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

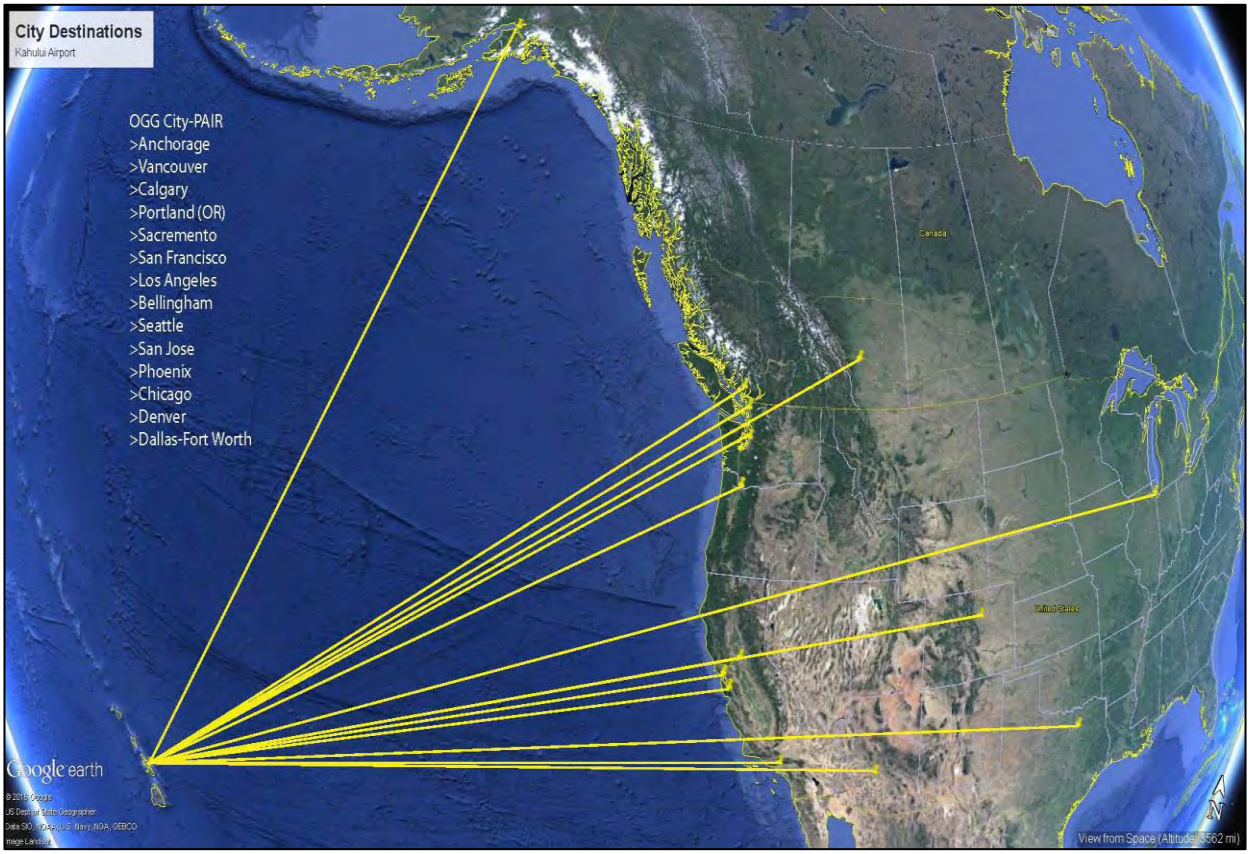


Figure 4-1 City Destinations From OGG

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.

