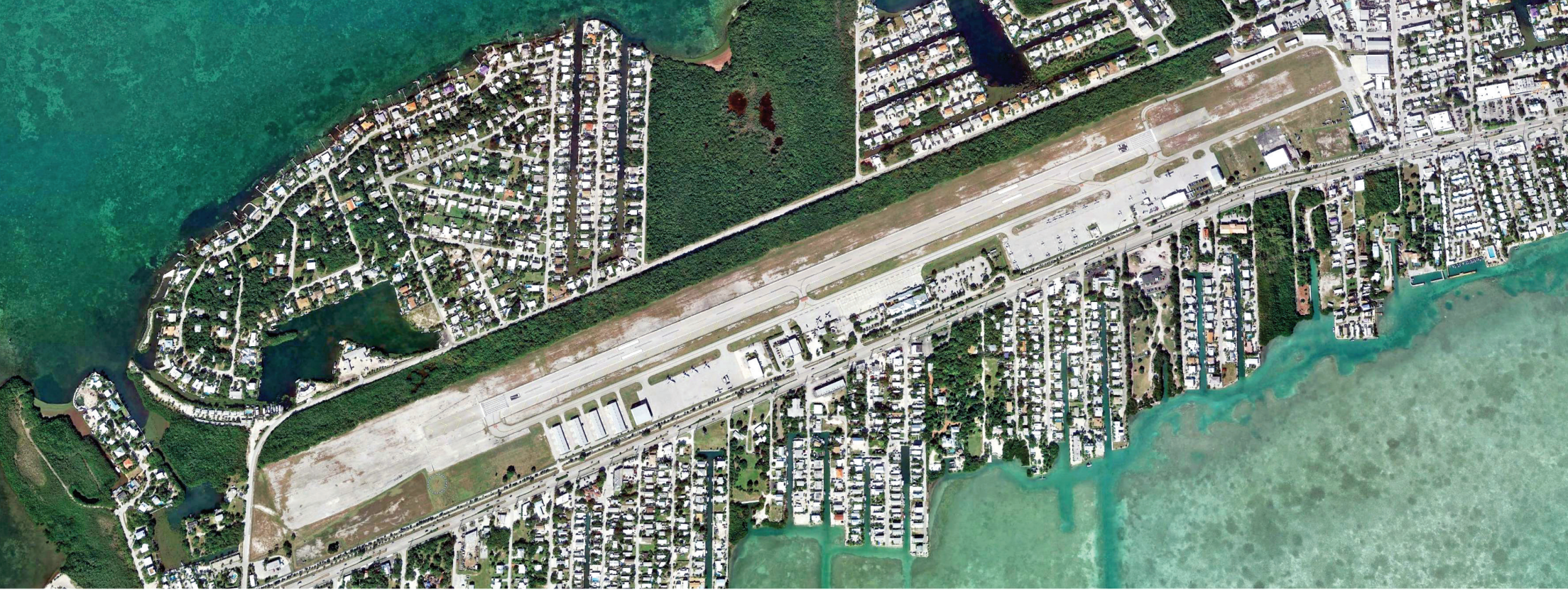

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT

Master Plan Update

PREPARED FOR Monroe County, Florida

June 2020

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Florida Keys Marathon International Airport

Executive Summary

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO & ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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1. Executive Summary

1.1 Introduction

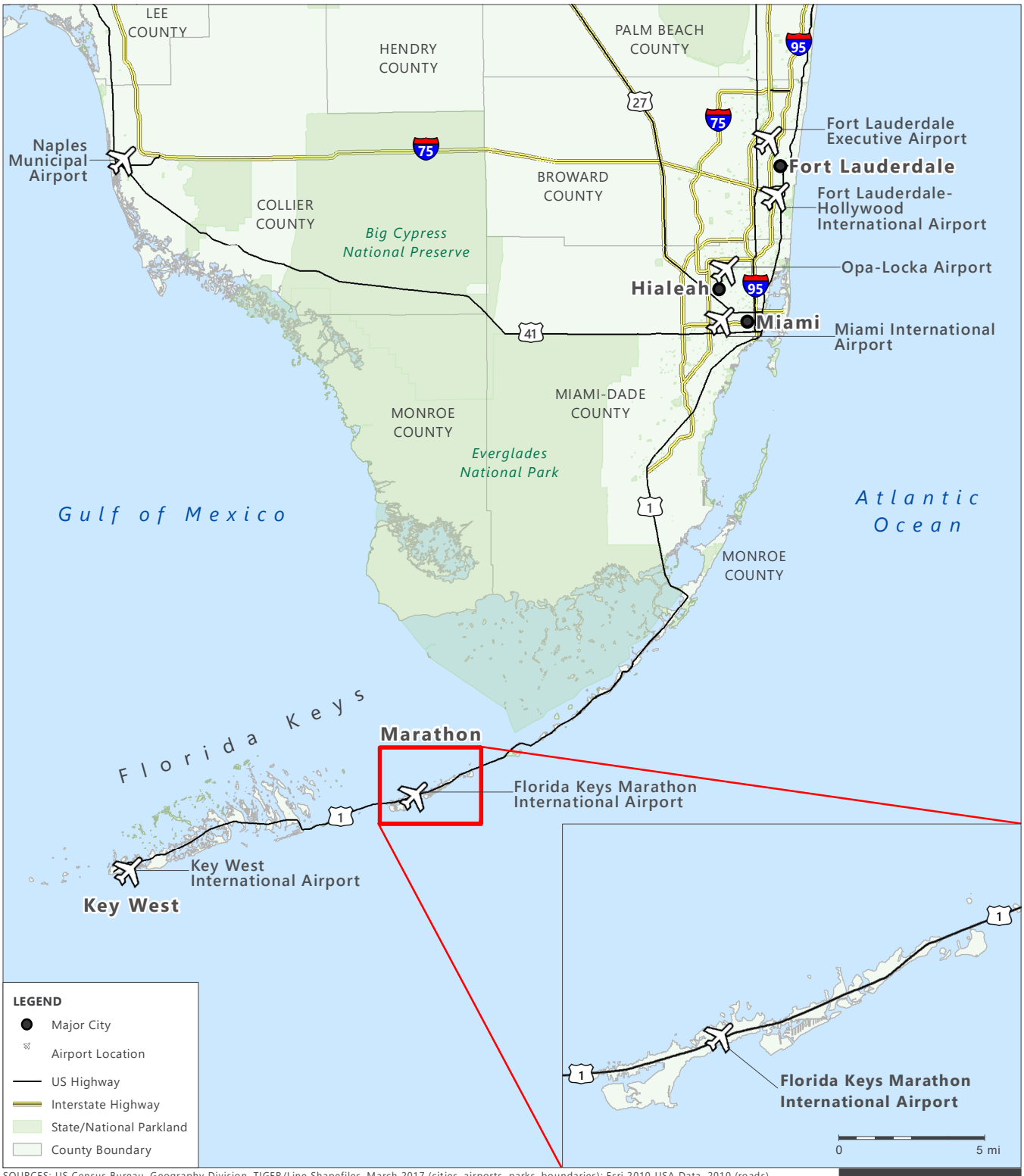
The Florida Keys Marathon International Airport (the Airport or MTH) is located in the city of Marathon, Florida in the middle portion of the Florida Keys. Marathon is 10-a mile-long island that includes amenities for scuba diving, snorkeling, fishing, and a variety of water sports[1]. MTH is located on U.S. Highway 1 (U.S. 1), approximately 2 miles east of the city's Central Business District. The locations of the city of Marathon and MTH are shown on **Exhibits 1-1** and **1-2**.

Monroe County owns and operates MTH and the Key West International Airport (EYW), a commercial service airport located approximately 40 nautical miles (NM) west/southwest of the city of Marathon.

The United States (U.S.) Navy originally constructed MTH in the early 1940s as an auxiliary airfield. At the end of World War II, the airfield was deactivated and transferred to the State of Florida, and later Monroe County, for civilian use. The Airport currently provides airfield, terminal, and support facilities for air charter/taxi operations, air cargo operations, and general aviation operations. Since the 1960s, intermittent scheduled commercial passenger service has been provided at MTH by several airlines, most recently by Delta Air Lines in 2007 and Continental Airlines in 2009 (through a codeshare with Cape Air). Currently, no scheduled commercial passenger service is offered at MTH; however, the Airport remains an important component of the transportation network serving south Monroe County, the city of Marathon, and surrounding communities.

Existing facilities at MTH include a runway, taxiways, aircraft parking aprons, approach and navigational aids (NAVAIDS), terminal buildings, aircraft maintenance and storage hangars, fuel storage tanks, and industrial facilities. Other major components include access roadways, vehicle parking lots, stormwater detention ponds, and equipment storage buildings.

[1] Monroe County Tourist Development Council (TDC), https://www.monroecounty-fl.gov/328/Tourist-Development-Council-TDC, accessed January 2020.



SOURCES: US Census Bureau, Geography Division, TIGER/Line Shapefiles, March 2017 (cities, airports, parks, boundaries); Esri 2010 USA Data, 2010 (roads).

EXHIBIT 1-1

NORTH 0 25 mi

Airport Location Map

P:\GIS\Projects\LGA\MXD\MTH_RunwayEA_PurposeNeed_Exhibit1-1_LocationMap_20200316.mxd

SOURCES: Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property); US Census Bureau, Geography Division, TIGER/Line Shapefiles, 2017 (county); ESRI 2010 USA Data, 2010 (roads).

EXHIBIT 1-2

NORTH 0 6,500 ft

Airport Vicinity Map

P:\GIS\Projects\LGA\MXD\MTH_RunwayEA_PurposeNeed_Exhibit1-2_VicinityMap_20200316.mxd

The Airport serves a variety of general aviation (GA) needs and offers a U.S. Customs and Border Protection (CBP) facility, 24-hour airport security, and two main fixed-base operators (FBOs) among other facilities and services that support aircraft fueling and parking, air ambulance, air charter, maintenance, and flight training operations. City-andCounty-owned facilities located on-airport include the Monroe County Sheriff's Department, the City of Marathon Fire Rescue Station #14; the Monroe County Humane Society, and the Monroe County Department of Public Works. A Florida Keys Aqueduct Authority (FKAA) wastewater treatment facility is also located in the southeast corner of the Airport

The MTH Master Plan Update outlines a plan for the provision of future facilities and infrastructure to accommodate the forecast demand through 2036 and is consistent with the standards and methodologies outlined in FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, and the Florida Department of Transportation (FDOT) Guidebook for Airport Master Planning.

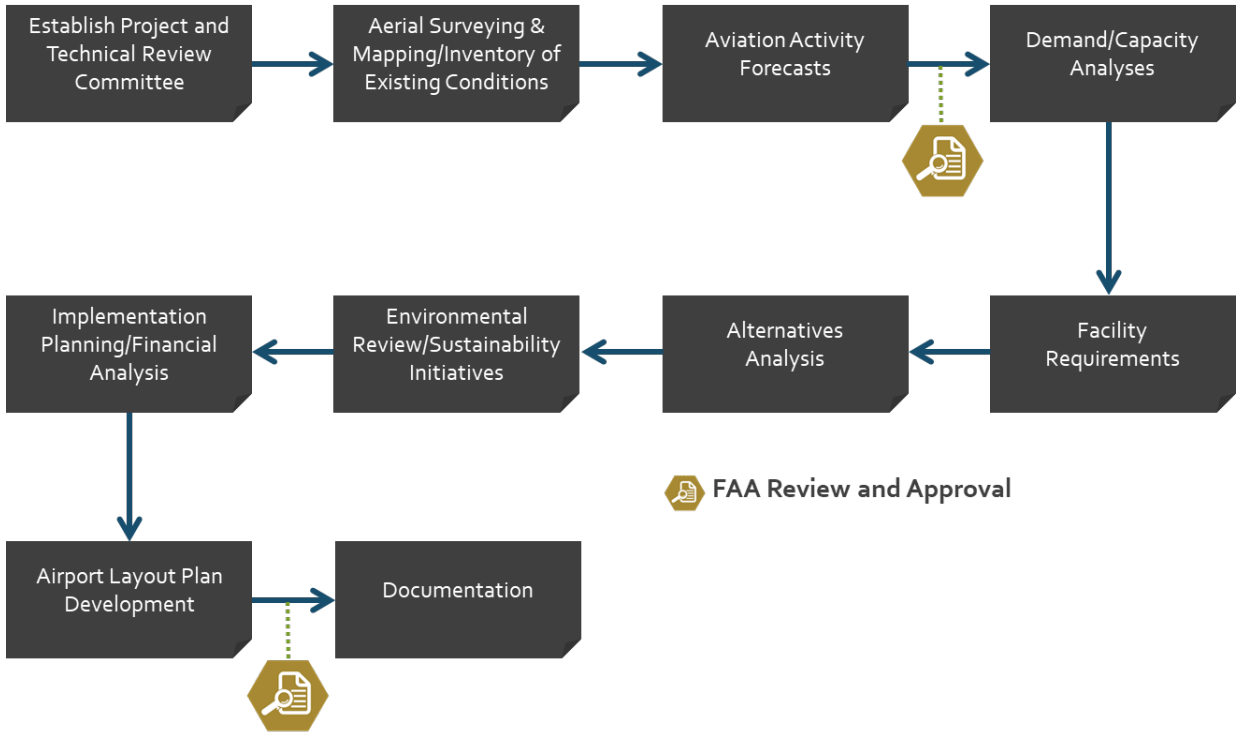
This summary highlights key elements of the plan's recommended development program. It is designed for stakeholders to gain an overview of major matters addressed in the detailed Master Plan report. While the Master Plan is a visionary document that sets out a 'road map' for the sustainable growth of the Airport, it is not an approval for any specific development or project. In addition, time frames for the projects shown in the plan are flexible and demand driven.

1.2 The Master Planning Process

The FAA recommends airport master plans to be updated every five years, or as necessary, to keep them current. MTH's last master plan update was completed in 2002. Since that study, the Airport has completed several projects and the state of the general aviation industry has evolved over the years. The update of the Master Plan is needed to reflect new facilities, reassess future projections of airport activity, and plan for an appropriate mix of land uses to support projected aviation and non-aviation needs.

This Airport Master Plan Update (MPU) for MTH was prepared in accordance with the requirements of the FAA and FDOT. The Master Plan and the associated Airport Layout Plan (ALP) drawing set were developed based on the criteria set forth in the FAA AC 150/5070-6B, *Airport Master Plans*, and AC 150/5300-13A, *Airport Design*, and the Florida Department of Transportation (FDOT) Guidebook for Airport Master Planning. The study began in February of 2016 and the aviation activity forecasts were completed in August 2017 and approved by the FAA in October 2017. The final technical analysis for the Master Plan Update was completed in Winter 2019/2020. After review by stakeholders, the final technical report and an Airport Layout Plan (ALP) drawing were presented to the Monroe County Board of County Commissioners in June 2020. The process for the MTH Master Plan is summarized on **Exhibit 1-3**.

Exhibit 1-3: The Master Planning Process



SOURCES: Ricondo & Associates, Inc., May 2017.

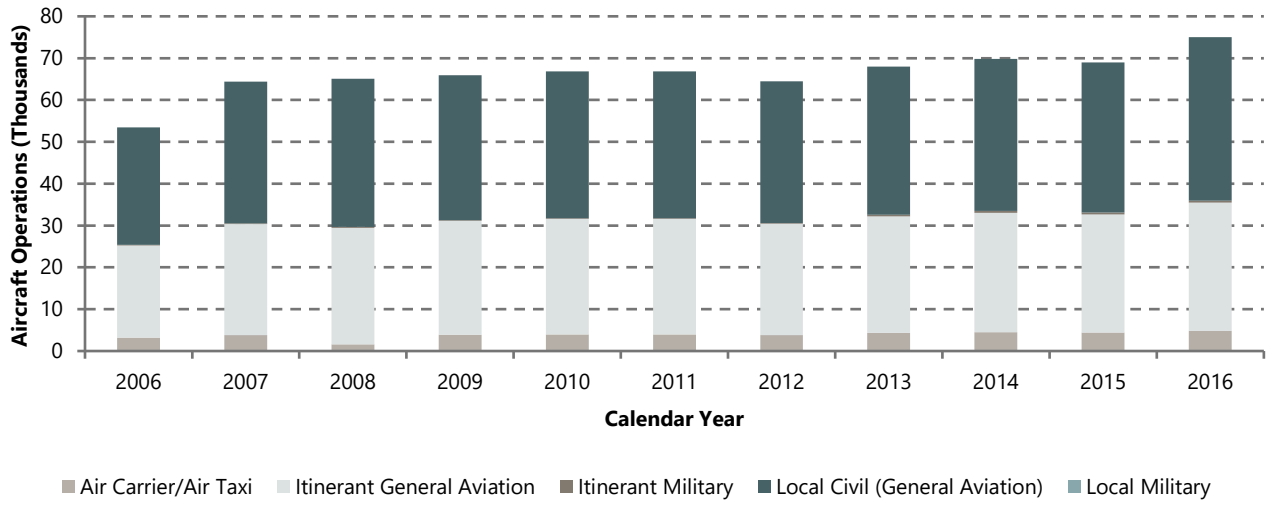
1.3 Aviation Activity Forecasts

The Airport accommodated between 53,467 and 75,000 total aircraft operations from CY 2006 to CY 2016, a compound annual growth rate (CAGR) of 3.4 percent. In CY 2016, it accommodated 75,000 operations, including 69,771 General Aviation (GA) operations (30,698 itinerant and 39,073 local), 4,809 itinerant air taxi operations, and 420 military operations.

GA operations, which account for 93.0 percent of the Airport's total aircraft operations, include aircraft operations not conducted by a commercial airline or the military. Various activities are included under GA operations, including business operations for the transport of goods and/or people, recreational flying, flight training operations, and special operations such as those conducted for research, surveillance, agricultural spraying, emergency response, fire suppression, and law enforcement. In addition, the U.S. Customs and Border Protection facility allows the airport to accommodate international traffic and has made MTH a popular entry point to the United States for airplanes arriving from the Caribbean and Central and South America. The majority of the GA operations are handled by the two FBOs located at the Airport, Marathon Jet Center and Marathon General Aviation. The Marathon Jet Center FBO serves single and multi-engine aircraft, including jets, while the Marathon General Aviation FBO primarily serves single engine aircraft.

Since CY 2009, the Airport's air taxi operations are composed of cargo and charter passenger operations. Mountain Air Cargo operates cargo service for FedEx between Miami and Marathon approximately twice daily on Cessna 208 Caravan aircraft. Charter services are offered by providers such as Marathon Jet Center, Air Charter Service, Flexjet, and Charter Flight Group. Approximately 6.4 percent of total operations at the Airport are classified as air carrier/air taxi operations.

Exhibit 1-4: Historical Aircraft Operations: CY 2006-CY 2016

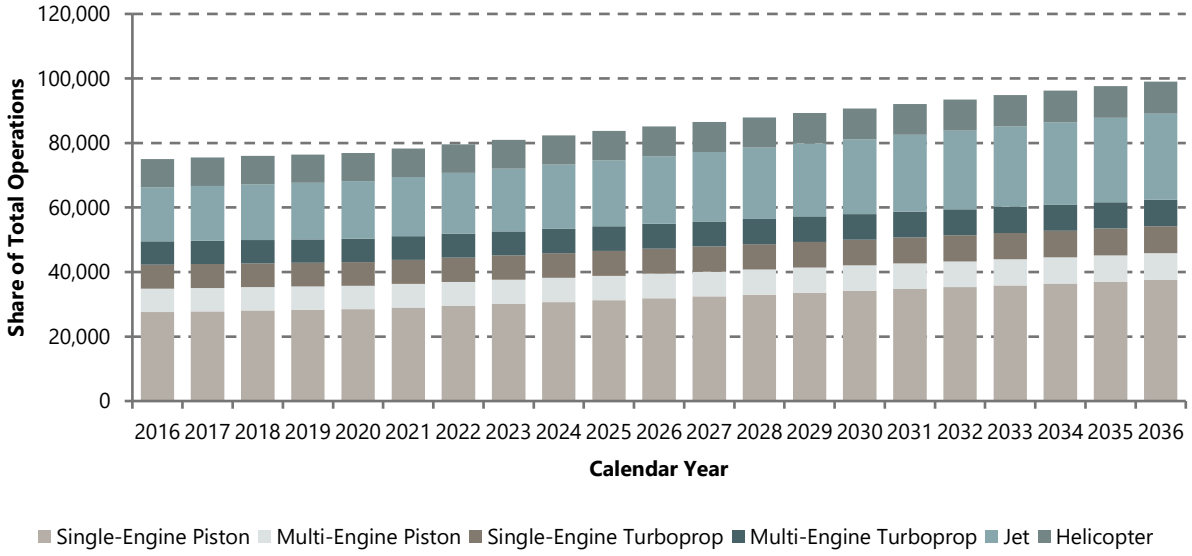


SOURCES: Monroe County Airports Department, April 2017; FDOT FASP, 2017.

Military operations have historically accounted for a small percentage of total operations at the Airport, fluctuating between 0.2 percent and 0.6 percent from CY 2006 to CY 2016. All of the military operations at the Airport are itinerant operations, and many are performed by Lockheed C-130 Hercules aircraft according to historical data from FAA Traffic Flow Managements Counts (TFMSC) data.

Aircraft operations are forecast to increase from 75,000 in CY 2016 to 98,978 in CY 2036, a CAGR of 1.4 percent. Single-engine piston aircraft operations comprise the highest share of operations throughout the forecast period and are projected to increase at a CAGR of 1.6 percent, consistent with local trends. Jet aircraft remain the lowest share of total operations through 2036. Jet aircraft operations are forecast to increase at a CAGR of 2.4 percent, a higher rate than single-engine piston aircraft operations and slightly above the FAA Aerospace Forecast CAGR of 2.3 percent during the same period. Operations by aircraft with other engine types were forecast to decrease in shares proportionally to their base year share.

Exhibit 1-5: Forecast Aircraft Operations by Fleet Mix



SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

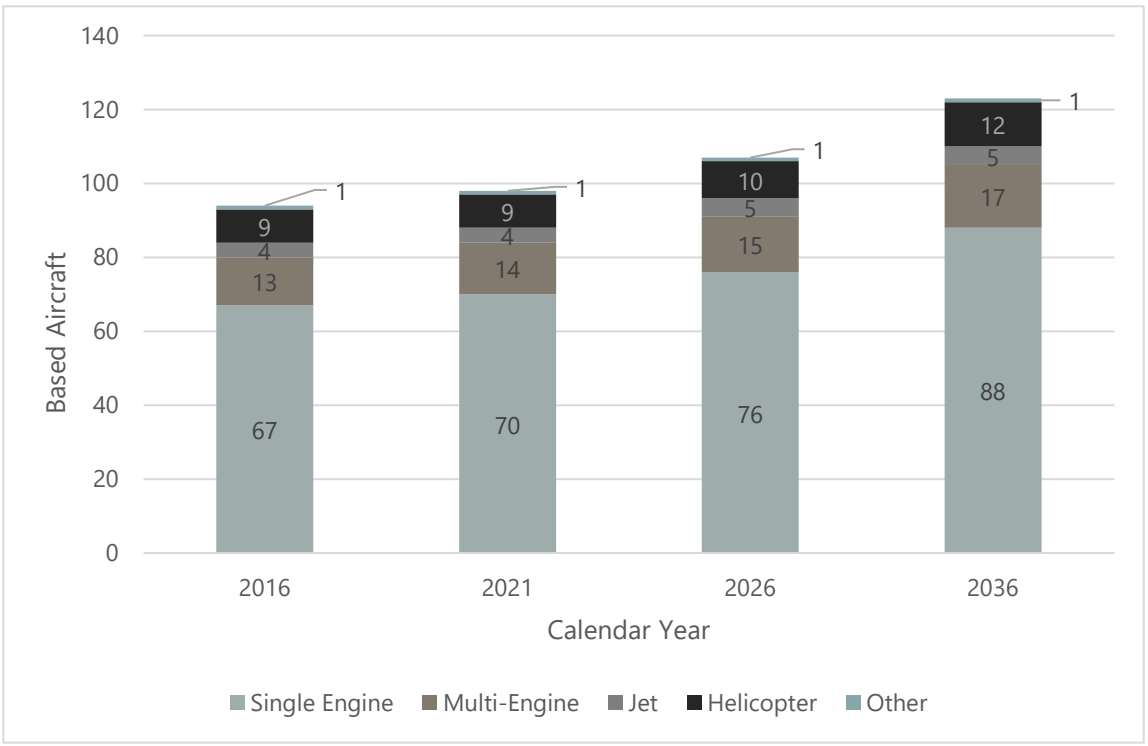
The critical aircraft at the Airport currently falls within the FAA Airplane Design Group (ADG) II category (wingspan of 79 feet or less). Typical ADG II aircraft that operate at the Airport include Cessna Citation Excel C56X, Cessna Citation II C550, Beech 350 Super King Air, or Embraer Phenom 300. The FAA defines the critical aircraft as "the most demanding aircraft type or grouping of aircraft with similar characteristics that make regular use of the airport. Regular use is defined as 500 annual operations.[2]" The critical aircraft will remain an ADG II aircraft throughout the forecast period.

In 2016, approximately 56.6 percent of operations at the Airport were ADG I aircraft (wingspan of 49 feet or less), 42.8 percent were ADG II, 0.3 percent were ADG III (wingspan of 118 feet or less), and 0.3 percent of operations were ADG IV aircraft (wingspan of 171 feet or less). The ADG I aircraft account for approximately 44,420 annual operations and ADG II aircraft account for approximately 33,120 annual operations at MTH. ADG IV operations were primarily related to military activities conducted by C-130 Hercules aircraft.

In 2016, 94 aircraft were based at the Airport including 67 single-engine aircraft, 13 multi-engine aircraft, 4 business jet aircraft, 9 helicopters, and 1 ultra-light or glider (defined as "other" by FAA). The total based aircraft at the Airport are forecast to grow from 94 in 2016 to 123 in 2036, a CAGR of 1.4 percent. Historically, single-engine aircraft have represented the highest share of total based aircraft, which is forecast to continue through CY 2036. Jet aircraft are forecast to be the slowest growing category of based aircraft and also the lowest share of total based aircraft at MTH.

[2] Federal Aviation Administration, Advisory Circular 150/5000-17, June 2017.

Exhibit 1-6: Forecast of Based Aircraft by Type

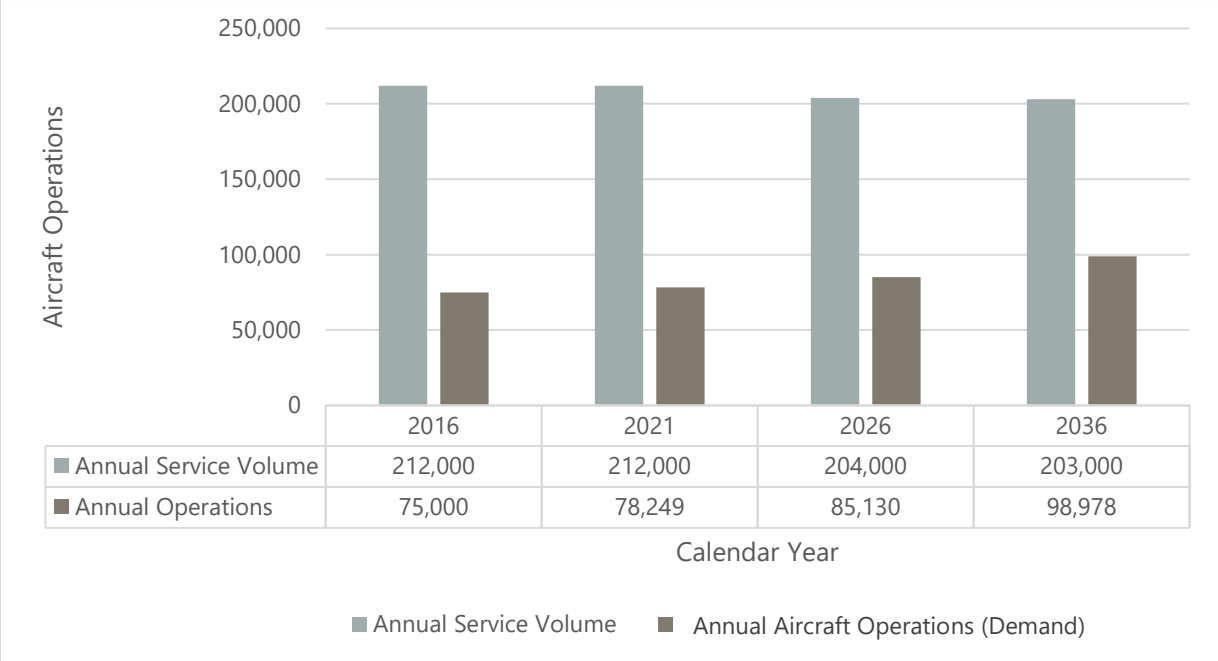


SOURCES: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., May 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

1.4 Demand/Capacity Analysis and Facility Requirements

Several analyses were conducted to determine the ability of existing facilities to fulfill current and forecast demand. An airfield demand/capacity analysis using the method in FAA AC 5060-5, Change 2, *Airport Capacity and Delay* was conducted to assess the ability of Runway 7-25 and the associated taxiway system to accommodate existing and forecast aircraft operations. The result of the analysis indicates that the existing and forecast operations do not exceed the Annual Service Volume (ASV)[3]. The existing runway system is adequate to accommodate existing and future (through 2036) operational demand at the Airport.

Exhibit 1-7: Annual Service Volume (Capacity) Versus Annual Aircraft Operations (Demand)



	2016	2021	2026	2036
Annual Service Volume	212,000	212,000	204,000	203,000
Annual Operations	75,000	78,249	85,130	98,978

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, Change 2, Airport Capacity and Delay, December 1995; Ricondo & Associates, Inc., Aviation Activity Forecasts, August 2017.

[3] ASV represents the estimated annual number of aircraft operations an airport can efficiently accommodate, taking hourly, daily, and monthly operational patterns into consideration. ASV is defined in AC 150/5060-5 as "a reasonable estimate of an airport's annual aircraft operations capacity."

To meet FAA design standards, the Master Plan Update recommends the following key airfield improvements:

- Shift Runway 7-25 to the northwest 40 feet to provide a runway-to-taxiway centerline separation distance of 240 feet. Runway 7-25 has a width of 100 feet, but it is planned to be reduced to 75 feet upon completion of the runway shift project in compliance with FAA standards.
- Reconstruct Taxiway C west of its existing location to mitigate direct access from the cargo apron to Runway 7-25.
- Reconstruct Taxiway B to eliminate wide expanse of pavement
- Replace the existing runway and taxiway lighting system. During Hurricane Irma, the airfield lighting system, including the medium intensity runway and taxiway lights, was submerged by a storm surge. Though the airfield lighting system remains functional, it should be replaced when the runway is relocated.
- Realign/reconstruct Taxiway D from an acute-angled runway exit to a perpendicular runway exit.
- Remove existing taxiway and apron pavement on the north side of the approach to Runway 25.
- Implement new taxiway nomenclature: To meet FAA AC 150/5340-18 requirements, it is recommended that the parallel taxiway south of Runway 7-25 continues to be designated as Taxiway A; however, all stub taxiways are proposed to be designated as A1 through A6. Similarly, the connector taxilanes from parallel Taxiway A to the various apron areas are proposed to be renamed as B1 through B20.
- Relocate the existing Automated Surface Observing Systems (ASOS) to allow for the expansion of existing general aviation apron.

The Master Plan proposes the extension of Runway 7-25 from 5,008 feet to 5,400 feet to provide the necessary takeoff length required to operate most types of business jet aircraft without imposing significant weight penalties or requiring intermediate fuel stop when flying nonstop to medium or long-haul destinations. While the proposed 392-foot runway extension is not warranted in the short-term, it should be incorporated into the Airport layout Plan (ALP) in order to protect the safety and airspace surfaces associated with the proposed runway extension from incompatible land uses.

The Master Plan also recommends the identification of development areas for future general aviation facilities including aircraft apron, automobile parking spaces, and aircraft hangars. The fuel farm currently located in the middle of the west general aviation apron should also be relocated to free up space for aircraft operations.

The Airport does not currently have a dedicated maintenance storage facility. The equipment is stored in a shed, a storage container, and in the grass area adjacent to the ASOS. To provide indoor storage, in a consolidated facility, as well as to create office space for maintenance personnel, the construction of a 2,000 square feet maintenance facility adjacent to and west of the existing passenger terminal facility is recommended.

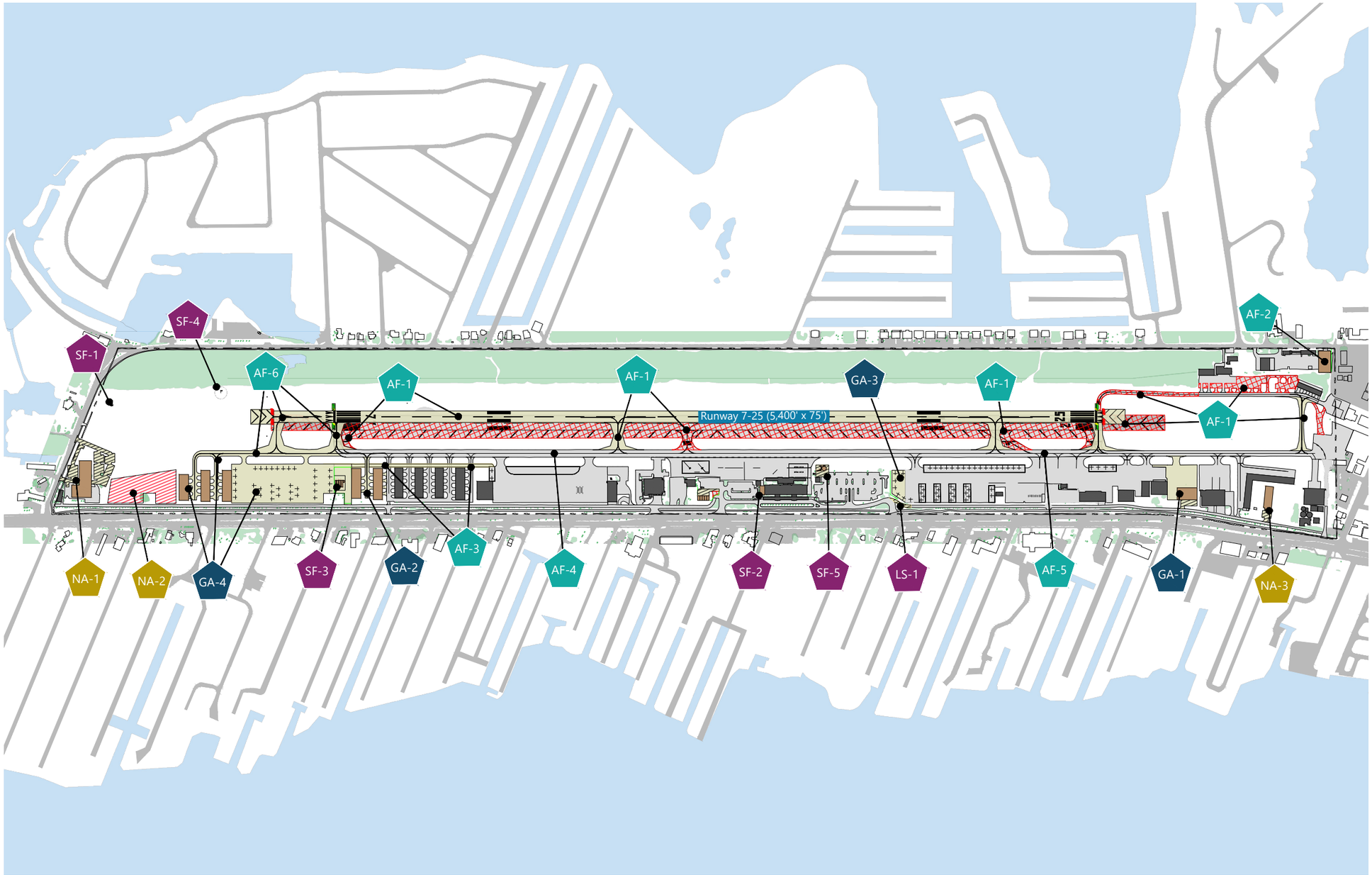
1.5 Proposed Airport Development Program

One of the goals of the master planning process is to identify the best options available for meeting the future development needs at the Airport. Based on the results of the master planning analysis and coordination with stakeholders, a recommended Airport Development Program was selected.

The recommended Airport Development Plan shown on **Exhibit 1-8** represents in conceptual form future development that should be implemented if growth were to occur as forecast. This plan has been created and refined through multiple iterations with Monroe County Department of Airports staff and MPU stakeholders. The Airport Development Program represents one vision of how facilities could be developed through 2036. Actual development may not mirror that shown on the Airport Development Program due to factors such as changing demand, funding availability, or future environmental constraints. However, the Airport Development Program serves as a guideline for the future layout of MTH. The Airport Development Program was derived on the ability to incrementally achieve the preferred ultimate plan development concept.

THE AIRPORT DEVELOPMENT PROGRAM IS COMPRISED OF THE FOLLOWING KEY PROJECTS:

Exhibit 1-8: Proposed Airport Development Plan



Airfield Improvements

- AF-1 Shift Runway 7-25 Northwest by 40 Feet
- AF-2 Remote Communications Air/Ground (RCAG) Facility Construction
- AF-3 Vehicle Service Road Construction
- AF-4 Taxiway Renaming
- AF-5 Taxiway Rehabilitation
- AF-6 Runway 7 End Extension West

General Aviation/Fixed Based Operator Facility Development

- GA-1 Southeast General Aviation Development
- GA-2 Southwest General Aviation Development (Phase 1)
- GA-3 Midfield General Aviation Apron Expansion
- GA-4 Southwest General Aviation Development (Phase 2)

Non-Aeronautical Facilties

- NA-1 Emergency Operations Center (EOC) Facility Construction
- NA-2 Retention Pond Modifications - Southwest
- NA-3 Indoor Shooting Range Facility Construction

Airport Support Facility Development

- LS-1 Airport Access Road Extension
- SF-1 Automated Surface Observing Systems (ASOS) Relocation
- SF-2 Airport Maintenance Storage Facility Construction
- SF-3 Fuel Storage Facility Relocation
- SF-4 Segmented Circle/Wind Cone Relocation
- SF-5 Airport Traffic Control Tower (ATCT) Facility Construction

1.5.1 AIRFIELD IMPROVEMENTS

AF-1 Shift Runway 7-25 Northwest by 40 Feet: This project will shift Runway 7-25 to the northwest 40 feet to achieve the FAA-required 240-foot runway-to-taxiway separation distance. Relocating the runway 40 feet to the north would also address the existing runway pavement condition which is in Fair condition[4] and in need of rehabilitation. The Florida Department of Transportation (FDOT) pavement evaluation report recommends the runway undergo major rehabilitation, which includes milling the surface of the existing runway pavement and resurfacing with asphalt (i.e., mill and overlay).

The FAA Orlando Airports District Office (ADO) has completed a Final Environmental Assessment (Final EA) and issued a Finding of No Significant Impact (FONSI) and Record of Decision (ROD) for this project on March 30, 2020. This project consists of:

- Shift Runway 7-25 to the northwest 40 feet to provide a runway-to-taxiway centerline separation distance of 240 feet.
- Construct new blast pads at relocated runway ends.
- Reconstruct Taxiway C west of its existing location to mitigate direct access from the cargo apron to Runway 7-25.
- Reconstruct Taxiway D perpendicular to relocated runway.
- Demolish existing excess pavement on Taxiway E.
- Relocate and/or install new runway edge lights and threshold lights.
- Relocate and/or install new Runway End Identifier Lights (REIL) on Runway 7 end.
- Relocate the Precision Approach Path Indicators (PAPI) for both runway ends.
- Clear a 40-foot wide by 5,608-foot long strip of vegetation on the north side of the shifted runway within the Runway Object Free Area (ROFA).[5] No fill or excavation would occur in the area to be cleared.
- Trim or remove select trees to clear the relocated runway Threshold Siting Surface[6, 7].
- Remove existing taxiway and apron pavement on the north side of the approach to Runway 25.
- Add drainage and utilities necessary to implement the Proposed Action.
- Update existing area navigation (RNAV) Global Positional System (GPS) instrument approach procedures to reflect the 40-foot lateral shift of Runway 7-25.[8]

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4 Florida Department of Transportation, *Statewide Airfield Pavement Management Program District 6 Report*, June 2015.

5 The OFA extends 300 feet beyond both runway ends.

6 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*, February 26, 2014.

7 The approach surface used to locate the runway threshold. The threshold is ideally located at the beginning of the runway and is located to provide proper clearance for landing aircraft over existing obstacles while on approach to landing. Obstacles that penetrate the Threshold Siting Surface, that are under the airport owner's power to remove, relocate or lower should be addressed.

8 RNAV GPS procedures provide instrument landing capability to varying levels of aircraft equipment and certification without requiring additional navigation equipment at the airport.

AF-2 Remote Communication Air-Ground Facility Construction (Parcel 4): This project, which is being sponsored and funded by the FAA, consists of designing and constructing a 12,000 square feet Remote Communication Air-Ground (RCAG) facility in the northeast corner of the Airport. This unmanned VHF/UHF transmitter/receiver facility will be used to expand the Miami Air Route Traffic Control Centers (ARTCC) air/ground communications coverage and to facilitate direct contact between pilots and controllers.

AF-3 Vehicle Service Road Construction: This project consists of constructing a dedicated 3,000 square yard service road between the existing general aviation aircraft ramp located west of the terminal facilities and the proposed fuel farm. It is anticipated this project will be completed as part of the GA-2 or SF-2 project. The interior service road will allow fuel trucks to circulate between the existing general aviation ramps and the future fuel farm without having to use Airport Access Road, a public road.

AF-4 Taxiway Renaming: This project consists of updating the taxiway nomenclature per the guidance provided in FAA Engineering Brief 89, Taxiway Nomenclature Convention. It is estimated that up to 30 new signs may need to be updated and/or replaced.

AF-5 Taxiway Rehabilitation: The rehabilitation of Taxiway A is intended to restore and/or maintain the pavement areas' serviceability, and it would include milling the existing 37,000 square yards of pavement to remove the deteriorated pavement, as well as a bituminous asphalt concrete pavement overlay.

AF-6 Runway 7 End Extension West: This project consists of extending Runway 7 by 392 feet and extending Taxiway A to the new runway end. This project also includes the construction of two new connectors between Taxiway A and the proposed runway extension. This runway extension will provide the additional runway length for larger jet aircraft currently departing MTH with operational weight restrictions. The runway extension will reduce payload penalties and/or increase aircraft range.

1.5.2 GENERAL AVIATION/FIXED BASED OPERATOR FACILITY DEVELOPMENT

The proposed general aviation/fixed based operators facilities shown on the Airport Development Plan are conceptual. The Airport will lease these tracts of land to the FBOs and the FBOs will be responsible for developing the land for general aviation facilities within their leaseholds. These facilities generally include a building with public/pilot service areas, offices, hangar(s), apron, and auto parking.

GA-1 Southeast General Aviation Development: This project consists of constructing GA facilities, including 11,000 square feet of aircraft hangars and 6,000 square yards of aircraft parking apron. This project also includes a connector to Taxiway A, as well as a new landside connector to Airport Access Road. The landside parking would include approximately 2,000 square feet and provides 10 automobile parking spaces. The layout of the proposed facilities will be dictated by the needs of the third-party developer which would sign a ground lease with the Monroe County Department of Airport for the development of this area.

GA-2 Southwest General Aviation Apron Development: This project consists of constructing 19 T-hangars and a taxilane between the hangars. This project also includes a new taxiway connector to Taxiway A. The facility inventory and needs assessment that was completed as part of this Master Plan Update identified the need for more hangar space at MTH. As of 2019, the hangars were 100 percent leased with a waiting list that ranges between 20 and 40 people. This project will help MTH meet the demand for hangar facilities.

GA-3 Midfield General Aviation Apron Expansion: This project consists of expanding the eastern general aviation apron to the southwest to provide an additional 2,000 square yards of apron space. It is anticipated the apron would be designed in accordance with FAA ADG I or II standards to accommodate a mix of based and transient aircraft, including single/twin engine piston and turboprop aircraft.

GA-4 Southwest General Aviation Apron Development: This project consists of constructing 16 new T-hangars for single- or twin-engine piston or turboprop aircraft and an additional 14,000 square yards of aircraft parking apron. The proposed building consists of 35,000 square feet of hangar space. This project also includes the extension of Taxiway A to provide access to the new T-hangars and apron areas. The layout of the proposed facilities will be dictated by the needs of the third-party developer which would sign a ground lease with the Monroe County Department of Airport for the development of this area.

1.5.3 AIRPORT SUPPORT FACILITY DEVELOPMENT

LS-1 Airport Access Road Extension: The proposed extension will link the east and west sections of Airport Access Road, allowing Airport tenants to access the various aviation facilities located along Airport Access Road without having to use U.S. Highway 1. This project will facilitate on-Airport vehicle circulation and will reduce vehicle crossings and traffic on U.S. Highway 1. The proposed two-lane road (18 to 20 feet wide) extension is approximately 150 feet long.

SF-1 Automated Surface Observing Systems (ASOS) Relocation: The location of the existing Automated Surface Observing System (ASOS) causes radio interference issues, and pilots have complained that they cannot hear the system message that includes important surface weather conditions, such as wind, visibility, sky condition, and pressure. This project consists of relocating the ASOS equipment currently located east of the passenger terminal parking facilities west of the Runway 7 end, along the property line that runs parallel to Aviation Boulevard. This relocation will also free up the area where the existing ASOS is located to allow for the expansion of existing general aviation apron.

SF-2 Airport Maintenance Storage Facility Construction: This project consists of designing and constructing a 2,000-square foot maintenance facility adjacent to and west of the existing passenger terminal. This facility will allow for the storage and parking of maintenance equipment and vehicles. A dedicated Airport maintenance facility will free up the area located between the existing passenger terminal automobile parking and the east general aviation ramp for aviation-related uses.

SF-3 Fuel Storage Facility Relocation: This project consists of relocating the two fuel tanks, including a 12,000-gallon Jet-A fuel tank and a 10,000-gallon 100-low lead (LL) Avgas tank with a self-service fueling facility located on the southwestern apron, to a new location west of the proposed T-hangars. The fuel storage facility relocation will free up space on the ramp for the movement and parking of aircraft.

SF-4 Segmented Circle/Wind Cone Relocation: This project consists of relocating the existing lighted wind cone and the associated segmented circle, located on the west side of the airfield and southwest of the Runway 7 end, to allow for the development of additional aviation-related facilities, such as hangars and aircraft apron. The existing segmented circle is a visual indicator that provides traffic pattern information to pilots operating at the Airport. It consists of a landing runway indicator, a traffic pattern indicator, and a lighted wind cone. The Master Plan Update proposes to relocate the segmented circle and lighted wind cone along the north side of the runway.

SF-5 Airport Traffic Control Tower Construction: This project will allow for the protection of the land area adjacent to the passenger terminal for the construction of a future ATCT when warranted by air traffic demand. The proposed location for the ATCT was selected because it provides clear line-of-sight to the runway ends (and associated approaches), as well as the aircraft parking apron areas. In addition, landside access to the proposed ATCT can easily be provided using the passenger terminal access road. Finally, the proposed site is not anticipated to impact any existing environmentally sensitive areas and existing navigational aids at the Airport.

1.5.4 AIRPORT SUPPORT FACILITY DEVELOPMENT

Non-aeronautical development to be located on-airport property will include:

NA-1 Emergency Operations Center: This project consists of the construction of a raised hurricane-rated building to serve as the Emergency Operations Center (EOC) for the County of Monroe to coordinate disaster response and recovery efforts in support of field operations in the event of a natural disaster, such as a hurricane. The EOC building's first floor will be raised to minimize the impacts of potential flooding associated with hurricanes. This project will require the demolition of an existing building. This project will be fully funded by Monroe County.

NA-2 Rental Car/Wash Facility: This project consists of constructing four (4) wash bays for the rental car operator at the Airport. This project will be fully funded by the Department of Airports.

NA-3 Indoor Shooting Range: This project consisted of constructing an indoor shooting range for the Monroe County Sheriff's Office. This facility was designed for firearms qualifications, training, or practice, and it will be operated by the Monroe County Sheriff's Office. This project, which was completed in 2019, was funded by the Monroe County Sheriff's Office.

1.6 Program Phasing

Actual growth and the requirement for delivery of airport infrastructure and capacity development is dependent on the state of the aviation industry, prerequisite projects, anticipated development costs, and global economic trends. This is not expected to affect the development strategies presented in this Master Plan Update; however, it will affect the timing of investments in elements of the plan.

Phasing also involves financial considerations and a logical progression of development that will allow critical projects to be in place to meet demand. The proposed Implementation Plan divides into three phases: Short-Term Improvements (FY2018 to FY2022), Intermediate-Term Improvements (FY 2023 to FY 2028), and Long-Term Improvements (FY 2029 to FY 2036).

Table 1-1 includes the proposed Airport Development projects illustrated on Exhibit 1-8, future airfield pavement rehabilitation and improvement projects, projects included in the existing Capital Improvement Program (CIP), and project enablers such as environmental studies.

Although these three phases estimate the general period (in fiscal years) anticipated for future Airport improvements, periodic reevaluation of the proposed timing will be necessary to accommodate changing development needs or priorities and to adjust for other unforeseen factors. It is also possible that other improvements not identified in this implementation plan may be required to support Airport operations and/or to improve operational efficiency.

Table 1-1: Phasing Program

Short-Term Improvements (FY 2018 to FY 2022)	
Airfield Improvements:	
AF-1	Runway and Parallel Taxiway Separation Improvements – Design and Permitting
AF-2	Remote Communication Air-Ground Facility Construction
General Aviation/Fixed Based Operator Facility Development:	
GA-1	General Aviation Development - Southeast
GA-2	General Aviation Development - Southwest
Airport Support Facility Development:	
SF-1	Automated Surface Observing System Relocation
SF-2	Airport Maintenance Storage Facility
SF-3	Fuel Storage Facility Relocation
SF-4	Segmented Circle/Wind Cone Relocation
Non-Aeronautical Facilities:	
NA-1	Emergency Operations Center
NA-3	Indoor Shooting Range
Intermediate-Term Improvements (FY 2023 to FY 2028)	
Airfield Improvements:	
AF-1	Runway and Parallel Taxiway Separation Improvements – Construction
AF-4	Taxiway Renaming
AF-5	Taxiway A Rehabilitation
Non-Aeronautical Facilities:	
NA-2	Retention Pond Modifications - Southwest
Long-Term Improvements (FY 2029 to FY 2036)	
Airfield Improvements:	
AF-6	Runway Extension West and Associated Airspace Obstruction Mitigation
General Aviation/Fixed Based Operator Facility Development:	
GA-3	General Aviation Apron Expansion- Midfield
GA-4	General Aviation Development - Southwest
Airport Support Facility Development:	
LS-1	Airport Access Road Extension

SOURCES: Jacobs, December 2018; Monroe County Department of Airports, June 2020.

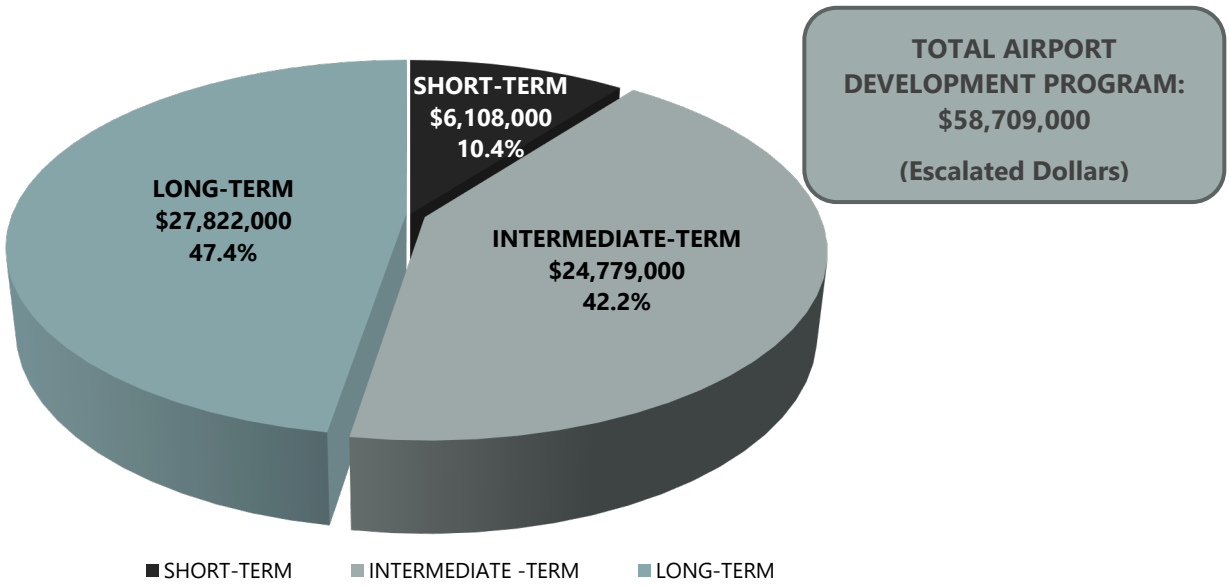
1.7 Financial Plan

The County owns and operates the Airport through the Monroe County Board of County Commissioners (BOCC) as a separate enterprise fund of the County. The BOCC manages the Airport through the County Administrator, the Senior Director of Airports, the Deputy Director of Airports, and the Airport Business Managers who oversee daily operations. The Airport is not a legally separate or fiscally independent unit of the County. Therefore, it is considered a part of the County's primary government, and it is included as such in the Monroe County Comprehensive Annual Financial Report. The County and Airport operate on a 12-month FY ending September 30.

The total cost of the projects included in the recommended Airport Development Program is approximately $58.7 million[9] in escalated dollars. The actual implementation schedule for the various construction projects will be influenced by demand, funding availability, the County's priorities, and other relevant factors and actual funding strategies for each project will be determined at the time of project implementation.

Exhibit 1-9 presents the CIP by planning phase.

Exhibit 1-9: Capital Improvement Program by Planning Phase



SOURCES: Jacobs, December 2018; Monroe County Department of Airports, June 2020.

[9] Excludes the fuel storage facility relocation, the Monroe County Emergency Operations Center (EOC), the development of new FBO-operated general aviation facilities, the Monroe County Sheriff's Office Indoor Shooting Range, and the FAA Remote Communication Air-Ground Facility Construction (RCAG).

Typically, airport capital improvements are generally financed through federal- and state-imposed user taxes, as well as from funds generated from airport operations, including fuel taxes, space-leasing fees, and other similar sources. Major sources may include the FAA's Airport Improvement Program (AIP), FDOT and local funding programs, Airport revenue, Airport user charges, and private investment. Public grants and airport revenues provide most of the capital funding, while user charges generally cover an airport's operating expenses and the debt service for any specially financed projects.

- Federal Funding Sources: The U.S. Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for national defense and the promotion of interstate commerce. Various grants-in-aid programs to public airports have been established over the years for this purpose. The primary sources for federal aviation-related funds are those associated with the AIP program, which are distributed by the FAA. AIP provides federal grants for airport planning and the development of capital projects that support airport operations, including runways, taxiways, aprons, and noise abatement. Airport sponsors and non-federal contributors must provide at least a 5 percent share of any project funded by AIP grants. Historically, most airfield safety and capacity projects at the Airport have been eligible for 90 percent AIP participation. As in the past, Federal grants are expected to play a role in the financing of the Airport's projected capital expenditures and approximately $29.0 million in escalated project costs are expected to utilize funding from the federal entitlement and discretionary programs.

- State Funding Sources: In support of the State of Florida airport system, the FDOT also participates in the development of airport improvements. FDOT Grants are funded from the State Transportation Trust Fund, which consists, in part, of funds collected through the state's aviation fuel tax. Presently, the State will contribute as much as 50 percent of the local share on federally eligible projects for airports in Florida. The State will also provide up to 100 percent funding for security projects and up to 80 percent funding for the development of facilities that are otherwise ineligible for FAA AIP grants, such as hangar development, pay-parking areas, and fuel tanks/farms. The County has received an average of approximately $1.6 million annually in FDOT Grants over the past five years to fund eligible projects at the Airport. Approximately $24.5 million in escalated project costs are expected to receive state funding.

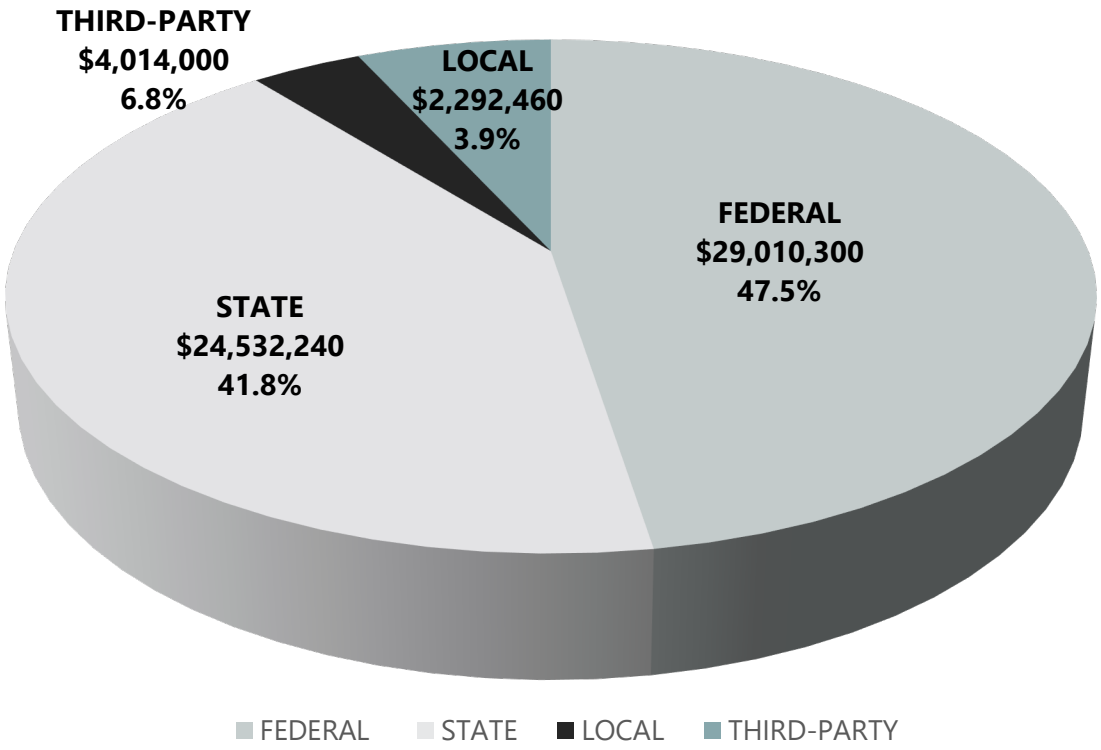
- Airport Funds: Revenues remaining after the payment of operating and maintenance (O&M) expenses are deposited into the Airport's General Revenue Fund (Fund 403). Revenues in Fund 403 may be used to fund capital improvement projects at the Airport. Approximately $2.3 million in escalated project costs are expected to be funded with local funds.

- Third-Party Funds: Development projects that are not eligible for federal grants require funding from local or private funding sources. General examples of projects that are often candidates for third-party funding include hangars, aircraft and automobile parking facilities, and other facilities to be constructed by tenants under a lease agreement. Facilities that are constructed with private financial contributions

may also provide a financial benefit in the form of land lease revenues to the Airport. Approximately $4.0 million in escalated project costs are expected to be funded with third-party funding.

Exhibit 1-10 presents the estimated funding sources for the CIP projects.

Exhibit 1-10: Capital Improvement Program by Funding Source



SOURCES: Monroe County Airports Department, April 2017; FDOT FASP, 2017.

Cash flow derived through the operation of the Airport is adequate to annually fund the projected CIP during the entire 20-year planning horizon, which is based on the assumed funding sources and the conservative projections of operating expenses and operating revenues. After reviewing the Airport's annual financial cash flows, there is adequate funds available within the Marathon Enterprise Fund and annual net remaining revenues to undertake the projects in the CIP. It is not anticipated that any long-term or short-term debt will be needed to fund any capital projects. Although these projections were based on conservative assumptions, material differences in the levels of operating revenues or expenses, or in the cost of the capital projects, could influence the feasibility of the overall CIP. As implementation of the Airport Development Program progresses, MTH Airport staff should assess the financial feasibility of each project included in the program.

Florida Keys Marathon International Airport

Inventory of Existing Conditions

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO® & ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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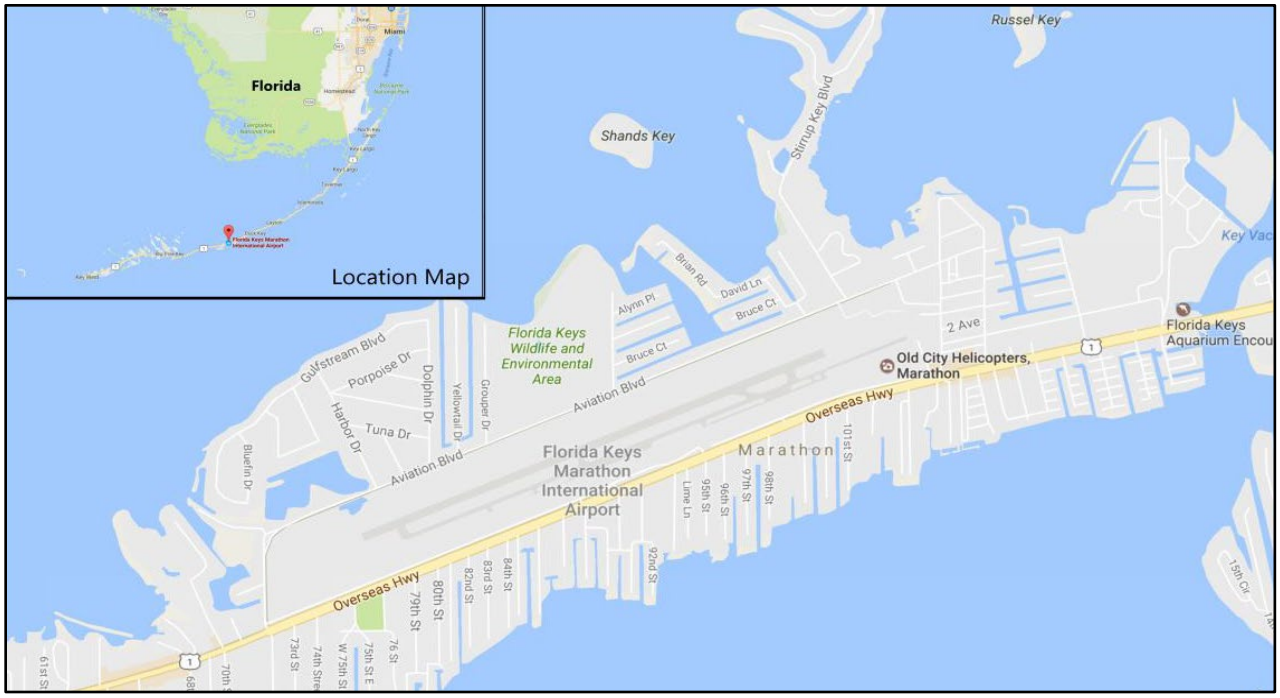
2. Inventory of Existing Conditions

2.1 Airport Setting

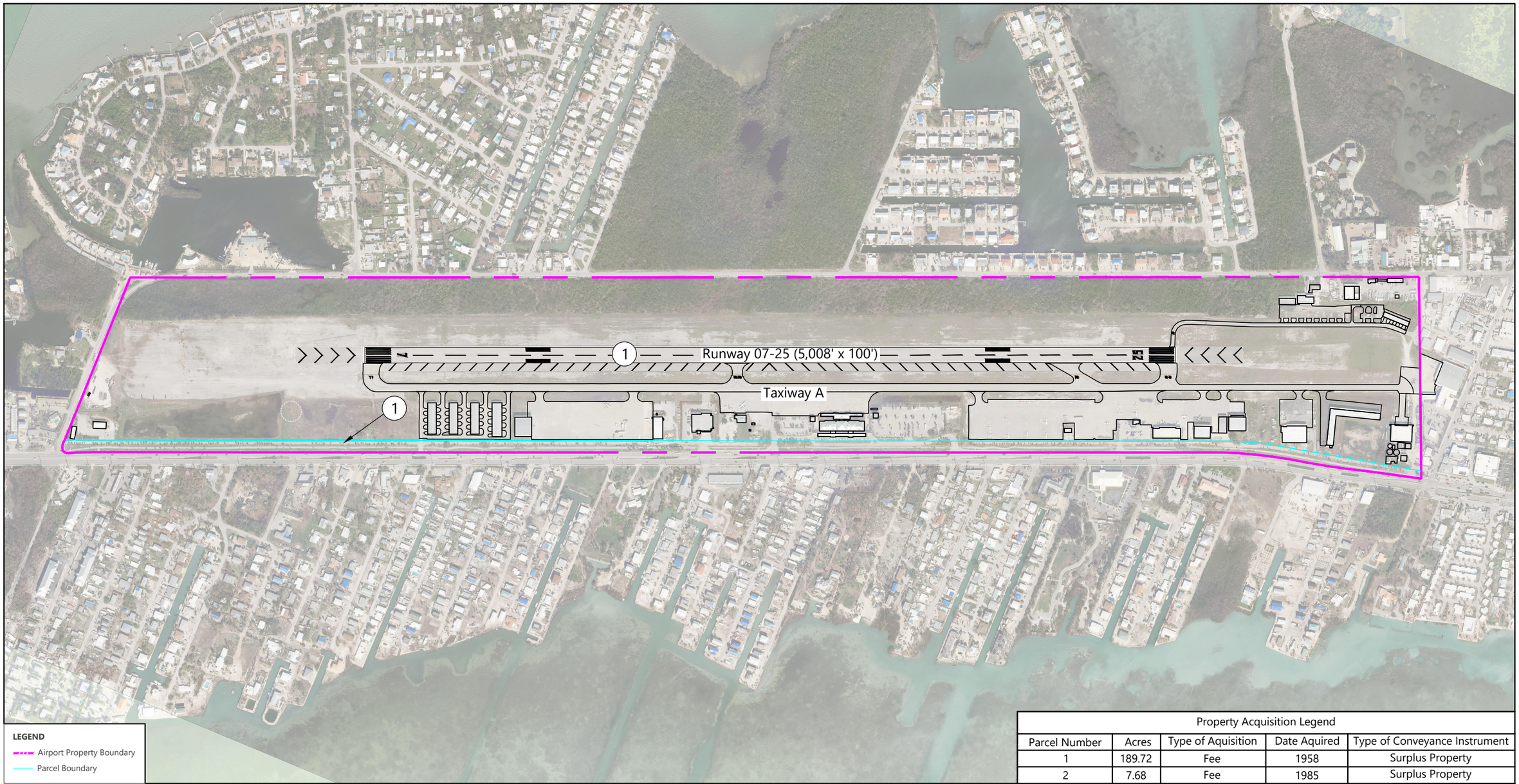
2.1.1 AIRPORT HISTORY

Florida Keys Marathon International Airport (the Airport or MTH) is located in the city of Marathon, between Key West and Key Largo; it is 100 miles southwest of Miami. MTH is primarily a general aviation (GA) airport for the Middle Keys. **Exhibit 2-1** depicts the general vicinity and location of MTH. The Airport encompasses 197.4 acres of land, which is depicted on **Exhibit 2-2**. The Airport is owned by Monroe County, and it is operated by the Board of County Commissioners (BOCC). The Director of Airports reports to the BOCC and manages the day-to-day operations of both MTH and Key West International Airport.

Exhibit 2-1: Vicinity/Location Map for MTH



SOURCE: Google Maps Pro, April 2017 (Basemap).
PREPARED BY: American Infrastructure Development, Inc., April 2017.



LEGEND
- Airport Property Boundary
- Parcel Boundary

Property Acquisition Legend				
Parcel Number	Acres	Type of Aquisition	Date Aquired	Type of Conveyance Instrument
1	189.72	Fee	1958	Surplus Property
2	7.68	Fee	1985	Surplus Property

SOURCE: Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018; Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., June 2020.

EXHIBIT 2-2

NORTH 0 600 ft.

Airport Property Map

In 2007, Delta Connection began operating daily commercial service between Marathon, Florida, and Atlanta, Georgia; however, that service ended after six months. Two years later, Continental Airlines began operating three daily flights between Marathon and Fort Myers. Continental Airlines, however, discontinued service at MTH in 2010.

2.1.2 HISTORICAL AIRCRAFT OPERATIONS

MTH is a non-towered airport, and the BOCC does not maintain any systems to count aircraft operations. Fixed-base operators (FBOs) also do not actively log all operations; therefore, accurate data for past operations are not available. Data from the FAA Terminal Area Forecast (TAF) database were obtained and reviewed for a generalized view of the operations over the past 10 years. The TAF data are presented in **Table 2-1**, which provides a summary of the Federal Aviation Administration (FAA)'s assumptions regarding aircraft operations over the past 10 years.

Table 2-1: Historical Aircraft Operations

CALENDAR YEAR	AIR CARRIER	AIR TAXI	GENERAL AVIATION	MILITARY	TOTAL	CIVIL	MILITARY	TOTAL	TOTAL OPERATIONS
2007	0	3,805	26,483	156	30,444	33,705	0	33,705	**64,149**
2008	212	1,370	27,513	244	29,339	35,017	0	35,017	**64,356**
2009	0	3,907	27,227	156	31,290	34,654	0	34,654	**65,944**
2010	0	3,907	27,227	156	31,290	34,654	0	34,654	**65,944**
2011	0	3,958	27,608	156	31,722	35,138	0	35,138	**66,860**
2012	0	3,958	27,608	156	31,722	35,138	0	35,138	**66,860**
2013	0	4,200	26,780	400	31,380	34,084	0	34,084	**65,464**
2014	0	4,360	27,798	415	32,573	35,380	0	35,380	**67,953**
2015	0	4,435	28,284	422	33,141	35,999	0	35,999	**69,140**
2016	0	4,493	28,679	422	33,594	36,503	0	36,503	**70,097**
Total:	**212**	**38,393**	**275,207**	**2,683**	**316,495**	**350,272**	**0**	**350,272**	**666,767**

SOURCE: Federal Aviation Administration, Terminal Area Forecast Database, April 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.1.3 RECENT CAPITAL IMPROVEMENT PROJECTS

The last Master Plan for MTH was completed in 2002. The Airport Development Plan identified 12 improvement projects. Of those 12 projects, the following have been constructed or are underway:

- Monroe County Sheriff Hangar, Apron, and Fuel Farm Complex
- Additional East FBO Hangar
- Aircraft Rescue and Fire Fighting Station
- Three Additional Corporate Hangars
- T-Hangar Development

2.2 Airfield System

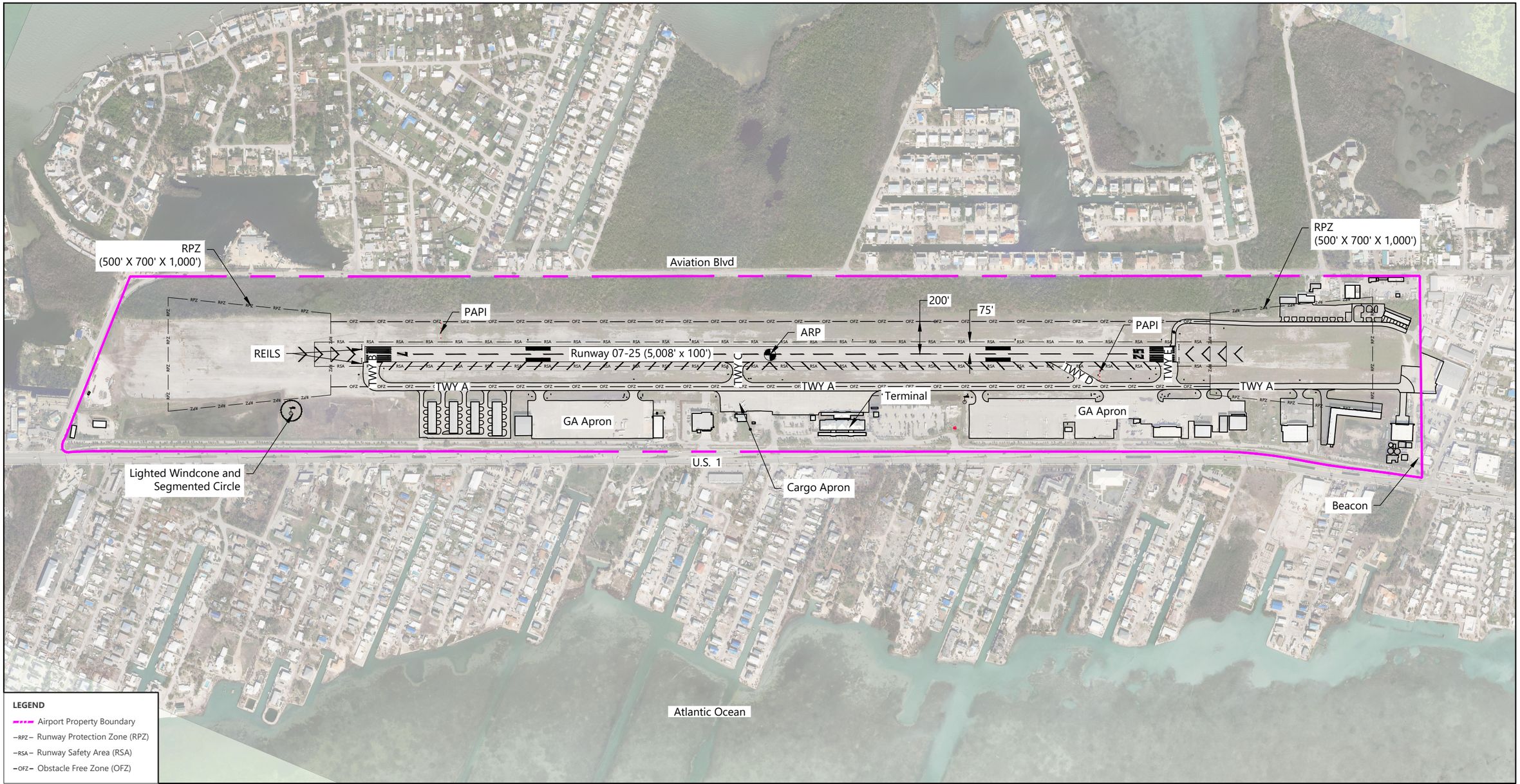
The Airport's airfield includes those facilities necessary to support the movement and operations of aircraft, including runways, taxiways, and apron areas, along with associated markings, lighting systems, and instrumentation. The locations of airfield facilities at MTH are shown on **Exhibit 2-3**. The Airport's elevation, the highest point on the runway, is 5.2 feet above mean sea level (MSL). The Airport is classified as an Airport Reference Code (ARC) B-II, and the design aircraft is a Cessna Citation.

2.2.1 RUNWAY LAYOUT AND TAXIWAY NETWORK

Runway 7-25, the only runway at MTH, is 5,008 feet in length and 100 feet wide. The runway is equipped with medium intensity runway lights (MIRL), runway end identifier lights (REIL), and four light precision approach path indicators (PAPIs). The runway is grooved asphalt concrete and has the following gross weight by landing gear configuration: 75,000-pound single-wheel, 129,000-pound double-wheel, and 191,000-pound double-wheel tandem. A single wheel gear aircraft is one where each landing gear is supported by a single tire; dual wheel gear consists of two tires per axle; and dual wheel tandem gear consists of four tires per axle arranged as a pair of dual wheel gear that helps provide for a greater weight distribution. The last overlay/construction work was completed in 1985, according to the Florida Department of Transportation's (FDOT's) *Statewide Airfield Pavement Management Program, District 6 Report*, dated June 2015. The report indicates that the runway has a Pavement Condition Index (PCI) rating of 61 ("Fair"). **Exhibit 2-4** provides the results of the FDOT's 2015 airfield pavement assessment.

The taxiway system at the Airport provides access between the runway and the aircraft parking aprons on the airfield. Taxilanes are designated within and adjacent to the apron areas to facilitate the movement of aircraft between parking positions and taxiways. All the taxiways at MTH are asphalt and have medium intensity taxiway lights (MITL). Taxiway A is a full-parallel taxiway with a width of 50 feet; it is located 200 feet south of the Runway 7-25 centerline. Four taxiways (B, C, D, and E) connect Taxiway A to Runway 7-25. Taxiway E provides access to the hangars on the northeast side of the airfield with access to Runway 7-25 and the general aviation facilities on the south side of the airfield. **Table 2-3** lists the pavement condition of the taxiways at MTH.

The existing runway-to-taxiway centerline separation distance is 200 feet. This separation distance does not meet the required standard of 240 feet for a facility with an ARC of B-II. Monroe County is planning a capital improvement project to shift Runway 7-25 to the northwest by 40 feet to correct the nonstandard separation issue. The result of this project will be a reduction in the runway width from 100 feet to 75 feet and an increase in the runway-to-taxiway separation from 200 feet to the required 240 feet.



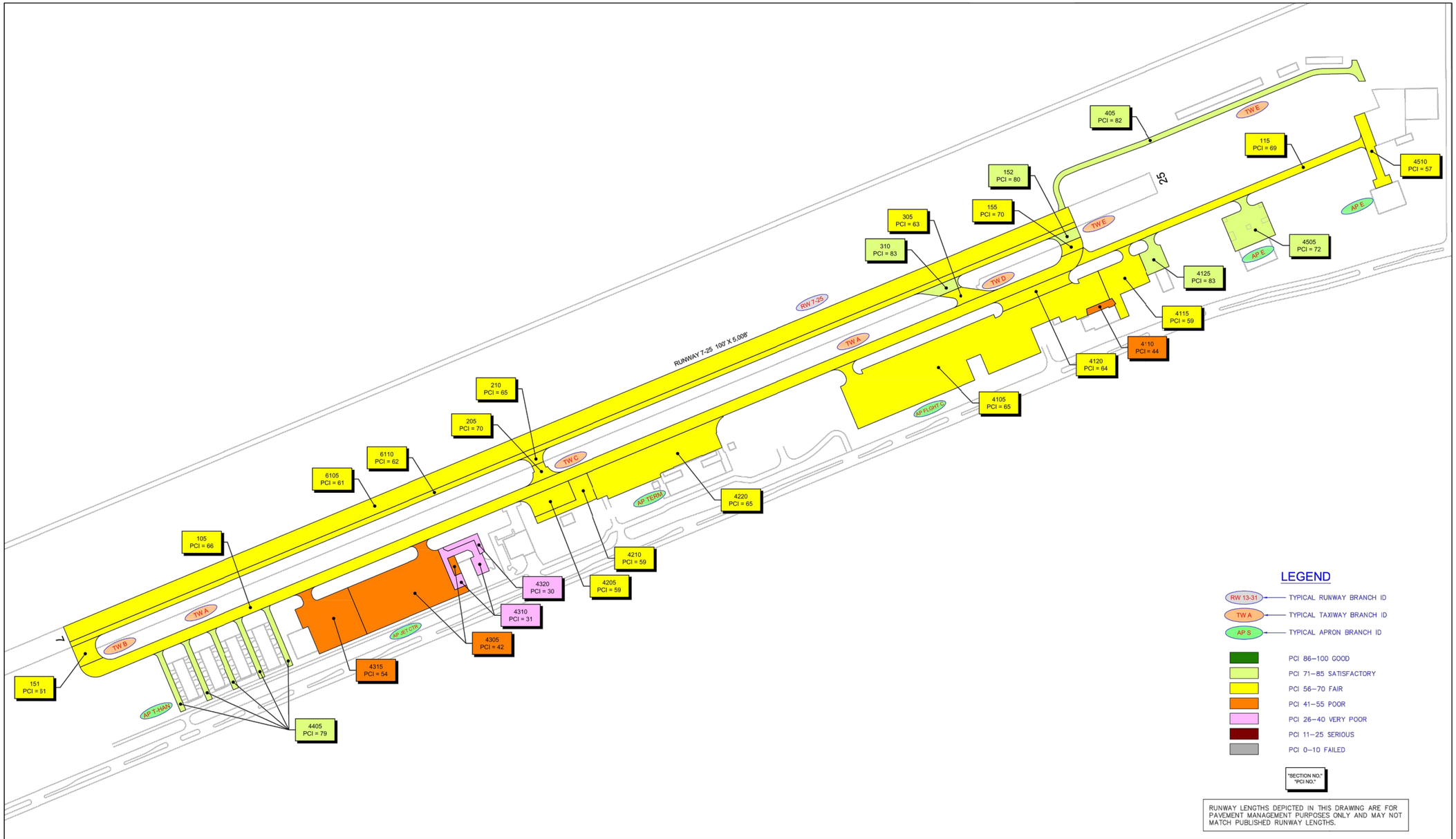
SOURCE: Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018; Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., June 2020.

EXHIBIT 2-3

NORTH 0 600 ft.

Airfield Facilities

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-3_MTH_Airfield Facilities Map.dwgLayout: Exhibit 2-3 Plotted: Jul 16, 2020, 11:07AM



SOURCE: Florida Department of Transportation (FDOT), 2015 (Basemap).
PREPARED BY: American Infrastructure Development, Inc., May 2017.

EXHIBIT 2-4

NORTH 0 700 ft.

Airfield Pavement Conditions Index Rating

Drawing: D:\Dropbox (AID)\1-PROJECTS\MTH\JAC17027 - Marathon Master Plan\03-Drawings\WIP\EXHIBITS\MTH-ARFD-PAVE-COND-INDX.dwgLayout: Layout1 Plotted: May 10, 2017, 11:21AM

Table 2-3: Existing Taxiway Inventory and Conditions

TAXIWAY	TAXIWAY WIDTH (FEET)	AGE (YEARS)	PAVEMENT CONDITION INDEX/CONDITION	TYPE
A	50	17	66 / 69 Fair	Asphalt
B	100	17	61 Fair	Asphalt
C	50	17	65 / 70 Fair	Asphalt
D[1/]	55	32 and 17	63 Fair (32-year-old pavement); 83 Satisfactory (17-year-old pavement)	Asphalt
E	50 south of runway; 25 north of runway	17	70–80 Fair–Satisfactory (south); 82 Satisfactory (north)	Asphalt

NOTE:

1/ A section of Taxiway D, near the Runway 7-25 edge, is approximately 17 years old, while the section of Taxiway D adjacent to Taxiway A is approximately 32 years old.

SOURCE: Florida Department of Transportation, *Statewide Airfield Pavement Management Program, District 6 Report*, 2015.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.2.2 AIRFIELD LIGHTING AND NAVIGATIONAL AIDS

Airfield lighting and navigational aids are necessary at all airports that accommodate aircraft operations during nighttime hours or during inclement weather. These aids enable pilots to identify the airport from the air and help them to maneuver safely on the ground during reduced visibility conditions. The following subsections detail the various airfield lighting and navigational aid components present at MTH.

Airport Rotating Beacon

The Airport beacon indicates the location and presence of the Airport at night or during low visibility conditions. The rotating beacon at MTH is 63 feet in height, and it is located near the wastewater facility. This navigational aid consists of an optical rotating beacon that projects two beams of sequenced flashing lights, one green and one white, 180 degrees apart, which designate a civil land airport. The beacon at the Airport is continuously operated during nighttime hours and when the airfield is operating under instrument flight rule (IFR) conditions. It is in good condition.

Runway/Taxiway Edge Lighting. Runway edge lights enable pilots to identify the edges of the runway and assist them in determining the runway length remaining during periods of darkness and restricted visibility. The lights marking the ends of the runway emit red light toward the runway to indicate the end of the runway to a departing aircraft, and they emit green light outward from the runway end to indicate the runway threshold to pilots of landing aircraft. These lighting systems are classified according to their intensity or brightness. Runway 7-25 is equipped with standard MIRLs along the runway edges. Similarly, all taxiways and associated connectors are equipped with MITLs along the taxiway edges. According to Airport staff, all lighting is in good condition.

Approach Lighting. Runway 7 is equipped with REILs to aid pilots in identifying the approach end of the runway. The REIL system consists of a pair of synchronized flashing lights located laterally on each side of the runway

threshold. The MIRLs for Runway 7-25 are preset to low intensity; pilots can increase the intensity and activate REILs by using the Common Traffic Advisory Frequency 122.8.

Visual glide slope indicators aid pilots in judging the correct approach slope of the aircraft toward the touchdown zone of a runway. A system of lights comprises the PAPI; the lights may be visible for up to 5 miles during the day and up to 20 miles or more at night. PAPI systems use lights installed in a single row of either two- or four-light units. Each set of lights is designed to appear as either white or red, depending upon the approach angle. When the pilot is approaching the lights at the proper angle, the first set of lights appears white and the second set appears red. When both sets appear white, the pilot is flying too high, and when both appear red, the pilot is flying too low. Runway 7-25 is equipped with a four-light PAPI system located on the left side of each runway approach end. The PAPIs for Runway 7-25 can be activated by the pilot using the Common Traffic Advisory Frequency 122.8.

Wind Cones. Wind cones provide pilots with existing wind conditions and direction. Runway 7-25 is equipped with a lighted wind cone within a segmented circle, located on the west side of the airfield and south of the displaced threshold of Runway 7. **Table 2-4** provides a summary of the lighting and approach aids provided on Runway 7-25.

Table 2-4: Lighting and Navigational Approach Aids

RUNWAY END	RUNWAY EDGE LIGHTS	REIL	WIND CONE	VISUAL GLIDE SLOPE INDICATOR	THRESHOLD CROSSING HEIGHT (FEET)	VISUAL GLIDE ANGLE (DEGREES)	RUNWAY MARKING TYPE
7	MIRL	Y	Y	PAPI-4	24	3	Nonprecision Instrument
25	MIRL	N	Y	PAPI-4	24	3	Nonprecision Instrument

NOTES:

MIRL – Medium Intensity Runway Lights

REIL – Runway End Identifier Lights

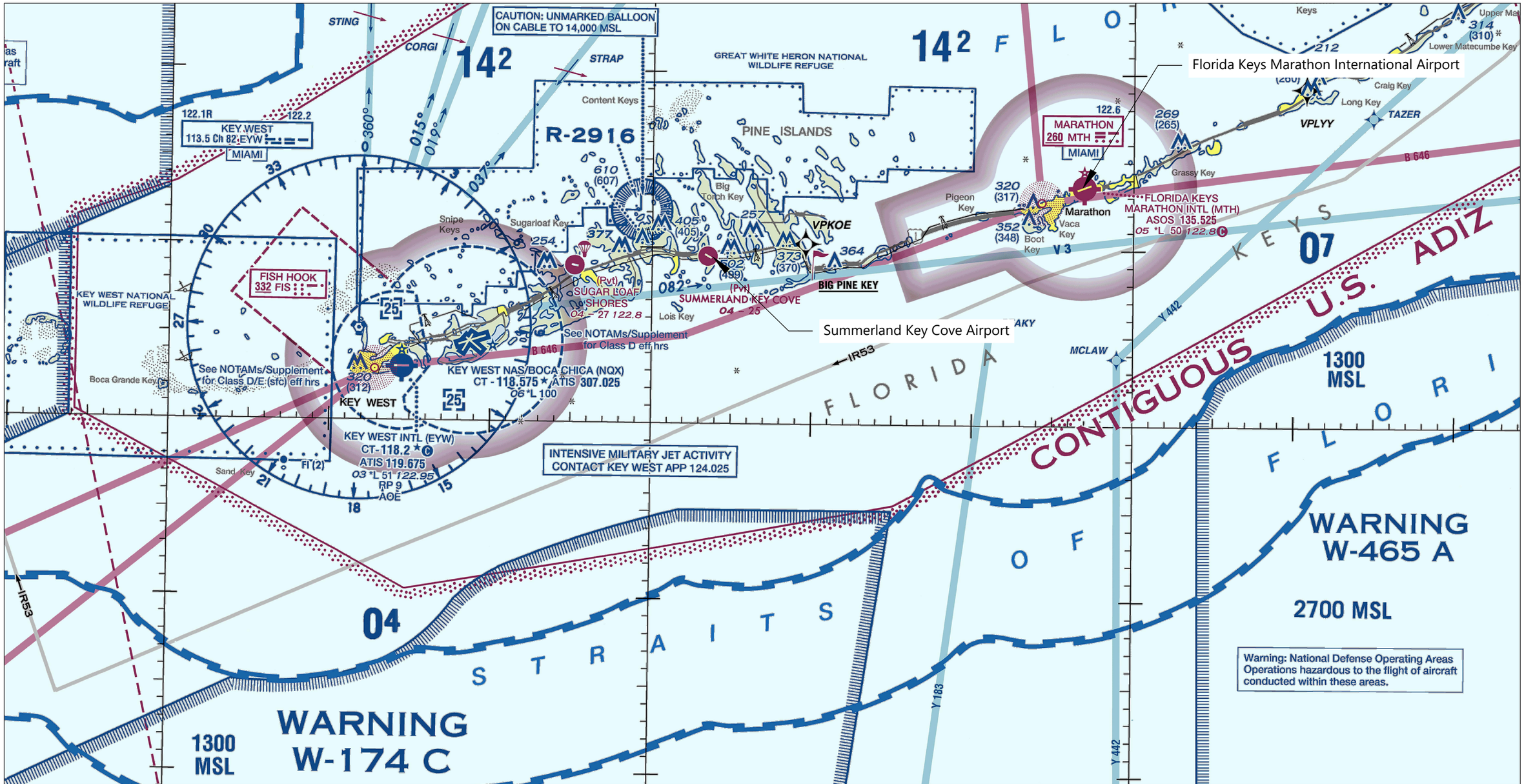
PAPI – Precision Approach Path Indicators

SOURCE: Federal Aviation Administration, Airport Master Record, April 2017.

PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.2.3 REGIONAL AIRSPACE

This inventory of existing conditions includes navigational factors, such as military, public, and private airports; civil and military flight corridors; navigational and visual aids; military restricted and operational areas; published approaches; and known obstructions that affect approaches or departures at MTH. The National Oceanic and Atmospheric Administration, Miami Sectional Aeronautical Chart provided on **Exhibit 2-5** shows that Summerland Key Cove Airport, a private facility, located 21 nautical miles to the west, is the only facility within 25 nautical miles of MTH.



