

# Kahului Airport Master Plan Update

DECEMBER, 2016

State of Hawai'i  
Department of Transportation,  
Airports Division





# **KAHULUI AIRPORT MASTER PLAN UPDATE**

**KAHULUI, MAUI, HAWAII**

**1-21713-06P**

Prepared For The  
**STATE OF HAWAI'I  
DEPARTMENT OF TRANSPORTATION  
AIRPORTS DIVISION**

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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 <sub>4</sub>	Methane
CO <sub>2</sub>	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

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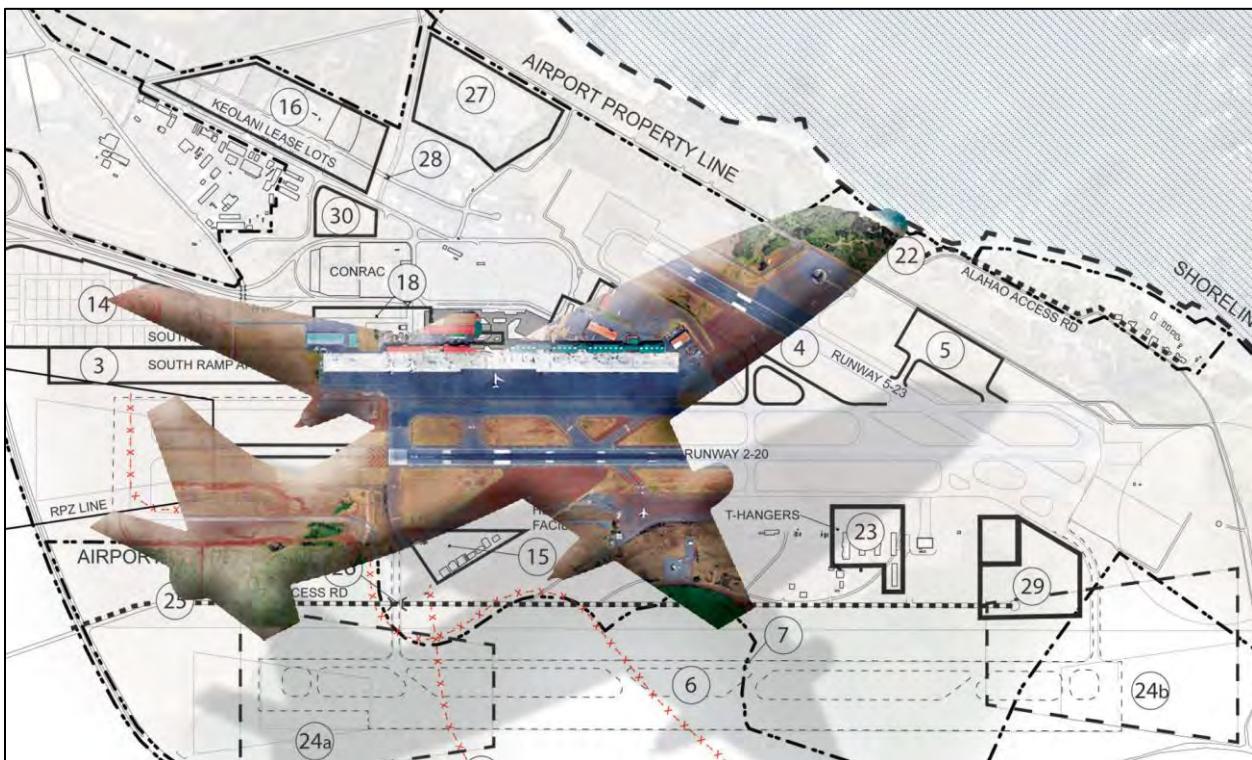
HDOT	Department of Transportation, State of Hawai'i
HIRL	High Intensity Runway Lights
HNL	Honolulu International Airport
HRS	Hawai'i Revised Statutes
HTA	Hawai'i Tourism Authority
IFR	Instrument Flight Rule
ILS	Instrument Landing System
kWh	Kilowatt Hour
lbs.	Pounds
LOS	Level of Service
LUC	Land Use 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	Nitrous 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

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# 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

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- 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

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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

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**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.,

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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.