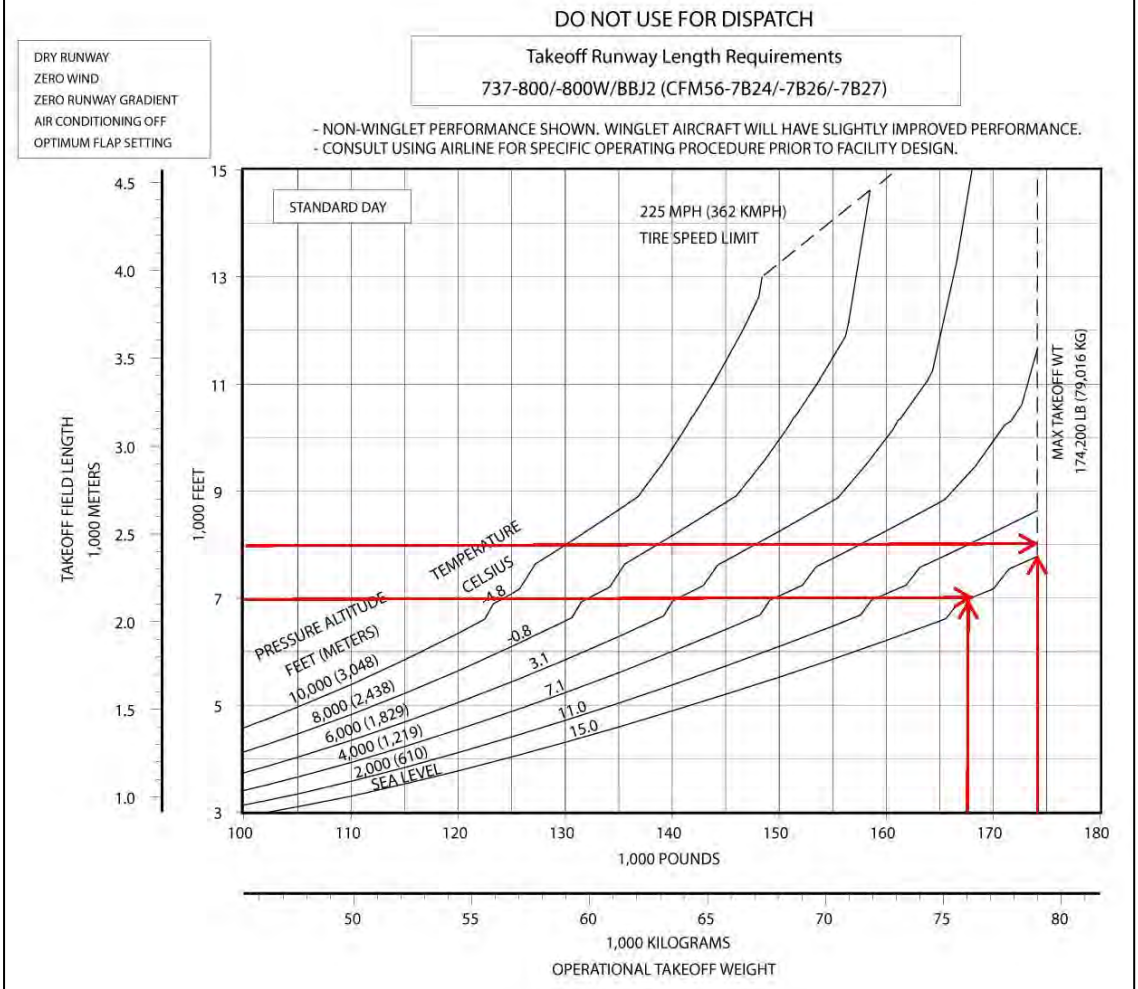
The selection of a runway length that meets the OGG MP Update objectives considers (1) the design aircraft; (2) aircraft performance; and (3) the anticipated market to be served.

