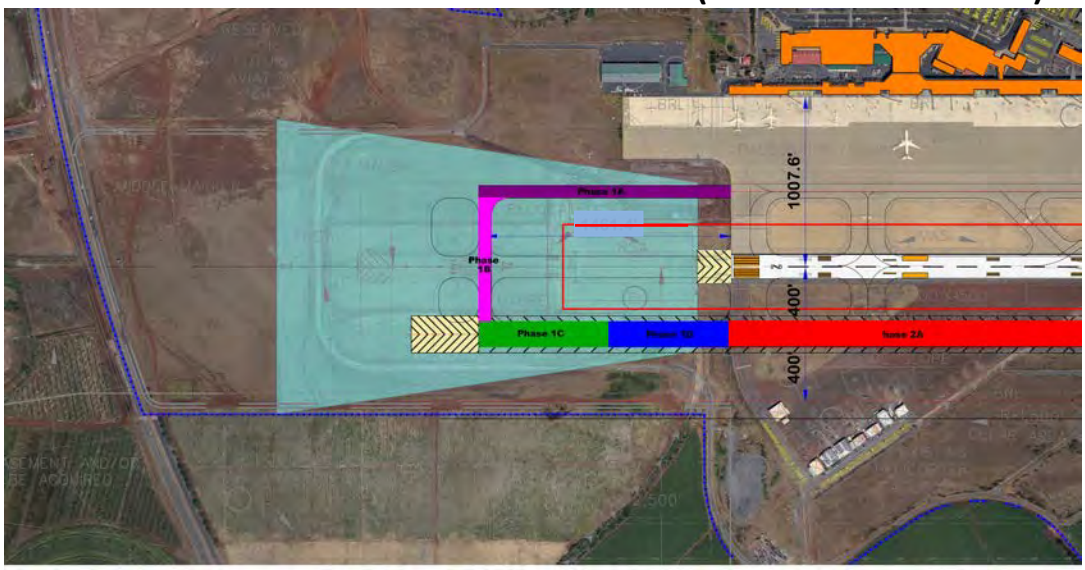
the T-RWY RSA is needed before the area of the T-RWY RSA is filled to grade. Also included as an enabling project are:

- Closure of Haleakala Road
- Terrain Excavation to the east (adjacent to the ASR and RTR)

These projects are more fully described in the East Side Facilities and Operations Report.

The pavement construction phases for the south end T-RWY under the RPZ are shown in Exhibit 7.

Exhibit 7 – T-RWY Pavement Construction (South End under RPZ)



As shown, the pavements are defined into segments for the purposes of FAA reviews:

- Phase 1A (dark purple) is the extension of TXY A to the south – This pavement segment is located outside of the ROFZ and a ROFA does not apply to a non-precision runway. Construction should be permissible day and night during E-RWY 02 operations. The tie into the existing pavement can be accomplished due to the added width of the TXY A and TXY C intersection.

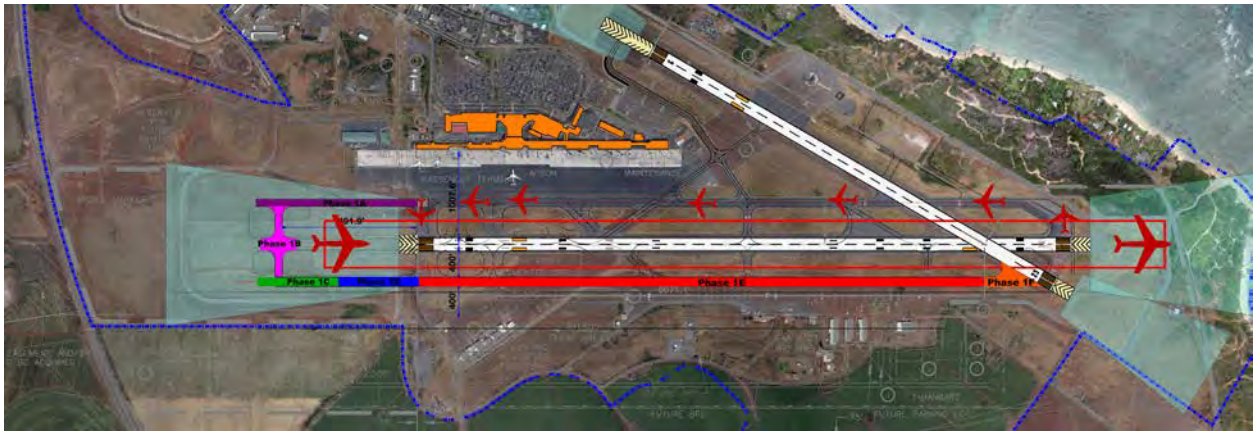
- Phase 1B (magenta) is the construction of the Connector/Crossover TXY between TXY A and the T-RWY. This pavement is sufficiently south of the E-RWY 02 threshold to be beyond the RSA and under the 34:1 non-precision approach surface. Construction day and night is expected. Note that if a runway extension is approved, transition areas will also be constructed in this phase such that aircraft access can be maintained to the T-RWY when (and if) the extension to E-RWY 2/20 is constructed.