SOURCE: National Oceanic and Atmospheric Administration, *Miami Sectional Aeronautical Chart*, (Effective 30 January 2020 to 13 August 2020).
PREPARED BY: Ricondo & Associates, Inc., June 2020.

EXHIBIT 2-5

Miami Sectional Aeronautical Chart

0 Not To Scale

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-5_MTH_Miami Sectional Aeronautical Chart.dwgLayout: Exhibit 1-15 Plotted: Jul 15, 2020, 04:36PM

Obstructions within 25 nautical miles of the Airport include a strobe-lighted and marked balloon up to 14,000 feet west of the Airport, as well as several towers located west and northeast of the Airport. These towers are situated at elevations ranging from 227 feet to 502 feet above MSL. The latest FAA edition (March 3, 2017 to April 27, 2017) of the *Takeoff Minimums, (Obstacle) Departure Procedures and Diverse Vector Areas (Radar Vectors)* indicates that pilots departing from Runway 7 or 25 must be aware of several obstacles, as indicated in **Table 2-5**.

MTH does not have an air traffic control tower; therefore, it is in controlled Class E airspace, which extends from 700 feet above ground level to 18,000 feet MSL. Radio communications are not required in Class E airspace.

MTH airspace is adjacent to the Air Defense Identification Zone, United States Defense Area R-2916, and numerous warning areas outside of FAA jurisdiction and over international waters. Traffic from the north and northeast is routinely routed clear of warning areas. The U.S. Navy employs some warning areas for high-speed aerial combat training, including surface-to-air and air-to-air missile firings and anti-aircraft gunnery.

Table 2-5: Departure Obstacles

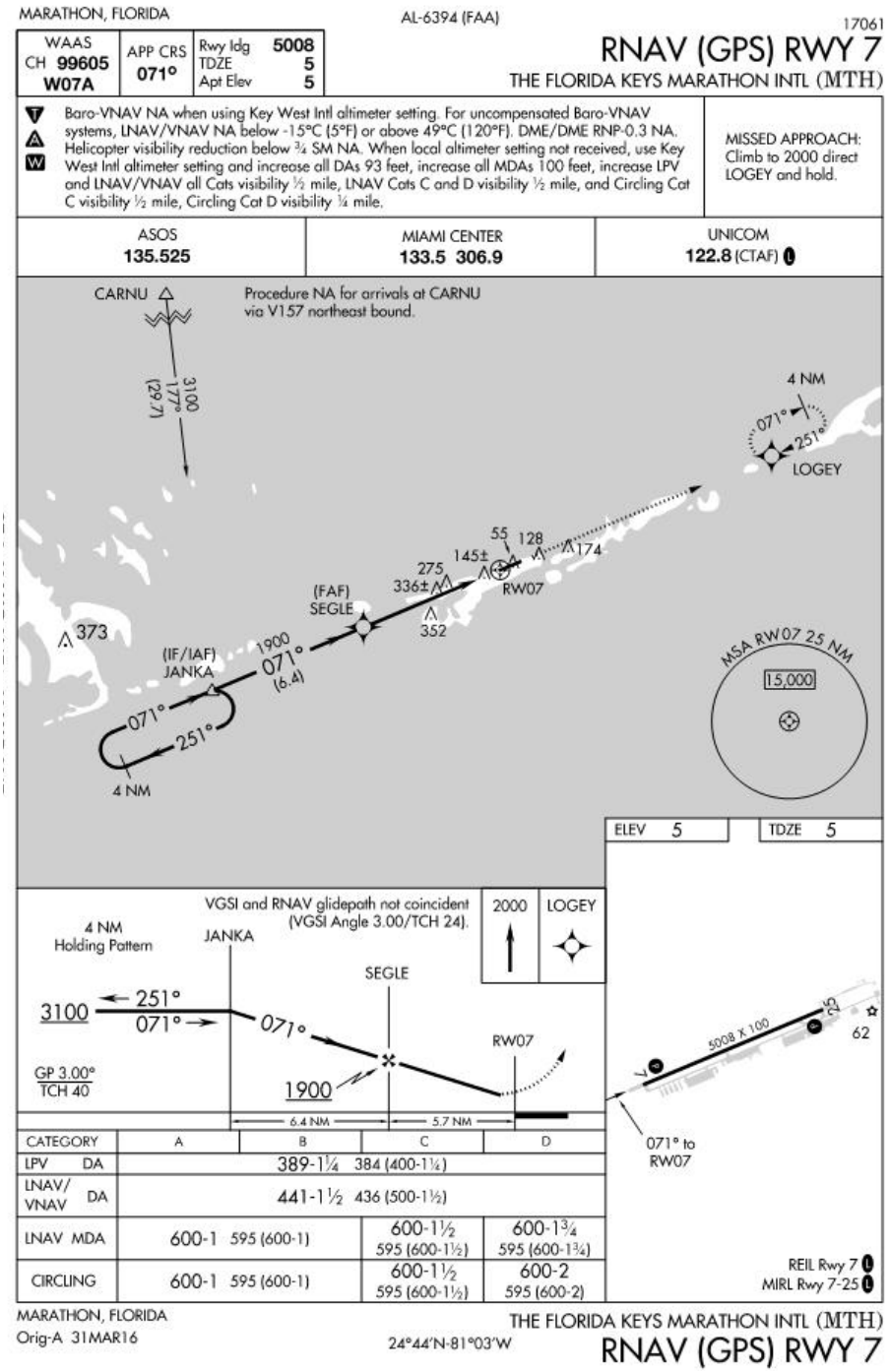
DEPARTURE END OF RUNWAY	BEGINNING FROM DEPARTURE END OF RUNWAY	TYPE OF OBSTACLE
7	337 feet, 324 right of centerline, up to 74 feet above ground level / 81 feet mean sea level	Trees
7	166 feet, 323 right of centerline, 9 feet above ground level / 16 feet mean sea level	Brush
7	726 feet, 589 feet right of centerline, 39 feet above ground level / 46 feet mean sea level	Pole
7	1404 feet, 655 feet right of centerline, 55 feet above ground level / 62 feet mean sea level	Rod on Obstruction Light
7	2360 feet, 1029 feet right of centerline, 89 feet above ground level / 96 feet mean sea level	Transmission Pole
7	3366 feet, 1010 feet right of centerline, 136 feet above ground level / 143 Mean sea level	Rod on Obstruction Light Antenna
7	3270 feet, 1253 right of centerline, 121 above ground level / 128 mean sea level	Antenna
7	3427 feet, 1033 right of centerline, 151 above ground level / 121 mean sea level	Tower
7	242 feet, 99 feet left of centerline, up to 75 feet above ground level / 82 feet mean sea level	Trees
7	1660 feet, 371 feet left of centerline, up to 86 feet above ground level / 93 feet mean sea level	Antennas
7	876 feet, 468 feet left centerline, 39 feet above ground level / 46 mean sea level	Pole
7	1391 feet, 534 left of centerline, 51 feet above ground level / 58 mean sea level	Concrete Pole
7	1441 feet, 586 feet right of centerline, 55 feet above ground level / 62 feet mean sea level	Pole
25	122 feet, 224 feet right of centerline, up to 65 feet above ground / 72 feet mean sea level	Trees
25	702 feet, 470 feet right of centerline, up to 37 feet above ground level / 44 feet mean sea level	Poles
25	1752 feet, 135 feet right of centerline, 49 feet above ground level / 56 feet mean sea level	Antenna
25	223 feet, 324 feet left of centerline, up to 66 feet above ground level / 73 feet mean sea level	Trees
25	2353 feet, 22 feet right of centerline, up to 138 feet above ground level / 145 feet mean sea level	Rod on Obstruction Light Antenna
25	2953 feet, 745 feet left of centerline, 75 feet above ground level / 82 feet mean sea level	Antenna
25	1545 feet, 693 feet left of centerline, 60 feet above ground level / 67 feet mean sea level	Transmission Pole
25	3997 feet, 660 feet left of centerline, 136 feet above ground level / 140 feet mean sea level	Monopole

SOURCE: Federal Aviation Administration, Takeoff Minimums and Obstacle Departure Procedures, April 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.2.4 PUBLISHED INSTRUMENT APPROACH PROCEDURES

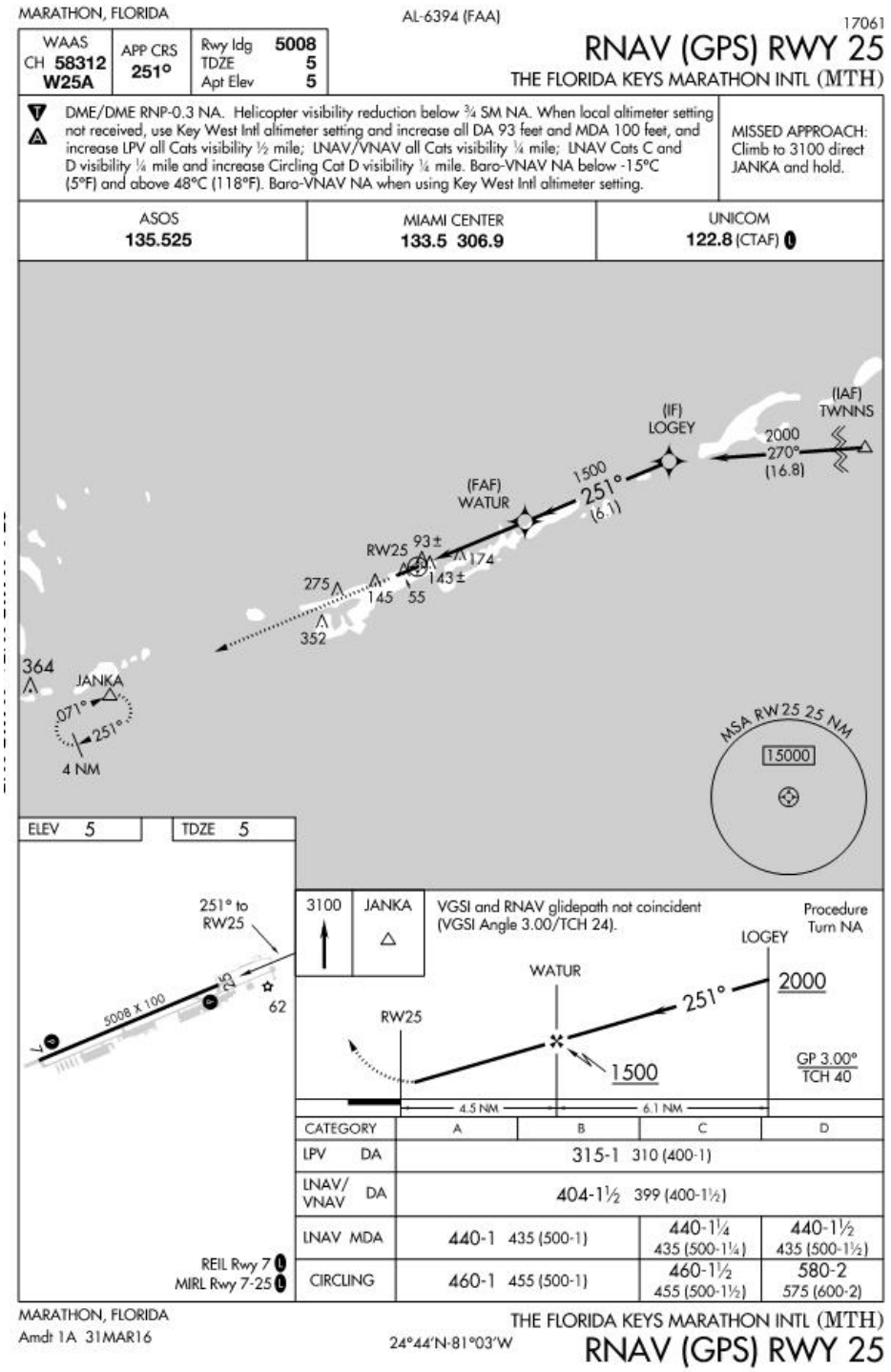
As of 2017, MTH had two published Area Navigation (RNAV) Global Positioning System (GPS) nonprecision approaches and one nondirectional beacon (NDB-A) circling approach to Runway 7-25, as depicted on **Exhibits 2-6**, **2-7**, and **2-8**. A nonprecision instrument approach is only used for horizontal navigational guidance to align an aircraft with a runway. When flying such an approach, the pilot proceeds along the specified course and descends to the minimum descent altitude (MDA) while locating the runway. If the runway (or runway lights) is in sight, then the pilot may land; otherwise, the pilot must execute a missed approach.

Exhibit 2-6: Runway 7 Global Positioning System Approach



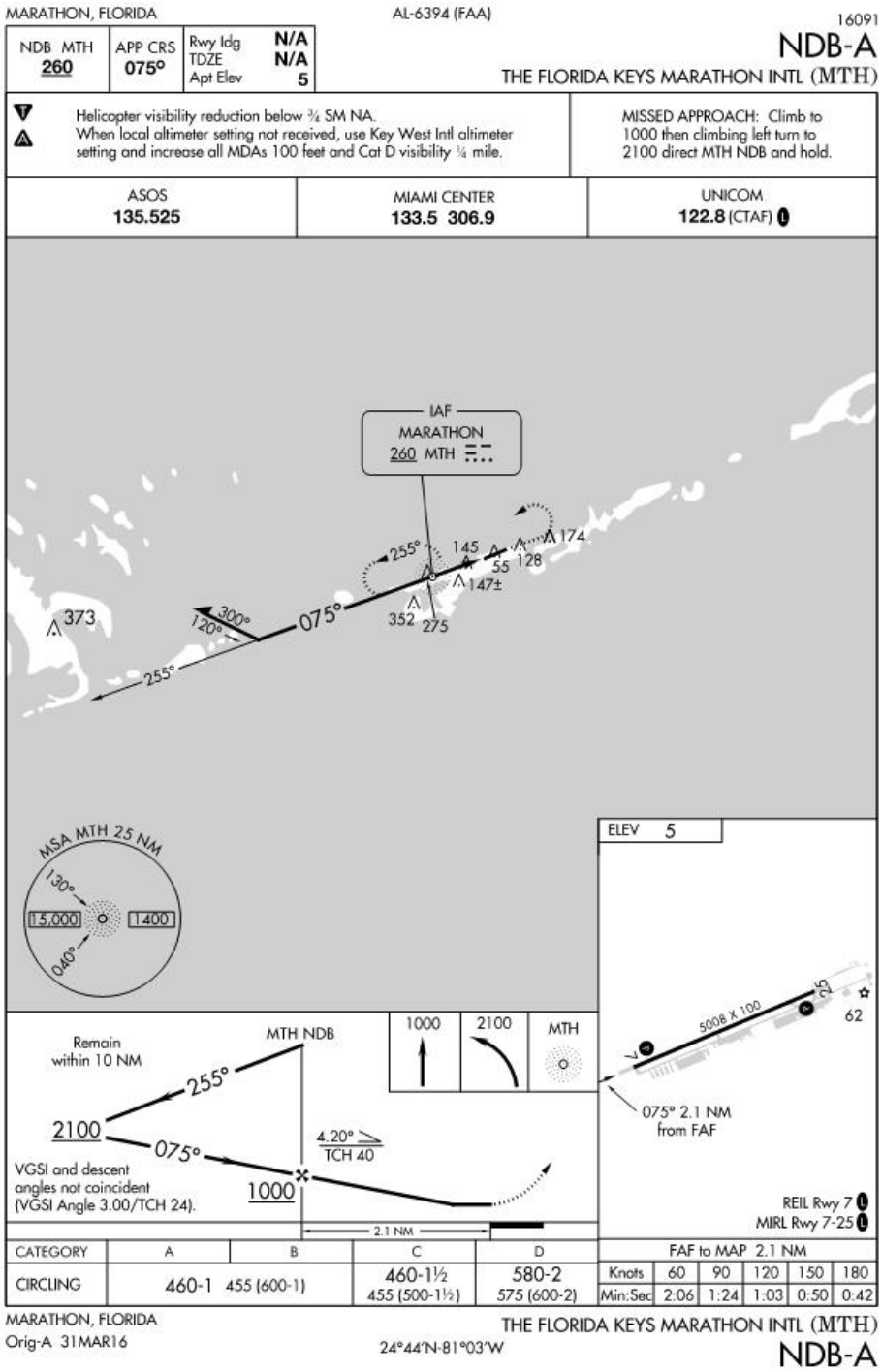
SOURCE: Federal Aviation Administration, U.S. Terminal Procedures Publication, March 2017 (Effective 30 March 2017 to 27 April 2017).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

Exhibit 2-7: Runway 25 Global Positioning System Approach



SOURCE: Federal Aviation Administration, U.S. Terminal Procedures Publication, March 2017 (Effective 30 March 2017 to 27 April 2017).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

Exhibit 2-8: Runway 7-25 NDB-A Approach



SOURCE: Federal Aviation Administration, U.S. Terminal Procedures Publication, March 2017 (Effective 30 March 2017 to 27 April 2017).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

The RNAV (GPS) Runway 7 approach allows straight-in and circling approaches to Runway 7. The straight-in approach to Runway 7 has an MDA of 600 feet and a visibility of 1.0 miles for Aircraft Approach Categories (AACs) A and B; an MDA of 600 feet and visibility of 1.5 miles for AAC C; and an MDA of 600 feet and visibility of 1.75 miles for AAC D. Circling approaches are allowed with an MDA of 600 feet and visibility of 1.0 miles for AACs A and B; an MDA of 600 feet and visibility of 1.5 miles for AAC C; and an MDA of 600 feet and visibility of 2.0 miles visibility for AAC D.

The RNAV (GPS) Runway 25 approach allows straight-in and circling approaches to Runway 25. The straight-in approach to Runway 25 has an MDA of 440 feet and visibility of 1.0 miles for AACs A and B; an MDA of 440 feet and visibility of 1.25 for AAC C; and an MDA of 440 feet and visibility of 1.50 miles for AAC D. Circling approaches are allowed with an MDA of 460 feet and visibility of 1.0 miles for AACs A and B; an MDA of 460 feet and visibility of 1.5 miles for AAC C; and an MDA of 580 feet and visibility of 2.0 miles for AAC D.

The NDB-A approach provides for a circling approach to the Airport with an MDA of 460 feet and visibility of 1.0 miles for AACs A and B; an MDA of 460 feet and visibility of 1.5 miles for AAC C; and an MDA of 580 feet and visibility of 2.0 miles for AAC D. The NDB-A instrument approaches are conducted using the MTH NDB frequency 260.

2.2.5 AIRFIELD SIGNAGE AND MARKING PLAN

MTH is certificated under 14 Code of Federal Regulations (CFR) Part 139, which requires a signage plan in the Airport Certification Manual. In accordance with FAA Advisory Circular (AC) 150/5340-18D, *Standards for Airport Sign Systems*, the signage plan must show the signage system needed to identify hold positions and taxiing routes in the movement area for aircraft. The airfield signage plan should be updated as needed to comply with current safety standards and operating conditions. Standards for runway and taxiway markings are set in accordance with AC 150/5340-1K, *Standards for Airport Markings*. The photos of airfield signage and markings for MTH are provided on **Exhibit 2-9**. All airfield signs are lighted with light-emitting diodes (LEDs).

2.2.6 RAMP AND APRON AREAS

Aircraft parking aprons, also referred to as ramp areas, provide space for aircraft parking and circulation as aircraft transition between the apron and other facilities at the Airport. MTH has one commercial apron, one cargo apron, and two GA aprons.

2.2.6.1 Commercial and Cargo Apron

The commercial apron is 87,363 square feet, and it is located north of the terminal building, providing direct access to the departure lounge. The commercial apron is composed of cement concrete, and it is in fair condition, according to the FDOT Pavement Management Program. The U.S. Customs and Border Protection (CBP) uses 120 feet by 90 feet of the commercial apron to process inbound aircraft. The customs area of the apron is marked as "Customs" in yellow and is located directly in front of the customs office, which is located in the terminal building.

The cargo apron is 38,383 square feet, and it is located in front of the FedEx cargo building. The apron is composed of asphalt concrete and has tie-downs and markings for two Cessna 208 Caravans. The pavement is in fair condition, according to the FDOT Pavement Management Program.

Exhibit 2-9: Airfield Signage and Markings

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.2.6.2 Eastern General Aviation Apron

Marathon Aviation operates the eastern GA apron, which is located adjacent to the Marathon General Aviation FBO Building. The asphalt-concrete apron is 266,634 square feet, excluding the 7,020-square-foot fuel farm. The FDOT Pavement Management Program classified the pavement condition as fair. The apron has 27 marked spaces for aircraft tie-downs perpendicular to Taxiway A and 21 spaces parallel to Taxiway A.

2.2.6.3 Western General Aviation Apron

Marathon Aviation also operates the Marathon Jet Center FBO and the adjacent apron. The western apron is constructed of asphalt concrete, measures 170,819 square feet, which excludes the 2,797 square feet occupied by the fuel farm. According to the FDOT Pavement Management Program, the western GA apron is classified as poor.

2.2.6.4 Additional Apron Space

In addition to the apron space previously described, there is apron space allocated to leased hangars on the eastern side of the Airport. The Florida Keys Mosquito Control District occupies a hangar with an adjacent 25,850-square-foot apron. The land occupied by the Florida Keys Mosquito Control District is considered a "through-the-fence" operation, because the apron extends outside the Airport's eastern property boundary. The Monroe County Sheriff's hangar has a 35,198-square-foot apron. A newly constructed 8,000-square-foot conventional hangar has a 35,147-square-foot apron, and the neighboring hangar to the east has a 14,266-square-foot apron.

2.2.7 PERIMETER ROAD

Airport Access Road is the paved perimeter road that parallels U.S. Highway 1 and runs the length of the southern property line. The perimeter road provides landside access to t-hangars, FBOs, a fire station, the terminal building, the sheriff's building, and the wastewater facility.

2.2.8 FENCING AND SECURITY GATES

An Airport perimeter fence limits access to the airfield and features vehicle and pedestrian gates. The Air Operations Area (AOA) is a secured area that can be accessed only by those who have been properly badged through the Monroe County Sheriff's Office, Airport Security Division. The perimeter fence includes a total of 11 gates with card readers that provide access to Airport property. **Exhibit 2-10** shows a section of the existing property fence and access gate.

Exhibit 2-10: Fencing and Access Gate

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.3 Passenger Terminal Facilities

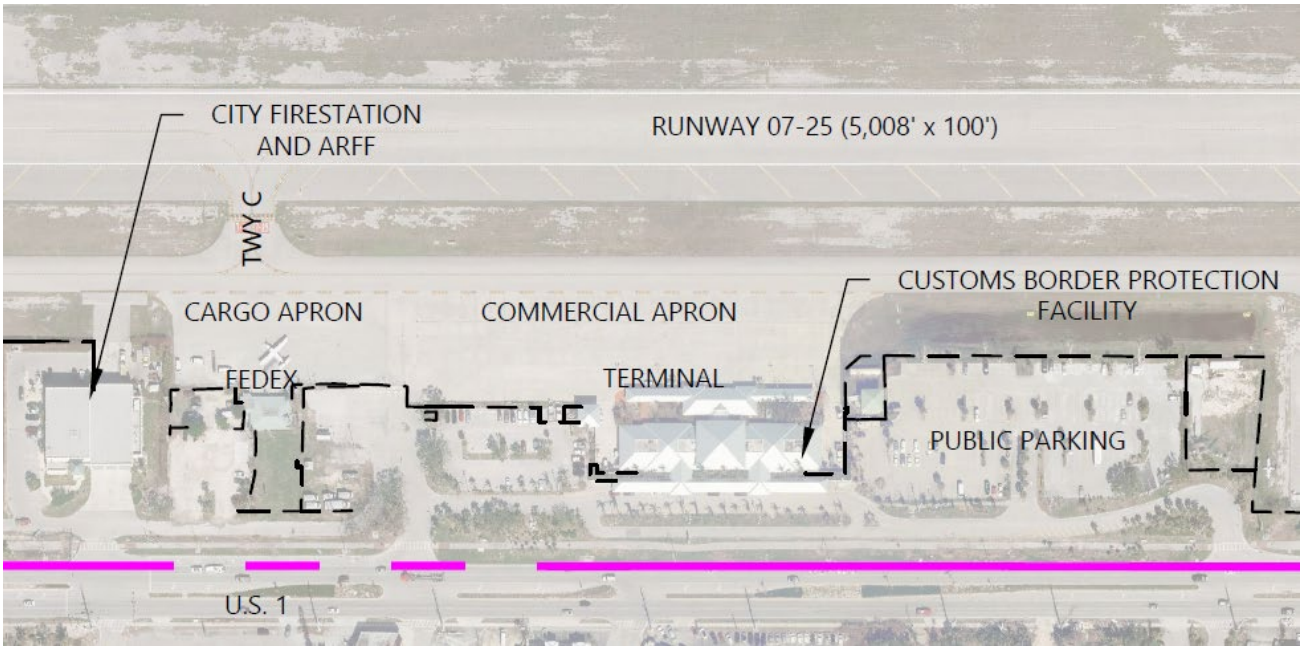
2.3.1 LANDSIDE TERMINAL AREA

The Airport landside terminal area consists of the following: passenger arrival and departure roadway; passenger ticketing and check-in terminal and associated facilities; public parking lot; rental car pick-up/return area; passenger gate area; baggage claim area; rental car counters; the U.S. CBP facility; the FedEx cargo building; and rental car facilities. Landside terminal facilities are depicted on **Exhibits 2-11** and are described in the following sections.

2.3.2 PASSENGER CURBFRONT

The terminal curbfront provides a location for passenger pick-up and drop-off. For rental car returns, 30-minute curbside parking is available. Commercial vehicles, such as hotel vans, limousines, and shuttles, may utilize the passenger curbfront. The Airport also serves as a stop for both Greyhound Bus Line and the Lower Keys Shuttle. The Lower Keys Shuttle is operated by Key West Transit and has multiple stops between Key West and Marathon. The bus stops are located 150 feet southwest of the terminal building. **Exhibit 2-12** shows the terminal building curbside.

Exhibit 2-11: Landside Terminal Facilities



SOURCE: URS, March 2016 (Basemap and Aerial Photography).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

Exhibit 2-12: Terminal Building Curbside

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.3.3 PASSENGER TERMINAL FACILITIES

The two-story 19,160-square-foot passenger terminal building opened in 1995. The first floor of the terminal building contains all of the passenger services, and the second floor houses the Airport administration office and a conference room. The terminal building is easily accessed via U.S. Highway 1, with unrestricted vehicle access to the terminal curbside for arrival, departure, commercial transportation, and rental car returns.

2.3.3.1 Rental Car Counters

Counters for Avis, Budget, and Enterprise are located on the first level of the terminal in the baggage claim area. Each rental car company leases 40 linear feet of counter space. Three rental car administrative offices are in a combined 470-square-foot space behind the rental counters.

2.3.3.2 Baggage Claim

The baggage area is 600 square feet and has a single-belt baggage system to deliver bags from the apron to the terminal building. There is a tourist information desk offering a variety of attraction brochures and information.

2.3.3.3 Concourse / Departure Lounge Area

The departure lounge and concourse area are located on the north side of the terminal and are centered in the hallway that served as the security screening area when commercial service was offered at MTH. The concourse and departure lounge area comprise 2,100 square feet of space. The departure lounge contains two gate positions, and each has a separate apron access door. Currently, the departure lounge is occupied by the U.S. Department of Agriculture, which has set up an incident command post to combat the screwworm outbreak in the Florida Keys.

2.3.3.4 U.S. Customs and Border Protection Office

The U.S. CBP office occupies the 4,200 square feet of space in the terminal building that was used for airline ticket counters when commercial service was operating at MTH. The U.S. CBP office opened in April 2016; it has the capacity to process GA/charter aircraft passengers entering the United States. This facility, which does not have the capacity to handle commercial flights, has a dedicated 120-foot by 90-foot apron space to process GA arrivals at MTH. Customs at MTH is open Wednesday through Sunday, 9:00 a.m. to 5:30 p.m., and is closed on Monday and Tuesday. After-hours service is available with 24 hours' notice.

2.3.3.5 Airport Administration Office

The Airport's administrative office is located on the second level of the terminal building. The space is 900 square feet and includes the Airport manager's office, the receptionist office area, the conference room, kitchen/break area, and nonpublic restrooms. Airport staff can access the administrative office from the airside of the terminal building via stairs on the outside of the building that provide access to the second level.

2.3.4 PUBLIC PARKING

The public parking lot is located to the east of the terminal building. The parking lot has a total of 182 spaces, which include 5 handicap spaces and 4 Tesla-sponsored electric-car charging stations, which were installed in April 2015. The public parking lot is free of charge, and it also serves as the employee parking lot. **Exhibit 2-13** shows the Tesla electric-car charging stations.

2.3.5 RENTAL CAR FACILITY

The rental car parking lot is located to the west of the terminal building; it consists of 50 spaces that are shared by Avis, Budget, and Enterprise. There is an approximately 7,000-square-foot rental car service facility where cars are cleaned and prepared for rental. Budget also rents moving trucks from the Airport location, which are parked in a grass lot to left of the terminal exist. **Exhibit 2-14** provides photos of the existing rental car facilities.

2.4 General Aviation Facilities

GA landside facilities support both based and itinerant aircraft operations at MTH. GA landside facilities include FBO facilities; conventional, box, and T-hangars; apron areas; and automobile parking areas. GA consists of all flying activity except for military and commercial service. GA users at MTH include individuals flying for business or personal reasons and aircraft maintenance. The locations of all GA facilities at MTH are illustrated on **Exhibit 2-15**.

Marathon Aviation Associates owns and operations both Marathon Jet Center and Marathon General Aviation. These FBOs provides aviation fuel, aircraft ground handling, aircraft parking (ramp or tie-down), hangar leasing, ground power units, aircraft maintenance, and avionics sales and service. Marathon Jet Center, located in the western GA area, operates a 3,000-square-foot FBO and a 12,000- square-foot hangar with 28-foot high doors capable of sheltering aircraft up to a Gulfstream G650. These facilities, which are scheduled to be completed in 2020, replace the terminal and hangar that were destroyed by Hurricane Irma in 2017. Marathon General Aviation operates a 7,000-square-foot building in the eastern GA apron area. Amenities provided at both FBOs include a pilot's lounge, vending, planning rooms, pre-arranged rental cars, and charter services.

2.4.1 MARATHON JET CENTER

2.4.1.1 Aircraft Ramp

The Marathon Jet Center apron is 170,819 square feet and provides space for the movement and parking of aircraft. An approximate 2,800 square-foot fuel farm is located on the apron. The apron has 18 tie-downs designed for single- and multi-engine aircraft; however, jet aircraft can also park in those areas.

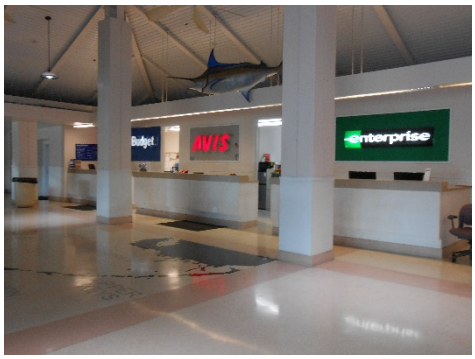
2.4.1.2 Fuel Storage

Marathon Jet Center maintains two above-ground fuel tanks: a 12,000-gallon Jet-A fuel tank and a 10,000-gallon 100-LL Avgas tank with a self-service fueling facility. The FBO also operates two fuel trucks, one for 100-LL and one for Jet-A.

Exhibit 2-13: Tesla Electric-Car Charging Stations

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

Exhibit 2-14: Rental Car Facilities

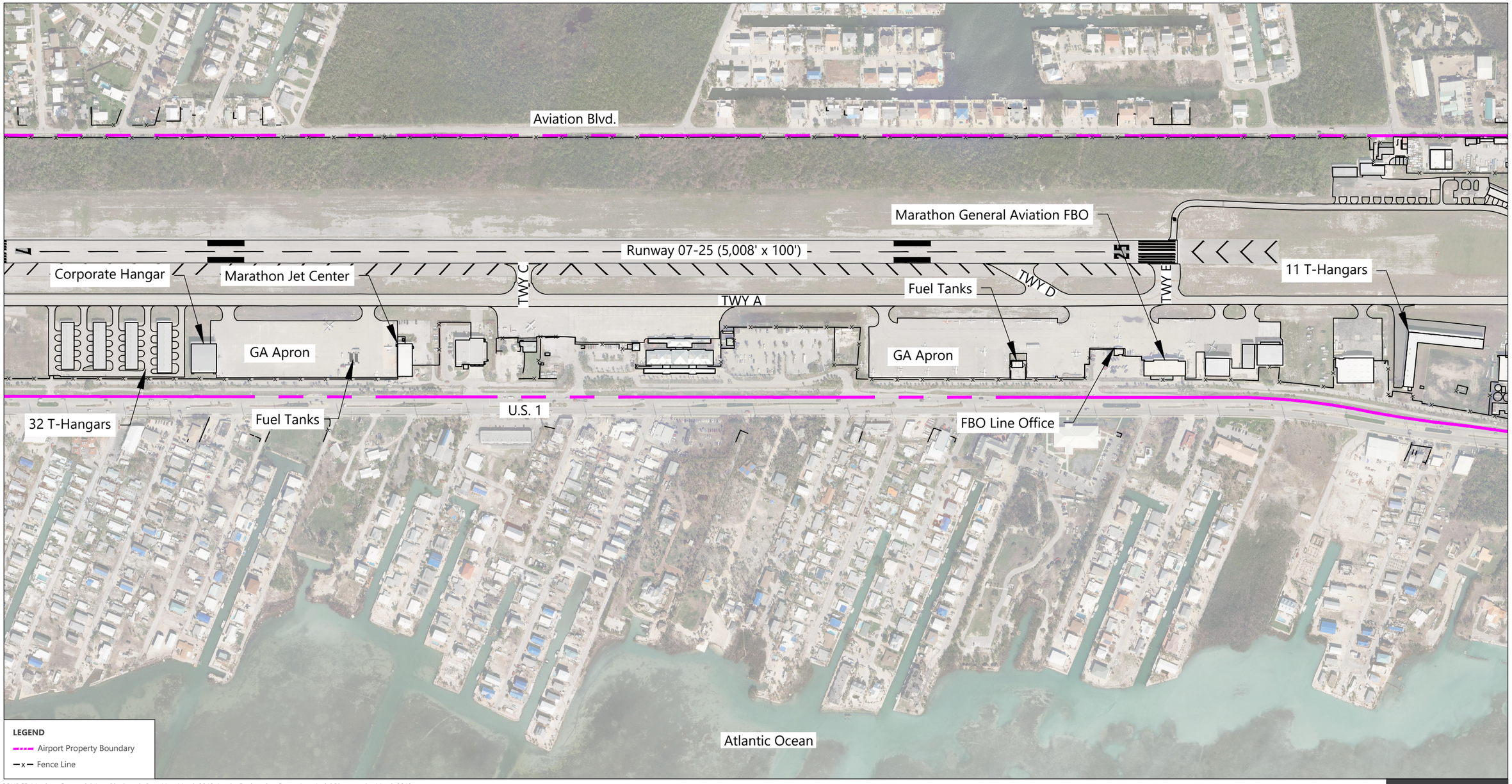


Rental Car Counter

Rental Car Service Facility

Rental Car Parking Lot

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.



SOURCE: Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018; Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., June 2020.

EXHIBIT 2-15

NORTH 0 400 ft.

General Aviation Facilities

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-15_MTH_General Aviation Facilities.dwgLayout: Exhibit 1-15 Plotted: Jul 16, 2020, 09:47AM

2.4.1.3 Conventional Hangars

Marathon Jet Center occupies two conventional hangars. The hangar located west of the Aircraft Rescue and Firefighting (ARFF) station is 12,000 square feet, and it includes 3,000 square feet of FBO space including a pilot lounge, flight planning area, , a second-floor passenger lounge, and an outdoor viewing decks. The second conventional hangar is located east of the T-hangar development, and it is 11,800 square feet.

2.4.2 MARATHON GENERAL AVIATION

2.4.2.1 Aircraft Ramp

The Marathon General Aviation apron is 266,634 square feet and provides space for the movement and parking of aircraft. An approximate 7,000 square-foot fuel farm is located on the apron. The apron has 48 cable tie-downs available primarily for single-engine aircraft, but they can accommodate multi-engine and jet aircraft.

2.4.2.2 Fuel Storage

The Marathon General Aviation FBO apron has three above-ground fuel storage tanks. The fuel storage tanks consist of one 12,000-gallon 100-LL AvGas tank and two 20,000-gallon Jet-A tanks. Self-service is available for the 100-LL Avgas tank.

2.4.2.3 Conventional Hangars

The Marathon General Aviation FBO occupies a 7,000-square-foot conventional hangar, which houses a lobby, a pilot's lounge, vending area, and flight planning rooms.

2.4.3 T-HANGARS

Monroe County owns four T-hangar buildings located in the southwest area of the Airport property. There are 32 T-hangars that are equipped with electric and water services. The T-hangar development is approximately 39,864 square feet. **Exhibit 2-16** shows one of the four existing T-hangar buildings located in the southwest area of the Airport property.

In September 2017, Monroe County completed a new T-hangar building adjacent to the sheriff's hangar. This "L" shaped unit replaces the shade hangars that were located within the runway protection zone (RPZ) for Runway 25. The new building has eleven 40-foot by 45-foot T-hangars: six that face north and five that face west.

2.4.4 SHADE HANGARS

One shade-hangar developments is located on the northeast side of the airfield. This building is 4,950 square feet with four hangars. This four-unit shade hangar is outside of the RPZ and will remain in its current location.

Exhibit 2-16: Existing T-Hangars

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.4.5 FEDEX CARGO

FedEx leases 11,565 square feet of Airport property that includes the 2,000-square-foot cargo building. The facility operates Monday through Friday from 9:00 a.m. to 6:00 p.m. FedEx subleases 19,800 square feet of the cargo apron from Mountain Air Cargo. FedEx ground truck access the sorting facility through an access gate on the west side of the cargo building via Airport Access Road. Sorting is done on the ramp using a mobile sorting trailer, and it occurs between 8:00 a.m. and 11:00 p.m. During peak periods, FedEx operates two inbound and two outbound flights between Marathon and Fort Lauderdale.

2.4.6 ANTIQUE AIRCRAFT RESTORATION

Antique Aircraft Restoration occupies a 13,100-square-foot hangar and leases a total of 34,984 square feet of Airport land. The services include airframe and power plant maintenance, avionic repair, and instrument repairs. The facility is located on the southwest side of the airfield, adjacent to the wastewater plant.

2.4.7 MOSQUITO CONTROL

The Florida Keys Mosquito Control District provides aerial mosquito spraying services for Monroe County. This operation occupies 25,850 square feet of land; 13,000 square feet the associated apron space is located on Airport property; the remainder of the facility is outside of the Airport property boundary. Florida Keys Mosquito Control District maintains one Jet-A fuel tank for its own use.

2.4.8 MONROE COUNTY SHERIFF'S DEPARTMENT

The Monroe County Sheriff's Department leases 62,500 square feet of Airport property on the eastern side of the Airport. The Sheriff's Department occupies a 12,000-square-foot hangar and has an office on the first level of the terminal building, near the main entrance.

2.5 Support Facilities

2.5.1 AIRCRAFT RESCUE AND FIREFIGHTING FACILITY

ARFF crews conduct fire prevention, firefighting, rescue, and medical response in the event of an aircraft incident or accident. The ARFF index determination and equipment requirements for scheduled and unscheduled air carrier flights are determined by the standards set forth in 14 CFR Part 139, *Certification of Airports*. As stated in 14 CFR Part 139.315, the ARFF index is determined by the length of the air carrier aircraft and the number of average daily departures of the air carrier aircraft. MTH is a Part 139 Class I, ARFF Index A airport, which includes aircraft less than 90 feet long. The FAA conducts annual inspections to ensure the Airport, personnel, and ARFF equipment comply with all 14 CFR Part 139 requirements.

The MTH ARFF facility, also referred to as the City of Marathon Fire Rescue Station #14, provides fire suppression, emergency medical services, and ARFF services. The ARFF facility serves both the Airport and the city of Marathon; trained fire fighters are at the facility 24 hours per day/365 days per year. The Airport requires a 48-hour notification for unscheduled 14 CFR Part 121 operations with greater than 30 passenger seats or for any aircraft with a wingspan of 79 feet or greater. The ARFF facility is located directly east of the FedEx cargo building, and it is depicted on **Exhibit 2-17**.

Exhibit 2-17: Aircraft Rescue and Firefighting Station

SOURCE: American Infrastructure Development, Inc., March 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.5.2 AIRFIELD ELECTRICAL VAULT

The airfield electrical vault is located northeast of the terminal building and is equipped with an emergency generator.

2.5.3 AIRPORT MAINTENANCE FACILITIES

Airport management has allotted 11,432 square feet of the grassy area between the public parking lot and the GA apron for the storage of airport maintenance equipment. The Automated Surface Observing System (ASOS) is currently located in a portion of the fenced off area. Equipment includes three tractors, a storage shed, a storage container, and other miscellaneous equipment. **Exhibit 2-18** depicts the location of the maintenance equipment. Airport management would like to build a maintenance building that could house equipment and provide the maintenance staff with an office. The relocation of the ASOS would be beneficial, as Airport management indicated that the current location affects the accuracy of the data being collected.

Exhibit 2-18: Maintenance Facility

SOURCE: American Infrastructure Development, Inc., March 2017 (Site Visit).
PREPARED BY: American Infrastructure Development, Inc., April 2017.

2.6 Non–Aviation Related Facilities

2.6.1 DEPARTMENT OF PUBLIC WORKS

The Monroe County Department of Public Works is located in the northwest corner of the Airport on Aviation Boulevard, adjacent to the Humane Society. The public works facility, which includes a maintenance building, occupies 80,000 square feet of Airport land.

2.6.2 HUMANE SOCIETY

The Monroe County Humane Society facility is located in the northeast corner of the Airport on Aviation Boulevard, behind the shade-hangar development. The Humane Society occupies 15,000 square feet of Airport land.

2.6.3 DISABLED AMERICAN VETERANS HALL

The Disabled American Veterans Hall is located in the southwest corner of the Airport at the intersection of Aviation Boulevard and U.S. Highway 1. The leasehold totals 37,462 square feet, which includes a 4,000-square-foot building and adjacent vehicle parking.

2.6.4 WASTEWATER TREATMENT FACILITY

The Florida Keys Aqueduct Authority (FKAA) wastewater treatment facility is located in the southeast corner of Airport property near the intersection of U.S. Highway 1 and Industrial Avenue. The facility occupies 23,435 square feet of land.

2.7 Off- and On-Airport Land Uses

Existing land use mapping, aerial photography, comprehensive plans, and other documentation pertaining to current and future land use in the vicinity of the Airport (up to 1 mile from the Airport property boundary) was reviewed. Existing zoning districts were also reviewed to determine the locations where potential incompatible land uses could be developed. Further, local planning agencies were contacted to obtain their future land use or zoning plans and to identify the potential for future residential, commercial, and industrial development near the Airport.

2.7.1 EXISTING LAND USES AND ZONING NEAR THE AIRPORT

Land use defines the type of activity that occurs on a parcel, such as natural areas (e.g., wildlife habitats, wetlands, coastal regions, conservation areas), working landscapes (e.g., farms, forests, recreation areas, mineral extraction lands), and constructed areas (e.g., residential, commercial, industrial, public space). Zoning regulations and restrictions are used by municipalities to control and direct the development of property within their borders.

2.7.1.1 Existing Land Uses

Existing land uses around the Airport, include the following, as shown on **Exhibit 2-19**.

- **Airport:** The entire Airport property is within this land use.
- **Northeast:** This area consists of single- and multi-family residential, warehousing/industrial, vacant residential, and commercial retail. Residential land uses are 2,000 feet from the Runway 25 threshold on the eastern side of Industrial Avenue. This residential area is buffered by the industrial development on the west side of Industrial Avenue.
- **Northwest:** This area consists of a large single-family residential development that is buffered by the wetlands area along the portion of Airport Boulevard that parallels Runway 7-25. In addition, public/institutional and vacant residential uses exist in this area.
- **Southeast:** This area consists of a mix of residential and commercial land uses along U.S. Highway 1. The commercial properties have direct access to U.S. Highway 1, with the residential uses to the south of the commercial development.
- **Southwest:** This area consists of commercial retail, single-family residential, mobile home, public/institutional, vacant residential, and mixed-use residential/commercial. Two residential parcels are located 1,700 feet from the Runway 7 threshold on Airport Boulevard. There is a hotel and marina near the intersection of Airport Boulevard and U.S. Highway 1.

2.7.1.2 Existing Zoning

The city of Marathon maintains the official zoning map, provided as **Exhibit 2-20**. The map shows the following zoning types within 1 mile of the runway ends:

- Airport
- Mixed Use
- Public
- Parks and Recreation
- Conservation Native Area
- Residential Medium
- Residential Mobile Home
- Residential High
- Industrial General

SOURCES: Florida Department of Revenue, County Property Appraisers, Water Management Districts, Panda Consulting, and GeoPlan Center, 2015 (land use); NRCS Pilot Environment, March 2017 (land use); US Census Bureau, Geography Division, TIGER/Line Shapefiles, 2017 (roads); Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property); Ricondo & Associates, Inc., May 2017 (study area),

EXHIBIT 2-19

NORTH

0 2,500 ft

Existing Land Use

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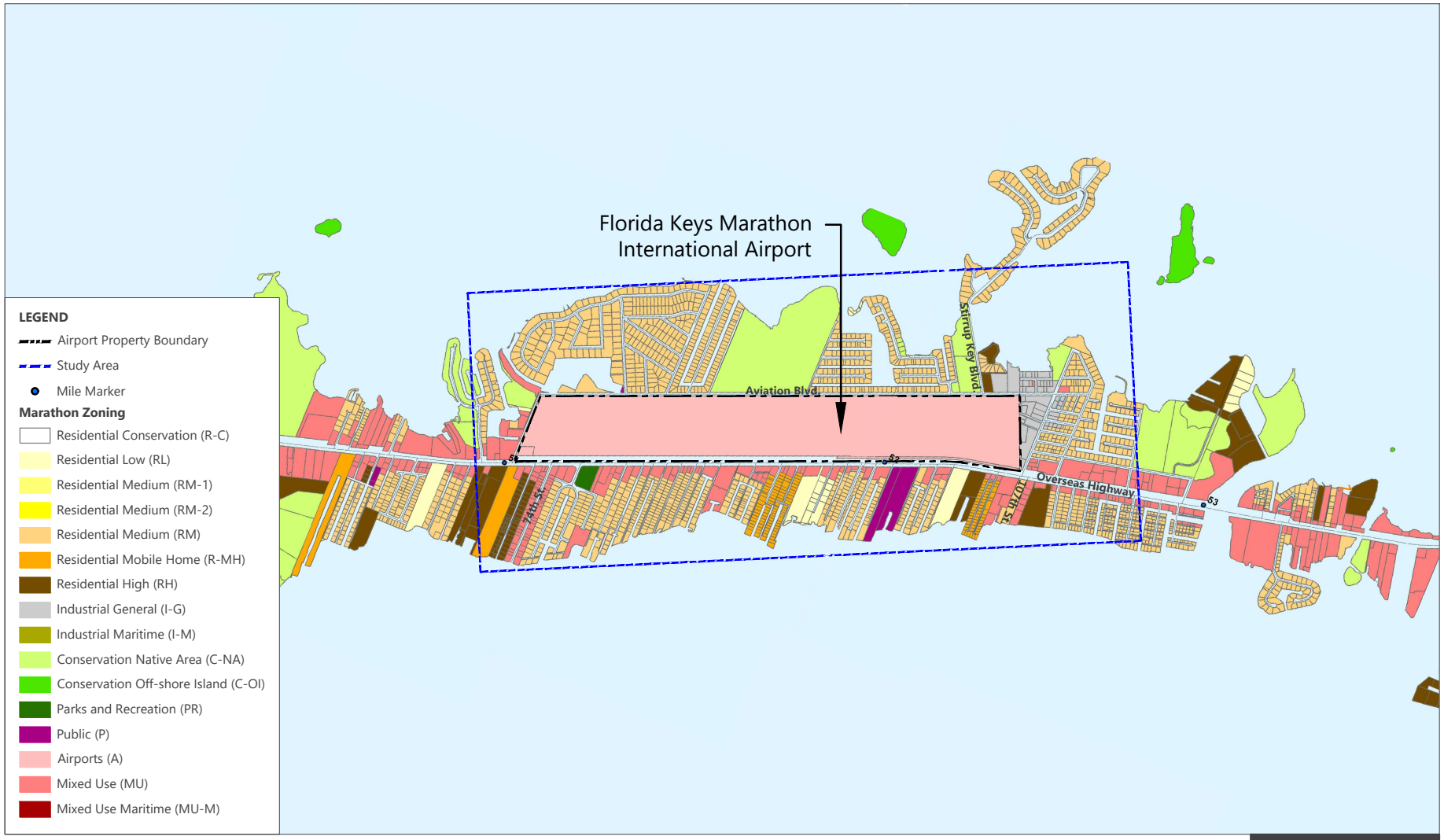


SOURCE: City of Marathon, *Official Zoning Map Series*, Effective January 25, 2011.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

EXHIBIT 2-20

NORTH 0 2,500 ft

Existing Zoning Map

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-20_MTH_Existing Zoning Map.dwgLayout: Exhibit 1-20 Plotted: Jul 15, 2020, 04:34PM

2.7.2 FUTURE LAND USES AND ZONING NEAR THE AIRPORT

2.7.2.1 Future Land Uses

Future land uses around the Airport, based on the City of Marathon Comprehensive Plan update in 2013, include the following, as shown on **Exhibit 2-21**:

- **Airport:** The entire Airport property is within this land use.
- **Northeast:** This area consists of land uses that include conservation, industrial, medium- and high-residential, and mixed-use commercial.
- **Northwest:** This area consists of land uses that include medium residential, conservation, and mixed-use commercial.
- **Southeast:** This area consists of land uses that include public, medium- and high-residential, and mixed-use commercial.
- **Southwest:** This area consists of land uses that include mixed-use commercial, medium- and high-residential, and recreational.

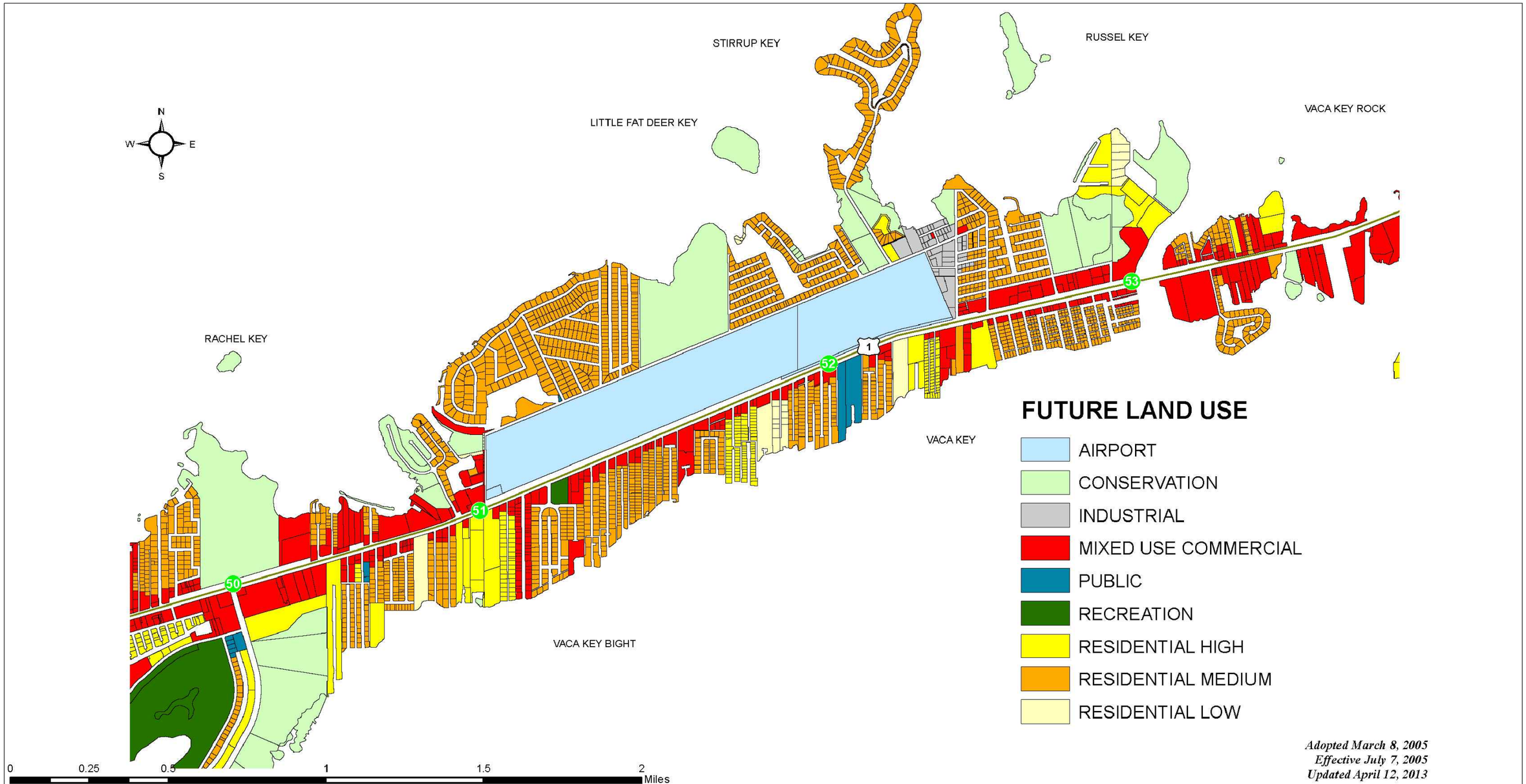
2.7.2.2 Future Zoning

Currently, the city of Marathon does not maintain a future zoning map.

2.7.3 ON-AIRPORT LAND USES

The following land uses are present on the Airport property, as shown on **Exhibit 2-22**:

- **Airfield:** This land use encompasses all movement areas of the Airport, including runways, taxiways, and respective object free areas.
- **Terminal Area:** This land use encompasses the terminal building, commercial apron, public parking, rental car parking, and rental car wash facility.
- **General Aviation:** This land use encompasses the T-hangar and box-hangar units, both FBO buildings, and both GA apron areas.
- **Cargo:** This land use encompasses the cargo building and apron.
- **Operations:** This land use encompasses the ARFF station, waste disposal area, ASOS, and maintenance area.
- **Existing Aviation Related:** This land use encompasses the mosquito-control facility and the sheriff's facility.
- **Future Aviation Related:** This land use encompasses areas available for aviation-related development.
- **Wastewater Facility:** This land use encompasses the wastewater facility and beacon.
- **Existing Drainage Detention/Retention Ponds:** This land use encompasses area currently used for drainage.
- **Future Drainage Detention/Retention Ponds:** This land use encompasses area proposed to be used for drainage in the future.
- **Environmental Use:** This land use includes the conservation area, as well as the salt ponds, mangroves, and vegetation that parallels the runway.



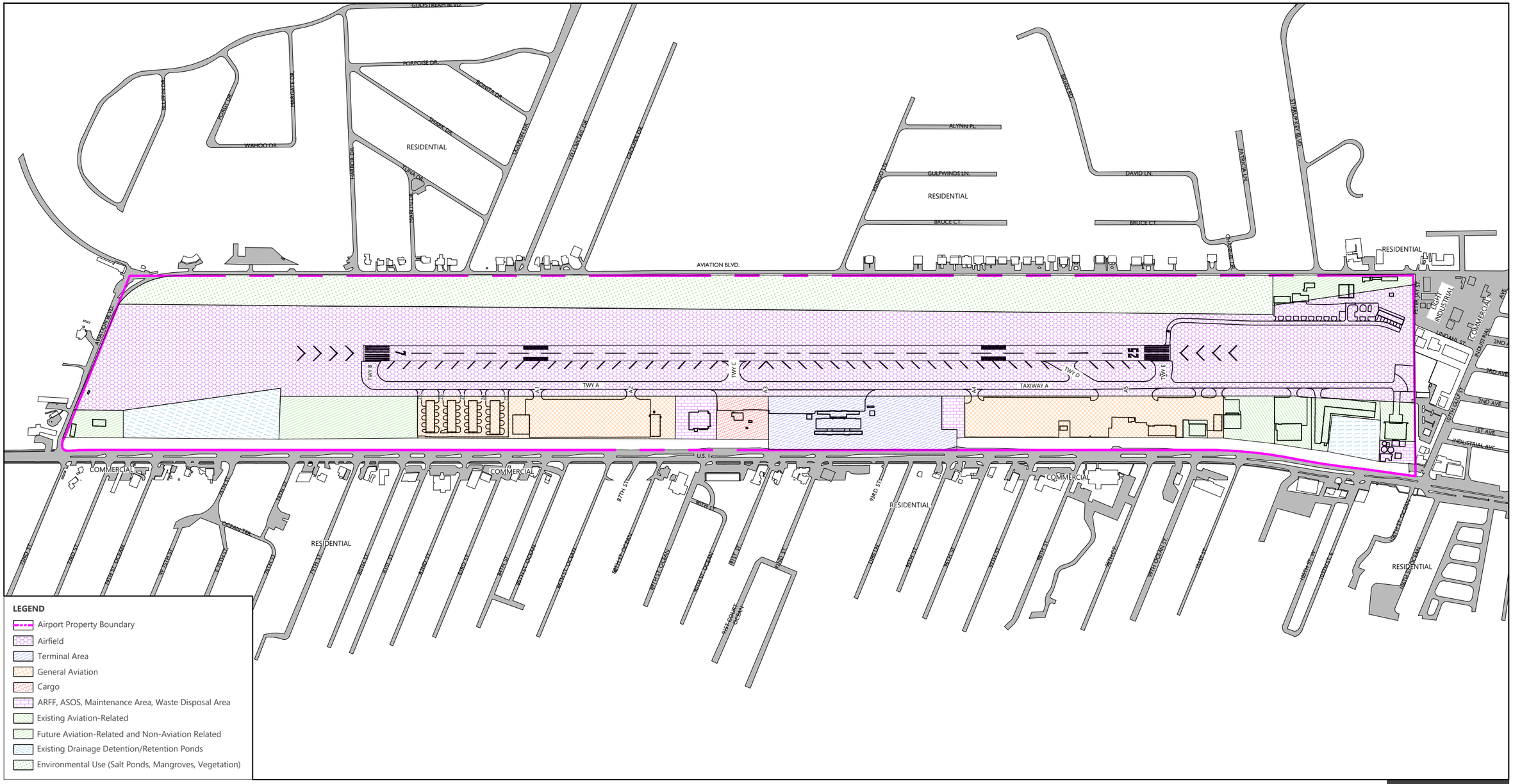
SOURCE: City of Marathon Florida Website (Basemap).
PREPARED BY: American Infrastructure Development, Inc., May 2017.

EXHIBIT 2-21

NORTH

Future Off-Airport Land Use

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-21_MTH_Future Off-Airport Land Use Map.dwgLayout: Exhibit 1-21 Plotted: Jul 15, 2020, 04:33PM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2.8 Inventory of Lease Documents

An inventory of existing leaseholds was obtained from Airport staff. **Table 2-6** and **Exhibit 2-23** summarize the lease information to date.

Table 2-6: Airport Leaseholds

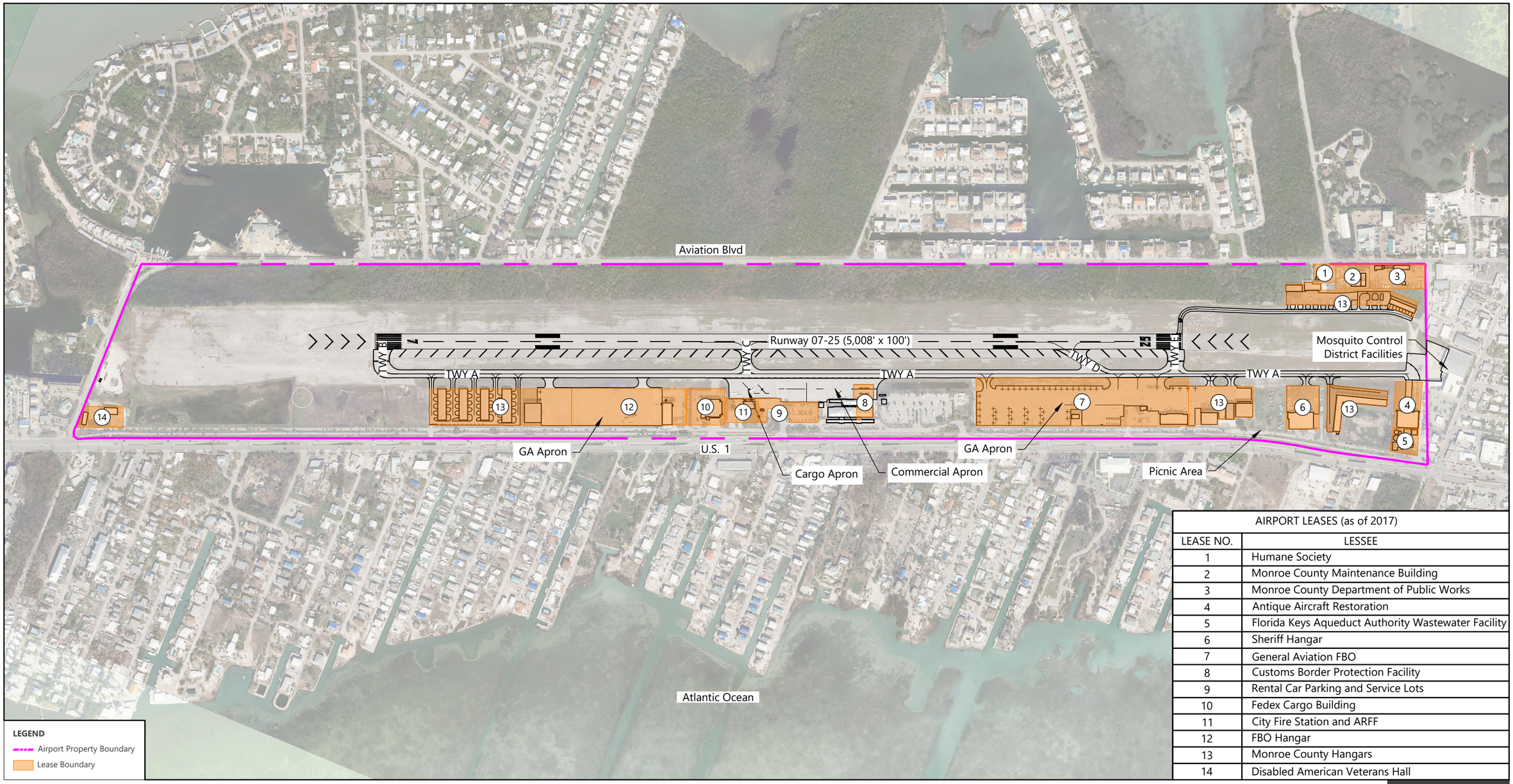
DESCRIPTION	SQ FT	LEASED TO
Marathon Fire Station/ARFF	55,363	City of Marathon
Mosquito Control	51,700	Florida Keys Mosquito Control District
Cargo Apron	19,800	Mountain Air Cargo, Inc.
Doumis/Neat Biplane Operation	4,800	Evan Doumis, Joy Doumis, & Brad Neat
Cargo Building	11,565	Federal Express Corporation
Jet Center Vehicle Parking	15,000	Marathon Aviation Associates, LLC.
Jobe Hangar	10,925	El Paso Partners, LLC.
Fire Station Equipment Parking	4,375	City of Marathon
Sheriff Hangar and Office	62,500	Monroe County Sheriff
T-Hangar Buildings and Pavement	89,855	Marathon Hangar Development, Inc.
Hangar	25,000	Jobe Materials
Hangar	7,000	Marathon General Aviation
Marathon General Aviation FBO	373,679	South Shore Aviation Associates, LLC.
Antique Aircraft Restoration	34,980	Antique Aircraft Restoration
Hangar and Apron	25,200	Marathon Aviation Associates, LLC.

NOTES:

ARFF – Aircraft Rescue and Firefighting

FBO – Fixed-Base Operator

SOURCE: Florida Keys Marathon International Airport, Tenant Lease Agreements, April 2017
PREPARED BY: American Infrastructure Development, Inc., April 2017.



AIRPORT LEASES (as of 2017)	
LEASE NO.	LESSEE
1	Humane Society
2	Monroe County Maintenance Building
3	Monroe County Department of Public Works
4	Antique Aircraft Restoration
5	Florida Keys Aqueduct Authority Wastewater Facility
6	Sheriff Hangar
7	General Aviation FBO
8	Customs Border Protection Facility
9	Rental Car Parking and Service Lots
10	Fedex Cargo Building
11	City Fire Station and ARFF
12	FBO Hangar
13	Monroe County Hangars
14	Disabled American Veterans Hall

SOURCE: Martinez Geospatial, Inc., *Planimetric Base Map,* March 2018; Jacobs Engineering Group, Inc., *Aerial Photography,* March 2018.
PREPARED BY: Ricondo & Associates, Inc., June 2020.

EXHIBIT 2-23

NORTH 0 400 ft.

Airport Leaseholds

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 503.0 - Inventory of Existing Conditions\CAD\Exhibit 2-23_MTH_Airport Leaseholds.dwgLayout: Exhibit 1-23 Plotted: Jul 28, 2020, 03:47PM

2.9 Environmental Settings

The following subsections detail the existing environmental conditions at the Airport. The most significant environmental elements at MTH are wetlands, threatened and endangered species, and floodplains.

2.9.1 WETLANDS LAND

Executive Order 11990, *Protection of Wetlands*, defines wetlands as "…those areas that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction [1]."

The U.S. Fish & Wildlife Service (USFWS) National Wetland Inventory identifies a 6.8-acre estuarine wetland located northwest of the Runway 7 threshold. The USFWS describes an estuarine as "deep-water tidal habitats and adjacent tidal wetlands that are influenced by water run-off from and often semi-enclosed by land. They are located along high-energy coastline and they have variable salinity[2]." This wetland is known to consist of mangroves and salt ponds.

Development within the wetland areas is limited due to stringent permit requirements of the U.S. Army Corps of Engineers, the South Florida Water Management District, and the Florida Department of Environmental Protection. Mitigation is required for any impacts to these wetlands.

2.9.2 THREATENED AND ENDANGERED SPECIES

For the purposes of the initial fish, wildlife, and plant assessment, data were collected from the USFWS Information for Planning and Consultation database and the Florida Natural Areas Inventory to identify threatened and endangered species. **Table 2-7** and **Table 2-8** provide a list of threatened and endangered species with the potential to have a presence in or around Airport property.

2.9.3 FLOODPLAINS

Executive Order 11988 directs federal agencies to act to reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial floodplains. Floodplains are defined as areas that have a 1 percent or greater chance of flooding in any given year. According to the Federal Emergency Management Agency's Flood Insurance Rate Maps, the southern portion of the Airport is classified as Flood Hazard Zone AE (base flood zone elevations determined). This zone is at risk of a 100-year flood, i.e., a 1 percent annual chance of flooding. **Exhibit 2-24** shows the surrounding floodplains.

[1] Executive Order No. 11990, Protection of Wetlands, Section 7(c).

[2] U.S. Fish and Wildlife Wetlands, Inventory Mapper, https://www.fws.gov/wetlands/Data/Mapper.html (accessed April 2017).

Table 2-7: Threatened and Endangered Plant Species in Marathon

COMMON NAME	SCIENTIFIC NAME	STATUS
Big Pine Partridge Pea	Chamaecrista lineata keyensis	Endangered
Blodgett's Silverbush	Argythamnia blodgettii	Threatened
Cape Sable Thoroughwort	Chromolaena frustrata	Endangered
Everglades Bully	Sideroxylon reclinatum ssp. Austrofloridense	Threatened
Florida Pineland Crabgrass	Digitaria pauciflora	Threatened
Florida Prairie-clover	Dalea carthagenensis floridana	Endangered
Florida Semaphore Cactus	Consolea corallicola	Endangered
Garber's Spurge	Chamaesyce garberi	Threatened
Key Tree Cactus	Pilosocereus robinii	Endangered
Sand Flax	Linum arenicola	Endangered
Wedge Spurge	Chamaesyce deltoidea serpyllum	Endangered

SOURCE: U.S. Fish & Wildlife Service, *Information for Planning and Consultation*, April 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

Table 2-8: Threatened and Endangered Wildlife Species in Marathon

COMMON NAME	SCIENTIFIC NAME	STATUS
Bachman's Warbler	Vermivora bachmanii	Endangered
Cape Sable Seaside Sparrow	Ammodramus maritimus mirabilis	Endangered
Everglade Snail Kite	Rostrhamus sociabilis plumbeus	Endangered
Ivory-billed Woodpecker	Campephilus principalis	Endangered
Piping Plover	Charadrius melodus	Threatened
Red Knot	Calidris canutus rufa	Threatened
Roseate Tern	Sterna dougallii	Threatened
Wood Stork	Mycteria Americana	Threatened
Key Deer	Odocoileus virginianus clavium	Endangered
Key Largo Cotton Mouse	Peromyscus gossypinus allapaticola	Endangered
Key Largo Woodrat	Neotoma floridana smalli	Endangered
Lower Keys Marsh Rabbit	Sylvilagus palustris hefneri	Endangered
Rice Rat	Oryzomys palustris natator	Threatened
West Indian Manatee	Trichechus manatus	Threatened
American Alligator	Alligator mississippiensis	Threatened
American Crocodile	Crocodylus acutus	Threatened
Eastern Indigo Snake	Drymarchon corais couperi	Threatened
Hawksbill Sea Turtle	Eretmochelys imbricate	Endangered
Leatherback Sea Turtle	Dermochelys coriacea	Endangered
Loggerhead Sea Turtle	Caretta caretta	Threatened

SOURCE: U.S. Fish & Wildlife Service, *Information for Planning and Consultation*, April 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

SOURCES: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, January 2018 (basemap); US Department of Homeland Security, Federal Emergency Management Agency, FEMA Flood Map Service Center, County Mapping Data Downloads, 2017 (floodplains); Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property, buildings); Ricondo & Associates, Inc., May 2017 (study area, LOPD).

EXHIBIT 2-24

NORTH

0 2,500 ft

Floodplains

P:\GIS\Projects\MTH\MXDs\MTH_RunwayEA_AffectedEnvironment_Exhibit3-15_Floodplains_20200316.mxd

2.9.4 METEOROLOGICAL CONDITIONS

Operations at the Airport are affected by weather patterns and the associated meteorological conditions of the region. The levels of rainfall, the prevailing winds, and the average amount of inclement weather help to determine runway orientation and the types of instrument approaches available to achieve the safest and most efficient operations possible. The National Oceanic and Atmospheric Administration (NOAA) compiles data related to precipitation and temperature.

Data were collected from the Marathon Airport Station, USW00012896, from 1981 through 2010. The annual median temperature is 78.4 degrees Fahrenheit, with highs in the low 90s in August and lows in the mid-60s in January. NOAA precipitation data show the annual average rainfall over the data collection period was 46.17 inches, with much of the rainfall occurring from June through September. **Table 2-9** depicts the temperature and precipitation data.

Table 2-9: Meteorological Conditions

	ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average Max Temperature (°F)	83.8	75.0	76.9	79.4	82.9	86.5	90.4	90.8	91.2	89.4	85.5	80.5	76.7
Average Min Temperature (°F)	73.1	64.2	66.3	68.5	71.8	76.2	79.2	79.2	79.4	78.5	75.8	71.1	66.7
Average Temperature (°F)	78.4	69.9	71.6	74.0	77.3	81.4	84.8	85.0	85.3	83.9	80.7	75.8	71.7
Precipitation (inches)	46.17	1.61	2.21	2.39	2.38	3.35	5.61	4.28	6.99	7.73	4.78	2.82	2.02

SOURCE: National Oceanic and Atmospheric Administration, Marathon Airport Station, April 2017.
PREPARED BY: American Infrastructure Development, Inc., April 2017.

In addition to temperature and precipitation, local prevailing meteorological conditions, such as wind direction, cloud ceiling heights, and visibility, have a direct influence on the utility of the runway system. Therefore, as part of the Master Plan Update, a wind analysis is performed to assess the local origin and velocity of prevailing winds. Ideally, any single runway should be aligned with the prevailing winds that, to varying degrees, have a direct effect on all aircraft. Generally, the smaller the aircraft, the more the aircraft is affected by the wind, particularly crosswind components. The crosswind component is the resultant vector of the runway direction and existing wind that acts at a right angle to the runway.

FAA AC 150/5300-13A, *Airport Design*, Appendix 2, recommends that at least 95 percent crosswind coverage be provided by the runway system (one or more runways) at any airport. The most desirable runway orientation provides the greatest runway wind coverage with the least crosswind component.

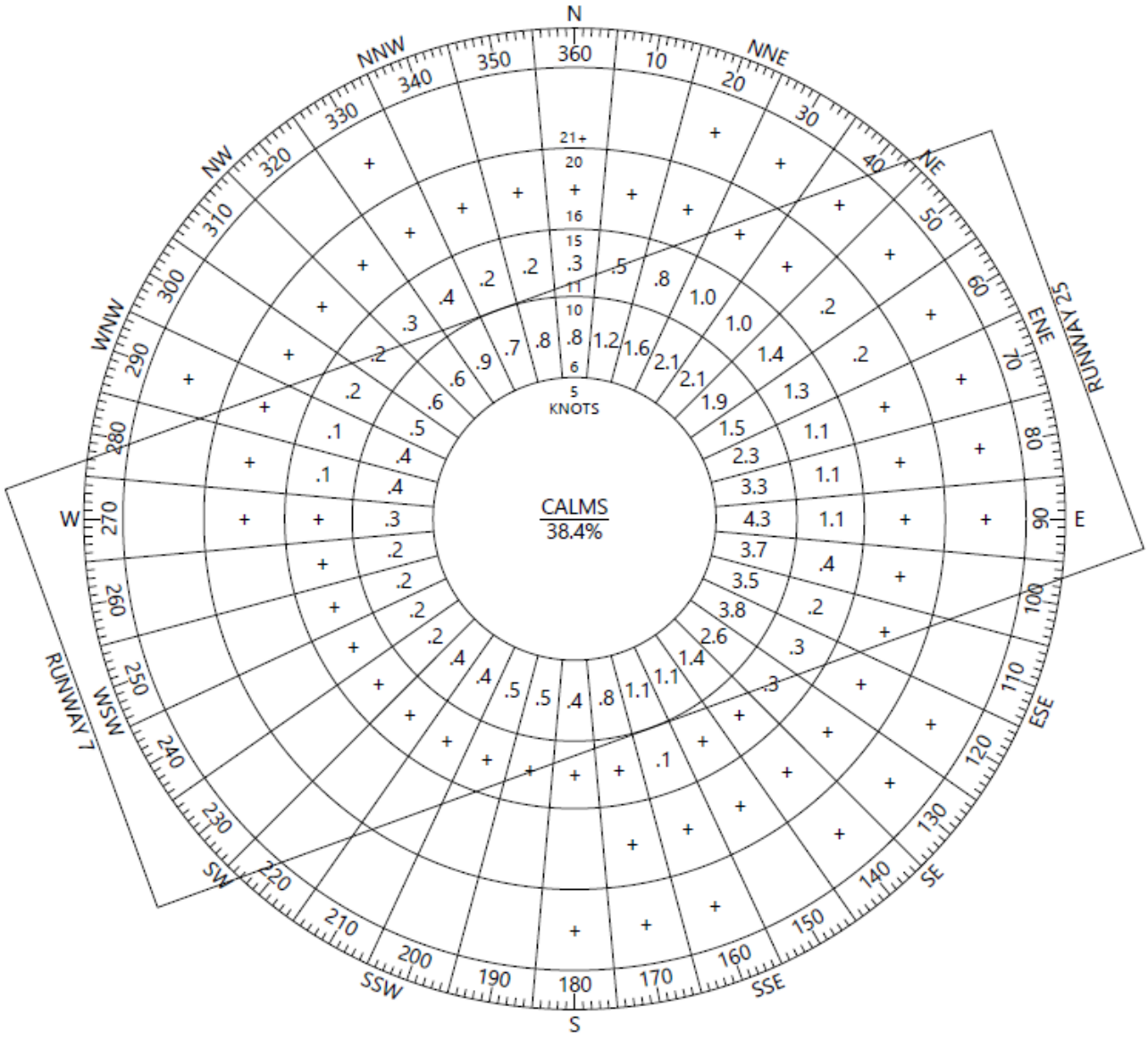
When surface winds cross the runway at an angle during landing and takeoff, the wind exerts both headwind and crosswind components upon the aircraft. For operational safety considerations, pilots prefer to use runways that, to the greatest extent practicable, offer the greatest headwinds and the least crosswinds. Each aircraft (by factory design) has a maximum recommended crosswind velocity limit, which is the crosswind component for

which adequate control of the airplane was demonstrated during takeoff and landing. As a rule, most airplanes are limited to a crosswind component of 20 percent of the maximum certificated weight-stall speed with recommended landing flaps. Runway wind coverage, as used in airport planning, measures the percent of time crosswind components are below maximum acceptable velocity limits.

To accomplish the wind analysis, wind data for MTH were obtained from the FAA's Airports Geographic Information System (AGIS) website[3]. The data consisted of 198,141 observations recorded from January 1, 2007, through December 31, 2016, at the ASOS Station number 722016 located on the airfield at MTH. The data provided hourly observations which were then converted to windrose graphical representations for all-weather, IFR, and VFR conditions. The windroses are depicted on **Exhibits 2-25**, **2-26**, and **2-27**.

[3] Federal Aviation Administration, Airport Design Tool, https://airports-gis.faa.gov/public/index.html (accessed April 2017).

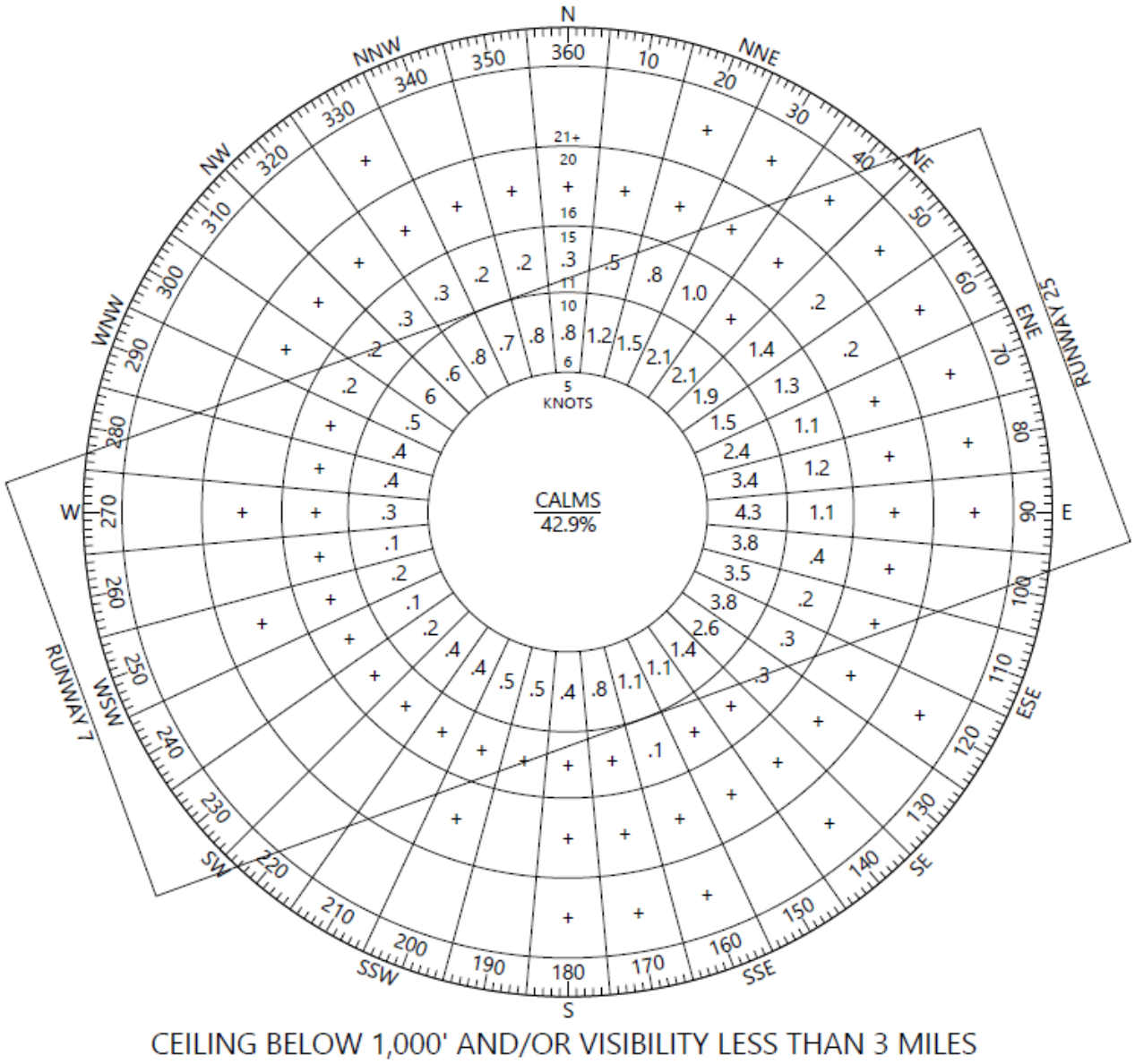
Exhibit 2-25: All-Weather Windrose



SOURCE: National Climatic Data Center (NCDC), 3505 Surface Hourly Weather Observations for Florida Keys Marathon International Airport (722016), 2008 - 2017 (87,534 Observations), Accessed October 3, 2018

PREPARED BY: Ricondo and Associates, Inc., June 2020.

Exhibit 2-26: Instrument Flight Rules Windrose

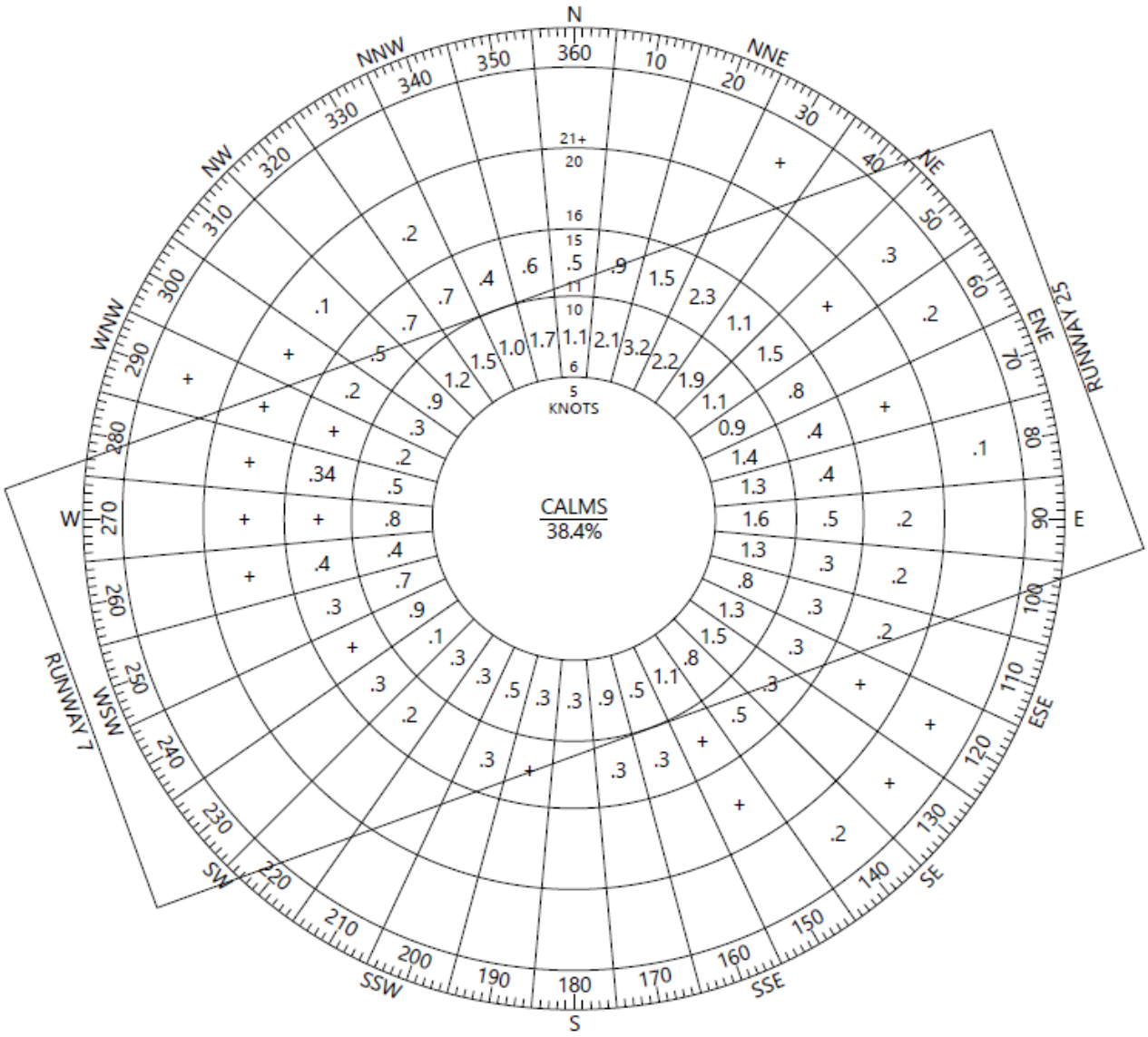


CEILING BELOW 1,000' AND/OR VISIBILITY LESS THAN 3 MILES

SOURCE: National Climatic Data Center (NCDC), 3505 Surface Hourly Weather Observations for Florida Keys Marathon International Airport (722016), 2008 - 2017 (87,534 Observations), Accessed October 3, 2018

PREPARED BY: Ricondo and Associates, Inc., June 2020.

Exhibit 2-27: Visual Flight Rules Windrose



CEILING AT OR ABOVE 1,000' AND VISIBILITY GREATER THAN OR EQUAL TO 3 MILES

SOURCE: National Climatic Data Center (NCDC), 3505 Surface Hourly Weather Observations for Florida Keys Marathon International Airport (722016), 2008 - 2017 (87,534 Observations), Accessed October 3, 2018

PREPARED BY: Ricondo and Associates, Inc., June 2020.

2.10 Existing Utility Infrastructure

The utility systems serving the Airport include electric power, water, sanitary sewer, storm sewer, and communications. The following subsections provide a brief overview of the utilities available to aviation and non-aviation parcels at the Airport.

2.10.1 ELECTRIC POWER

Electric power for the Airport is currently supplied by the Florida Keys Electric Cooperative Association. The city of Key West purchased the electric utility in 1943, and the City Council created a Utility Board to oversee the utility. As of March 2016, the city of Key West maintains ownership of the power service.

Power service is available throughout the aviation and non-aviation parcels at the Airport. Power is also readily accessible to areas that Airport management may wish to further develop or change. From the transformer, power is distributed to the terminal, the FAA electrical vault, and throughout the aviation and non-aviation parcels at the Airport. The FAA vault provides power to the windsock, the ASOS, and other airside equipment.

2.10.2 WATER

Existing water services for the Airport are provided by the FKAA. The primary water source for the FKAA is the Biscayne Aquifer, and the wellfield is located near Everglades National Park. During the higher demand dry season, the FKAA supplements its primary source by utilizing the Floridian Aquifer.[4] In emergency situations, the FKAA has the capability of utilizing two seawater plants located in Marathon and Stock Island. Potable water is distributed throughout the landside and through a portion of the airside facilities via a series of water lines. All facilities at the Airport are supplied with potable water, including the FBOs, the terminal building, the ARFF facility, and the hangars.

2.10.3 SANITARY SEWER

Wastewater from the passenger terminal building is processed by the wastewater treatment plant located on the east side of the Airport property.

2.10.4 STORMWATER DRAINAGE

The Airport's existing stormwater drainage system is through surface drainage, except for the GA apron that drains into an injection well. Monroe County currently leases two retention areas to the FDOT as part of the project that widened U.S. Highway 1 from two to four traffic lanes. The location to the east side of the Airport is 1.7 acres, and the location to the west side is 5.8 acres. Each location is designed to comply with the Florida Department of Environmental Regulations.

2.10.5 COMMUNICATIONS

Existing telephone and internet communications services for the Airport are provided by AT&T and Comcast, respectively. In general, internet and voice communications are available throughout the Airport, including the FBOs and the terminal. An existing FAA conduit connects the electrical vault to the FAA equipment around the airfield, such as the windsock and ASOS.

[4] The Florida Keys Aqueduct Authority, http://www.fkaa.com/infoRepository.html#drinking-water-dialog, (accessed April 2017)

Florida Keys Marathon International Airport

Aviation Activity Forecasts

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO & ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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3. Aviation Activity Forecasts

This chapter describes historical aviation activity and trends at the Florida Keys Marathon International Airport (MTH or the Airport) and presents the forecasts of aviation demand through calendar year (CY) 2036. The forecasts were developed for aircraft operations, based aircraft by engine type, and aircraft fleet mix. The aircraft operations forecast includes local and itinerant operations and is shown by the Airport user categories, such as Air Carrier/Air Taxi, General Aviation, and Military. These projections will provide a foundation for evaluating the current facility capacity and determining future facility requirements for the Master Plan Update's 5-, 10-, and 20-year planning horizons.

The forecasts were prepared in 2017, using CY 2016 as the base year. The Monroe County Airports Department provided total aircraft operations for 2015 and 2016. All other aircraft operations values for MTH were sourced from historical operations published in the Florida Department of Transportation (FDOT) Florida Aviation System Plan (FASP) Forecast from 2015.

The projected activity level at the Airport is subject to uncertainties and may differ from the actual future activity level. This is due to continuously changing factors influencing aviation demand at the local and national levels. These factors include economic conditions, political shifts, regulatory requirements, changes in business models/practices in the commercial airline industry, and technological advancements. Additionally, factors such as changes in operating costs or the development of an air carrier incentive program may influence aviation demand at the Airport.