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:

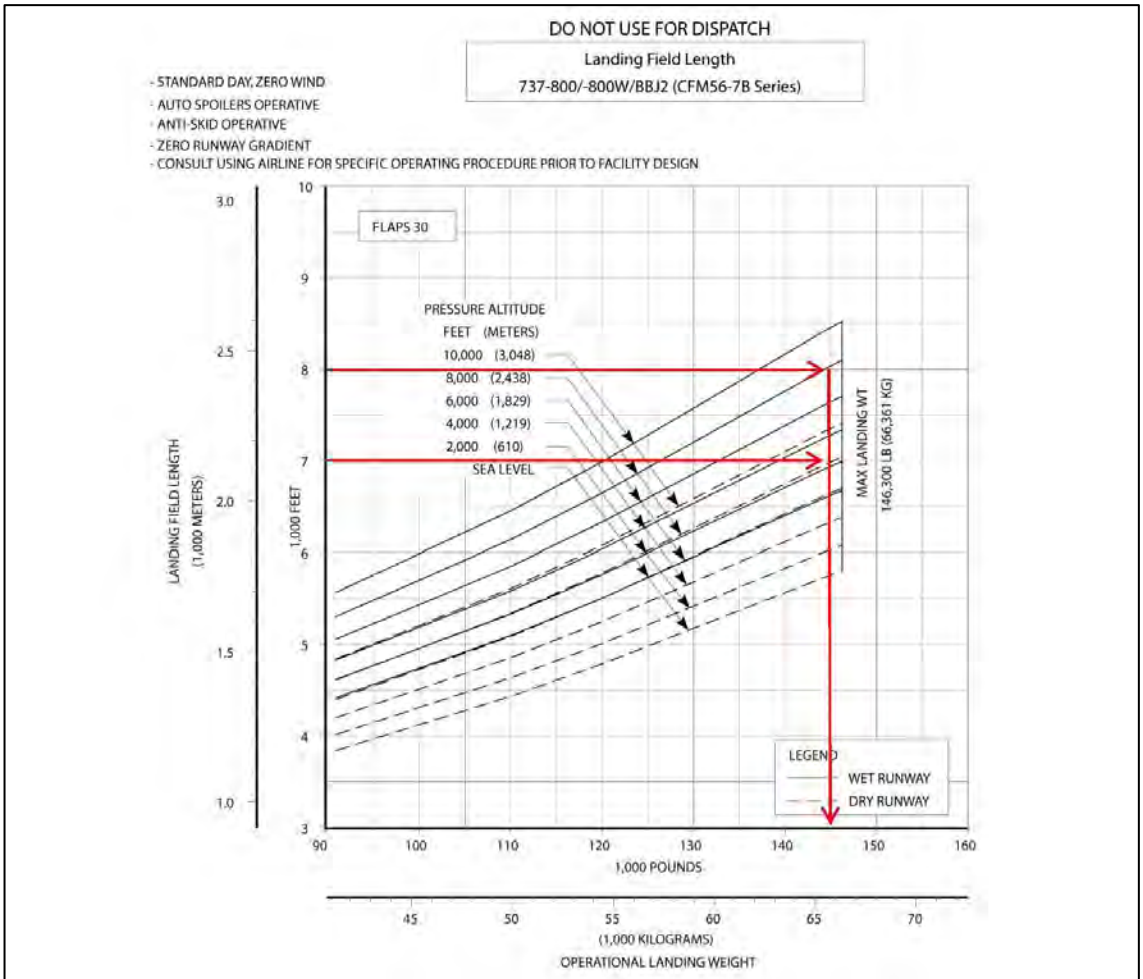
1 The 4% loss in revenue per passenger aircraft was calculated by taking the difference in weight from the MTOW (174,200 lbs) and the OTW (168,000 lbs) at the current Runway 2-20 length of 6,995 ft. The weight difference is 6,800 lbs, which was divided by an average 200 lbs per person resulting in approximately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