- Phase 1C (green) includes the end portions of the T-RWY to include the blast pad and the runway segments up to the location where workers and equipment no longer remain under the RPZ. Construction day and night is expected.

- Phase 1D (blue) includes the area under the RPZ up to TXY C, and within the ROFA. This area is likely to require the E-RWY to be closed and construction conducted as night work.

The T-RWY portions north of TXY C are expected to be constructed in not fewer than two segments labeled Phase 1E and 1F as shown in Exhibit 8. There are no time of day limitations on these construction areas with the exception that phasing must allow for ARFF vehicle access to E-RWY 02/20 at all times, and that aircraft access/egress to/from the T-Hangars and E-RWY 02/20 via TXY F and/or TXY K must be maintained. See East Side Facilities and Operation Plan Report for details of the T-hangar access requirements and accommodations.

Exhibit 8 – T-RWY Pavement Construction North of TXY C



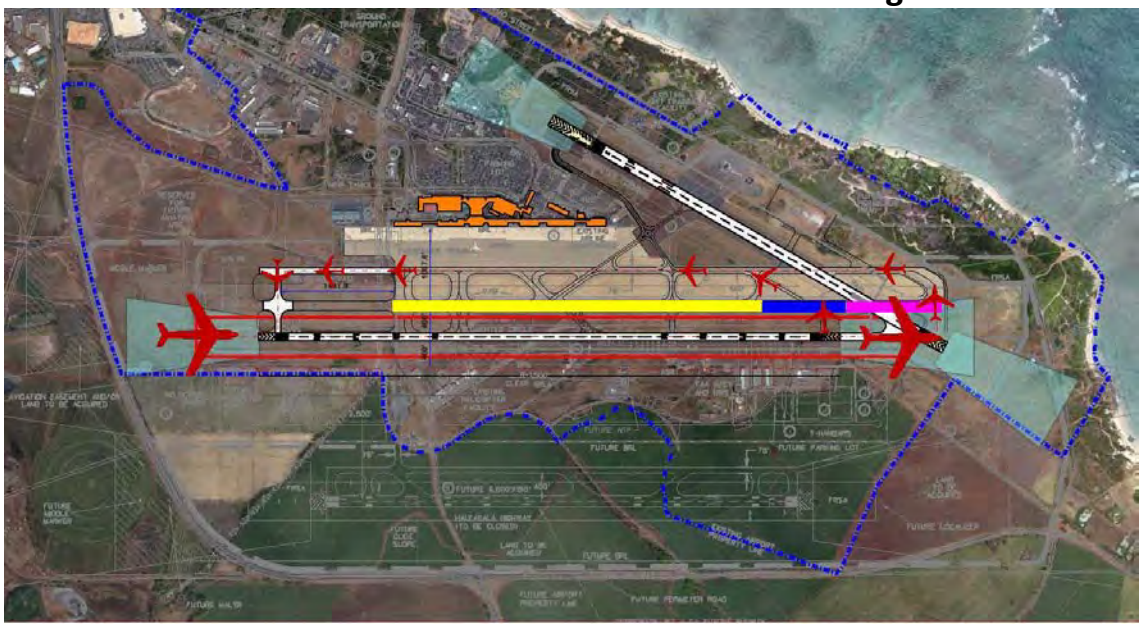
5.2 Phase 2 Construction Phasing

Phase 2 construction includes the reconstruction of E-RWY 02/20. An extension to E-RWY End 02 may be included in this Phase of the project. See Runway Length Report for details on the issues related to a runway extension. Exhibit 9 shows the phasing for E-RWY 02/20 reconstruction.