Consistent with the guidelines included in Federal Aviation Administration, Advisory Circular 150/5070-6B, *Airport Master Plans* and the FDOT *Guidebook for Airport Master Planning,* this section describes the following components:

- historical activity levels and trends
- factors affecting aviation activity
- forecast methodology overview and results

3.1 Historical Activity Levels and Trends

3.1.1 HISTORICAL AIRCRAFT OPERATIONS TRENDS AT FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT

The Airport is located along the Overseas Highway in Monroe County, Florida, approximately 50 miles east of Key West and 115 miles southwest of Miami. As previously stated, historical activity at the Airport prior to CY 2015 is based on operations reported in the FDOT FASP, while activity in CY 2015 and CY 2016 is based on data provided by the Airport. Operations by category (e.g., itinerant and local air carrier/air taxi, general aviation, and military) were estimated using the share of operations by category reported in the 2016 Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) for the Airport.

Historical FDOT FASP operations were used to establish historical activity levels at the Airport because FDOT FASP data appear to better reflect historical activity at the Airport than data in the FAA TAF. Historical data from the FDOT FASP show a decline in operations at MTH around the period of economic recession in the late 2000s. During this same period, FAA TAF data show an increase in operations, while FAA TAF data from airports with similar macroeconomic conditions, such as Key West International Airport (EYW), show a decrease in operations around the period of the economic recession. Because airports with the same macroeconomic conditions are expected to have similar activity trends, historical data from the FDOT FASP were used instead of historical data from the FAA TAF.

Approximately 93.0 percent of the Airport's total aircraft operations are general aviation (GA) operations. The Airport last had commercial air service in 2009, when Cape Air operated service on behalf of Continental Airlines to Fort Myers, Florida. American Eagle and Mesa Airlines operated at MTH from 1990 to 2000 and Delta Air Lines operated from MTH offering regional jet services to Atlanta from February to September of 2007. The total origin and destination passengers peaked at 79,550 in 1996 during the period when Mesa Airlines operated as US Airways Express, offering service from MTH to various Florida airports such as Orlando and Tampa.

3.1.1.1 Air Carrier and Air Taxi Operations

Air carrier operations are defined by the United States Department of Transportation (U.S. DOT) as operations carrying passengers or cargo on aircraft with more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Air taxi operations are defined as operations transporting passengers or cargo on aircraft with no more than 30 seats and a maximum payload capacity of at most 7,500 pounds.[1] Historically at MTH, air taxi operations comprised both passenger and cargo operations. In CY 2006, MTH had scheduled commercial passenger service operated by Florida Coastal Airlines, using 8-seat Cessna 402 aircraft. In CY 2007, Delta Airlines offered commercial service to Atlanta, operated by regional partners on 40-seat Bombardier CRJ-200 aircraft and 50-seat Embraer ERJ-145 aircraft. After Delta discontinued operations at the

[1] United States Department of Transportation, Bureau of Transportation Statistics, Transportation Expressions/Transportation Acronym Guide, https://www.rita.dot.gov/bts/dictionary/index.xml (accessed August 2017).

Airport in September 2007, the Airport did not have scheduled commercial service until Continental offered regional service to Fort Myers, operated by Cape Air on 11-seat Cessna 402 aircraft from December 2008 to April 2009. The Airport has not had scheduled commercial passenger service since CY 2009.

Since CY 2009, the Airport's air taxi operations are composed of cargo and charter passenger operations. Mountain Air Cargo operates cargo service for FedEx between Miami and Marathon approximately twice daily on Cessna 208 Caravan aircraft with a maximum payload of approximately 3,300 pounds.[2] Charter services are offered by providers such as Marathon Jet Center, Air Charter Service, Flexjet, and Charter Flight Group. Approximately 6.4 percent of total operations at the Airport are classified as air carrier/air taxi operations.

3.1.1.2 Military Operations

Military operations have historically accounted for a small percentage of total operations at the Airport, fluctuating between 0.2 percent and 0.6 percent from CY 2006 to CY 2016. All of the military operations at the Airport are itinerant operations, and many are performed by Lockheed C-130 Hercules aircraft according to historical data from FAA Traffic Flow Managements Counts (TFMSC) data.

3.1.1.3 Total Airport Operations

The Airport accommodated between 53,467 and 75,000 total aircraft operations from CY 2006 to CY 2016. In CY 2016, it accommodated 75,000 operations, including 69,771 GA operations (30,698 itinerant and 39,073 local), 4,809 itinerant air carrier and air taxi operations, and 420 military operations. Over the past 10 years, operations at MTH have increased at a compound annual growth rate (CAGR) of 3.4 percent. Historical aircraft operations are presented in **Table 3-1** and **Exhibit 3-1**.

[2] Cessna, Cessna Caravan Short Brochure, http://cessna.txtav.com/-/media/cessna/files/caravan/caravan/caravan_short_brochure.ashx, (accessed August 2017).

Table 3-1: Historical Aircraft Operations at Florida Keys Marathon International Airport: CY 2006–CY 2016

	ITINERANT				LOCAL			
CALENDAR YEAR	AIR TAXI/CARRIER	GENERAL AVIATION	MILITARY	TOTAL ITINERANT	CIVIL (GENERAL AVIATION)	MILITARY	TOTAL LOCAL	TOTAL OPERATIONS
2006	3,172	22,071	134	25,377	28,090	0	28,090	53,467
2007	3,818	26,569	154	30,541	33,815	0	33,815	64,356
2008	1,599	27,806	247	29,652	35,389	0	35,389	65,041
2009	3,907	27,226	158	31,291	34,653	0	34,653	65,944
2010	3,962	27,604	160	31,726	35,134	0	35,134	66,860
2011	3,958	27,609	154	31,721	35,139	0	35,139	66,860
2012	3,816	26,620	148	30,584	33,880	0	33,880	64,464
2013	4,360	27,798	415	32,573	35,380	0	35,380	67,953
2014	4,480	28,568	426	33,474	36,360	0	36,360	69,834
2015	4,426	28,227	420	33,073	35,927	0	35,927	69,000
2016	4,809	30,698	420	35,927	39,073	0	39,073	75,000
Compound Annual Growth Rate								
CY 2006–CY 2016	4.3%	3.4%	12.1%	3.5%	3.4%	0.0%	3.4%	3.4%

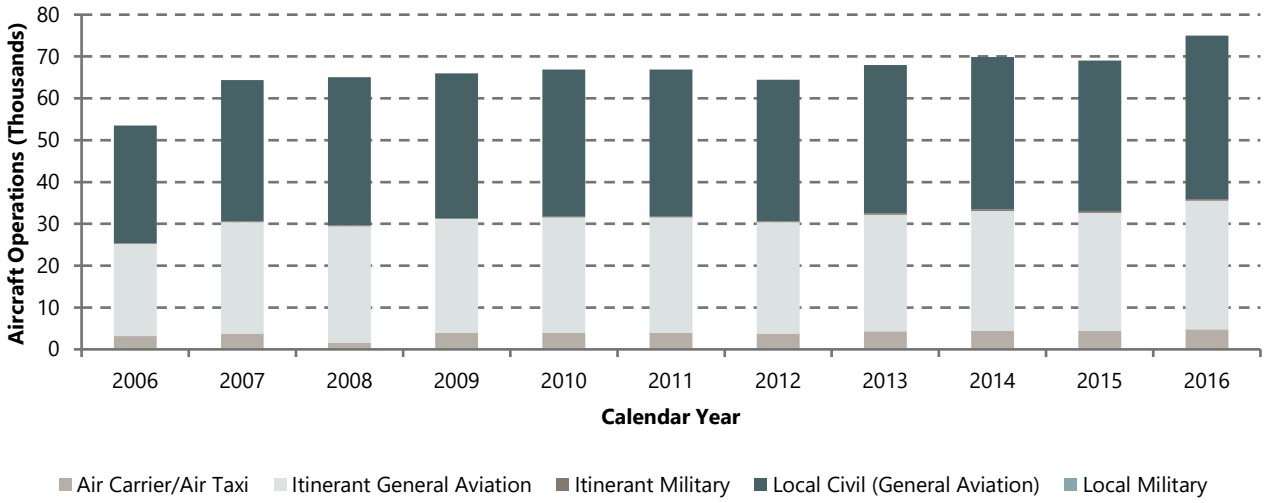
NOTES: CY – Calendar Year, MTH – Florida Keys Marathon International Airport, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP. MTH operations by type were calculated using the share of total operations in Federal Aviation Administration Terminal Area Forecast.

SOURCES: Monroe County Airports Department, April 2017; FDOT FASP, 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-1: Historical Aircraft Operations at Florida Keys Marathon International Airport: CY 2006–CY 2016



NOTES: CY – Calendar Year, MTH – Florida Keys Marathon International Airport, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP. MTH operations by type were calculated using the share of total operations in Federal Aviation Administration Terminal Area Forecast.

SOURCES: Monroe County Airports Department, April 2017; FDOT FASP, 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Aircraft operations at the Airport are further segmented by local and itinerant operations. The historical local and itinerant operations at the Airport are presented in **Table 3-2**. Over the past 10 years, itinerant operations have increased at a CAGR of 3.5 percent, while local operations have increased at a CAGR of 3.4 percent. The share of itinerant operations has averaged 47.0 percent of the total operations during the past 10 years.

Table 3-2: Historical Itinerant and Local Airport Operations at Florida Keys Marathon International Airport

CALENDAR YEAR	ITINERANT OPERATIONS	ITINERANT SHARE OF TOTAL	LOCAL OPERATIONS	LOCAL SHARE OF TOTAL	TOTAL OPERATIONS
2006	25,377	47%	28,090	53%	53,467
2007	30,541	47%	33,815	53%	64,356
2008	29,652	46%	35,389	54%	65,041
2009	31,291	47%	34,653	53%	65,944
2010	31,726	47%	35,134	53%	66,860
2011	31,721	47%	35,139	53%	66,860
2012	30,584	47%	33,880	53%	64,464
2013	32,573	48%	35,380	52%	67,953
2014	33,474	48%	36,360	52%	69,834
2015	33,073	48%	35,927	52%	69,000
2016	35,927	48%	39,073	52%	75,000
Compound Annual Growth Rate					
CY 2006–CY 2016	3.5%		3.4%		3.4%

NOTES:

CY – Calendar Year

SOURCES: Florida Department of Transportation Florida Aviation System Plan, 2017; Monroe County Airports Department, April 2017; Federal Aviation Administration Terminal Area Forecast, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.1.2 HISTORICAL TRENDS OF SELECTED GENERAL AVIATION AIRPORTS IN SOUTHEAST FLORIDA

As depicted on **Exhibit 3-2**, there are multiple airports within a 120-mile distance (approximately a one hour flight) of MTH that would be likely to experience similar trends as MTH. The airports within this distance of MTH were chosen if total GA operations are at least 20,000 per year, under the assumption that these airports could compete for some of the same traffic. The one exception is EYW, which was also chosen because it is the nearest airport to MTH. **Table 3-3** shows total operations at the selected airports in southeast Florida. Miami International Airport, which falls within 120 miles of the Airport, was not selected because it has fewer than 20,000 annual GA operations.

From CY 2006 to CY 2010, the total operations at MTH increased at a CAGR of 5.7 percent, whereas there was a decline in the GA operations at each of the other airports. Combined, GA operations at the selected airports declined at a CAGR of 4.2 percent, greater than the 2.9 percent average annual decline for total GA operations in the U.S. during the same period. The larger decline in operations at Southeast Florida airports may be due to the greater impact of the 2007 to 2009 recession on Florida compared to the United States (U.S.). According to data from Woods & Poole Economics, Inc., the growth in gross regional product (GRP) for Florida decreased by 0.24 percentage points from 2007 to 2008 and decreased an additional 0.19 percentage points in 2009. In contrast gross domestic product (GDP) growth for the U.S. decreased by 0.01 percentage points from 2007 to 2008 and another 0.07 percentage points in 2009. However, from CY 2010 to CY 2016, GA operations at the selected airports increased except for at EYW. Furthermore, the combined CAGR of 3.9 percent was in contrast to the 0.7 percent average annual decline of GA operations in the U.S. and the CAGR

of 0.9 percent for total Florida GA operations, indicating stronger recent growth in southeast Florida than either statewide or nationally.

Exhibit 3-2: Map of Selected Southeast Florida General Aviation Airports

SOURCE: United States Department of Commerce, Bureau of the Census, Topologically Integrated Geographic Encoding and Referencing (TIGER)/Line Files, March 2015.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-3 depicts the itinerant and local share of operations at each of the selected airports from CY 2010 to CY 2016. Of the airports compared, Miami Executive Airport (TMB) and Fort Lauderdale Executive Airport (FXE) have consistently reported the highest number of itinerant operations, while TMB, FXE, and EYW have consistently had the highest share of itinerant operations compared to local operations. These numbers indicate a higher proportion of travel to and from TMB, FXE, and EYW from outside of their respective local areas[3] compared to the other selected airports depicted on Exhibit 3-3. In contrast, MTH has consistently reported one of the lowest shares of itinerant operations, along with North Perry Airport (HWO) and, since CY 2013, Miami Homestead General Aviation Airport (X51). The latter two airports have flight training schools that help increase local activity, as described below.

[3] According to the Federal Aviation Administration definition, local operations are those operations performed by aircraft that remain in the local traffic pattern, execute simulated instrument approaches or low passes at the airport, and the operations to or from the airport and a designated practice area within a 20−mile radius of the tower.

Table 3-3: Historical Aircraft Operations of Selected Florida General Aviation Airports: CY 2006–CY 2016

CALENDAR YEAR[1/]	KEY WEST INTL. AIRPORT (EYW)[2/]	FORT LAUDERDALE EXECUTIVE (FXE)	MIAMI–OPA LOCKA EXECUTIVE AIRPORT (OPF)	MIAMI EXECUTIVE AIRPORT (TMB)	NORTH PERRY AIRPORT (HWO)	HOMESTEAD GENERAL AVIATION AIRPORT (X51)	FLORIDA KEYS MARATHON INTL. AIRPORT (MTH)[3/]	MARKET SHARE OF MTH	SOUTHEAST FLORIDA TOTAL	FLORIDA TOTAL GENERAL AVIATION	U.S. TOTAL GENERAL AVIATION
2006	47,045	202,264	121,061	208,090	164,378	79,834	53,467	6%	876,139	6,754,183	80,148,503
2007	43,988	200,030	112,238	263,267	182,190	82,668	64,356	7%	948,737	6,885,700	80,185,281
2008	39,209	180,082	94,065	308,902	170,077	75,667	65,041	7%	933,043	6,717,194	78,020,289
2009	36,023	149,637	89,145	212,738	162,885	72,084	65,944	8%	788,456	6,309,482	73,598,797
2010	37,117	149,705	98,708	189,732	120,322	75,133	66,860	9%	737,577	5,799,356	71,230,624
2011	41,366	150,197	100,553	172,058	136,104	82,000	66,860	9%	749,138	5,859,864	69,900,768
2012	41,638	158,742	103,490	210,819	127,648	56,000	64,464	8%	762,801	5,948,404	69,577,152
2013	33,775	158,400	110,149	243,929	142,399	72,300	67,953	8%	828,905	6,109,491	68,808,247
2014	28,814	168,772	136,581	258,197	155,776	76,617	69,834	8%	894,591	6,085,670	68,183,393
2015	28,612	160,065	143,088	262,166	171,550	77,383	69,000	8%	911,864	6,135,264	68,334,308
2016	32,651	160,295	130,070	278,027	176,306	78,157	75,000	8%	930,506	6,109,590	68,365,883
Compound Annual Growth Rate											
CY 2006–CY 2010	(5.8%)	(7.2%)	(5.0%)	(2.3%)	(7.5%)	(1.5%)	5.7%		(4.2%)	(3.7%)	(2.9%)
CY 2010–CY 2016	(2.1%)	1.1%	4.7%	6.6%	6.6%	0.7%	1.9%		3.9%	0.9%	(0.7%)
CY 2006–CY 2016	(3.6%)	(2.3%)	0.7%	2.9%	0.7%	(0.2%)	3.4%		0.6%	(1.0%)	(1.6%)

NOTES:

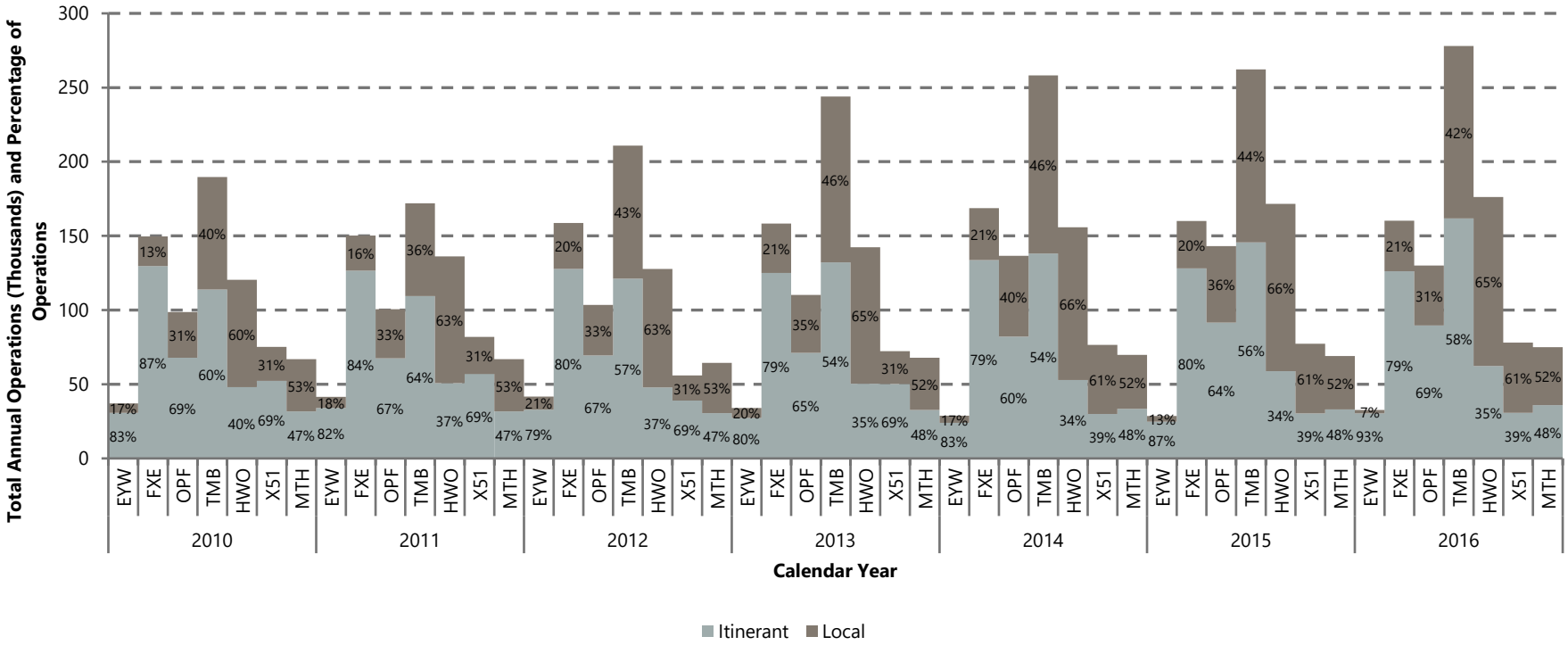
CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan; CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP; CY 2006 – 2016 X51 operations are from the FDOT FASP and CY 2015 – 2016 X51 operations are forecast values; for all other airports, values are from the Federal Aviation Administration Operations Network (OPSNET); EYW operations are general aviation (GA) operations only.

1/ Operations for Florida and the United States are sourced from the Federal Aviation Administration 2016 Terminal Area Forecast FY 2016 and are on a Federal Fiscal Year basis; operations in 2016 are forecast.

SOURCES: Federal Aviation Administration, OPSNET, April 2017; FDOT FASP, 2017; Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-3: Historical Itinerant and Local Operations Shares of Selected Florida General Aviation Airports: CY 2010–CY 2016



NOTES:

CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan, EYW – Key West International Airport, FXE – Fort Lauderdale Executive Airport, OPF – Miami–Opa Locka Executive Airport, TMB – Miami Executive Airport, HWO – North Perry Airport, X51 – Miami Homestead General Aviation Airport, MTH – Florida Keys Marathon International Airport

CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP; CY 2006 – 2016 X51 operations are from the FDOT FASP and CY 2015 – 2016 X51 operations are forecast values; for all other airports, values are from Operations Network (OPSNET). MTH and X51 itinerant and local operations were calculated using the share of total operations in Federal Aviation Administration Terminal Area Forecast.

EYW operations are general aviation (GA) operations only.

SOURCES: Federal Aviation Administration, OPSNET, April 2017; FDOT FASP, 2017; Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

As shown in Table 3-3, operations at MTH increased at a CAGR of 3.4 percent from CY 2006 to CY 2016. This is faster than the corresponding CAGR of 0.6 percent for southeast Florida airports. When comparing based aircraft, MTH has fewer based aircraft than most of the southeast Florida GA airports, which are in areas with higher populations, but more than the nearest airport, EYW, as depicted on **Exhibit 3-4**. This further reflects its importance for local operations compared to EYW.

EYW is unique due to its geographic location. It is located on Key West Island, 49 miles southwest of MTH. Several major air carriers offer scheduled service to EYW, including American Airlines, Delta Air Lines, Silver Airways, and United Airlines. In CY 2016, EYW had a total of 52,300 aircraft operations, approximately 32,650 of which were GA operations. Total GA operations at EYW decreased at a CAGR of 3.6 percent from CY 2006 to CY 2016. EYW has the smallest number of based aircraft among the airports compared.

FXE is located approximately 14 miles north of Fort Lauderdale-Hollywood International Airport (FLL) for which it serves as a reliever airport. It is also approximately 116 miles northeast of MTH. The airport is served by six Fixed Base Operators (FBOs), which cater to GA traffic near Fort Lauderdale and Miami. Operations at the airport fluctuated between CY 2006 and CY 2016 from a minimum of 149,637 in CY 2009 to 202,264 in CY 2006. In CY 2016, FXE had a total of 160,295 aircraft operations, of which 146,715 were GA operations. Total aircraft operations at FXE decreased at a CAGR of 2.3 percent from CY 2006 to CY 2016. In terms of based aircraft, FXE has the most based aircraft of the selected airports and more jet based aircraft than the other six airports combined. Miami-Opa Locka Executive Airport (OPF) is located approximately 10 miles north of Miami International Airport (MIA) and 95 miles northeast of MTH. OPF is a reliever airport to MIA and has the longest GA runways among the selected airports. 0GA operations accounted for 85.0 percent of the total operations at OPF in CY 2016. There has been an increase in activity in recent years, following a 21.0 percent decline from CY 2007 to CY 2009. Since CY 2010, operations at OPF have increased at a CAGR of 4.7 percent, one of the highest growth rates among the airports compared.

TMB is located approximately 20 miles southwest of MIA and 75 miles northeast of MTH and is also a reliever airport to MIA. The airport accommodates corporate, recreational, flight training, and government agency activities. GA operations accounted for an average of nearly all of the total operations at TMB in CY 2016. Operations at TMB grew at a CAGR of 6.6 percent from CY 2010 to CY 2016, the highest growth (with HWO) among the selected airports. This growth follows a 31.1 percent decline in operations from CY 2008 to CY 2009 during the economic recession. When comparing based aircraft, TMB has the highest number of based helicopter aircraft among the selected airports, as it is the only airport among those compared that has a heliport.[4]

HWO is located approximately 15 miles southwest of FLL and 100 miles northeast of MTH and also serves as a reliever airport to FLL. It has two sets of parallel runways and accommodates several flight schools and aircraft sales and repair stations. In CY 2016, the airport had a total of 176,306 operations; almost 100 percent were GA operations. From CY 2010 to CY 2016, operations at HWO increased at a CAGR of 6.6 percent.

[4] Federal Aviation Administration, National Flight Data Center, https://nfdc.faa.gov/xwiki/bin/view/NFDC/WebHome (accessed August 8, 2017).

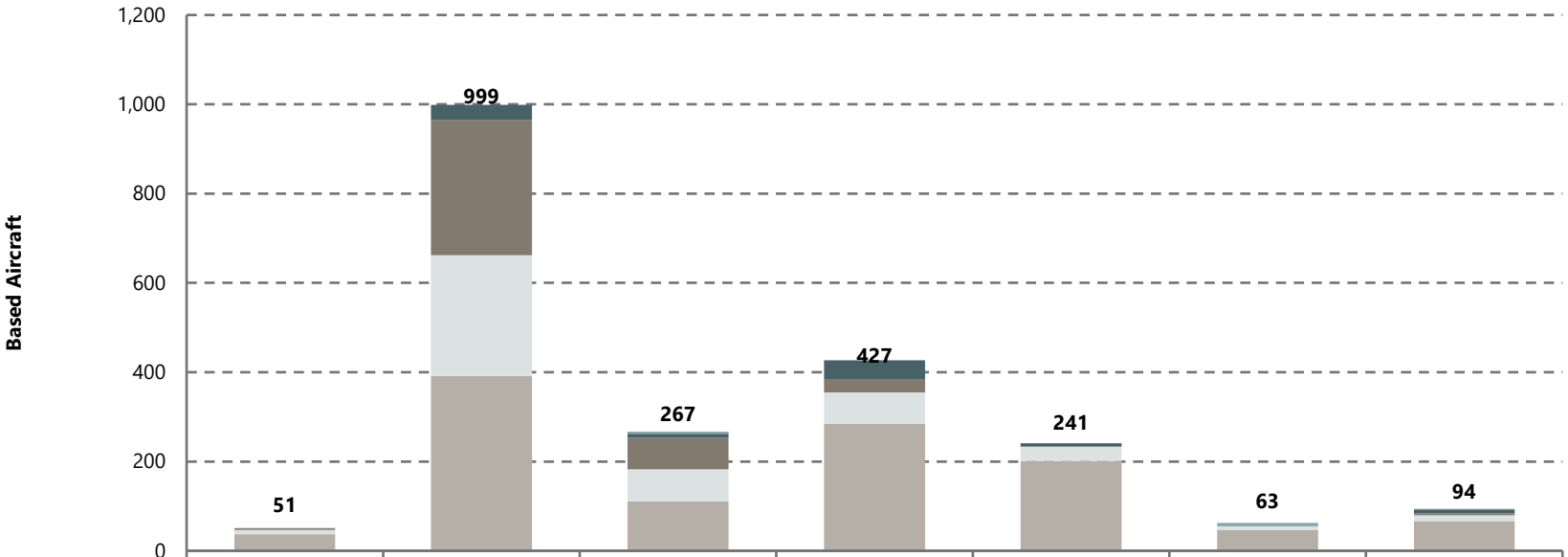
However, as shown in **Table 3-4**, all runways are shorter than 4,000 feet which limits the types of aircraft that can operate at HWO.

Miami Homestead General Aviation Airport (X51) is located approximately 40 miles southeast of MIA and 60 miles northeast of MTH in an agricultural community adjacent to Everglades National Park and near the Florida Keys. X51 has three runways, one with a turf surface and two with asphalt surfaces. However, the longest runway it has is 3,999 feet long, which is approximately 1,000 feet shorter than MTH's runway, limiting the size and types of aircraft that can operate at the airport. Total aircraft operations at X51 in 2016 were 78,157, approximately 60 percent of which were local operations, supported by a glider flight school and skydiving center at the airport.[5] As indicated in Exhibit 3-4, X51 had 63 based aircraft in CY 2016, mostly single-engine piston aircraft.

Table 3-4 contains a summary of the facilities provided at each of the selected southeast Florida airports. As shown in Table 3-4, all airports have an airport traffic control tower (ATCT) except MTH and X51, and three of the seven airports have instrument landing systems (ILS). Besides MTH, FXE, OPF, and EYW have customs facilities on site. MTH and EYW are the only two airports shown in Table 3-4 that have a single runway. The runway length at MTH is 207 feet longer than the runway at EYW. However, based on discussion with the FBO at the Airport in April 2017, the current runway length of 5,008 feet limits aircraft size and payload range. When comparing size, MTH has the smallest acreage among the six airports shown in the table, which limits its ability to expand.

[5] Miami Homestead General Aviation Airport, http://www.miami-airport.com/homestead.asp (accessed August 8, 2017).

Exhibit 3-4: Based Aircraft at Selected Florida Airports, CY 2016



	EYW	FXE	OPF	TMB	HWO	X51	MTH
OTHERS	0	0	5	0	0	8	1
HELICOPTER	1	34	9	42	7	0	9
JET	3	303	70	30	1	0	4
MULTI-ENGINE	10	270	72	70	32	8	13
SINGLE-ENGINE	37	392	111	285	201	47	67

NOTES:

EYW - Key West International Airport, FXE – Fort Lauderdale Executive Airport, OPF – Miami–Opa Locka Executive Airport, TMB – Miami Executive Airport, HWO – North Perry Airport, X51 – Homestead General Aviation Airport, MTH – Florida Keys Marathon International Airport.

CY – Calendar Year

Based Aircraft values for FXE are from City of Fort Lauderdale Transportation and Mobility Department, December 2016 (Historical); Based Aircraft values for MTH are actual values provided by Monroe County Airports Department; for all other airports, values are from AirportIQ 5010.

SOURCES: AirportIQ 5010, May 2017; Basedaircraft.com, May 2017; Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Table 3-4: Overview of South Florida Airports, CY 2016

	FORT LAUDERDALE EXECUTIVE AIRPORT (FXE)	MIAMI-OPA LOCKA EXECUTIVE AIRPORT (OPF)	MIAMI EXECUTIVE AIRPORT (TMB)	KEY WEST INTL. AIRPORT (EYW)	NORTH PERRY AIRPORT (HWO)	MIAMI HOMESTEAD GENERAL AVIATION AIRPORT (X51)	FLORIDA KEYS MARATHON INTL. AIRPORT (MTH)
Physical Characteristics:							
Total Airport Acreage	1,050	1,880	1,380	334	536	807	197
Number of Paved Runways:	2	3	3	1	4	2	1
Number of Grassed Runways:	0	0	0	0	0	1	0
Runway Length x Width[1/]	6,002 x 100 ft. 4,000 x 100 ft.	8,002 x 150 ft. 6,800 x 150 ft. 4,309 x 100 ft.	6,000 x 150 ft. 5,003 x 150 ft. 4,001 x 150 ft.	4,801 x 100 ft.	3,350 x 100 ft. 3,260 x 100 ft. 3,255 x 100 ft. 3,240 x 100 ft.	3999 x 100 ft. 3000 x 75 ft. 2500 x 150 ft.	5,008 x 100 ft.
ATCT on site:	Yes	Yes	Yes	Yes	Yes	No	No
Precision & Non-Precision Approach	1 ILS, 2 RNAV GPS (LNAV)	3 ILS, 3 RNAV GPS (LNAV)	1 ILS, 4 RNAV GPS (LNAV)	2 RNAV GPS (LNAV)	2 RNAV GPS (LNAV)	2 RNAV GPS (LNAV)	3 RNAV GPS (LNAV)
Statistics:							
Based Aircraft in CY 2016 (based on AirportIQ 5010)[1/]							
Single Engine:	392	111	285	37	201	47	67
Business Jet:	303	70	30	3	1	0	4
Multi Engine:	270	72	70	10	32	8	13
Helicopters:	34	9	42	1	7	0	9
Others:	0	5	0	0	0	8	1
Total Based Aircraft	999	267	427	51	241	63	94
CY 2016 Total Operations (based on OPSNET)[2/]	160,295	130,070	278,027	32,651	176,306	78,157	75,000
Number of FBOs:	5	5	5	1	4	2	2
Customs on Site:	Yes	Yes	No	Yes	No	No	Yes
100LL Pricing[3/]:	$7.59	$7.59	$5.99	$6.71	$4.45	$4.95	$6.00
Jet A Pricing[3/]:	$6.21	$6.21	$5.57	$6.59	$4.50	$4.40	$4.83

NOTES:
ATCT – Airport Traffic Control Tower, FBO – Fixed Base Operators, RNAV - Area Navigation, GPS - Global Positioning System, LNAV - Lateral Navigation, OPSNET - Operations Network, CY – Calendar Year
1/ Based Aircraft values for FXE are from basedaircraft.com; Based Aircraft values for MTH are actual values provided by Monroe County Airports Department; for all other airports, values are from AirportIQ 5010.
2/ CY 2016 MTH operations are based on data from the Airport; X51 operations are from the FDOT FASP; for all other airports, values are from OPSNET; EYW operations are General Aviation operations only.
3/ Fuel prices reflect the maximum full service price for fuel at each airport as of August 11, 2017.

SOURCES: AirportIQ 5010, May 2017; basedaircraft.com, April 2017; Monroe County Airports Department, April 2017; Federal Aviation Administration, OPSNET, April 2017; AirNav, August 2017
PREPARED BY: Ricondo & Associates, Inc., August 2017.

3.1.3 HISTORICAL STATE AND NATIONAL GENERAL AVIATION OPERATIONS TRENDS

According to data from the FAA, the total GA activity in the state of Florida declined from Federal Fiscal Year[6] (FY) 2006 to FY 2016 at a CAGR of 1.0 percent. Itinerant GA operations declined at a faster rate (1.8 percent) than local operations (0.2 percent) during the period from FY 2006 to FY 2016. During the same period, GA operations declined by a CAGR of 1.6 percent nationally, as shown in **Table 3-5**. Similar to the trends in Florida, total itinerant GA operations in the U.S. decreased at a CAGR of 2.0 percent, while local GA operations declined at a CAGR of 1.2 percent. During this period, the combined operations at MTH increased at a CAGR of 3.4 percent.

Table 3-5: Historical General Aviation Aircraft Operations in Florida and the United States: FY 2006–FY 2016

	FLORIDA			UNITED STATES			FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT (MTH)
FISCAL YEAR[1/]	ITINERANT	LOCAL	TOTAL	ITINERANT	LOCAL	TOTAL	TOTAL OPERATIONS
2006	3,658,964	3,095,219	6,754,183	39,619,314	40,529,189	80,148,503	53,467
2007	3,740,402	3,145,298	6,885,700	39,409,921	40,775,360	80,185,281	64,356
2008	3,563,080	3,154,114	6,717,194	37,785,083	40,235,206	78,020,289	65,041
2009	3,361,477	2,948,005	6,309,482	35,502,146	38,096,651	73,598,797	65,944
2010	3,059,645	2,739,711	5,799,356	34,411,873	36,818,751	71,230,624	66,860
2011	3,115,211	2,744,653	5,859,864	33,772,350	36,128,418	69,900,768	66,860
2012	3,129,043	2,819,361	5,948,404	33,645,965	35,931,187	69,577,152	64,464
2013	3,161,783	2,947,708	6,109,491	33,106,131	35,702,116	68,808,247	67,953
2014	3,106,211	2,979,459	6,085,670	32,572,698	35,610,695	68,183,393	69,834
2015	3,094,854	3,040,410	6,135,264	32,409,951	35,924,357	68,334,308	69,000
2016[2/]	3,061,144	3,048,446	6,109,590	32,449,388	35,916,495	68,365,883	75,000
Compound Annual Growth Rate							
FY 2006–FY 2016	(1.8%)	(0.2%)	(1.0%)	(2.0%)	(1.2%)	(1.6%)	3.4%

NOTES:

FY – Fiscal Year

1/ Operations for MTH are on a calendar year (CY) basis. CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP.

2/ Operations for FY 2016 are forecast operations in the 2016 Federal Aviation Administration Terminal Area Forecast.

SOURCE: Federal Aviation Administration, 2016 Terminal Area Forecast, January 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.1.4 HISTORICAL LOCAL, STATE, AND NATIONAL BASED AIRCRAFT TRENDS

The total MTH based aircraft in 2016, as reported by Monroe County Airports Department, was 94, of which 67 were single-engine and 4 were jet aircraft as shown in **Table 3-6**. Single-engine aircraft represent the

[6] The Federal Fiscal Year is from October 1 to September 30 of the following year. For example, FY 2016 was from October 1, 2015, to September 30, 2016.

highest share of based aircraft at MTH. The share of jet aircraft has been low compared to other engine types between CY 2006 and CY 2016 as depicted on **Exhibit 3-5**.

As shown in **Table 3-7,** statewide, single-engine based aircraft decreased at a CAGR of 1.2 percent from FY 2006 to FY 2016. Nationally, total single-engine based aircraft decreased at a CAGR of 1.5 percent during the same period. In contrast, from FY 2006 to FY 2016, jet based aircraft increased at a CAGR of 1.8 percent statewide and 0.6 percent nationally. Comparing these national trends to those at MTH, single-engine and jet based aircraft have fluctuated at the Airport and both are at the same level as in CY 2006. Instead of declining, single-engine aircraft remain important to MTH and jet based aircraft, while not changing when compared to 2006 and comprising a small share of based aircraft at the Airport, have increased in recent years, consistent with state and national trends.

Table 3-6: Historical Based Aircraft at Florida Keys Marathon International Airport Terminal Area Forecast: CY 2006–CY 2016

CALENDAR YEAR	SINGLE-ENGINE	JET	MULTI-ENGINE	HELICOPTER	OTHER	TOTAL
2006	67	4	16	6	0	93
2007	50	1	15	7	0	73
2008	59	0	21	6	1	87
2009	71	0	23	8	1	103
2010	52	1	12	6	0	71
2011	60	1	12	7	0	80
2012	59	1	12	6	2	80
2013	65	1	17	7	1	91
2014	57	0	10	6	1	74
2015	59	0	13	6	0	78
2016 [1/]	67	4	13	9	1	94
Compound Annual Growth Rate						
CY 2006–CY 2016	0.0%	0.0%	(2.1)%	4.1%	N/A	0.1%

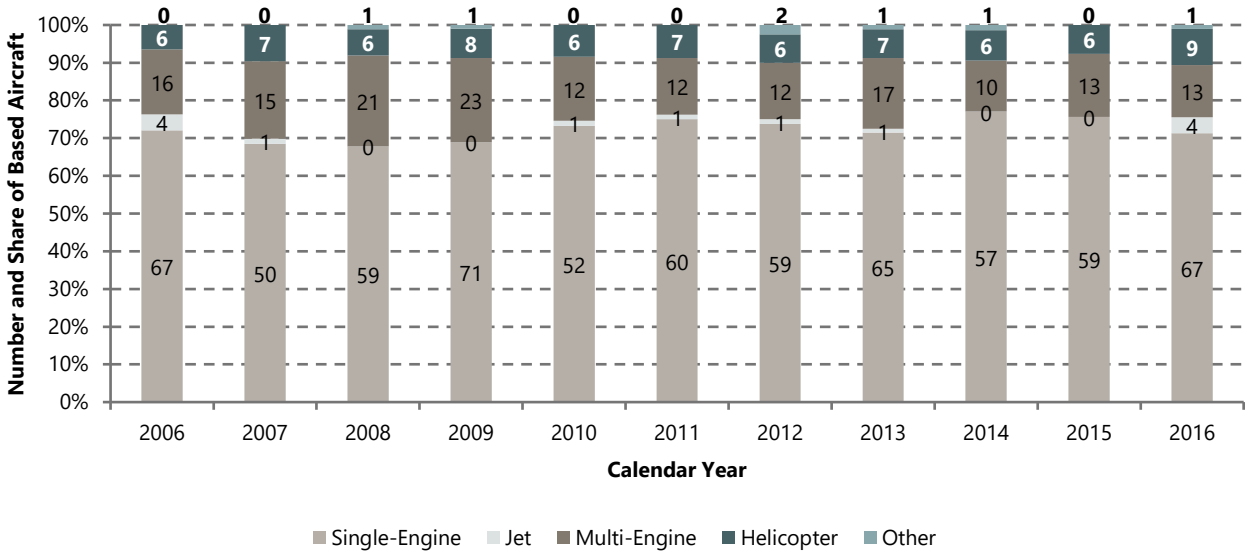
NOTES:

CY – Calendar Year, MTH - Florida Keys Marathon International Airport

1/ 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year. All other based aircraft values were taken from Federal Aviation Administration Terminal Area Forecast, in Fiscal Year.

SOURCES: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-5: Based Aircraft at Florida Keys Marathon International Airport: CY 2006–CY 2016



NOTE:

CY – Calendar Year

2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year. All other based aircraft values were taken from Federal Aviation Administration Terminal Area Forecast, in Fiscal Year.

SOURCES: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Table 3-7: Historical Based Aircraft for Florida and the United States: FY 2006–FY 2016

	FLORIDA						UNITED STATES					
FISCAL YEAR	SINGLE-ENGINE	JET	MULTI-ENGINE	HELICOPTER	OTHER	TOTAL	SINGLE-ENGINE	JET	MULTI-ENGINE	HELICOPTER	OTHER	TOTAL
2006	8,927	1,041	2,420	504	377	13,269	149,829	10,543	23,914	5,484	7,531	197,301
2007	8,885	1,018	2,316	540	411	13,170	151,877	10,864	23,854	5,767	7,246	199,608
2008	7,564	869	1,874	506	425	11,238	130,522	10,118	21,256	5,577	8,106	175,579
2009	7,193	850	1,729	489	363	10,624	132,381	10,466	20,937	5,558	8,090	177,432
2010	7,737	907	1,758	529	0	10,931	128,412	10,447	20,112	5,623	878	165,472
2011	7,589	950	1,757	536	0	10,832	125,117	10,221	19,216	5,564	256	160,374
2012	7,641	1,021	1,796	567	267	11,292	123,029	10,436	18,640	5,674	5,554	163,333
2013	7,733	1,067	1,788	558	408	11,554	125,483	10,155	18,770	5,670	6,875	166,953
2014	7,866	1,161	1,821	580	410	11,838	128,073	10,605	18,992	5,806	6,899	170,375
2015	7,775	1,210	1,802	558	15	11,360	128,201	10,988	18,390	5,902	513	163,994
2016[1/]	7,877	1,238	1,831	575	15	11,536	129,154	11,160	18,642	5,986	538	165,480
Compound Annual Growth Rate												
FY 2006–FY 2016	(1.2%)	1.8%	(2.8%)	1.3%	(27.6%)	(1.4%)	(1.5%)	0.6%	(2.5%)	0.9%	(23.2%)	(1.7%)

NOTES:

FY – Fiscal Year

1/ Based aircraft in FY 2016 are as forecast in the 2016 Federal Aviation Administration Terminal Area Forecast.

SOURCE: Federal Aviation Administration, 2016 Terminal Area Forecast, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.2 Factors Affecting Aviation Activity

Aviation activity is influenced by numerous factors, including national, regional, and local socioeconomic conditions and trends. However, the extent of influence varies from airport to airport. Global events such as terrorism, natural disasters, global fuel prices, severe weather events, and political instability can also significantly influence aviation activity at an airport.

In addition to world events, more localized events surrounding airports and competition also impact a GA airport's aviation activity. According to the National Plan of Integrated Airport Systems, there are a total of 81 airports in Florida classified as reliever or GA airports and an additional 29 airports with commercial service. In the Southeast Florida region, as defined by the Continuing Florida Aviation System Planning Process (CFASPP), there are a total of 13 reliever or GA airports and four commercial-service airports. The number of airports in the region affects competition for GA activity, which could lead to shifting market shares of operations among the airports. For example, airports that open certain facilities, such as a United States Customs and Border Protection (CBP) facility, may attract international activity that would have previously flown to other airports in the region.

3.2.1 GLOBAL AND NATIONAL FACTORS

The following subsection describes several factors that may impact forecasts of aviation activity.

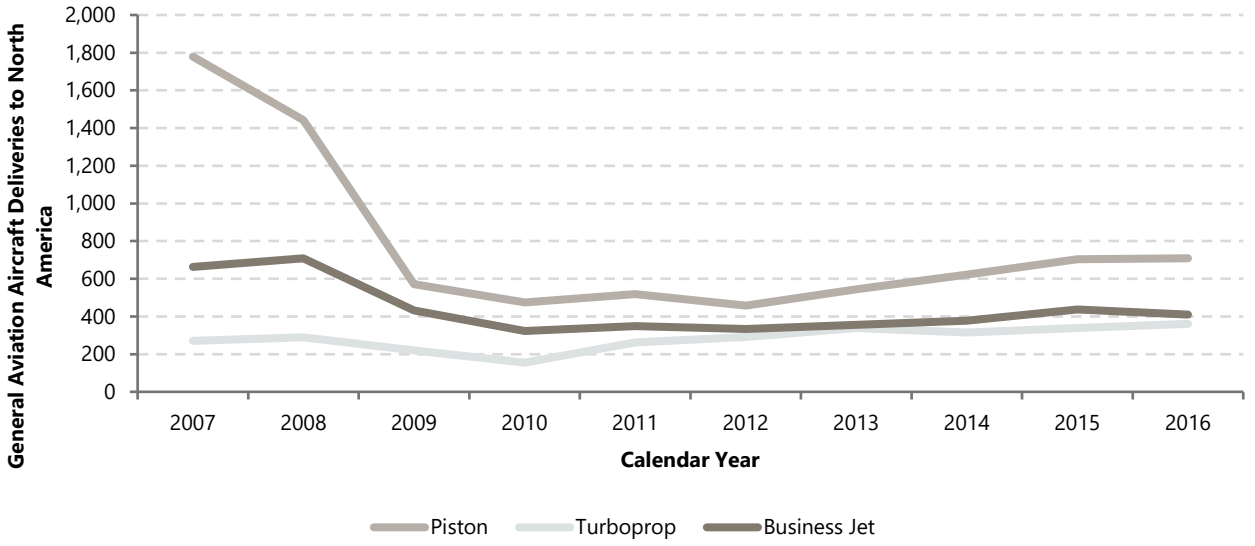
3.2.1.1 Industry Aircraft Market Trends

As presented in the 2016 General Aviation Manufacturers Association (GAMA) General Aviation Statistical Databook[7], deliveries of GA aircraft manufactured worldwide grew at a CAGR of 4.1 percent from CY 2000 to CY 2007. However, deliveries of GA aircraft declined at a CAGR of 6.8 percent worldwide from CY 2007 to CY 2016.

Single-engine piston aircraft comprise the highest share of GA aircraft deliveries. However, the single-engine piston share of total worldwide deliveries declined by 22.6 percentage points, from 62.0 percent in CY 2006 to 39.3 percent in CY 2016. In contrast, during the same period, the total worldwide deliveries accounted for by business jet aircraft increased 7.3 percentage points, from 21.9 percent to 29.2 percent. Despite worldwide decreases in general aviation aircraft deliveries, according to GAMA, deliveries to North America have increased relative to deliveries to other regions. For piston aircraft, the North American share of worldwide deliveries increased from 66.5 percent in CY 2007 to 69.6 percent in CY 2016. Similarly, North America's share of worldwide turboprop deliveries increased from 57.2 percent to 57.8 percent and its share of worldwide business jet aircraft deliveries increased from 58.3 percent to 62.0 percent between CY 2007 and CY 2016. As shown in **Exhibit 3-6** there has been an upward trend in GA aircraft deliveries of all engine types to North America since CY 2010, indicating continued demand for general aviation aircraft of all engine types in North America relative to the rest of the world.

[7] General Aviation Manufacturers Association, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.

Exhibit 3-6: North American General Aviation Aircraft Shipments by Engine Type: CY 2007–CY 2016



NOTES: CY – Calendar Year; CY 2007 was the first year of data available from the source.

SOURCE: General Aviation Manufacturers Association, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.
PREPARED BY: Ricondo & Associates, Inc., August 2017.

While general aviation aircraft deliveries to North America remain stronger than in other regions of the world, based aircraft in the U.S. display trends similar to the global trends in aircraft deliveries. Nationally, single-engine based aircraft declined from FY 2006 to FY 2016 at a CAGR of 1.5 percent, as shown in Table 3-7. According to the 2017 FAA Aerospace Forecast[8], the number of active single-engine aircraft nationwide is forecast to decline at a CAGR of 0.9 percent from 2016 to 2036. In contrast, jet based aircraft increased nationwide at a CAGR of 0.6 percent from FY 2006 to FY 2016 as shown in Table 3-7 and active jet aircraft are forecast to increase at a CAGR of 2.3 percent between CY 2016 and CY 2036, as shown in **Table 3-8**. According to the FAA in its 2017 Aerospace Forecast, single-engine piston activity largely comprises hobby and personal operators, whereas jets are more widely used for business purposes. As flying becomes more expensive due to increased fuel costs, higher training costs, higher maintenance costs and competing cheaper alternatives for recreational use increase, the FAA expects single-engine piston activity to decline, while forecasting an increase in jet activity due to favorable socioeconomic and business trends.

At the regional level, based aircraft trends are similar to those experienced globally and nationally. As shown in **Table 3-9**, single-engine based aircraft at the selected southeast Florida airports declined at a CAGR of 0.6 percent from CY 2006 to CY 2016, while jet based aircraft at the selected airports increased from 169 in 2006 to 442 in 2016, representing a CAGR of 10.1 percent.

[8] Federal Aviation Administration, FAA Aerospace Forecast, May 2017

Table 3-8: Active General Aviation and Air Taxi Aircraft Fleet in the United States

COMPOUND ANNUAL GROWTH RATE	SINGLE ENGINE	MULTI ENGINE	TURBOPROP	JET	HELICOPTER
CY 2016–CY 2026	(0.9%)	(0.3%)	0.1%	2.3%	1.6%
CY 2016–CY 2036	(0.9%)	(0.5%)	1.3%	2.3%	1.6%

NOTE:

CY – Calendar Year

General Aviation data in the Federal Aviation Administration Aerospace Forecast are reported on a calendar year basis, while commercial aviation data are reported on a Federal Fiscal Year basis.

SOURCE: Federal Aviation Administration, FAA Aerospace Forecast (Fiscal Years 2017–2037), June 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Table 3-9: Based Aircraft at Selected Southeast Florida Airports: CY 2006–CY 2016

CALENDAR YEAR[1/]	SINGLE-ENGINE	JET	MULTI-ENGINE	HELICOPTER	OTHER	TOTAL
2006	1,212	169	463	118	29	1,991
2007	1,184	164	458	119	29	1,954
2008	1,005	220	346	86	30	1,687
2009	897	215	343	94	30	1,579
2010	1,098	219	391	99	0	1,807
2011	975	282	379	88	0	1,724
2012	977	282	385	90	2	1,736
2013	1,040	305	401	81	18	1,845
2014	1,092	365	449	91	18	2,015
2015	1,125	395	462	92	0	2,074
2016	1,140	442	475	102	14	2,173
Compound Annual Growth Rate						
CY 2006–CY 2016	(0.6%)	10.1%	0.3%	(1.4%)	(7.0%)	0.9%

NOTES:

CY – Calendar Year, FY – Fiscal Year

Based aircraft shown are total based aircraft at Key West International Airport (EYW), Fort Lauderdale Executive Airport (FXE), Miami–Opa Locka Executive Airport (OPF), Miami Executive Airport (TMB), North Perry Airport (HWO), Miami Homestead General Aviation Airport (X51), and Florida Keys Marathon International Airport (MTH),

1/ Based aircraft values from 2006 to 2015 are from the 2016 Federal Aviation Administration Terminal Area Forecast for each airport, which is on a FY basis; 2016 based aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year; based aircraft values for FXE in 2016 are from basedaircraft.com; all other based aircraft for 2016 are from AirportIQ 5010;.

SOURCES: Federal Aviation Administration, 2016 Terminal Area Forecast, April 2017; Monroe County Airports Department, April 2017; AirportIQ 5010; basedaircraft.com, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

The global and national trends in the general aviation fleet suggest that jet aircraft operations are likely to increase at the Airport throughout the forecast period. However, in contrast to global and national trends, single-engine piston aircraft are likely to continue to account for a significant share of activity at the Airport, as seen by the high share of single-engine based aircraft at the Airport. These trends were further confirmed by stakeholders at the Airport with the opening of the new U.S. CBP facility, as described in Section 3.2.2.1.

3.2.1.2 Socioeconomic Conditions

National and local socioeconomic conditions are often correlated with an airport's activity level. Section 3.3 includes analyses of the historical relationships between local and national socioeconomic variables and activity at MTH. As shown in **Table 3-10**, all socioeconomic variables evaluated in this report for Monroe County and the U.S. have increased since 2010 following a decline in 2008 as a result of the global economic recession. Overall, from CY 2006 to CY 2016, total U.S. GDP increased at a CAGR of 1.5 percent and total U.S. earnings increased at a CAGR of 1.4 percent. U.S. GDP and total U.S. earnings are forecast to increase at a CAGR of 2.0 percent and 2.1 percent respectively from CY 2016 to CY 2036, and all the local and national socioeconomic variables presented in Table 3-10 are forecast to increase throughout the forecast period.

Table 3-10 (1 of 2): Projections of Socioeconomic Variables for the United States and Monroe County, Florida

	MONROE COUNTY, FLORIDA				UNITED STATES			
CALENDAR YEAR	TOTAL PCPI[1/]	POPULATION (THOUSANDS)	TOTAL EARNINGS (MILLIONS)[1/]	TOTAL GRP (MILLIONS)[1/]	TOTAL PCPI[1/]	POPULATION (THOUSANDS)	TOTAL EARNINGS (MILLIONS)[1/]	TOTAL GDP (MILLIONS)[1/]
Historical								
2006	68,714	74	2,222	3,663	40,266	298,380	9,018,137	14,539,610
2007	71,339	73	2,226	3,734	41,010	301,231	9,136,922	14,820,650
2008	68,064	73	2,137	3,569	41,055	304,094	9,088,547	14,617,095
2009	59,684	73	2,020	3,442	39,376	306,771	8,743,722	14,320,115
2010	61,343	73	2,065	3,475	39,622	309,347	8,829,868	14,618,132
2011	61,913	74	2,060	3,415	40,762	311,719	9,017,120	14,792,272
2012	66,564	75	2,126	3,497	41,714	314,103	9,272,654	15,115,991
2013	62,382	76	2,120	3,520	41,348	316,427	9,412,786	15,415,698
2014	65,943	77	2,202	3,623	42,523	318,907	9,695,477	15,829,180
2015	67,934	77	2,363	3,890	43,924	321,421	10,110,889	16,501,908
2016	69,056	78	2,409	3,963	44,637	324,161	10,351,893	16,923,958
Forecasts								
2017	70,213	79	2,463	4,054	45,308	327,168	10,585,549	17,298,638
2018	71,374	79	2,517	4,146	45,984	330,207	10,819,511	17,673,837
2019	72,554	80	2,572	4,239	46,671	333,280	11,055,611	18,052,252
2020	73,761	81	2,628	4,333	47,378	336,383	11,295,148	18,436,030
2021	74,976	81	2,684	4,430	48,082	339,515	11,538,413	18,825,583
2022	76,213	82	2,742	4,528	48,803	342,677	11,785,672	19,221,367
2023	77,453	83	2,801	4,627	49,522	345,865	12,036,363	19,622,540
2024	78,684	83	2,859	4,726	50,231	349,081	12,289,617	20,027,671
2025	79,935	84	2,919	4,827	50,953	352,315	12,545,583	20,436,994
2026	68,714	74	2,222	3,663	40,266	298,380	9,018,137	14,539,610
2027	71,339	73	2,226	3,734	41,010	301,231	9,136,922	14,820,650

Table 3-10 (2 of 2): Projections of Socioeconomic Variables for the United States and Monroe County, Florida

	MONROE COUNTY, FLORIDA				UNITED STATES			
CALENDAR YEAR	TOTAL PCPI[1/]	POPULATION (THOUSANDS)	TOTAL EARNINGS (MILLIONS)[1/]	TOTAL GRP (MILLIONS)[1/]	TOTAL PCPI[1/]	POPULATION (THOUSANDS)	TOTAL EARNINGS (MILLIONS)[1/]	TOTAL GDP (MILLIONS)[1/]
2028	68,064	73	2,137	3,569	41,055	304,094	9,088,547	14,617,095
2029	59,684	73	2,020	3,442	39,376	306,771	8,743,722	14,320,115
2030	61,343	73	2,065	3,475	39,622	309,347	8,829,868	14,618,132
2031	61,913	74	2,060	3,415	40,762	311,719	9,017,120	14,792,272
2032	66,564	75	2,126	3,497	41,714	314,103	9,272,654	15,115,991
2033	62,382	76	2,120	3,520	41,348	316,427	9,412,786	15,415,698
2034	65,943	77	2,202	3,623	42,523	318,907	9,695,477	15,829,180
2035	67,934	77	2,363	3,890	43,924	321,421	10,110,889	16,501,908
2036	69,056	78	2,409	3,963	44,637	324,161	10,351,893	16,923,958
Compound Annual Growth Rate								
CY 2006–CY 2010	2.0%	1.1%	2.6%	2.2%	2.0%	0.8%	2.7%	2.5%
CY 2006–CY 2016	0.0%	0.6%	0.8%	0.8%	1.0%	0.8%	1.4%	1.5%
CY 2016–CY 2026	1.6%	0.8%	2.1%	2.2%	1.5%	0.9%	2.2%	2.1%
CY 2026–CY 2036	1.4%	0.7%	1.9%	1.9%	1.2%	0.9%	1.9%	1.9%
CY 2016–CY 2036	1.5%	0.8%	2.0%	2.1%	1.3%	0.9%	2.1%	2.0%

NOTES:

PCPI–Per Capita Personal Income

GRP–Gross Regional Product

GDP–Gross Domestic Product

CY – Calendar Year

1/ Economic data are adjusted for inflation.

SOURCE: Woods & Poole Economics, Inc., May 2017.
PREPARD BY: Ricondo & Associates, Inc.., May 2017.

3.2.1.3 Technological Shifts

According to the FAA drone registration database[9], the number of new registered drone pilots in 2017 is 711,670, a 34 percent increase from 469,836 in 2016. In Florida, drones, also referred to as unmanned aircraft systems (UAS), are often used for commercial and recreational purposes, such as real estate listings, water sport activities, etc. Furthermore, in 2015, the FAA authorized drones to be used for mosquito control in the Florida Keys, according to NBC news[10].

To help address increased use of drones, the FAA has developed tools such as B4UFLY, a free application that drone operators can download for guidance on operating drones safely around airport areas. Drones may positively or negatively impact activity at general aviation airports such as MTH. Increased use of drones could increase interest in aviation in general and lead to more people flying GA aircraft, increasing GA activity. Or drones may provide a substitute for flying aircraft (as in the case of mosquito control for example), leading to a decrease in GA activity.

3.2.2 LOCAL FACTORS

The airport itself is also a key contributor to the development of aviation activity. Airport improvements can help drive additional activity. Additionally, local tourism development and business prospects influence an airport's activity level. The geographical location of an airport also plays an important role in the type of travelers an airport attracts, such as tourists or business travelers.

3.2.2.1 Role of the Airport

The opening of the new United States CBP facility at MTH in April 2016 allows the Airport to process flights arriving from the Bahamas, Mexico, Cuba, and other international origins. According to data provided by the Airport, at the time of this report, a total of 170 piston aircraft and 210 jet aircraft were processed at this new facility in the 14 months since it opened. According to the National Business Aviation Association (NBAA)[11], the addition of this facility will potentially increase the number of business aviation flights to and from South America and the Caribbean. Similarly, airport stakeholders indicated that they have observed more piston and jet aircraft operations at MTH in 2017 as a result of the CBP facility opening.

3.2.2.2 Tourism

Marathon is 10-mile-long island located in the Florida Keys that includes amenities for scuba diving, snorkeling, fishing, and a variety of water sports according the Monroe County Tourist Development Council (TDC). The tourism industry generates aviation activities and benefits the Airport by attracting passengers. As shown in **Table 3-11,** the total annual visitors, excluding visitors arriving by cruise ship, to the Marathon Area increased at a CAGR of 18 percent from CY 2009 to CY 2014. Data in Table 3-11 were provided by the Greater

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9 Federal Aviation Administration, Drone Registration by City-State-Zip, 2016 - 2017.

10 NBC News, FAA Authorizes Drone Use for Mosquito Control in Florida Keys, http://www.nbcmiami.com/news/local/FAA-Authorizes-Drone-Use-for-Mosquito-Control-in-Florida-Keys-287336931.html (accessed July 2017)

11 https://www.nbaa.org/ops/intl/customs-regulatory/20160502-new-customs-facility-in-florida-keys-services-flights-from-cuba-caribbean.php (accessed June 2017)

Marathon Chamber of Commerce and are not available after CY 2014. Tourism in the Marathon Area is seasonal; according to data from Smith Travel Research hotel occupancy rates peak between February and April. The majority of visitors to Marathon stay overnight, with an average length of stay of just over eight days in CY 2016, according to a 2016 visitor profile survey conducted by the TDC.[12] However, according to the 2016 Visitor Profile Survey, approximately 75 percent of these visitors to Monroe County arrived by automobile.

Table 3-11: Annual Total Non-Cruise Ship Visitors Statistics in Marathon, Florida: CY 2009–CY 2014

	OVERNIGHT VISITORS					
CALENDAR YEAR	HOTEL/MOTEL/GUEST HOUSE	VACATION RENTAL	CAMPGROUND	TOTAL OVERNIGHT	DAY TRIP	TOTAL VISITS
2009	193,818	23,279	68,730	285,827	50,592	336,419
2010	234,006	38,733	113,355	386,094	68,339	454,433
2011	262,029	34,692	65,642	362,363	64,138	426,501
2012	497,313	17,853	59,797	574,963	101,768	676,731
2013	529,207	17,853	64,593	611,653	108,263	719,916
2014	545,400	33,200	65,500	644,100	114,000	758,200
Compound Annual Growth Rate						
CY 2009–CY 2014[1/]	23.0%	7.4%	(1.0%)	17.6%	17.6%	17.6%

NOTES:

CY – Calendar Year

1/ Data were not provided after 2014.

SOURCES: Greater Marathon Chamber of Commerce, April 2017; Smith Travel Research, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.3 Forecast Methodology Overview and Results

Various FAA approved forecasting techniques were explored to determine the preferred methodology for developing the Airport operations, based aircraft, and fleet mix forecasts. The forecast methodologies explored include market share analysis and socioeconomic regression analysis. In addition, operations per based aircraft analysis was considered for the based aircraft forecast. Each methodology is described in further detail below.

[12] Insights, Inc., 2016 TDC Visitor Profile Survey: County-wide Annual Summary by Quarter, January – December 2015/2016, http://www.monroecounty-fl.gov/DocumentCenter/Home/View/11911 (accessed August 2017).

3.3.1 MARKET SHARE ANALYSIS

Market share analysis compares local aviation activity to state, regional, or national aviation activity. This technique is used to identify the historical market shares of an airport relative to a larger area containing the airport (e.g., a state, region, or nation). The historical relationships are then used in conjunction with an independent forecast of the larger area to forecast activity at the airport. Market share analyses were conducted to explore the historical relationships between total operations at MTH and total GA operations at the statewide and national levels as reported in the 2016 FAA TAF published in January 2017.

The Airport's market share of total U.S. GA activity is shown in **Table 3-12**. This analysis showed an increasing share of operations at the Airport relative to the U.S.

When examining the historical relationship between total operations at MTH and total GA operations in Florida, the results indicated inconsistency and fluctuation in the MTH's market share of statewide GA operations, with an overall increasing trend, as shown in **Table 3-13**.

Table 3-12: Florida Keys Marathon International Airport Market Share of Total United States General Aviation Activity

CALENDAR YEAR[1/]	TOTAL MTH AIRPORT OEPRATIONS	TOTAL U.S. GENERAL AVIATION OPERATIONS	MTH SHARE OF OPERATIONS
2006	53,467	80,148,503	0.07%
2007	64,356	80,185,281	0.08%
2008	65,041	78,020,289	0.08%
2009	65,944	73,598,797	0.09%
2010	66,860	71,230,624	0.09%
2011	66,860	69,900,768	0.10%
2012	64,464	69,577,152	0.09%
2013	67,953	68,808,247	0.10%
2014	69,834	68,183,393	0.10%
2015	69,000	68,334,308	0.10%
2016	75,000	68,365,883	0.11%

NOTES:

MTH – Florida Keys Marathon International Airport ,CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP

1/ Total U.S. general aviation operations are from the 2016 Federal Aviation Administration Terminal Area Forecast and are on a Federal Fiscal Year basis.

SOURCES: FDOT FASP, 2017; Federal Aviation Administration, 2016 Terminal Area Forecast, January 2017; FDOT FASP, 2017; Ricondo & Associates, Inc., May 2017 (Analysis).

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Table 3-13: Florida Keys Marathon International Airport Market Share of Total Florida General Aviation Activity

CALENDAR YEAR[1/]	TOTAL MTH AIRPORT OEPRATIONS	FLORIDA TOTAL AIRPORT OPERATIONS	MTH SHARE OF OPERATIONS
2006	53,467	6,754,183	0.79%
2007	64,356	6,885,700	0.93%
2008	65,041	6,717,194	0.97%
2009	65,944	6,309,482	1.05%
2010	66,860	5,799,356	1.15%
2011	66,860	5,859,864	1.14%
2012	64,464	5,948,404	1.08%
2013	67,953	6,109,491	1.11%
2014	69,834	6,085,670	1.15%
2015	69,000	6,135,264	1.12%
2016[1/]	75,000	6,109,590	1.23%

NOTES:

MTH – Florida Keys Marathon International Airport, CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan
CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP

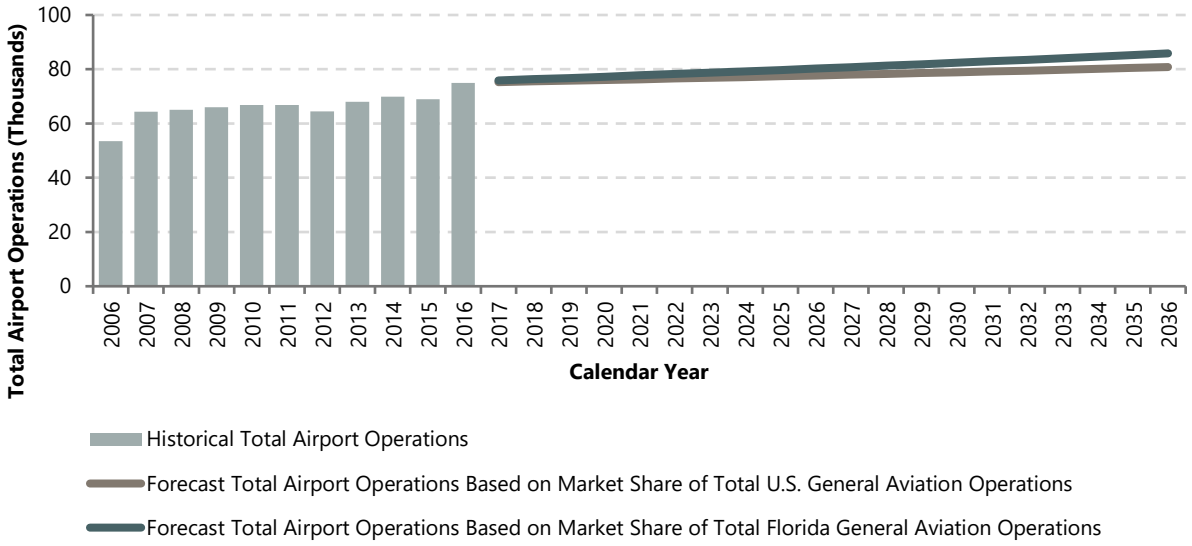
1/ Total Florida general aviation operations are from the 2016 Federal Aviation Administration Terminal Area Forecast and are on a Federal Fiscal Year basis.

SOURCES: Federal Aviation Administration, 2016 Terminal Area Forecast, January 2017; Ricondo & Associates, Inc., May 2017 (Analysis).

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Assuming that the Airport's market share of total GA operations in Florida and the U.S. remained at it CY 2016 levels throughout the forecast period, the total annual forecast operations at the Airport would be between approximately 81,000 and 86,000 in CY 2036, as presented on **Exhibit 3-7**. The CAGR from CY 2016 to CY 2036 for total operations at the Airport would be 0.4 percent based on the Airport's current market share of total U.S. GA operations applied to forecast total U.S. GA operations and 0.7 percent based on the Airport's current market share of total Florida GA operations applied to forecast total Florida GA operations. These growth rates are lower than the projected growth rate in the 2016 FAA TAF and the FDOT FASP forecast for the Airport and are also lower than the projected growth in the preferred forecast. Therefore, market share analysis was not chosen as the preferred forecast methodology.

Exhibit 3-7: Historical and Forecast Total Operations Based on Market Share Analyses



NOTES: CY 2015-2016 MTH operations are based on data from the Airport; CY 2006-2014 MTH operations are from the FDOT FASP. Total Florida and U.S. general aviation operations are from the 2016 Federal Aviation Administration Terminal Area Forecast and are on a Federal Fiscal Year basis.

SOURCES: Federal Aviation Administration, 2016 Terminal Area Forecast, January 2017; Ricondo & Associates, Inc., May 2017 (Analysis).
PREPARED BY: Ricondo & Associates, Inc., August 2017.

3.3.2 SOCIOECONOMIC REGRESSION ANALYSIS

Socioeconomic regression analysis is used to identify relationships between aviation demand (called the dependent variable) and one or more socioeconomic variables (called the independent variables). The relationships identified by the regression analyses (in the form of a mathematical equation) can then be applied to independent forecasts of socioeconomic variables to forecast the total airport demand.

The outputs of the socioeconomic regression analyses were evaluated based on certain criteria. A common way to determine the quality of the regression model is by examining the R-squared value, which is a measure of how well the independent variables explain the changes in the dependent variable from period to period. For the purpose of these analyses, the independent variables have been considered strongly correlated with the dependent variable when the R-squared value is more than 70.0 percent. However, R-squared is not the only output used to determine the appropriateness of a regression model. The direction of the coefficient also plays an important role in determining if the relationship makes sense in a given context. For example, in aviation activity forecasts, a positive relationship is expected between socioeconomic growth and aviation activity growth. A negative relationship, in this context, will cause the forecast operations to decrease below zero over time, which is not realistic, requiring the need for further forecast techniques to be explored.

Local and national socioeconomic data were sourced from Woods & Poole Economics, Inc. All economic data are adjusted for inflation and are equivalent to 2009 U.S. dollars, and linear regression analyses were conducted between all socioeconomic variables individually. The local socioeconomic variables were for

Monroe County, Florida, which includes the Florida Keys and a portion of southwest Florida that contains Everglades National Park. As shown in **Table 3-14**, regression analyses using local socioeconomic variables resulted in R-squared values less than 70.0 percent. As such, these models were not considered any further. National socioeconomic variables, however, exhibited a stronger correlation with total MTH operations. In particular, U.S. population, total personal income, total GDP, and employment have the strongest correlation with total MTH operations among the variables explored.

Regression analysis based on national socioeconomic variables was subsequently used to forecast total operations for the Airport. This analysis concludes that growth in national socioeconomic variables such as population, personal income, total GDP, and employment coincides with an increase in aircraft operations at MTH and vice versa.

Exhibit 3-8 depicts the relationship between historical aircraft operations at the Airport and selected socioeconomic variables. Total operations and socioeconomic variables (e.g., national population, national personal income, national employment, and national GDP) have historically followed similar trends.

Table 3-14: Socioeconomic Regression Analysis Results

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	REGRESSION COEFFICIENT OF VARIABLE	R-SQUARED VALUE 1/
Total MTH Annual Operations	**National Population**	0.4	**84.6%**
	National Total Personal Income	0.0	**80.5%**
	National GDP	0.0	**78.8%**
	National Employment	0.5	**76.6%**
	National PCPI	1.7	74.2%
	National Total Earnings	0.0	73.3%
	Local GRP	14.5	65.0%
	Local Total Personal Income	8.2	63.9%
	Local Employment	1,438.7	63.4%
	Local PCPI	0.5	61.2%
	Local Total Earnings	24.3	59.2%
	Local Population	-1,427.9	32.2%

NOTES:
Local socioeconomic variables represent Monroe County, Florida.
All economic data are adjusted for inflation.
PCPI – Per Capita Personal Income
GDP – Gross Domestic Product
GRP – Gross Regional Product

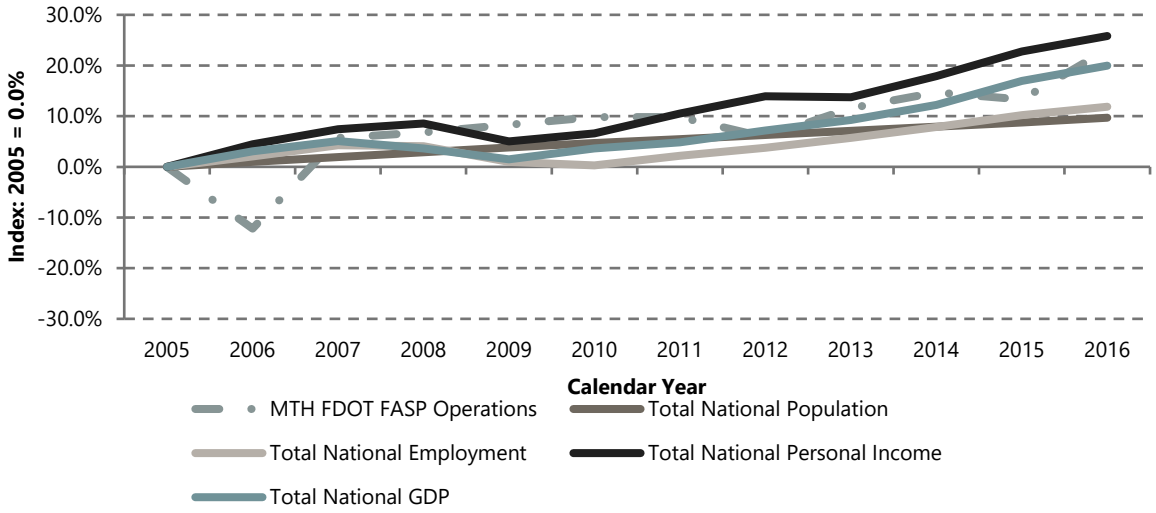
MTH – Florida Keys Marathon International Airport, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

1/ Adjusted R-squared values are shown, which allow direct comparison between different regression results. Adjusted R-squared values greater than or equal to 70.0 are generally considered indications of acceptable model fit. Adjusted R-squared values greater than 75.0 are indicated in bold.

SOURCES: Monroe County Airports Department, April 2017; FDOT FASP, 2017; Woods & Poole, Inc., 2017; Ricondo & Associates, Inc., May 2017 (Analysis).

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-8: Socioeconomic Variables and Total Florida Keys Marathon International Airport Operations



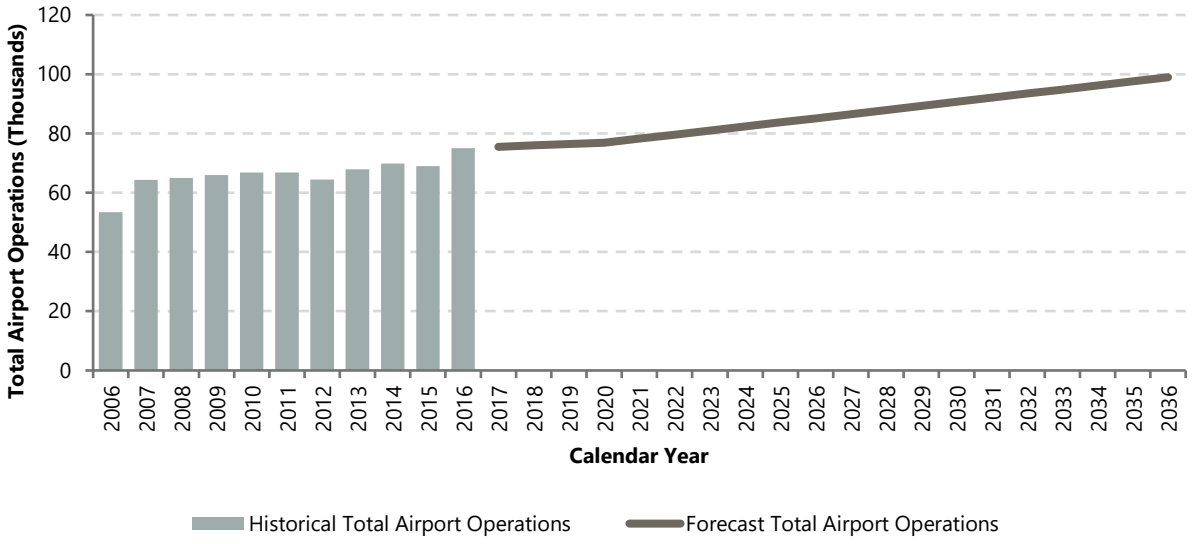
NOTES: MTH – Florida Keys Marathon International Airport, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan
GDP – Gross Domestic Product
SOURCES: FDOT FASP, 2017; Woods & Poole, Inc., 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.3.3 TOTAL AIRPORT OPERATIONS FORECAST RESULTS

The output of the socioeconomic regression analyses were used to forecast total aircraft operations at MTH as explained in Section 3.3.2. The relationship between socioeconomic variables and activity at the Airport resulted in a projected decrease in operations in CY 2017 and CY 2018 compared to CY 2016. However, since total operations at the Airport are not expected to decrease over the next two years, growth from CY 2016 to CY 2020 was adjusted to reflect increasing operations over the next four years. The projected total operations were further segmented by local and itinerant activities consistent with the shares reflected in the FAA TAF.

As depicted on **Exhibit 3-9,** total aircraft operations are forecast to increase from 75,000 in CY 2016 to 98,978 in CY 2036, a CAGR of 1.4 percent. Consistent with the TAF, the relative shares of operations by type at the Airport are forecast to remain unchanged from CY 2016, and both itinerant and local operations are forecast to grow at a CAGR of 1.4 percent. As shown in **Table 3-15,** military operations consistently comprise the lowest share of total operations and 6.4 percent of the total operations are forecast to be air carrier and air taxi operations in CY 2036.

Exhibit 3-9: Historical and Forecast Total Operations



NOTES:

CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

CY 2015 and CY2016 operations are estimates provided by the Airport.

SOURCES: FDOT FASP, 2017; 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., May 2017 (Forecast); Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., August 2017.

Table 3-15: Historical and Forecast Total Operations

CALENDAR YEAR	AIR CARRIER/ AIR TAXI	ITINERANT GENERAL AVIATION	ITINERANT MILITARY	ITINERANT TOTAL	LOCAL CIVIL (GENERAL AVIATION)	LOCAL MILITARY	LOCAL TOTAL	TOTAL AIRPORT OPERATIONS
Historical								
2006	3,172	22,071	134	25,377	28,090	0	28,090	53,467
2007	3,818	26,569	154	30,541	33,815	0	33,815	64,356
2008	1,599	27,806	247	29,652	35,389	0	35,389	65,041
2009	3,907	27,226	158	31,291	34,653	0	34,653	65,944
2010	3,962	27,604	160	31,726	35,134	0	35,134	66,860
2011	3,958	27,609	154	31,721	35,139	0	35,139	66,860
2012	3,816	26,620	148	30,584	33,880	0	33,880	64,464
2013	4,360	27,798	415	32,573	35,380	0	35,380	67,953
2014	4,480	28,568	426	33,474	36,360	0	36,360	69,834
2015	4,426	28,227	420	33,073	35,927	0	35,927	69,000
2016	4,809	30,698	420	35,927	39,073	0	39,073	75,000
Forecast								
2017	4,841	30,893	420	36,154	39,320	0	39,320	75,474
2018	4,871	31,090	420	36,381	39,571	0	39,571	75,952
2019	4,902	31,287	420	36,609	39,823	0	39,823	76,432
2020	4,934	31,486	420	36,840	40,076	0	40,076	76,916
2021	5,019	32,035	420	37,474	40,775	0	40,775	78,249
2022	5,106	32,593	420	38,119	41,485	0	41,485	79,604
2023	5,195	33,156	420	38,771	42,201	0	42,201	80,972
2024	5,283	33,722	420	39,425	42,922	0	42,922	82,347
2025	5,373	34,294	420	40,087	43,650	0	43,650	83,737
2026	5,463	34,867	420	40,750	44,380	0	44,380	85,130
2027	5,552	35,441	420	41,413	45,110	0	45,110	86,523
2028	5,643	36,016	420	42,079	45,841	0	45,841	87,920
2029	5,733	36,592	420	42,745	46,575	0	46,575	89,320
2030	5,823	37,167	420	43,410	47,307	0	47,307	90,717
2031	5,913	37,735	420	44,068	48,030	0	48,030	92,098
2032	6,000	38,301	420	44,721	48,750	0	48,750	93,471
2033	6,089	38,865	420	45,374	49,468	0	49,468	94,842
2034	6,177	39,430	420	46,027	50,187	0	50,187	96,214
2035	6,267	39,999	420	46,686	50,911	0	50,911	97,597
2036	6,356	40,567	420	47,343	51,635	0	51,635	98,978
Compound Annual Growth Rate								
CY 2006–CY 2016	4.2%	3.4%	12.1%	3.5%	3.4%	-	3.4%	3.4%
CY 2016–CY 2026	1.3%	1.3%	0.0%	1.3%	1.3%	-	1.3%	1.3%
CY 2026–CY 2036	1.5%	1.5%	0.0%	1.5%	1.5%	-	1.5%	1.5%
CY 2016–CY 2036	1.4%	1.4%	0.0%	1.4%	1.4%	-	1.4%	1.4%

NOTES: FDOT FASP – Florida Department of Transportation Florida Aviation System Plan, CY – Calendar Year

SOURCES: FDOT FASP, 2017; Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., May 2017 (Forecast); Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.3.4 AIRCRAFT FLEET MIX

Federal Aviation Administration TFMSC data were analyzed to understand fleet mix trends at the Airport, as shown in **Table 3-16**. As, these data do not capture all operations, including most conducted under Visual Flight Rules (VFR) and some conducted under Instrument Flight Rules (IFR) not captured by the FAA's enroute computers, supplemental data were provided by Marathon Aviation Associates, a Fixed Base Operator at MTH. The supplemental data provided fleet mix data for 2016 based on transaction data from fuel sales and facility use fees. These data have been used to augment TFMSC data to inform the baseline fleet mix.

The operational fleet mix for CY 2016 was determined by applying the relative share of operations by each engine type in the fleet mix data available for 2016 to total operations. The ratio between each engine type and total operations in the base year were then used to forecast the proportion of operations for each engine type from CY 2017 to CY 2036 as shown in **Table 3-17**. The proportion of single-engine piston and jet aircraft operations were forecast to increase over the forecast period based on local and national trends described in Section 3.2.1.1 and Section 3.2.2.1.

Table 3-16: Traffic Flow Management System Counts Year-to-Date Fleet Mix Comparison

ENGINE TYPE	TFMSC JANUARY 2016 – APRIL 2016	SHARE	TFMSC 1/ JANUARY 2017 – APRIL 2017	SHARE
Single-Engine Piston	789	23.4%	995	26.0%
Multi-Engine Piston	301	8.9%	397	10.4%
Single-Engine Turboprop	509	15.1%	532	13.9%
Multi-Engine Turboprop	458	13.6%	547	14.3%
Jet	1,291	38.3%	1,327	34.6%
Helicopter	3	0.1%	6	0.2%
Unknown	16	0.5%	31	0.8%
Total	3,367	100.0%	3,835	100.0%

NOTES:

TFMSC – Traffic Flow Management System Counts

1/ April 2017 is the latest month for which TFMSC data are available.

SOURCES: Federal Aviation Administration, TFMSC, June 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

As presented in Table 3-17 and **Exhibit 3-10**, single-engine piston aircraft operations comprise the highest share of operations throughout the forecast period and are projected to increase at a CAGR of 1.6 percent, consistent with local trends. Jet aircraft remain the lowest share of total operations through 2036. Jet aircraft operations are forecast to increase at a CAGR of 2.4 percent, a higher rate than single-engine piston aircraft operations and slightly above the FAA Aerospace Forecast CAGR of 2.3 percent during the same period. Operations by aircraft with other engine types were forecast to decrease in shares proportionally to their base year share.

Table 3-17 also shows the most frequently operated aircraft for each engine type. For single-engine piston aircraft, the most common aircraft are Cirrus SR22, Cessna C-172, and Piper PA32. The most frequently

operated jet aircraft are Cessna Citation Excel C56X, Cessna Citation II C550, and Cessna 525 CitationJet aircraft.

Table 3-17: Historical and Forecast Total Operations by Fleet Mix

CALENDAR YEAR	SINGLE-ENGINE PISTON	MULTI-ENGINE PISTON	SINGLE-ENGINE TURBOPROP	MULTI-ENGINE TURBOPROP	JET	HELICOPTER	TOTAL
Historical							
2016	27,594	7,263	7,378	7,303	16,692	8,771	75,000[1/]
2016 Share [1/]	36.8%	9.7%	9.8%	9.7%	22.3%	11.7%	100.0%
Forecast							
2017	27,814	7,255	7,371	7,295	16,977	8,762	75,474
2018	28,036	7,248	7,364	7,288	17,264	8,752	75,952
2019	28,259	7,240	7,355	7,281	17,554	8,743	76,432
2020	28,485	7,232	7,347	7,272	17,848	8,732	76,916
2021	29,026	7,302	7,418	7,342	18,343	8,818	78,249
2022	29,577	7,372	7,490	7,413	18,849	8,903	79,604
2023	30,134	7,442	7,560	7,483	19,365	8,988	80,972
2024	30,695	7,510	7,630	7,552	19,890	9,070	82,347
2025	31,264	7,578	7,699	7,620	20,424	9,152	83,737
2026	31,835	7,644	7,766	7,687	20,966	9,232	85,130
2027	32,408	7,709	7,831	7,752	21,514	9,309	86,523
2028	32,985	7,771	7,895	7,814	22,070	9,385	87,920
2029	33,564	7,832	7,957	7,876	22,633	9,458	89,320
2030	34,144	7,891	8,016	7,935	23,202	9,529	90,717
2031	34,719	7,946	8,072	7,990	23,774	9,597	92,098
2032	35,293	7,999	8,126	8,043	24,350	9,660	93,471
2033	35,868	8,049	8,177	8,094	24,932	9,722	94,842
2034	36,445	8,098	8,227	8,143	25,521	9,780	96,214
2035	37,028	8,146	8,275	8,191	26,120	9,837	97,597
2036	37,612	8,191	8,322	8,237	26,724	9,892	98,978
2036 Share	38.0%	8.3%	8.4%	8.3%	27.0%	10.0%	100%
Compound Annual Growth Rate							
CY 2016–CY 2036	1.6%	0.6%	0.6%	0.6%	2.4%	0.6%	1.4%
Representative Aircraft	Cirrus SR22, Cessna C172, Piper PA32	Beech 55, Diamond DA42	Cessna 208 Caravan, Pilatus PC-12	Beech 200 Super King, Beech King Air 90	Cessna Citation Excel C56X, Citation II C550, Cessna 525 CitationJet	Eurocopter EC-135	

NOTES:

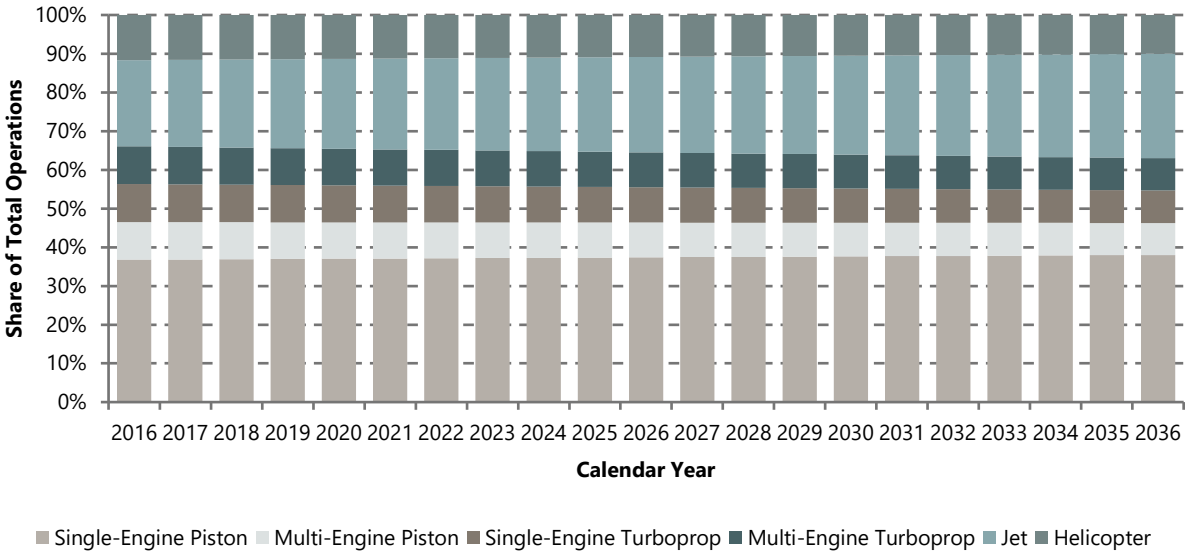
CY – Calendar Year, MTH – Florida Keys Marathon International Airport

1/ Total CY 2016 operations are based on estimates provided by the Airport.

SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-10: Historical and Forecast Total Operations by Fleet Mix



NOTES: CY 2016 operations are estimates provided by the Airport.

MTH – Florida Keys Marathon International Airport

SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

PREPARED BY: Ricondo & Associates, Inc., May 2017.

3.3.5 CRITICAL AIRCRAFT

The critical aircraft at the Airport is currently an Aircraft Approach Category (AAC) B and Airplane Design Group (ADG) II aircraft (e.g., Cessna Citation Excel C56X or Cessna Citation II C550). The FAA defines the critical aircraft as "the most demanding aircraft type or grouping of aircraft with similar characteristics that make regular use of the airport. Regular use is defined as 500 annual operations.[13]"

In 2016, approximately 56.6 percent of operations at the Airport were ADG I aircraft, 42.8 percent were ADG II, 0.3 percent were ADG III, and 0.3 percent of operations were ADG IV aircraft. The ADG I aircraft account for approximately 44,420 annual operations and representative ADG II aircraft account for approximately 33,120 annual operations at MTH. ADG IV operations were primarily related to military activities conducted by C-130 Hercules aircraft.

The critical aircraft is projected to remain a B-II aircraft throughout the forecast period.

3.3.6 BASED AIRCRAFT PROJECTIONS

This section presents the methodology and results of the projections of based aircraft at the Airport.