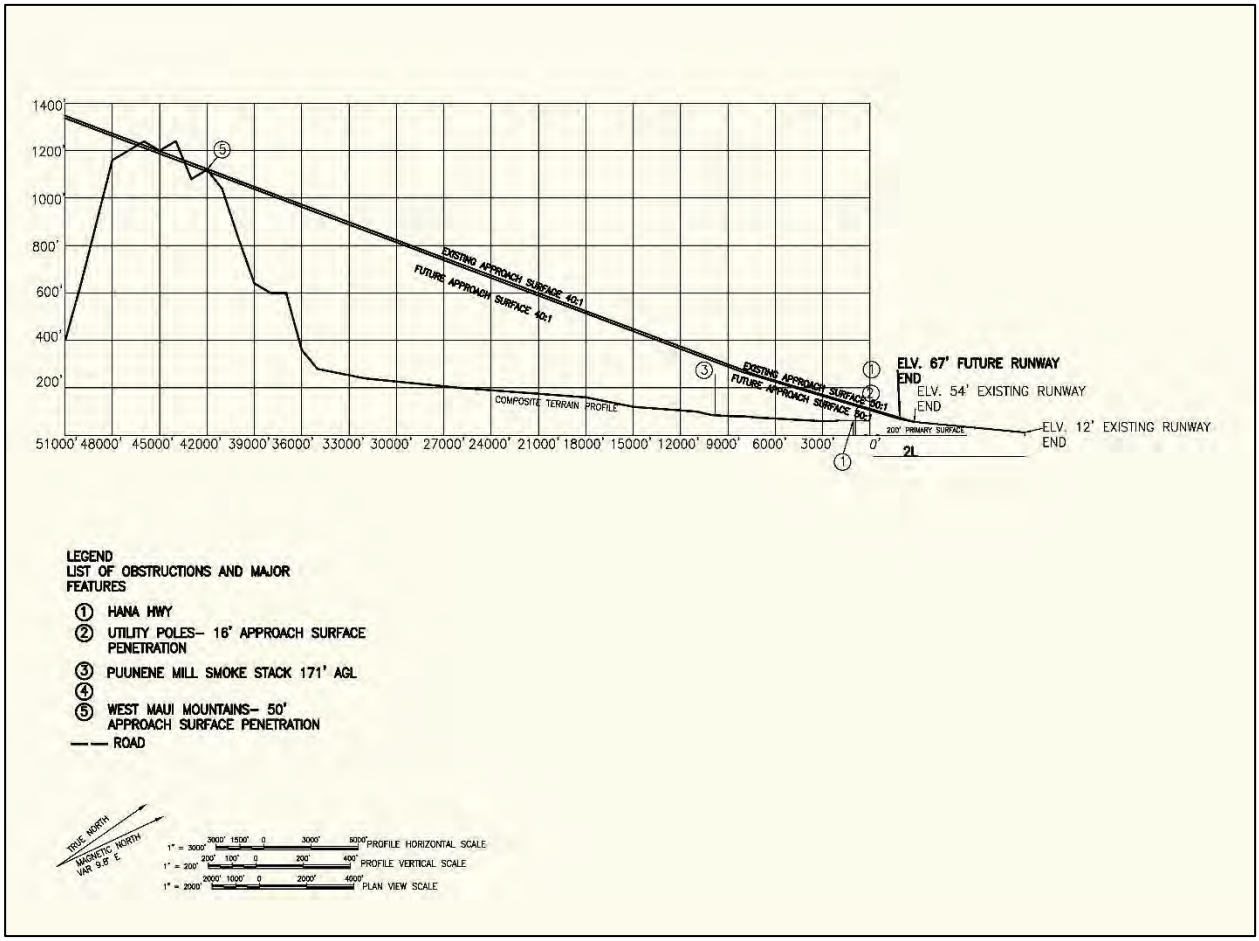


Figure 4-4 Approach Surface Runway 2-20

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.