As shown, the reconstruction of E-RWY 02/20 is largely unconstrained, meaning that the construction contractor has few constraints to defining the most expeditious and cost effective construction means and methods. The lone limitation is the need to provide aircraft egress from the T-RWY at the north end. At least 2 phases of work will be needed to provide for aircraft exits either at TXY K or the connecting pavement to RWY

End 23/TXY A at end of the T-RWY when the reconstruction requires closures for reconstruction through these intersections.

Exhibit 9 – E-RWY Reconstruction Phasing



6. T-RWY Conversion to a Parallel TXY

The existing east apron parallel taxiway (un-named) is located with a lateral separation of 400 feet from the E-RWY. The TXY is 50 feet in width and has a 35 foot wide shoulder. The distance from the centerline to the clearance limit line is 80 feet adjacent to the Large GA parking area and only 70 feet adjacent to the GA Tie-down area. The transition in clearance limit line is north of TXY F. The 81 foot dimension is acceptable for a 100 foot wing span aircraft "taxiway" or a "taxilane" for a 118 for wing span aircraft. The Tie-down area is appropriate for a taxiway serving aircraft with a wing span of 86 foot or a taxilane serving aircraft with a wing span up to 100 feet. The Large GA parking area is accessible via TXY.

Upon completion of reconstruction and reopening of E-RWY 02/20, the T-RWY will be closed and converted to a parallel taxiway that serves the East Apron area. With the construction of the T-RWY along this same centerline (400 feet) and being widened to 150 feet plus the 25 foot shoulder, a portion of the T-RWY will be excess pavement when converted to a taxilane if the lateral separation remains at 400 feet. It is recommended that the centerline of the new East Side Taxiway be located at a lateral separation of 350 feet from E-RWY 02/20. This would locate the centerline at a distance of 25 feet from the west edge of the T-RWY runway pavement, essentially creating a 50 foot wide taxiway with the 25 foot T-RWY shoulder and edge lights reused.

The recommended constant lateral slope facilitated the location of the taxiway/taxilane centerline at a position other than the T-RWY centerline which would otherwise be required if the T-RWY were crowned. This should translate into cost savings as trench drains on the east side of the T-RWY would be avoided.

Exhibit 10 presented on the page that follows, shows a graphical depiction of the conversion of the T-RWY back to a taxiway in a manner that re-uses the investment made in the T-RWY to the maximum practical extent. As shown, the west edge of the T-RWY is used as the parallel taxiway.

The East Side facilities are limited to GA aircraft that may include aircraft as large as a BBJ with winglets (ADG III – maximum 118 foot wing span). This definition is consistent with the current capability. Flexibility to define the criteria as either "taxiway", meaning ATC controlled movement area or "taxilane", non-ATC controlled non-movement area. The lateral separation of 350 feet is appropriate with the limitation to ADG III Aircraft.

These actions will benefit the accommodation of Large GA aircraft as the existing apron depth is increased by 50 feet and in combination with the excavation of the high terrain, will allow further depth expansion by an additional 250 feet. This area will permit the GA facilities to be re-developed as a campus with expanded support facilities including the opportunity for additional apron area to more efficiently accommodate peak aircraft parking demands.

The 350 foot lateral separation and the reuse of the T-RWY edge lighting will save the expense of placing conduit in the T-RWY for taxiway/taxilane edge lights at a location 60 to 65 feet west of a centerline located at 400 feet. Reusing the T-RWY edge lights for the East Side taxiway/taxilane would be accomplished by changing the light fixtures only.

The design features will be addressed in cooperation with the FAA at the appropriate time. Cost savings are available to minimize the expense of the T-RWY while maximizing its long term reuse value.