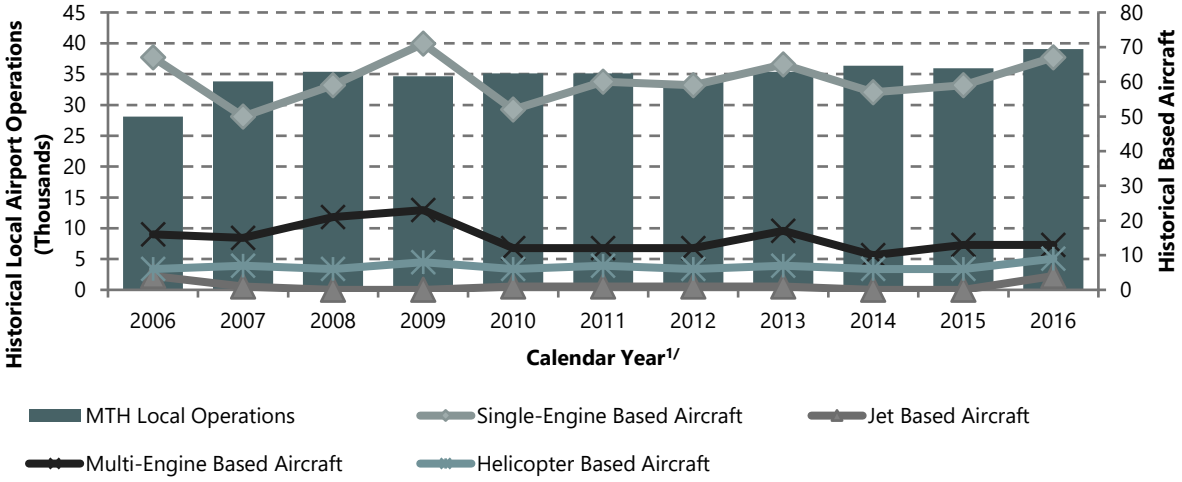
[13] Federal Aviation Administration, Advisory Circular 150/5000-17, June 2017.

3.3.6.1 Operations per Based Aircraft

Historically, based aircraft have shared similar trends with both total and local operations at the Airport. As depicted on **Exhibit 3-11**, local operations at MTH have increased from CY 2010 through CY 2016, displaying similar trends as single-engine and jet-engine based aircraft. A similar relationship between total operations at MTH and based aircraft is also depicted on **Exhibit 3-12**.

Due to the similar trends, the ratio of total based aircraft to total local operations in CY 2016 at MTH was used to project total based aircraft from CY 2017 to CY 2036. Subsequently, the relative shares of based aircraft by engine type from the 2016 based aircraft data were applied to the total forecast based aircraft to project based aircraft for each engine type.

Exhibit 3-11: Florida Keys Marathon International Airport Based Aircraft and Local Airport Operations



NOTES:

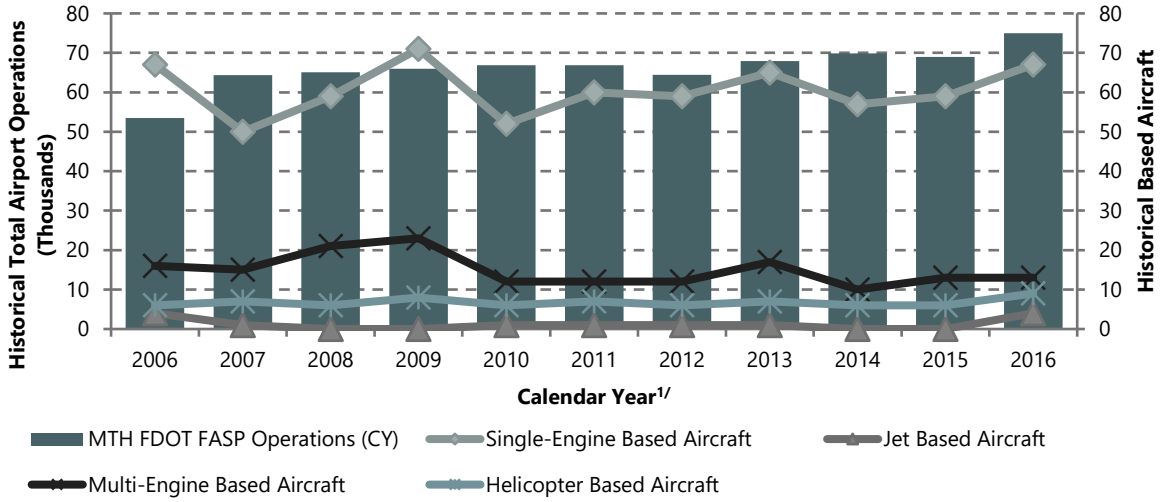
CY – Calendar Year, MTH – Florida Keys Marathon International Airport

1/ Historical MTH based aircraft from 2006 through 2015 are in Fiscal Year; 2016 based aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year. CY 2015 – CY 2016 total operations values are provided by the Airport.

SOURCES: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-12: Florida Keys Marathon International Airport Based Aircraft and Total Operations



NOTES:

CY – Calendar Year, MTH – Florida Keys Marathon International Airport, TAF – Terminal Area Forecast

1/ Historical MTH based aircraft from 2006 through 2015 are in Fiscal Year; 2016 based aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year; CY 2015 – CY 2016 total operations values are provided by the Airport.

SOURCES: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

As shown in **Table 3-18**, the total based aircraft at the Airport are projected to grow at a CAGR of 1.4 percent, from 94 in CY 2016 to 123 in CY 2036. Historically, single-engine aircraft have represented the highest share of total based aircraft, which is forecast to continue through CY 2036. Jet aircraft are forecast to be the slowest growing category of based aircraft and also the lowest share of total based aircraft at MTH.

Single-engine based aircraft are forecast to increase at a CAGR of 1.7 percent in the 2016 FAA TAF, a faster rate than forecast. Multi-engine based aircraft, however, are projected to increase at a CAGR of 1.4 percent, compared to a CAGR of 4.4 percent in the FAA TAF. While jet based aircraft have fluctuated in the past at the Airport, continued socioeconomic growth in the region and prevailing the larger trends in the general aviation fleet described in Section 3.2.1.1 are expected to contribute to growth in jet operations and based aircraft at the Airport. Jet based aircraft are projected to increase at a CAGR of 1.1 percent throughout the forecast period. In contrast, the 2016 FAA TAF does not forecast based jet aircraft throughout the forecast period at MTH because there were no jet aircraft based at the Airport at the time the 2016 FAA TAF was conducted. Total based aircraft are forecast to be 123 in CY 2036 generally consistent with the FAA TAF. The projected based aircraft are presented graphically on **Exhibit 3-13**.

Table 3-18: Historical and Forecast Based Aircraft

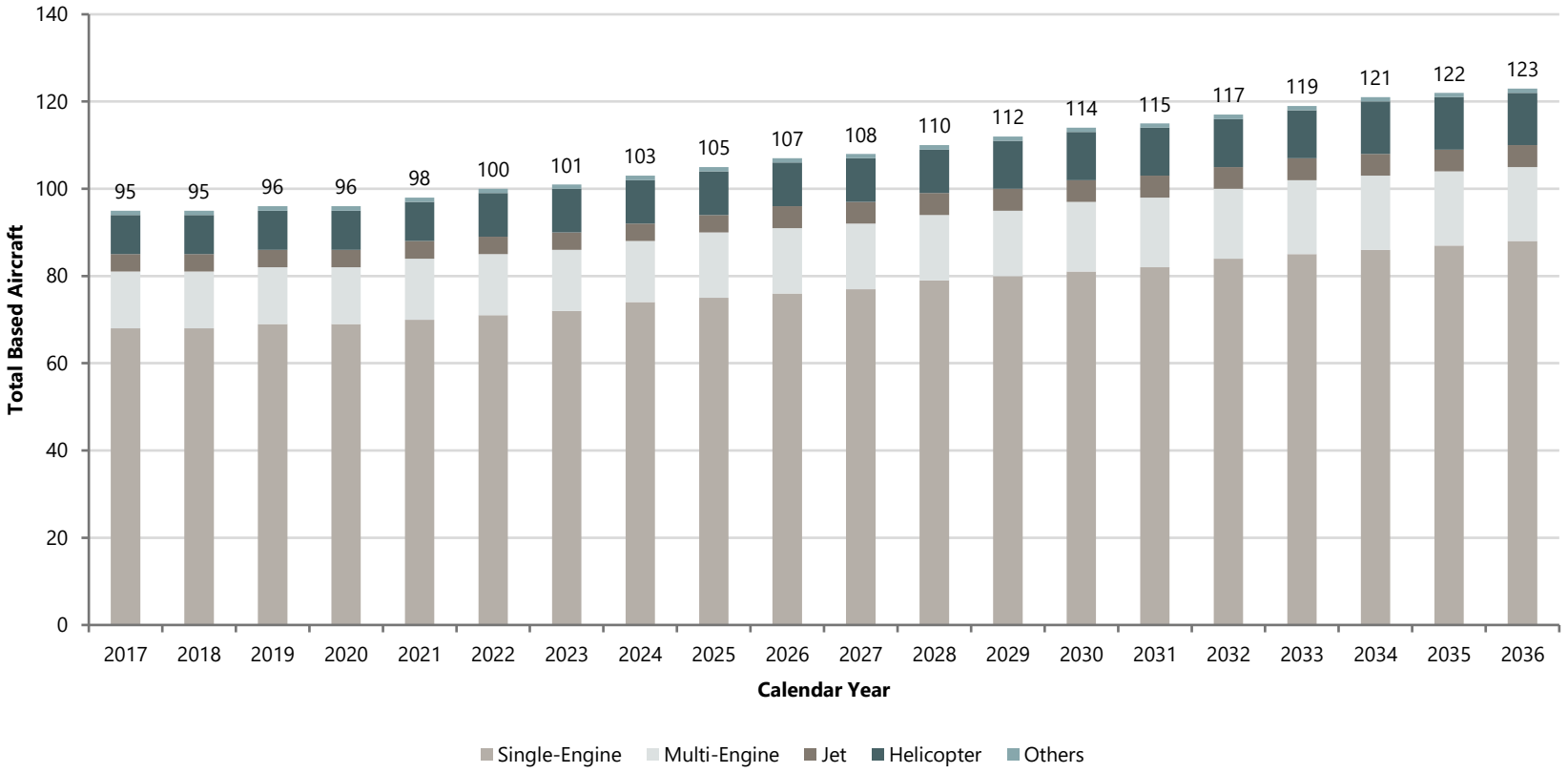
	SINGLE-ENGINE		MULTI-ENGINE		JET		HELICOPTER		OTHER		TOTAL	
CALENDAR YEAR	MPU FORECAST	2016 FAA TAF	MPU FORECAST	2016 FAA TAF	MPU FORECAST	2016 FAA TAF	MPU FORECAST	2016 FAA TAF	MPU FORECAST	2016 FAA TAF	MPU FORECAST	2016 FAA TAF
Historical												
2016	67	60	13	14	4	0	9	6	1	0	94	80
Forecast												
2017	68	61	13	15	4	0	9	6	1	0	92	82
2018	68	63	13	16	4	0	9	6	1	0	93	85
2019	69	64	13	16	4	0	9	6	1	0	95	86
2020	69	66	13	17	4	0	9	6	1	0	96	89
2021	70	67	14	18	4	0	9	6	1	0	98	91
2022	71	69	14	19	4	0	10	6	1	0	100	94
2023	72	71	14	20	4	0	10	6	1	0	101	97
2024	74	72	14	21	4	0	10	6	1	0	103	99
2025	75	73	15	22	4	0	10	6	1	0	105	101
2026	76	74	15	23	5	0	10	6	1	0	107	103
2027	77	75	15	24	5	0	10	6	1	0	108	105
2028	79	76	15	25	5	0	10	6	1	0	110	107
2029	80	77	15	26	5	0	11	6	1	0	112	109
2030	81	78	16	27	5	0	11	6	1	0	114	111
2031	82	79	16	28	5	0	11	6	1	0	115	113
2032	84	80	16	29	5	0	11	6	1	0	117	115
2033	85	81	17	30	5	0	11	6	1	0	119	117
2034	86	82	17	31	5	0	12	6	1	0	121	119
2035	87	83	17	32	5	0	12	6	1	0	122	121
2036	88	84	17	33	5	0	12	6	1	0	123	123
Compound Annual Growth Rate												
CY 2016–CY 2026	1.3%	2.1%	1.4%	5.1%	2.3%	0.0%	1.1%	0.0%	1	0.0%	1.3%	2.6%
CY 2026–CY 2036	1.5%	1.3%	1.3%	3.7%	0.0%	0.0%	1.8%	0.0%	1	0.0%	1.4%	1.8%
CY 2016–CY 2036	1.4%	1.7%	1.4%	4.4%	1.1%	0.0%	1.4%	0.0%	1	0.0%	1.4%	2.2%

NOTES: CY – Calendar Year, MPU – Master Plan Update, FAA TAF – Federal Aviation Administration Terminal Area Forecast

SOURCES: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., May 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

Exhibit 3-13: Forecast Based Aircraft



SOURCES: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., May 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

PREPARED BY: Ricondo & Associates, Inc., May 2017.

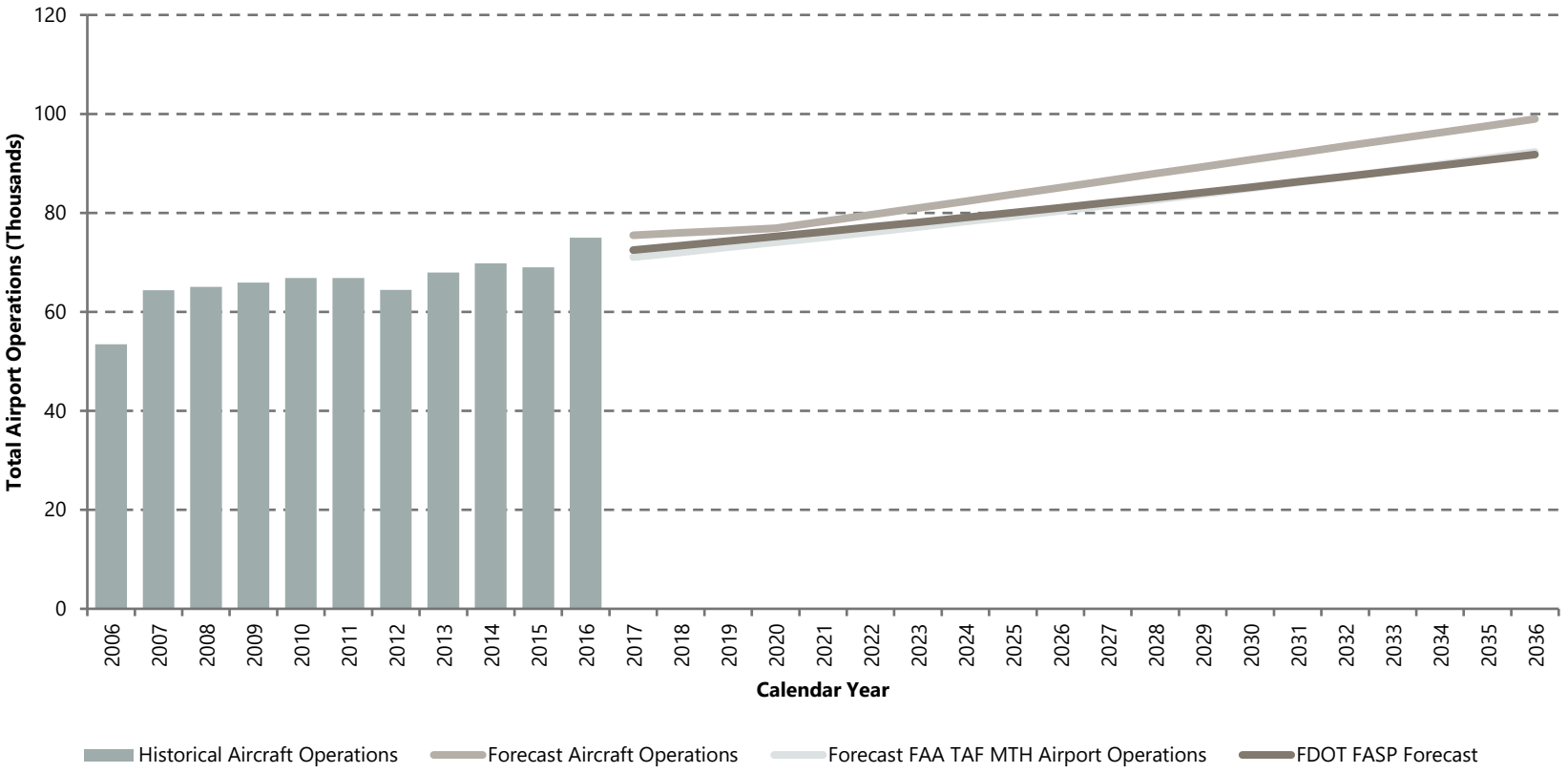
3.3.7 COMPARISONS WITH OTHER FORECASTS

Total aircraft operations at MTH increased at a CAGR of 3.4 percent from CY 2006 through CY 2016 and are forecast to grow at a CAGR of 1.4 percent throughout the forecast period. This is slightly higher than both the 2016 FAA TAF and 2015 Florida Department of Transportation Florida Aviation System Plan forecast, which, when calculated from the same base of operations in CY 2016, forecast operations to grow at a CAGR of 1.0 percent through 2036 as depicted on **Exhibit 3-14**.

The maximum forecast variance from the 2016 FAA TAF is 4.6 percent over 5 years and 6.1 percent over 10 years. The baseline master plan forecast remains within the acceptable variance specified by the FAA (i.e., within 10 percent over 5 years and within 15 percent over 10 years),[14] as shown in **Table 3-19**.

[14] Forecast tolerances are defined in Federal Aviation Administration, Advisory Circular 150/5070-6B, *Airport Master Plans*.

Exhibit 3-14: Historical and Forecast Total Operations: Comparison to Other Forecasts



NOTES:

FDOT FASP – Florida Department of Transportation Florida Aviation System Plan, CY – Calendar Year, FAA TAF – Federal Aviation Administration Terminal Area Forecast, MTH – Florida Keys Marathon International Airport

CY 2015-2016 operations are estimates provided by the Airport; CY 2035 – CY 2036 FDOT FASP are estimated values; FAA TAF Airport operations are in fiscal year.

SOURCES: FDOT FASP, 2017; 2017 Woods & Poole Economics, Inc., May 2017; U.S. Department of Transportation, Form T-100, April 2017, Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

PREPARED BY: Ricondo & Associates, Inc., August 2017.

Table 3-19: Forecast Total Operations Variance from Federal Aviation Administration Terminal Area Forecast

	MTH MPU BASELINE FORECAST		2016 FAA TAF
CALENDAR YEAR[1/]	FORECAST OPERATIONS	VARIANCE FROM TAF[1/]	FORECAST OPERATIONS
2017	75,474	6.2%	71,065
2018	75,952	5.4%	72,048
2019	76,432	4.6%	73,044
2020	76,916	3.9%	74,054
2021	78,249	4.2%	75,075
2022	79,604	4.6%	76,115
2023	80,972	4.9%	77,168
2024	82,347	5.3%	78,235
2025	83,737	5.6%	79,320
2026	85,130	5.9%	80,419
2027	86,523	6.1%	81,536
2028	87,920	6.4%	82,667
2029	89,320	6.6%	83,812
2030	90,717	6.8%	84,975
2031	92,098	6.9%	86,155
2032	93,471	7.0%	87,351
2033	94,842	7.1%	88,565
2034	96,214	7.1%	89,795
2035	97,597	7.2%	91,042
2036	98,978	7.2%	92,308

NOTES:

MPU – Master Plan Update, FAA TAF – Federal Aviation Administration Terminal Area Forecast, MTH – Florida Keys Marathon International Airport

Acceptable variance is less than 10 percent in the 5-year forecast period and less than 15 percent in the 10-year forecast period.

1/ FAA TAF Forecast operations are in Fiscal Year;

SOURCES: Federal Aviation Administration, Terminal Area Forecast, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).
PREPARED BY: Ricondo & Associates, Inc., August 2017.

Appendix A MTH Forecast Summary

Table A-1 includes data provided for internal FAA review. Data are presented in a template provided in the document *Forecasting Aviation Activity by Airport*.[1]

[1] GRA, Incorporated, *Forecasting Aviation Activity by Airport*, July 2001.

Table A-1: Florida Keys Marathon International Airport Forecast Summary

	A. FORECAST LEVELS AND GROWTH RATES					AVERAGE ANNUAL COMPOUND GROWTH RATES			
BASE YEAR	**BASE YEAR LEVEL**	**BASE YEAR + 1 YEAR**	**BASE YEAR + 5 YEARS**	**BASE YEAR + 10 YEARS**	**BASE YEAR + 20 YEARS**	**BASE YEAR + 1 YEAR**	**BASE YEAR + 5 YEARS**	**BASE YEAR + 10 YEARS**	**BASE YEAR + 20 YEARS**
CY 2016	**CY 2016**	**CY 2017**	**CY 2021**	**CY 2026**	**CY 2036**	**CY 2017**	**CY 2021**	**CY 2026**	**CY 2036**
OPERATIONS									
Itinerant									
Air Carrier/Air Taxi[1/]	4,809	4,841	5,019	5,463	6,356	0.7%	0.9%	1.3%	1.4%
General Aviation	30,698	30,893	32,035	34,867	40,567	0.6%	0.9%	1.3%	1.4%
Military	420	420	420	420	420	0.0%	0.0%	0.0%	0.0%
Local									
General Aviation	39,073	39,320	40,775	44,380	51,635	0.6%	0.9%	1.3%	1.4%
Military	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Total Operations	**75,000**	**75,474**	**78,249**	**85,130**	**98,978**	**0.6%**	**0.9%**	**1.3%**	**1.4%**

NOTES:

CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

1/ Air carrier operations are defined by the United States Department of Transportation as being operations carrying passengers or cargo on aircraft with more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Air taxi operations are defined to be operations transporting passengers or cargo on aircraft with no more than 30 seats and a maximum payload capacity of at most 7,500 pounds.

SOURCES: FDOT FASP, 2017; 2017 Woods & Poole Economics, Inc., May 2017; April 2017, Ricondo & Associates, Inc., May 2017 (Forecast); Monroe County Airports Department, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

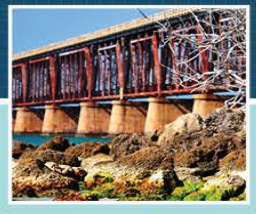
Appendix B Presentation of the Forecast Aviation Activity to the Federal Aviation Administration

Appendix B contains slides from the presentation of the forecast given to the FAA Airport District Office in Orlando at 10:00 EDT on Tuesday, July 18, 2017.

Florida Keys Marathon Airport

Forecast of Aviation Activity

Historical Trend and Forecast Discussions
June 20, 2017



JACOBS

RICONDO & ASSOCIATES

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Presentation Objectives

1. Present the Master Plan Forecast process
   - Planning Horizon: 2016 – 2036
   - Data sources used
2. Discuss the national and local trend of the aviation industry
3. Review forecast methodologies
   - Socioeconomic Regression Analyses
   - Operations per based aircraft
   - Market Share Analyses
   - Trend Analyses
4. Present forecast results/deliverables
   - Annual Aircraft Operations
     - Annual General Aviation (GA) Operations (Local vs. Itinerant)
   - Annual Fleet Mix Operations by Aircraft Types
   - Based Aircraft Totals
   - Based Aircraft by Type
5. Discuss forecast results and next steps

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Presentation Agenda

- Section 1: Master Plan Forecast Process
- Section 2: National and Local Trends
- Section 3: Airport Activity Forecasts
- Section 4: Comparison to Other Forecasts
- Section 5: Additional Considerations/Discussions

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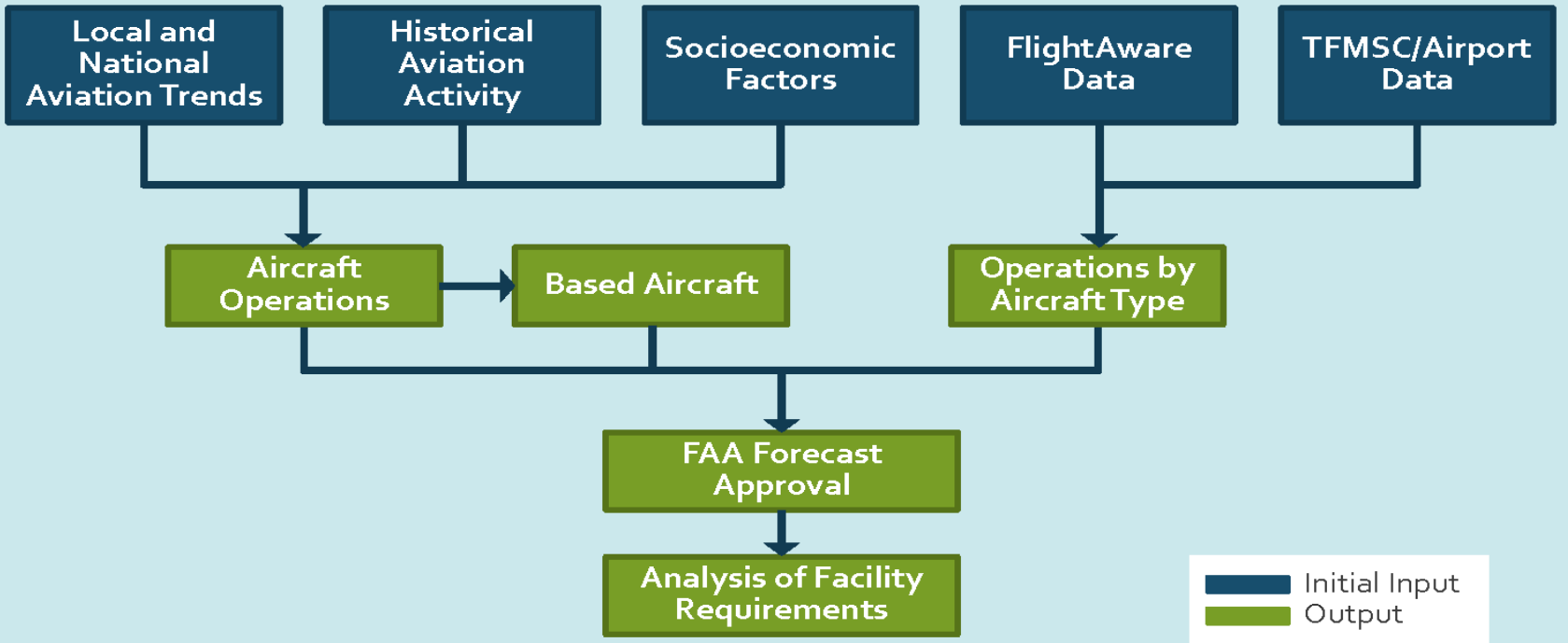
Section One

MASTER PLAN FORECAST PROCESS

The Master Plan Forecast Development Process



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Data Sources

- MTH historical operations from the Florida Department of Transportation (FDOT) Florida Aviation System Plan (FASP)
- 2015 – 2016 total airport operations at MTH provided by Monroe County Department of Airports
- April 2017 based aircraft data provided by Monroe County Department of Airports
- Fleet mix data from Traffic Flow Management System Counts (TFMSC)
- 2016 fleet mix data provided by Marathon Aviation Associates
- Socioeconomic data provided by Woods & Poole, Inc.

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Data Sources

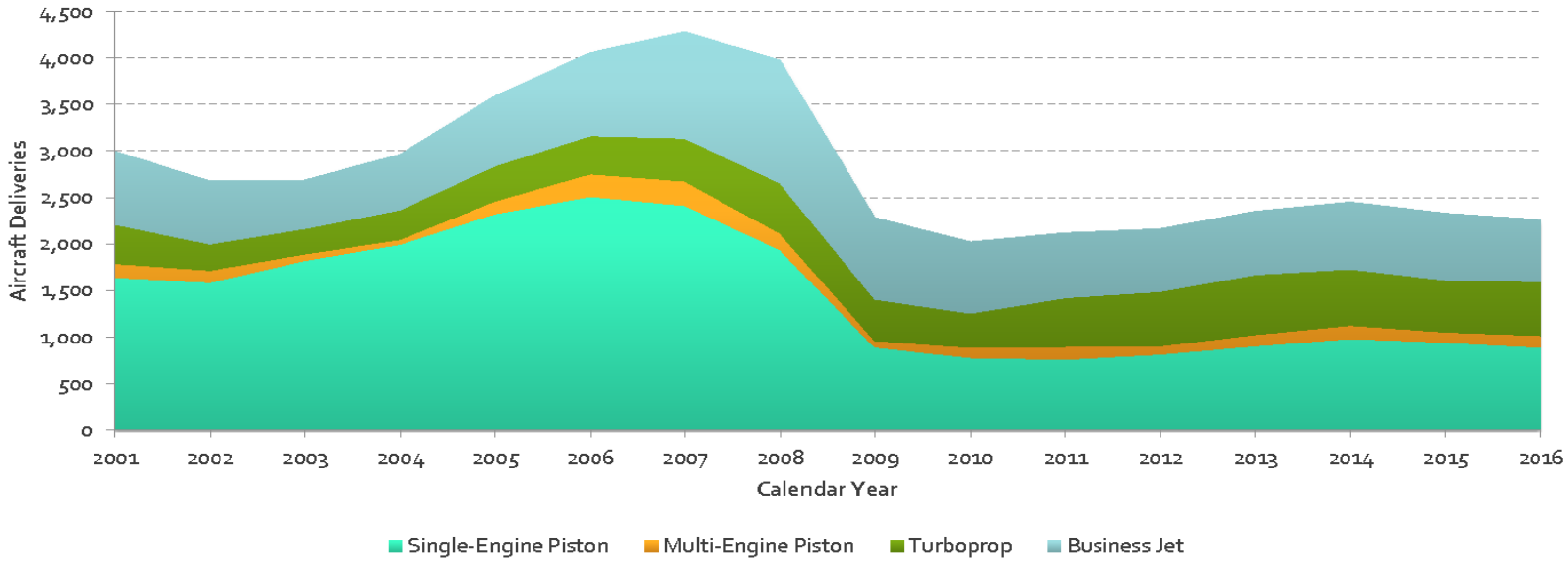
- Historical FDOT FASP Operations were used in regression analyses instead of FAA Terminal Area Forecast (TAF) data because:
  - FAA TAF shows a decline in activity level at airports with characteristics similar to MTH, such as Key West International Airport (EYW), but a continued increase in the aviation activity at MTH during the recession
  - FDOT FASP data show a decline in operations during the economic recession
  - FAA TAF shows an identical total operations at MTH from 2009 to 2010 and 2011 to 2012 which is uncommon at other airports
- There is no evidence that suggest the share of operations by type and based aircraft in TAF were not accurate

Section Two

NATIONAL AND LOCAL TRENDS

Global General Aviation Market Trends

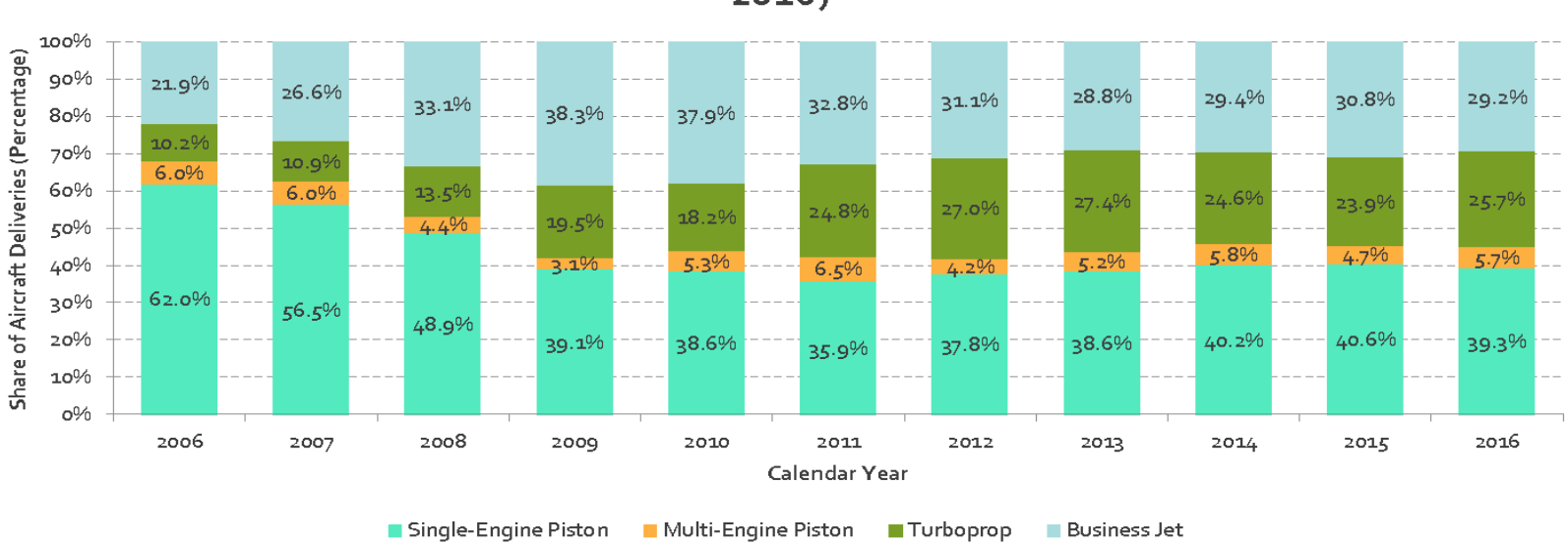
- Deliveries of general aviation aircraft increased at a CAGR of 4.1 percent from 2001 to 2008 but decreased at a CAGR of 6.8 percent from 2008 to 2016.



Source: GAMA, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.

Global General Aviation Market Trends

- Single-Engine piston aircraft comprise the highest share for GA aircraft deliveries. However, the share of single-engine piston deliveries declined 22.7 percentage points from 2006 to 2016.
- The share of jet aircraft deliveries has increased 7.3 percentage points from 2006 through 2016.



Source: GAMA, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.

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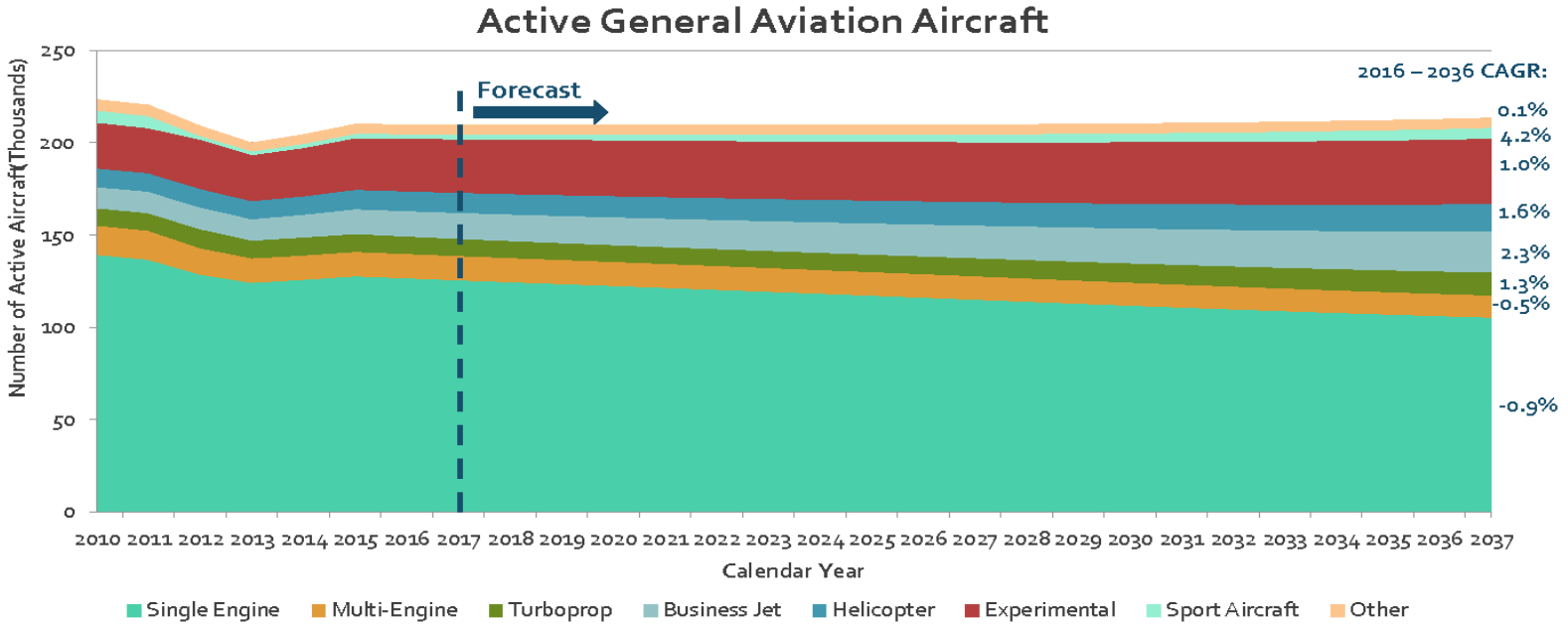
National General Aviation Market Trends

- Historically, active GA single-engine aircraft declined at a CAGR of 1.6 percent from 2010 to 2016.
- The FAA forecast the total active GA fleet to increase at a CAGR of 0.1 percent through 2036.
- Forecast growth varies by engine type.



Source: 2017 FAA Aerospace Forecast: Calendar Years 2017-2037, April 2017

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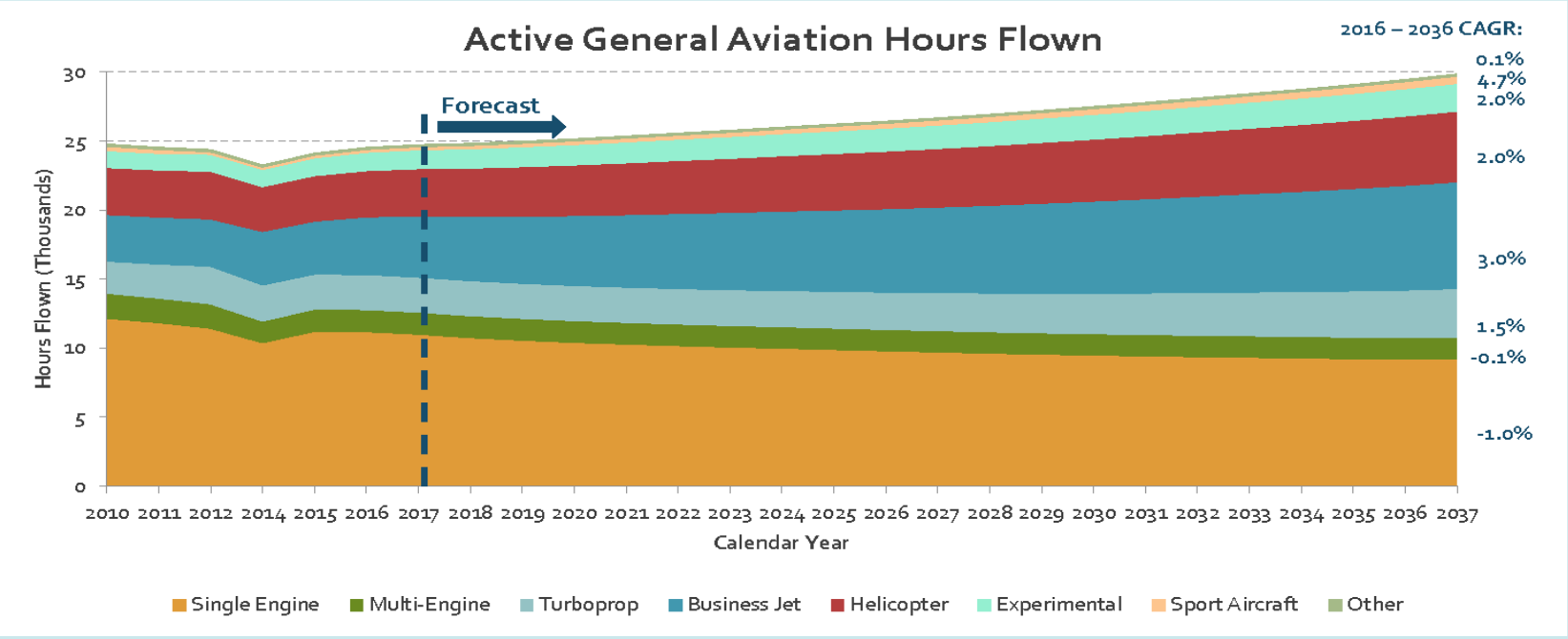
National General Aviation Market Trends

- The total number of GA hours flown is forecast to increase at a CAGR 0.9 percent through 2036.
- Single-engine aircraft hours flown are forecast to decline at a CAGR of 1.0 percent through 2036.
- Business jet hours flown are projected to grow at an average rate of 3.0 percent through 2036.



Source: 2017 FAA Aerospace Forecast: Calendar Years 2017-2037, April 2017

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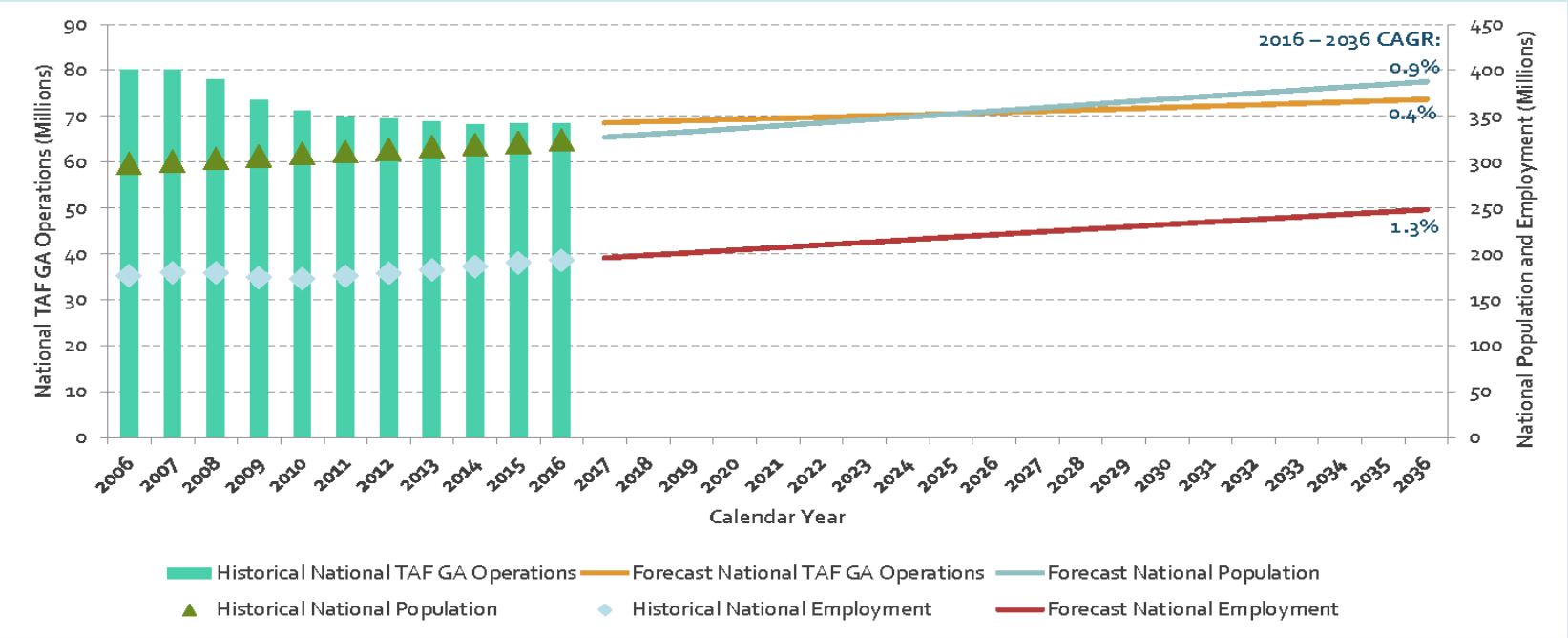
National Trends

- Total national GA operations have declined since 2008 while total national population continued to grow and total national employment has increased since 2011 following a decline in 2008–2011.
- GA operations, as well as total national population and employment, are projected to grow throughout the forecast period.



Note: Historical and Forecast National TAF GA operations are in Fiscal Year.
Sources: Woods & Poole, Inc., 2017; FAA 2016 TAF, January 2017.

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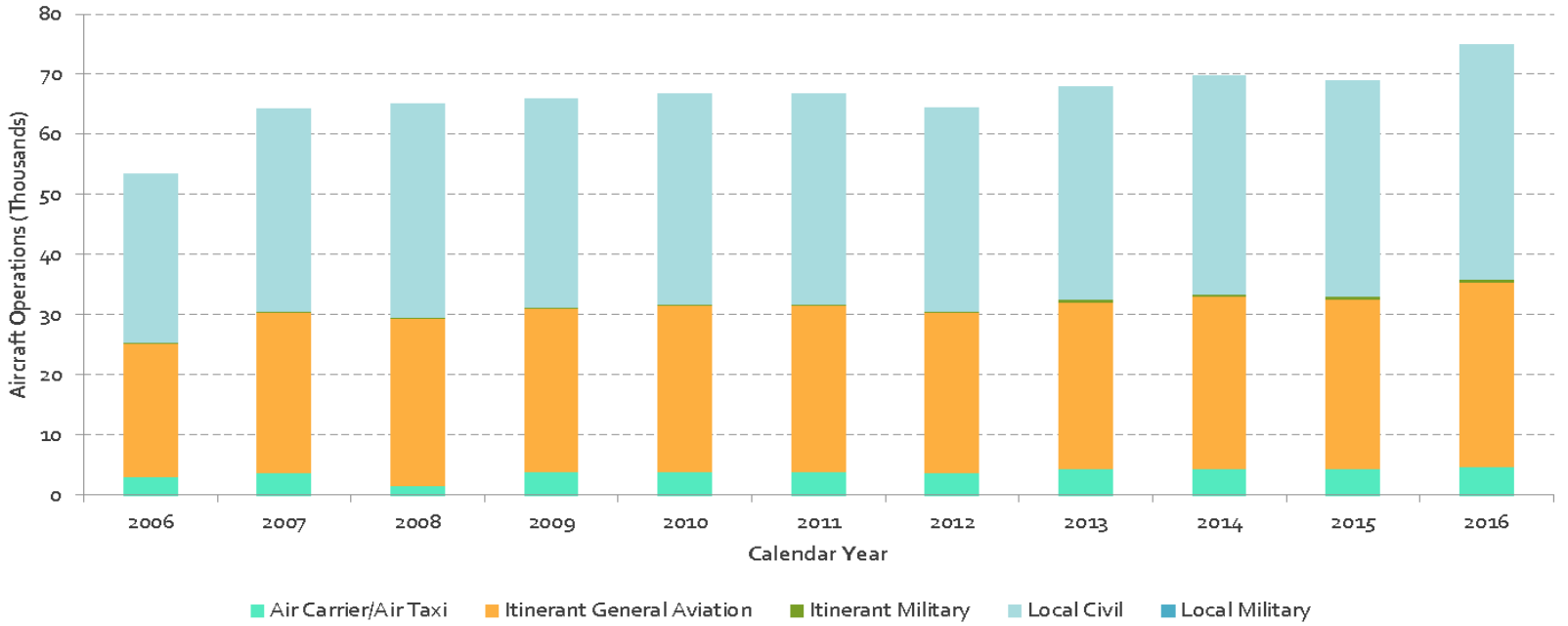
Local Activity Trends

- The total operations at MTH increased at a CAGR of 3.4 percent from CY 2006 to CY 2016 with a decline in 2012.
- Total itinerant operations have increased at a CAGR of 3.5 percent and local operations have increased at a CAGR of 3.4 percent.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2006-2014 MTH operations are values from FDOT FASP; MTH Operations by types were calculated using the share of total operations in TAF.

Sources: FDOT FASP, 2017; Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

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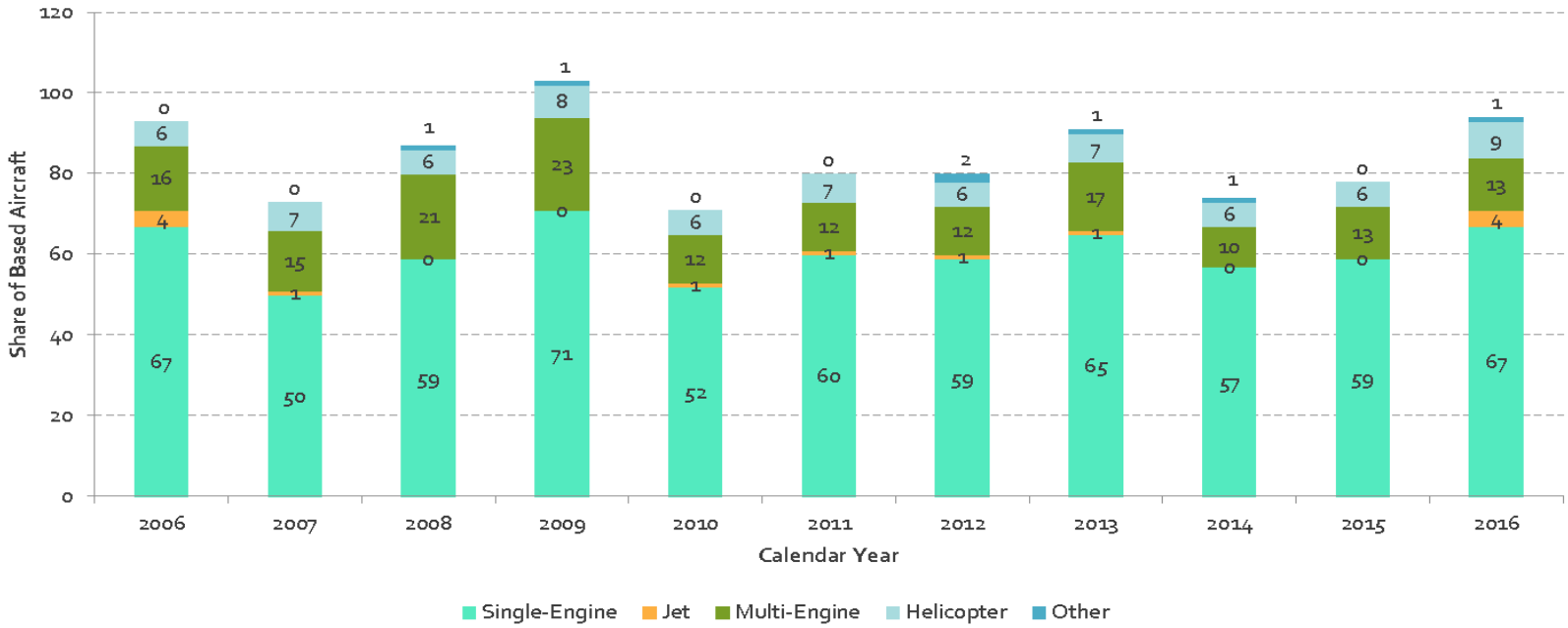
Local Based Aircraft Trends

- Single-engine aircraft represent the highest share of based aircraft at MTH. The share of jet aircraft remains low throughout CY 2006 to CY 2016.
- The total based aircraft increased at a CAGR of 0.11 percent from CY 2006 to CY 2016.



Notes: 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar year; all other values are from the FAA TAF, in Federal Fiscal Year. "Other" aircraft include aircraft such as gliders, military aircraft, and ultra-light aircraft .

Sources: Monroe County Airports Department, April 2017; FAA, Terminal Area Forecast (TAF), April 2017; FAA, Glossary for the 2016 Terminal Area Forecast (TAF), June 2017.

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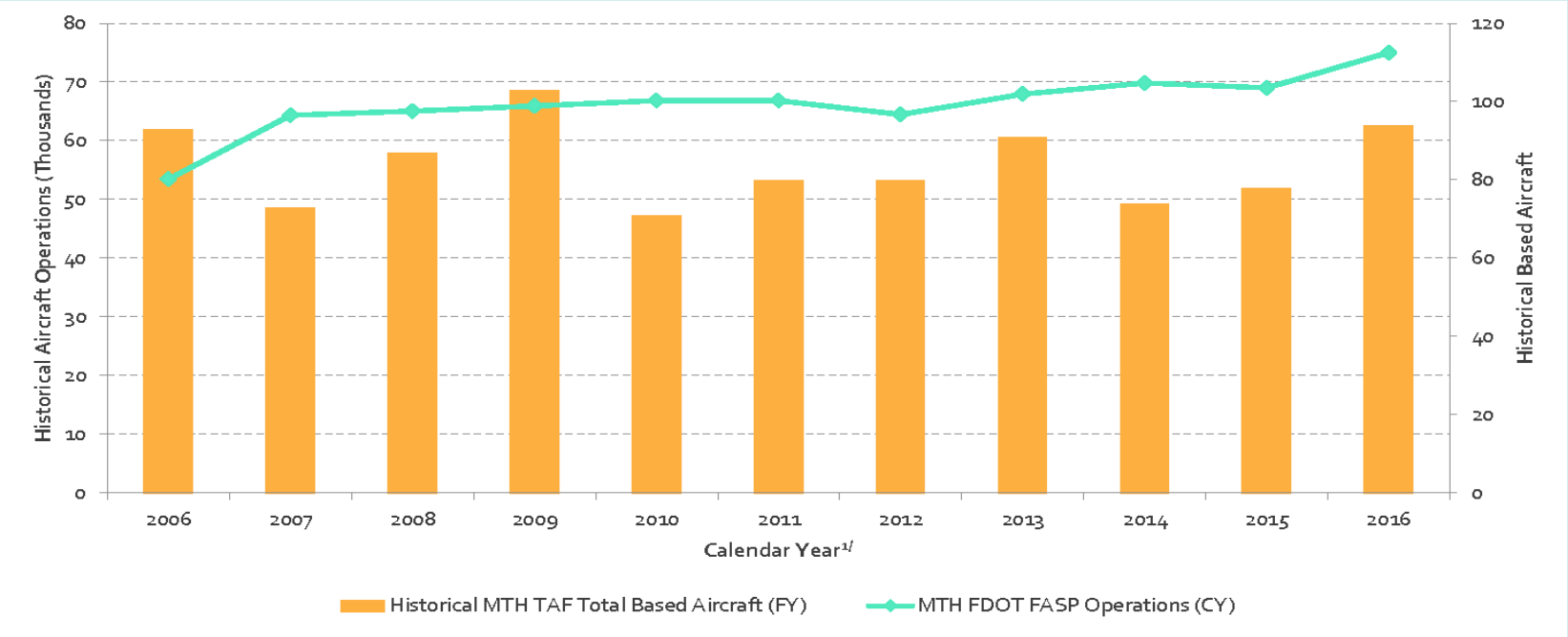
Local Historical Operations and Based Aircraft Trends

- Total Operations at MTH have increased at a CAGR of 3.4 percent in the past 10 years. Based aircraft shared similar trends with operations throughout the 10 years and increased at a CAGR of 0.1 percent.



Note: 1/ Historical MTH TAF Total Based Aircraft is in Fiscal Year; 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year; CY 2015-2016 operations are estimates provided by the Airport.
Sources: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

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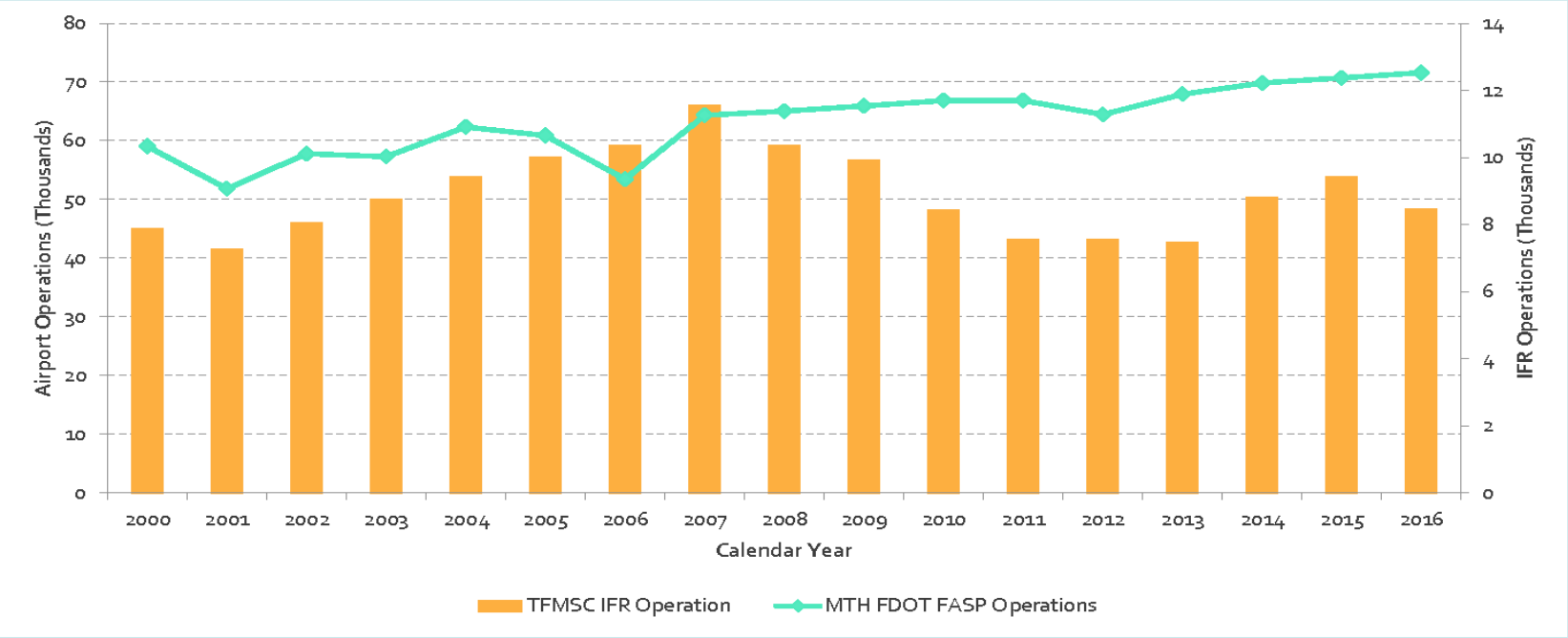
Local Historical IFR Operations and Airport Operations

- Total IFR operations as reported in the FAA TFMSC have similar historical trends as total airport operations at MTH.



Source: FDOT FASP, 2017; Federal Aviation Administration, TFMSC, June 2017

Section Three

AIRPORT ACTIVITY FORECAST

Methodologies Overview

- Reviewed and analyzed historical airport operations, national trends and national forecasts
- Market share analyses were conducted between total operations at MTH and total National/Regional operations reported by TAF to determine the percentage of MTH operations compared to National/Regional operations and how has the percentage has changed overtime
  - Market share analyses with total National operations were not preferred because there was an increasing share of operations at the Airport relative to the nation
  - Market share analyses with total Florida operations were not selected because of the inconsistency and fluctuation in shares

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Preferred Methodology

- Socioeconomic regression analyses were conducted to establish historical relationships between socioeconomic variables and operations at the Airport
- Forecasts of total MTH operations were developed using the outputs of the socioeconomic regression analyses
- The projected MTH operations were further segregated by local and itinerant operations on the basis of shares in the FAA TAF.

Socioeconomic Regression Analysis Results

- Historical national socioeconomic variables have strong correlation with the total MTH FDOT FASP operations. However, local economic variables have poor model fit with the total MTH operations.
- National population, employment, personal income, and GDP have the strongest correlation with the total MTH operations.

Dependent Variable	Independent Variable[1/]	R-squared Value[2/]
Total MTH Annual Operations	**National Population**	**84.60%**
	National Total Personal Income	**80.50%**
	National GDP	**78.80%**
	National Employment	**76.60%**
	National PCPI	74.20%
	National Total Earnings	73.30%
	Local GRP	65.00%
	Local Total Personal Income	63.90%
	Local Employment	63.40%
	Local PCPI	61.20%
	Local Total Earnings	59.20%
	Local Population	32.20%

Note:
1/ Local socioeconomic variables are for Monroe County, Florida.
2/ Adjusted R-Squared values are shown, which adjust for over-fitting. Adjusted R-squared values greater than or equal to 70.0 percent are generally considered indications of acceptable model fit. Adjusted R-squared values greater than 75.0 percent are highlighted.
Sources: Monroe County Airports Department, April 2017; FDOT FASP, 2017; Woods & Poole, Inc., 2017.

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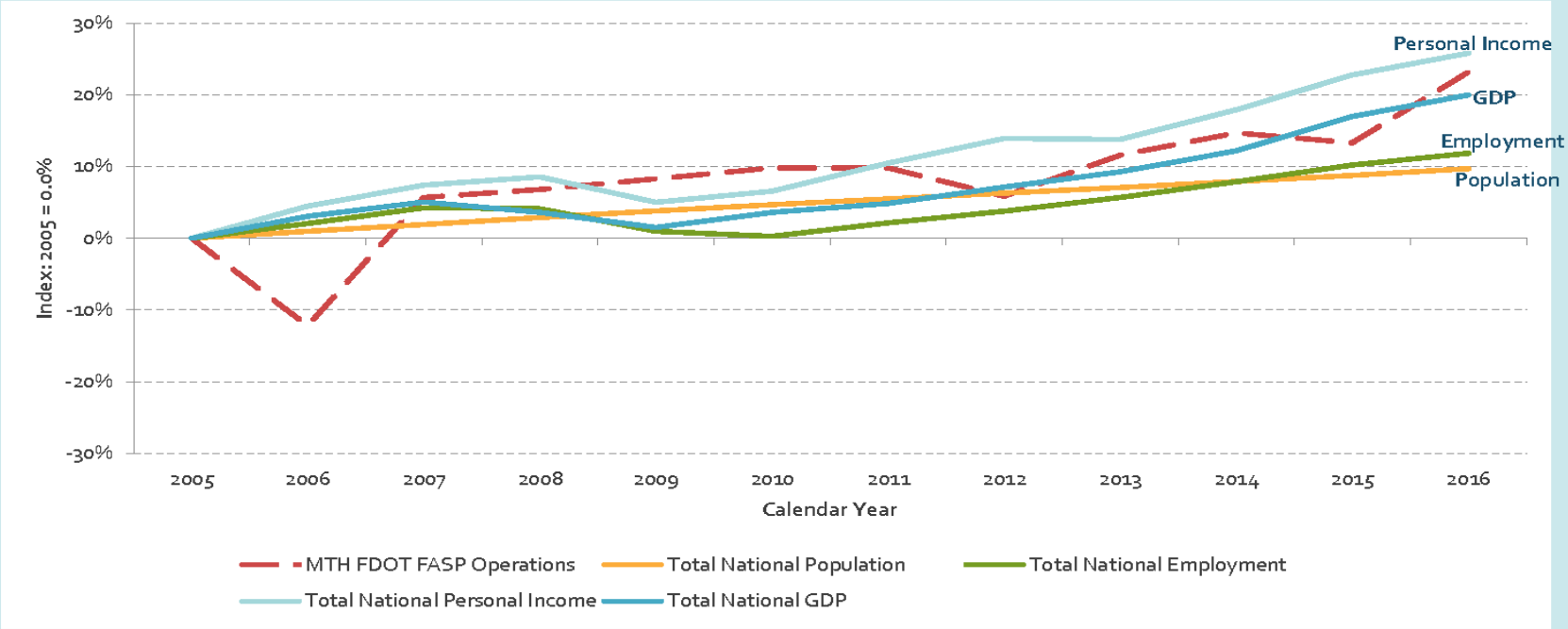
Historical Relationships

- Total MTH operations increased at a CAGR of 0.3 percent since 1995 with a decline in 2006. All socioeconomic variables increased continuously since 2005 through 2016.



Sources: FDOT FASP, 2017; Woods & Poole, Inc., 2017.

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Total Airport Operations Forecast

- Total operations at MTH are forecast to increase at a CAGR of 1.4 percent from 2016 through 2036 from 75,000 in 2016 to 98,978 in 2036.

Note: CY 2015-2016 operations are estimates provided by the Airport.
Source: FDOT FASP, 2017 ; 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

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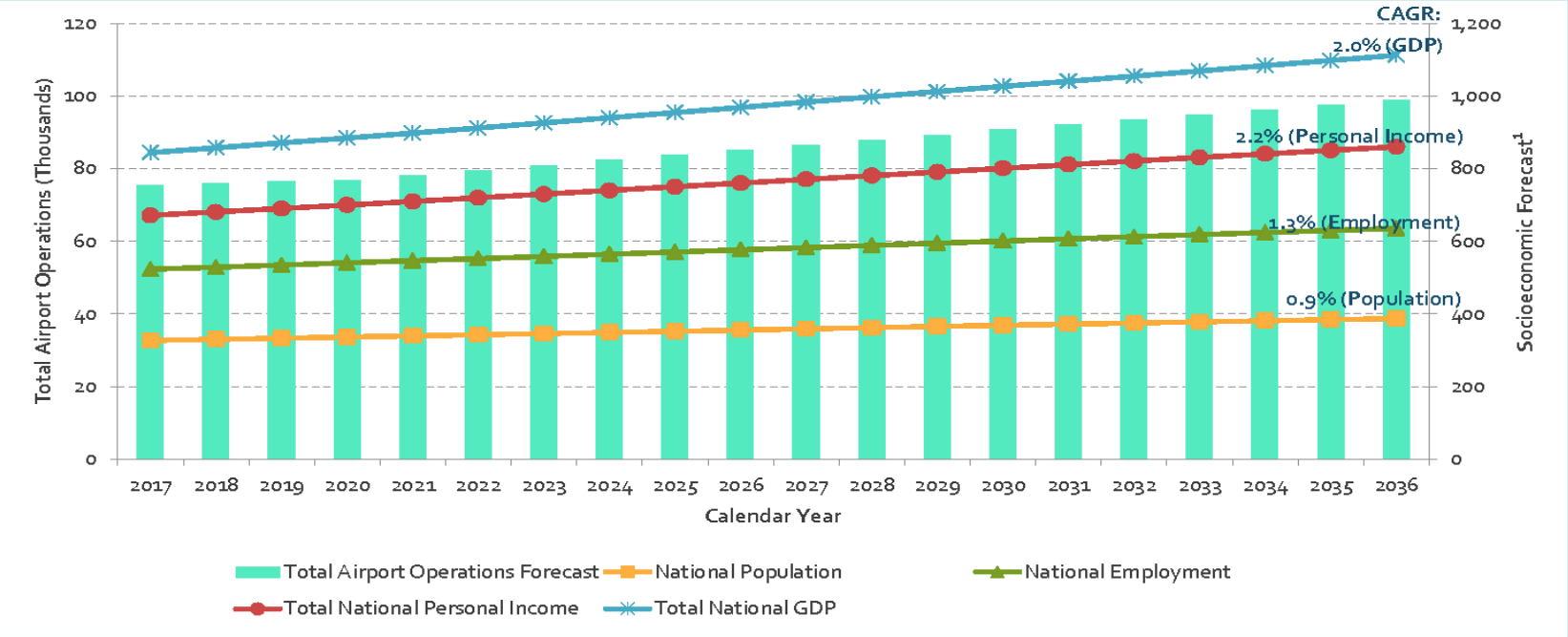
Total Airport Operations Forecast and Socioeconomic Forecast

- The National GDP is forecast to increase at a CAGR of 2.0 percent from 2017 to 2036, a slightly faster rate than the increase of total airport operations.



Note: 1/ National population and employment in millions and personal income and GDP in hundred billions.

Source: 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Total Airport Operations Forecast

- Total GA operations comprise the highest share of total operations through 2036.
- Total itinerant operations are forecast to increase at a CAGR of 1.3 percent and total local operations are forecast to increase at a CAGR of 1.4 percent.

	Air Carrier/ Air Taxi		Itinerant GA		Local Civil		Itinerant Military		Local Military	
Calendar Year	Operations	Share	Operations	Share	Operations	Share	Operations	Share	Operations	Share
Historical										
2016	4,809	6.4%	30,698	40.9%	39,073	52.1%	420	0.6%	0	0.0%
Forecast										
2022	5,106	6.4%	32,593	40.9%	41,485	52.1%	420	0.5%	0	0.0%
2026	5,463	6.4%	34,867	41.0%	44,380	52.1%	420	0.5%	0	0.0%
2036	6,356	6.4%	40,567	41.0%	51,635	52.2%	420	0.4%	0	0.0%

Note: Percentages may not sum to 100 percent due to rounding.

Sources: Monroe County Airports Department, April 2017; FDOT FASP, 2017; Woods & Poole, Inc., 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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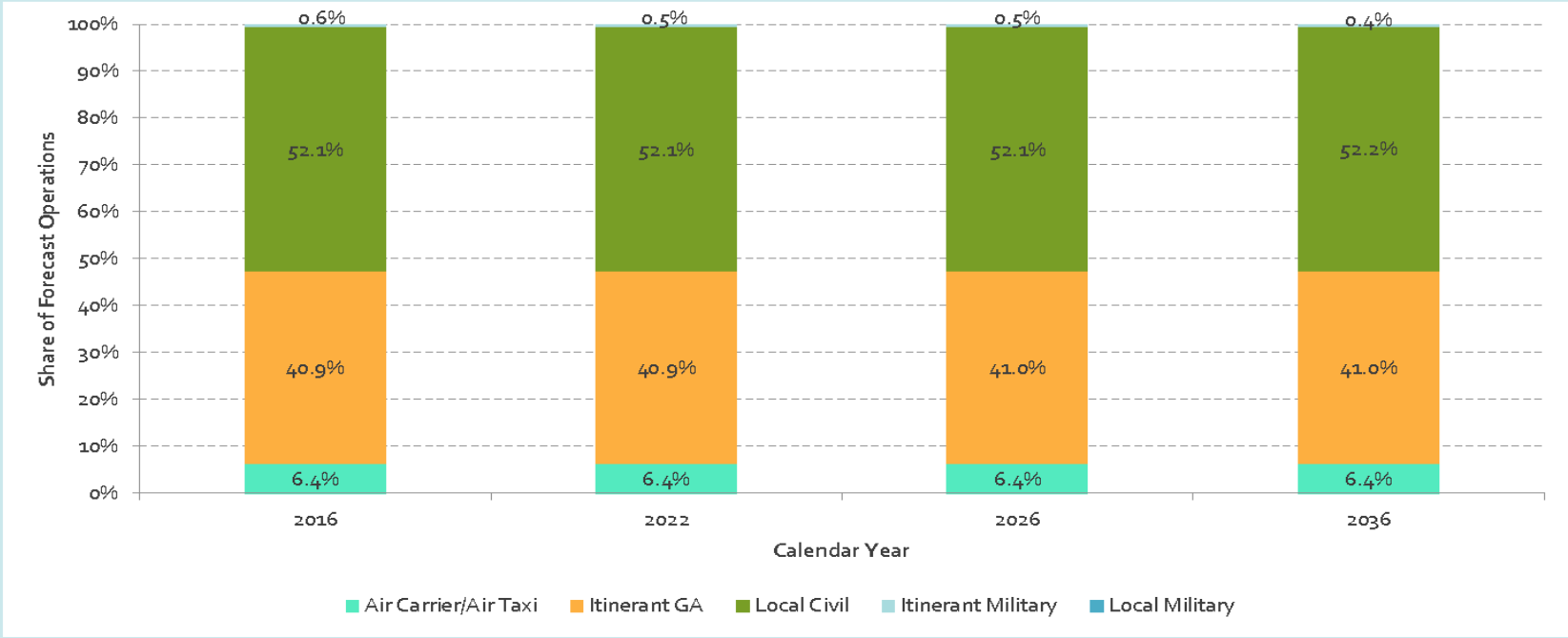
Total Airport Operations Forecast

- Itinerant and local GA operations have an average of 41 and 52 percent share of total operations through 2036 respectively.



Note: CY 2015-2016 operations are estimates provided by the Airport; MTH Operations by types were calculated using the share of total operations in FAA TAF.
Source: Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

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Methodology and Assumptions
Based Aircraft

- Airport Based Aircraft Forecast
  - Monroe County Department of Airports provided April 2017 based aircraft data at MTH which were used as 2016 based aircraft.
  - Total local operations per based aircraft in 2016 were calculated and used to forecast the total based aircraft through 2036 based on the forecast of local operations
  - Market share analyses were conducted to establish the historical proportions between each engine type and total based aircraft in 2016
  - The base year shares were used to forecast based aircraft by engine types through 2036

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Total Based Aircraft Forecast

- Total based aircraft at MTH are forecast to increase at a CAGR of 1.4 percent from 94 in 2016 to 123 in 2036.
- Jet aircraft are forecast to be the slowest growing category of based aircraft and Single-engine aircraft are forecast to have the highest share of total based aircraft throughout the forecast period.

	Single-Engine		Multi-Engine		Jet		Helicopter		Total	
Fiscal Year	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF
Historical										
2016	67	60	13	14	4	0	9	6	94	80
Forecast										
2022	71	69	14	19	4	0	10	6	100	94
2026	76	74	15	23	5	0	10	6	107	103
2036	88	84	17	33	5	0	12	6	123	123

Sources: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

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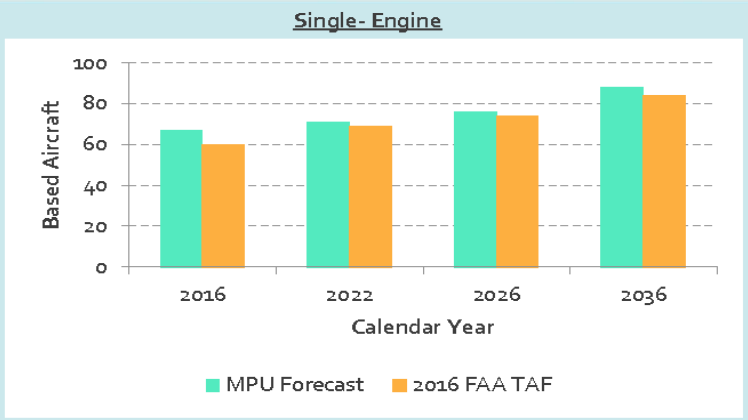
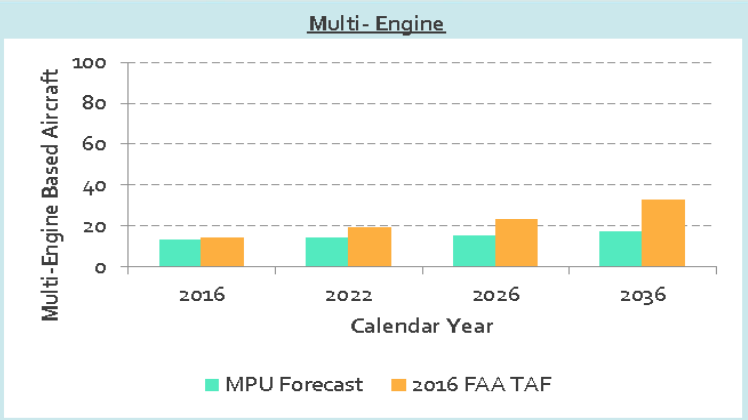
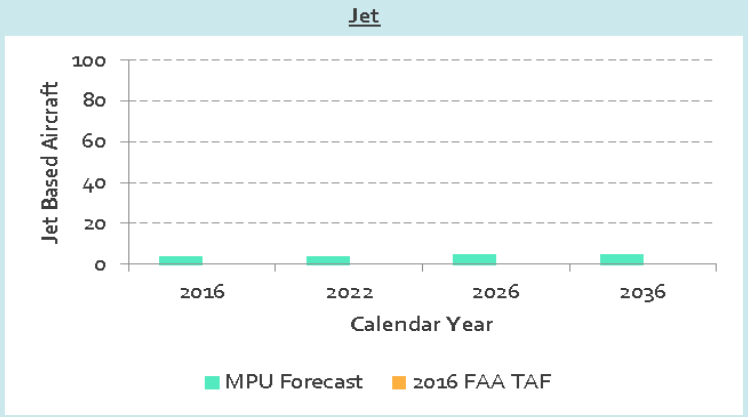
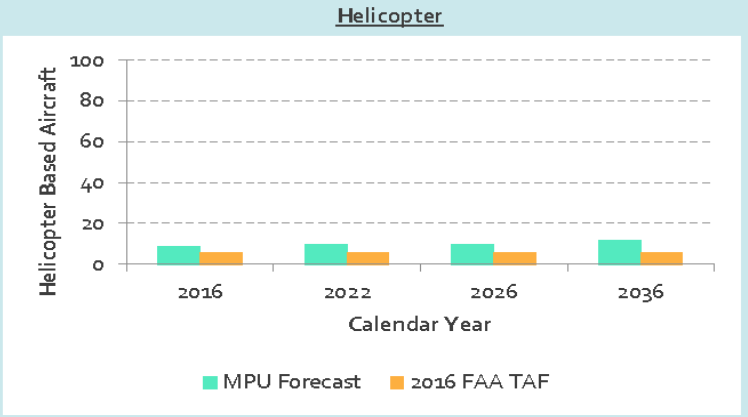
Total Based Aircraft Forecast









Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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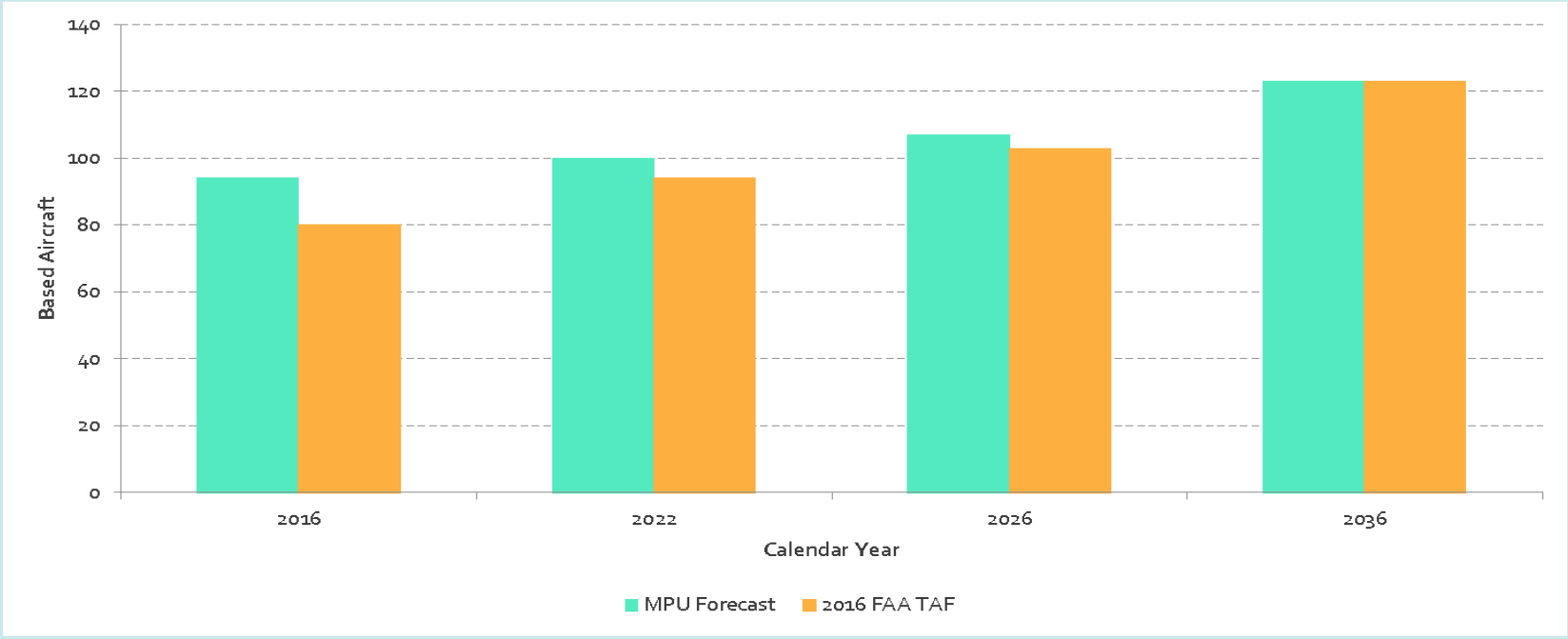
Total Based Aircraft Forecast

- Master Plan Update forecast of total based aircraft at MTH is generally higher than FAA TAF forecast. However, the forecast for based aircraft is identical in 2036.



Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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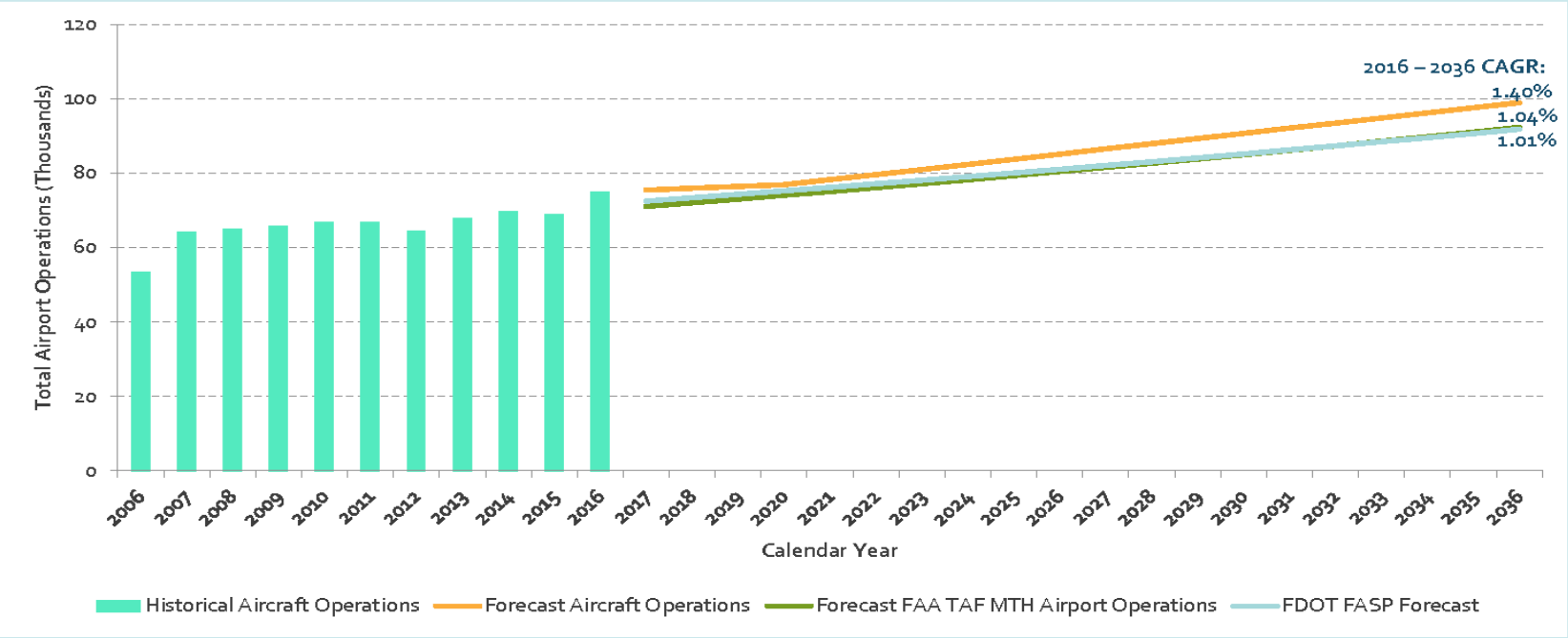
Section Four

FORECAST COMPARISON

Comparison to Other Forecasts

- Total operations at MTH have increased at a CAGR of 3.4 percent in the past 10 years and are forecast to grow at a CAGR of 1.4 percent through 2036, slightly above 2016 FAA TAF forecast. FDOT FASP forecast is similar to FAA TAF forecast.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2035 – CY 2036 FDOT FASP are estimated values.
Sources: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017; FDOT FASP, 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Operations Forecast Variance From TAF

- The total operations forecast is within the acceptable variance from the TAF.

	MTH Forecast		2016 FAA TAF Forecast
Calendar Year	Forecast Operations	Variance From TAF	Forecast Operations
2017	75,474	6.2%	71,065
2018	75,952	5.4%	72,048
2019	76,432	4.6%	73,044
2020	76,916	3.9%	74,054
2021	78,249	4.2%	75,075
2022	79,604	4.6%	76,115
2023	80,972	4.9%	77,168
2024	82,347	5.3%	78,235
2025	83,737	5.6%	79,320
2026	85,130	5.9%	80,419
2027	86,523	6.1%	81,536
2028	87,920	6.4%	82,667
2029	89,320	6.6%	83,812
2030	90,717	6.8%	84,975
2031	92,098	6.9%	86,155
2032	93,471	7.0%	87,351
2033	94,842	7.1%	88,565
2034	96,214	7.1%	89,795
2035	97,597	7.2%	91,042
2036	98,978	7.2%	92,308

Note: FAA TAF Forecast is in Fiscal Year; Acceptable variance is less than 10 percent in the 5-year forecast period and less than 15 percent in the 10-year forecast period.
Source: Federal Aviation Administration, Terminal Area Forecast, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Section Five

ADDITIONAL CONSIDERATIONS/DISCUSSIONS

Fleet Mix Forecast Discussion

- Fleet mix data
  - TFMSC data from 2000 through 2016 were used to examine fleet mix trends at the Airport
  - TFMSC data do not capture all operations at the Airport, including most operations conducted under Visual Flight Rules (VFR)
  - Marathon Aviation Associates provided additional data to determine the 2016 fleet mix
  - Airport stakeholders stated single-engine piston operations have been increasing, which was verified by recent TFMSC data
- Fleet Mix Forecast Methodology and Assumptions
  - Market share analyses were used to estimate the proportion of each engine type and determine the total operations by engine types in 2016 base year
  - The share of single-engine piston and jet aircraft operations were forecast to increase over the forecast period based on local and national trends
  - Other shares were forecast to decrease proportionally to their base year share

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Airport TFMSC Fleet Mix Trend

Calendar Year	Single Piston	Multi Piston	Single Turboprop	Multi Turboprop	Jet	Helicopter	Unknown	Total
2000	1,940	1,466	653	1,822	1,868	14	125	7,888
2001	1,834	1,580	847	886	2,074	5	59	7,285
2002	1,842	1,937	669	1,035	2,459	4	124	8,070
2003	1,800	2,259	761	1,154	2,634	3	153	8,764
2004	1,931	2,194	930	1,368	2,953	2	68	9,446
2005	2,088	2,437	1,040	1,379	3,025	2	49	10,020
2006	2,355	2,387	1,232	1,362	2,993	8	49	10,386
2007	2,544	2,598	1,189	1,409	3,760	8	53	11,561
2008	2,946	2,181	1,019	1,118	3,081	11	30	10,386
2009	3,224	2,338	1,007	803	2,493	14	44	9,923
2010	2,774	1,328	926	1,018	2,358	18	34	8,456
2011	2,157	1,083	975	958	2,351	19	34	7,577
2012	2,200	998	902	1,014	2,381	19	57	7,571
2013	2,173	1,048	948	958	2,313	24	22	7,486
2014	2,849	1,133	1,044	1,152	2,570	31	47	8,826
2015	3,183	998	1,210	1,235	2,749	19	56	9,450
2016	**2,109**	**893**	**1,277**	**1,247**	**2,878**	**16**	**47**	**8,467**

Source: Monroe County Airports Department, April 2017.

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Base Year Fleet Mix Analysis

- According to TFMSC data, single-engine piston operations have decreased in 2016 from 3,183 in 2015. However, not all operations are captured by TFMSC data, and the share of single-engine piston operations remain as one of the highest after Jet operations.

Engine Types	FlightAware June 2016 – May 2017	Share	TFMSC 2016 (CY)	Share	TFMSC May 2016 – April 2017	Share	Marathon Aviation Associates CY 2016[1/]	Share
Single-Engine Piston	2,696	29.95%	2,145	25.12%	2,338	26.06%	4,776	36.79%
Multi-Engine Piston	975	10.83%	893	10.46%	989	11.02%	1,257	9.68%
Single-Engine Turboprop	1,375	15.28%	1,277	14.96%	1,300	14.49%	1,279	9.85%
Multi-Engine Turboprop	1,098	12.20%	1,264	14.80%	1,333	14.86%	1,264	9.74%
Jet	2,704	30.04%	2,889	33.84%	2,912	32.46%	2,889	22.25%
Helicopter	24	0.27%	1	0.01%	22	0.25%	1,518	11.69%
Unknown	129	1.43%	69	0.81%	78	0.87%	0	0.00%
Total	9,001	100.00%	8,538	100.00%	8,972	100.00%	12,983	100.00%

Note: 1/ Based on data from TFMSC and the Airport. TFMSC data does not capture all operations at the Airport such as visual operations.
Source: Federal Aviation Administration, TFMSC, June 2017; FlightAware, June 2017; Monroe County Airports Department, April 2017.

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TFMSC Year-to Date Fleet Mix Comparison

- The share of single-engine piston operations increased 2.52 percentage points in January to April 2017 compared to the same period in 2016.

Engine Types	TFMSC January 2016 – April 2016	Share	TFMSC January 2017 – April 2017	Share
Single-Engine Piston	789	23.43%	995	25.95%
Multi-Engine Piston	301	8.94%	397	10.35%
Single-Engine Turboprop	509	15.12%	532	13.87%
Multi-Engine Turboprop	458	13.60%	547	14.26%
Jet	1,291	38.34%	1,327	34.60%
Helicopter	3	0.09%	6	0.16%
Unknown	16	0.48%	31	0.81%
Total	3,367	100.00%	3,835	100.00%

Note: April 2017 is the latest month for which TFMSC data are available.
Source: Federal Aviation Administration, TFMSC, June 2017.

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Fleet Mix Forecast Results

- Single-engine piston operations are forecast to increase at a CAGR of 1.6 percent through 2036. The share of single-engine piston operations remain as the highest.
- Jet aircraft operations were forecast to increase over the forecast period at a CAGR of 2.4 percent based on national and local trends
- Other shares were forecast to decrease proportionally to their base year share

	Piston				Turboprop				Jet		Helicopter		Total	
Calendar Year	Single-Engine	Share	Multi-Engine	Share	Single-Engine	Share	Multi-Engine	Share	Jet	Share	Helicopter	Share	Total	Share
Historical														
2016	27,594	36.8%	7,263	9.7%	7,378	9.8%	7,303	9.7%	16,692	22.3%	8,771	11.7%	75,000	100%
Forecast														
2022	29,577	37.2%	7,372	9.3%	7,490	9.4%	7,413	9.3%	18,849	23.7%	8,903	11.2%	79,604	100%
2026	31,835	37.4%	7,644	9.0%	7,766	9.1%	7,687	9.0%	20,966	24.6%	9,232	10.8%	85,130	100%
2036	37,612	38.0%	8,191	8.3%	8,322	8.4%	8,237	8.3%	26,724	27.0%	9,892	10.0%	98,978	100%
CAGR 2016-2036	1.6%		0.6%		0.6%		0.6%		2.4%		0.6%		1.4%	

Note: CY 2016 operations are estimates provided by the Airport.
Source: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Florida Keys Marathon International Airport

Demand/Capacity and Facility Requirements

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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4. Demand/Capacity Analysis and Facility Requirements

The facility requirements necessary to meet forecast demand at MTH are identified in this section of the Master Plan Update. Analyses were conducted to explore the relationship between demand and capacity in the context of various Airport systems, and to provide general assessments as to the ability of existing facilities to meet forecast demand.