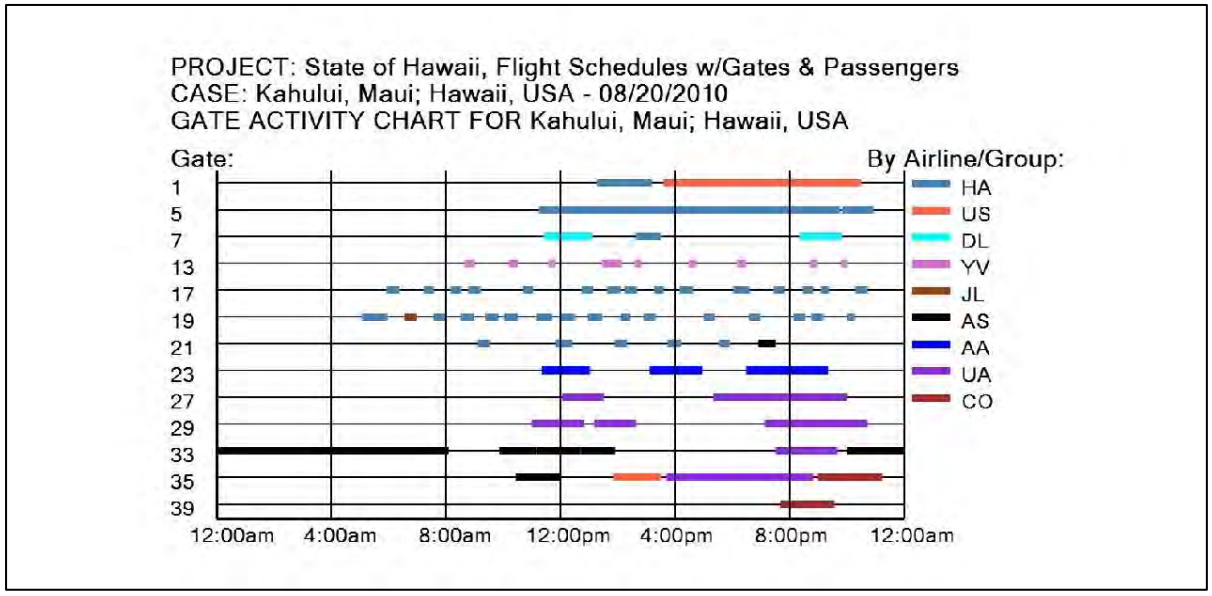


Figure 4-5 Existing Terminal Facilities

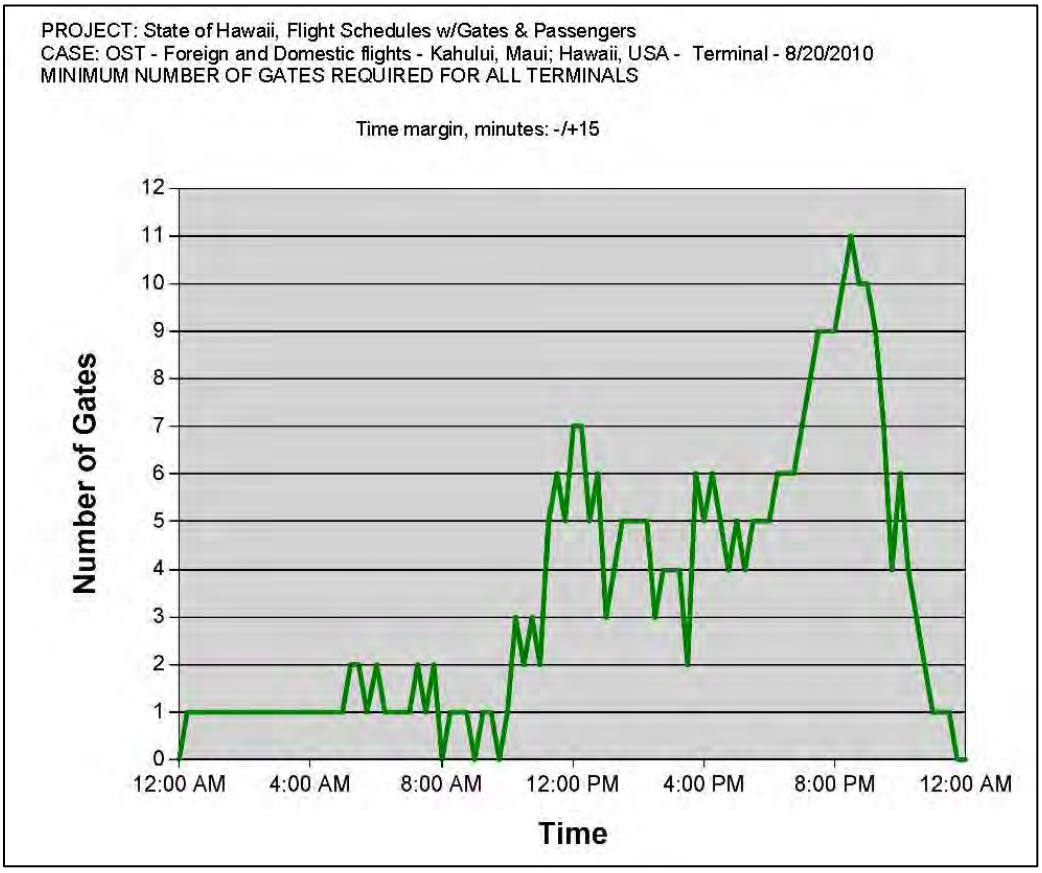


Figure 4-6 Aircraft Gate Time at Kahului Airport

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.