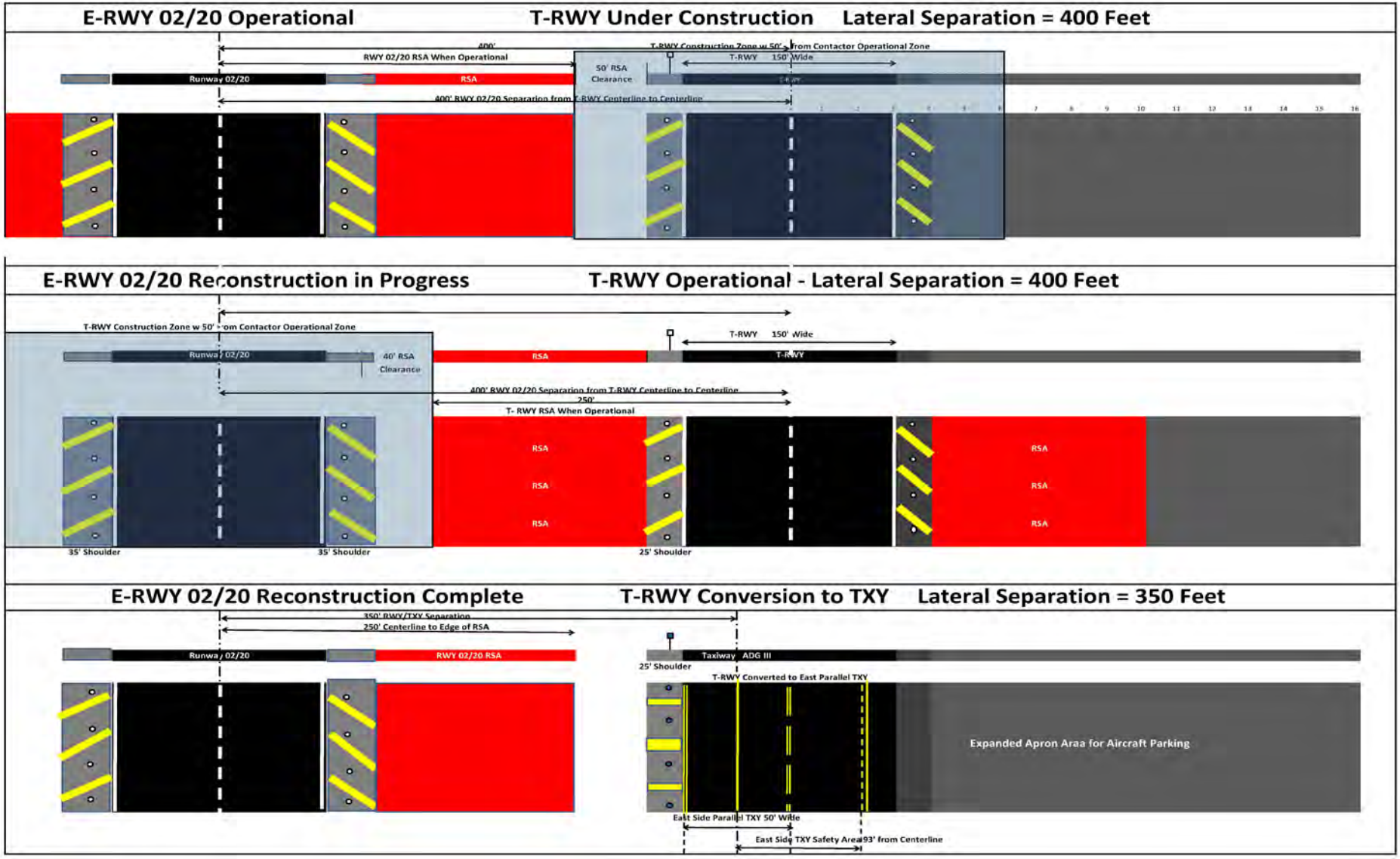
7. Modification to Standards Required for the T_RWY

The recommended project and its components to reconstruct E-RWY 02/20 include the two major phases of constructing and operating a T-RWY on an interim basis (estimated to be approximately 15 months) and reconstructing and operating for the long term the E-RWY 02/20 (reconstructed in place). The recommended plan has some limitations and has been defined to occur in recognition of several existing constraints. The proposed solution represents numerous trade-offs and interim accommodations to maintain all airport and user operations in some form or fashion. All user requirements are addressed in an economical and functional manner. Interim accommodations are not perfect but are appropriate for the interim operational period of the T-RWY and the requirement to reconstruct E-RWY 02/20. The non-standard features of the recommended plan are presented below.

7.1 Reconstructed E-RWY 02/20

The reconstructed E-RWY with or without an extension will be designed to meet all FAA design standards for a precision instrument runway. There will be two criteria for which the DOT-A should request a Modification to Standard (MoS). These include:

Exhibit 10 – Recommended T-RWY Conversion to a Taxiway



- Lateral Separation of TXY A from Reconstructed E-RWY
- RPZ Land Ownership (applicable only if an 1,530 foot Extension is recommended for E-RWY 02).

Each is described below.

7.1.1 TXY A

The new Airport Design Advisory Circular 150-5300-13A brings new taxiway lateral separation criteria into play that here to fore was not a factor. TXY A will not meet new lateral separation standards based upon new Taxiway Design Group (TDG) definitions. The current lateral separation is 450 feet for the current D-V Runway and Parallel Taxiway. The new standards could require a lateral separation of as much as 520 feet. TXY A has operated adequately under the prior standards. There are constraints to meeting the new TDG design standards that present a significant expense to correct (relocation of E-RWY 02/20 or relocation of the Terminal Building) or a significant operational constraint with the loss of the push-out zone.