The current traffic activity levels (the base) reflect a typical busy 2016 weekday in the Airport's peak month to establish the peak month average day (PMAD). Three planning horizon years were analyzed in detail, which assessed traffic activity levels 5, 10, and 20 years from the base (2021, 2026, and 2036).

The analyses are documented in this section by functional system. For clarity, each system was assessed separately. Four functional systems were identified, as summarized below:

- Airfield: The airfield analysis includes an assessment of existing airfield capacity at MTH. Based on the forecasts of operational activity, fleet mix, and peak activity characteristics set forth in Section 3, the overall hourly and annual capacities of the airfield were assessed. Hourly demand and the extent (frequency and duration) to which this demand exceeds runway capacity are key determinants of the need for taxiway and\or runway enhancements to provide for increased airfield operational capacity.
- Passenger terminal facilities: passenger terminal facility improvements required to support the current and future use of the passenger terminal including operations by the U.S. Customs and Border Protection (CBP) and rental car operators.
- On-airport roadways: airport roadway improvements required to support future Airport demand are identified.
- Fixed base operator and general aviation facilities: General aviation facility requirements assessed include aircraft ramp and parking areas, aircraft storage hangars, general aviation terminal needs, FBO facilities, and vehicle parking areas.
- Airport Support Facilities: Requirements addressing the Airport facilities necessary to support the airfield, general aviation facilities, and their related activity are also identified in this section. These facilities include, but are not limited to, ARFF equipment and facilities, fuel storage facilities, and airfield maintenance facilities.

Each section describes the key findings from the analyses, any potential limitations in the system based on today's facilities, and areas that may require improvements/expansion to accommodate anticipated passenger and aircraft traffic levels throughout the forecast horizon.

4.1 Airfield Facilities

This section serves to determine if any of the airside facilities will become inadequate to meet the various demand levels forecast through 2036. This information will provide the foundation for the next step in the planning process: the definition and evaluation of airside development alternatives (presented in Section 5, *Alternatives Development*).

4.1.1 AIRFIELD CAPACITY

The purpose of this airfield capacity analysis is to determine the Airport's capability to accommodate the future needs of its users. The calculated capacity is compared to the forecast demands from the previous section to determine if the airfield configuration will adequately meet those demands, without creating unacceptable delays for its users. The airfield analysis is expressed in terms of the hourly capacity and the annual service volume (ASV), along with the total estimated annual aircraft delay.

4.1.1.1 Analysis Assumptions

Methods for determining airport capacity are detailed in FAA AC 150/5060-5, Change 2, *Airport Capacity and Delay*. It should be noted that the methodology outlined in this AC assumes the Airport is equipped with an Air Traffic Control Tower (ATCT), which is not the case for MTH. This methodology utilizes several key factors to determine the airfield capacity, including:

- runway configuration
- percentage of time the airport experiences poor weather conditions (i.e., low cloud ceilings and/or low visibility)
- aircraft fleet mix (types of aircraft operating at the airport)
- percent of aircraft arrivals
- frequency of touch-and-go operations
- taxiway configuration

Each of these factors has differing impacts on the capacity by setting certain limits on how aircraft can operate on the airfield system. The following subsections will evaluate each of these factors with respect to the airfield facilities at MTH.

Runway Configuration

The number of runways at an airport and how they are positioned in relation to one another determines how many arrivals and departures can occur within an hour. For example, if an airport has two runways that are oriented parallel to each other, then it is generally possible to have arrivals and departures to both runways at the same time. However, if the two runways intersect, then an aircraft departing on one runway must wait for operations on the other to be completed prior to starting its takeoff. As noted in Section 2, the Airport has one runway, 7-25, with an east-west orientation.

Meteorological Conditions

Meteorological conditions affecting airfield capacity include wind direction and speed, cloud ceiling height, and visibility. Fog, intense storms, and strong crosswinds have a major impact on runway capacity and may even cause a temporary closure of the airfield. Low cloud ceilings and low visibility conditions result in greater airspace separations between aircraft and longer runway occupancy times. These conditions may also restrict which runways can be used, because arrivals in these conditions require published instrument approach procedure. VFR govern the procedures used to conduct flight operations under visual meteorological conditions (VMC). Similarly, IFR govern the procedures used to conduct flight operations under instrument meteorological conditions (IMC). **Table 4-1** lists the criteria for determining the two operating conditions.

Table 4-1: Operating Conditions for Airfield Capacity Analysis

CLASSIFICATION	WEATHER CONDITIONS			OCCURRENCE AT MTH
	VISIBILITY		CLOUD CEILING	
Visual Meteorological Conditions	Greater than or equal to 3 statute miles	and	Greater than or equal to 1,000 feet above ground level	98.7%
Instrument Meteorological Conditions	Less than 3 statute miles	and/or	Less than 1,000 feet above ground level	1.3%

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., January 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

Runway capacity is highest during good weather when visibility is at its best and VFR is in effect. Based on the latest 10 years of weather data at MTH, it is estimated that VMC occurs 98.7 percent of the time, while IMC occurs 1.3 percent of the time. The Airport currently has a RNAV (GPS) localizer performance with vertical guidance (LPV) approach to Runway 7, which may be utilized with a decision altitude of 389 feet and a 1.25-mile visibility minimum during IMC conditions, and a RNAV (GPS) LPV approach to Runway 25, which may be utilized with a decision altitude of 315 feet and a 1-mile visibility minimum. Beyond these conditions, aircraft may not operate at the Airport. For this analysis, it has been assumed that weather conditions below the Runway 25 GPS minimums occur 0.6 percent of the time at the Airport. When these weather conditions occur, it is assumed the Airport is closed.

When determining the runway end that is used for takeoffs and landings, wind conditions at an airfield can also affect the capacity. Using the latest 10 years of wind observations at MTH, runway end utilization percentages were assigned. This determination was based upon what would be the normal arrival flow on an average day at the Airport. **Table 4-2** lists the usage of each runway end. East flow is assumed to be the predominant flow of operations; it includes all weather observations in calm wind conditions (less than 3 knots), as well as observations when winds are perpendicular to the runway.

Table 4-2: Runway End Utilization

RUNWAY END	CONFIGURATION	UTILIZATION
7	East Flow	83.6%
25	West Flow	15.7%
	Weather Below Minimums	0.7%
	Total	100.0%

SOURCE: National Centers for Environmental Information, *3505 Surface Hourly Weather Observations for The Florida Keys Marathon International Airport (January 1, 2008 – December 31, 2017)*, January 19, 2018.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

Aircraft Mix Index

In AC 150/5060-5, the FAA classifies aircraft based on their maximum certified operational weight. The mix index is a calculated ratio of the aircraft fleet based upon a weight classification system, described in **Table 4-3**. As the number of heavier aircraft increases, so does the mix index. The hourly runway capacity decreases as the mix index increases, because the FAA requires that heavier aircraft be spaced further apart from other aircraft for safety reasons. Helicopter operations are not included in the fleet mix and mix index calculations, as they typically fly a separate traffic pattern from fixed-wing aircraft (at MTH, helicopters line up with Taxiway A for landing and hover-taxi to their parking point).

Another way the aircraft fleet influences airfield capacity is the time needed for the aircraft to clear the runway, either on arrival or departure. As aircraft size and weight increases, so does the time needed for the aircraft to slow to a safe taxiing speed or to achieve the needed speed for takeoff. Therefore, a larger aircraft generally requires more runway occupancy time than a smaller aircraft. Thus, as additional larger aircraft enter an airport's operating fleet, runway capacity will likely decrease. The aircraft classifications, shown in Table 4-3, are based upon the maximum certificated takeoff weight, the number of engines, and the wake turbulence classifications. The mix index is defined as the percent of "Large" aircraft plus three times the percent of "Heavy" aircraft. The percent of "Small" aircraft is not considered, because the wake turbulence generated by these aircraft dissipates rapidly. Small aircraft can also be spaced closer than Large or Heavy class aircraft.

Table 4-3: Aircraft Classifications

AIRCRAFT CLASSIFICATION	MAXIMUM CERTIFICATED TAKE-OFF WEIGHT (POUNDS)	REPRESENTATIVE AIRCRAFT TYPES
Small	12,500 or less	Piper PA-23, Cessna C-180, Cessna C-207, Cessna C-182, King Air
Small+	12,500 – 41,000	Lear 25, Cessna Citation, Grumman GI
Large	41,001 – 220,000	Gulfstream IV, Dash 8, B737, B727
B757	220,001 – 300,000	B-757-200/300
Heavy	300,001 or more	A300, B-767, L1011, DC-10, B-747, A380, KC-135, Antonov 124

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., January 2018.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

For this analysis, the aircraft operational fleet mix was determined based on a review of the aviation activity forecasts presented in Section 3. **Table 4-4** summarizes the composition of the VMC aircraft fleet mix operating at the Airport during 2016, and the projected fleet mix through the planning horizon. The table also presents the resulting mix index that formed the basis for estimating the throughput of the airfield. As shown in the table, the existing and projected fleet mix at MTH includes aircraft categorized as Small, Small+, and Large. To determine the existing and projected fleet mix share, the following assumptions were made:

- The Small aircraft classification includes all single-engine and multi-engine piston and turboprop aircraft.
- The Small+ aircraft classification includes 99.4 percent of all jet aircraft.
- The Large aircraft classification includes the remaining 0.6 percent of jet aircraft.

As shown in Table 4-4, the mix index associated with 2016 operations under VMC was 25 percent, with an increase through the planning period to 30 percent in 2036, reflecting an anticipated increase in the share of jet aircraft and a decrease in piston aircraft.

Table 4-4 also summarizes the IMC aircraft fleet mix composition operating at the Airport during 2016 and through the planning horizon. The IMC fleet mix composition was derived from the VMC fleet mix composition, assuming a 50 percent reduction in small piston aircraft operations during IMC. Accordingly, the IMC mix index is projected to increase from 32 percent in 2016 to 38 percent in 2036.

Table 4-4: Existing and Projected Fleet Mix Share by Aircraft Classification

	VISUAL METEOROLOGICAL CONDITIONS				INSTRUMENT METEOROLOGICAL CONDITIONS			
AIRCRAFT CLASSIFICATION	**2016**	**2021**	**2026**	**2036**	**2016**	**2021**	**2026**	**2036**
Small	74.8%	73.6%	72.4%	70.0%	68.2%	66.6%	65.0%	62.0%
Small+	25.1%	26.3%	27.5%	29.8%	31.7%	33.2%	34.8%	37.8%
Large	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
B757	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Aircraft Mix Index[3/]	**25%**	**26%**	**28%**	**30%**	**32%**	**33%**	**35%**	**38%**

NOTES:

1. Existing and projected fleet mix based on existing operations and the *Aviation Activity Forecasts*.
2. Totals may not add up due to rounding.
3. Formula for determining mix index: (Percent of "Small+" Aircraft) + (Percent of "Large" Aircraft) + (3 * Percent of "Heavy" Aircraft)

SOURCE: Ricondo & Associates, Inc., *Aviation Activity Forecasts*, August 2017.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

Percent of Aircraft Arrivals

The percentage of aircraft arrivals and the sequencing of aircraft departures are two other operational characteristics that affect overall airfield capacity. An arriving aircraft occupies a runway longer than a departing aircraft. Therefore, the hourly runway capacity decreases as the percentage of aircraft arrivals increases. At the Airport, the percentage of aircraft arrivals is expected to remain at 50 percent throughout the planning period. For general planning purposes, it is assumed that aircraft operations would remain balanced with a 50/50 percent split between aircraft arrivals and departures.

Percent of Aircraft Touch-and-Go Operations

A touch-and-go operation is defined as an operation by a single aircraft that lands and departs without stopping or exiting the runway. Pilots conducting touch-and-go operations are usually conducting training exercises and, thus, stay in the airport traffic pattern. Airfield capacity, in terms of the number of aircraft operations, increases as the number of touch-and-go operations increases.

This increase in capacity is a result of aircraft continually making approaches and departures without requiring significant runway occupancy time. However, continuous touch-and-go operations reduce the availability of the runway for other non-training operations, or they may impede aircraft operations on nearby or intersecting runways.

According to Airport management personnel, the level of touch-and-go operations at MTH is relatively low. Unfortunately, no official counts are made. Therefore, it was assumed that 5 percent of total aircraft operations were touch-and-go operations.

Taxiway Configuration

The number of taxiways impacts the hourly runway capacity by influencing when an arriving aircraft can exit the runway after slowing to a safe taxiing speed. Proper placement and number of exit taxiways, based on the Airport's fleet mix, can reduce runway occupancy times and preserve optimum capacity levels. The longer an aircraft remains on a runway, the less time the runway is available for other operations; therefore, the runway processes at a lower capacity. If taxiway exits are placed at the approximate location where the aircraft would reach safe turning speed, then the aircraft can exit and clear the runway for another user. However, if the taxiway is spaced either too close to or too far from the touchdown zone, then the aircraft would spend more time on the runway than if the taxiway had been in the optimum zone. Although pilot technique is also a factor, the FAA has determined optimal distances to exit taxiways based upon the mix index, as listed in **Table 4-5**.

Table 4-5: Optimum Taxiway Exit Distance

MIX INDEX	MINIMUM DISTANCE FROM THRESHOLD	MAXIMUM DISTANCE FROM THRESHOLD	
0 to 20	2,000	4,000′	
21 to 50	**3,000′**	**5,500′**	MTH Aircraft Mix Index
51 to 80	3,500′	6,500′	
81 to 120	5,000′	7,000′	
121 to 180	5,500′	7,500′	

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., January 2018.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

There are four taxiways serving the runway. Based on the FAA's criteria, the exit factor at the Airport is maximized when the runways have exit taxiways between 3,000 and 5,500 feet from the runway ends (mix index at MTH is between 21 and 50). Using this criterion, Runway 7-25 has two exits within the optimum range in East Flow, and one in West Flow. Once the proposed runway extension is implemented, there would be two exits in the optimum range for both East and West Flows.

4.1.1.2 Airfield Capacity Analysis

The FAA methodology for capacity analysis involves a step-by-step process that addresses the factors previously discussed. Three components of the airfield's capacity can be determined using the method in FAA AC 5060-5, Change 2, *Airport Capacity and Delay*, including the hourly capacity of the runways and the ASV. ASV represents the estimated annual number of aircraft operations an airport can efficiently accommodate, taking hourly, daily, and monthly operational patterns into consideration. The formula for calculating ASV consists of three variables: CW (weighted hourly capacity), D (the ratio of annual demand to average daily demand in the peak month), and H (the ratio of average daily demand to average peak-hour demand during the peak month).

These variables are multiplied together (CW*D*H) to obtain the ASV for the Airport. Each of these analyses is discussed in the following subsections.

Hourly Capacity of the Runway

The first step in determining the capacity of the airfield at the Airport involves determining the hourly throughput capacity (i.e., the number of aircraft operations that can be accommodated at the Airport in one hour) of each runway-use configuration, which is dependent on the previously describe factors (aircraft fleet mix, percentage of arrivals and touch-and-go operations, navigational aids, etc.). Using AC 150/5060-5, the ultimate capacity of the airfield was calculated for operations in both VMC and IMC. The FAA's capacity calculations include several assumptions "based on runway utilizations which produce the highest sustainable capacity consistent with current ATC rules and practices." These assumptions are as follows:

- The number of arrivals is equal to the number of departures.
- The percent of touch-and-go operations is within the ranges shown in AC 150/5060-5.
- There is a full-length parallel taxiway, and there are ample runway entrance/exit taxiways and no taxiway-crossing problems.
- There are no airspace limitations that would adversely impact flight operations, or otherwise restrict aircraft that could operate at the Airport. Missed approach protection is assured for all converging operations in IFR weather conditions.

Table 4-6 presents the calculated hourly capacities for the operational configurations of the Airport.

Table 4-6: Hourly Airfield Capacity (Aircraft per Hour)

	VISUAL METEOROLOGICAL CONDITIONS		INSTRUMENT METEOROLOGICAL CONDITIONS	
YEAR	EAST FLOW	WEST FLOW	EAST FLOW	WEST FLOW
2016	72	65	55	51
2021	72	65	55	51
2026	69	63	55	51
2036	68	68	54	54

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., January 2018.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

Assuming a 50 percent arrival mix and east flow operations, the VMC hourly capacity decreases from 72 operations in 2016 to 68 operations in 2036. The increase in the share of larger jet aircraft would cause this decrease in hourly capacity. The hourly capacity in VMC East Flow is slightly higher than in VMC West Flow because of a higher occurrence of touch-and-goes in East Flow.

As expected, the hourly capacity estimates under IMC are lower than the estimates under VMC, as a result of a variety of factors: (1) an increase in the mix index and (2) increased separation requirements between successive aircraft operations. Assuming a 50 percent arrival mix, the IMC hourly capacity estimates remain relatively constant through 2036 at 54-55 operations in east flow.

Annual Service Volume

ASV is defined in AC 150/5060-5 as "a reasonable estimate of an airport's annual aircraft operations capacity." ASV accounts for the hourly, daily, and seasonal variations in aircraft demand associated with the airfield, as well as the occurrence of low visibility conditions. ASV can be used as a reference point for the general planning of capacity-related improvements. As annual demand exceeds the ASV of the airfield, aircraft delays increase exponentially. To minimize aircraft delays, the FAA recommends that planning for additional airfield capacity should begin when the airfield's annual demand reaches 60 percent to 75 percent of its ASV[1].

For MTH, the ASV was calculated from AC 150/5060-5 using the fleet mix assumptions previously discussed and the runway-use configuration. Peak-month operations were assumed to total 10 percent of total annual operations. **Table 4-7** summarizes the criteria used to calculate the ASV through the planning period.

As shown, the ASV at the Airport during 2016 was estimated at 212,000 operations, while actual annual demand numbered 75,000 operations. Through the planning horizon, the ASV decreases slightly to 203,000 annual operations, while forecast aircraft operations increase to 98,978 in 2036.

[1] Federal Aviation Administration, Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS), December 4, 2000.

Table 4-7: Annual Service Volume Calculation Summary

	BASE (2016)	2021	2026	2036
Annual Operations	75,000	78,249	85,130	98,978
Peak Month = 10 Percent of Total Annual Operations				
Average Peak Month Daily Operations (Avg PMDO) 1/	242	252	275	319
Average Peak Month Peak Hour Operations (Avg PMPHO) 2/	24	25	27	32
D = Annual Ops / (Avg PMDO) 3/	310	310	310	310
H = (Avg PMDO) / (Avg PMPHO)	10	10	10	10
CW = Weighted Hourly Capacity	68	68	66	66
Airport Service Volume: 4/	212,000	212,000	204,000	203,000

NOTES:

1/ Peak month is assumed to represent 10 percent of the total annual aircraft operations.

2/ Peak hour is assumed to represent 10 percent of the average daily operations of the peak month.

3/ Calculations rounded to nearest whole integer.

4/ ASV calculations (ASV = CW x D x H) do not compute to exact figures shown due to rounding of Avg PMDO, Avg PMPHO, D, H, and CW. ASV calculations rounded to the nearest 1,000.

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., *Aviation Activity Forecasts,* August 2017.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

The ASV ratio, which is the ratio of future demand to the ASV for the Airport, can be used to evaluate if planning and construction of new or modified runway facilities would be required. As previously noted, the FAA recommends airports to initiate planning/design for new runways when existing facilities reach 60 to 75 percent of their capacity. As indicated in **Table 4-8** and on **Exhibit 4-1**, the Airport's annual demand is forecast to increase from 75,000 operations (35 percent of ASV) in 2016 to 98,978 operations (49 percent of ASV) in 2036. Runway capacity is anticipated to be adequate during the planning horizon, and no planning for additional airfield capacity is required through the planning horizon.

Table 4-8: Annual Demand versus Annual Service Volume

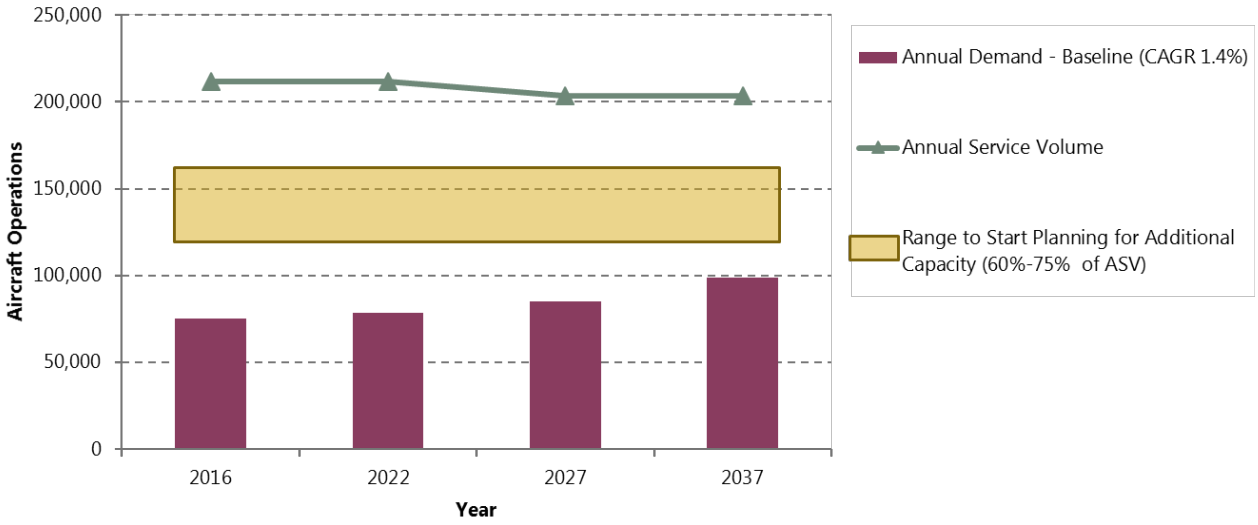
	BASE (2016)	2021	2026	2036
Annual Operations	75,000	78,249	85,130	98,978
ASV (Average)	212,000	212,000	204,000	203,000
ASV Ratio	35%	37%	42%	49%

NOTE: ASV – Annual Service Volume

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, December 1995; Ricondo & Associates, Inc., *Aviation Activity Forecasts*, August 2017.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

Exhibit 4-1: Annual Service Volume versus Forecast Demand



NOTE: ASV – Annual Service Volume

SOURCE: Ricondo & Associates, Inc., January 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

4.1.2 AIR TRAFFIC CONTROL TOWER

Although forecast aviation activity does not justify an ATCT at MTH, Airport management personnel expressed interest in protecting the land area adjacent to the passenger terminal for the construction of a future ATCT (when warranted by air traffic demand). This ATCT could operate under the FAA Contract Tower Program or as a remote control tower.

Saab started operating remote control towers in 2015 in Sweden; these towers are certified as conventional control towers. Several other sites in Europe and the United States have successfully tested remote control towers and are planning for implementation. A remote control tower includes high-definition cameras and Pan-Tilt-Zoom cameras, surveillance and meteorological sensors, microphones, signal light guns, and other devices for deployment at an airport. Data from these sensors are sent to a Remote Tower Center (RTC) to be displayed in real time. A controller at the RTC has the tools, in addition to live video, to operate the airport in a similar manner as he or she would in a normal ATCT. Remote control towers can enable an airport to more economically provide tower services without building and equipping a tower.

4.1.3 AIRFIELD GEOMETRY

The airfield consists of the runway, taxiways, taxilanes, and apron areas. These facilities support the maneuvering of aircraft at the Airport. This section provides an assessment of airfield improvements identified for MTH. Specifically, the following subsections will discuss runway, taxiway, and other airfield facility requirements

necessary to support the various types and level of aircraft operations expected over the course of the planning horizon.

4.1.3.1 Airport Design Aircraft

The critical design aircraft is defined as the most demanding aircraft that will substantially use the Airport, with "substantially" defined as either 500 or more annual itinerant operations or scheduled service. Also, the critical design aircraft can be either a single aircraft or a composite of the most demanding characteristics of several aircraft.[2] The 2016 FAA-approved interim Airport Layout Plan (ALP) identified the Cessna Citation family as the critical aircraft for Runway 7-25. The Cessna Citation is a B-II aircraft.

As part of this demand/capacity and facility requirements analysis, the critical aircraft was re-evaluated based on data obtained from the FAA Traffic Flow Management System Counts (TFMSC), collected between January 1, 2016, and December 31, 2016. As these data do not capture all operations, including most conducted under VFR and some conducted under IFR not captured by the FAA's enroute computers, supplemental data were provided by Marathon Aviation Associates, the FBO who oversees Marathon General Aviation and Marathon Jet Center at MTH.The supplemental data provided fleet mix data for 2016 based on transaction data from fuel sales and facility use fees. This data has been used to augment TFMSC data to inform the baseline fleet mix.

Table 4-9 summarizes the augmented TFMSC data for Runway 7-25. Annual operations by Airplane Design Group (ADG) suggests that ADG II represents the largest ADG with 500 or more annual operations (substantial use threshold). A review of the aircraft type in the ADG II category shows that the Cessna Citation family aircraft conducted over 5,300 operations in 2016. It is anticipated that the Cessna Citation will remain the critical aircraft in the future. For the Cessna Citation, the Taxiway Design Group (TDG), which is based on the overall width of the aircraft's main gear and the distance between the main gear and the cockpit, is TDG 2. Designation of the TDG is determined using a chart in FAA AC 150/5300-13A, Change 1. This newer approach offers proper taxiway width and separation dimensions, while at the same time offering a better method for determining the required turning radii and edge fillets. The intent is to provide the appropriate taxiway geometry, while minimizing excess pavement and limiting the potential for confusing layouts.

Table 4-9: 2016 Runway 7-25 Aircraft Operations

Airplane Design Group	I	II	III	IV	V	TOTAL
Number of Annual Aircraft Operations	42,450	32,100	225	225	0	75,000
Share	56.6%	**42.8%**	0.3%	0.3%	0.0%	100%

SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, *Estimated Activity at KMTH for 2016*, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).
PREPARED BY: Ricondo & Associates, Inc., October 2017.

[2] Federal Aviation Administration, Advisory Circular 150/5000-XX, *Critical Aircraft and Regular Use Determination*, Draft.

4.1.3.2 Runway Design Code

The Runway Design Code (RDC) is a coding system described in FAA AC 150/5300-13A, Change 1, *Airport Design*; it is the basis for specifying applicable runway design standards. The intent of the RDC is to provide a simple method for compiling the numerous dimensional and performance specifications for aircraft operating at or projected to operate at an airport; the specifications are translated into criteria that define the dimensional and design standards for a given runway. The RDC consists of three parameters: AAC, ADG, and approach visibility minimums. The RDCs for Runway 7-25 are described in the following list and are summarized in **Table 4-10**:

- Aircraft Approach Category – From an approach speed standpoint, the Cessna Citation is categorized as AAC B.
- Airplane Design Group – Based on wingspan, the Cessna Citation is categorized as ADG II.
- Visibility Minimums – Runway 7 is equipped with an RNAV/GPS approach that provides a visibility minimum of 1.25 miles, and Runway 25 is equipped with an RNAV/GPS approach that provides a visibility minimum of 1.0 mile.

Table 4-10: Runway Design Codes (Existing and Future)

	RUNWAY DESIGN CODE COMPONENTS			
RUNWAY	**AIRCRAFT APPROACH CATEGORY**	**AIRPLANE DESIGN GROUP**	**VISIBILITY MINIMUMS**	**RUNWAY DESIGN CODES**
7-25	B	II	7–5,000 (1.25 miles) 25–5,000 (1.00 mile)	**7 – B/II/5000** **25 – B/II/5000**

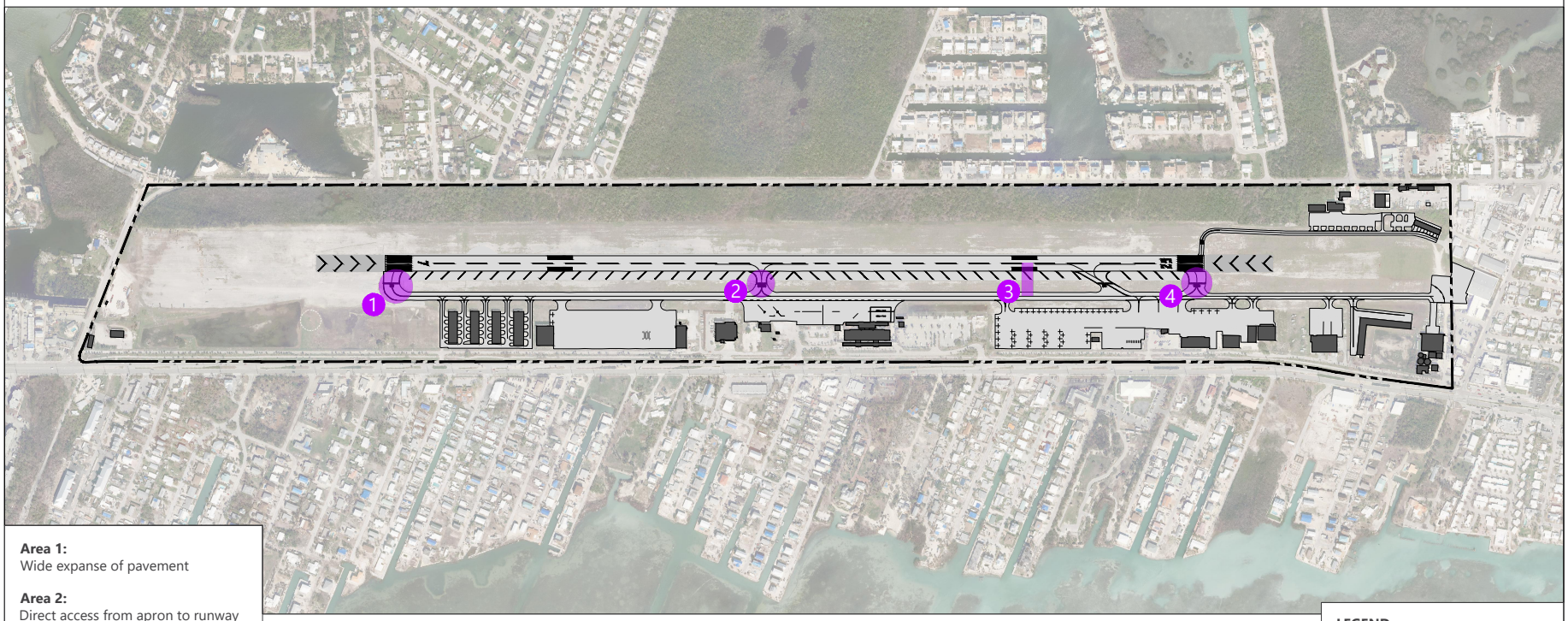
SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, February 26, 2014.
PREPARED BY: Ricondo & Associates, Inc., December 2017.

4.1.3.3 Areas of Noncompliant Airfield Geometry

An assessment of airfield geometry principles was conducted, based on guidance set forth in FAA AC 150/5300-13A, *Airport Design*. A total of four areas of noncompliance were identified and are highlighted on **Exhibit 4-2**. The following is a list of the four areas of noncompliance:

- Area 1 – wide expanse of pavement at runway entrance
- Area 2 – direct access from apron to runway
- Area 3 – runway centerline-to-parallel taxiway separation (currently 200 feet instead of 240 feet)
- Area 4 – wide expanse of pavement at runway entrance

Resolution of these areas of noncompliance will be addressed in Section 5, Alternatives Development.



Area 1:
Wide expanse of pavement

Area 2:
Direct access from apron to runway

Area 3:
Nonstandard Runway 7-25 to parallel taxiway separation

Area 4:
Wide expanse of pavement

LEGEND
- Areas of Noncompliance
- Airport Property Boundary
- Existing Buildings
- Existing Airfield Pavement

SOURCES: Jacobs Inc., September 2015 (Aerial Photography); URS Corporation, Airport Layout Plan, March 2016; Ricondo & Associates, Inc., November 2017.
PREPARED BY: Ricondo & Associates, Inc., December 2018.

EXHIBIT 4-2

NORTH 0 1,000 ft.

Noncompliant Airfield Geometry

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 505.0 - Capacity Analysis & Facility\2-Airfield Geometry\CAD\Exhibit 4.1-2_MTH Noncompliant Airfield Geometry.dwgLayout: Exhibit 4.1-2 Plotted: Dec 16, 2019, 05:09PM

4.1.3.4 Federal Aviation Administration Design Standards

Table 4-11 presents the dimensional design standards for ARC B-II and TDG 2 (corresponding to Runway 7-25), as listed in FAA AC 150/5300-13A, Change 1, *Airport Design*, as well as key dimensions for the existing airfield facilities. This table provides the foundation for assessing future facility needs, and it presents standards for the instrument approach minimums that correspond to existing conditions.

4.1.3.5 Runway Design

As indicated in Section 4.1.1, it is not anticipated that the Airport will experience runway capacity constraints during the planning period. Nonetheless, runways should be designed to accommodate the most demanding or critical aircraft, in accordance with the standards developed by the FAA, using the ARC and RDC systems. Runway geometry deficiencies are described in the following subsections.

Runway Width

The FAA has determined runway width requirements based upon the critical aircraft's approach speed and wingspan. The various widths provide a certain margin of error to account for wind effects on landing and departing aircraft. Referencing FAA AC 150/5300-13A, Change 1, *Airport Design*, the standard runway width of a B-II runway is 75 feet wide. Runway 7-25 has a width of 100 feet, but it is planned to be reduced to 75 feet upon completion of the runway shift project (anticipated to be completed within the next 5 to 10 years). No improvements to the planned runway width are required.

Runway Pavement Strength

The published pavement strengths for Runway 7-25 are 75,000 pounds for single-wheel landing gears; 125,000 pounds for dual-wheel landing gears; and 191,000 pounds for dual-wheel tandem landing gears. The runway's pavement classification number (PCN) is 94, with the following characteristics:

- F (flexible pavement)
- A (high subgrade)
- W (no tire pressure limit)
- T (technical pavement evaluation method).

No improvements to runway pavement strength are required.

Runway Pavement Conditions

As mentioned in Section 2.2, according to the *2015 Statewide Airfield Pavement Management Program*, published by the FDOT Aviation and Spaceport Office, Runway 7-25 is in fair condition with a weighted PCI value of 61. The recommended FDOT minimum PCI's is 65. Thus, the runway should be milled and overlaid to rehabilitate and restore the pavement areas' serviceability. The runway rehabilitation will be addressed when the runway is shifted to the northwest 40 feet to address the non-standard runway to taxiway separation distance.

Table 4-11: Design Standards for Airport Reference Code B-II and Taxiway Design Group 2

	EXISTING		AIRPORT REFERENCE CODE B-II STANDARDS	TAXIWAY DESIGN GROUP 2 STANDARDS
	RWY 7	RWY 25		
Runway Centerline to Holdline	130 feet		200 feet	
Runway Centerline to Taxiway/Taxilane Centerline	200 feet		240 feet	
Runway Centerline to Aircraft Parking Area	Varies: 265 feet to 285 feet		250 feet	
Taxiway and Taxilane Separation Standards	-	-	-	
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	-		105 feet	
Taxiway Centerline to Fixed or Movable Object	Varies: 25 feet 1/ to 85 feet		65.5 feet	
Taxilane Centerline to Parallel Taxilane Centerline	-		97 feet	
Taxilane Centerline to Fixed or Movable Object	-		57.5 feet	
APPROACH RUNWAY PROTECTION ZONE DIMENSIONS				
Length	1,000 feet		1,000 feet	
Inner Width	500 feet		500 feet	
Outer Width	700 feet		700 feet	
Acres	13.77		13.77	
RUNWAY DESIGN STANDARDS				
Runway Width	100 feet		75 feet	
Runway Shoulder Width	Varies: 0 feet to 50 feet		10 feet	
Runway Blast Pad Width	100 feet		95 feet	
Runway Blast Pad Length	400 feet		150 feet	
Runway Safety Area Width	150 feet		150 feet	
Runway Safety Area Length Prior to Landing Threshold	300 feet		300 feet	
Runway Safety Area Length Beyond Runway End	300 feet		300 feet	
Runway Object Free Area Width	500 feet		500 feet	
Runway Object Free Area Length Beyond Runway End	300 feet		300 feet	
TAXIWAY DIMENSIONAL STANDARDS				
Taxiway Width	Varies: 35 feet to 50 feet		-	35 feet
Taxiway Edge Safety Margin	-		-	7.5 feet
Taxiway Shoulder	0 feet		-	15 feet
Taxiway Safety Area Width	79 feet		79 feet	-
Taxiway Object Free Area Width	131 feet		131 feet	-
Taxilane Object Free Area Width	115 feet		115 feet	-

NOTES: RWY – Runway

1/ 25 feet from Taxiway A to commercial apron pavement.

2/ Values in red are noncompliant.

SOURCES: Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, February 2014; Ricondo & Associates, Inc., December 2017.

PREPARED BY: Ricondo & Associates, Inc., December 2017.

Runway Shoulder Width

Runway 7-25 has a 50-foot-wide shoulder along its south edge, but there is no shoulder along the north edge. Per FAA standards, runway shoulders are only recommended for ADG III runways and are required for ADG IV, V, and VI runways. As such, no improvement to the exiting runway shoulders is required. Considering the type of aircraft that will operate at the Airport, runway shoulders will not be required when the runway is shifted northwest 40 feet.

Runway Blast Pads

FAA AC 150/5300-13A, Change 1, *Airport Design*, recommends that runways serving aircraft with an RDC of B-II have blast pads located at each runway end. These areas are paved, but they are not usually constructed of full-strength pavement. They serve to reduce erosion caused by jet blast produced upon aircraft takeoff.

Blast pad dimensions for ADG II aircraft (visual approach) are 95 feet wide by 150 feet long. The Runway 7 and Runway 25 end blast-pads meet these dimensions; therefore, no improvements to the blast pads are required. While not required, the construction of new blast pads should be considered when the runway is shifted northwest 40 feet.

Runway-to-Taxiway Separation Distance

The FAA's design standards for runway-to-taxiway separation distances ensure aircraft can safely operate on parallel taxiways without encroaching the runway safety area (RSA), obstacle free zone (OFZ), RPZ, or navigational aid critical areas. For a B-II runway, the FAA requires a 240-foot separation between the runway centerline and the parallel taxiway centerline.

The existing Runway 7-25 centerline separation to Taxiway A is 200 feet. To conform with ADG II requirements, a 40-foot northerly shift of the runway is planned. This shift would necessitate the construction of additional pavement, the relocation of existing runway lights, the remarking of pavement, and the reconfiguration of taxiway connectors.

4.1.3.6 Runway Length

This subsection discusses the runway length that would allow the Airport to meet the operational requirements of current and forecast users. Runway length is a critical component at each airport. While insufficient runway length may restrict operations by some aircraft, too long of a runway may result in unnecessary maintenance costs. As stated in Section 2, Runway 7-25 has an overall length of 5,008 feet and a width of 100 feet. A Commercial Air Service Analysis conducted as part of this MPU concluded that commercial air service at MTH was not viable. However, GA jet aircraft occasionally incur weight penalties with the existing runway length, requiring a refueling stop enroute to their destination. To better serve their users at MTH, Monroe County is proposing a runway extension of 392 feet to the west end, which would result in a total runway length of 5,400 feet.

The runway length analysis determines the maximum runway length required to accommodate various aircraft at expected ranges (longest nonstop distances to be flown from MTH). According to FAA planning guidance,

the recommended length of a primary runway is determined by considering either the family of aircraft with similar performance characteristics or a specific aircraft type requiring the longest runway. In either case, the choice should be based on aircraft that are reasonably expected to use the runway on a regular basis, which is at least 500 operations a year (landings and takeoffs combined), as defined in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.[3]

FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, states: "For federally funded projects, the airport designer must consider the length of haul (range) that is flown by airplanes on a substantial use basis." This requirement is predicated on the fact that aircraft takeoff weights are influenced by the amount of fuel payload required to travel to the destination, including minimum fuel reserves prescribed by the FAA. Aircraft performance information was obtained from the Aircraft Performance Comparator[4] software.

Planning Factors

Planning factors that were used in the runway length determination included the following:

- **Aircraft Type:** The runway length analysis is based on the aircraft fleet mix identified in the forecasts. Runway length requirements were considered for aircraft operating long-haul international flights.
- **Aircraft Weight:** Aircraft weight is the single most important factor when conducting a runway length analysis. As the weight of a model of aircraft increases, the runway length requirement increases for a given condition. The weight of each aircraft type can vary considerably depending on payload (passengers, baggage, and cargo) and the amount of fuel on board to fly a defined stage length.
- **Engine Model:** Engine models are typically not a factor in evaluating GA aircraft.
- **Weather (temperature, prevailing winds, etc.):** Performance characteristics of the most demanding weather conditions that typically occur at the Airport were considered. The runway length requirements provided herein reflect the aircraft performance characteristics during the manufacturer-defined "hot day" (84°F to 92°F) and zero-wind conditions. The normal temperature high for MTH during the hottest month (August) is 91°F.[5]
- **Flap Settings:** Most aircraft have a variety of flap settings that affect runway length requirements. The optimal aircraft flap settings for takeoff performance were used in the analyses.
- **Airport Elevation:** Aircraft performance is also affected by the elevation of the airfield. No adjustments to runway length requirements were made, as the airfield elevation is 5.2 feet above mean sea level.
- **Runway Surface Conditions:** FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, addresses the implications of wet, slippery pavement conditions. In accordance with this document, landing runway length requirements should be increased to accommodate wet pavement conditions when assessing the needs of turbojet-powered aircraft. When data pertaining to landing distances on wet runways are unavailable, a net increase of 15 percent is recommended. Takeoff runway length

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3 Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, July 2005.

4 Conklin & de Decker, *Aircraft Performance Comparator*, 2017.

5 U.S. Climate Data, https://www.usclimatedata.com/climate/marathon/florida/united-states/usfl0787/2015/8 (accessed January 2018).

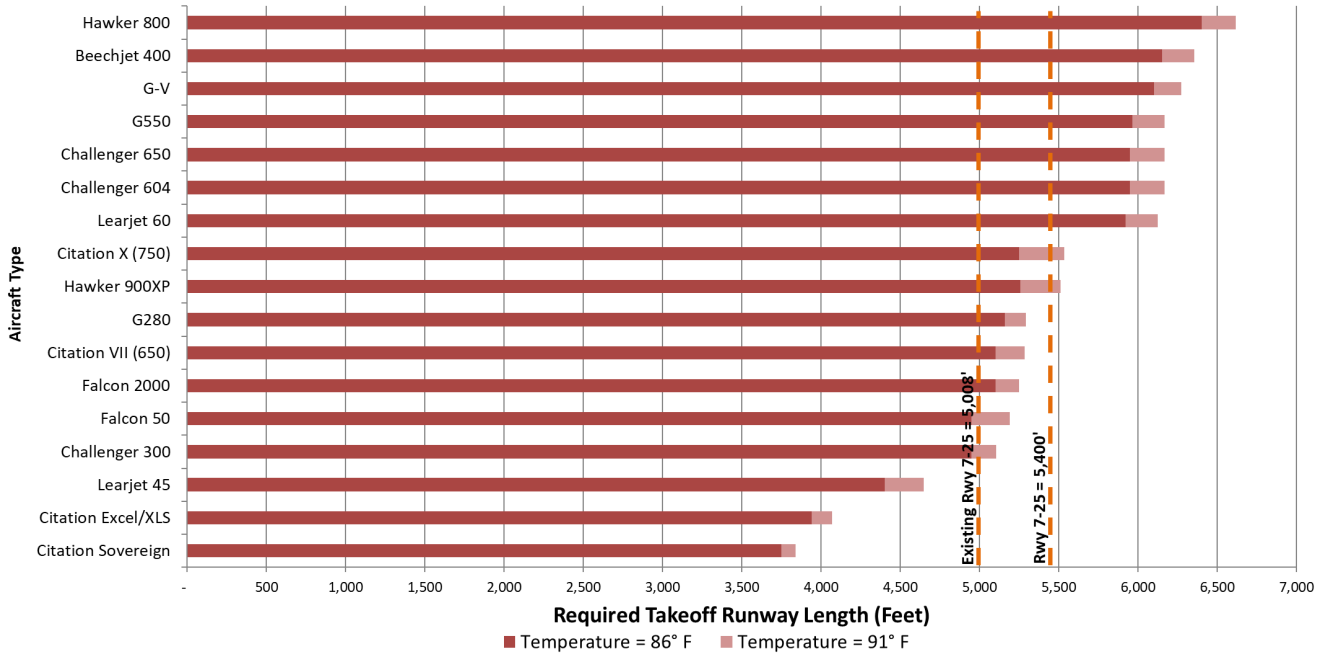
requirements prescribed by the aircraft manufacturers do not require adjustments to account for wet pavement conditions.

- **Runway Gradient:** No adjustments to runway length requirements were made based on runway gradient, since the elevation changes along the Runway 7-25 centerline are negligible.
- **Aircraft Fleet Mix:** As aircraft performance characteristics vary, the establishment of a preferred runway length does not require evaluation of every aircraft type. Only the most demanding aircraft types, in terms of runway length and width, need to be evaluated. For the purposes of this analysis, representative small and midsize jet aircraft anticipated to operate at MTH through the planning horizon were evaluated.

Takeoff Runway Length Requirements Based on Maximum Takeoff Weight

Exhibit 4-3 depicts the required takeoff runway length at maximum take-off weight (MTOW) when the temperature is 86 degrees and 91 degrees. MTOW is the maximum certificated weight an aircraft is allowed at takeoff, based on structural and engineering requirements. This information is presented as a bar graph reflecting the takeoff runway length required for the aircraft anticipated to operate from MTH through the planning horizon. As depicted, three of the seventeen evaluated aircraft could takeoff on the existing Runway 7-25 at MTOW at 91 degrees. A 5,400-foot-long runway would allow a total of eight aircraft to operate on Runway 7-25 at MTOW at 91 degrees.

Exhibit 4-3: Takeoff Distance Requirements at Maximum Certificated Takeoff Weight



NOTE: RWY – Runway

SOURCES: Conklin & de Decker, *Aircraft Performance Comparator*, 2017; Federal Aviation Administration, Advisory Circular 150/5325-4C, *Runway Length Recommendations for Airport Design*, July 30, 2013; Ricondo & Associates, Inc., December 2017.

PREPARED BY: Ricondo & Associates, Inc., December 2017.

Takeoff Runway Length Requirements Based on Useful Load

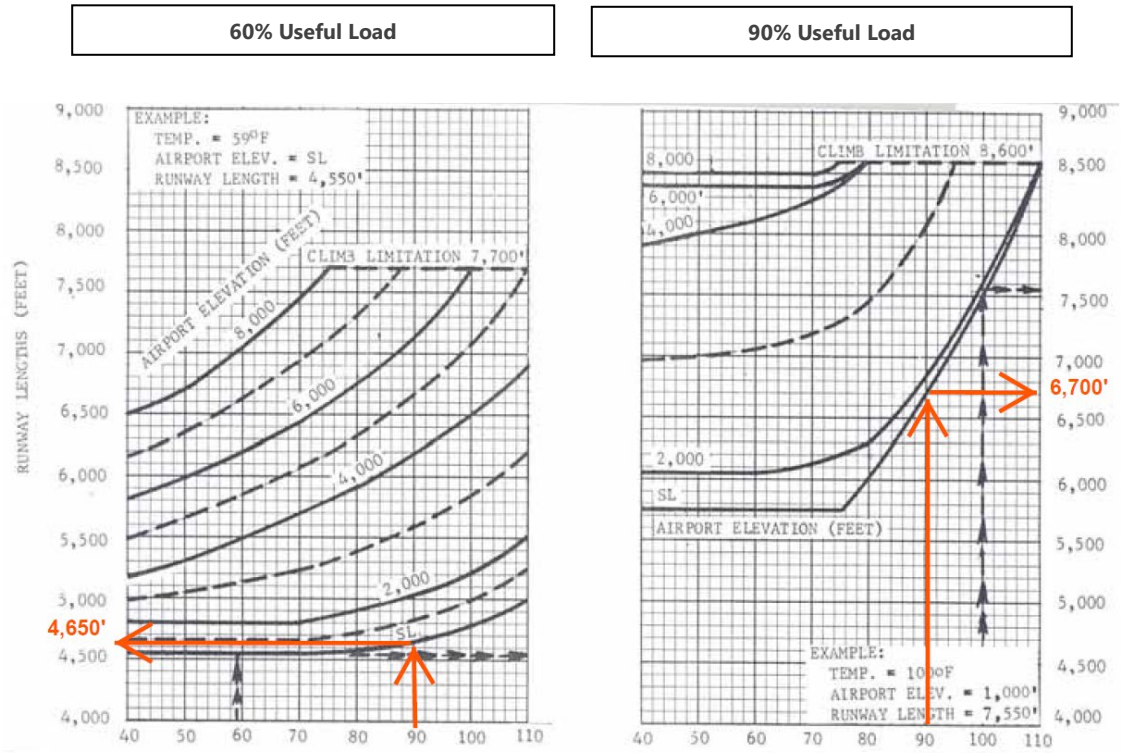
The performance curves developed by the FAA, and presented in AC 150/5325-4B, for aircraft within a maximum certificated takeoff weight of more than 12,500 pounds and up to and including 60,000 pounds were used to obtain the required runway length for either 75 or 100 percent of the turbojet-powered fleet that could operate at 60 or 90 percent of the useful load.

Exhibit 4-4 and **Exhibit 4-5** show the following runway length requirements:

- 75 percent of the fleet at 60 percent useful load: 4,650 feet required
- 75 percent of the fleet at 90 percent useful load: 6,700 feet required
- 100 percent of the fleet at 60 percent useful load: 5,400 feet required
- 100 percent of the fleet at 90 percent useful load: 8,300 feet required

As shown, the existing runway length of 5,008 feet can accommodate 75 percent of the turbojet-powered aircraft fleet with a 60 percent payload, but the length cannot accommodate a 90 percent payload (would require 6,700 feet). The planned runway extension to a total length of 5,400 feet would accommodate 100 percent of the fleet with a 60 percent payload, but it would not accommodate a 90 percent payload (would require 8,300 feet).

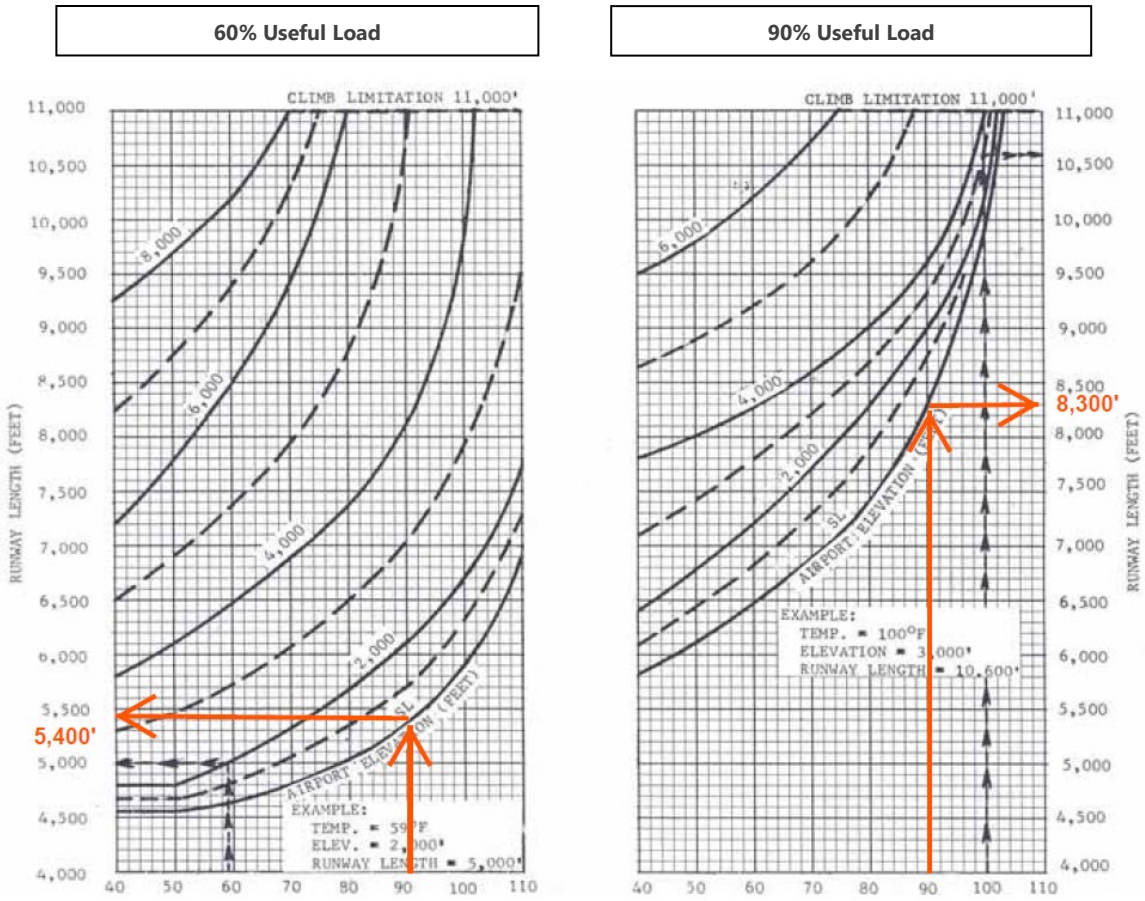
Exhibit 4-4: Takeoff Runway Length Requirements Based on Useful Load – 75 Percent of the Fleet



SOURCES: Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, July 2005; Ricondo & Associates, Inc., January 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

Exhibit 4-5: Takeoff Runway Length Requirements Based on Useful Load – 100 Percent of the Fleet



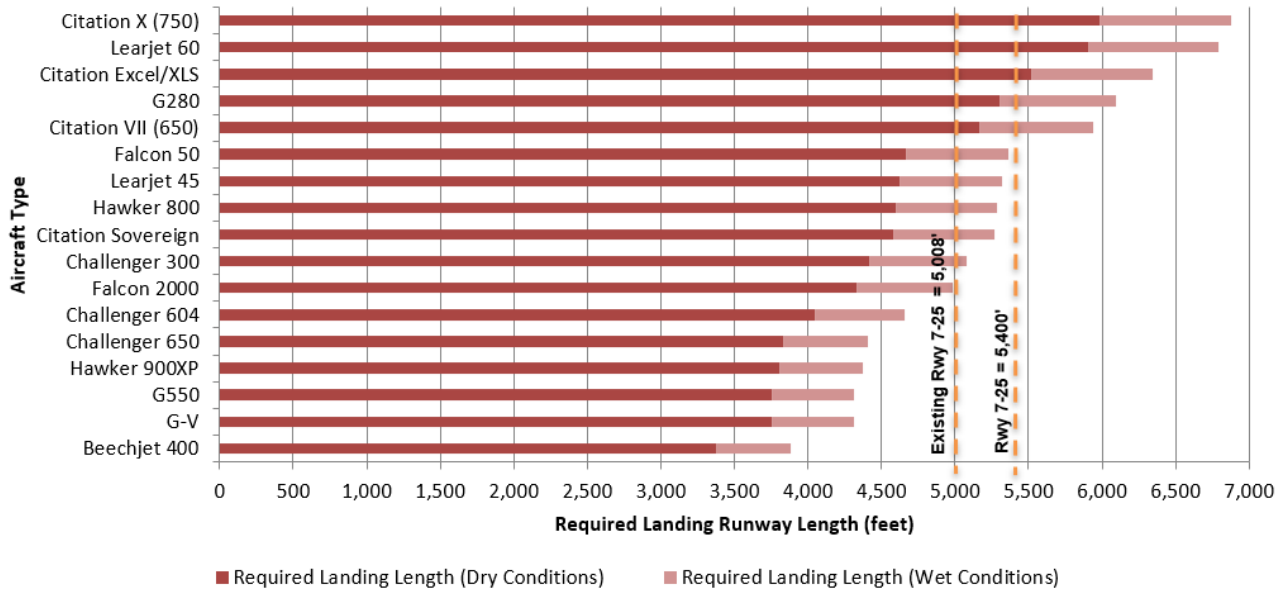
SOURCES: Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, July 2005; Ricondo & Associates, Inc., January 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2018.

Landing Runway Length Requirements Based on Maximum Landing Weight

Although the runway length requirements for aircraft departures typically exceed those for aircraft arrivals, a landing distance requirements analysis was conducted to determine whether Runway 7-25 could accommodate the anticipated aircraft fleet mix at maximum gross landing weight. The same aircraft as those identified in the takeoff length requirements analysis were evaluated. As shown on **Exhibit 4-6**, twelve of the sixteen aircraft evaluated can land on existing Runway 7-25 in dry conditions. Three of the sixteen aircraft are anticipated to require more than 5,400 feet to stop on a dry runway, and five of the sixteen aircraft require more than 5,400 feet to stop on a wet runway.

Exhibit 4-6: Landing Distance Requirements at Maximum Certificated Landing Weight



NOTE: RWY – Runway

SOURCES: Conklin & de Decker, *Aircraft Performance Comparator*, 2017; Federal Aviation Administration, Advisory Circular 150/5325-4C, *Runway Length Recommendations for Airport Design*, July 30, 2013; Ricondo & Associates, Inc., December 2017.

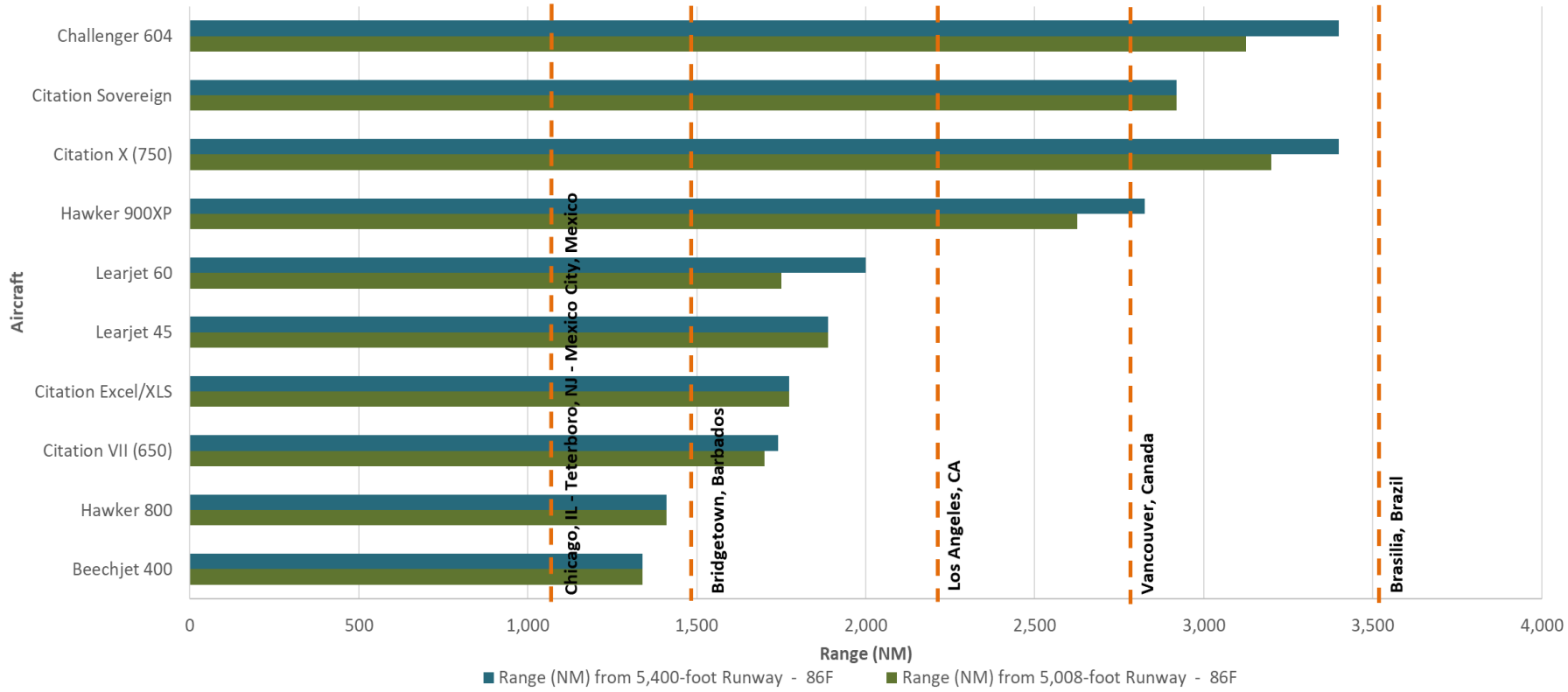
PREPARED BY: Ricondo & Associates, Inc., December 2017.

Maximum Aircraft Range

Exhibit 4-7 depicts the maximum range the evaluated aircraft could travel from MTH, assuming a typical payload of four passengers and a temperature of 86°F. This information is presented as a bar graph reflecting the maximum distance, in nautical miles, that can be flown from MTH's existing Runway 7-25 (5,008 feet) and the planned runway extension (5,400 feet). Representative cities are shown for reference.

As shown on Exhibit 4-7, the jet aircraft range capabilities vary significantly based on the type of business jet aircraft being considered. The proposed 392 feet extension would benefit the Challenger 604, Citation X, Hawker 900XP, Learjet 60, and Citation VII. The Challenger 604 would benefit the most with its range capability increasing from 3,125 to 3,400 nautical miles. Considering that 99.6 percent of flights originating from MTH operate within 1,500 nautical miles of the Airport, it is anticipated the proposed runway extension would accommodate nearly 100 percent of business jet aircraft anticipated at MTH.

Exhibit 4-7: Maximum Aircraft Range (86°F – Four Passengers)



NOTE: NM – Nautical Miles

SOURCES: Conklin & de Decker, *Aircraft Performance Comparator*, 2017; Ricondo & Associates, Inc., January 2018.
PREPARED BY: Ricondo & Associates, Inc., January 2018.

Conclusion

While the proposed 392-foot runway extension is not warranted in the short-term, it should be incorporated into the Airport layout Plan (ALP) in order to protect the safety and airspace surfaces associated with the proposed runway from incompatible land uses. In the long-term, this project would give pilots greater flexibility in meeting their stage length and payload requirements and allow for the accommodation of nearly 100 percent of jet aircraft (based on the destinations currently served from the Airport).

4.1.3.7 Runway Areas

The FAA's design standards for the various runway areas at MTH are presented in this section. The following is a list of the airfield safety areas that were evaluated for the Airport:

- runway safety areas (RSAs)
- runway object free areas (ROFAs)
- object free zones (OFZs)
- runway OFZs
- runway protection zones (RPZs)

The existing ALP was used to determine the locations of objects that may affect air navigation. The existing runway area deficiencies are described in the following subsections.

Runway Safety Area

RSAs are rectangular areas centered on runway centerlines. Under normal (dry) conditions, these areas can support aircraft without causing structural damage to the aircraft or injury to its occupants, should an aircraft inadvertently leave the paved runway surface. To serve this function, the FAA requires RSAs to be: (1) cleared and graded; (2) drained by grading or storm sewers to prevent water accumulation; and (3) free of objects, except those that must be in the RSA because of their function (e.g., approach lighting, other NAVAIDS).

The existing Runway 7-25 RSA (length and width) meets the FAA design standards for B-II runways, and no improvements are required.

Runway Object Free Area

ROFAs are rectangular areas centered on runway centerlines that are required to be clear of objects protruding above the RSA edge elevation, except for those objects that are essential to air navigation or aircraft ground maneuvering. Objects that are nonessential for either air navigation or aircraft ground maneuvering are not permitted within the ROFA.

The existing Runway 7-25 ROFA (length and width) meets the FAA design standards for B-II runways, and no improvements are required.

Obstacle Free Zone

The OFZs are three-dimensional volumes of airspace that support the transition of ground-to-airborne aircraft (and vice-versa). The OFZ clearance standards established by the FAA prohibit taxiing and parking aircraft, or locating other objects, where they would penetrate this airspace, except frangible NAVAIDS or fixed-function objects. The OFZ consists of the airspace up to 150 feet above the established Airport elevation and along the runway and extended runway centerline. The OFZ can be further categorized as inner-approach OFZs and inner-transitional OFZs.

The required runway OFZ for runways serving aircraft more than 12,500 pounds is typically 400 feet wide and extends 200 feet beyond each end of the runway. The OFZ for the existing Runway 7-25 meets current FAA standards. The only objects within the runway OFZ are NAVAIDS that are required to be located there because of their function.

Runway Protection Zone

The RPZ is a trapezoidal area centered on the extended runway centerline. The length and width of the RPZ are contingent on the size of the aircraft operating on the runway, as well as the type of approach (e.g., visual, instrument) and the approach minimums available. As a result, the criteria for the RPZ may vary for each runway end. RPZs are designed to enhance the protection of people and property on the ground. To achieve this goal, the FAA recommends that the airport operator own the property inside the RPZ. This area should be free of land uses that create glare and smoke. Also, the FAA recommends that airport operators keep the RPZs clear of incompatible land uses, specifically residences, fuel storage facilities, and places of public assembly (e.g., churches, schools, office buildings, and shopping centers). Typically, a single RPZ is associated with each runway end; however, the FAA has suggested that separate approach and departure RPZs be defined for any runway end with a displaced arrival threshold.

Buildings #23 and #19 (aircraft shade hangars along Taxiway E) were located inside the Runway 25 RPZ; these buildings, however, were demolished in 2017. There are no incompatible land uses within the Runway 7 RPZ.

4.1.3.8 Aircraft Run-Up Areas

There are currently no designated run-up areas at the Airport. The FAA recommends providing holding bays or run-up areas when runway operations reach a level of 30 operations per hour. Based on discussions with Airport management personnel, hourly operations peak at approximately 20 aircraft, and no congestion was observed due to run-up operations. Therefore, no run-up areas are planned at the Airport through the planning horizon.

4.1.4 INSTRUMENT APPROACHES

There are two nonprecision instrument approaches at MTH: RNAV/GPS approaches to each runway end. No deficiencies with the current instrument approaches were reported.

4.1.5 AIRFIELD LIGHTING

Various types of airfield lighting are evaluated in this section, such as the Airport beacon and the runway and taxiway edge lights.

4.1.5.1 Airport Beacon

As described in Section 2.2, the rotating beacon at MTH is located near the wastewater facility. The beacon was damaged during Hurricane Irma in September 2017 and was subsequently rebuilt and restored to an operational condition.

4.1.5.2 Runway and Taxiway Edge Lights

As described in Section 2.2, Runway 7-25 and the airfield taxiways are equipped with medium-intensity edge lighting systems for night operations and restricted visibility. According to Airport personnel, the airfield lighting system is in poor conditions and is antiquated. Additionally, it was submerged by Hurricane Irma's storm surge in September 2017. A full damage assessment was conducted in October 2017. Although the airfield lighting system is still functional, it is anticipated that corrosion will require the system to be replaced in the near term. The airfield lighting system will be replaced as part of the runway shift project which is anticipated to occur in 2024/2025.

4.1.6 AIRFIELD SIGNAGE

Based on FAA AC 150/5340-18D, *Standards for Airport Sign Systems*, FAA AC 150/5300-18F, *Standards for Airport Signs Systems (2010)*, and FAA Engineering Brief 89, *Taxiway Nomenclature Convention*, the following are key issues related to existing airfield nomenclature:

- Runway 7-25 stub taxiways (both sides) should be designated as "A1," "A2," A3," etc., to promote positive location identification and to reduce the risk of runway incursions.
- Runway 7-25 entrance taxiways at the same runway end must use their respective parallel taxiway's single alphabet designation with the addition of a numeric designation, such as "A1" and "B1."
- The naming "Taxiway E" should not be used twice and for two taxiways located on opposite side of the runway. The taxiway nomenclature on each side of the runway should be different (only crossing taxiways that accommodate high traffic should keep the same name).

A revised airfield signage plan is recommended, which will be further discussed in Section 5, Alternatives Development. Throughout the planning period, existing signage should be maintained in proper working order. Additionally, as other airfield pavement projects are conducted, new signage should be installed that meets FAA design criteria. The types and number of new signs that are likely to be required during the planning period will depend upon the selected development alternatives.

4.1.7 PAVEMENT MARKINGS

Airport pavements are marked with painted lines and numbers to aid in the identification of the runways from the air and to provide information to the pilot during the approach phase of flight. A description of the existing markings on airfield pavement areas was provided in Section 2.

All areas have the appropriate markings for the existing conditions, but some markings are fading and need repainting. MTH has a recurring maintenance program that includes annual repainting of airfield markings, and it is anticipated that faded markings will be repainted as part of this program.

4.1.8 VISUAL LANDING AIDS

As discussed in Section 2.2, the Runway 7 and Runway 25 ends are equipped with four-box PAPI lighting systems. In addition, Runway 7 is equipped with REIL. Throughout the planning period, existing visual landing aids should be maintained in proper working order. However, no additional visual landing aids are anticipated to be required at the Airport. The PAPI and REIL systems will need to be relocated when the runway is shifted northwest 40 feet or new systems would need to be installed.

4.1.9 WIND DIRECTION INDICATORS

The lighted segmented circle and wind cones are reported in good condition. No improvements are recommended to the existing system, beyond routine maintenance.

4.1.10 SUMMARY OF RECOMMENDED AIRFIELD IMPROVEMENTS

The following improvements are recommended to meet FAA design standards:

- airfield geometry improvements for compliance with FAA AC 150/5300-13A, Change 1, *Airport Design including:*
    - Shift Runway 7-25 to the northwest 40 feet, which will provide a runway-to-taxiway centerline separation distance of 240 feet;
    - Remove 40 feet of excess runway pavement on the south side of the existing runway;
    - Remove excess runway shoulder pavement;
    - Construct new blast pads at relocated runway ends;
    - Demolish existing excess pavement on Taxiway B;
    - Demolishing existing Taxiway C and reconstruct Taxiway C west of its existing location;
    - Demolish existing Taxiway D and reconstruct Taxiway D perpendicular to the relocated runway;
    - Demolish existing excess pavement on Taxiway E;
    - Relocate and/or install new runway edge lights and threshold lights;
    - Relocate and/or install new REIL on the Runway 7 end;
    - Modify markings, lighting, and signage on connecting Taxiways B, C, D, and E;
    - Update RNAV GPS instrument approach procedures to reflect the runway 40-foot lateral shift
    - Extend Runway 7 by 392 feet and extend Taxiway A to the new runway end

4.2 Passenger Terminal Facilities

A Commercial Air Service Analysis conducted as part of this Master Plan Update (MPU) concluded that commercial air service was not viable at MTH. As a result, there is no anticipated demand for passenger terminal facilities such as security screening checkpoints, baggage claim devices, etc. The existing passenger terminal will continue accommodating rental car operators, the U.S. CBP facility, and Monroe County administration offices.

4.3 On-Airport Roadways

On-airport roadways typically consist of terminal frontage/curb roads, perimeter roads, and service roads. At MTH, access to the Airport is provided by U.S. Highway 1 and Airport Access Road. Airport Access Road provides one-way access to the terminal curbside, parking lot, and rental car facility.

4.3.1 AIRPORT ACCESS ROAD

Although Airport Access Road provides landside access for the entire south side of the Airport, it is segmented in one location and requires re-entry to U.S. Highway 1 at the Marathon General Aviation FBO entrance to access facilities to the west of the terminal building. **Exhibit 4-8** shows the segmented location of Airport Access Road. Options to mitigate the segmentation by tying the existing road into the Airport's main entrance with be evaluated in Section 5.

Exhibit 4-8: Airport Road Segmentation

SOURCE: Google Earth Aerial, December 2017.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

4.4 Fixed-Base Operator and General Aviation Facilities

This section will determine if the existing FBO facilities and other GA facilities can accommodate the demand levels forecast through 2036. This information will contribute to the definition and evaluation of airside development alternatives, which are presented in Section 5, Alternatives Development.

4.4.1 AIRCRAFT HANGAR STORAGE

The quantity and type of GA hangars at an airport are influenced by factors such as aircraft fleet mix, local climate conditions, security, and aircraft owner preferences. In general, smaller single-engine aircraft and multi-engine aircraft are stored in T-hangar units. Helicopters, larger multi-engine aircraft, and jet aircraft are typically stored in conventional hangars. **Table 4-12** summarizes the existing hangar storage capacity at MTH. Depending on the number of aircraft stored in the conventional hangars, there is storage capacity for approximately 64 aircraft: 47 T-hangars/shade hangars and 17 aircraft parking positions in conventional hangars.

The percentage of based aircraft stored at an airport can vary from 20 percent to over 80 percent. Compared to the national average, airports in Florida typically have a higher percentage of owners that store aircraft in hangars. At MTH, 48 percent of based aircraft are currently stored in hangars. It is assumed that over the 20-year planning horizon, the need for aircraft storage in hangars will increase to 80 percent of based aircraft.

Table 4-12: Aircraft Hangar Storage Capacity

OWNER / TENANT	HANGAR TYPE	AIRCRAFT CAPACITY
Marathon General Aviation	Conventional	2
Marathon Jet Center	Conventional	3
Mosquito Control	Conventional	5
Sheriff's Department	Conventional	3
Antique Restoration	Conventional	2
El Paso Partners (Jobe Hangar)	Conventional	2
Monroe County	T-Hangars	32
Monroe County	Shade Hangars	15
		64

SOURCE: Florida Keys Marathon International Airport, Airport Management, April 2017.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

Table 4-13 presents the hangar requirements for MTH for the projected number of based aircraft through the planning horizon. Demand for T-hangar/shade hangar is expected to exceed the existing capacity of 47 parking

positions by 2031. Demand for conventional hangar capacity is also expected to exceed the existing capacity of 17 parking positions by 2031. Design and construction of aircraft storage facilities should be planned in the mid-term planning horizon to increase capacity and meet projected demand.

Based upon the assumptions mentioned above, aircraft hangar storage is currently deficient by 11 t-hangars/shade hangars. By the 2036 planning year, t-hangar/shade hangars will be deficiency by approximately 29 units and conventional hangar space will be deficient by 6 aircraft parking positions. Thus, it is recommended that areas be reserved for the development of additional hangars. The construction of new hangars, however, will be driven by tenant demand and needs. The alternatives chapter will focus on the identification of available areas for hangar development and identify conceptually where facilities may be located at the Airport.

Table 4-13: Aircraft Hangar Requirements (By Aircraft Number)

YEAR	TOTAL AIRCRAFT STORED	T-HANGAR / SHADE HANGAR DEMAND	CONVENTIONAL HANGAR DEMAND	T-HANGAR / SHADE HANGAR SURPLUS/ (DEFICIENCY)	CONVENTIONAL HANGAR SURPLUS/ (DEFICIENCY)
2016	75	58	17	(11)	0
2021	78	60	18	(13)	(1)
2026	86	66	20	(19)	(3)
2031	92	71	21	(24)	(4)
2036	98	76	23	(29)	(6)

SOURCE: Florida Keys Marathon International Airport, Airport Management, April 2017.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

4.4.2 AIRCRAFT APRON STORAGE

The existing apron facilities at MTH consist of 69,166 square yards of paved surface, of which 46,131 square yards are used for aircraft parking and tie-down, circulation, aircraft movement, and FBO frontage. The remaining 23,035 square yards of pavement accounts for apron space allocated to other tenant conventional/corporate hangars. Small transient GA aircraft are typically parked on the FBO apron areas.

For planning purposes, it is estimated that 20 percent of based aircraft at the Airport not stored in hangars require apron space. Additionally, it is assumed that 65 percent of the total daily itinerant aircraft would be on the apron at any given time. For planning purposes, the following standards were applied to determine the future GA apron space requirements:

- 400 square yards per single-engine aircraft
- 420 square yards per multi-engine aircraft
- 500 square yards per jet aircraft
- 400 square yards per helicopter[6]

Table 4-14 presents apron area requirements at MTH for the 20-year planning horizon. The table shows an existing surplus of 6,985 square yards. By 2036, however, 5,834 square yards of additional apron space would be required. The construction of additional apron area will also be driven by tenant demand and needs.

Table 4-14: Aircraft Apron Requirements (Square Yards)

	REQUIREMENTS					SURPLUS/ (DEFICIENCY)
YEAR	SINGLE ENGINE	MULTI-ENGINE	JET	HELICOPTER	TOTAL	
2016	27,833	5,610	1,933	3,771	39,147	6,985
2021	29,029	5,851	2,016	3,933	40,829	5,303
2026	31,591	6,367	2,194	4,281	44,433	1,699
2031	34,122	6,878	2,370	4,624	47,993	(1,861)
2036	36,627	7,382	2,544	4,963	51,516	(5,384)

NOTE: Totals may not add up due to rounding.
SOURCE: American Infrastructure Development, Inc., January 2018.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

4.4.3 GENERAL AVIATION TERMINAL SPACE

Facility requirements for FBO/GA terminal were determined by applying the planning factors contained in the Transportation Research Board (TRB) Airport Cooperative Research Program (ACRP) Report 113, *Guidebook on General Aviation Facility Planning*. ACRP Report 113 specifies that the allocation of 100 to 150 square feet per peak-hour passenger should be used to estimate the appropriate FBO/GA terminal area. For this study, the average of 125 square feet was used to estimate FBO/GA terminal requirements. The assumption is that 2 passengers per peak-hour operations will utilize FBO/GA terminal spaces.

Table 4-15 presents the resulting space estimates based on this methodology. Currently, Marathon Aviation provides a combined total of approximately 4,550 square feet of FBO space between both Marathon Jet Center and Marathon General Aviation. The table estimates that FBO/GA terminal areas will be deficient by 250 square

[6] Based on the dimensional characteristics of the based helicopter operating at the Airport (Bell 206) and FAA AC 150/5390-2C, *Heliport Design*.

feet by the 2036 planning horizon. Thus, based on the assumptions noted above, the FBO/GA terminal building would need to be expanded to provide additional passenger space by 2036.

Table 4-15: Fixed Base Operator/General Aviation Terminal Building Space Requirements

YEAR	PEAK-HOUR OPERATIONS	PEAK-HOUR PASSENGERS 1/	PASSENGER UTILIZATION 2/	SPACE REQUIREMENTS (SQ. FT.)	SURPLUS/ (DEFICIENCY) (SQ. FT.)
2016	24	48	29	3,600	950
2021	25	50	30	3,750	800
2026	28	56	34	4,200	350
2031	30	60	36	4,500	50
2036	32	64	38	4,800	(250)

NOTES:

1/ Assumes 2 passengers per peak-hour operation.

2/ Assumes 60 percent of the peak-hour operations will utilize FBO/GA terminal spaces.

SOURCE: Florida Keys Marathon International Airport, Airport Management, April 2017.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

4.4.4 AUTOMOBILE PARKING

Adequate automobile parking is required to provide convenient and efficient access to GA facilities, such as T-hangars and FBOs. A methodology similar to that used to determine FBO/GA terminal requirements was used to determine vehicle parking requirements. This methodology estimates the number of required parking spaces based on peak-hour aircraft operations and the amount of office space in the FBO buildings. ACRP Report 113 recommends that the number parking spaces are calculated using the planning factors of 2.5 spaces per peak-hour operations and 1 space per 200 square feet of office space. For this study, the 2.5 factor was reduced to 2.0, since owners typically park their personal vehicle inside the hangar while utilizing their aircraft.

Table 4-16 estimates the automobile parking requirements to between 64 spaces in 2016 and 80 spaces in 2036. Currently, there are 77 paved parking spaces dedicated to GA facilities at MTH. As a result, existing GA automobile parking does not meet existing and future parking requirements. Parking expansion should occur in areas most convenient and accessible to GA facilities, such as T-hangars and apron areas. Based upon discussion with Airport staff, the public parking lot adjacent to the passenger terminal should be preserved should commercial air service resume.

Table 4-16: Fixed Base Operator/General Aviation Automobile Parking Requirements

	FOR AIRCRAFT OPERATORS		FOR OFFICE USERS			
YEAR	PEAK-HOUR AIRCRAFT OPERATIONS	AUTOMOBILE PARKING SPACES REQUIRED 1/	ESTIMATED FBO OFFICE SPACE (SQ. FT)	AUTOMOBILE PARKING SPACES REQUIRED 2/	TOTAL AUTOMOBILE PARKING SPACES REQUIRED	SURPLUS/ (DEFICIENCY)
2016	24	48	3,200	16	64	13
2021	25	50	3,200	16	66	11
2026	28	56	3,200	16	72	5
2031	30	60	3,200	16	76	1
2036	32	64	3,200	16	80	(3)

NOTES:

1/ Assumes 2 spaces per peak-hour passenger.

2/ Based on 1 space per 200 square feet of office space.

FBO – Fixed Base Operator

SOURCE: Florida Keys Marathon International Airport, Airport Management, April 2017.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

4.4.5 Summary of Recommended Fixed Base Operator and General Aviation Facility Improvements

The following improvements are recommended to meet the projected 2036 demand for FBO and GA facilities:

- Increase GA based and itinerant apron space by approximately 5,384 square yards
- Increase T-hangar and/or conventional/corporate hangar aircraft parking positions by 35
- Increase FBO/GA terminal building space by approximately 250 square feet
- Increase automobile parking spaces by 3 spaces

4.5 Airport Support Facilities

As described in Section 2, support facilities provide essential, core services needed for the safe and efficient operation of airports. Support services will vary based on the type of airport and the amount of passenger and aircraft activity. An assessment of these services has been conducted to determine if they are adequately meeting the current needs of MTH, or if improvements are needed for meeting an acceptable performance level. They have also been evaluated to determine if the services they currently provide will be compatible with forecast Airport growth and recommended development. This section describes the facility requirements for MTH's primary support facilities, including ARFF, aircraft fuel storage, Airport maintenance facilities, Airport security, and any other tenant support facilities determined to be critical to the Airport's operations.

4.5.1 AIRPORT RESCUE AND FIRE FIGHTING

Airports that serve scheduled and unscheduled air carrier flights are required to provide ARFF facilities and equipment. The ARFF index determination and equipment requirements are determined by the standards in FAR Part 139, *Certification of Airports*. As stated in FAR Part 139.315, the ARFF index is determined by aircraft characteristics and the average number of daily departures. **Table 4-17** shows ARFF index determinations.

Table 4-17: Aircraft Rescue and Firefighting Index Determinations

INDEX	AIRCRAFT LENGTH	SCHEDULED DEPARTURES	NUMBER OF VEHICLES	AGENT AND WATER FOAM REQUIREMENTS
A	Less than 90 ft	1 or more	1	500 lbs. Dry Chemical/HALON 1211 or 450 lbs. Dry Chemical and 100 gallons of water
B	90 ft to 126 ft	Less than 5	1	Index A equipment and 1,500 gallons of water
		5 or more	2	Index A equipment and 1,500 gallons of water
C	126 ft to 159 ft	Less than 5	2	Index A equipment and 3,000 gallons of water
		5 or more		Index A equipment and 3,000 gallons of water
D	159 ft to 200 ft	Less than 5	3	Index A equipment and 4,000 gallons of water
		5 or more		Index A equipment and 4,000 gallons of water
E	200 ft and greater	1 or more	3	Index A equipment and 6,000 gallons of water

SOURCE: Title 14 Code of Federal Regulations Part 139.315, *Aircraft Rescue and Firefighting: Index Determination*, January 2018.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

Although there are no commercial aircraft operations, MTH is certified as a 14 CFR Part 139 Class I, ARFF Index A airport, which includes aircraft less than 90 feet long. The Airport requires a 48-hour notification for unscheduled 14 CFR Part 121 operations with greater than 30 passenger seats for any wingspan of 79 feet or greater. Commercial air service is not expected to resume at MTH through the 2036 planning horizon, therefore, the Airport is not required to provide ARFF services. Although ARFF services are not required, it is recommended that the Airport maintain airfield access to the fire station and continue to coordinate with the City of Marathon for fire services.

4.5.2 AIRPORT MAINTENANCE

Currently, the Airport does not have a designated structure to house maintenance equipment. Equipment is kept within a 11,432-square-foot fenced grassy area between the public parking lot and the GA apron adjacent to the ASOS. Stored equipment includes three tractors, a storage shed, a storage container, and other miscellaneous equipment. Airport management expressed the desire to build a maintenance facility that could house equipment and provide the maintenance staff with office space. The relocation of the ASOS would be required to construct the maintenance facility in the same location.

Airport management personnel recommended constructing a 2,000 square feet maintenance facility adjacent to and west of the existing passenger terminal. This facility would allow for the storage and parking of maintenance equipment and vehicles.

4.5.3 AIRCRAFT FUEL STORAGE

Marathon Aviation (Marathon Jet Center and Marathon General Aviation FBOs) operates and maintains fuel storage and manages fuel sales. As described in Section 2, the FBO fuel storage capacity at the Airport is currently 55,000 gallons of Jet A fuel and 25,000 gallons of Avgas fuel (Marathon Jet Center currently has a 12,000-gallon Jet A tank and a 10,000-gallon aviation gasoline (Avgas) tank, while Marathon General Aviation has two 20,000-gallon Jet A tanks and a 12,000-gallon Avgas tank, as well as 3,000 gallons of Jet A and 3,000 gallons of Avgas fuel in fuel trucks. The Sheriff Department and Mosquito Control operations both have their own dedicated fuel tanks, which are exclusively used for their individual operations and are not available for sale to other tenants or operators.

Analysis of Airport data from 2015 to 2017 demonstrated an average of 11.36 gallons of fuel dispensed per operation. By applying this ratio to projected activity, the future fuel requirements are determined. It is estimated that Avgas represents 17.0 percent of total fuel sales, with jet fuel representing 83.0 percent of total fuel sales. **Table 4-18** presents the fuel storage requirements for the planning activity levels. Based upon the assumed utilization of a 12,000-gallon tank for Avgas storage and 20,000-gallon tanks for Jet A storage, the 2036 projected demand will require a minimum of one Avgas and one Jet A storage tank. Assuming the Airport desires to maintain 7 days of fuel reserves, the existing fuel storage capacity is sufficient through the 2036 planning horizon.

Table 4-18: Fuel Storage Requirements

		ANNUAL DEMAND (GALLONS)			WEEKLY DEMAND (GALLONS)			STORAGE TANK REQUIREMENTS	
YEAR	TOTAL AIRCRAFT OPERATIONS	AVGAS	JET A	TOTAL	AVGAS	JET A	TOTAL	AVGAS TANK	JET A TANK
2016	75,000	144,840	707,160	852,000	2,785	13,599	16,385	1	1
2021	78,249	151,114	737,794	888,909	2,906	14,188	17,094	1	1
2026	85,130	164,403	802,674	967,077	3,162	15,436	18,598	1	1
2031	92,098	177,860	868,374	1,046,233	3,420	16,699	20,120	1	1
2036	98,978	191,146	933,244	1,124,390	3,676	17,947	21,623	1	1

NOTES:

1/ Totals do not add up due to rounding.

2/ Assumes continued use of 12,000-gallon tanks for avgas fuel storage.

3/ Assumes the continued use of 20,000-gallon tanks for jet fuel storage.

SOURCE: Florida Keys Marathon International Airport, Airport Management, January 2018.
PREPARED BY: American Infrastructure Development, Inc., January 2018.

While additional fuel tanks are not required through the planning horizon, the Marathon Jet Centers fuel tanks are located in the middle of the west general aviation apron, limiting the apron space available for parking jet aircraft. Thus, it is recommended that the fuel tanks be relocated to an area with less impacts to aircraft parking.

4.5.4 U.S. CUSTOMS AND BORDER PROTECTION

Airport staff has provided information indicating the current U.S. CBP office occupies 4,200 square feet of space on the first floor of the passenger terminal building. There is also a 120-foot by 90-foot apron area allocated for aircraft processing. Based on discussions with Airport staff, the capacity of the current facility is sufficient for the processing of GA charter aircraft; however, it is not sufficient to process commercial flights. Because commercial service is not anticipated to resume at MTH throughout the planning horizon, the current capacity of the existing U.S. CBP office is sufficient through the 2036 planning horizon. The Wednesday through Sunday, 9:00 a.m. to 5:30 p.m., hours of service should be maintained, and after-hour service should remain available upon request. Airport management should monitor any future needs to expand service into Monday and Tuesday.

4.5.5 RENTAL CAR FACILITY

Typically, the rental car facility would be discussed under the passenger terminal facilities; however, for this study, the rental car facility will be addressed as part of the GA support facilities. Although commercial passenger service is not anticipated to resume at MTH through the planning horizon, the rental car facility should continue to provide services to passengers utilizing Marathon Jet Center and Marathon General Aviation. Both FBOs offer rental car services to their customers, which is provided by the on-site rental car companies, including Avis, Budget, and Enterprise. In addition, the Airport's rental car facility serves as the primary rental car location for the City of Marathon residents and visitors. The Monroe County Department of Airport worked with its car rental providers to build a new car wash facility in proximity to the passenger terminal. This car wash is anticipated to open in 2020.

4.5.6 UTILITIES

Any future development at the Airport should consider the need for utilities, such as water, sanitary sewer, drainage, power, and industrial waste. A small GA airport utilizes utilities in a similar manner to a small commercial industrial park. Therefore, long-term service planning for water, sanitary sewer, and power is accomplished by the local utility company. Airport management will coordinate with local utility providers to ensure appropriate utility needs are satisfied.

The existing stormwater drainage facilities at MTH consist of a series of culverts and retention basins. As part of the U.S. Highway 1 widening project, the Airport leased 1.7 acres on the east side and 5.8 acres on the west side of the Airport to the FDOT as drainage for the roadway. A drainage plan, being conducted concurrently with this master plan, indicated the potential to free up to 60 percent of the 5.8 drainage site for future development through the use of infiltration trenches that would help reduce stormwater runoff volumes.

Future improvements will likely increase the area of impervious surfaces on the Airport. In conjunction with future airfield development, drainage plans must be developed to address the increased runoff from such development in new, less developable area, where possible.