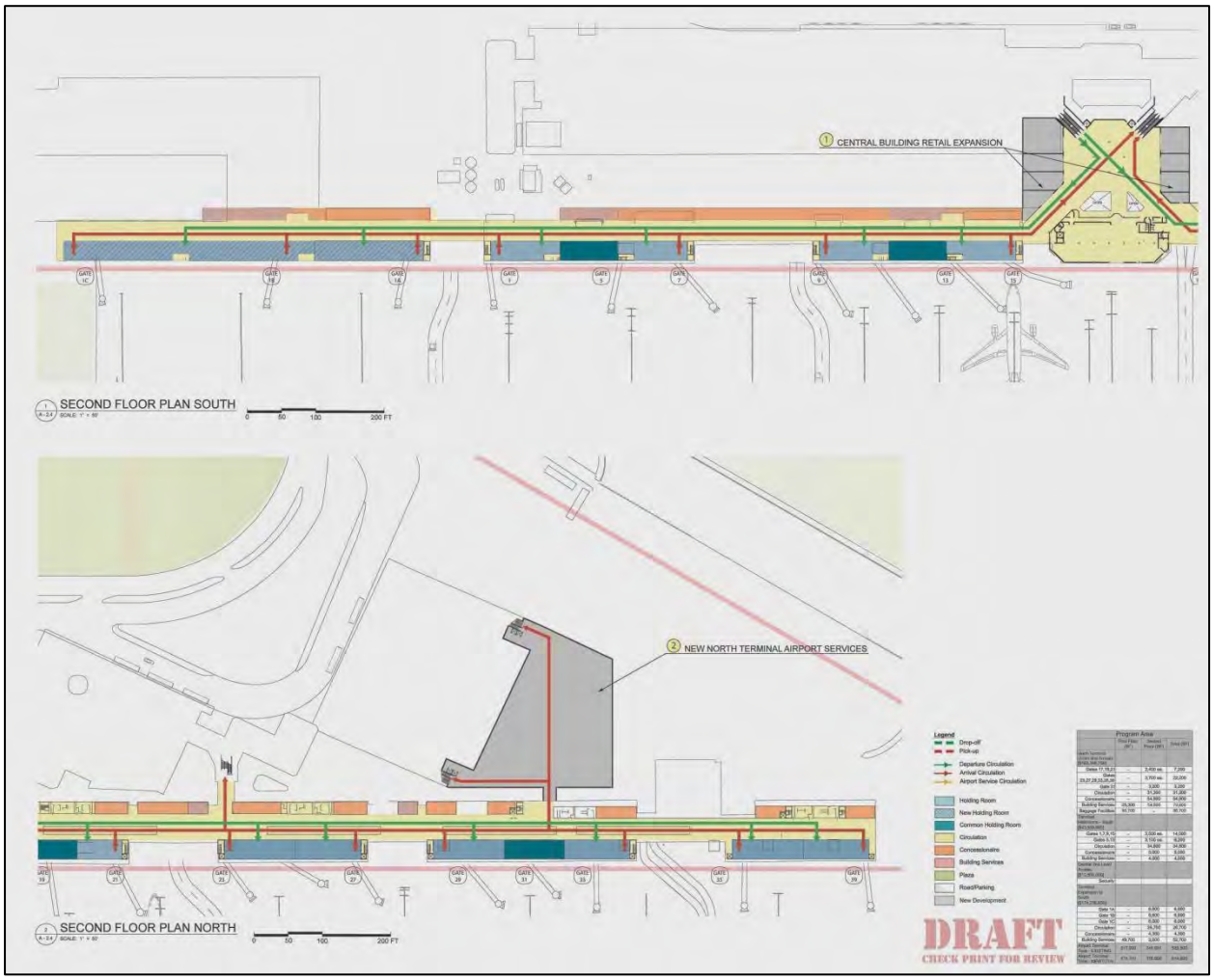


Figure 4-8 Terminal Improvements

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.