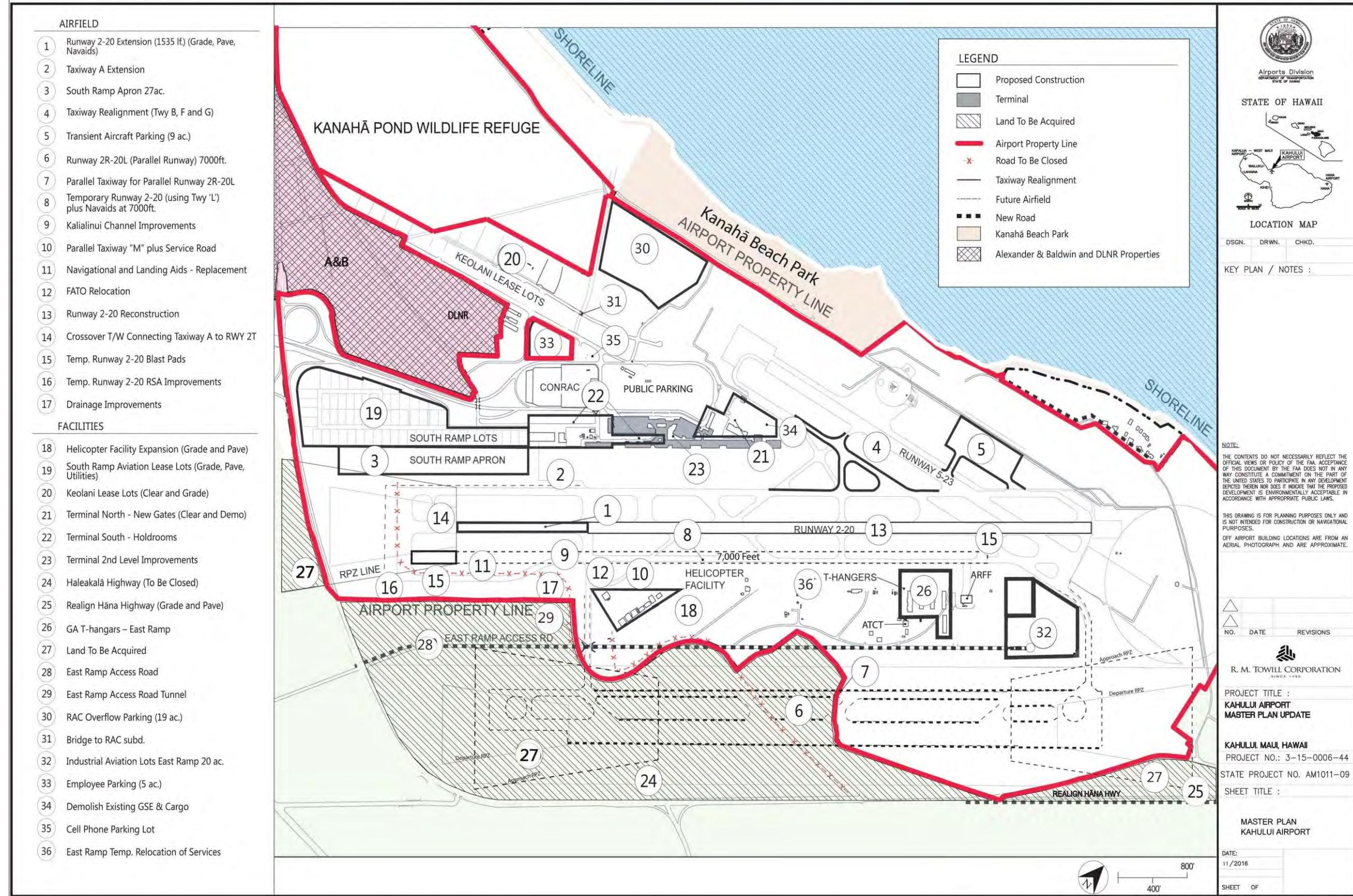


Figure ES-2. OGG Master Plan

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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	Kalalinui 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
	<b>Terminal</b>			
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	Kalalinui 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	
	<b>TOTALS</b>	<b>\$403,427,070</b>	<b>\$136,526,068</b>	<b>\$2,424,754,353</b>

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