4.5.7 SUMMARY OF RECOMMENDED AIRPORT SUPPORT FACILITY IMPROVEMENTS

The following improvements are recommended to meet the projected demand on support facilities:

- Construct a 2,000-square-foot maintenance facility for the storage and parking of maintenance equipment and vehicles.
- Relocate the fuel farm and associated fuel tanks currently located in the middle of the west general aviation apron to free up space for aircraft operations

4.6 Non-Aeronautical Facilities

4.6.1 EMERGENCY OPERATIONS CENTER

The City of Marathon has two Emergency Operations Center (EOCs), located off-airport:

- a primary EOC (2798 Overseas Highway Marathon Government Center Second Floor Marathon, FL 33050)
- a secondary EOC with administrative offices (490 63rd St. (Ocean) Suite 150 Marathon, FL 33050,

The secondary EOC can only withstand category 2 hurricane force winds, and needs to be upgraded. This facility was proposed to be relocated on-Airport, and as such, potential sites for the relocation of the EOC will be assessed in Section 5.

4.6.2 REMOTE COMMUNICATIONS AIR-GROUND FACILITY

The FAA has requested the use of an area in the northwest corner of the Airport for the installation of an unmanned Very High Frequency (VHF)/Ultra High Frequency (UHF) transmitter/receiver facility to expand the Miami Air Route Traffic Control Center (ARTCC) air/ground communications coverage and to facilitate direct contact between pilots and controllers.

4.7 Summary of Facility Requirements

- Airfield:
  - Shift Runway 7-25 to the northwest 40 feet
  - Remove 40 feet of excess runway pavement on the south side of the existing runway
  - Construct new blast pads at relocated runway ends
  - Demolishing existing Taxiway C and reconstruct Taxiway C west of its existing location
  - Demolish existing Taxiway D and reconstruct Taxiway D perpendicular to the relocated runway
  - Demolish existing excess pavement on Taxiway E
  - Relocate and/or install new runway edge lights and threshold lights
  - Relocate and/or install new REIL on the Runway 7 end
  - Modify markings, lighting, and signage on connecting Taxiways B, C, D, and E
  - Update existing RNAV GPS instrument approach procedures to reflect the 40-foot lateral shift of Runway 7-25
  - Preserve land areas for the extension of the runway to 5,400 feet in the long-term future
- On-airport roadways:
  - Airport Access Road segmentation mitigation
- FBO and GA:
  - Increase GA based and itinerant apron space by approximately 5,384 square yards
  - Increase T-hangar or conventional/corporate hangar aircraft parking positions by 35
  - Increase FBO/GA terminal building space by approximately 250 square feet
  - Increase automobile parking spaces by 3 spaces
  - Relocated fuel farm from middle of southwest GA apron
- Airport support:
  - Construct a 2,000-square-foot maintenance facility for the storage and parking of maintenance equipment and vehicles.
  - Consider drainage improvements as part of airfield, apron, and aircraft storage development.
- Non-aeronautical:
  - Relocate Monroe County's secondary EOC on-Airport
  - Construct RCAG facility (by FAA)

Florida Keys Marathon International Airport

Alternatives Analysis and Recommended Development Plan

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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5. Alternatives Analysis and Recommended Development Plan

A key objective of the master planning process is to identify projects (e.g., facilities and infrastructure) to accommodate forecast aviation activity and to support planning priorities for the Airport. This section presents the alternatives developed for MTH to satisfy the facility requirements and to adhere to the FAA's design standards. This analysis provides the framework for selecting a preferred development concept for each facility that best meets the future needs of the Airport. This section identifies and discusses alternatives for the following functional components:

- Airfield
- On-Airport Roadways
- Fixed-Base Operator (FBO) and General Aviation (GA) Facilities
- Airport Support Facilities
- Non-Aeronautical Facilities

5.1 Airfield

5.1.1 AIRFIELD CAPACITY

Airfield capacity was found to be adequate through the planning horizon; therefore, no additional runway capacity improvements are proposed in this MPU. Once annual aircraft demand reaches 60 to 75 percent of annual capacity (anticipated to occur beyond 2036), planning for additional airfield capacity should be initiated.

5.1.2 RUNWAY RELOCATION

Although the critical aircraft at MTH is a C-II aircraft, the Airport can only realistically meet B-II design standards. Meeting C-II standards would be impractical, as it would result in significant financial, operational, and environmental impacts to the Airport and the surrounding environs.

To achieve a runway centerline to taxiway centerline separation distance of 240 feet, a 40-foot shift of Runway 7-25 is being planned to meet B-II standards. The proposed runway relocation requires approval and financial assistance from the FAA. The associated federal actions require the FAA to consider potential environmental

impacts in accordance with the National Environmental Policy Act of 1969. The runway relocation project will also include the following:

- Remove excess runway and runway shoulder pavement on the south side of the existing runway.
- Construct new blast pads at the relocated runway ends.
- Relocate and/or reconstruct taxiway pavement.
- Relocate and/or install new runway edge lights and threshold lights.
- Relocate and/or install new Runway End Identifier Lights (REIL) on the Runway 7 end.
- Relocate the Precision Approach Path Indicators (PAPI) for both runway ends.
- Modify and/or replace markings, lighting, and signage.
- Grade the Runway Safety Area (RSA).
- Clear vegetation within the future Runway Object Free Area (ROFA) and threshold siting surface.
- Improve drainage and utilities necessary to support a relocated runway.
- Update the existing area navigation (RNAV) Global Positional System (GPS) instrument approach procedures to reflect the 40-foot lateral shift of Runway 7-25.

5.1.3 RUNWAY EXTENSION

Monroe County is planning a runway extension to provide pilots greater flexibility in meeting their stage length and payload requirements and allow for the accommodation of nearly 100 percent of jet aircraft (based on the destinations currently served from the Airport). As part of the MPU, four alternatives were developed to extend the existing 5,008-foot runway by 392 feet, for a total length of 5,400 feet. The following factors were considered when evaluating and discussing the alternatives with stakeholders during the planning process:

- **Usable operational length and declared distances**: The use of a displaced threshold and declared distances was considered to modify the takeoff and landing distances available to aircraft in east flow and west flow. Declared distances is an FAA-approved approach of declaring the operational length of a runway different than the physical length of the runway. However, according to FAA Advisory Circular (AC) 150/5300-13A (Change 1), *Airport Design*, the use of declared distances is applicable to turbine-powered aircraft only. This includes turboprop and jet engine aircraft.
- **Runway protection zone (RPZ) impacts**: Any shift in the location of the existing RPZs will be subject to the latest FAA RPZ guidance,[1] which includes a list of land uses inside the RPZ that:
  - Are acceptable without further evaluation: farming, irrigation channels, airport service roads, underground facilities, and unstaffed navigational aids and facilities.

[1] Federal Aviation Administration, *Interim Guidance on Land Uses Within a Runway Protection Zone*, September 27, 2012.

  - Require coordination with the FAA: transportation facilities (e.g., public roadways), aboveground utility infrastructure, hazardous material storage, fuel storage, buildings and structures, and recreational land uses.
- **Runway safety area (RSA) / Runway object free area (ROFA) impacts**: An analysis of potential impacts to the existing roadways and structures inside the proposed RSA and ROFA would be required.
- **Obstructions in approach path**: The existing Runway 25 end approach path is constrained by manmade obstructions, resulting in higher than standard instrument approach minimums. Moving the runway end further east, closer to these obstructions, would only exacerbate the penetration amounts and the resulting impacts to the Runway 25 instrument approaches.
- **Property acquisition**: Ideally, the RPZ and the areas needed to mitigate obstructions are controlled (i.e., with an avigation easement) or owned by Monroe County.
- **Noise impacts**: A shift of the departure point would reduce noise impacts to the neighborhoods under the departure path, but it could potentially increase impacts to the neighborhoods closer to the departure point.

The following subsections describe the runway extension alternatives.

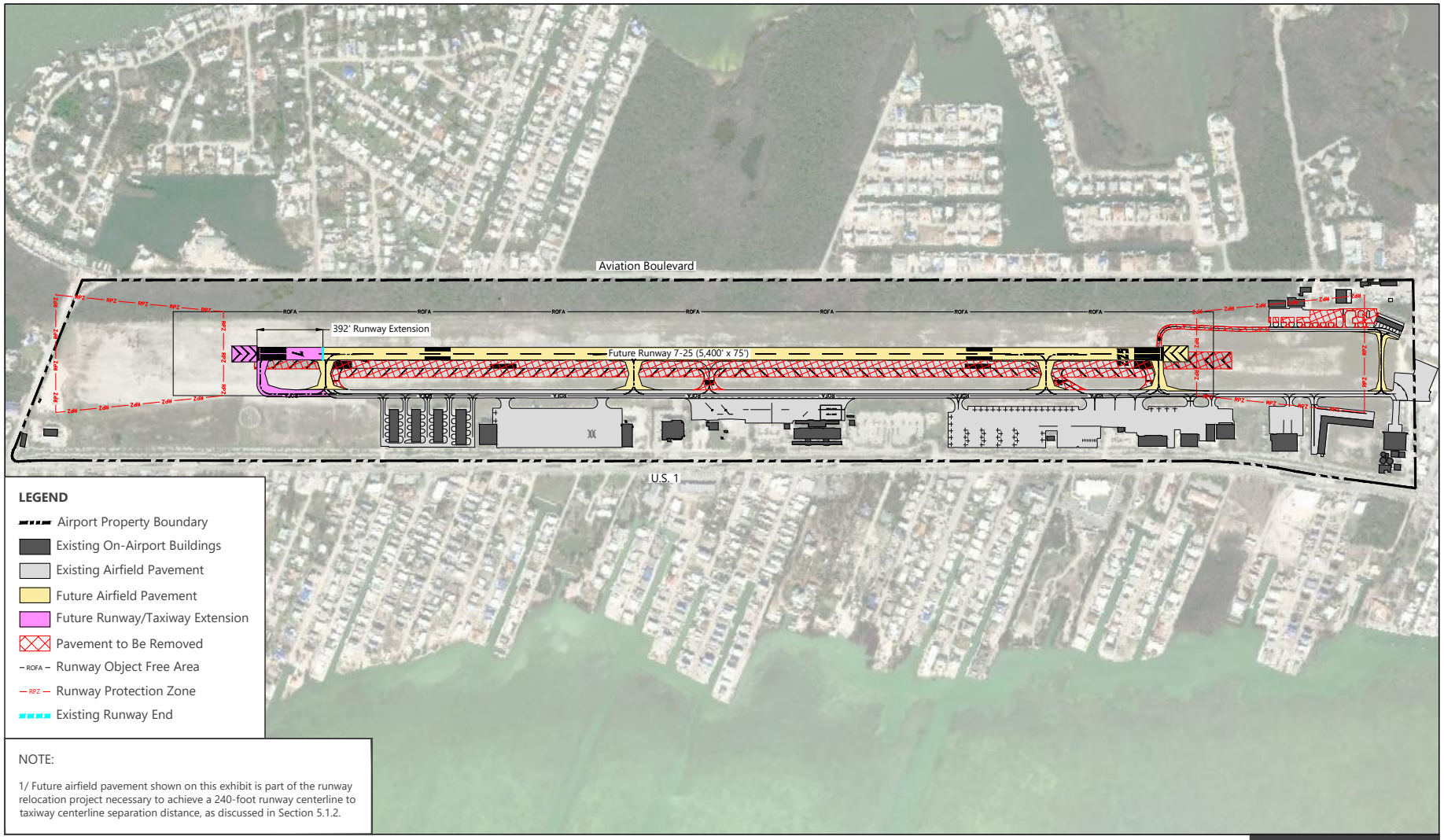
5.1.3.1 Alternative 1A – 392-Foot Runway Extension to the West

Alternative 1A proposes to extend Runway 7-25 to the west (Runway 7 approach end) by 392 feet to achieve 5,400 feet of runway length. This alternative would also include an extension of parallel Taxiway A to the new runway end. The runway threshold would be located at the end of the runway, resulting in the full utility of the runway in both directions for takeoffs and landings.

This option would require the acquisition of additional land to maintain control of the relocated RPZ and to mitigate potential approach and departure obstructions. Incompatible land uses within the RPZ would include Aviation Boulevard. **Exhibit 5-1** illustrates Alternative 1A.

5.1.3.2 Alternative 1B – 392-Foot Runway Extension to the West with Displaced Threshold

Alternative 1B also proposes to extend Runway 7-25 to the west (Runway 7 approach end) by 392 feet to achieve 5,400 feet of runway length; however, the runway threshold would remain at its current location. This alternative would also include a new access taxiway between parallel Taxiway A and the relocated runway end. Declared distances would be used by pilots to calculate takeoff and landing distances. **Table 5-1** summarizes the declared distances.



SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-1

NORTH 0 900 ft.

Alternative 1A
392-Foot Runway Extension to the West

Drawing: \\EgnyteDrive\Projects\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-1_MTH_Alt 1A - 392' West.dwgLayout: Exhibit 5-1 Plotted: Jul 24, 2020, 02:05PM

Table 5-1: Runway Extension Alternative 1B Declared Distances (in feet)

	RUNWAY 7	RUNWAY 25
Takeoff Run Available (TORA)	5,400	5,008
Takeoff Distance Available (TODA)	5,400	5,008
Accelerate-Stop Distance Available (ASDA)	5,400	5,400
Landing Distance Available (LDA)	5,008	5,400

SOURCE: Ricondo & Associates, Inc., May 2018.
PREPARED BY: Ricondo & Associates, Inc., May 2018.

This option would ensure no new incompatible land uses would be introduced to the Runway 7 approach RPZ and the Runway 25 departure RPZ due to the displaced threshold and use of declared distances. **Exhibit 5-2** illustrates Alternative 1B.

5.1.3.3 Alternative 2A – 392-Foot Runway Extension to the East

Alternative 2A proposes to extend Runway 7-25 to the east (Runway 25 approach end) by 392 feet to achieve 5,400 feet of runway length. This alternative would also include a new access taxiway between parallel Taxiway A and the relocated runway end. The runway threshold would be located at the end of the runway, resulting in the full utility of the runway in both directions for takeoffs and landings.

This option would require the acquisition of additional land to control the areas associated with the relocated RPZ and to mitigate approach and departure obstructions. Incompatible land uses within the RPZ would include four shade aircraft hangars. Coordination with the FAA would be required to evaluate land uses in the new RPZs and to evaluate mitigation options to minimize any risk to people and property on the ground. The proposed FAA RCAG facility would also be located within the Runway 25 RPZ. In this option, additional residential areas would likely be exposed to aircraft noise in comparison to Alternatives 1A and 1B because the runway would be extended toward the residential areas located east of 107th Gulf Street. **Exhibit 5-3** illustrates Alternative 2A.

5.1.3.4 Alternative 2B – 392-Foot Runway Extension to the East with Displaced Threshold

Alternative 2B also proposes to extend Runway 7-25 to the east (Runway 25 approach end) by 392 feet to achieve 5,400 feet of runway length; however, the runway threshold would remain at its current location. This alternative would also include a new access taxiway between parallel Taxiway A and the relocated runway end. Declared distances would be employed by pilots to calculate takeoff and landing distances. **Table 5-2** summarizes the declared distances.

This option would ensure no new incompatible land uses would be introduced to the Runway 25 approach RPZ and the Runway 7 departure RPZ due to the displaced threshold and use of declared distances. This option, however, does not mitigate for the potential aircraft noise impacts on the residential areas located east of 107th Gulf Street**. Exhibit 5-4** illustrates Alternative 2B.

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-2

NORTH 0 900 ft.

Alternative 1B
392-Foot Runway Extension to the West with Declared Distances

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-2_MTH_Alt 1B - 392' West with Displaced Threshold.dwgLayout: Exhibit 5-2 Plotted: Jul 24, 2020, 03:31PM

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-3

NORTH 0 900 ft.

Alternative 2A
392-Foot Runway Extension to the East

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-3_MTH_Alt 2A - 392' East.dwgLayout: Exhibit 5-3 Plotted: Jul 24, 2020, 03:30PM

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-4

NORTH 0 900 ft.

Alternative 2B
392-Foot Runway Extension to the East with Declared Distances

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-4_MTH_Alt 2B - 392' East with Displaced Threshold.dwgLayout: Exhibit 5-4 Plotted: Jul 24, 2020, 03:28PM

Table 5-2: Runway Extension Alternative 2B Declared Distances (in feet)

	RUNWAY 7	RUNWAY 25
Takeoff Run Available (TORA)	5,008	5,400
Takeoff Distance Available (TODA)	5,008	5,400
Accelerate-Stop Distance Available (ASDA)	5,400	5,400
Landing Distance Available (LDA)	5,400	5,008

SOURCE: Ricondo & Associates, Inc., May 2018.
PREPARED BY: Ricondo & Associates, Inc., May 2018.

5.1.3.5 Selection of a Preferred Alternative

Among the four alternatives, each one provides the Airport with the recommended runway length of 5,400 feet. After coordinating with the stakeholders and the Monroe County Department of Airports, Alternative 1B was selected as the preferred alternative for the following reasons:

- The existing Runway 7 threshold will be maintained at its current location and the declared distances will be used by pilots to calculate takeoff and landing distances. Through the application of declared distances, the Runway 7 approach RPZ and Runway 25 departure RPZ (located at the Runway 7 end) will remain collocated in their current location. The use of a displaced threshold and declared distances has the following benefits:
  - It prevents the introduction of roads, structures, and other aboveground objects into the relocated RPZs.
  - The proposed 392 feet of pavement added to the Runway 7 approach end will be available for departures to the east and for rollout when landing on Runway 25, which occurs 84 percent of the time.
  - It minimizes potential noise impacts east of the Airport by allowing for departures to begin further to the west.
  - It minimizes potential land acquisition costs.
- It minimizes the potential for on- and off-Airport environmental impacts (mainly aircraft noise impacts).
- It does not introduce new obstructions since the landing threshold at the Runway 7 end and the departure point for aircraft utilizing Runway 25 remain the same as their current location.
- The Monroe County Department of Airports prefer Alternative 1B as it minimizes costs, incompatible land uses, and aircraft noise impacts, and it achieves 5,400 feet of runway that is available for departures from Runway 7 and for landings on Runway 25.

5.1.4 TAXIWAY GEOMETRY AND NOMENCLATURE

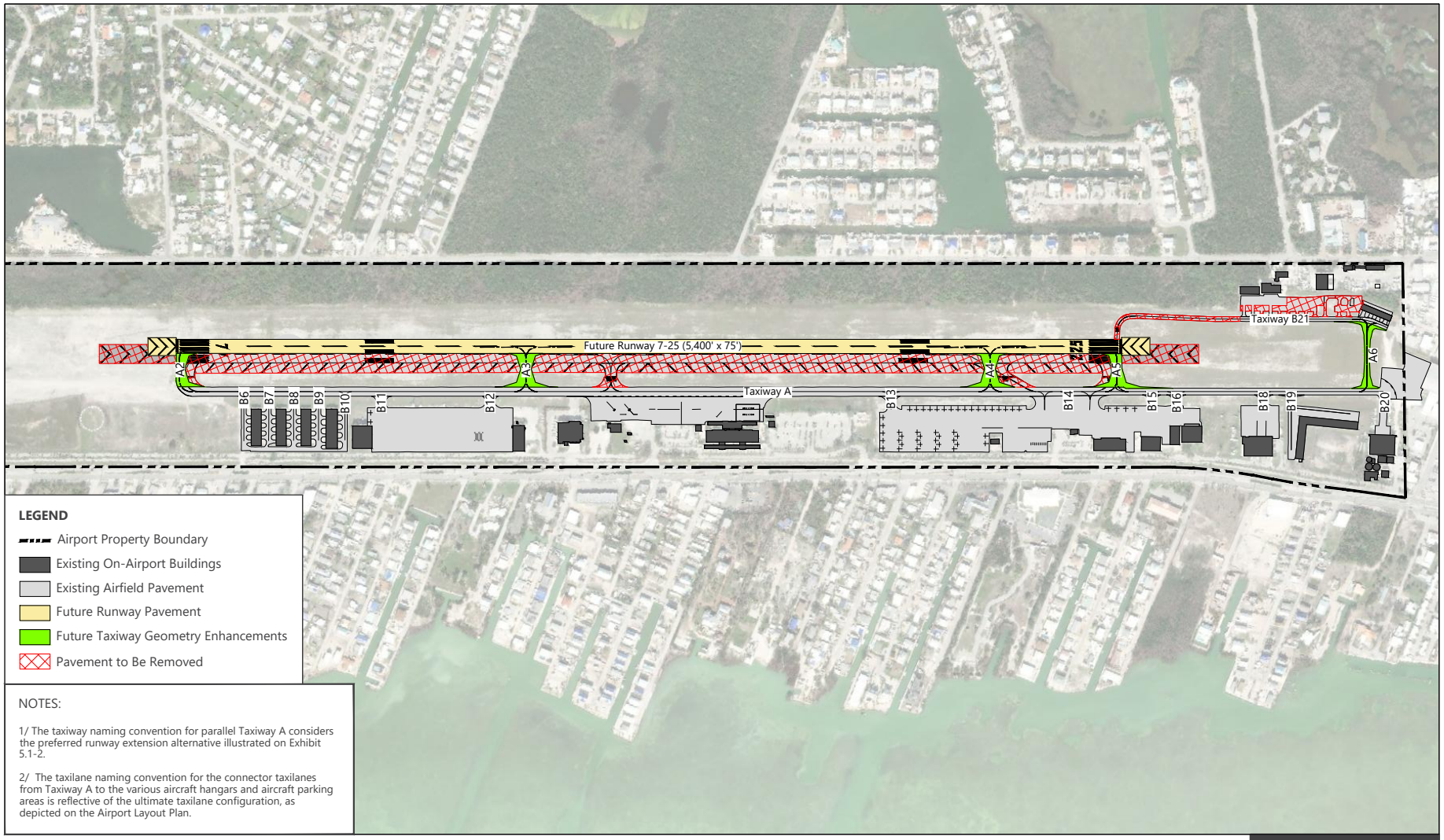
5.1.4.1 Taxiway Geometry Enhancements

Four areas of noncompliant taxiway geometry were identified. Areas 1 and 4 (wide expanses of pavement at the runway entrance) and Area 3 (runway centerline to parallel taxiway centerline separation) will be mitigated when the runway is shifted north 40 feet. Area 2 (direct access from the apron to the runway) is recommended to be mitigated by shifting Taxiway C to the west. As part of the runway relocation project, Taxiway D is proposed to be realigned from an acute-angled runway exit to a perpendicular runway exit. **Exhibit 5-5** illustrates the proposed taxiway geometry enhancements.

5.1.4.2 Taxiway Nomenclature

Guidance for taxiway nomenclature is found in FAA AC 150/5340-18, *Standards for Airport Sign Systems*. The FAA recommends using the guidelines and standards in this AC when developing or revising an airport signage plan and an Airport Layout Plan (ALP), as well as when developing new projects. As the runway is being relocated 40 feet north of its present location, the appropriate time to revisit the taxiway naming convention is during the course of the runway relocation project.

It is recommended that the parallel taxiway south of Runway 7-25 continues to be designated as Taxiway A; however, all stub taxiways are proposed to be designated as A1 through A6. Similarly, the connector taxilanes from parallel Taxiway A to the various apron areas are proposed to be renamed as B1 through B20. The proposed taxiway nomenclature is shown on Exhibit 5.1-5.



SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-5

NORTH 0 800 ft.

Proposed Taxiway Geometry Enhancements

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-5_MTH_Taxiway Geometry Updates.dwgLayout: Exhibit 5-5 Plotted: Jul 24, 2020, 03:26PM

5.2 On-Airport Roadways

Airport Access Road provides access to the south side of the Airport; however, the roadway is not contiguous, and vehicular traffic must exit and re-enter Airport Access Road via U.S. Highway 1 (Overseas Highway) when traveling between the various facilities. To provide contiguous access to the entire development area on the south side, including the terminal and FBO facilities, it is recommended that the roadway be connected, as illustrated on **Exhibit 5-6**.

5.3 Fixed-Base Operator and General Aviation Facilities

This section discusses the development of FBO and GA facilities that are needed to accommodate the Airport's forecast demand. The following improvements are recommended to meet the forecast 2036 demand for FBO and GA facilities:

- Increase based and itinerant GA apron space by approximately 5,384 square yards.
- Increase T-hangar or conventional/corporate hangar aircraft parking positions by 35.
- Increase FBO/GA terminal building space by approximately 250 square feet.
- Increase automobile parking spaces to support existing and future FBO and GA operations.

FBO and GA facility development is typically tenant-driven to accommodate increased demand on existing facilities or to satisfy expansion opportunities for existing tenants, as well as for new entrants. Future hangar development is recommended to reflect the following siting criteria:

- Hangars must have direct airfield access.
- Hangars must be constructed clear of the following surfaces:
  - Runway and taxiway safety areas
  - Runway and taxiway object free areas
  - RPZs
  - 14 Code of Federal Regulations (CFR) Part 77 imaginary surfaces
  - navigational aid critical areas
- Future hangars should be centralized for vehicle access and to minimize paving, drainage, and utilities.

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-6

NORTH 0 200 ft.

On-Airport Roadway Improvements

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-6_MTH_On-Airport Roadway Improvements.dwgLayout: ALT01 Plotted: Jul 24, 2020, 01:20PM

5.3.1 AREAS AVAILABLE FOR FIXED-BASE OPERATOR AND GENERAL AVIATION FACILITY DEVELOPMENT

Exhibit 5-7 depicts vacant areas of the Airport property that are available for FBO and/or GA development. The areas for development are divided into the southwest, midfield, and southeast development areas and are further discussed in the following sections.

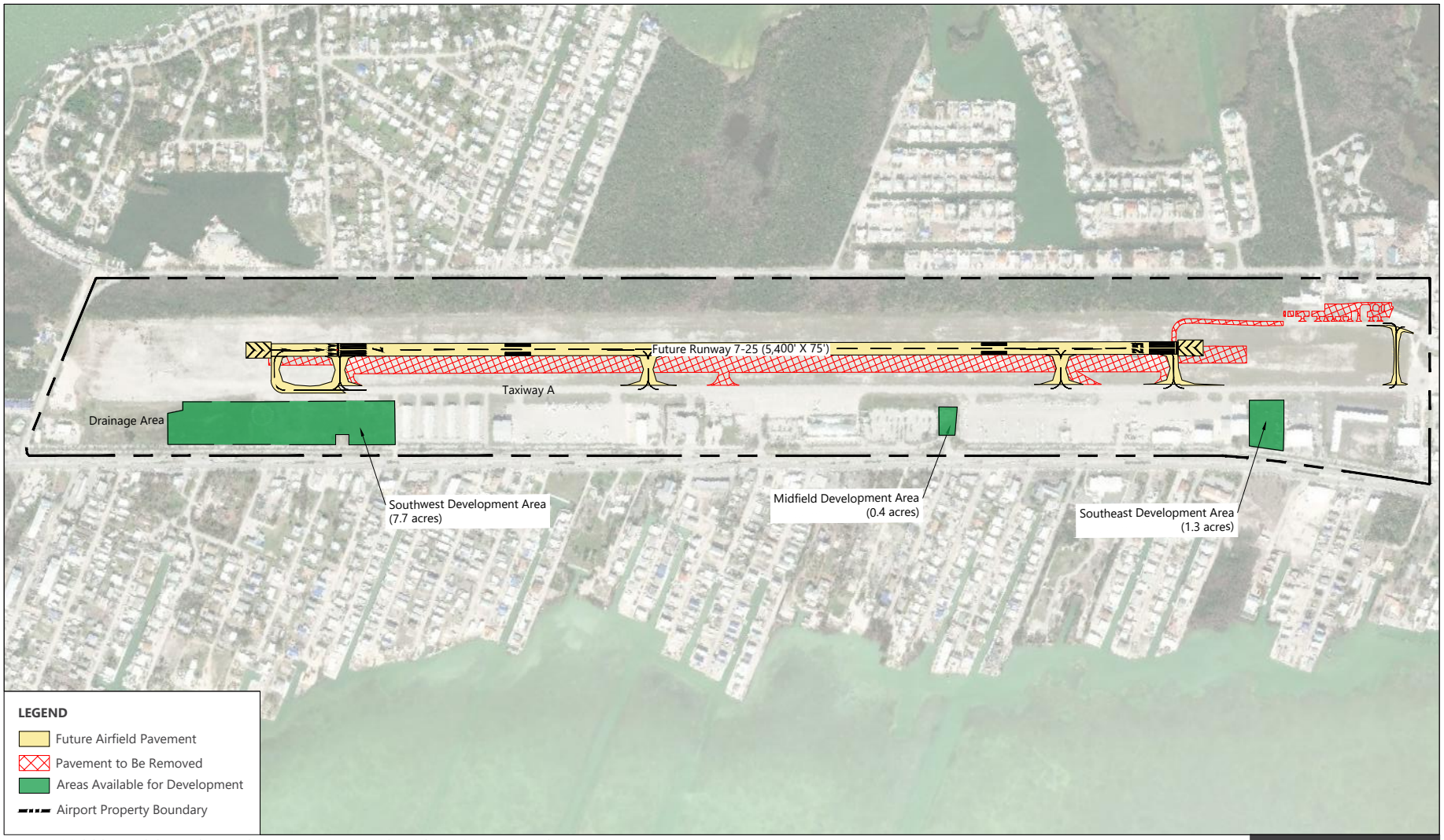
5.3.2 SOUTHWEST DEVELOPMENT AREA

The southwest development area is 7.7 acres and is located west of the existing T-hangars, near the Runway 7 approach end. The area is accessible via U.S. Highway 1 (Overseas Highway) and Airport Access Road. The site is outside the Taxiway A taxiway object free area (TOFA) and approach surfaces. Portions of the southwest development area would have height restrictions due to the departure surface serving Runway 25, as prescribed in FAA Order 8260.3D, *United States Standard for Terminal Instrument Procedures (TERPS)*.

An existing stormwater drainage basin is located on the western edge of the southwest development area. The site is currently leased to FDOT to accommodate drainage from a previously completed U.S. Highway 1 (Overseas Highway) widening project. Depending on future stormwater management plans being developed as part of the runway relocation project, a portion of the stormwater drainage basin could potentially be repurposed and converted to developable space. The stormwater drainage basin is also within the TERPS departure surface; however, the area is located between 500 feet and 1,300 feet from the runway end, allowing for progressively higher development as the distance increases from the start of the departure surface.

The southwest development area could accommodate a variety of FBO and GA functions, including the development of conventional hangars and T-hangars, apron areas, vehicular parking, and a relocated fuel farm. The FBO operator expressed interest in relocating the existing fuel farm currently located in the middle of the GA apron ramp to the southwest development area.

Six alternatives with various hangar and apron configurations were evaluated to accommodate future demand (Refer to Appendix E). The preferred alternative provides for 31 T-hangars, approximately 16,900 square yards of apron, and additional space for the relocation of the fuel farm. Development in this area would require the relocation of the existing windsock and segmented circle. **Exhibit 5-8** illustrates the preferred alternative for the southwest development area, as well as illustrates the proposed location for a new windsock and segmented circle.



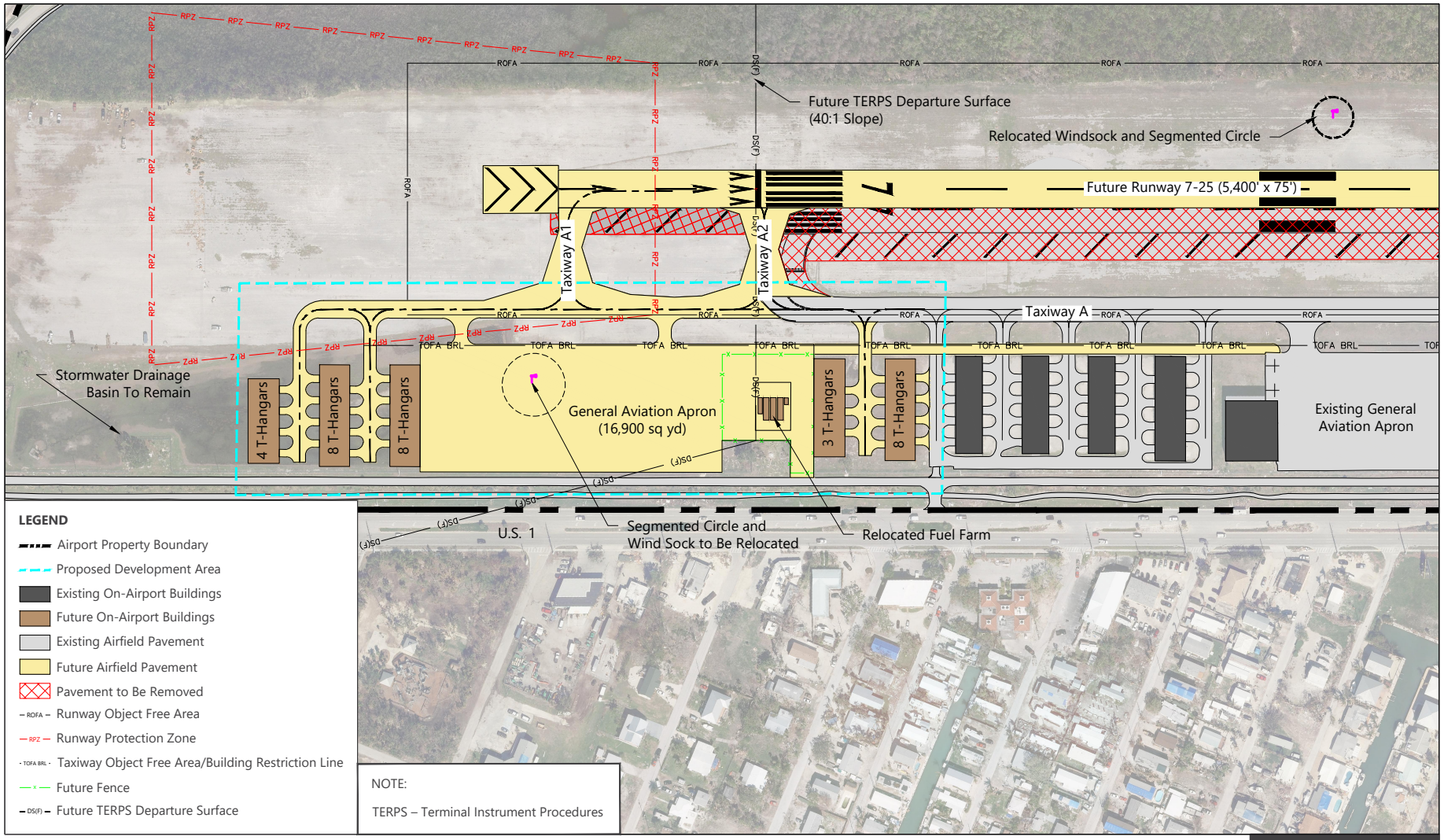
SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-7

NORTH 0 900 ft.

Areas Available for Development

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-7_MTH_Areas Available for Development.dwgLayout: Overall Plotted: Jul 24, 2020, 03:12PM



SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-8

NORTH 0 300 ft.

Southwest Development Area
Preferred Alternative

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-8 through 5-10_GA Development Alternatives.dwgLayout: Exhibit 5.8 Plotted: Jul 24, 2020, 01:35PM

5.3.3 MIDFIELD DEVELOPMENT AREA

The midfield development area is approximately 0.4 acres and is located between the vehicular parking lot supporting the terminal building and the GA apron. The site is accessible via U.S. Highway 1 (Overseas Highway) and Airport Access Road. This area is located outside the Taxiway A TOFA, but it is located within the Automated Surface Observation System (ASOS) critical area.

The midfield development area could support apron expansion and/or hangar development. Ultimately, the layout of a new hangar and/or apron development is dependent upon the Airport's needs at the time of development and/or the tenants' proposed plans. Development in this area would require the relocation of the ASOS. **Exhibit 5-9** illustrates the midfield development area, as well as an 8,000-square-yard apron expansion.

Additionally, the terminal building and adjacent automobile parking areas could be repurposed and used for FBO/GA development and supporting operations, depending upon tenant demand.

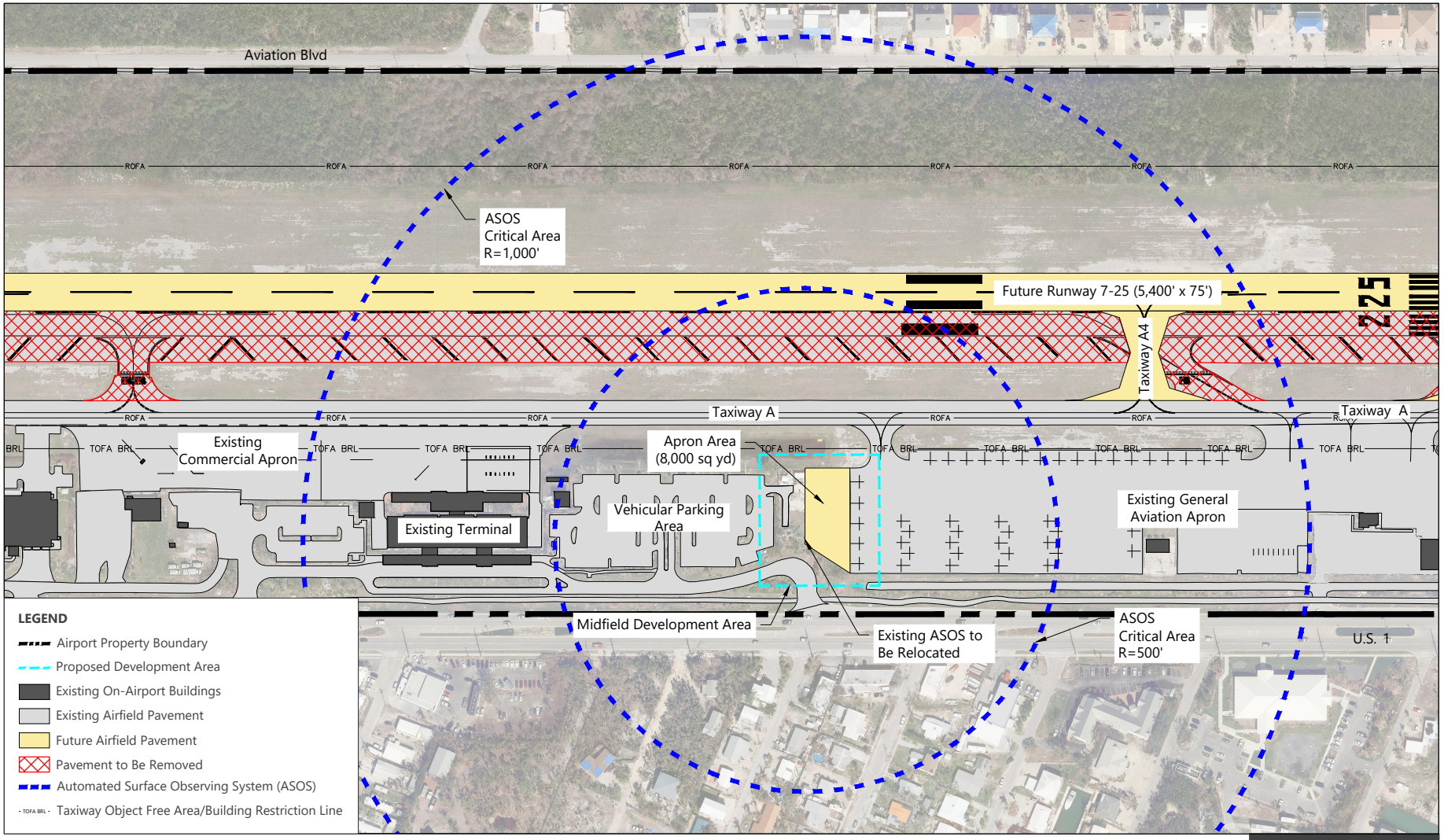
5.3.4 SOUTHEAST DEVELOPMENT AREA

The southeast development area is approximately 1.3 acres and is located west of the Monroe County Sheriff's Office hangar, beyond the end of Runway 25. The site is accessible via Airport Access Road and is outside the approach surface and RPZ. The southeast development area is located within the Runway 7 TERPS departure surface. Proposed development would need to be coordinated with the FAA to determine if the introduction of new penetrations to the departure surface would be permissible.

Upon favorable determination from the FAA, the southeast development area could accommodate conventional hangars and/or FBO activities. Seven conceptual alternatives were evaluated to accommodate future FBO/GA demand (Refer to Appendix E). The alternatives provided a range of proposed facilities in various configurations to include:

- Between 2,600 and 4,000 square yards of apron space
- Between 6,800 and 12,7000 square feet of conventional hangar space
- Between 8 and 12 vehicular parking spaces

Ultimately, tenant needs will determine the size, layout, and quantity of the facilities. The preferred alternative provides for 4,000 square yards of apron space, a 10,200-square-foot conventional hangar, and 10 vehicular parking spaces. **Exhibit 5-10** illustrates the preferred alternative for the southeast development area.



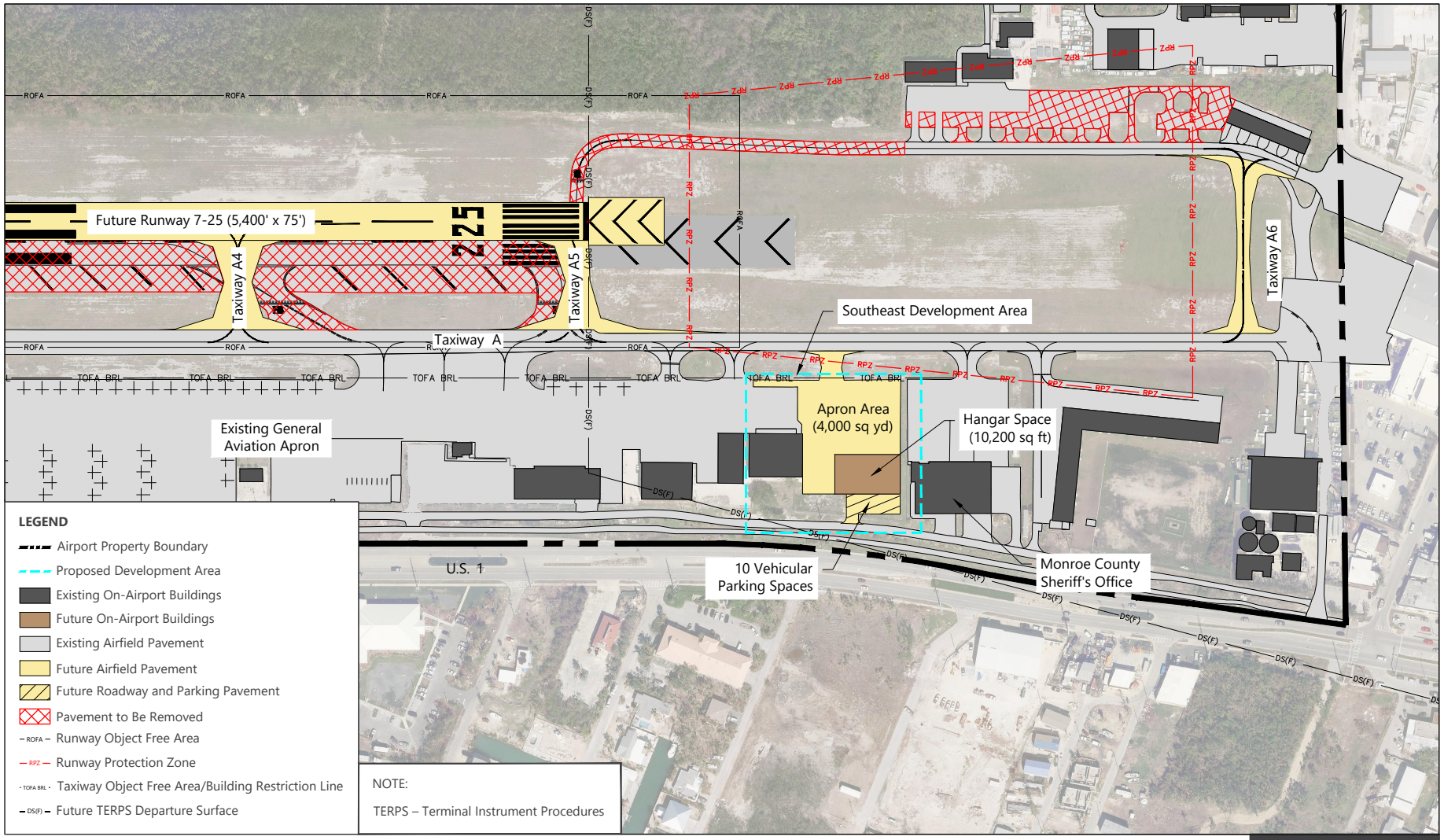
SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-9

NORTH 0 300 ft.

Midfield Development Area

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5.3-2 through 5.3-4_GA Development Alternatives.dwgLayout: Exhibit 5.3-3 Plotted: Jan 2, 2020, 10:31AM



SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-10

NORTH 0 300 ft.

Southeast Development Area
Preferred Alternative

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-8 through 5-10_GA Development Alternatives.dwgLayout: Exhibit 5-10 Plotted: Jul 24, 2020, 03:09PM

5.4 Airport Support Facilities

In consultation with the Monroe County Department of Airports staff and other stakeholders, several Airport support facilities were evaluated for expansion, replacement, and/or upgrade. These support facilities include:

- Airport maintenance storage facility
- ATCT
- ASOS

The following subsections discuss the alternatives associated with the Airport maintenance storage facility, ATCT, and ASOS.

5.4.1 AIRPORT MAINTENANCE STORAGE FACILITY

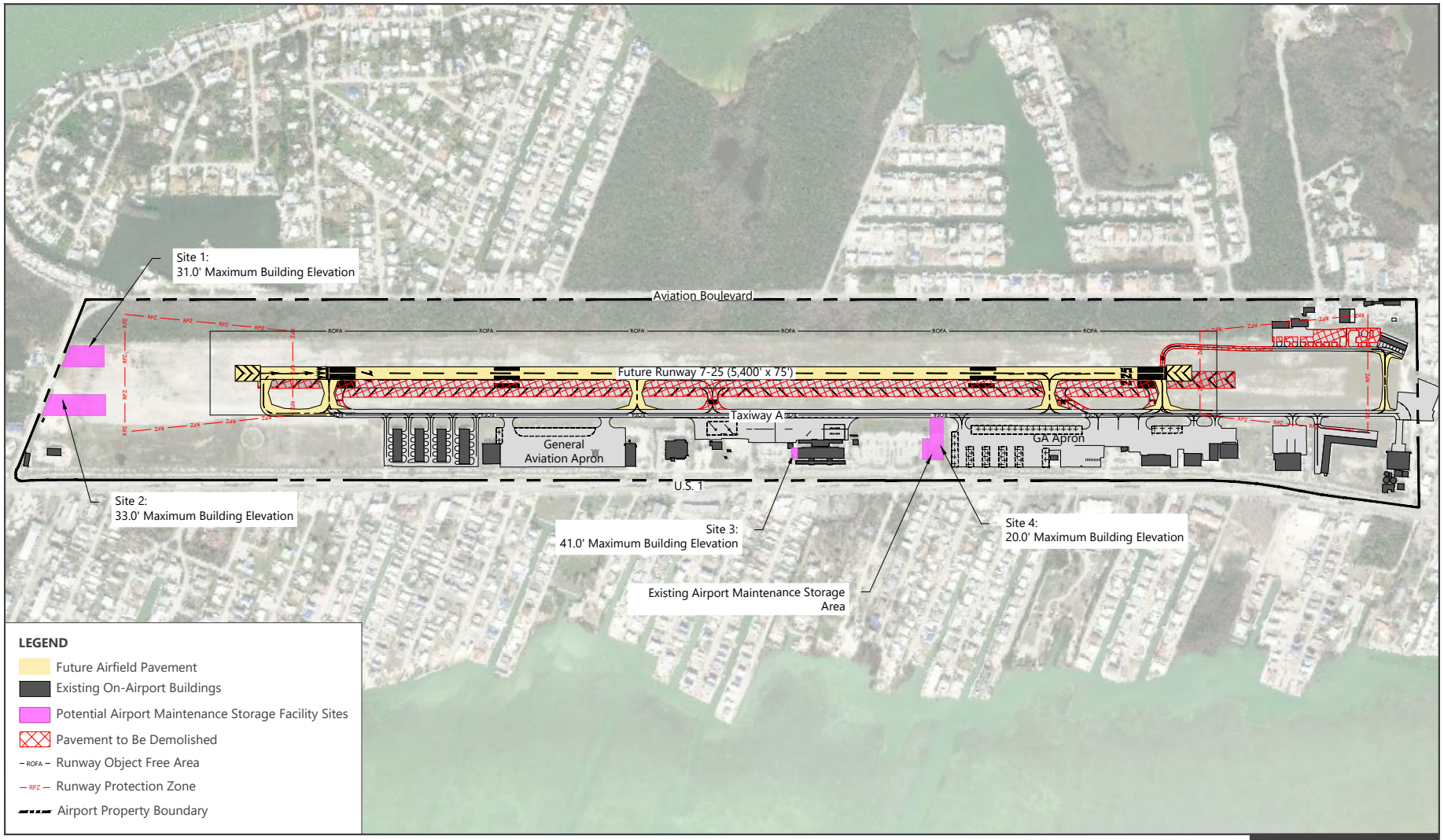
The Airport does not currently have a dedicated maintenance storage facility. The equipment is stored in a shed, a storage container, and in the grass area adjacent to the ASOS. To provide indoor storage, in a consolidated facility, as well as to create office space for maintenance personnel, the development of a maintenance storage facility was evaluated.

Four sites were evaluated as potential locations for a maintenance storage facility. **Exhibit 5-11** illustrates the potential sites for a maintenance facility. The potential sites were evaluated using the following considerations:

- site acreage
- existing airfield and surface street access
- maximum building height
- enabling projects
- highest and best use of site
- cost

Site 3 was chosen as the optimal site in the near term. The site would require minimal preparation to construct a facility; it currently has airfield and landside access; and it would be the most cost effective. Additionally, the site is near the existing maintenance equipment and is centrally located on the airfield.

For the long term, Sites 1 and 2 were chosen as the ultimate preferred locations, because these sites have excellent airside and surface street access; they do not require the relocation of any existing facilities; and the sites are not well suited for the development of aircraft hangars or apron space (i.e. the development of these sites would not impact the availability of prime real estate along the flight line). Additionally, these sites could accommodate the existing and forecast needs of the Airport's maintenance storage throughout the planning period and beyond.



SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-11

NORTH 0 900 ft.

Airport Maintenance Storage Facilities Potential Sites

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-11_MTH_Airport Maintenance Storage Facilities.dwgLayout: 8.5x11L Plotted: Jul 24, 2020, 02:27PM

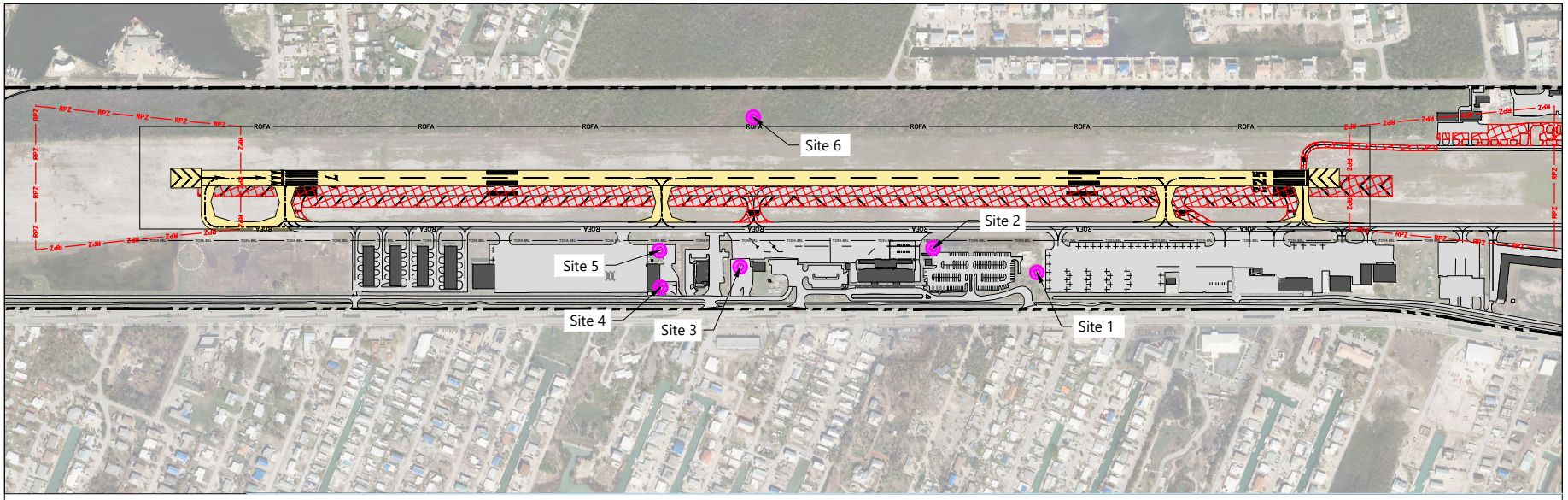
5.4.2 AIR TRAFFIC CONTROL TOWER

Although there is currently no ATCT at MTH and the forecast operations do not justify an ATCT during the planning period, Monroe County Department of Airports staff requested that potential sites be evaluated as part of the MPU process. Six sites were evaluated for impacts to the following:

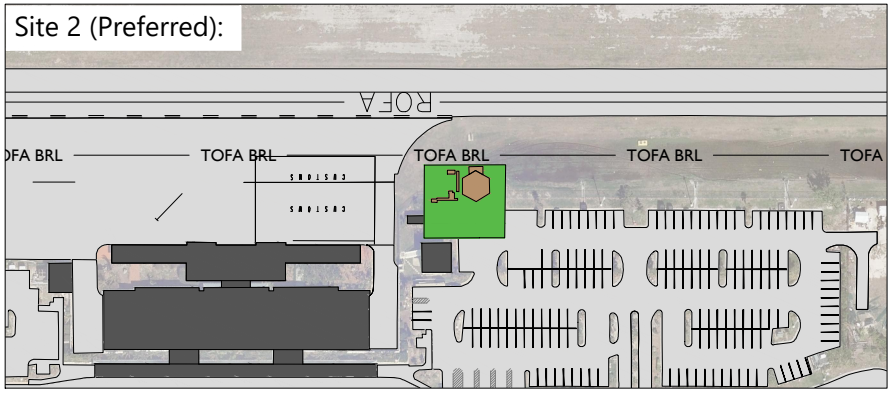
- Visibility performance – does the ATCT eye elevation at this site meet all mandatory visibility requirements?
- Airspace – does this site impact the surrounding airspace at MTH?
- Impacts to NAVAIDS (navigational aids) – does this site interfere with or reduce existing NAVAID performance?
- Environmental impacts – does this site impact any known wetlands, mangrove areas, etc.?
- Cab orientation – does the cab orientation for this site increase of reduce sun glare?
- Construction phasing – would constructing an ATCT at this site impact current airport operations?
- Vehicular accessibility – would additional roadways be required for vehicles to access this site?
- FAA personnel accessibility – are FAA personnel impacted accessibility limitations to this site?

Exhibit 5-12 illustrates the six sites that were evaluated as potential sites for a future ATCT and it also shows the preferred site. The preferred site (Site 2) is located east of the former commercial terminal, adjacent to the vehicular parking lot. An ATCT constructed at the preferred site would have minimal TERPS and Part 77 impacts, suitable landside access, and minimal impacts to environmentally sensitive areas, since the area is currently developed. This site also offers a centralized location on the airfield and visibility to all runway ends.

Site 1, which is located between the existing passenger terminal parking area and the apron, was discarded because this area can be used for the expansion of the existing apron and allow for the development of additional general aviation facilities in the area. In addition, the view from the ATCT cab would be obstructed by the existing terminal building and ARFF station. Site 3 was also discarded because the view from the ATCT cab would be obstructed by the existing terminal building and ARFF station. Sites 4 and 5, which are located on the north side of the southwest apron, were discarded because this area is being reconfigured to accommodate the Marathon Jet Center FBO facilities. Site 6 was discarded because it would impact mangrove and wetland areas. In addition, this site would require the construction of a new road to access the site. The extension of utilities would also increase the development costs of this site.



Site 2 (Preferred):



LEGEND

- Airport Property Boundary
- Existing On-Airport Buildings
- Existing Airfield Pavement
- Air Traffic Control Tower (ATCT) Site Alternatives
- Future Airfield Pavement
- Preferred Future ATCT Site
- Pavement to Be Removed
- ROFA – Runway Object Free Area
- RPZ – Runway Protection Zone
- TOFA BRL – Taxiway Object Free Area/Building Restriction Line

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-12

NORTH 0 800 ft.

Air Traffic Control Tower Potential Sites

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5.4-2_MTH_Air Traffic Control Tower Potential Sites.dwgLayout: Exhibit 5.4-2 Plotted: Jan 2, 2020, 10:45AM

5.4.3 AUTOMATED SURFACE OBSERVING SYSTEM

The existing ASOS, located between the vehicular parking lot adjacent to the terminal building and the GA aircraft parking apron, would limit the potential development opportunities due to height restrictions associated with the sensors' critical (clearance) areas. The existing ASOS equipment has two clearance areas:

- 500-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be 15 feet lower than the height of the wind sensor.
- 1,000-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be no greater than 10 feet above the height of the wind sensor.

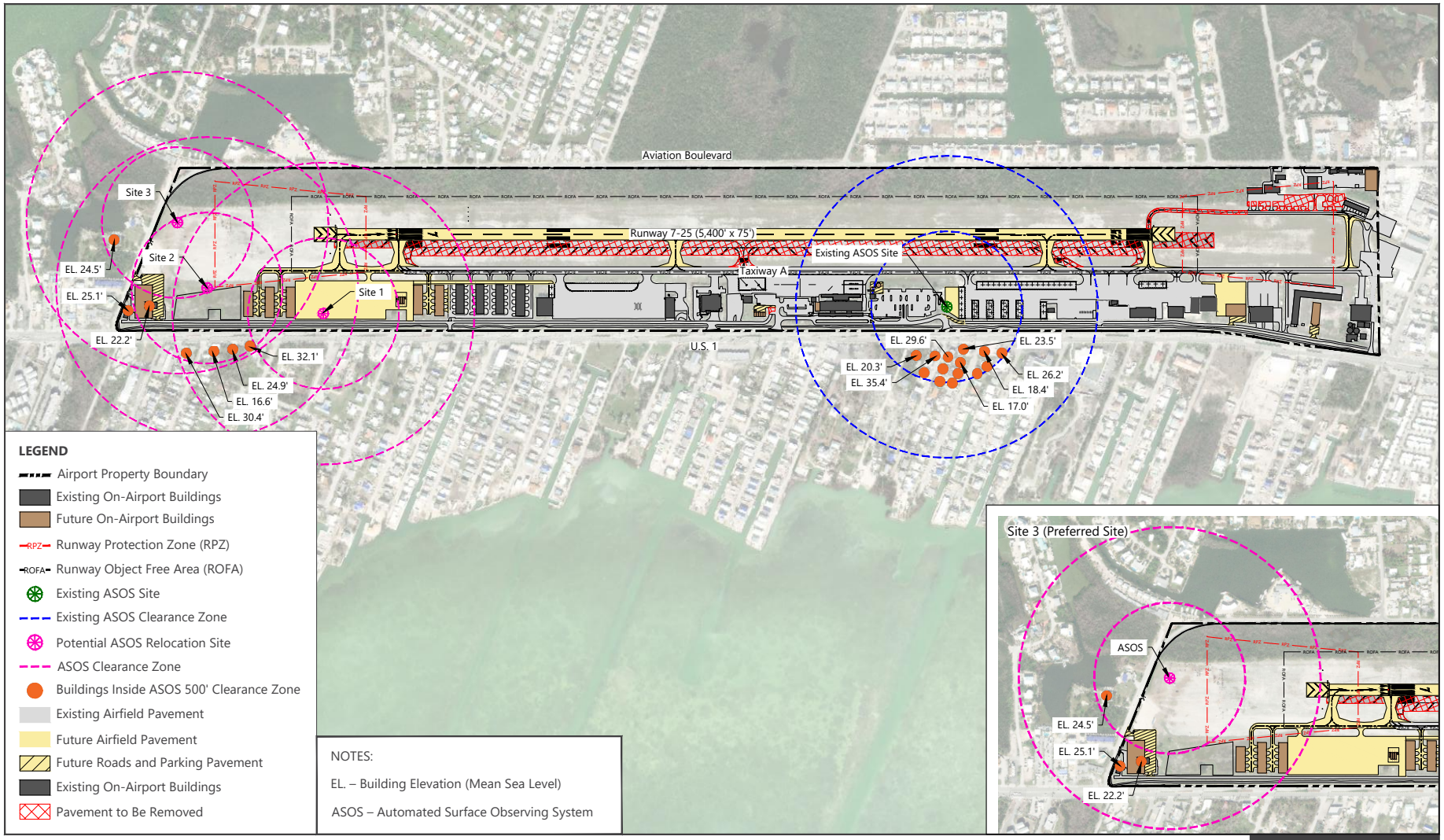
Currently, 14 structures are located within the ASOS critical area, and four facilities exceed the height requirements. To provide clear critical areas and to accommodate potential development in the midfield development area, three sites were evaluated for the ASOS replacement.

During the evaluation of the potential sites, it was determined that there is no location on Airport property that would provide clear ASOS critical areas. The preferred site (Site 3) minimizes the number of facilities inside the critical areas and minimizes the facilities exceeding the critical area height requirements. The preferred site maximizes the development potential of the Airport's property by replacing the ASOS at the western edge of the Airport. **Exhibits 5-13** illustrates the three sites evaluated for the ASOS relocation, as well as shows the preferred site.

5.5 Non-Aeronautical Facilities

As part of the MPU, a cursory review of Airport property was conducted to evaluate MTH's potential to accommodate additional non-aeronautical development opportunities. Four sites were identified as being suitable candidates, since they do not have direct airfield access. **Exhibit 5-14** illustrates the sites, which are the following:

- Parcel 1 is approximately 1.2 acres, accessible via Aviation Boulevard, and it is being considered for the relocation of the Monroe County Emergency Operations Center.
- Parcel 2 is approximately 0.2 acres, accessible via Airport Access Road, and it is being considered for a car wash facility.
- Parcel 3 is approximately 1.5 acres, accessible via Airport Access Road, and it is being considered for an indoor shooting range.
- Parcel 4 is approximately 0.3 acres, accessible via Industrial Avenue and Aviation Boulevard, and it is being considered for a FAA remote communications air-ground (RCAG) facility.



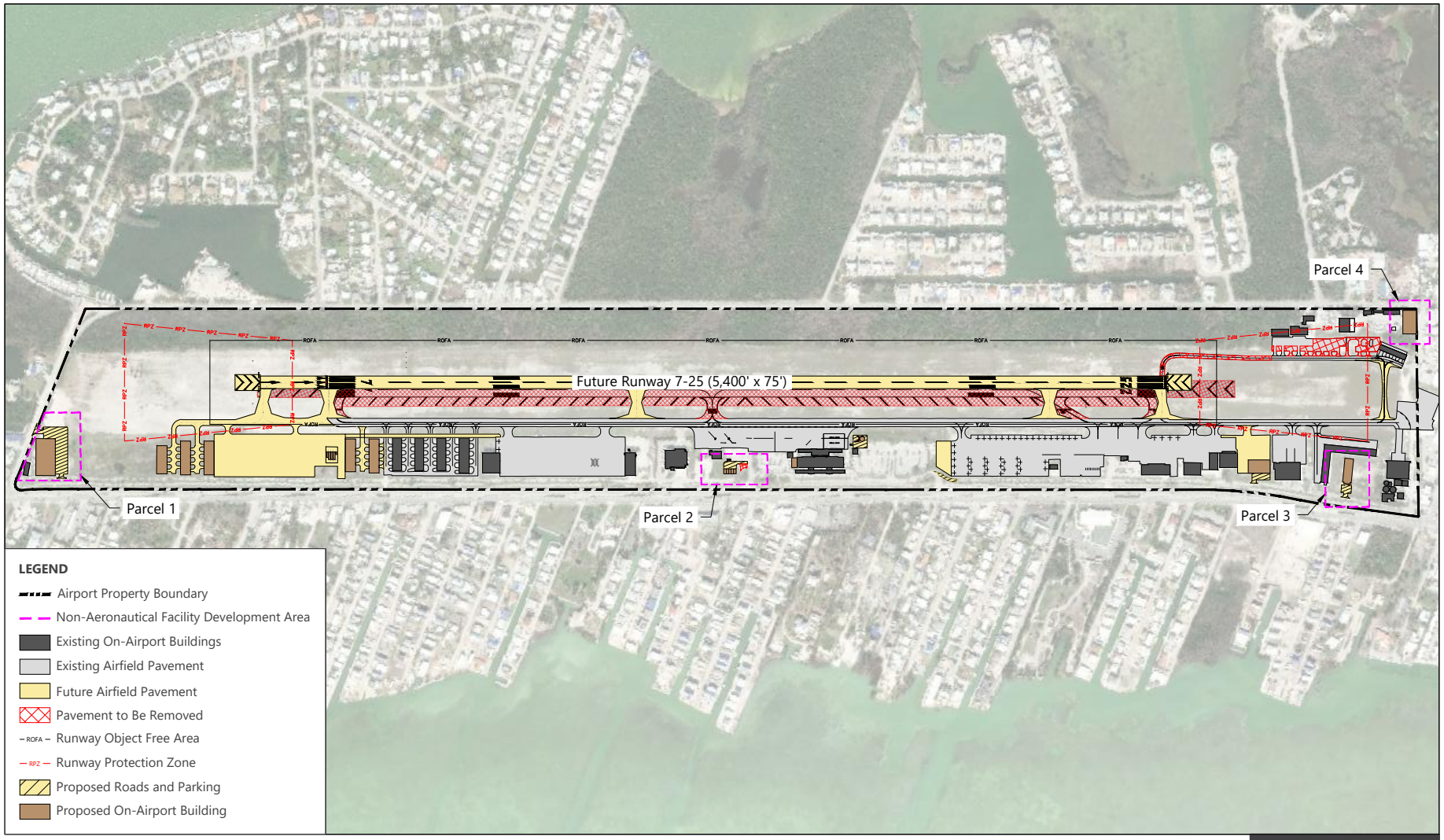
SOURCES: DigitalGlobe, *Aerial Photography,* December 2019; Martinez Geospatial, Inc., *Planimetric Base Map,* March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-13

NORTH 0 1,000 ft.

Automated Surface Observing System Replacement

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-13 Automated Surface Observation System Replacement.dwgLayout: Exhibit 5-13 Plotted: Jul 24, 2020, 02:08PM



SOURCES: DigitalGlobe, *Aerial Photography,* December 2019; Martinez Geospatial, Inc., *Planimetric Base Map,* March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-14

NORTH 0 900 ft.

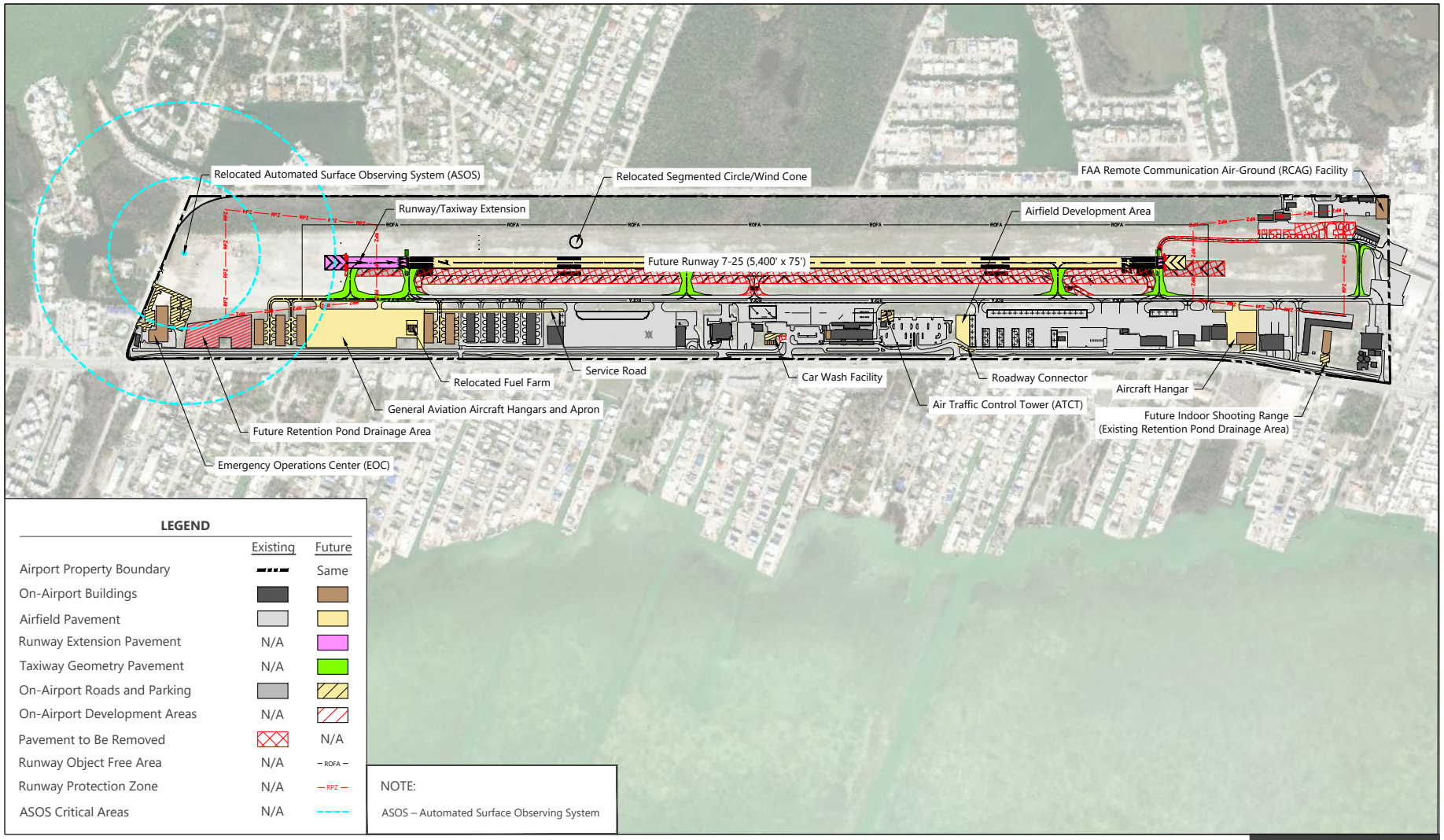
Future Non-Aeronautical Facilities

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-14_MTH_Non-Aeronautical Facilities.dwgLayout: Exhibit 5-14 Plotted: Jul 24, 2020, 01:58PM

5.6 Overall Airport Development Plan

The overall Airport development plan includes a relocated runway 40 feet north of its current location, a 392-foot runway extension, and various taxiway geometry improvements. The extension of Airport Access Road is recommended to provide contiguous access to the various buildings and businesses located south of the runway, including the FBO, terminal, vehicular parking areas, and hangars. To accommodate existing and future tenant-driven demand for FBO and GA facilities, the southwest, midfield, and southeast development areas are included in the overall Airport development plan. An Airport maintenance storage facility, ATCT, and a new ASOS have been evaluated, and their preferred locations are also included. Areas that do not have airfield access have been depicted as non-aeronautical development opportunities to increase revenue and to reflect Monroe County's current development efforts.

The overall Airport development plan has been created and refined through multiple iterations with Monroe County Department of Airports staff and MPU stakeholders. The preferred alternatives, which are shown on the ALP, will be incorporated into the Airport's capital program, as needed, to satisfy future demand. **Exhibit 5-15** illustrates the overall Airport development plan.



LEGEND

	Existing	Future
Airport Property Boundary		Same
On-Airport Buildings		
Airfield Pavement		
Runway Extension Pavement	N/A	
Taxiway Geometry Pavement	N/A	
On-Airport Roads and Parking		
On-Airport Development Areas	N/A	
Pavement to Be Removed		N/A
Runway Object Free Area	N/A	– ROFA –
Runway Protection Zone	N/A	— RPZ —
ASOS Critical Areas	N/A	

NOTE:
ASOS – Automated Surface Observing System

SOURCES: DigitalGlobe, *Aerial Photography*, December 2019; Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018.
PREPARED BY: Ricondo & Associates, Inc., December 2019.

EXHIBIT 5-15

NORTH 0 1,000 ft.

Overall Airport Development Plan

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 506.0 - Alternative Analysis & Development\CAD\Exhibit 5-15_MTH_Overall Airport Development Plan.dwgLayout: Exhibit 5-15 Plotted: Jul 30, 2020, 09:33AM

Florida Keys Marathon International Airport

Environmental Overview

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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6. Environmental Overview

This section provides a general overview of the potential environmental consequences and environmental review requirements associated with the Capital Improvement Plan projects recommended as part of the Airport Master Plan Update (MPU). Prior to project implementation, the potential environmental effects of these projects must be reviewed in accordance with the National Environmental Policy Act (NEPA) requirements and implementing guidance in FAA Orders 1050.1F, *Environmental Impacts: Policies and Procedures*,[1] and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*,[2] or the latest versions of those Orders at the time of environmental processing.

A project is considered ready for environmental review pursuant to NEPA when construction is expected to be initiated within a few years. As a general rule of thumb, construction should begin within three to five years of the FAA's issuance of a finding. The level of environmental documentation required for a project depends on the type of project(s), the potential environmental effects of the project(s), and the types of environmental resources that could be affected. The three levels of environmental documents prepared to comply with NEPA are:

- **Categorical Exclusion (CATEX):** FAA Order 1050.1F lists projects that typically do not result in significant adverse impacts. These projects are eligible for a categorical exclusion if no extraordinary circumstances are involved. A CATEX requires an assessment of potential areas of impact and associated documentation of no significant impacts.
- **Environmental Assessment (EA)**: The airport sponsor is required to prepare an EA for projects that are not eligible for a categorical exclusion; the EA documents whether the project has the potential to result in a significant adverse impact. The EA presents a discussion and evaluation of the potential environmental effects. If no significant impacts would be expected to occur, or it is demonstrated that any potential impacts could be mitigated to a level below significance, then the FAA may issue a Finding of No Significant Impact (FONSI). If the adverse environmental impacts cannot be mitigated below a level of significance, then further analysis, in the form of an Environmental Impact Statement (EIS), may be required.

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1 US Department of Transportation, Federal Aviation Administration, Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 16, 2015.

2 US Department of Transportation, Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions,* April 28, 2006.

- **Environmental Impact Statement:** The FAA prepares an EIS, which presents detailed analyses of the environmental effects of a project. The EIS process provides for full public disclosure of significant environmental effects, practicable alternatives that would avoid or minimize adverse effects, and mitigation for those impacts that cannot be avoided.

6.1 Projects Potentially Eligible for Exclusion from Environmental Review

Table 6-1 lists the Capital Improvement Plan projects identified through the Airport MPU planning process. As shown, the majority of Capital Improvement Plan projects are eligible for categorical exclusion under NEPA. The table also cites the relevant paragraphs in FAA Order 1050.1F that define the potential eligibility for categorical exclusion from NEPA. Although a potentially applicable categorical exclusion paragraph is identified for most projects, some projects would not likely be eligible for a CATEX based on the scale of the project or the presence of extraordinary circumstances (e.g., wetland effects). Furthermore, projects may be assessed together as a single "action" under NEPA if they are connected by implementation timing, proximity, or other common aspects of the projects, such as one project enabling implementation of another. Connected and enabling projects comprising a single action under NEPA may collectively not meet the definition of an action eligible for a CATEX. Therefore, Table 6-1 is intended to provide a reference to support future consideration of NEPA review needs. As noted in Table 6-1, one of the projects is already in the environmental review process as of 2019—a Draft EA is being prepared for the Runway and Parallel Taxiway Separation Improvements project (AF-1).

Table 6-1: Potential Categorical Exclusion Eligibility

PROJECT NUMBER[1/]	PROJECT NAME	PRELIMINARY EVALUATION OF CATEGORICAL EXCLUSION ELIGIBILITY[2/]	POTENTIALLY RELEVANT 1050.1F PARAGRAPH(S)[3/]
Short-Term Improvement Projects (FY 2018 – FY 2022)			
Airfield			
AF-1	Runway and Parallel Taxiway Separation Improvements – Design	See Note 4	–
AF-2	RCAG Facility Construction	Potentially Eligible	5-6.3.a
AF-3	Service Road Construction – Phase 1	Potentially Eligible	5-6.4.a
General Aviation			
GA-1	General Aviation Development	Potentially Eligible	5-6.4.f; 5-6.4.h
GA-3	General Aviation Development – Southwest	Potentially Eligible	5-6.4.f; 5-6.4.h
Support Facilities			
SF-1	ASOS Relocation	Potentially Eligible	5-6.3.c
SF-2	Airport Maintenance Storage Facility Construction	Potentially Eligible	5-6.4.f
SF-3	Fuel Storage Relocation	Potentially Eligible	5-6.4.u
SF-4	Segmented Circle/Wind Cone Relocation	Potentially Eligible	5-6.3.e
Non-Aviation			
NA-1	Emergency Operations Center	Potentially Eligible	5-6.4.h
NA-2	Retention Pond Modifications – Southwest	Potentially Eligible	5-6.4.l
NA-3	Indoor Shooting Range	Potentially Eligible	5-6.4.h
Mid-Term Improvement Projects (FY 2023 – FY 2028)			
Airfield			
AF-1[4/]	Runway and Parallel Taxiway Separation Improvements – Construction	See Note 4	–
General Aviation			
GA-2	General Aviation Apron Expansion – Midfield	Potentially Eligible	5-6.4.e
Landside			
LS-1	Airport Access Road Extension	Potentially Eligible	5-6.4.a
Long-Term Improvement Projects (FY 2028 – FY 2036)			
Airfield			
AF-5	Runway Extension West	Potentially Eligible[5/]	5-6.4.e
General Aviation			
GA-3	General Aviation Development - Southwest	Potentially Eligible	5-6.4.f; 5-6.4.h
Support Facilities			
SF-5	Airport Traffic Control Tower Construction	Potentially Eligible	5.6.4.dd

NOTES:

– Not Applicable

ASOS—Automated Surface Observing System

FAA—Federal Aviation Administration

RCAG—-Remote Communications Air-Ground

1/ The Project Number refers to the individual projects identified on Exhibit 7-1

2/ Projects are eligible for a categorical exclusion if no extraordinary circumstances exist, as listed in Section 5.2 of FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. Categorical exclusion eligibility should be reassessed when individual projects are ready for environmental review and should include coordination with the FAA to confirm eligibility.

3/ The cited paragraphs in FAA Order 1050.1F are:

5-6.3.a Construction of the following facilities on designated airport property or commercial space launch sites, co-located with other FAA facilities, co-located at a location currently used for similar facilities or equipment, or replacement with essentially similar facilities or equipment: Remote Communications Outlet (RCO), Remote Transmitter/Receiver (RT/R), or Remote Center-Air Ground Communication Facility (RCAG), or essentially similar facilities or equipment identified in, and designed and constructed in accordance with FAA Order 6580.3, *The Remote Communications Facilities Installation Standards Handbook*. These facilities are typically located within a 150 feet by 150 feet parcel with antenna towers reaching approximately 40 feet in height. (ATO)

5-6.3.c Federal financial assistance for, or Airport Layout Plan (ALP) approval of, or FAA installation or upgrade of facilities and equipment, other than radars, on designated airport or FAA property or commercial space launch sites. Facilities and equipment means FAA communications, navigation, surveillance, and weather systems. Weather systems include hygrothermometers, Automated Weather Observing System (AWOS), Automatic Surface Observation System (ASOS), Stand Alone Weather Sensors (SAWS), Runway Visual Range (RVR), and other essentially similar facilities and equipment that provide for modernization or enhancement of the service provided by these facilities. Navigational aids include Very High Frequency Omnidirectional Range (VOR), VOR Test facility (VOT), co-located VORs and Tactical Aircraft Control and Navigation (TACAN) (VORTAC), Low Power TACAN, Instrument Landing System (ILS) equipment or components of ILS equipment (establishment or relocation of an ILS is not included; an EA is normally required; see Paragraph 3-1.2.b(8)), Wide Area Augmentation System (WAAS), Local Area Augmentation System (LAAS), other essentially similar facilities and equipment, and equipment that provides for modernization or enhancement of the service provided by that facility, such as conversion of VOR to VORTAC, conversion to Doppler VOR (DVOR), or conversion of ILS to category II or III standards. FAA Order 6820.10, VOR, VOR/DME and VORTAC Siting Criteria governs the installation of VOR/VOT/VORTAC-type equipment. These facilities are typically located within a 150 feet by 150 feet parcel, with a total structure height reaching approximately 50 feet in height. (ATO, ARP, AST)

5-6.3.e Federal financial assistance for, ALP approval of, or FAA installation, repair, relocation, replacement, removal, or upgrade of minor miscellaneous items such as Low Level Wind Shear Alert System (LLWAS), wind indicators, wind measuring devices, landing directional equipment, segmented circles (visual indicators providing traffic pattern information at airports without airport traffic control towers (ATCTs)), mobile ATCTs, Mobile Emergency Radar Facilities (MERF), and associated fencing and calibration equipment. (ARP, ATO)

5-6.4.a Access road construction, and construction, relocation, or repair of entrance and service roadways that do not reduce the level of service on local traffic systems below acceptable levels.

5-6.4.e Federal financial assistance, licensing, or ALP approval for the following actions, provided the action would not result in significant erosion or sedimentation, and will not result in a significant noise increase over noise sensitive areas or result in significant impacts on air quality: construction, repair, reconstruction, resurfacing, extending, strengthening, or widening of a taxiway, apron, loading ramp, or runway safety area (RSA), including an RSA using Engineered Material Arresting System (EMAS); or reconstruction, resurfacing, extending, strengthening, or widening of an existing runway. This CATEX includes marking, grooving, fillets and jet blast facilities associated with any of the above facilities.

5-6.4.f Federal financial assistance, licensing, ALP approval, or FAA construction or limited expansion of accessory onsite structures, including storage buildings, garages, hangars, t-hangars, small parking areas, signs, fences, and other essentially similar minor development items.

5-6.4.h Federal financial assistance, licensing, or ALP approval for construction or expansion of facilities—such as terminal passenger handling and parking facilities or cargo buildings, or facilities for non-aeronautical uses at existing airports and commercial launch sites—that do not substantially expand those facilities.

5-6.4.l Federal financial assistance for, licensing or approval of the grading of land, the removal of obstructions to air navigation, or erosion control measures, provided those activities occur on and only affect airport property, a commercial space launch site, or FAA-owned or leased property. (ATO, ARP, AST)

5-6.4.u Approval of an ALP for installation of on-airport, aboveground storage tanks or underground storage tanks (USTs) on airport property or FAA installation, repair, or replacement of USTs and aboveground storage tanks at FAA facilities. These actions must comply with FAA Order 1050.15, Fuel Storage Tanks at FAA Facilities, and EPA regulations, 40 CFR parts 112, 280, and 281, as applicable. This CATEX includes the closure and removal of a fuel storage tank, and remediation of contaminants resulting from a fuel storage tank at an FAA facility or on an airport, provided those actions occur in accordance with the order and the regulations noted above. The establishment of bulk fuel storage and associated distribution systems is not within the scope of this CATEX. Those actions are subject to Paragraph 3-1.2.b.(5) of this Order. (ATO, ARP)

5.6.4.dd FAA construction, reconstruction, or relocation of a non-Radar, Level 1 airport traffic control tower (a tower that does not use radar) at an existing visual flight rule airport, or FAA approval of an ALP and/or Federal funding to do so, provided the action would occur on a previously disturbed area of the airport and not: (1) cause an increase in the number of aircraft operations, a change in the time of aircraft operations, or a change in the type of aircraft operating at the airport; (2) cause a significant noise increase in noise sensitive areas; or (3) cause significant air quality impacts. (ARP, ATO)

4/ This project is being addressed in the ongoing Environmental Assessment for the Runway and Parallel Taxiway Separation Improvements.

5/ For the cited categorical exclusion paragraph to be applicable, the runway extension would not result in a significant increase in aircraft noise, among other criteria. The planning-level noise analysis conducted for the Master Plan Update provides an indication of whether a significant increase in aircraft noise may occur; however, this would need to be confirmed at the time the project is ready for environmental review.

SOURCES: Ricondo & Associates, Inc., August 2019, based on US Department of Transportation, Federal Aviation Administration, Order 1050.1F, *Environmental Impacts: Policies* and *Procedures*, effective July 16, 2015.

6.2 Environmental Considerations

Based on known environmental conditions at the Airport presented in Section 2.9, Environmental Settings, and the proposed Capital Improvement Plan projects, the following NEPA environmental resource categories may be affected and would likely require assessment during environmental review of proposed projects pursuant to NEPA:

- biological resources
- water resources – wetlands and floodplains

The Capital Improvement Plan projects are depicted on **Exhibit 6-1** along with natural habitats located on Airport property. A discussion of each of the biological and wetland resource categories and the proposed Capital Improvement Plan projects that may affect these resources are provided in this section. The environmental resource effects identified herein are preliminary and intended to provide an early indication of the issues that would likely require detailed analyses during a future NEPA environmental review. All Capital Improvement Plan projects would be subject to a level of review under NEPA prior to implementation.

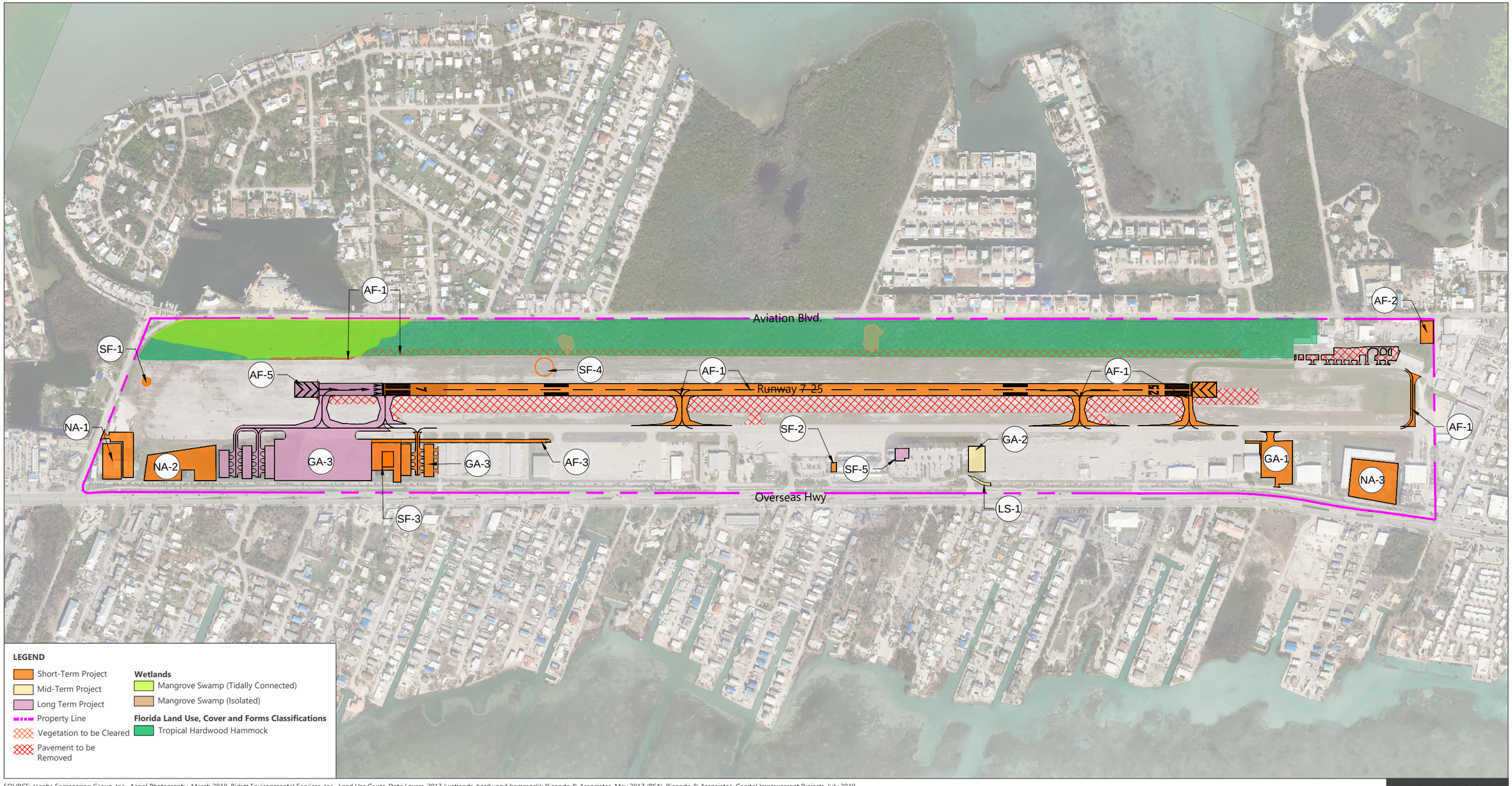
6.2.1 BIOLOGICAL RESOURCES

Habitat that supports several endangered and threatened species may occur at or near the Airport, as identified in Section 2.9. Additionally, as part of the EA being prepared for the the Runway and Parallel Taxiway Separation Improvements project, a Biological Assessment (BA) was prepared. The BA identified 13 federally protected species (8 animal and 5 plant species) and 45 state protected species (17 animal and 28 plant species) with the potential to occur near the Airport or along the north side of Airport property, which includes tropical hardwood hammock and mangrove (isolated and tidally connected wetland) habitats, as shown on Exhibit 6-1.

Aside from the Runway and Parallel Taxiway Separation Improvements project, which includes clearing of a strip of the tropical hardwood hammock and mangrove habitat, no Capital Improvement Projects directly effect on-Airport sensitive habitat. Effects on biological resources due to implementation of the Runway and Parallel Taxiway Separation Improvements project are being evaluated in an EA.

6.2.2 WATER RESOURCES – FLOODPLAINS

MTH is located entirely within the Federal Emergency Management Agency (FEMA) 100-year floodplain, and as such, all Capital Improvement Plan projects are located within a floodplain. Because these facilities must be located at the Airport, no practicable alternatives exist to siting these projects elsewhere out of the floodplain. Therefore, the significance of a floodplain encroachment would need to be evaluated, as defined in DOT Order 5640.2.