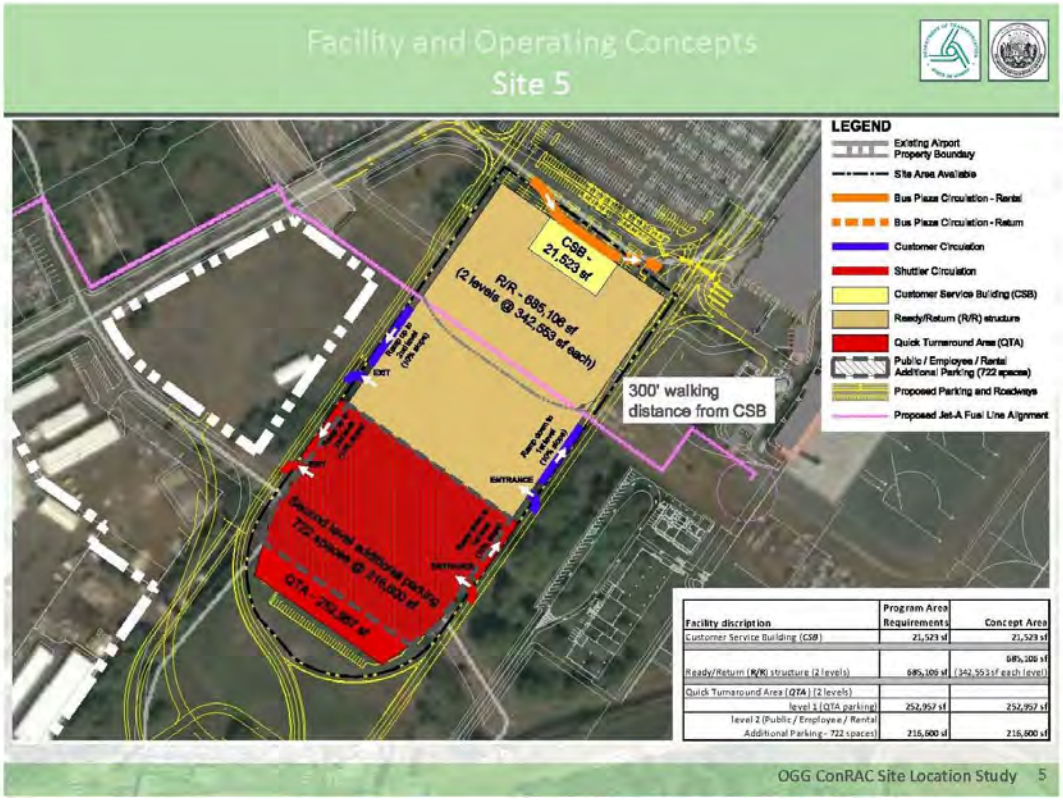


Figure 4-9 Consolidated Rent-a-Car Facilities

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)