The DOT-A should request that the existing lateral separation of the E-RWY and TXY A be grandfathered. A Modification to Standard to maintain the current lateral separation will be prepared and submitted to FAA for consideration.

7.1.2 RPZ Standards

Should it be decided that a 1,530 foot extension is the preferred course of action the E-RWY 02 RPZ would extend beyond the Airport's south property line. The extent of area outside of the property line is limited. Current FAA guidance indicates that there may be opportunity for a waiver of the criteria in cases where the intended safety interests can be appropriately maintained. The FAA guidance allows for an application for a waiver to be made. It is recommended that this application be made for only the 1,530 foot extension should it be recommended.

7.2 T-RWY

The T-RWY will be in place and operated for only the time required to reconstruct E-RWY 02/20 and restore it to operational status. This may or may not include an extension of at least 795 feet but not more than 2,605 feet. The operational time frame for the T_RWY is estimated to be approximately 15 months.

The modifications to design standards for the T-RWY include the following:

- Runway Shoulder
- Helicopter Area TLOF
- ROFA Standards
- East Side Parallel Taxiway Lateral Separation from the E-RWY

Each is discussed in the sections that follow.

7.2.1 T-RWY Runway Shoulder Width

The T-RWY shoulder width is recommended to be 25 feet in width. The recommended standard is 35 feet for a runway serving D-V aircraft. In the case of OGG, all ADG IV and ADG V aircraft will be twin engine aircraft where the engines will remain over paved surface. The 25 foot recommendation is also related to the shoulder requirement for the ADG III East Side TXY that will be created from the T-RWY. The 25 foot recommendation for the interim T-RWY is a cost saving recommendation for the interim conditions but also an investment that meets standards for the long term.

ARFF Vehicle access is a consideration in this change. The shoulder is recommended to meet the design requirements for ARFF vehicle passage. It is expected that the continuous paved surface to the east of the T-RWY will serve this purpose as well although it is recognized that an ARFF Vehicle approach to an aircraft is wind based and may not always be from one side.

7.2.2 Helicopter Area TLOF

The Helicopter TLOF is recommended to be located immediately outside of the ROFA (400 feet) on an interim basis. The recommended standard is that the TLOF be located laterally 700 feet from the centerline of a runway serving ADG V aircraft. The key in this recommendation is the presumption of independent operations. Wake vortex considerations are factors in this consideration. Given the limited number of widebody arrival aircraft operations (ADG IV and ADG V) as well as the overall time of day of ADG IV and V arrival operations, the recommendation is that a non-standard TLOF approved with the definition of a procedure to assure that wake vortex separation is maintained. This may induce some delays into the normally free flow of helicopter arrivals and departures during the interim operational period of the T-RWY. This is considered a more appropriate trade-off to the relocation of the helicopter operations from a cost and schedule perspective, as well as, a customer perspective, given the short duration of the T-RWY operations.

7.2.3 ROFA Standards

The T-RWY will be a visual runway and the presence of limited fixed facilities within the ROFA is not considered to be a particular issue. The interim nature of the T-RWY along with the fact that workers and equipment will be located inside of the ROFA (up to the RSA at 250 feet from the operating runway) make the definition of other less prominent ROFA penetrations at greater distances considerations but not issues. The project will make every attempt to clear ROFA penetrations including the demolition of buildings if necessary. The goal is to clear the ROFA to a distance of 375 feet from the centerline of the T-RWY. The recommended plan for addressing all East Side ROFA issues is contained in a companion paper titled: *East Side Facility Interim Accommodations*.

7.2.4 East Side Parallel Taxiway Lateral Separation from the E-RWY

A MoS is recommended to seek approval for a 350 foot lateral separation of the East Side parallel taxiway. In the case of the East Side Parallel taxiway, the 350 foot lateral separation is presumed acceptable with aircraft restrictions to ADG III. This ADG III restriction on a taxiway located at 350 feet locates the wing tip at the same location as an ADG V aircraft wing tip on a parallel taxiway located at 400 feet. FAA standards consider same aircraft runway/taxiway separations. The MoS will request consideration of different ADG standards. The 350 foot lateral spacing will save both project cost and conversion time. In addition, it will also maximize the investments made in pavements and increase areas for parking GA aircraft in the future.