SOURCE: Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018. Birkitt Environmental Services, Inc., *Land Use Cover, Data Layers,* 2017 (wetlands, hardwood hammock); Ricondo & Associates, May 2017 *(BSA*). Ricondo & Associates, *Capital Improvement Projects,* July 2019.

EXHIBIT 6-1

NORTH 0 600 ft.

Environmental Considerations for the Capital Improvement Plan (FY 2018 – FY 2036)

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 507.0 - Environmental Overview\CAD\MTH_Environmental Considerations for the Capital Improvement Plan.dwgLayout: Exhibit 6-1 Plotted: Jul 15, 2020, 05:26PM

A significant floodplain encroachment, however, is not necessarily considered a significant environmental impact under NEPA. The FAA may approve a project involving a significant floodplain encroachment if a finding can be made there is no practicable alternative to placing a project in the floodplain and that all measures to minimize harm will be included in the project. The NEPA document should explain that other alternatives were analyzed, justify locating the project in the floodplain as the only practicable alternative, evaluate effects on the floodplain's natural and beneficial values, and identify applicable mitigation measures, if appropriate, as part of the project in order to minimize potential harm to or within the floodplain.

6.2.3 WATER RESOURCES – WETLANDS

A tidally connected wetland and two isolated wetlands are located within the undeveloped area along the north side of the Airport property, as shown on Exhibit 6-1. A potential wetlands effect would occur if a project would degrade, disturb, or remove any portion of the wetlands.

As noted in Section 6.2.1, the Runway and Parallel Taxiway Separation Improvements project includes clearing a strip of undeveloped land north of Runway 7-25, which intersects with each of the three wetlands. These direct wetland effects are being evaluated in an EA. No other Capital Improvement Projects directly affect wetland resources. For projects that increase impervious surface at the Airport or otherwise result in a change in activities that could affect stormwater runoff, strategies to minimize pollutants entering the stormwater runoff should be evaluated.

6.2.4 OTHER ENVIRONMENTAL CONSIDERATIONS

The existing conditions associated with other environmental resource categories that are being evaluated as part of the EA for the Runway and Parallel Taxiway Separation Improvements project were not discussed in Section 2.9. A brief description of these resources and potential considerations follows.

- **Air quality and climate:** Monroe County is classified as in "attainment" for all criteria air pollutants through the US Environmental Protection Agency National Ambient Air Quality Standards (NAAQS).[3] Therefore, under NEPA, temporary emissions from construction activities, as well as long-term changes in operational emissions (e.g., new buildings, changes that affect aircraft and vehicle emissions), would not require a general conformity analysis; however, all projects should include evaluation of whether they violate the NAAQS. While it is not anticipated that any of the proposed Capital Improvement Plan projects would induce increased aviation activity, the implementation of a project that would result in a new facility or change in activity patterns would require coordination with the Florida Department of Environmental Protection (FDEP), Division of Air Resource Management to determine air quality permitting requirements.

  Although a significance threshold has not been established for the evaluation of climate change effects, greenhouse gas (GHG) emissions associated with construction and operational changes can be

[3] US Environmental Protection Agency, Florida Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, https://www3.epa.gov/airquality/greenbook/anayo_fl.html (accessed September 11, 2019).

estimated if criteria pollutant emissions analyses are conducted and should be disclosed in the NEPA documentation.

- **Coastal Resources:** The entire state of Florida is designated as within the coastal zone, and Monroe County is designated as a Florida Coastal County.[4] Since the Airport is within the coastal zone, any federal activity affecting the coastal zone must be consistent with the Florida Coastal Management Program (FCMP). As such all Capital Improvement Plan projects would need to show consistency with the FCMP and evaluate potential impacts to coastal resources as part of the NEPA documentation.
- **Department of Transportation, Section 4(f) Resources:** Several Section 4(f) resources (i.e., publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites) are located near the Airport, including: Florida Keys Overseas Heritage Trail (FKOHT), Children's Rotary Park, Marathon's Dog Park, Oceanfront Park, Kayak Launch at Oceanfront Park, the Florida Keys Wildlife and Environmental Area, and the Florida Keys National Marine Sanctuary (FKNMS). Capital Improvement Plan projects would not directly affect Section 4(f) resources; however, indirect effects including visual effects or changes in noise exposure at noise-sensitive resources should be evaluated as part of NEPA documentation if a project involves the potential for visual or noise effects.
- **Hazardous Materials:** The primary types of hazardous materials at MTH are fuels and lubricants; fuels are stored in four aboveground jet fuel tanks, two aboveground aviation gasoline tanks, an aboveground unleaded gasoline storage tank, and an aboveground diesel fuel storage tank. Potential hazardous materials effects would occur if a Capital Improvement Plan project footprint overlaps with or is adjacent to a hazardous material site or storage tank or if operations at the site with project implementation would involve the use, transport, or storage of hazardous materials (such as fueling operations). Potential Capital Improvement Plan projects that may involve hazardous materials that should be evaluated as part of NEPA documentation include General Aviation Development (GA-1 and GA-3), Airport Maintenance Storage Facility Construction (SF-3), Fuel Storage Relocation (SF-4), and Emergency Operations Center (NA-1).
- **Historical, Archaeological, Architectural, and Cultural Resources:** Previous historical, architectural, and cultural resource surveys and analyses, including those conducted as part of the EA for the Runway and Parallel Taxiway Separation Improvements project, indicate these resources are not present at the Airport. No known archaeological resources are present at the Airport; however, potential affects to archaeological resources may need to be considered for Capital Improvement Plan projects that include ground disturbing construction activities.
- **Water Resources – Surface Water:** Surrounding ocean waters are federally protected waters under the National Marine Sanctuary Act. Additionally, the Florida Keys are designated as an Area of Critical State Concern (ACSC), which includes regulation of near-shore water quality. Although the Capital Improvement Plan projects would not directly impact off-site water resources, the potential for indirect

[4] Florida Department of Environmental Protection, *Florida Coastal Management Program Guide, A Guide to the Federally Approved Florida Coastal Management Program*, October 11, 2017.

effects, such as changes in stormwater runoff quality and/or quantity during construction and operation, should be considered as part of NEPA documentation.

6.3 Aircraft Noise Screening Analysis

Changes to an airport's runways are a common development action that may change the aircraft noise environment in the vicinity of an airport. Therefore, a planning-level aircraft noise screening analysis was prepared to estimate the existing aircraft noise exposure conditions and future conditions with and without implementation of the Runway Extension West project, a proposed long-term improvement.

The existing noise exposure modeled in this study represents conditions in 2016, which was developed for the Environmental Assessment. Two future-year scenarios were modeled to represent conditions in 2036 to assess changes to noise exposure with and without implementation of the planned runway extension. In both future-year 2036 scenarios, the planned Runway and Parallel Taxiway Separation Improvements would be in place.[5] The 2036 results presented herein serve as an indication of the future change in noise exposure resulting from the runway extension but are not intended to document whether the change in noise exposure would be significant under NEPA, as this would be reevaluated when the Runway Extension West project is ready for NEPA review.

The future operations and fleet mix used in the noise analysis for 2036 were developed based on the aircraft operations forecast chapter, approved by FAA on October 13, 2017.

6.3.1.1 Existing Conditions Noise Contours (2016)

The existing noise environment in the Airport vicinity includes noise from Airport-related activities such as aircraft departing, landing, and taxiing. The existing noise exposure modeled in this analysis represents noise generated by Airport-related aircraft arrival and departure operations.

The 2016 existing conditions noise exposure contours are depicted on **Exhibit 6-2**. The DNL 65 dB contour, which represent FAA's threshold for impacts to noise-sensitive facilities, is primarily confined to Airport property. The contour follows the runway alignment running northeast to southwest. The DNL 65 dB contour extends off Airport property to include commercial, residential, and natural areas to the north, east, and south. The southwest end of the contour remains on Airport property. The Presbyterian Kirk of the Keys, Kingdom Hall of Jehovah's Witnesses, and portions of Oceanfront Park,[6] the Aviation Boulevard Boat Ramp, and two sites managed as part of the Florida Keys Wildlife and Environmental Area are within the DNL 65 dB noise contour.

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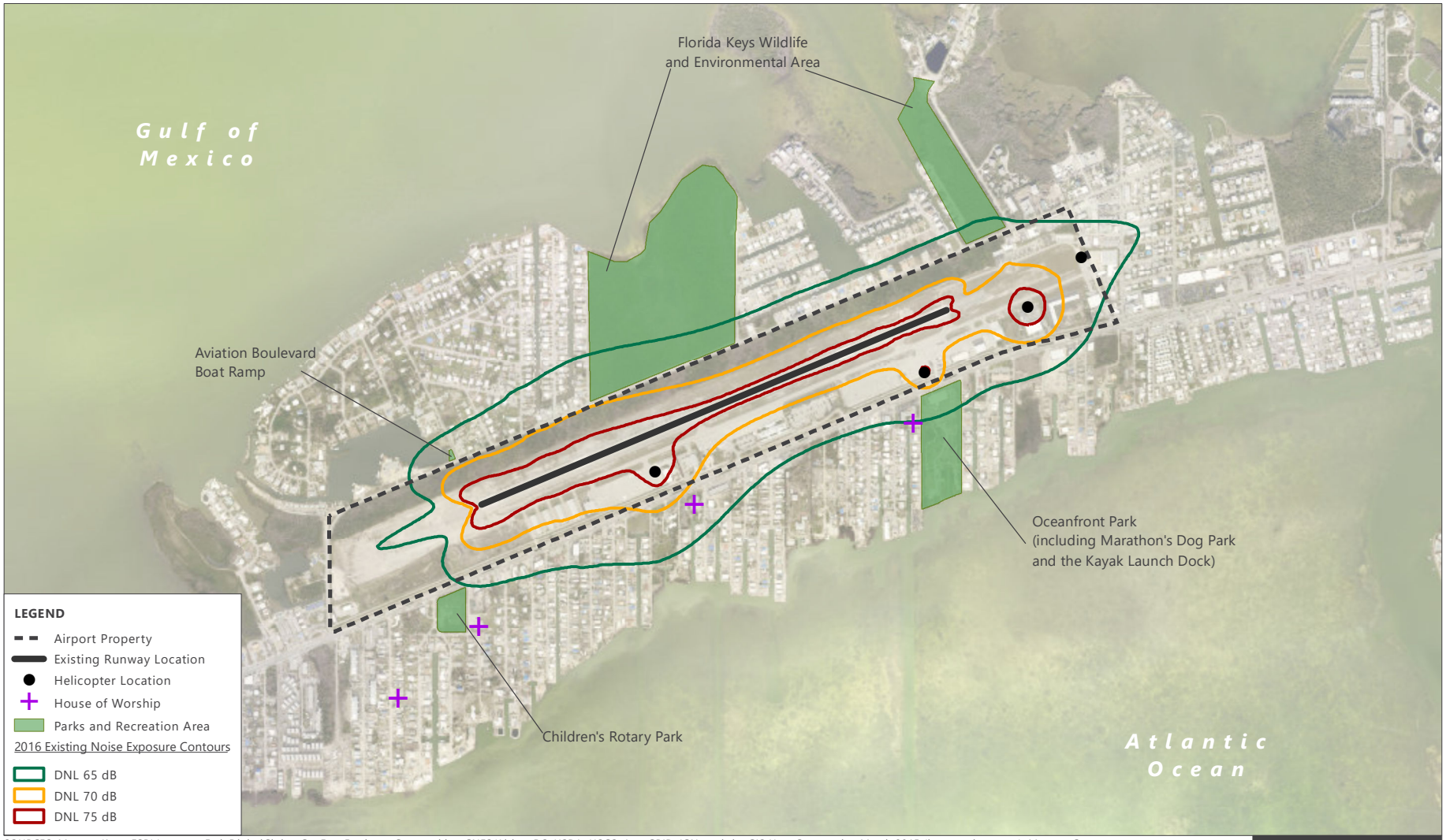
[5] An Environmental Assessment to evaluate the proposed Runway and Parallel Taxiway Separation Improvements project was underway at the time this noise screening analysis was prepared. As such, it was assumed that the Runway and Parallel Taxiway Separation Improvements project would be in place by 2036 under both future-year scenarios—with and without the proposed runway extension.

[6] Oceanfront Park includes Marathon's Dog Park and the Oceanfront Park Kayak Launch Dock.



SOURCES: Monroe Keys, ESRI Imagery, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, March 2015 (imagery basemap); Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property); University of Florida GeoPlan Center, 2015 (houses of worship); University of Florida GeoPlan Center, 2016 (parks); Ricondo & Associates, Inc., June 2017 (study area, parks), based on basemap, May 2017; Ricondo & Associates, Inc., Aviation Environmental Design Tool, Version 2d, July 2018.

EXHIBIT 6-2

NORTH 0 1,500 ft

Existing Aircraft Noise Contours (2016)

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Table 6-2 summarizes population and noise-sensitive facilities exposed to aircraft noise above DNL 65 dB, in DNL 5 dB increments. Dwelling units were identified using satellite imagery and counted within each DNL 5 dB contour. Population was estimated using a factor of people per dwelling unit, based on the US Census 2013–2017 American Community Survey 5-Year Estimates for the City of Marathon to determine the total population exposed in each noise contour range.[7] Under existing conditions, an estimated 226 residents living in 149 dwelling units are located within the DNL 65 dB and greater noise exposure contour. No residences or other noise-sensitive facilities are located within the DNL 70 dB and greater noise exposure contour.

Table 6-2: Noise Exposure: Population and Noise-Sensitive Facilities (2016)

LAND USE	DNL 65+ dB	DNL 70+ dB	DNL 75 dB AND ABOVE
Residential			
Population[1/]	226	–	–
Dwelling Unit	149	–	–
Other Noise-Sensitive Facilities			
School	–	–	–
House of Worship	2	–	–
Hospital	–	–	–
Recreation	4	–	–

NOTES:

– No residences or properties present

DNL— Day-Night Average Sound Level

dB—decibel

1/ Dwelling units counted within each contour level. Population within each contour estimated based on US Census 2013-2017 American Community Survey 5-Year Estimates City of Marathon average of 1.52 people per housing unit.

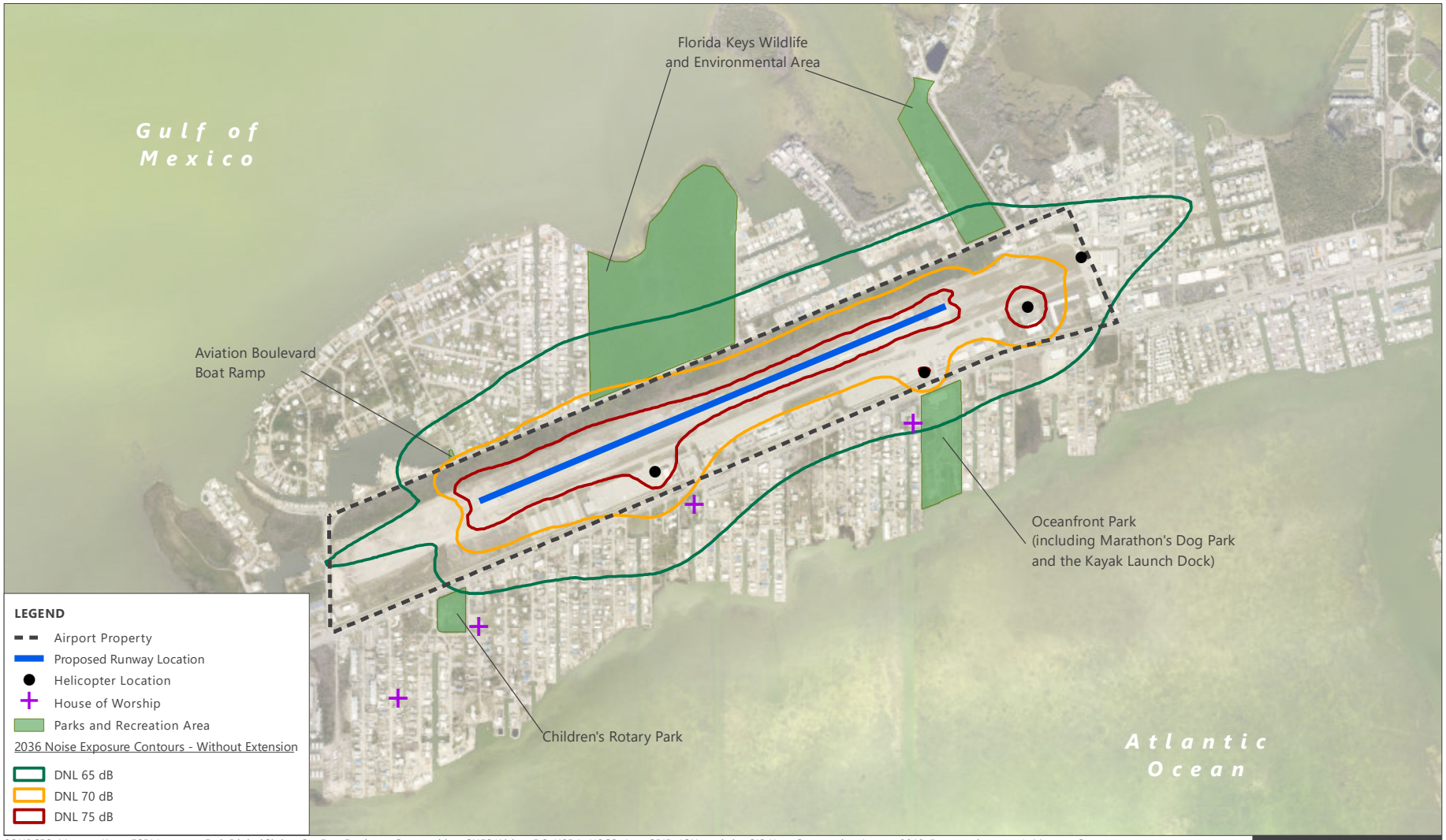
SOURCES: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates, 2019; Ricondo & Associates, Inc., August 2019.

6.3.1.2 Future Conditions Noise Contours (2036) – Without Runway Extension

The 2036 future noise exposure modeled in this analysis represents noise generated by Airport-related aircraft arrival and departure operations based on the Master Plan Study aircraft operation forecast with the runway, at the existing runway length, shifted to the north.

The 2036 future conditions noise exposure contours are depicted on **Exhibit 6-3**. As a result of the forecast increase in aircraft operations, the DNL noise contours for the 2036 future scenario would be slightly larger than existing conditions and would shift slightly to the north in accordance with the runway shift to the north.

[7] Population within each contour estimated based on US Census 2013-2017 American Community Survey 5-Year Estimates City of Marathon average of 1.52 people per housing unit.



SOURCES: Monroe Keys, ESRI Imagery, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, August 2019 (imagery basemap); Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property); University of Florida GeoPlan Center, 2015 (houses of worship); University of Florida GeoPlan Center, 2016 (parks); Ricondo & Associates, Inc., June 2017 (study area, parks), based on basemap, May 2017; Ricondo & Associates, Inc., Aviation Environmental Design Tool, Version 2d, August 2019.

EXHIBIT 6-3

NORTH 0 1,500 ft

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Future Aircraft Noise Contours (2036): Without Runway Extension

As with 2016, the 2036 DNL 65 dB contour would be primarily confined to Airport property. The contour follows the runway alignment running northeast to southwest. The DNL 65 dB contour extends off Airport property to include commercial, residential, and natural areas to the north, east, and south. The southwest end of the contour remains on Airport property but is shifted farther southwest. The Presbyterian Kirk of the Keys, Kingdom Hall of Jehovah's Witnesses, and portions of Oceanfront Park,[8] the Aviation Boulevard Boat Ramp, Children's Rotary Park, and two sites managed as part of the Florida Keys Wildlife and Environmental Area would be within the DNL 65 dB noise contour. Small portions of the Florida Keys Wildlife and Environmental Area and Aviation Boulevard Boat Ramp would also be within the DNL 70 dB contour.

Table 6-3 summarizes estimated population and noise-sensitive facilities exposed to aircraft noise above DNL 65 dB, in DNL 5 dB band increments in 2036 without the runway extension. Using the methodology described in Section 6.3.1.1, results indicate that under proposed future conditions, an estimated 473 residents living in 311 dwelling units would be located within the DNL 65 dB and greater noise exposure contour, while an estimated 11 residents living in 7 dwelling units would be located within the DNL 70 dB and greater noise exposure contour. These 7 dwelling units are located on the north side of the Airport, along Aviation Boulevard between Yellowtail Drive and Dolphin Drive.

Table 6-3: Noise Exposure: Population and Noise-Sensitive Facilities (2036) – Without Runway Extension

LAND USE	DNL 65+ dB	DNL 70+ dB	DNL 75 dB AND ABOVE
Residential			
Population[1/]	473	11	–
Dwelling Unit	311	7	–
Other Noise-Sensitive Facilities			
School	–	–	–
House of Worship	2	–	–
Hospital	–	–	–
Recreation	5	2	–

NOTES:

– No residences or properties present

DNL— Day-Night Average Sound Level

dB—decibel

1/ Dwelling units counted within each contour level. Population within each contour estimated based on US Census 2013-2017 American Community Survey 5-Year Estimates City of Marathon average of 1.52 people per housing unit.

SOURCES: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates, 2019; Ricondo & Associates, Inc., August 2019.

[8] Oceanfront Park includes Marathon's Dog Park and the Oceanfront Park Kayak Launch Dock.

6.3.1.3 Future Conditions Noise Contours (2036) – With Runway Extension

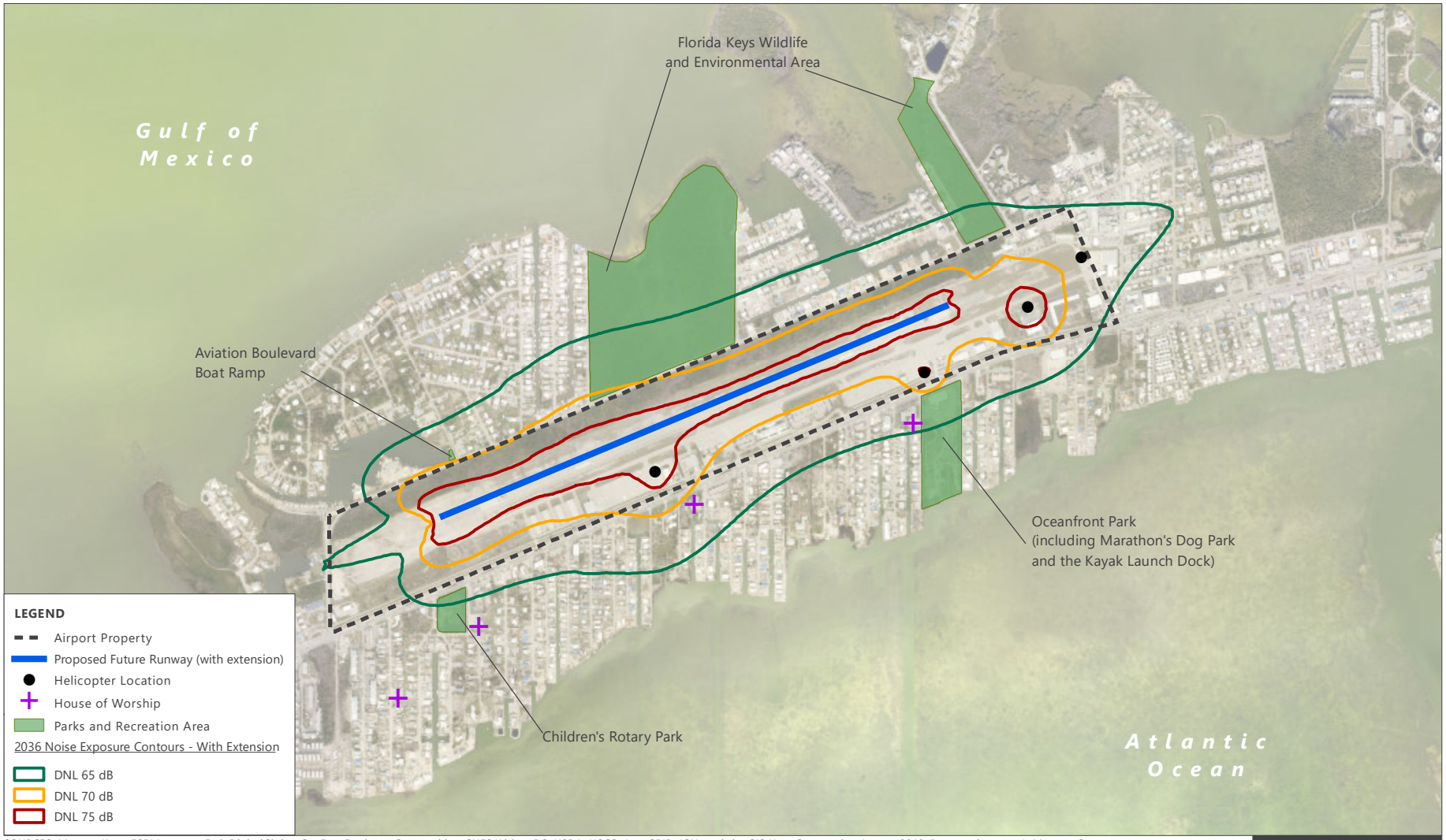
The 2036 future noise exposure modeled in this analysis includes the conditions described in Section 6.3.1.2 above, as well as the proposed 392-foot runway extension to the west.

The 2036 with runway extension noise exposure contours are depicted on **Exhibit 6-4**. As a result of the forecast increase in aircraft operations and the runway extension, the DNL noise contours for the 2036 future scenario would be slightly larger than existing conditions and would shift to the west in accordance with the runway extension. As with 2016 and the without extension 2036 contours, the 2036 with extension DNL 65 dB contour is primarily confined to Airport property and follows a similar alignment. The contours under the runway extension scenario shift slightly to the west, which moves the contour away from residential areas east of the Airport.

The DNL 65 dB contour extends off Airport property to include commercial, residential, and natural areas to the north, east, and south. The southwest end of the contour remains on Airport property but is shifted farther southwest. The Presbyterian Kirk of the Keys, Kingdom Hall of Jehovah's Witnesses, and portions of Oceanfront Park,[9] the Aviation Boulevard Boat Ramp, Children's Rotary Park, and two sites managed as part of the Florida Keys Wildlife and Environmental Area would be within the DNL 65 dB noise contour. A portion of the Florida Keys Wildlife and Environmental Area would also be within the DNL 70 dB contour.

Table 6-4 summarizes estimated population and noise-sensitive facilities exposed to aircraft noise above DNL 65 dB, in DNL 5 dB band increments in 2036 with the runway extension in place. Using the methodology described in Section 6.3.1.1, results indicate that under proposed future conditions, an estimated 438 residents living in 288 dwelling units would be located within the DNL 65 dB and greater noise exposure contour. The 2036 DNL 65 dB contour shifted slightly to the west in comparison to the future year 2036 scenario without the runway extension, so fewer dwelling units are within the DNL 65 dB contour at the east end of the Airport property. An estimated 6 residents living in 4 dwelling units would be located within the DNL 70 dB and greater noise exposure contour. These 4 dwelling units are located on the north side of the Airport, along Aviation Boulevard between Yellowtail Drive and Grouper Drive.

[9] Oceanfront Park includes Marathon's Dog Park and the Oceanfront Park Kayak Launch Dock.



SOURCES: Monroe Keys, ESRI Imagery, Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, August 2019 (imagery basemap); Monroe County Board of County Commissioners, The Florida Keys Marathon International Airport, *Airport Layout Plan*, July 15, 2013 (runway, property); University of Florida GeoPlan Center, 2015 (houses of worship); University of Florida GeoPlan Center, 2016 (parks); Ricondo & Associates, Inc., June 2017 (study area, parks), based on basemap, May 2017; Ricondo & Associates, Inc., Aviation Environmental Design Tool, Version 2d, August 2019.

EXHIBIT 6-4

NORTH 0 1,500 ft

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Future Aircraft Noise Contours (2036): With Runway Extension

Table 6-4: Noise Exposure: Population and Noise-Sensitive Facilities (2036) – With Runway Extension

LAND USE	DNL 65+ dB	DNL 70+ dB	DNL 75 dB AND ABOVE
Residential			
Population[1/]	438	6	–
Dwelling Unit	288	4	–
Other Noise-Sensitive Facilities			
School	–	–	–
House of Worship	2	–	–
Hospital	–	–	–
Recreation	5	1	–

NOTES:

– No residences or properties present

DNL— Day-Night Average Sound Level

dB—decibel

1/ Dwelling units counted within each contour level. Population within each contour estimated based on US Census 2013-2017 American Community Survey 5-Year Estimates City of Marathon average of 1.52 people per housing unit.

SOURCES: US Census Bureau, 2013-2017 American Community Survey 5-Year Estimates, 2019; Ricondo & Associates, Inc., August 2019.

6.4 Environmental Processing Strategy

The Airport Layout Plan (ALP) depicts planned development project(s) identified through the master planning process that are reasonably foreseeable over the planning horizon. Environmental approval of planned facilities depicted on an ALP can occur in one of two ways: 1) conditional approval, where projects require further environmental review before being undertaken, and 2) unconditional approval, where NEPA compliance has been achieved for all projects depicted on the ALP. The ALP submitted to FAA with the Capital Improvement Plan projects is subject to conditional approval by FAA. Individual or groups of Capital Improvement Plan projects will be subject to NEPA analysis to obtain unconditional approval of the portion(s) of the ALP depicting the project(s).

When considering the environmental review associated with the Capital Improvement Plan projects, the dependencies among projects must be considered. The Council on Environmental Quality (CEQ) regulations require that connected projects be considered in the same environmental document. Projects may be connected either because one project enables another or because one project would not happen without a second. In addition, projects occurring in a similar location and/or timeframe may also need to be considered in the same environmental document. When proceeding with environmental review and approval of projects that have the potential to be connected to other projects, independent utility must be demonstrated if those potentially connected projects are not considered.

Coordination with the FAA and other stakeholders (e.g., agencies with jurisdiction over affected resources) should occur well in advance of the need for environmental approval to determine how NEPA compliance can be achieved, including protocols and analyses required to support a compliance determination. Environmental processing of projects can take three or more years for an EIS and a year or more for an EA. Projects eligible for CATEX can be processed in a shorter time period (i.e., three to six months). Projects requiring permits from other agencies often require additional time after the NEPA processing is complete to obtain permits; therefore, permit processing should be factored into the environmental processing timeline.

As the anticipated timing for undertaking the Capital Improvement Plan projects is further evaluated and refined through subsequent advanced planning and decision making, the environmental factors identified in this section as well as other emerging environmental issues should be reflected in the NEPA processing strategy. Ongoing collaboration with the FAA regarding updates and refinements to future project assumptions, such as timing and anticipated impacts, will be critical to refining a NEPA processing strategy and associated timeline.

Florida Keys Marathon International Airport

Implementation Plan

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO®
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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7. Implementation Plan

7.1 Introduction

The primary objective of this implementation plan is to outline the capital improvements proposed for the Airport through 2036. The implementation plan presented herein describes the timing of proposed improvements, prerequisite or enabling projects, and anticipated development costs. This implementation plan is intended to outline the suggested sequence of development projects proposed for the Airport as part of this master plan update based on forecast aviation activity and operational needs. It also identifies land parcels that are anticipated to be developed by others including the Monroe County Sheriff's Office, the FAA, the Monroe County Emergency Services Department, etc.

This section focuses on the projects identified as part of the master planning process (master plan projects). The establishment of the Capital Improvement Program (CIP) assumes the Airport's activity will grow consistent with the aviation activity forecasts presented in this MPU, and the proposed facilities or infrastructure will be developed when required to meet demand. If actual activity does not meet forecast demand, then the implementation of the project schedule should be modified accordingly.

The information provided in this section can also be used to update the Joint Automated Capital Improvement Program (JACIP) used by the FAA and the FDOT to coordinate and program airport grant funding. To facilitate coordination with the various stakeholders, project summary sheets for each master plan project have been included. These project summary sheets include the following information:

- name and brief description of the project
- project justification: brief explanation on why the project is needed
- site information: location map indicating the project location
- projected timing: anticipated project construction start date
- order-of-magnitude costs
- sources of funds: potential sources of funding for the project

7.2 Capital Improvement Program

The proposed CIP for the Airport includes airfield, landside (generally comprising roadways, parking, and rental car facilities), hangar, and other general airport improvements necessary to accommodate forecast aviation activity, as well as accommodate existing or anticipated Airport needs. This section presents a general order of priority for the implementation of these improvements based on forecast Airport activity growth.

7.2.1 PROJECT SEQUENCING

To clearly present the priorities for the recommended Airport improvements, the proposed sequencing of projects has been divided into three phases based on the Fiscal Year (FY) timelines:

- Short-Term Improvements (FY 2018 through FY 2022)
    - Associated Activity Levels in FY 2022: 100 based aircraft; 79,604 operations
- Intermediate-Term Improvements (FY 2023 through FY 2028)
    - Associated Activity Levels in FY 2028: 110 based aircraft; 87,920 operations
- Long-Term Improvements (FY 2029 through FY 2036)
    - Associated Activity Levels in FY 2036: 123 based aircraft; 98,978 operations

Although these three phases estimate the general period (in fiscal years) anticipated for future Airport improvements, periodic re-evaluation of the proposed timing will be necessary to accommodate changing development needs or priorities and to adjust for other unforeseen factors. It is also possible that other improvements not identified in this implementation plan may be required to support Airport operations and/or to improve operational efficiency.

Table 7-1 lists the short-term Master Plan and CIP projects, and **Exhibit 7-1** illustrates these projects. The short-term projects are described as follows:

- General Aviation (GA) Development – Southeast, designated as project GA-1: This project consists of constructing GA facilities, including aircraft hangars and aircraft parking apron. This project also includes a connector to Taxiway A and a connector to the existing apron, as well as a new landside connector to Airport Access Road. It is anticipated the Monroe County Department of Airports will seek a qualified and responsible firm and/or FBO for the long-term ground lease and development of the parcel designated as GA-1.
- General Aviation (GA) Development – Southwest, designated as project GA-2: This project consists of constructing up 19 T-hangars and a taxilane between the hangars. This project also includes a new taxiway connector to Taxiway A. Similar to GA-1, the Monroe County Department of Airports will seek a qualified and responsible firm and/or FBO for the long-term ground lease and development of the parcel designated as GA-2.

Table 7-1: Short-Term Projects

PROJECT ID[1]	PROJECT DESCRIPTION	PRIMARY PROJECT SPONSORS
GA-1	General Aviation Development – Southeast	Monroe County Dpt. Of Airports/Private Entity
GA-2	General Aviation Development – Southwest	Monroe County Dpt. Of Airports/Private Entity
SF-1	Automated Surface Observing System Relocation	Monroe County Dpt. Of Airports/FAA
SF-2	Airport Maintenance Storage Facility Construction	Monroe County Dpt. Of Airports/FDOT
SF-3	Fuel Storage Facility Relocation	Monroe County Dpt. Of Airports/Private Entity
SF-4	Segmented Circle/Wind Cone Relocation	Monroe County Dpt. Of Airports/FDOT
NA-1	Non-Aeronautical Use Building – Emergency Operations Center	Monroe County
NA-2	Retention Pond Modifications – Southwest	Monroe County Dpt. Of Airports/FDOT
NA-3	Indoor Shooting Range	Monroe County Sheriff's Office
AF-1	Runway and Parallel Taxiway Separation Improvements – Tree Clearing, Obstruction Lighting, Design, and Environmental Mitigation	Monroe County Dpt. Of Airports/FAA
AF-2	Remote Communication Air-Ground Facility Construction	FAA
AF-3	Service Road Construction – Phase 1	Monroe County Dpt. Of Airports/FDOT

NOTES:

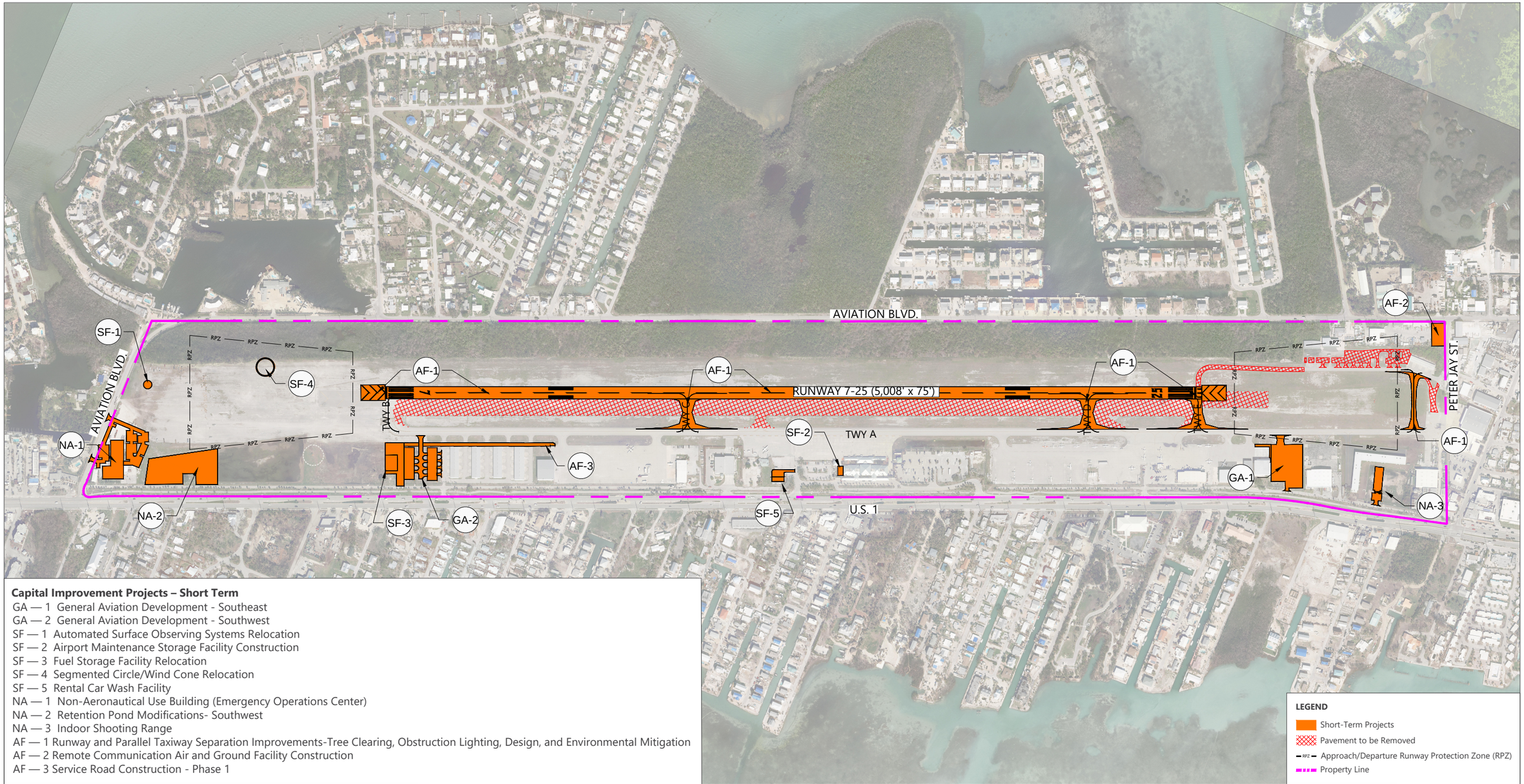
1 NA – Non-Aviation; AF – Airfield; GA – General Aviation; SF – Support Facility; Dpt. – Department

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels.

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., September 2019.

- Automated Surface Observing Systems (ASOS) Relocation, designated as project SF-1: This project consists of relocating the ASOS equipment currently located east of the passenger terminal parking facilities west of the Runway 7 end, along the property line that runs parallel to Aviation Boulevard. This project will free up the area adjacent to the passenger terminal parking facilities for other aviation-related uses. Specifically, it would free the area for the apron expansion that is recommended in the intermediate-term CIP designated as project GA-3. The new location should also help reduce radio frequency interference problems, which have been noted by the pilots operating at the Airport. The cost estimates provided in the following sections of this document assumes that no new weather equipment would need be acquired as part of this project and that the existing ASOS system can be relocated to the new location. This project will be funded by the Department of Airports, FAA, and FDOT.
- Airport Maintenance Storage Facility, designated as project SF-2: This project consists of constructing a 2,000 square feet maintenance facility adjacent to and west of the existing passenger terminal. This facility will allow for the storage and parking of maintenance equipment and vehicles. This project will be funded by the Department of Airports and FDOT.



Capital Improvement Projects – Short Term

GA — 1 General Aviation Development - Southeast
GA — 2 General Aviation Development - Southwest
SF — 1 Automated Surface Observing Systems Relocation
SF — 2 Airport Maintenance Storage Facility Construction
SF — 3 Fuel Storage Facility Relocation
SF — 4 Segmented Circle/Wind Cone Relocation
SF — 5 Rental Car Wash Facility
NA — 1 Non-Aeronautical Use Building (Emergency Operations Center)
NA — 2 Retention Pond Modifications- Southwest
NA — 3 Indoor Shooting Range
AF — 1 Runway and Parallel Taxiway Separation Improvements-Tree Clearing, Obstruction Lighting, Design, and Environmental Mitigation
AF — 2 Remote Communication Air and Ground Facility Construction
AF — 3 Service Road Construction - Phase 1

SOURCES: Martinez Geospatial, Inc., *Planimetric Base Map*, March 2018; Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018.

EXHIBIT 7-1

NORTH 0 600 ft.

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Short-Term Improvement Projects (FY 2018 – FY 2022)

- Fuel Storage Facility Relocation, designated as project SF-3: This project consists of relocating the two fuel tanks, including a 12,000-gallon Jet-A fuel tank and a 10,000-gallon 100-low lead (LL) Avgas tank with a self-service fueling facility located on the southwestern apron, to a new location west of the proposed T-hangars. The fuel storage facility relocation will free up space on the ramp for the movement and parking of aircraft. Based on discussions with the Monroe County Department of Airports, this project is likely to be fully funded by the existing FBOs at the Airport. This project may also include the addition of new fuel tanks and/or the replacement of the existing tanks.
- Non-Aeronautical Use Building - Emergency Operations Center, designated as project NA-1: This project consists of the construction of a raised hurricane-rated building to serve as the Emergency Operations Center (EOC) for the County of Monroe to coordinate disaster response and recovery efforts in support of field operations in the event of a natural disaster, such as a hurricane. The EOC building's first floor will be raised to minimize the impacts of potential flooding associated with hurricanes. This project will require the demolition of an existing building. This project will be fully funded by Monroe County. The purposed EOC building is 23,000 square feet and the purposed parking lot is 4,800 square yards.
- Retention Pond Modifications - Southwest, designated as project NA-2: This project consists of modifying the existing retention pond to reduce its size from 5 acres to 2 acres, and to allow for the development of additional aviation-related facilities, such as hangars and aircraft apron. The proposed modifications will include the construction of exfiltration trenches to handle stormwater runoff. This project will be funded by FDOT and the Department of Airports.
- Indoor Shooting Range, designated as project NA-3: This project consisted of constructing an indoor shooting range for the Monroe County Sheriff's Office. This facility was designed for firearms qualifications, training, or practice, and it will be operated by the Monroe County Sheriff's Office. This project, which was completed in 2019, was funded by the Monroe County Sheriff's Office.
- Segmented Circle/ Wind Cone Relocation, designated as project SF-4: This project consists of relocating the existing lighted wind cone and associated segmented circle, currently located on the west side of the airfield and southwest of the Runway 7 end, to allow for the development of additional aviation-related facilities, such as hangars and aircraft apron. The existing segmented circle is a visual indicator that provides traffic pattern information to pilots operating at the Airport. It consists of a landing runway indicator, a traffic pattern indicator, and a lighted wind cone. The MPU proposes to relocate the segmented circle and lighted wind cone along the north side of the runway. No additional weather equipment would be acquired as part of this project. This project will be funded by the Department of Airports and FDOT.
- Rental Car/Wash Facility, designated as project SF-5: This project consists of constructing four (4) wash bays for the rental car operator at the Airport. This project, which was completed in 2020, was funded by the Department of Airports and FDOT.
- Runway and Parallel Taxiway Separation Improvements – Tree Clearing, Obstruction Lighting, Design, and Environmental Mitigation, designated as project AF-1: This project will shift Runway 7-25 to the northwest by 40 feet to achieve the FAA-required 240-foot runway-to-taxiway separation distance. As part of the runway relocation, the runway width will be reduced from 100 feet to 75 feet, consistent with the FAA airfield design standards for runways that fall within Approach Category B and ADG II. The first phase of this project will include clearing a 40-foot-wide by 5,608-foot-long strip of vegetation on

the north side of the shifted runway within the ROFA; the addition of obstruction lights, as required, to mark the remaining trees encroaching the Part 77 airspace surfaces; the trimming or removal of select trees to clear the relocated runway threshold siting surface; the removal of existing taxiway and apron pavement on the north side of the approach to Runway 25; the addition of drainage and utilities necessary to implement the proposed runway shift; and environmental mitigation. This phase also includes the design services for the runway shift and associated taxiway improvements. This project will be funded by the FAA and Department of Airports.

- Remote Communication Air-Ground Facility Construction, designated as project AF-2: This project, which is being sponsored and funded by the FAA, consists of the construction of a Remote Communication Air-Ground (RCAG) facility in the northeast corner of the Airport. This unmanned very high frequency (VHF)/ ultra high frequency (UHF) transmitter/receiver facility will be used to expand the Miami Air Route Traffic Control Centers (ARTCC) air/ground communications coverage and to facilitate direct contact between pilots and controllers. This project will be fully funded by the FAA.
- Service Road Construction – Phase 1, designated as project AF-3: This project consists of constructing a dedicated two-lane service road extension approximately 150 feet long between the existing GA aircraft ramp located west of the terminal facilities and the proposed fuel farm. This project will be funded by the FDOT and Department of Airports.

The intermediate-term CIP projects are required to provide additional airfield improvements, to expand aircraft parking apron areas, and to improve vehicular traffic on Airport Access Road. **Table 7-2** lists the proposed intermediate-term projects and **Exhibit 7-2** illustrates these projects. Most of the intermediate-term CIP projects, except for one, are anticipated to be sponsored by the department of airports. The intermediate-term projects are described as follows:

- Runway and Parallel Taxiway Separation Improvements – Construction, designated as project AF-1: This project comprises the construction of Project AF-1 and consists of the following: shifting Runway 7-25 to the northwest 40 feet, which will provide a runway-to-taxiway centerline separation distance of 240 feet; removing 40 feet of excess runway pavement on the south side of the existing runway; removing excess runway shoulder pavement; constructing new blast pads at relocated runway ends; demolishing existing excess pavement on Taxiway B; demolishing existing Taxiway C; reconstructing Taxiway C west of its existing location; demolishing existing Taxiway D; reconstructing Taxiway D perpendicular to the relocated runway; demolishing existing excess pavement on Taxiway E; constructing new Taxiway F; relocating and/or installing new runway edge lights and threshold lights; relocating and/or installing new REIL on the Runway 7 end; modifying markings, lighting, and signage on connecting Taxiways B, C, D, and E; grading the RSA, and updating existing RNAV GPS instrument approach procedures to reflect the 40-foot lateral shift of Runway 7-25. This project will be funded by the FAA and Department of Airports.

Table 7-2: Intermediate-Term Projects

PROJECT ID[1]	PROJECT DESCRIPTION	PRIMARY PROJECT SPONSORS
AF-1	Runway and Parallel Taxiway Separation Improvements – Construction	Monroe County Dpt. Of Airports/FAA
AF-4	Taxiway Renaming (Airfield-Wide)	Monroe County Dpt. Of Airports/FAA
AF-5	Taxiway A Rehabilitation – Design/Construction	Monroe County Dpt. Of Airports/FAA
GA-3	General Aviation Apron Expansion – Midfield	Monroe County Dpt. Of Airports/FDOT
LS-1	Airport Access Road Extension	Monroe County Dpt. Of Airports/FDOT

NOTES:

1 AF – Airfield; GA – General Aviation; LS – Landside

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels.

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Ricondo & Associates, Inc., May 2018.

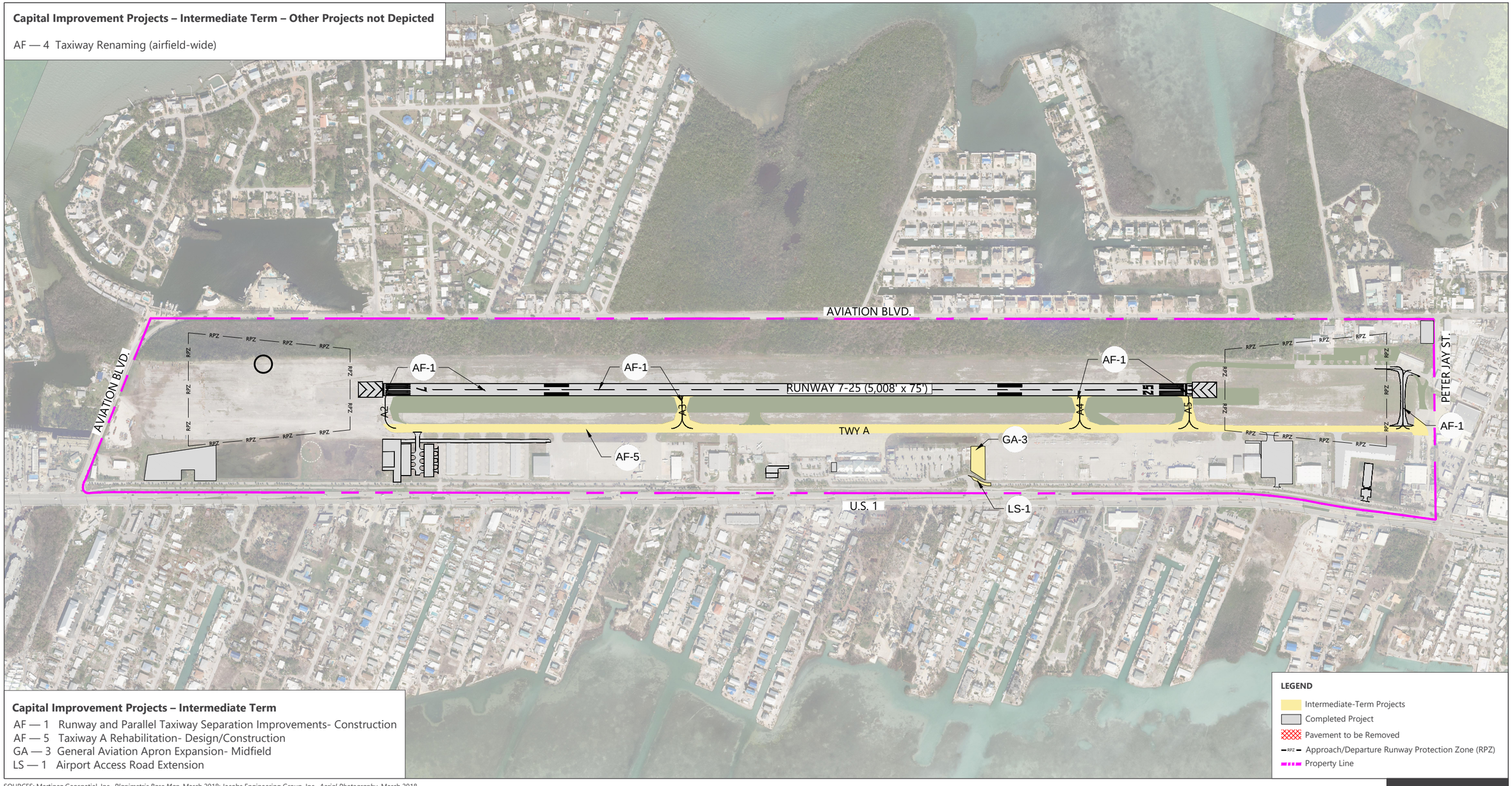
PREPARED BY: Ricondo & Associates, Inc., January 2019.

- Taxiway A Rehabilitation – Design/Construction, designated as project AF-5: The rehabilitation of Taxiway A is intended to restore and/or maintain the pavement areas' serviceability, and it would include the milling of the existing pavement to remove the deteriorated pavement, as well as a bituminous pavement overlay. This is not a MPU project; it was recommended in the FDOT's airfield-evaluation report[1]. At the time of the FDOT report publication (2015), Taxiway A had a Pavement Condition Index (PCI) ranging between 66 and 69. This project will be funded by the FAA, FDOT and Department of Airports.
- General Aviation Apron Expansion, designated as project GA-3: This project consists of expanding the eastern GA apron to the southwest to provide an additional 1,800 square yards of apron space. It is anticipated that the Monroe County Department of Airports will seek a qualified and responsible firm and/or FBO for the long-term ground lease and development of the parcel designated as GA-1. This project will be funded by the FDOT and Department of Airports.
- Airport Access Road Extension, designated as project LS-1: This project includes the extension of Airport Access Road to connect the eastern and western sections. The proposed two-lane road extension is approximately 150 feet long. This project will be funded by the FDOT and Department of Airports.
- Taxiway Renaming, designated as project AF-4: This project consists of updating the taxiway nomenclature per the guidance provided in FAA Engineering Brief 89, Taxiway Nomenclature Convention. This project will be funded by the FAA and Department of Airports.

[1] Florida Department of Transportation, *Airfield Pavement 10-Year Major Rehabilitation*, 2015.

Capital Improvement Projects – Intermediate Term – Other Projects not Depicted

AF — 4 Taxiway Renaming (airfield-wide)



Capital Improvement Projects – Intermediate Term

AF — 1 Runway and Parallel Taxiway Separation Improvements- Construction
AF — 5 Taxiway A Rehabilitation- Design/Construction
GA — 3 General Aviation Apron Expansion- Midfield
LS — 1 Airport Access Road Extension

SOURCES: Martinez Geospatial, Inc., *Planimetric Base Map,* March 2018; Jacobs Engineering Group, Inc., *Aerial Photography*, March 2018.

EXHIBIT 7-2

NORTH 0 600 ft.

Intermediate-Term Improvement Projects (FY 2023 – FY 2028)

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The long-term CIP projects consist of a western runway extension, new aircraft storage hangars, a new Air Traffic Control Tower (ATCT), obstruction mitigation, and master plan update. **Table 7-3** lists the proposed long-term projects, and **Exhibit 7-3** illustrates these projects. The long-term projects are described as follows:

- General Aviation Hangars Construction – Southwest, designated as project GA-4: This project consists of constructing 16 new T-hangars for single-engine piston aircraft and an additional 14,000 square yards of aircraft parking apron. This project also includes the extension of Taxiway A to provide access to the new T-hangars. The Monroe County Department of Airports will seek a qualified and responsible firm and/or FBO for the long-term ground lease and development of the parcel designated as GA-4.
- Airport Traffic Control Tower Construction, designated as project SF-6: When dictated by demand, this project will consist of constructing an ATCT on Airport property, in accordance with FAA regulations. The proposed location is adjacent to project GA-3 and south of Taxiway A.
- Runway Extension West, designated as project AF-6: This project consists of extending Runway 7 by 392 feet and extending Taxiway A to the new runway end. This project also includes the construction of two new connectors between Taxiway A and the proposed runway extension. project will be funded by the FAA, FDOT and Department of Airports.
- Airspace Obstruction Mitigation, designated as project MI-2: This project includes the trimming or removal of trees that would penetrate the airfield safety and airspace surfaces associated with the proposed 392-foot runway extension. project will be funded by the FAA and Department of Airports.
- Airport Master Plan Update, designated as project PS-1: This project consists of updating the master plan for the Airport to identify short-, medium-, and long-term development needs. project will be funded by the FAA, FDOT and Department of Airports.

Table 7-3: Long-Term Projects

PROJECT ID[1]	PROJECT DESCRIPTION	PRIMARY PROJECT SPONSORS
GA-4	General Aviation Development – Southwest	Monroe County Dpt. Of Airports/Private Entity
SF-6	Airport Traffic Control Tower Construction	Monroe County Dpt. Of Airports/FAA
AF-6	Runway Extension West	Monroe County Dpt. Of Airports/FAA
MI-2	Airspace Obstructions Mitigation	Monroe County Dpt. Of Airports/FAA
PS-1	Airport Master Plan Update	Monroe County Dpt. Of Airports/FAA

NOTES:

1 GA – General Aviation; SF – Support Facility; AF – Airfield; MI – Mitigation; PS – Planning Study

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels.

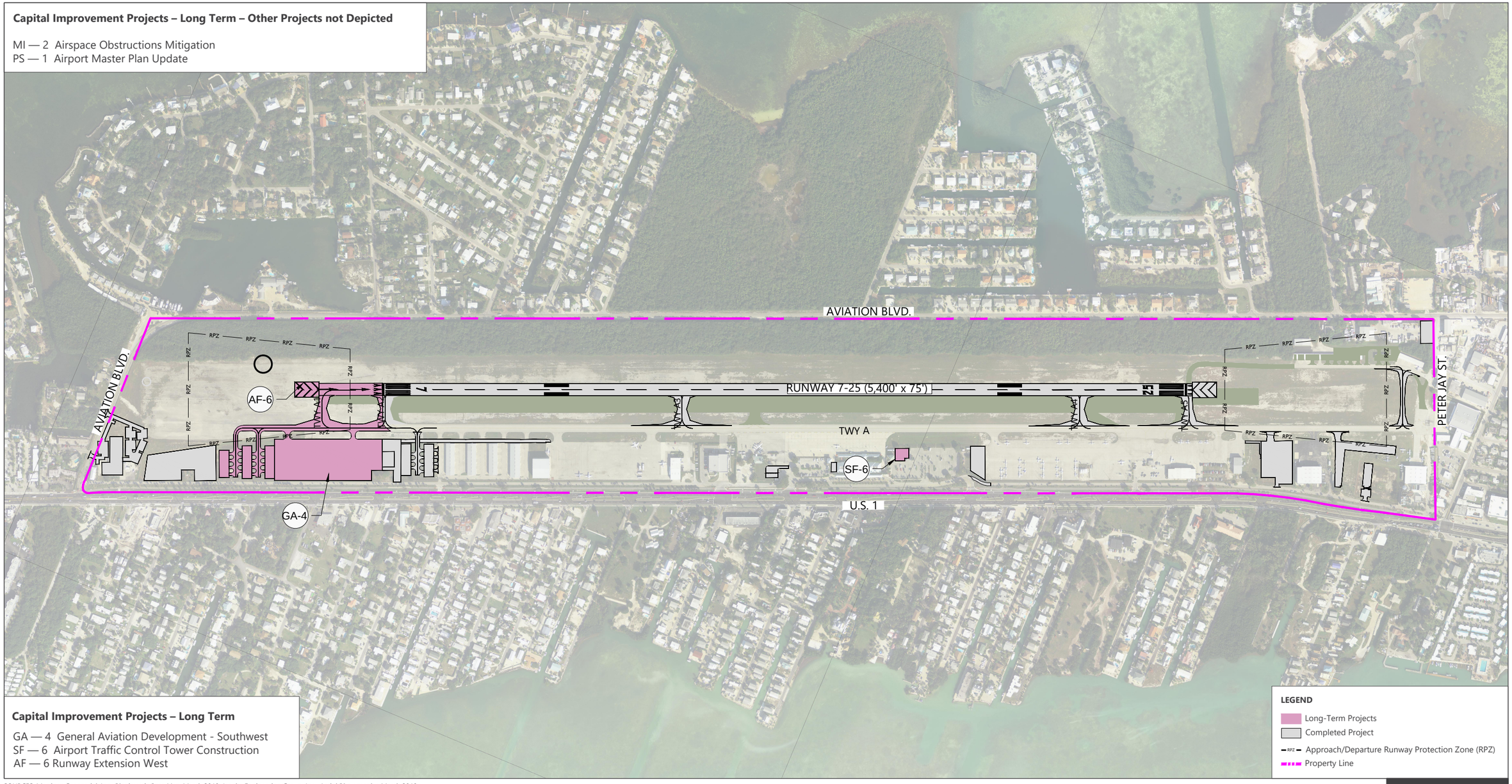
3 Project GA-4 will be sponsored/completed with the other general aviation development projects.

SOURCE: Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

Capital Improvement Projects – Long Term – Other Projects not Depicted

MI — 2 Airspace Obstructions Mitigation
PS — 1 Airport Master Plan Update



Capital Improvement Projects – Long Term

GA — 4 General Aviation Development - Southwest
SF — 6 Airport Traffic Control Tower Construction
AF — 6 Runway Extension West

LEGEND

- Long-Term Projects
- Completed Project
- RPZ Approach/Departure Runway Protection Zone (RPZ)
- Property Line

SOURCES: Martinez Geospatial, Inc., *Planimetric Base Map,* March 2018; Jacobs Engineering Group, Inc., *Aerial Photography,* March 2018.

EXHIBIT 7-3

NORTH 0 600 ft.

Long-Term Improvement Projects (FY 2029 – FY 2036)

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7.2.2 ROUGH ORDER OF MAGNITUDE (ROM) ESTIMATES

The estimated project budget presented for each identified Airport improvement reflects a preliminary opinion of the probable implementation costs for the project, including professional design, bidding, and permitting services (Architectural/Engineering services), construction administration and resident project representative services, as well as a 30 percent contingency allowance. The rough order of magnitude (ROM) cost estimates are escalated at an inflation rate of 3.0 percent to the planned implementation year. Due to the conceptual nature of the Airport plans that have been prepared as part of this task, further refinement of the ROM cost estimates, through architectural and engineering analyses, will be required. Capital costs in this MPU should be viewed only as estimates subject to further refinement during design, as the scope for a project is confirmed and/or refined. **Table 7-4** through **Table 7-6** present the short-, intermediate-, and long-term CIP cost estimates.

Table 7-4: Short-Term Capital Improvement Program Rough Order of Magnitude Costs

PROJECT ID[1]	FISCAL YEAR[2]	PROJECT DESCRIPTION	ROUGH ORDER OF MAGNITUDE (ESCALATED) [3, 4]	PRIMARY PROJECT SPONSORS
GA-1	2022	General Aviation Development – Southeast	$4,292,000	Dpt. Of Airports/Private Entity
GA-1	2022	General Aviation Development – Southwest	$4,321,000	Dpt. Of Airports/Private Entity
SF-1	2021	Automated Surface Observing System Relocation	$121,000	Dpt. Of Airports/FAA
SF-2	2022	Airport Maintenance Storage Facility	$2,163,000	Dpt. Of Airports/FDOT
SF-3	2021	Fuel Storage Facility Relocation	$3,224,000	Dpt. Of Airports/Private Entity
NA-1	2022	Emergency Operations Center	$22,511,000	Monroe County
NA-2	2021	Retention Pond Modifications – Southwest	$2,186,000	Dpt. Of Airports/FDOT
NA-3	2022	Indoor Shooting Range	$3,028,000	Sheriff's Office
SF-4	2022	Segmented Circle/Wind Cone Relocation	$74,000	Dpt. Of Airports/FAA
SF-5	2022	Rental Car Wash Facility	Not Available	Dpt. Of Airports
AF-1	2021 2022	Runway and Parallel Taxiway Separation Improvements - Tree Clearing/Environmental Mitigation - Design Services	$3,000,000 $750,000	Dpt. Of Airports/FAA
AF-2	2022	Remote Communication Air-Ground Facility Construction	$1,140,000	FAA
AF-3	2021	Service Road Construction – Phase 1	Included as part of Project SF-3	Dpt. Of Airports/FDOT
		Total Master Plan Projects Costs	**$46,810,000**	

NOTES:

1 NA – Non-Aviation; AF – Airfield; GA – General Aviation; SF – Support Facility; TBD – To Be Determined

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels and changing airport needs and priorities.

3 Estimated project costs include the following soft costs: professional design, bidding, and permitting services (Architectural/Engineering services), construction administration and resident project representative services; Project costs also include a 30 percent contingency allowance.

4 Costs were developed using 2018 U.S. dollars; costs have been escalated at 3 percent annually for inflation.

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates).

PREPARED BY: Ricondo & Associates, Inc., August 2019.

Table 7-5: Intermediate-Term Capital Improvement Program Rough Order of Magnitude Costs

PROJECT ID[1]	FISCAL YEAR[2]	PROJECT DESCRIPTION	ROUGH ORDER OF MAGNITUDE (ESCALATED) [3, 4]	PRIMARY PROJECT SPONSORS
AF-1	2023	Runway and Parallel Taxiway Separation Improvements – Construction	$14,366,000	Dpt. Of Airports/FAA
AF-4	2025	Taxiway Renaming	$750,000	Dpt. Of Airports/FAA
AF-5	2024 2025	Taxiway A Rehabilitation - Design -Construction	$350,000 $6,377,000	Dpt. Of Airports/FAA
GA-3	2025	General Aviation Apron Expansion – Midfield	$1,266,000	Dpt. Of Airports/FDOT
LS-1	2025	Airport Access Road Extension	$365,000	Dpt. Of Airports/FDOT
		Total Master Plan Projects Costs	**$23,474,000**	

NOTES:

1 TW – Taxiway; AF – Airfield; GA – General Aviation; RW – Runway; LS – Landside

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels and changing airport needs and priorities.

3 Estimated project costs include the following soft costs: professional design, bidding, and permitting services (Architectural/Engineering services), construction administration and resident project representative services; Project costs also include a 30 percent contingency allowance.

4 Costs were developed using 2018 U.S. dollars; costs have been escalated at 3 percent annually for inflation.

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., August 2019.

Table 7-6: Long-Term Capital Improvement Program Rough Order of Magnitude Costs

PROJECT ID[1]	FISCAL YEAR[2]	PROJECT DESCRIPTION	ROUGH ORDER OF MAGNITUDE (ESCALATED)[3, 4]	PRIMARY PROJECT SPONSORS
GA-4	2030	General Aviation Development – Southwest	$20,070,000	Dpt. Of Airports/Private Entity
SF-6	Beyond 2036	Airport Traffic Control Tower Construction	To be Determined	Dpt. Of Airports/FAA/FDOT
AF-6	2036	Runway Extension West	$3,395,000	Dpt. Of Airports/FAA
MI-2	2036	Airspace Obstructions Mitigation	$1,618,000	Dpt. Of Airports/FAA
PS-1	2029	Airport Master Plan Update	$1,108,000	Dpt. Of Airports/FAA
		Total Master Plan Projects Costs	**$26,191,000**	

NOTES:

1 SF – Support Facility; AF – Airfield; GA – General Aviation; MI – Mitigation; PS – Planning Study

2 The Fiscal Year is October 1 through September 30. Programmed FY is based on the approved Master Plan Forecasts. Actual implementation and timeline should be correlated with actual demand levels and changing airport needs and priorities.

3 Estimated project costs include the following soft costs: professional design, bidding, and permitting services (Architectural/Engineering services), construction administration and resident project representative services; Project costs also include a 30 percent contingency allowance.

4 Costs were developed using 2018 U.S. dollars; costs have been escalated at 3 percent annually for inflation.

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018

PREPARED BY: Ricondo & Associates, Inc., August 2019.

7.2.3 ANTICIPATED FUNDING SOURCES

This subsection discusses the potential funding sources for the CIP. Preliminary designations of funding for each project identified in the MPU are provided in the project description sheets included in Section 7.3.

- **Federal Grants** – The U.S. Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for defense purposes and to promote interstate commerce. Various grant-in-aid programs for public airports have been established over the years for this purpose. The primary source of federal aviation-related funds is the AIP, which was established by the Airport and Airway Improvement Act of 1982 (Public Law 97-248). Since then, the AIP has been amended several times, most recently with the passage of the FAA Modernization and Reform Act of 2012. Funds obligated for the AIP are drawn from the Airport and Airway Trust Fund, which is supported by user fees, fuel taxes, and other similar revenue sources. Funds deposited into the Airport and Airway Trust Fund are distributed to eligible airports throughout the United States and its territories through grants administrated by the FAA under appropriations limits established by Congress.

  To be eligible for AIP grants, airports must meet the following criteria: (1) publicly owned, or privately owned, but designated by the FAA as a reliever; or (2) privately owned but having scheduled commercial service and at least 2,500 annual enplaned passengers; and (3) included in the NPIAS. The NPIAS is published every 2 years; it identifies public-use airports that are important to public transportation and contribute to the needs of civil aviation, national defense, and the U.S. Postal Service.

  In general, airport sponsors can use AIP grants for most airfield capital improvements or repairs. AIP grants cannot be used for exclusive-use areas in terminals, revenue-producing areas of terminals, hangars, or nonaviation development. Any professional services that are necessary for eligible projects, such as planning, surveying, and design, are also eligible; however, operating expenses associated with AIP projects are not eligible.

  AIP funding is allocated on a national priority basis. MTH competes with other airports throughout the state of Florida and the FAA Southern Region, as well as the remainder of the country, for development grants. As in the past, federal grants are expected to be used to finance a portion of the Airport CIP. Historically, projects at the Airport have been eligible to receive 90 percent AIP participation. Also, in the case of security-related projects, airports may be eligible for 100 percent AIP funding. With respect to discretionary grants, it is difficult to predict a reasonable amount that can be applied to the CIP given today's status concerning federal funding of airport-related capital projects. To the extent that projected discretionary grants are not received, the County may have to re-evaluate the phasing of the CIP and/or its funding eligibility from other sources.

  The Monroe County Department of Airports has received approximately $1.5 million in AIP entitlement grants over the past 5 years for projects at MTH.

- **State Grants** – A significant amount of funding for Airport capital improvements has historically come from the state of Florida. The Airport is included in the JACIP, a coordinated process between the FAA and the Florida Department of Transportation (FDOT) to plan Airport capital improvements and expenditures. If the project receives federal funding, then FDOT is expected to contribute approximately 5 percent of the funding. The FDOT will provide up to 80 percent of the funding for most non-FAA-supported Airport

development projects; however, only 50 percent funding is provided if the project is directly related to economic development.

The Monroe County Department of Airports has received approximately $8.5 million in grants from the FDOT over the past 5 years for projects at MTH.

- **Sponsor Funding / Local Share** – The net remaining amount of funding required for the CIP will be derived from the Airport's revenues or other sources. The Airport's revenues are typically generated through collecting rent from properties leased to developers and FBOs and a percentage of the aviation fuel sold at the Airport. These fees are typically established by Airport management based on market conditions in the area.
- **Revenue Bond Proceeds** – While generally not used at GA airports, such as MTH, airport sponsors can issue bonds to finance long-term capital projects.

7.3 Master Plan Project Description Sheets

For each new project identified as part of this planning process and included in the short- and intermediate-term CIP, a project description sheet has been prepared to assist the County and Airport management in applying for grants and other financial assistance. These project description sheets include some of the information necessary for the preparation of a grant application or what is typically required by the JACIP database. Each sheet is intended to facilitate the entry of planned Airport capital improvement projects into the JACIP system. Note that sheets have not been developed for supporting projects, such as the environmental documentation accompanying each project.

Where applicable, each sheet also includes a diagram indicating the general location of the proposed capital improvement project and the general limits of work associated with each project. These diagrams illustrate nearby significant Airport landmarks for reference, and they may be useful in coordinating future projects with funding and regulatory agencies prior to initiating design and development.

The project description sheets also include the preliminary ROM cost estimates and funding sources based on the projected limits of work and the assumptions provided. Budget estimates are based on approximate quantities and typical unit prices for similar work, and they include professional services and contingency fees, where applicable. All estimated costs and budgets in this section are escalated to the planned implementation year.

PROJECT: GA-1 GENERAL AVIATION DEVELOPMENT – SOUTHEAST

Project Description: This project consists of constructing GA facilities, including 11,000 square feet of aircraft hangars and 6,000 square yards of aircraft parking apron. The proposed apron will be constructed of asphalt concrete. This project also includes a connector to Taxiway A, as well as a new landside connector to Airport Access Road. The landside parking would include approximately 2,000 square feet and provides 10 automobile parking spaces. The layout of the proposed facilities will be dictated by the needs of the third party developer which would sign a ground lease with the Monroe County Department of Airport for this area.

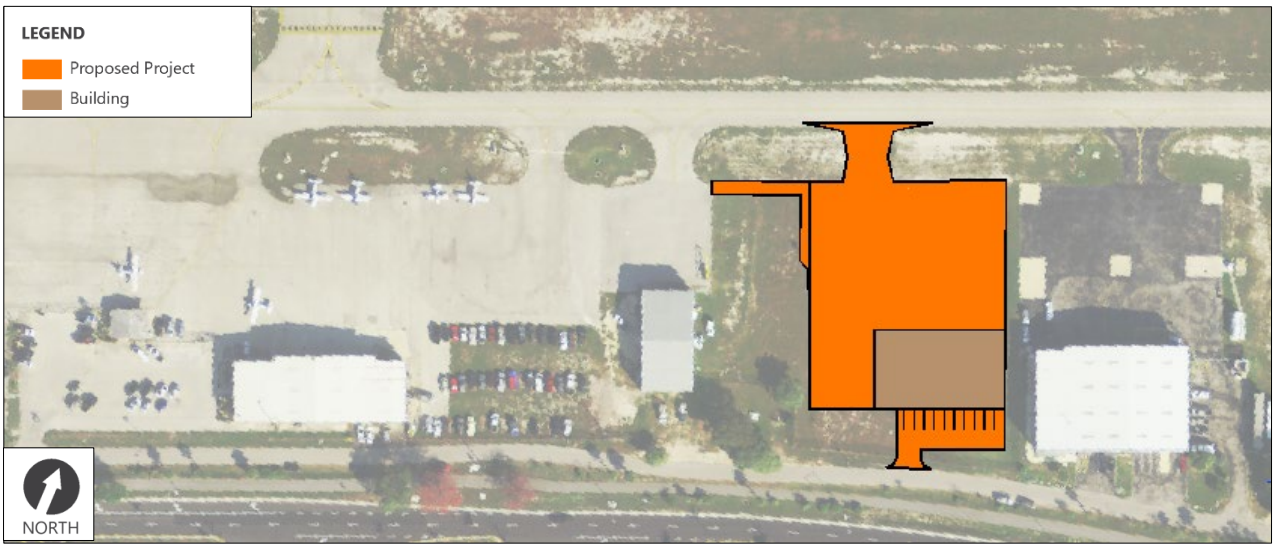
Project Justification: The facility inventory and needs assessment that was completed as part of this Master Plan Update identified the need for more hangar space at MTH. As of 2019, the hangars were 100 percent leased with a waiting list that ranges between 20 and 40 people. This project will help MTH meet the demand for hangar facilities.

Enabling Projects: None

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $4,292,000

Potential Funding Source: Third Party Development/Ground Lease



SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: GA-2 GENERAL AVIATION DEVELOPMENT – SOUTHWEST

Project Description: This project consists of constructing 19 T-hangars and a taxilane between the hangars. The proposed taxilane is 1,500 square yards. This project also includes a new taxiway to Taxiway A.

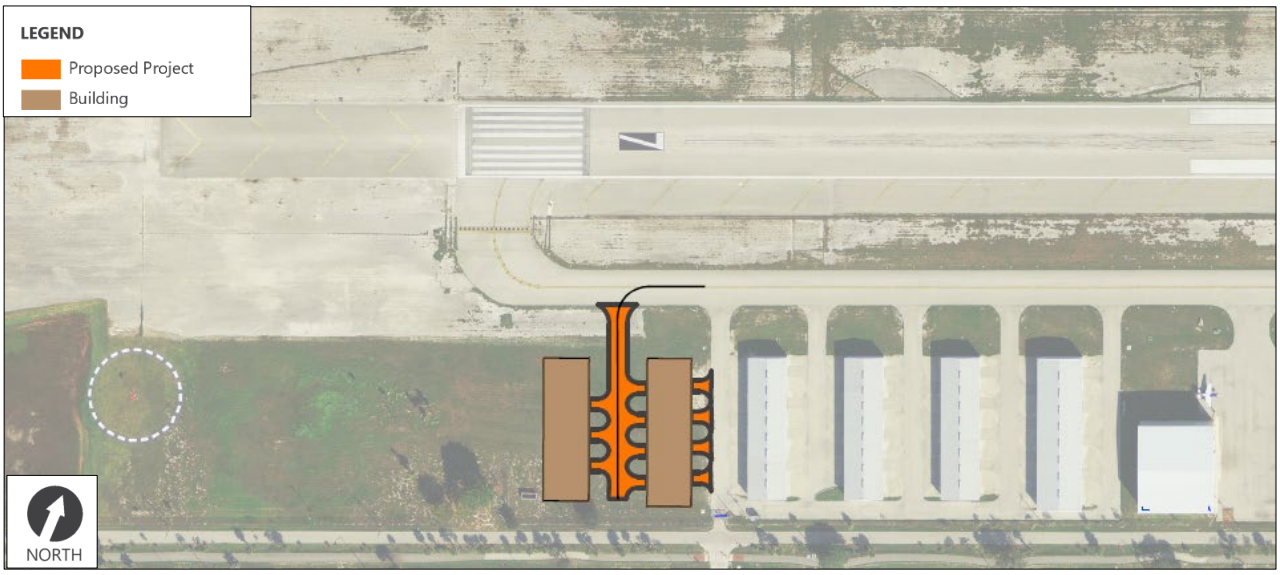
Project Justification: The facility inventory and needs assessment that was completed as part of this Master Plan Update identified the need for more hangar space at MTH. As of 2019, the hangars were 100 percent leased with a waiting list that ranges between 20 and 40 people. This project will help MTH meet the demand for hangar facilities.

Enabling Projects: None

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $4,321,000

Potential Funding Source: Third Party Development/Ground Lease



SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: GA-3 GENERAL AVIATION APRON EXPANSION – MIDFIELD

Project Location:

South of existing Taxiway A.

Project Description: This project consists of expanding the eastern general aviation apron to the southwest to provide an additional 2,000 square yards of apron space. It is anticipated the apron would be designed in accordance with FAA ADG I or II standards to accommodate a mix of based and transient aircraft, including single/twin engine piston and turboprop aircraft. The proposed apron will be constructed of asphalt concrete.

Project Justification: The apron expansion would allow for the construction of additional aircraft tie-down positions. As aircraft activity increases, expansion of the existing apron is required to accommodate additional transient aircraft parking.

Enabling Projects: ASOS Relocation (SF-1) and Airport Maintenance Storage Facility Construction (SF-2)

Anticipated Start Date: FY 2025

Initial ROM Cost Estimates: (in 2025 dollars) $1,266,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: GA-4 GENERAL AVIATION DEVELOPMENT – SOUTHWEST

Project Location:

Project Description: This project consists of constructing 16 new T-hangars for single- or twin-engine piston or turboprop aircraft and an additional 14,000 square yards of aircraft parking apron. The proposed building consists of 35,000 square feet of hangar space. This project also includes the extension of Taxiway A to provide access to the new T-hangars and apron areas.

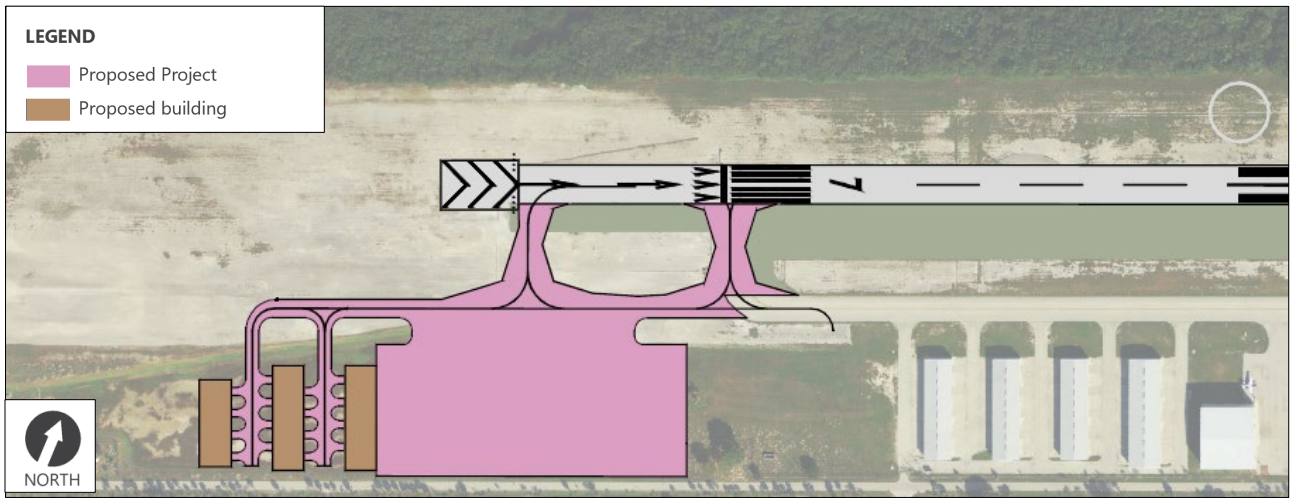
Project Justification: A new apron area constructed to FAA design standards, including access, signage, marking, and lighting, is needed to park, fuel, and tie-down transient and based aircraft. During peak times, the existing ramp is at capacity, and there are no available aircraft parking spaces. The proposed ramp will provide additional ramp capacity, especially for the accommodation of business jet aircraft. In the future, it is also anticipated that additional T-hangars will be required to accommodate future aircraft hangar storage requirements. The existing T-hangar tenancy is 100 percent. Since the majority of aircraft owners prefer enclosed hangar storage, the proposed hangar will provide additional indoor storage space. In addition, the Monroe County Department of Airports holds a waiting list for T-hangar space that regularly includes between 20 and 40 aircraft owners. The proposed hangars would also provide an additional source of revenues for the Airport.

Enabling Projects: Segmented Circle/Wind Cone Relocation, Retention Pond Modifications

Anticipated Start Date: FY 2030

Initial ROM Cost Estimates: (in 2030 dollars) $20,070,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent); or Third Party Devleopment



SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: SF-1 AUTOMATED SURFACE OBSERVING SYSTEM RELOCATION

Project Location: West end of the Airport; approximately 1,500 feet west of the Runway 7 end.

Project Description: This project consists of relocating the Automated Surface Observing System (ASOS) equipment currently located east of the passenger terminal parking facilities west of the Runway 7 end, along the property line that runs parallel to Aviation Boulevard. No new and/or additional weather equipment would be acquired as part of this project.

Project Justification: The location of the existing ASOS causes radio interference issues, and pilots have complained that they cannot hear the system message that includes important surface weather conditions, such as wind, visibility, sky condition, and pressure.

Existing Automated Surface Observing System

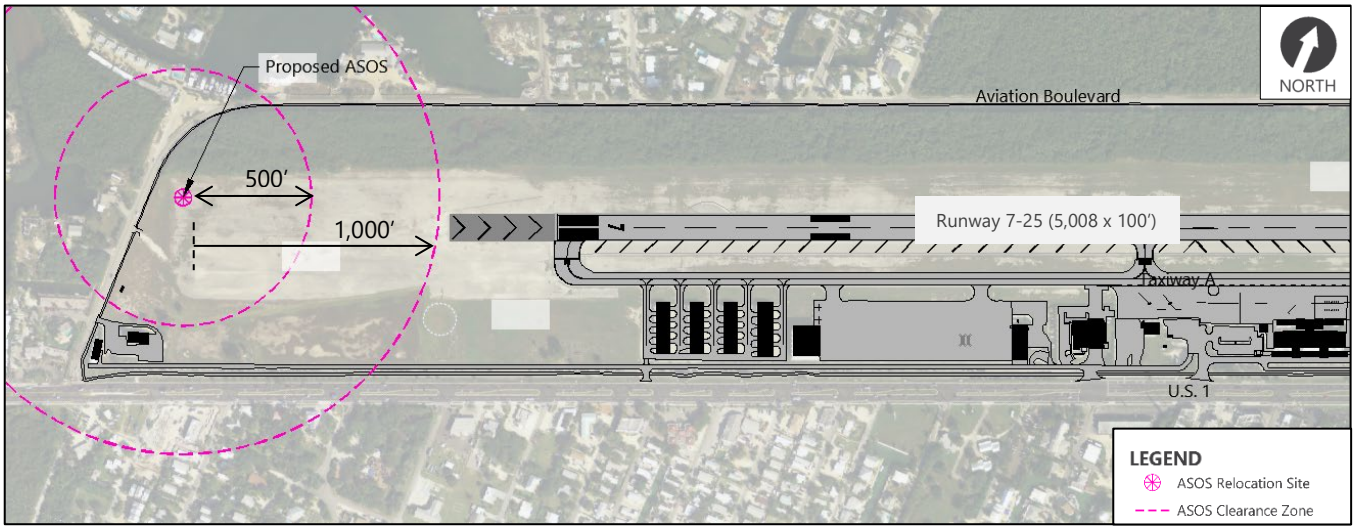
Enabling Projects:

None

Anticipated Start Date: FY 2021

Initial ROM Cost Estimates: (in 2021 dollars) $121,000

Potential Funding Sources: FAA (90 percent); FDOT (5 percent); Local Share (5 percent)



NOTES:

1 ASOS- Automated Surface Observing System

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: SF-2 AIRPORT MAINTENANCE STORAGE FACILITY-CONSTRUCTION

Project Location:

Adjacent to the existing passenger terminal building.

Project Description: This project consists of designing and constructing a 2,000-square foot maintenance facility adjacent to and west of the existing passenger terminal. This facility will allow for the storage and parking of maintenance equipment and vehicles.

Existing Airport Maintenance Area

Project Justification: A dedicated Airport maintenance facility will free up the area located between the existing passenger terminal automobile parking and the east general aviation ramp for aviation-related uses.

Enabling Projects: None

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: Construction (in 2022 dollars): $2,163,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)

SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: SF-3 FUEL STORAGE FACILITY RELOCATION

Project Location: South of the existing Runway 7 end.

Project Description: This project consists of relocating the two fuel tanks, including a 12,000-gallon Jet-A fuel tank and a 10,000-gallon 100-low lead (LL) Avgas tank with a self-service fueling facility located on the southwestern apron, to a new location west of the proposed T-hangars. The fuel storage facility relocation will free up space on the ramp for the movement and parking of aircraft.

Existing Fuel Farm

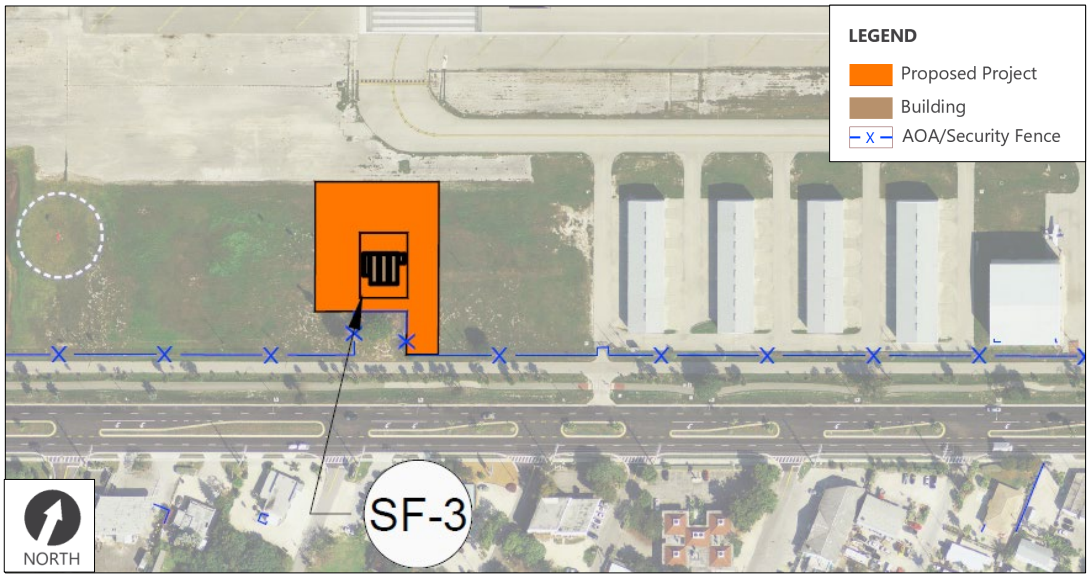
Project Justification: The relocation of the two fuel tanks will free up apron space for aircraft parking. Relocating the fuel storage tanks off the apron will also allow for easier and safer refueling during tanker deliveries.

Enabling Projects: Environmental Documentation

Anticipated Start Date: FY 2021

Initial ROM Cost Estimates: Construction (in 2021 dollars): $3,224,000

Potential Funding Sources: Third Party/FBO Development



SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: NA-1 EMERGENCY OPERATIONS CENTER

Project Location:

Northwest of the intersection of Aviation Boulevard and U.S. Highway 1.

Project Description: This project consists of constructing a raised hurricane-rated building to serve as the Emergency Operations Center (EOC) for the City of Marathon to coordinate overall disaster response and recovery efforts in support of field operations in the event of a natural disaster, such as a hurricane. The EOC building's first floor will be raised to minimize the impacts of potential flooding associated with hurricanes. This project will require the demolition of the American Veterans building and therefore this tenant will need to be relocated to a new facility. The purposed EOC building is 23,000 square feet and the purposed parking lot is 4,800 square yards.

Project Justification: The Airport provides a central location from which local governments can provide interagency coordination and executive decision-making in support of incident response and recovery operations. The purpose of the EOC is to provide a centralized location where public safety, emergency response, and support agencies coordinate planning, preparedness, and response activities.

Enabling Projects: Relocation of Veteran Services; Demolition of Veterans Affairs Building

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $22,511,000

Potential Funding Sources: Monroe County

SOURCES: Monroe County, April 2019 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: NA-2 RETENTION POND MODIFICATIONS – SOUTHWEST

Project Location:

Southwest corner of the Airport

Project Description:

This project consists of modifying the existing retention pond to reduce its size pond to reduce its size from 5 acres to 2 acres and to allow for the development of additional aviation-related facilities, such as hangars and aircraft apron. The proposed modifications will include the construction of exfiltration trenches to facilitate the return of runoff to the ground water.

Project Justification: Reducing the overall footprint of the retention pond would allow for future aircraft hangars and apron development.

Enabling Projects:

None

Anticipated Start Date: FY 2021

Initial ROM Cost Estimates: Construction (in 2022 dollars): $2,186,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: NA-3 INDOOR SHOOTING RANGE

Project Location:

Southeast of Runway 25 end.

Project Description: This project consists of constructing a 12,000 square feet indoor shooting range for the Monroe County Sheriff's Office. This facility will be designed for firearms qualifications, training, or practice, and it will be operated by the Monroe County Sheriff's Office.

Project Justification: The Airport provides a central location for the Monroe County Sheriff's Office. The proposed facility will consist of an indoor training facility that will be devoted to law enforcement firearms training.

Enabling Projects:

None

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $3,028,000

Funding Source: Monroe County Sheriff's Office

SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: SF-4 SEGMENTED CIRCLE/WIND CONE RELOCATION

Project Location:

Northwest of Runway 7-25 and south of Aviation Boulevard.

Project Description: This project consists of relocating the existing lighted wind cone and the associated segmented circle, located on the west side of the airfield and southwest of the Runway 7 end, to allow for the development of additional aviation-related facilities, such as hangars and aircraft apron. The existing segmented circle is a visual indicator that provides traffic pattern information to pilots operating at the Airport. It consists of a landing runway indicator, a traffic pattern indicator, and a lighted wind cone. The Master Plan Update proposes to relocate the segmented circle and lighted wind cone along the north side of the runway. No new and/or additional weather equipment would be acquired as part of this project.

Project Justification: The relocation of the segmented circle and wind cone will allow for the development of additional aviation-related facilities along the south side of the extended runway. The area where the existing segmented circle and associated wind cone are located is prime Airport real estate. This area is better suited for the development of facilities that can produce aeronautical revenues.

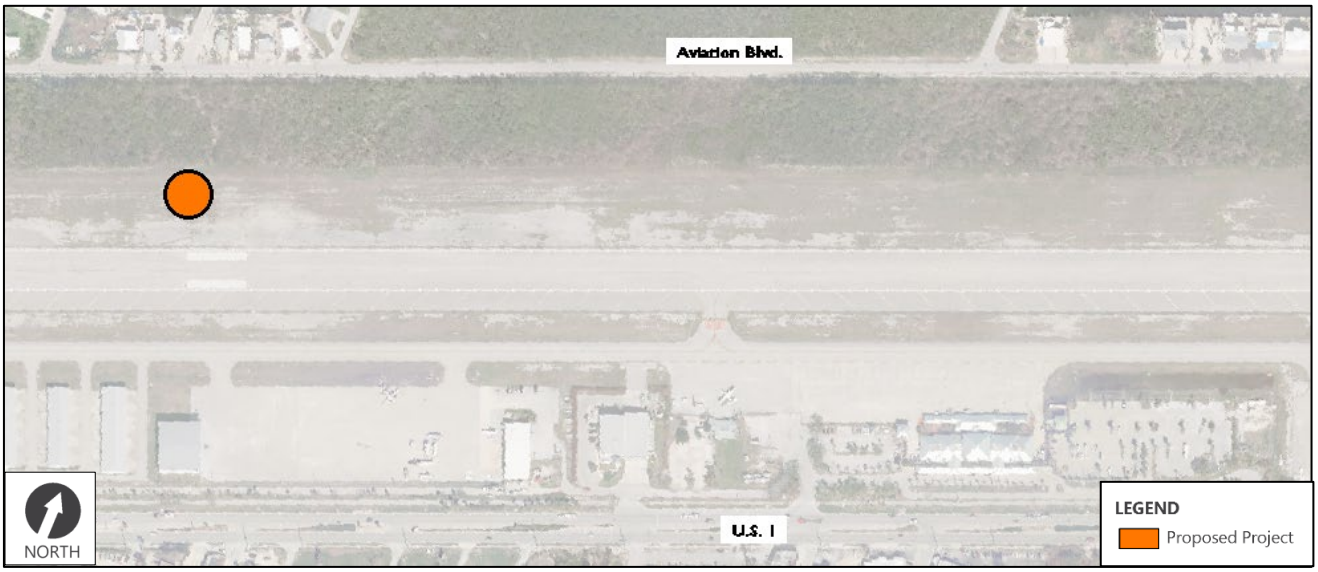
Enabling Projects:

None

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $74,000

Potential Funding Sources: FDOT (80 percent); Local Share (20 percent)



SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: AF-1 RUNWAY AND PARALLEL TAXIWAY SEPARATION IMPROVEMENTS

Project Location: Runway 7-25

Project Description: This project will shift Runway 7-25 to the northwest 40 feet to achieve the FAA-required 240-foot runway-to-taxiway separation distance. The first phase of this project will include clearing a 40-foot-wide by 5,608-foot-long strip of vegetation on the north side of the shifted runway within the runway object-free area (ROFA); the addition of obstruction lights, as required, to mark the remaining trees encroaching the Part 77 airspace surfaces; the trimming or removal of select trees to clear the relocated runway threshold siting surface; the removal of existing taxiway and apron pavement on the north side of the approach to Runway 25; the addition of drainage and utilities necessary to implement the proposed runway shift; and environmental mitigation. The first phase also includes the design services for the runway shift and associated taxiway improvements.

The second phase of the project (construction) will include constructing the relocated runway; removing 40 feet of excess runway pavement on the south side of the existing runway; removing excess runway shoulder pavement; constructing new blast pads at relocated runway ends; demolishing existing excess pavement on Taxiway B; reconstructing Taxiway C west of its existing location; reconstructing Taxiway D perpendicular to the relocated runway; demolishing existing excess pavement on Taxiway E; constructing new Taxiway F; relocating and/or installing new runway edge lights and threshold lights; relocating and/or installing new runway-end identifier lights (REIL) on the Runway 7 end; and updating existing area navigation (RNAV) Global Positional System (GPS) instrument approach procedures to reflect the 40-foot lateral shift of Runway 7-25.

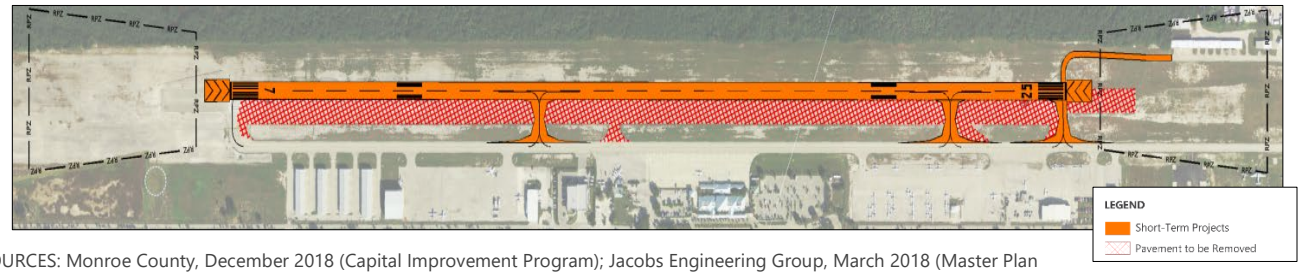
Project Justification: The taxiway separation distance and width of the runway will be brought into compliance with FAA Airport Design B-II standards, as outlined in FAA AC 150/5300-13A, *Airport Design*. As part of this project, the direct access between Runway 7-25 and the cargo apron will also be eliminated. FAA AC 5300-13A recommends the elimination of these conditions to reduce runway incursion. The elimination of this connector will meet FAA taxiway design standards, will eliminate the direct ramp to runway access, and will increase safety.

Enabling Projects: Environmental Assessment

Anticipated Start Date: FY 2021

Initial ROM Cost Estimates: Design (in 2022 dollars): $750,000; Tree Clearing/Environmental Mitigation(in 2021 dollars): $3,000; Construction (in 2023 dollars): $14,366,000

Potential Funding Sources: FAA (90 percent); FDOT (8 percent); Local Share (2 percent)



SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: AF-5 TAXIWAY A REHABILITATION – DESIGN/CONSTRUCTION

Project Location: Parallel Taxiway A

Project Description: The rehabilitation of Taxiway A is intended to restore and/or maintain the pavement areas' serviceability, and it would include milling the existing 37,000 square yards of pavement to remove the deteriorated pavement, as well as a bituminous asphalt concrete pavement overlay.

Project Justification: As of 2015, Taxiway A had a Pavement Condition Index (PCI) ranging between 66 and 69. The 2015 FDOT pavement evaluation report recommended this taxiway be milled and overlaid.

Enabling Projects: None

Anticipated Start Date: FY 2024/2025

Initial ROM Cost Estimates: Design (in 2024 dollars): $350,000; Construction (in 2025 dollars): $6,377,000

Potential Funding Sources: FAA (90 percent); FDOT (8 percent); Local Share (2 percent)

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: AF-2 REMOTE COMMUNICATION AIR-GROUND FACILITY DESIGN/ CONSTRUCTION

Project Location:

Northeast corner of the Airport at the intersection of Aviation Boulevard and Peter Jay Street.

Project Description: This project, which is being sponsored and funded by the FAA, consists of designing and constructing a 12,000 square feet Remote Communication Air-Ground (RCAG) facility in the northeast corner of the Airport.

Project Justification: This unmanned VHF/UHF transmitter/receiver facility will be used to expand the Miami Air Route Traffic Control Centers (ARTCC) air/ground communications coverage and to facilitate direct contact between pilots and controllers.

Enabling Projects: Monroe County Public Works Storage Area Relocation

Anticipated Start Date: FY 2022

Initial ROM Cost Estimates: (in 2022 dollars) $1,140,000

Funding Source: FAA (100 percent)

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: AF-3 SERVICE ROAD CONSTRUCTION

Project Location: South of Taxiway A and north of Runway 7-25.

Project Description: This project consists of constructing a dedicated 3,000 square yard service road between the existing general aviation aircraft ramp located west of the terminal facilities and the proposed fuel farm. It is anticipated this project will be completed as part of the GA-2 or SF-2 project.

Project Justification: The interior service road will allow fuel trucks to circulate between the existing general aviation ramps and the future fuel farm without having to use Airport Access Road, a public road.

Enabling Projects: GA-2 or SF-2

Anticipated Start Date: FY 2021

Initial ROM Cost Estimates: Included as part of SF-3

Potential Funding Sources: FDOT (80 percent); Local Share (20 percent)

SOURCES: Monroe County, April 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., April 2019.

PROJECT: LS-1 AIRPORT ACCESS ROAD EXTENSION

Project Location: South of Taxiway A.

Project Description: This project includes the extension of Airport Access Road to connect the eastern and western sections. The proposed two-lane road (18 to 20 feet wide) extension is approximately 150 feet long.

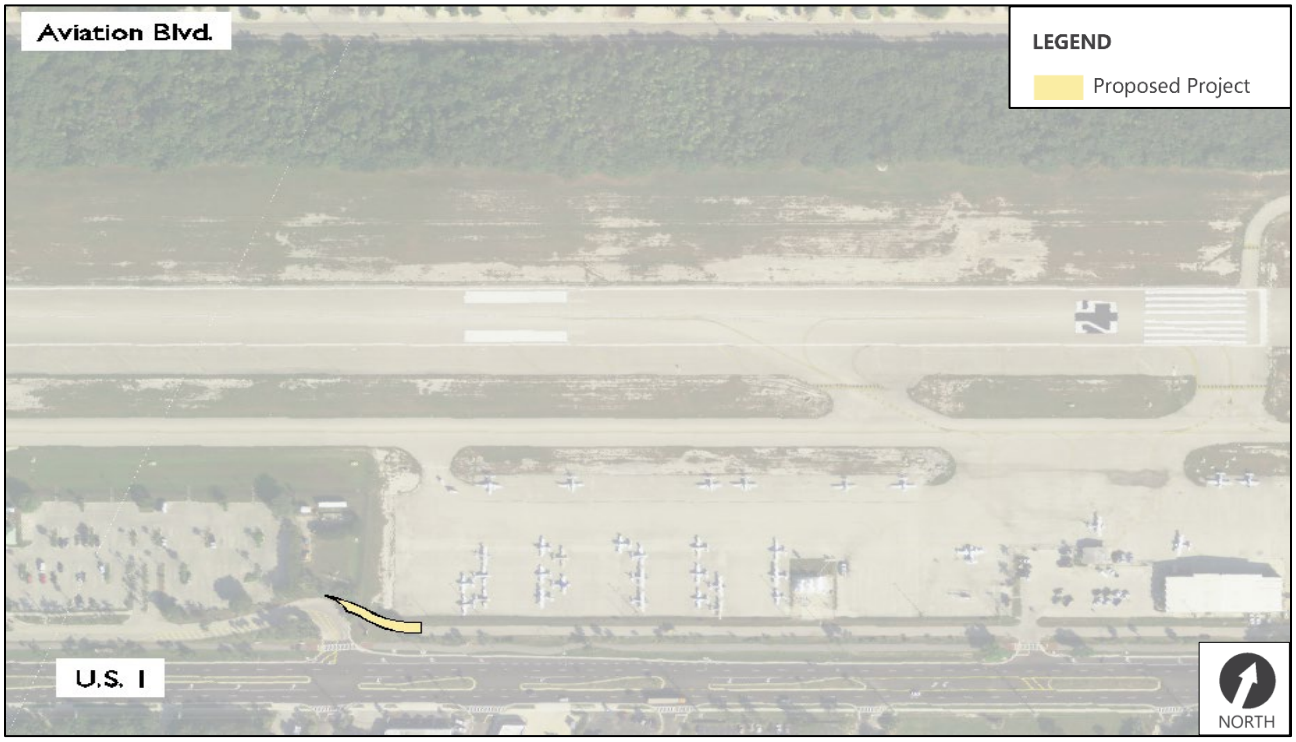
Project Justification: The proposed extension will link the east and west sections of Airport Access Road, allowing Airport tenants to access the various aviation facilities located along Airport Access Road without having to use U.S. Highway 1. This project will facilitate on-Airport vehicle circulation and will reduce vehicle crossings and traffic on U.S. Highway 1.

Enabling Projects: None

Anticipated Start Date: FY 2025

Initial ROM Cost Estimates: (in 2025 dollars) $365,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)



SOURCE: Monroe County, February 2019 (Capital Improvement Program).

PREPARED BY: Ricondo & Associates, Inc., February 2019.

PROJECT: AF-4 TAXIWAY RENAMING (AIRFIELD-WIDE)

Project Location: Airfield-wide.

Project Description: This project consists of updating the taxiway nomenclature per the guidance provided in FAA Engineering Brief 89, T*axiway Nomenclature Convention*. It is estimated that up to 30 new signs may need to be updated and/or replaced.

Project Justification: The renaming of the taxiways will bring the airfield in compliance with standards set forth in FAA AC 5300-13A, *Airport Design*, and FAA Engineering Brief 89, *Taxiway Nomenclature Convention*.

Enabling Projects: None

Anticipated Start Date: FY 2025

Initial ROM Cost Estimates: (in 2025 dollars) $750,000

Potential Funding Sources: FAA (90 percent); FDOT (8 percent); Local Share (2 percent)

Federal Aviation Administration

Memorandum

Date: MAR 29 2012

To: All Regional Airports Divisions Managers

From: John R. Dermody, Manager, Airport Engineering, AAS-100

Prepared by: Thomas Mai, Electronics Engineer, Airport Engineering, Division, AAS-100, x78754

Subject: INFORMATION: Engineering Brief No. 89, Taxiway Nomenclature Convention

This Engineering Brief (EB) provides clarification for taxiway designation convention standards contained in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5340-18F, Standards for Airport Sign Systems.

Attachment

SOURCES: Federal Aviation Administration, Engineering Brief No. 89, *Taxiway Nomenclature Convention*

PREPARED BY: Ricondo & Associates, Inc., February 2019.

PROJECT: AF-6 RUNWAY EXTENSION WEST

Project Location:

Runway 7 end.

Project Description: This project consists of extending Runway 7 by 392 feet and extending Taxiway A to the new runway end. This project also includes the construction of two new connectors between Taxiway A and the proposed runway extension.

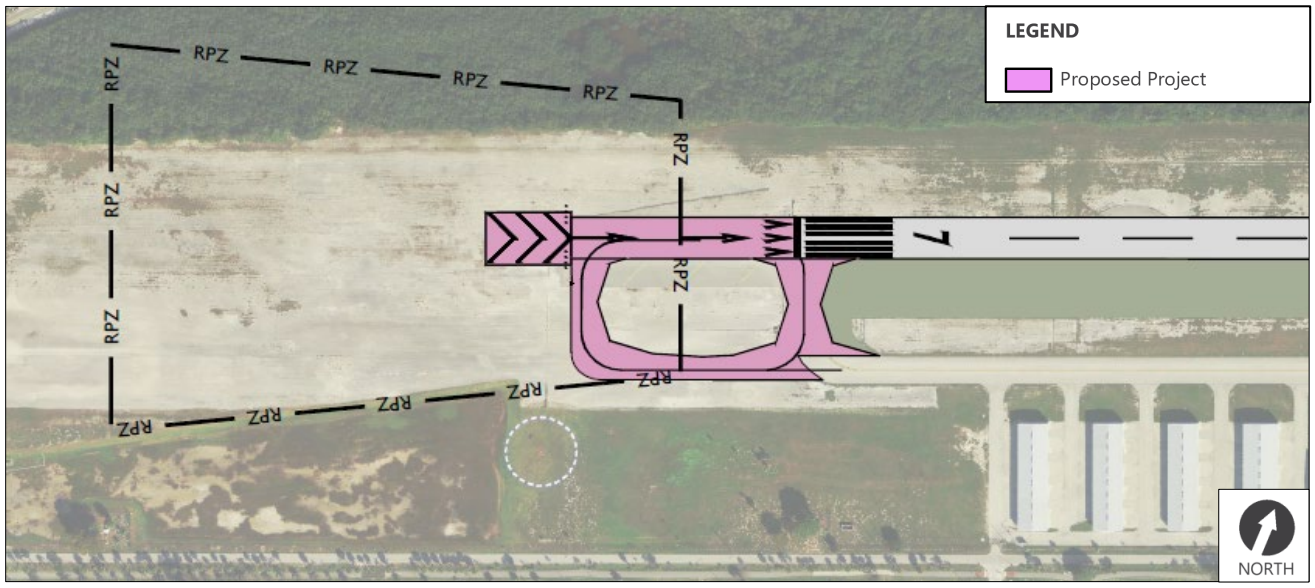
Project Justification: This runway extension will provide the additional runway length for larger jet aircraft currently departing MTH with operational weight restrictions. The runway extension will reduce payload penalties and/or increase aircraft range. Based on the performance curves developed by the FAA, and presented in AC 150/5325-4B, for aircraft within a maximum certificated takeoff weight of more than 12,500 pounds and up to and including 60,000 pounds, the additional runway length would accommodate 100 percent of the turbojet-powered fleet at 60 percent useful load (compared to 75 percent of the fleet at 60 percent useful load based on the existing runway length).

Enabling Projects: Environmental Assessment; Obstruction Mitigations (Project MI-2)

Anticipated Start Date: FY 2036

Initial ROM Cost Estimates: (in 2036 dollars) $3,395, 000

Potential Funding Sources: FAA (90 percent); FDOT (8 percent) ; Local Share (2 percent)



NOTES:

1 RPZ - Runway Protection Zone

SOURCE: Monroe County, February 2019 (Capital Improvement Program).

PREPARED BY: Ricondo & Associates, Inc., February 2019.

PROJECT: SF-5 RENTAL CAR WASH FACILITY

Project Location:

East of City of Marathon Fire Station #14

Project Description: This project consists of constructing four (4) wash bays for the rental car operators at the Airport.

Project Justification: Project is required for the cleaning of the rental cars that are returned to the Airport.

Enabling Projects:

None

Anticipated Start Date: FY 2020

Initial ROM Cost Estimates:

Funding Sources: FDOT ; Local Share (100 percent)

SOURCES: Monroe County, December 2018 (Capital Improvement Program); Jacobs Engineering Group, March 2018 (Master Plan Project Cost Estimates); Ricondo & Associates, Inc., May 2018.

PREPARED BY: Ricondo & Associates, Inc., January 2019.

PROJECT: SF-6 AIRPORT TRAFFIC CONTROL TOWER CONSTRUCTION

Project Location:

Directly east of the existing passenger terminal facilities.

Project Description: When dictated by demand, this project will consist of constructing an Air Traffic Control Tower (ATCT) on Airport property, in accordance with FAA guideline and design criteria. The proposed location for the ATCT was selected because it provides clear line-of-sight to the runway ends (and associated approaches), as well as the aircraft parking apron areas. In addition, landside access to the proposed ATCT can easily be provided using the passenger terminal access road. Finally, the proposed site is not anticipated to impact any existing environmentally sensitive areas and existing navigational aids at the Airport.

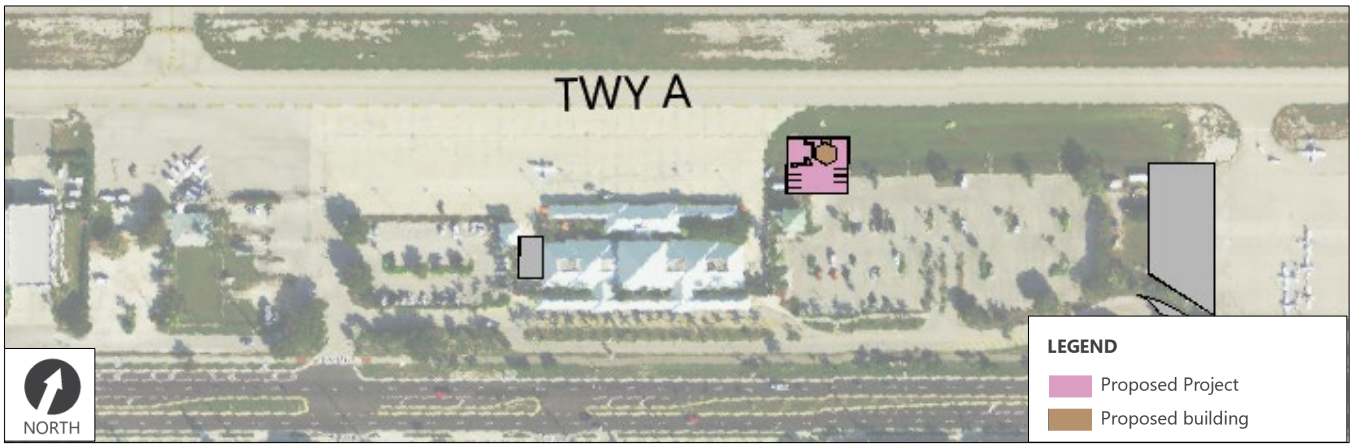
Project Justification: This project will allow for the protection of the land area adjacent to the passenger terminal for the construction of a future ATCT when warranted by air traffic demand.

Enabling Projects: N/A

Anticipated Start Date: FY 2036 or beyond

Initial ROM Cost Estimates: To Be Determined

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)



SOURCE: Monroe County, February 2019 (Capital Improvement Program).

PREPARED BY: Ricondo & Associates, Inc., February 2019.

PROJECT: MI-2 AIRSPACE OBSTRUCTION MITIGATION

Project Location:

Runway 7 end.

Project Description:

Tree clearing (trim or removal) and lighting of obstructions.

Project Justification: This project includes the trimming or removal of trees that would penetrate the airfield safety and airspace surfaces associated with the proposed 392-foot runway extension.

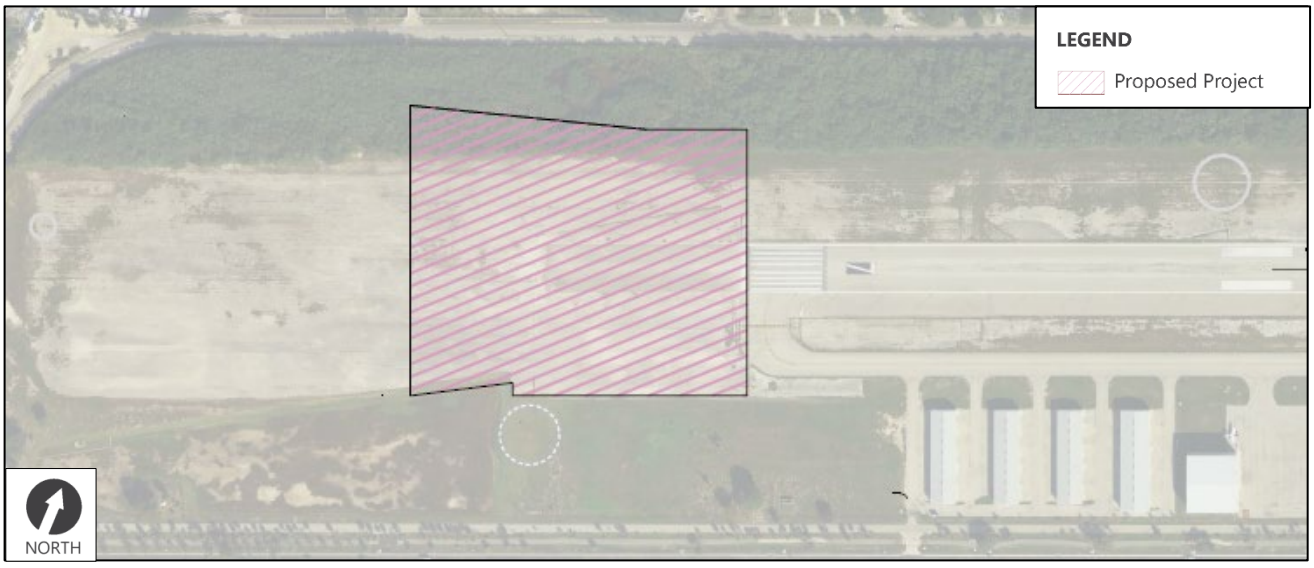
Enabling Projects:

None

Anticipated Start Date: FY 2036

Initial ROM Cost Estimates: (in 2036 dollars) $1,618,000

Potential Funding Sources: FAA (0 percent); FDOT (80 percent); Local Share (20 percent)



SOURCE: Monroe County, February 2019 (Capital Improvement Program).

PREPARED BY: Ricondo & Associates, Inc., February 2019.

PROJECT: PS-1 AIRPORT MASTER PLAN UPDATE

Project Location:

Florida Keys Marathon International Airport.

Project Description:

An airport master plan is a comprehensive study of an airport's short-, medium-, and long-term development plan to meet future (20-year) aviation demand.

Project Justification:

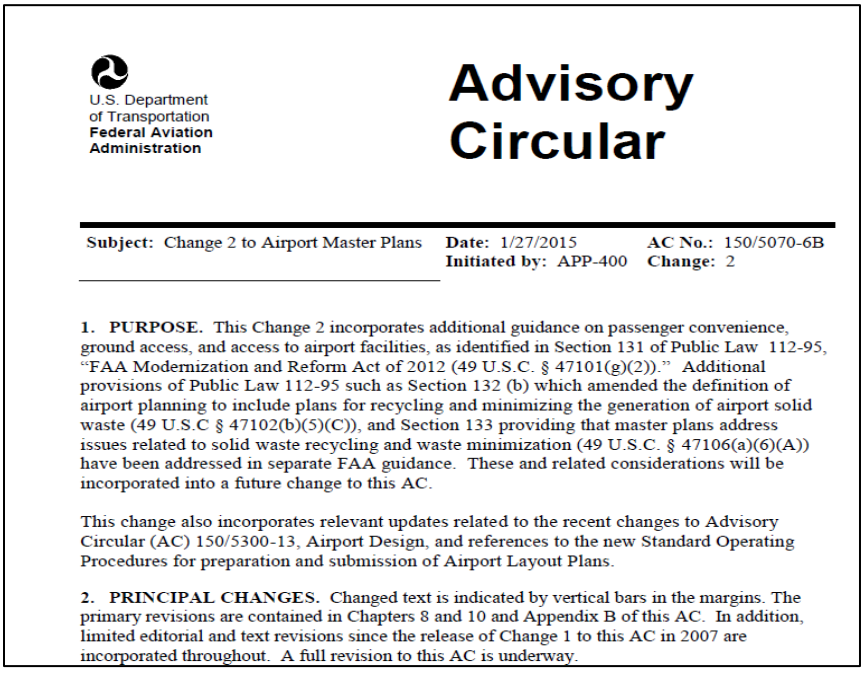
The FAA recommends continued updates to an airport's master plan every 10 years to accurately reflect the airport's current and future aviation demand at the time in which the master plan update is initiated. A master plan update will be needed to revisit the intermediate and long-term projects identified in the 2019 Master Plan Update to ensure they remain effective and accurately reflect the aviation demand of the Airport, as well as reflect the financial, community, environmental, and socioeconomic issues and concerns of the communities surrounding the Airport.

Enabling Projects: None

Anticipated Start Date: FY 2029

Initial ROM Cost Estimates: (in 2029 dollars) $1,108,000

Potential Funding Sources: FAA (90 percent); FDOT (5 percent); Local Share (5 percent)



U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Change 2 to Airport Master Plans **Date:** 1/27/2015 **AC No.:** 150/5070-6B
Initiated by: APP-400 **Change:** 2

1. PURPOSE. This Change 2 incorporates additional guidance on passenger convenience, ground access, and access to airport facilities, as identified in Section 131 of Public Law 112-95, "FAA Modernization and Reform Act of 2012 (49 U.S.C. § 47101(g)(2))." Additional provisions of Public Law 112-95 such as Section 132 (b) which amended the definition of airport planning to include plans for recycling and minimizing the generation of airport solid waste (49 U.S.C § 47102(b)(5)(C)), and Section 133 providing that master plans address issues related to solid waste recycling and waste minimization (49 U.S.C. § 47106(a)(6)(A)) have been addressed in separate FAA guidance. These and related considerations will be incorporated into a future change to this AC.

This change also incorporates relevant updates related to the recent changes to Advisory Circular (AC) 150/5300-13, Airport Design, and references to the new Standard Operating Procedures for preparation and submission of Airport Layout Plans.

2. PRINCIPAL CHANGES. Changed text is indicated by vertical bars in the margins. The primary revisions are contained in Chapters 8 and 10 and Appendix B of this AC. In addition, limited editorial and text revisions since the release of Change 1 to this AC in 2007 are incorporated throughout. A full revision to this AC is underway.

SOURCES: Federal Aviation Administration, FAA AC 150/5070-6B, *Change 2 to Airport Master Plans*

PREPARED BY: Ricondo & Associates, Inc., February 2019.

Florida Keys Marathon International Airport

Financial Plan

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO & ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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8. Financial Plan

This section presents a potential funding plan for implementing the CIP projects recommended in the MPU. It also assesses the ability of the County to fund the recommended projects associated with the preferred alternatives. These projects are designed to provide the required improvements and facilities at the Airport from FY 2018 through FY 2036 (projection period).

The actual implementation schedule for the various construction projects will be influenced by demand, funding availability, the County's priorities, and other relevant factors, and it may not correspond precisely to the schedule described in this section. For purposes of the illustrative financial analysis, a specific implementation schedule was assumed. However, it should be noted that this schedule and the resulting financial analyses are intended only to demonstrate financial feasibility. Actual funding strategies for each project will be determined at the time of project implementation.

The following actions were taken to conduct the MPU's financial analysis:

- Review the Airport's financial structure and obtain financial information.
- Compile a list of proposed capital development projects, including estimated project construction costs and construction start and end dates.
- Identify potential funding sources; analyze the potential availability of funding from those sources, as applicable.
- Develop projections of operating and maintenance (O&M) expenses and non-airline revenues.
- Construct a flow of funds to assess the impact of the CIP projects on the Airport's cash position.

8.1 Airport Financial Structure

The County owns and operates the Airport through the Board of County Commissioners (BOCC) as a separate enterprise fund of the County. The BOCC manages the Airport through the County Administrator, the Senior Director of Airports, the Deputy Director of Airports, and the Airport Business Managers who oversee daily operations. The Airport is not a legally separate or fiscally independent unit of the County. Therefore, it is considered a part of the County's primary government, and it is included as such in the Monroe County Comprehensive Annual Financial Report. The County and Airport operate on a 12-month FY ending September 30.

8.2 Capital Improvement Program – Projects and Funding Plan

The existing CIP presents a comprehensive list of projects identified as part of the MPU projects. These CIP projects address recommended improvements throughout the planning period. Projects are scheduled within one of three planning phases: FY 2018 through FY 2022 (short-term improvements), FY 2023 through FY 2028 (intermediate-term improvements), and FY 2029 through FY 2036 (long-term improvements).

Although projects are organized by phase, implementation of these projects may be adjusted to accommodate actual growth and demand at the Airport. The ROM project cost estimates were escalated annually at 3.0 percent to reflect project costs in future dollars. The project costs include costs related to construction, engineering, construction management/administration, and other contingencies. The costs should be considered preliminary, and it must be recognized that each project may require additional planning, environmental documentation, and/or design.

8.2.1 PROJECTS

Table 8-1 presents the estimated costs of the CIP projects expected to be implemented through FY 2036. The total estimated cost of the CIP in escalated dollars is approximately $97.2 million. Estimated costs were escalated from 2018 dollars at an annual rate of 3.0 percent, and they include construction contingencies, construction administration, and engineering/design services. For these projects, it was assumed that design would occur in one FY, with construction commencing in the following FY.

Recognizing the conceptual nature of a master plan, implementation of certain capital development projects would occur only after further refinement through advanced planning and programming, as well as through engineering and architectural analyses. Therefore, the estimated CIP costs developed for purposes of this funding plan must be viewed as preliminary; they reflect a master plan level of detail subject to refinement in subsequent implementation phases.

Table 8-1: Capital Improvement Program Estimated Costs

PROJECT ID [1/]	PROJECT DESCRIPTION	TOTAL COSTS [2/]	SHORT TERM (FY 2018 – FY 2022) 2018	2019	2020	2021	2022	INTERMEDIATE TERM (FY 2023 – FY 2028) 2023	2024	2025	2026	2027	2028	LONG TERM (FY 2029 – FY 2036) 2029	2030	2031	2032	2033	2034	2035	2036
SHORT TERM (FY 2018 – FY 2022)																					
AF-1	Runway and Parallel Taxiway Separation Improvements	$4,500,000	$0	$0	$750,000	$0	$3,000,000	$750,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SF-1	Automated Surface Observing System Relocation	$121,000	$0	$0	$0	$121,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SF-3	Fuel Storage Facility Relocation	$3,224,000	$0	$0	$0	$3,224,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SF-2	Airport Maintenance Storage Facility	$2,163,000	$0	$0	$0	$0	$2,163,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NA-1	Emergency Operations Center	$22,511,000	$0	$0	$0	$0	$22,511,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GA-1	General Aviation Development – Southeast	$4,292,000	$0	$0	$0	$0	$4,292,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
GA-2	General Aviation Development – Southwest	$4,321,000	$0	$0	$0	$0	$4,321,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NA-3	Indoor Shooting Range	$3,028,000	$0	$0	$0	$0	$3,028,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
AF-2	Remote Communication Air-Ground Facility Construction	$1,140,000	$0	$0	$0	$0	$1,140,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SF-4	Segmented Circle/Wind Cone Relocation	$74,000	$0	$0	$0	$0	$74,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
INTERMEDIATE TERM (FY 2023 – FY 2028)																	$0	$0	$0	$0	$0
AF-1	Runway and Parallel Taxiway Separation Improvements – Construction	$14,366,000	$0	$0	$0	$0	$0	$0	$14,366,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
AF-5	Taxiway A Rehabilitation	$6,727,000	$0	$0	$0	$0	$0	$0	$350,000	$6,377,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
AF-4	Taxiway Renaming	$750,000	$0	$0	$0	$0	$0	$0	$0	$750,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NA-2	Retention Pond Modifications – Southwest	$2,186,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,093,000	$1,093,000	$0	$0	$0	$0	$0	$0	$0	$0
LONG TERM (FY 2029 – FY 2036)																					
PS-1	Airport Master Plan Update	$1,108,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,108,000	$0	$0	$0	$0	$0	$0	$0
GA-4	General Aviation Development – Southwest	$20,070,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,070,000	$0	$0	$0	$0	$0	$0
LS-1	Airport Access Road Extension	$365,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$365,000	$0	$0	$0	$0	$0	$0
GA-3	General Aviation Apron Expansion – Midfield	$1,266,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,266,000	$0	$0	$0	$0	$0
MI-2	Airspace Obstruction Mitigation	$1,618,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,618,000
AF-6	Runway Extension West	$3,395,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,395,000
	Total Master Plan Projects	$97,225,000	$0	$0	$750,000	$3,345,000	$40,529,000	$750,000	$14,716,000	$7,127,000	$0	$1,093,000	$1,093,000	$1,108,000	$20,435,000	$1,266,000	$0	$0	$0	$0	$5,013,000

NOTES: Fiscal year (FY) ending September 30. Numbers may not add due to rounding.

1/ LS – Landside; AF – Airfield; GA – General Aviation; SF – Support Facilities; NA – Non-Aviation; MI – Mitigation; PS – Planning Study

2/ Costs estimated using 2018 U.S. dollars; costs have been escalated at 3.0 percent annually for inflation.

SOURCES: Jacobs, December 2018; Monroe County Department of Airports, June 2020.

PREPARED BY: Ricondo & Associates, Inc., June 2020.

8.2.1.1 Capital Improvement Program

Based on the facility requirements and operational analysis developed in previous sections, a CIP and phasing plan have been recommended that incorporate the facility requirements during the project sequencing. Each project has been assigned to a planning period (i.e., short term, intermediate term, and long term), as discussed in Section 7. The CIP for each period presents the improvements required during that period, but it does not assume how financially feasible it will be to undertake these projects.

Although this MPU charts a course for planned development, it must be emphasized that the planning and development of an airport is a continuous process. The rehabilitation and maintenance of existing facilities and the development of new facilities must be predicated on sustained demand and a positive return on investment, which justifies the costs of improvements. Therefore, periodic reevaluation of the CIP's schedule will be necessary to accommodate variations from the aviation forecasts and to adjust for other unforeseen factors. This will ensure any change in aviation demand or any socioeconomic changes within the local area will be fully considered as the development of MTH continues. It is also highly possible that other improvements not identified within the context of this study may be required to facilitate safe and efficient Airport operations or to accommodate some unforeseen demand. All future improvement projects, identified in this MPU or otherwise, shall be compatible with the development strategies proposed for MTH. If a significant variance from those plans is highlighted, then a careful compatibility review should be conducted, along with possible strategic plan updates.

The CIP presented in Table 8-1 includes the full list of MPU projects included in the Implementation Plan, and it summarizes project costs on an annual basis for short-term, intermediate-term, and long-term horizons. As shown in Table 8-1, the estimated $97.2 million project costs are associated with landside, airfield, general aviation, non-aviation, and support facility projects.

The following are the key MPU projects grouped by planning phase, as shown in **Table 8-2**:

Short Term

- The short-term CIP projects are required to provide general aviation development, additional support facilities, airfield improvements, a remote communication air-ground facility, service roads, and other non-aviation facility developments, including an emergency operations center and an indoor shooting range facility. Table 8-2 lists the proposed short-term projects and associated ROM costs. Short-term CIP funding is unique to each project's demands and eligibility. Approximately $37.9 million of short-term project funding is estimated to come from the County, the Monroe County Sheriff's Office, and other separate private entities. The total short-term CIP projects are estimated to cost approximately $44.6 million over the five-year period of FY 2018 through FY 2022.

Intermediate Term

- The intermediate-term CIP projects are required to provide additional airfield improvements, to expand aircraft parking apron areas, and to improve vehicular traffic on Airport Access Road. Table 8-2 lists the proposed intermediate-term projects and associated ROM costs. Most of the intermediate-term CIP projects, except for one, are anticipated to be funded by the Department of Airports. The total intermediate-

term CIP projects are estimated to cost approximately $24.8 over the five-year period of FY 2023 through FY 2028.

Long Term

- The long-term CIP projects consist of a western runway extension, new aircraft storage hangars, obstruction mitigation, and a master plan update. Table 8-2 lists the proposed long-term projects and associated ROM costs. Most of the long-term CIP projects, except for one, are anticipated to be funded by the Department of Airports. The General Aviation Development – Southwest (GA-4) project to construct 16 new T-hangars for single-engine piston aircraft and 14,000 square yards of aircraft parking apron is estimated to be 80 percent funded with FDOT grant proceeds and rely on 20 percent ($4.0 million) funding from third-party developments. The total long-term CIP projects are estimated to cost approximately $27.8 million over the five-year period of FY 2029 through FY 2036.

Table 8-2: Capital Improvement Program by Planning Phase

PROJECT ID 1/	PROJECT DESCRIPTION	TOTAL COSTS	SHORT TERM (FY 2018 – FY 2022)	INTERMEDIATE TERM (FY 2023 – FY 2028)	LONG TERM (FY 2029 – FY 2036)
SHORT TERM (FY 2018 – FY 2022)					
AF-1	Runway and Parallel Taxiway Separation Improvements	$4,500,000	$3,750,000	$750,000	$0
SF-1	Automated Surface Observing System Relocation	$121,000	$121,000	$0	$0
SF-3	Fuel Storage Facility Relocation	$3,224,000	$3,224,000	$0	$0
SF-2	Airport Maintenance Storage Facility	$2,163,000	$2,163,000	$0	$0
NA-1	Emergency Operations Center	$22,511,000	$22,511,000	$0	$0
GA-1	General Aviation Development – Southeast	$4,292,000	$4,292,000	$0	$0
GA-2	General Aviation Development – Southwest	$4,321,000	$4,321,000	$0	$0
NA-3	Indoor Shooting Range	$3,028,000	$3,028,000	$0	$0
AF-2	Remote Communication Air-Ground Facility Construction	$1,140,000	$1,140,000	$0	$0
SF-4	Segmented Circle/Wind Cone Relocation	$74,000	$74,000	$0	$0
INTERMEDIATE TERM (FY 2023 – FY 2028)					
AF-1	Runway and Parallel Taxiway Separation Improvements – Construction	$14,366,000	$0	$14,366,000	$0
AF-5	Taxiway A Rehabilitation	$6,727,000	$0	$6,727,000	$0
AF-4	Taxiway Renaming	$750,000	$0	$750,000	$0
NA-2	Retention Pond Modifications – Southwest	$2,186,000	$0	$2,186,000	$0
LONG TERM (FY 2029 – 2036)					
PS-1	Airport Master Plan Update	$1,108,000	$0	$0	$1,108,000
GA-4	General Aviation Development – Southwest	$20,070,000	$0	$0	$20,070,000
LS-1	Airport Access Road Extension	$365,000	$0	$0	$365,000
GA-3	General Aviation Apron Expansion – Midfield	$1,266,000	$0	$0	$1,266,000
MI-2	Airspace Obstruction Mitigation	$1,618,000	$0	$0	$1,618,000
AF-6	Runway Extension West	$3,395,000	$0	$0	$3,395,000
TOTAL MASTER PLAN PROJECTS		**$97,225,000**	**$44,624,000**	**$24,779,000**	**$27,822,000**

NOTES: Fiscal Year (FY) ending September 30. Numbers may not add due to rounding.

1/ LS – Landside; AF – Airfield; GA – General Aviation; SF – Support Facilities; NA – Non-Aviation; MI – Mitigation; PS – Planning Study

SOURCES: Jacobs, December 2018; Monroe County Department of Airports, June 2020.

8.2.2 CAPITAL IMPROVEMENT PROGRAM FUNDING PLAN

Airport development is often funded by a combination of public, local, and private sources. Most airports similar in size to MTH have a variety of available funding sources and mechanisms to fund capital projects. The funding plan presented herein does not represent a final plan of finance for the CIP projects. Additional actions are required prior to the use of some of these funding sources for specific projects. It was assumed that the costs of these projects will ultimately be funded by a combination of sources, such as federal AIP grants, FDOT grants, Airport funds, and other sources, including contributions from the County and other private entities.

Typically, airport capital improvements are generally financed through federal- and state-imposed user taxes, as well as from funds generated from airport operations, including fuel taxes, space-leasing fees, and other similar sources. Airport capital improvements are not funded from tax levies on the general public. The sequencing of key projects in the CIP recognizes that permitting, utility infrastructure, environmental planning studies, drainage studies and plans, and similar work must first be funded before actual design and construction of certain larger facilities projects can proceed (e.g., runway and taxiway enhancements, hangar construction).

Table 8-3 presents the estimated funding sources for the CIP projects. Each potential funding source is described in the following subsections.

8.2.2.1 Federal Grants

The Airport and Airway Improvement Act of 1982 authorizes funding of the federal AIP from the Airport and Airway Trust Fund for nationwide airport development, airport planning, and noise compatibility planning and programs. The Airport and Airway Trust Fund is funded through user taxes on airfares, air freight, and aviation fuel.

On February 15, 2012, President Obama signed into law the FAA Modernization and Reform Act of 2012, which reauthorized FAA AIP funding for airport projects. Under this reauthorization, the AIP was extended for four federal fiscal years (FFYs), through September 30, 2015. The authorized funding levels for AIP investment were established at approximately $3.35 billion each year. The FAA Extension, Safety, and Security Act of 2016, enacted on July 15, 2016, extended the authority and provided funding at current levels through the end of FFY 2017. The Disaster Tax Relief and Airport and Airway Extension Act of 2017, a subsequent six-month extension, expired at the end of March 2018. Reauthorization of FAA AIP funding through FFY 2018 was included in the Consolidated Appropriations Act, 2018 (the Act), the omnibus spending bill enacted on March 23, 2018. The Act authorized funding from the Airport and Airways Trust Fund for AIP grants-in-aid in the total amount of $3.35 billion for FFY 2018. The five-year FAA reauthorization has since been signed into law by President Trump as of October 5, 2018, securing approximately $90.0 billion in funding through 2023.

The federal AIP plays a critical role in maintaining and expanding the airport infrastructure. The AIP provides federal grants for airport planning and the development of capital projects that support airport operations, including runways, taxiways, aprons, and noise abatement. Airport sponsors and non-federal contributors must provide at least a 5 percent share of any project funded by AIP grants.

Table 8-3: Capital Improvement Program by Funding Source

PROJECT ID 1/	PROJECT DESCRIPTION	TOTAL COSTS	FEDERAL FAA/AIP GRANTS	STATE FDOT GRANTS	MTH LOCAL REVENUE	OTHER SOURCE REVENUE
SHORT TERM (FY 2018 – FY 2022)						
AF-1	Runway and Parallel Taxiway Separation Improvements	$4,500,000	$4,050,000	$360,000	$90,000	$0
SF-1	Automated Surface Observing System Relocation	$121,000	$108,900	$6,050	$6,050	$0
SF-3	Fuel Storage Facility Relocation	$3,224,000	$0	$0	$0	$3,224,000
SF-2	Airport Maintenance Storage Facility	$2,163,000	$0	$1,730,400	$432,600	$0
NA-1	Emergency Operations Center	$22,511,000	$0	$0	$0	$22,511,000
GA-1	General Aviation Development – Southeast	$4,292,000	$0	$0	$0	$4,292,000
GA-2	General Aviation Development – Southwest	$4,321,000	$0	$0	$0	$4,321,000
NA-3	Indoor Shooting Range	$3,028,000	$0	$0	$0	$3,028,000
AF-2	Remote Communication Air-Ground Facility Construction	$1,140,000	$1,140,000	$0	$0	$0
SF-4	Segmented Circle/Wind Cone Relocation	$74,000	$0	$59,200	$14,800	$0
INTERMEDIATE TERM (FY 2023 – FY 2028)						
AF-1	Runway and Parallel Taxiway Separation Improvements – Construction	$14,366,000	$12,929,400	$1,149,280	$287,320	$0
AF-5	Taxiway A Rehabilitation	$6,727,000	$6,054,300	$538,160	$134,540	$0
AF-4	Taxiway Renaming	$750,000	$675,000	$60,000	$15,000	$0
NA-2	Retention Pond Modifications – Southwest	$2,186,000	$0	$1,748,800	$437,200	$0
LONG TERM (FY 2029 – 2036)						
PS-1	Airport Master Plan Update	$1,108,000	$997,200	$55,400	$55,400	$0
GA-4	General Aviation Development – Southwest	$20,070,000	$0	$16,056,000	$0	$4,014,000
LS-1	Airport Access Road Extension	$365,000	$0	$292,000	$73,000	$0
GA-3	General Aviation Apron Expansion – Midfield	$1,266,000	$0	$1,012,800	$253,200	$0
MI-2	Airspace Obstruction Mitigation	$1,618,000	$0	$1,294,400	$323,600	$0
AF-6	Runway Extension West	$3,395,000	$3,055,500	$169,750	$169,750	$0
TOTAL MASTER PLAN PROJECTS		**$97,225,000**	**$29,010,300**	**$24,532,240**	**$2,292,460**	**$41,390,000**

NOTES: Fiscal Year (FY) ending September 30. Numbers may not add due to rounding.

FAA – Federal Aviation Administration; AIP – Airport Improvement Program; FDOT – Florida Department of Transportation;

1/ LS – Landside; AF – Airfield; GA – General Aviation; SF – Support Facilities; NA – Non-Aviation; MI – Mitigation; PS – Planning Study

SOURCES: Jacobs, December 2018; Monroe County Department of Airports, June 2020.

PREPARED BY: Ricondo & Associates, Inc., June 2020.

The assignment of AIP funding is performed on a priority basis. MTH will be competing with other airports throughout Florida and the FAA Southern Region, as well as the remainder of the country, for development grants. Slow performance in carrying out an FAA grant project can have a serious impact on the ability to secure future funds.

As in the past, federal grants were expected to play a role in the financing of the Airport's projected capital expenditures. Historically, most airfield safety and capacity projects at the Airport have been eligible for 90 percent AIP participation. However, airports may be eligible for up to 95 percent of AIP participation. Also, in the case of security-related projects, airports may be eligible for 100 percent of FDOT participation. With respect to discretionary grants, it is difficult to predict reasonable levels that can be applied to the CIP given today's status concerning federal funding of airport-related capital projects. To the extent that projected discretionary grants are not received, the County may have to reevaluate the phasing of the CIP and/or its funding eligibility under other sources. As shown in Table 8-3, approximately $29.0 million in escalated project costs are expected to utilize funding from the federal entitlement and discretionary programs.

8.2.2.2 State Grants

Many states have programs to assist in airport capital development. FDOT grants are funded from the State Transportation Trust Fund, which consists, in part, of funds collected through the state's aviation fuel tax. FDOT grants supplement the AIP, providing a portion of the sponsor's matching share when federal funding is available and up to 80 percent of the overall project cost when it is not. The State of Florida frequently distributes funding awarded via FDOT grants in a multiyear period for grant-approved projects. However, the availability of such funds in any given year is not guaranteed.

The Airport has historically received funds from the FDOT. The County has received an average of approximately $1.6 million annually in FDOT grants over the past five years to fund eligible projects at the Airport. As shown in Table 8-2, approximately $24.5 million of FDOT grants were assumed to be available to fund eligible CIP projects.

8.2.2.3 Airport Funds

Revenues remaining after the payment of O&M expenses are deposited into the Airport's Enterprise Fund (403). Revenues in Fund 403 may be used to fund capital improvement projects at the Airport. For purposes of this analysis, revenues available in Fund 403 are identified as Airport funds and are essentially treated as cash.

As shown in Table 8-2, CIP project costs totaling approximately $2.3 million were assumed to be funded with Airport funds. These funds are primarily to be used to pay remaining costs of projects after maximizing the use of AIP grants, state grants, and any available other sources of revenue.

8.3 Financial Feasibility Assessment

To determine financial feasibility of the CIP, operating expenses and operating revenues are conservatively projected for the MPU projection period. These projections are incorporated into a cash-flow analysis to assist in determining the feasibility of the overall CIP.

8.3.1 OPERATING AND MAINTENANCE EXPENSES

O&M expenses for the Airport include the County's costs for the operation, maintenance, and repair of the Airport, which include salaries and employee benefits, utility costs, ordinary maintenance, administrative and general expenses, and security expenses for contractual services.

Projections of future O&M expenses were developed based on a review of historical/budget data, the effects of inflation, and the forecast growth in numbers of aircraft operations at the Airport. Budgeted FY 2020 O&M expenses serve as the baseline from which future operating expenses are projected. Operating expenses and capital outlays are projected to increase at the following compound annual growth rates:

- Personnel – 2.31 percent
- Utilities – 3.5 percent
- Professional and Contractual Services – 1.0 percent
- Maintenance and Repairs – 2.5 percent
- Capital Outlay – 1.82 percent
- Miscellaneous – 2.1 percent

Table 8-4 presents projections of O&M and security expenses for the Airport by functional area. O&M expenses for Budget FY 2020 are also included. As shown, total O&M expenses for the Airport are projected to increase from approximately $962,000 in FY 2020 to approximately $1.4 million in FY 2036, reflecting a compound annual growth rate of 2.35 percent.

8.3.2 OPERATING REVENUES

Operating revenues include those revenues obtained from aviation and commercial property for operating at the Airport. Projections of future operating revenues were developed based on a review of existing leases, historical/budget data, the effects of inflation, and the anticipated increases in revenue from implementation of certain CIP projects. Each existing lease at the Airport was evaluated to determine future lease revenue potential. As stated in existing lease contracts, it was assumed most future leases allowed for annual rate increases. Individual aviation and land lease increases will vary based on terms and agreement. Operating revenues are projected to increase at the following compound annual growth rates:

- Aviation Lease Revenue – 2.2 percent
- Commercial Property Revenue – 1.7 percent

Projections for operating revenue categories were based on Budget FY 2020 financial data. **Table 8-5** presents projected operating revenues for the Airport. Total operating revenues are projected to increase from approximately $1.1 million in FY 2020 to approximately $1.5 million in FY 2036, reflecting a compound annual growth rate of 1.8 percent.

8.4 Cash Flow Analysis and Flow of Funds

Projects identified in this analysis are expected to be undertaken within one of the three planning horizons. **Table 8-6** presents the projected cash flow and flow of funds from FY 2020 through FY 2036 based on the projected operating expenses, revenues, and capital expenditures.

8.5 Conclusion

As presented in Table 8-6, the cash flow and flow of funds derived through the operation of the Airport are adequate to annually fund the CIP during the entire planning horizon, which is based on the assumed funding sources and the conservative projections of operating expenses and operating revenues. After review of Airport annual financial cash flow, there are adequate funds available within the Marathon Enterprise Fund (403) and annual net remaining revenues to undertake the projects in the CIP, as reflected in this funding plan. It is not anticipated that any long-term or short-term debt will be needed to fund any capital projects.

Although these projections were based on conservative assumptions, material differences in the levels of operating revenues or expenses, or in the cost of the capital projects, could influence the feasibility of the overall CIP.

Table 8-4: Operating and Maintenance Expenses

	BUDGET 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Personnel Services																	
Regular Salaries and Wages	$251,098	$257,375	$263,810	$270,405	$277,165	$284,094	$291,197	$298,477	$305,939	$313,587	$321,427	$329,462	$337,699	$346,141	$354,795	$363,665	$372,756
Overtime	$8,000	$8,146	$8,294	$8,445	$8,599	$8,756	$8,915	$9,078	$9,243	$9,411	$9,583	$9,757	$9,935	$10,116	$10,300	$10,488	$10,679
FICA Taxes	$18,547	$18,885	$19,229	$19,579	$19,936	$20,299	$20,669	$21,045	$21,429	$21,819	$22,217	$22,621	$23,033	$23,453	$23,880	$24,315	$24,758
Retirement Contributions	$20,748	$21,126	$21,511	$21,903	$22,302	$22,708	$23,122	$23,543	$23,972	$24,408	$24,853	$25,306	$25,767	$26,236	$26,714	$27,201	$27,696
Life and Health Insurance	$46,298	$47,141	$48,000	$48,875	$49,765	$50,672	$51,595	$52,535	$53,492	$54,466	$55,458	$56,468	$57,497	$58,545	$59,611	$60,697	$61,803
OPEB	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Workers' Compensation	$7,544	$7,681	$7,821	$7,964	$8,109	$8,257	$8,407	$8,560	$8,716	$8,875	$9,037	$9,201	$9,369	$9,540	$9,713	$9,890	$10,070
Total Personnel	**$352,235**	**$360,355**	**$368,665**	**$377,171**	**$385,876**	**$394,785**	**$403,904**	**$413,237**	**$422,790**	**$432,567**	**$442,574**	**$452,817**	**$463,300**	**$474,031**	**$485,014**	**$496,256**	**$507,763**
Utilities																	
Phone and Postage / Freight	$9,600	$9,936	$10,284	$10,644	$11,016	$11,402	$11,801	$12,214	$12,641	$13,084	$13,542	$14,016	$14,506	$15,014	$15,539	$16,083	$16,646
Utility Services	$108,000	$111,780	$115,692	$119,742	$123,932	$128,270	$132,760	$137,406	$142,215	$147,193	$152,345	$157,677	$163,195	$168,907	$174,819	$180,938	$187,270
Total Utilities	**$117,600**	**$121,716**	**$125,976**	**$130,385**	**$134,949**	**$139,672**	**$144,560**	**$149,620**	**$154,857**	**$160,277**	**$165,886**	**$171,692**	**$177,702**	**$183,921**	**$190,358**	**$197,021**	**$203,917**
Services																	
Professional Services	$4,500	$4,545	$4,590	$4,636	$4,683	$4,730	$4,777	$4,825	$4,873	$4,922	$4,971	$5,021	$5,071	$5,121	$5,173	$5,224	$5,277
Other Contractual Services	$40,000	$40,400	$40,804	$41,212	$41,624	$42,040	$42,461	$42,885	$43,314	$43,747	$44,185	$44,627	$45,073	$45,524	$45,979	$46,439	$46,903
Total Services	**$44,500**	**$44,945**	**$45,394**	**$45,848**	**$46,307**	**$46,770**	**$47,238**	**$47,710**	**$48,187**	**$48,669**	**$49,156**	**$49,647**	**$50,144**	**$50,645**	**$51,152**	**$51,663**	**$52,180**
Supplies/Travel/Advertising																	
Travel and Per Diem	$7,000	$7,128	$7,257	$7,390	$7,524	$7,661	$7,801	$7,943	$8,088	$8,235	$8,385	$8,538	$8,693	$8,852	$9,013	$9,177	$9,344
Printing and Binding	$250	$255	$259	$264	$269	$274	$279	$284	$289	$294	$299	$305	$310	$316	$322	$328	$334
Promotional Activities	$500	$509	$518	$528	$537	$547	$557	$567	$578	$588	$599	$610	$621	$632	$644	$656	$667
Advertising	$1,000	$1,018	$1,037	$1,056	$1,075	$1,094	$1,114	$1,135	$1,155	$1,176	$1,198	$1,220	$1,242	$1,265	$1,288	$1,311	$1,335
Office Supplies	$3,000	$3,055	$3,110	$3,167	$3,225	$3,283	$3,343	$3,404	$3,466	$3,529	$3,594	$3,659	$3,726	$3,794	$3,863	$3,933	$4,005
Operating Supplies	$50,000	$50,911	$51,838	$52,783	$53,744	$54,723	$55,720	$56,735	$57,769	$58,821	$59,893	$60,984	$62,095	$63,226	$64,378	$65,550	$66,745
Internal Fuel	$9,000	$9,164	$9,331	$9,501	$9,674	$9,850	$10,030	$10,212	$10,398	$10,588	$10,781	$10,977	$11,177	$11,381	$11,588	$11,799	$12,014
Books, Pubs, Subs, Educ, Mem	$6,000	$6,109	$6,221	$6,334	$6,449	$6,567	$6,686	$6,808	$6,932	$7,059	$7,187	$7,318	$7,451	$7,587	$7,725	$7,866	$8,009
Total Supplies	**$76,750**	**$78,148**	**$79,572**	**$81,021**	**$82,497**	**$84,000**	**$85,530**	**$87,089**	**$88,675**	**$90,290**	**$91,935**	**$93,610**	**$95,315**	**$97,052**	**$98,820**	**$100,620**	**$102,453**
Maintenance																	
Vehicle Maintenance Charge	$52,655	$53,971	$55,321	$56,704	$58,121	$59,574	$61,064	$62,590	$64,155	$65,759	$67,403	$69,088	$70,815	$72,585	$74,400	$76,260	$78,167
Repair and Maintenance	$93,500	$95,838	$98,233	$100,689	$103,207	$105,787	$108,431	$111,142	$113,921	$116,769	$119,688	$122,680	$125,747	$128,891	$132,113	$135,416	$138,801
Repair and Maintenance – Building	$34,000	$34,850	$35,721	$36,614	$37,530	$38,468	$39,430	$40,415	$41,426	$42,461	$43,523	$44,611	$45,726	$46,869	$48,041	$49,242	$50,473
Vehicle Maintenance	$10,000	$10,250	$10,506	$10,769	$11,038	$11,314	$11,597	$11,887	$12,184	$12,489	$12,801	$13,121	$13,449	$13,785	$14,130	$14,483	$14,845
Vehicle Maintenance	$52,655	$53,971	$55,321	$56,704	$58,121	$59,574	$61,064	$62,590	$64,155	$65,759	$67,403	$69,088	$70,815	$72,585	$74,400	$76,260	$78,167
Total Maintenance	**$190,155**	**$194,909**	**$199,782**	**$204,776**	**$209,896**	**$215,143**	**$220,522**	**$226,035**	**$231,685**	**$237,478**	**$243,414**	**$249,500**	**$255,737**	**$262,131**	**$268,684**	**$275,401**	**$282,286**
Total Capital Outlay	**$84,000**	**$85,530**	**$87,088**	**$88,675**	**$90,290**	**$91,935**	**$93,610**	**$95,315**	**$97,051**	**$98,819**	**$100,620**	**$102,453**	**$104,319**	**$106,219**	**$108,154**	**$110,125**	**$112,131**
Total Miscellaneous	**$96,536**	**$98,499**	**$100,505**	**$102,553**	**$104,645**	**$106,782**	**$108,964**	**$111,194**	**$113,471**	**$115,798**	**$118,174**	**$120,602**	**$123,083**	**$125,617**	**$128,206**	**$130,851**	**$133,554**
Total Operating Expenses	**$961,776**	**$984,102**	**$1,006,982**	**$1,030,429**	**$1,054,459**	**$1,079,087**	**$1,104,328**	**$1,130,199**	**$1,156,716**	**$1,183,897**	**$1,211,760**	**$1,240,321**	**$1,269,600**	**$1,299,616**	**$1,330,388**	**$1,361,937**	**$1,394,283**

NOTES: Fiscal year ending September 30. Numbers may not add due to rounding.
FICA – Federal Insurance Contributions Act; OPEB – Other Post-Employment Benefits

SOURCE: Monroe County Department of Airports, July 2020.

PREPARED BY: Ricondo & Associates, Inc., June 2020.

Table 8-5: Operating Revenue

	BUDGET 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Aviation Revenues																	
MJC / Grant Air Rent and Fuel Flow Fees and CBP Fuel Flow Fees	$140,000	$142,550	$145,147	$147,791	$188,630	$192,067	$195,566	$199,128	$202,756	$206,449	$210,210	$214,040	$217,939	$221,909	$225,952	$230,068	$234,259
MGA / Coast Rent and Parking Lot Rent and Fuel Flow Fees	$170,000	$173,097	$176,250	$179,461	$182,730	$186,059	$189,448	$192,900	$196,414	$199,992	$203,635	$207,345	$211,122	$214,968	$218,884	$222,871	$226,931
Antique Air Rent	$54,225	$55,213	$56,219	$57,243	$58,286	$59,347	$60,428	$61,529	$62,650	$63,791	$64,954	$66,137	$67,342	$68,568	$69,818	$71,089	$72,384
FedEx	$42,000	$42,765	$43,544	$44,337	$45,145	$45,968	$46,805	$47,658	$48,526	$49,410	$50,310	$51,226	$52,160	$53,110	$54,077	$55,062	$56,065
Marathon Flying Club Rent / Utilities	$35,000	$35,638	$36,287	$36,948	$37,621	$38,306	$39,004	$39,715	$40,438	$41,175	$41,925	$42,689	$43,466	$44,258	$45,064	$45,885	$46,721
Marathon Hangar Development	$25,000	$25,455	$25,919	$26,391	$26,872	$27,362	$27,860	$28,368	$28,884	$29,411	$29,946	$30,492	$31,047	$31,613	$32,189	$32,775	$33,372
Mountain Air Cargo Ramp Rent and Landings	$15,500	$15,782	$16,070	$16,363	$16,661	$16,964	$17,273	$17,588	$17,908	$18,235	$18,567	$18,905	$19,249	$19,600	$19,957	$20,321	$20,691
Marathon Landing and Flying Club	$6,700	$3,620	$3,686	$3,753	$3,821	$3,891	$3,962	$4,034	$4,107	$4,182	$4,258	$4,336	$4,415	$4,495	$4,577	$4,661	$4,746
Island Flying Club	$3,100	$3,156	$3,214	$3,273	$3,332	$3,393	$3,455	$3,518	$3,582	$3,647	$3,713	$3,781	$3,850	$3,920	$3,991	$4,064	$4,138
Hangars On	$8,000	$8,146	$8,294	$8,445	$8,599	$8,756	$8,915	$9,078	$9,243	$9,411	$9,583	$9,757	$9,935	$10,116	$10,300	$10,488	$10,679
El Paso	$5,800	$5,906	$6,013	$6,123	$6,234	$6,348	$6,464	$6,581	$6,701	$6,823	$6,948	$7,074	$7,203	$7,334	$7,468	$7,604	$7,742
Keyhopper	$4,000	$4,073	$4,147	$4,223	$4,300	$4,378	$4,458	$4,539	$4,621	$4,706	$4,791	$4,879	$4,968	$5,058	$5,150	$5,244	$5,340
Carew Rent and Utilities	$4,000	$4,073	$4,147	$4,223	$4,300	$4,378	$4,458	$4,539	$4,621	$4,706	$4,791	$4,879	$4,968	$5,058	$5,150	$5,244	$5,340
Strobbe Rent and Utilities	$4,000	$4,073	$4,147	$4,223	$4,300	$4,378	$4,458	$4,539	$4,621	$4,706	$4,791	$4,879	$4,968	$5,058	$5,150	$5,244	$5,340
Beckwitt	$2,550	$2,596	$2,644	$2,692	$2,741	$2,791	$2,842	$2,893	$2,946	$3,000	$3,055	$3,110	$3,167	$3,225	$3,283	$3,343	$3,404
International City Development	$7,000	$7,128	$7,257	$7,390	$7,524	$7,661	$7,801	$7,943	$8,088	$8,235	$8,385	$8,538	$8,693	$8,852	$9,013	$9,177	$9,344
Total Aviation Revenue	**$526,875**	**$533,271**	**$542,985**	**$552,877**	**$601,095**	**$612,046**	**$623,195**	**$634,548**	**$646,108**	**$657,878**	**$669,862**	**$682,065**	**$694,491**	**$707,142**	**$720,024**	**$733,141**	**$746,496**
Commercial Property																	
Public Works	$130,325	$132,699	$135,117	$137,578	$140,084	$142,636	$145,235	$147,880	$150,574	$153,317	$156,110	$158,954	$161,850	$164,798	$167,800	$170,857	$173,970
Budget Rent and Utilities and Commission	$101,000	$102,840	$104,713	$106,621	$108,563	$110,541	$112,555	$114,605	$116,693	$118,819	$120,983	$123,187	$125,431	$127,716	$130,043	$132,412	$134,824
Enterprise Rent and Utilities and Commission	$80,000	$81,457	$82,941	$84,452	$85,991	$87,557	$89,152	$90,776	$92,430	$94,114	$95,828	$97,574	$99,351	$101,161	$103,004	$104,881	$106,791
Avis Rent and Utilities and Commission	$72,000	$73,312	$74,647	$76,007	$77,392	$78,801	$80,237	$81,699	$83,187	$84,702	$86,245	$87,817	$89,416	$91,045	$92,704	$94,393	$96,112
MCSO Firing Range/Hangar/Communications Office	$91,580	$93,248	$94,947	$96,677	$98,438	$100,231	$102,057	$103,916	$105,809	$107,737	$109,699	$111,698	$113,733	$115,804	$117,914	$120,062	$122,249
City of Marathon, Little Venice, and Pump Station	$31,386	$31,958	$32,540	$33,133	$33,736	$34,351	$34,977	$35,614	$36,262	$36,923	$37,596	$38,281	$38,978	$39,688	$40,411	$41,147	$41,897
Guardian Ad Litem	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247	$11,247
Tesla	$7,500	$7,637	$7,776	$7,917	$8,062	$8,208	$8,358	$8,510	$8,665	$8,823	$8,984	$9,148	$9,314	$9,484	$9,657	$9,833	$10,012
Keys Woodworkers	$2,000	$2,036	$2,074	$2,111	$2,150	$2,189	$2,229	$2,269	$2,311	$2,353	$2,396	$2,439	$2,484	$2,529	$2,575	$2,622	$2,670
Mosquito Control	$5,900	$6,007	$6,117	$6,228	$6,342	$6,457	$6,575	$6,695	$6,817	$6,941	$7,067	$7,196	$7,327	$7,461	$7,597	$7,735	$7,876
District 4 Commissioner Rent	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125	$20,125
Total Commercial Property	**$553,063**	**$562,567**	**$572,243**	**$582,097**	**$592,129**	**$602,344**	**$612,746**	**$623,337**	**$634,121**	**$645,101**	**$656,281**	**$667,665**	**$679,257**	**$691,059**	**$703,077**	**$715,313**	**$727,772**
Miscellaneous Revenue																	
Interest Earnings	$25,000	$25,000	$15,000	$15,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,001	$10,002	$10,003
Disposition of Fixed Assets	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000
Miscellaneous Fees	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025	$2,025
Other Miscellaneous Revenue	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752	$1,752
Fire Station	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10
Total Miscellaneous Revenue	**$40,787**	**$40,787**	**$30,787**	**$30,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,787**	**$25,788**	**$25,789**	**$25,790**
Total Fund Transfers/Other	**$12,930**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Revenues	**$1,133,655**	**$1,136,624**	**$1,146,016**	**$1,165,761**	**$1,219,012**	**$1,240,177**	**$1,261,728**	**$1,283,672**	**$1,306,015**	**$1,328,766**	**$1,351,931**	**$1,375,517**	**$1,399,534**	**$1,423,988**	**$1,448,889**	**$1,474,243**	**$1,500,059**

NOTES: Fiscal year ending September 30. Numbers may not add due to rounding; MJC – Marathon Jet Center; CBP – Customs and Border Protection; MGA – Marathon General Aviation; MCSO – Monroe County Sheriff's Office

SOURCE: Monroe County Department of Airports, July 2020.

Table 8-6: Cash Flow and Flow of Funds

	BUDGET	PROJECTED															
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
Operating Revenue																	
Aviation	$526,875	$533,271	$542,985	$552,877	$601,095	$612,046	$623,195	$634,548	$646,108	$657,878	$669,862	$682,065	$694,491	$707,142	$720,024	$733,141	$746,496
Commercial Property	$553,063	$562,567	$572,243	$582,097	$592,129	$602,344	$612,746	$623,337	$634,121	$645,101	$656,281	$667,665	$679,257	$691,059	$703,077	$715,313	$727,772
Miscellaneous	$40,787	$40,787	$30,787	$30,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,788	$25,789	$25,790
Total Revenues	**$1,120,725**	**$1,136,624**	**$1,146,016**	**$1,165,761**	**$1,219,012**	**$1,240,177**	**$1,261,728**	**$1,283,672**	**$1,306,015**	**$1,328,766**	**$1,351,931**	**$1,375,517**	**$1,399,534**	**$1,423,988**	**$1,448,889**	**$1,474,243**	**$1,500,059**
Less:																	
Total Operating Expenses	$961,776	$984,102	$1,006,982	$1,030,429	$1,054,459	$1,079,087	$1,104,328	$1,130,199	$1,156,716	$1,183,897	$1,211,760	$1,240,321	$1,269,600	$1,299,616	$1,330,388	$1,361,937	$1,394,283
Net Revenues before Capital Improvement Program	**$158,949**	**$152,522**	**$139,034**	**$135,331**	**$164,553**	**$161,090**	**$157,400**	**$153,473**	**$149,299**	**$144,868**	**$140,171**	**$135,197**	**$129,934**	**$124,372**	**$118,501**	**$112,306**	**$105,775**
Less:																	
Capital Improvement Program – Local Funded	$15,000	$6,050	$507,400	$15,000	$294,320	$142,540	$0	$218,600	$218,600	$55,400	$73,000	$253,200	$0	$0	$0	$0	$493,350
Net Revenues after Capital Improvement Program	**$143,949**	**$146,472**	**($368,366)**	**$120,331**	**($129,767)**	**$18,550**	**$157,400**	**($65,127)**	**($69,301)**	**$89,468**	**$67,171**	**($118,003)**	**$129,934**	**$124,372**	**$118,501**	**$112,306**	**($387,575)**
Marathon Enterprise Fund (403)																	
Beginning Balance [1/]	**$1,022,317**	**$1,166,266**	**$1,312,738**	**$944,372**	**$1,064,703**	**$934,936**	**$953,486**	**$1,110,886**	**$1,045,759**	**$976,458**	**$1,065,926**	**$1,133,097**	**$1,015,093**	**$1,145,027**	**$1,269,400**	**$1,387,900**	**$1,500,206**
Deposit: Operating Revenues	$1,079,938	$1,095,837	$1,115,229	$1,134,974	$1,193,225	$1,214,390	$1,235,941	$1,257,885	$1,280,228	$1,302,979	$1,326,144	$1,349,730	$1,373,747	$1,398,201	$1,423,101	$1,448,454	$1,474,269
Deposit: Miscellaneous Revenues	$40,787	$40,787	$30,787	$30,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,787	$25,788	$25,789	$25,790
Expend: Total Operating Expenses	($961,776)	($984,102)	($1,006,982)	($1,030,429)	($1,054,459)	($1,079,087)	($1,104,328)	($1,130,199)	($1,156,716)	($1,183,897)	($1,211,760)	($1,240,321)	($1,269,600)	($1,299,616)	($1,330,388)	($1,361,937)	($1,394,283)
Expend: Capital Improvement Program – Local Funded	($15,000)	($6,050)	($507,400)	($15,000)	($294,320)	($142,540)	$0	($218,600)	($218,600)	($55,400)	($73,000)	($253,200)	$0	$0	$0	$0	($493,350)
Ending Balance	**$1,166,266**	**$1,312,738**	**$944,372**	**$1,064,703**	**$934,936**	**$953,486**	**$1,110,886**	**$1,045,759**	**$976,458**	**$1,065,926**	**$1,133,097**	**$1,015,093**	**$1,145,027**	**$1,269,400**	**$1,387,900**	**$1,500,206**	**$1,112,631**

NOTES: Fiscal year (FY) ending September 30. Numbers may not add due to rounding.

1/ Beginning Balance for Budget FY 2020 reflects estimated actual FY 2019 ending balance for the Marathon Enterprise Fund (403).

SOURCE: Monroe County Department of Airports, July 2020.

PREPARED BY: Ricondo & Associates, Inc., June 2020.

Florida Keys Marathon International Airport

Airport Layout Plan (ALP) Narrative Report

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

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9. Airport Layout Plan (ALP) Narrative Report

This section provides a brief description of the information specific to each of the individual drawing sheets in the "traditional" Airport Layout Plan (ALP) drawing set developed for The Florida Keys Marathon International Airport (MTH or Airport). These drawings were developed and produced as a set on 24-inch by 36-inch sheets using AutoCAD 2017 software. To provide vertical and horizontal accuracy for the ALP set, a digitized map, developed by Martinez Geospatial, Inc., was used as a base for all the drawings. The aerial image was created in March 2018. The coordinates, elevations, and aerial photogrammetry are in U.S. survey feet. The horizontal datum is the Florida State Plane Coordinate System, East Zone, North American Datum of 1983/1990 adjustment (NAD 83/90). The vertical datum is the North American Vertical Datum of 1988 (NAVD 88). Reduced reproductions of these drawings are included in **Appendix C** to this report for illustration purposes. A copy of the Federal Aviation Administration Standard Operating Procedure (FAA SOP) 2.00 ALP Review Checklist is included in **Appendix D**.

The critical design aircraft is defined as the most demanding aircraft that will substantially use the Airport, with "substantially" defined as either 500 or more annual itinerant operations or scheduled service. Also, the critical design aircraft can be either a single aircraft or a composite of the most demanding characteristics of several aircraft. The previous Master Plan identified the Cessna Citation jet (Model CJ1, CJ2+, CJ3+, and CJ4) as the critical aircraft. A review of the aircraft type in the ADG II category shows that the Cessna Citation family aircraft conducted over 5,300 operations in 2016. Based on data obtained from the FAA Traffic Flow Management System Counts (TFMSC), it is anticipated that the Cessna Citation will remain the critical aircraft in the future.

9.1 Runway Design Code

The Runway Design Code (RDC) is a coding system described in FAA Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*; it is the basis for specifying applicable runway design standards. The intent of the RDC is to provide a simple method for compiling the numerous dimensional and performance specifications for aircraft operating at or forecast to operate at an airport; the specifications are translated into criteria that define the dimensional and design standards for a given runway. The RDC consists of three parameters: Aircraft Approach Category (AAC), ADG, and approach visibility minimums:

- Aircraft Approach Category – From an approach speed standpoint, the Cessna Citation is categorized as AAC B.

- Airplane Design Group – Based on wingspan, the Cessna Citation is categorized as ADG II.
- Visibility Minimums – Runway 7 is equipped with an RNAV/GPS approach that provides a visibility minimum of 1.25 miles, and Runway 25 is equipped with an RNAV/GPS approach that provides a visibility minimum of 1.0 mile.

Combined, these parameters result in an RDC of B/II/5000 for Runway 7 and Runway 25. This information is summarized in **Table 9-1**.

Table 9-1: Runway Design Codes (Existing and Future)

	RUNWAY DESIGN CODE COMPONENTS			
RUNWAY	**AIRCRAFT APPROACH CATEGORY**	**AIRPLANE DESIGN GROUP**	**VISIBILITY MINIMUMS**	**RUNWAY DESIGN CODES**
7-25	B	II	7–5,000 (1.25 miles) 25–5,000 (1.00 mile)	**7 – B/II/5000** **25 – B/II/5000**

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, February 26, 2014.
PREPARED BY: Ricondo & Associates, Inc., December 2017.

9.2 Runway Reference Codes

The Runway Reference Codes, or the Approach Reference Code and the Departure Reference Code (APRC and DPRC), describe the current operational capabilities of a runway and adjacent taxiways where no special operating procedures are necessary. The APRC consists of the same three parameters as the RDC (AAC, ADG, and visibility minimums), whereas the DPRC consists of the AAC and ADG only. The APRC and DPRC coding system is described in FAA AC 150/5300-13A, Change 1, *Airport Design*.[1]

The APRC and DPRC are determined based on the existing runway-to-taxiway separation and visibility minimums. At MTH, the runway centerline separation from the associated full-length parallel taxiway centerline is 200 feet. The runway-to-taxiway separation combined with the visibility minimums results in the following APRCs: B/I(S)/5000 for both Runways 7 and 25. In the future, the runway will be relocated to increase the separation distance between the runway and the parallel taxiway from 200 feet to 240 feet. As result, the APRCs for Runways 7 and 25 will ultimately be B/II/5000. The DPRC at MTH is B/II for Runway 7-25. The DPRC will remain the same in the future. **Table 9-2** summarizes the APRCs and the DPRCs at MTH.

[1] Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, §323, February 26, 2014.

Table 9-2: Fort Approach and Departure Reference Codes

	EXISTING		ULTIMATE (FOLLOWING THE RELOCATION OF THE RUNWAY)	
RUNWAY	APPROACH REFERENCE CODE (APRC)	DEPARTURE REFERENCE CODE (DPRC)	APPROACH REFERENCE CODE (APRC)	DEPARTURE REFERENCE CODE (DPRC)
7	B/I(S)/5000	B/II	B/II/5000	Same
25	B/I(S)/5000	B/II	B/II/5000	Same

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, §323, February 26, 2014.
PREPARED BY: Ricondo & Associates, Inc., October 2018.

9.3 Cover Sheet (Sheet 1)

Sheet 1, the Cover Sheet, lists the drawings within the MTH ALP set. It also includes location and vicinity maps. The location map is a scaled representation of the Airport's location in the state of Florida, and a vicinity map shows the location of the Airport in the Monroe County area, including major highways in the Airport vicinity.

9.4 Airport Data Sheet (Sheets 2)

Sheet 2, the Airport Data Sheet, contains a set of data tables, a list of abbreviations and acronyms used throughout the ALP set, and wind rose data.

- Airport Data Table – This table lists existing and ultimate information specific to the Airport, such as Airport elevation, service level, role, reference code, design aircraft, Airport Reference Points, temperature information, magnetic variation, and available NAVAIDS. This table identifies the Cessna Citation CJ4 as critical aircraft under both existing and ultimate conditions.
- Runway Data Table – This table is a compiled tabulation of information relating specifically to the runway at the Airport. Various specifications are listed for the existing and ultimate runway, including runway location, dimensions, ADG, available lighting and NAVAIDS, declared distances, and safety areas, as defined in FAA AC 150/5300-13A, *Airport Design*, *Change 1*.
- Taxiway Data Tables (Existing and Ultimate) – These tables provide information associated with the existing and ultimate taxiways at the Airport, including taxiway width, shoulder width, and taxiway safety area and object free area sizes.
- Wind Rose and Wind Coverage Tables – These tables include the Airport's wind roses (VFR, IFR, and All-Weather). The wind data depicted in this table were obtained from the National Oceanic and Atmospheric Administration's NCDC. Wind data are provided for all weather conditions, visual meteorological conditions (ceiling at or above 1,000 feet and visibility greater than or equal to 3 miles),

and instrument meteorological conditions (ceiling below 1,000 feet and/or visibility less than 3 miles). These components provide information on the percentage of time a runway end or a combination of runway ends, or runways are available for arrivals. When combined, the coverage is intended to be as near as possible to 100 percent. Wind coverage is summarized for each runway end and combination of runway ends. Historical wind data were obtained for MTH for the 10-year period beginning in Junary 2008 and ending in December 2017.

- Declared Distances Table - This table This table provides the take-off run available (TORA), take-off distance available (TODA), the accelerate stop distance available (ASDA), and the landing distance available (LDA) associated with Runway 7-25.
- Modification of Standards Table – This table lists the existing Modification of Standards (MOS) currently in place at the Airport regarding the non-standard separation distance between the runway and taxiway. The table provides a description of the FAA standard that is not currently being met, the approval date of the MOS, and a proposed mitigating action.
- Abbreviations and Acronyms – A list of abbreviations and acronyms explains all the abbreviations used in the ALP set.

9.5 Existing Airport Layout Plan (Sheet 3)

The existing ALP is provided as a reference document to identify existing facilities (including airfield pavement, buildings and other structures). The ALP sheet represents the airport in its entirety at a scale of 1 inch = 300 feet. The ALP drawing is a graphic presentation of the actual layout of the physical facilities at MTH. Major features of the ALP drawing include runways, taxiways, aprons, NAVAIDS, other existing airport facilities, and the roadway system. This drawing also includes the runway approaches, runway end elevations, runway high and low points, true azimuths for each runway, and the angle of declination (magnetic north) including the annual rate of change for the magnetic declination. It also includes pertinent clearance and dimensional information associated with the runways and taxiways, such as runway safety areas (RSAs), runway object-free areas (ROFAs), and runway protection zones (RPZs). Other data referenced on the existing ALP sheet includes existing Airport reference point (ARP), ground terrain contours, and other dimensional data recommended by the FAA.

9.6 Ultimate Airport Layout Plan (Sheet 4)

The ultimate ALP, which depicts the proposed Airport development-related projects necessary to meet forecasted demand over the 20-year planning horizon and beyond. The proposed development is consistent with those projects discussed in Chapter 7 Implementation Plan of the Airport Master Plan Update. The ultimate ALP sheet illustrates the Airport in its entirety at a scale of 1-inch equals 300 feet. Major features of the ultimate ALP include runways, taxiways, aprons, NAVAIDs, existing facilities, roadway system, and non-Airport facilities surrounding Airport property. This drawing also includes information from the data sheet for each runway approach, runway end elevations, runway high and low points, true azimuths for each runway, and the angle of

declination (magnetic north), including the annual rate of change for the magnetic declination. The ultimate ALP also includes pertinent clearance and dimensional information associated with runways and taxiways, such as RSAs, ROFAs, and RPZs. The ultimate ALP demonstrates the Airport's compliance with standards set forth in FAA AC 150/5300-13A, Change 1, *Airport Design*.

The proposed airfield and other related development that are presented graphically on the ultimate ALP are consistent with those projects discussed in Chapter 7 of the Airport Master Plan Update. Primary proposed improvements depicted on the ultimate ALP include the following:

- Shift Runway 7-25 to the northwest 40 feet to provide a runway-to-taxiway centerline separation distance of 240 feet and remove excess runway shoulder pavement.
- Reconstruct 35 feet by 5,008 feet of existing runway pavement to provide a 75-foot wide runway
- Remove 65 feet of excess runway pavement on the south side of the existing runway.
- Construct new blast pads at relocated runway ends.
- Demolish existing excess pavement on Taxiway B.
- Demolish existing Taxiway C and reconstruct Taxiway C west of its existing location.
- Demolish existing Taxiway D and reconstruct Taxiway D perpendicular to relocated runway.
- Demolish existing excess pavement on Taxiway E.
- Construct new Taxiway F.
- Relocate and/or install new runway edge lights and threshold lights.
- Relocate and/or install new Runway End Identifier Lights (REIL) on Runway 7 end.
- Relocate the Precision Approach Path Indicators (PAPI) for both runway ends.
- Modify markings, lighting, and signage on connecting Taxiways B, C, D, and E.
- Grade the Runway Safety Area (RSA).
- Clear a 40-foot wide by 5,608-foot long strip of vegetation on the north side of the shifted runway within the Runway Object Free Area (ROFA).[2] No fill or excavation would occur in the area to be cleared.
- Remove existing taxiway and apron pavement on the north side of the approach to Runway 25.
- Extend Runway 7 by 392 feet to increase the Runway 7 departure runway length from 5,008 feet to 5,400 feet. The proposed runway extension will also require the extension of Taxiway A by 392 feet.
- Provide for additional general aviation facilities including apron, taxilane connectors, and new hangars.
- Protect the land area near the existing passenger terminal for the potential of an Air Traffic Control Tower (ATCT), if warranted by demand.

[2] The OFA extends 300 feet beyond both runway ends.

- Construct an Emergency Operations Center for Monroe County in the southwest corner of the Airport.
- Construct a Remote Communications Air/Ground (RCAG) facility in the northwest corner of the Airport.
- Construct a car wash facility near the terminal area for the rental car operators.
- Relocate the existing Automated Surface Observing Systems (ASOS) and segmented circle and wind cone.

9.7 14 CFR Part 77 Airport Airspace Plans (Sheets 5, 6 and 7)

Sheets 5 and 6 of the ALP set provides the Airport Airspace Drawings, for MTH. To enhance the safe operation of aircraft in the airspace around an airport, the FAA has adopted 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. Subpart C of 14 CFR Part 77 establishes imaginary surfaces for determining obstructions to air navigation, which are illustrated on the Airport Airspace Plans. The Airport Airspace Drawings also illustrate physical features on and around the Airport, including any existing obstructions that penetrate the 14 CFR Part 77 imaginary surfaces. These obstructions are listed numerically on the 14 CFR Part 77 Airport Airspace Plan Drawings, and the obstruction data table included in Sheet 7 provides a description of the obstruction, the obstruction elevation, the affected 14 CFR Part 77 surface, surface elevation, amount of penetration, and proposed solution in which the obstruction will be mitigated. The dimensions of the 14 CFR Part 77 surfaces are based on the NAVAIDs and types of approaches available to a runway end. **Table 9-3** summarizes the primary 14 CFR Part 77 dimensions associated with Runway 7-25 at the Airport. The specific imaginary surfaces depicted on these drawings include:

- Primary Surface – Longitudinally centered on each runway, this surface extends 200 feet beyond each end of the runway and has an elevation equal to that of the runway centerline. The width of the primary surface is that prescribed for the most precise instrument approach procedure, existing or planned, for either end of the runway. The primary surface at MTH is 500 feet wide for Runway 7/25. Approach Surfaces – These surfaces are longitudinally centered along the extended centerline and extend outward and upward from each end of the primary surface. The size and slope of the approach surface are based on the type of approach, existing or planned, for that runway end. The inner edge of the approach surface is the same width as the primary surface. However, its overall length, slope, and outermost width may vary; refer to Table 9-3.
- Transitional Surfaces – These surfaces extend outward and upward from the lateral edges of all primary and approach surfaces at a slope of 7:1. The overall width of the transitional surfaces is 5,000 feet, which is measured perpendicularly from the runway centerline.
- Horizontal Surface – This surface is a plane located 150 feet above the established Airport elevation (5.2'). Its perimeter consists of arcs of specific radii connected by lines tangential to the arcs. The arcs are centered on the midpoint of the ends of all primary surfaces.
- Conical Surface – This surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1, for a horizontal distance of 4,000 feet.

Table 9-3: 14 Code of Federal Regulations Part 77, Existing Primary Imaginary Surfaces by Runway End

	RUNWAY APPROACH END	
	EXISTING/ULTIMATE RUNWAY 7	EXISTING/ULTIMATE RUNWAY 25
Approach Type	NPI/NPI	SAME
Primary Surface Width (feet)	500/500	SAME
Horizontal Surface Radius (feet)	10,000/10,000	SAME
Approach Surface Width (inner; feet)	500/500	SAME
Approach Surface Width (outer; feet)	3,500/3,500	SAME
Approach Surface Length (feet)	10,000/10,000	SAME
Approach Slope	34:1/34:1	SAME

NOTES:

NPI – Non-Precision Instrument

SOURCES: Federal Aviation Administration, Airport/Facility Directory, September 2018.
PREPARED BY: Ricondo & Associates, Inc., October 2018.

9.8 Inner Portion of the Approach Drawings and Obstruction Data Tables (Sheets 8 and 9)

The Inner Portion of the Approach Surface Drawings (Sheets 8 and 9) were prepared for each of the runway approaches; they consist of scaled drawings of the area immediately beyond the existing and ultimate runway ends at MTH, including the RPZ off each runway end. These drawings depict the location of roadways, structures, natural ground elevations, and other manmade or natural features within the limits of each RPZ. The drawings also detail objects that penetrate the existing and proposed approach surfaces. These obstructions are listed numerically on the Inner Portion of the Approach Surface Drawings. The obstruction data tables included on these sheets provide a description of the obstruction, the obstruction elevation, the affected 14 CFR Part 77 surface, the surface elevation, the amount of penetration, and the proposed way the obstruction will be mitigated. Only trees penetrating the Terminal Instrument Procedures (TERPS) and/or Threshold Siting surfaces (TSS) were recommended for trimming and/or removal. Objects fixed by function and/or marked with obstruction lights would remain in place. Obstruction information was obtained from the March 2018 aerial photo survey that was completed by Martinez Geospatial, Inc.

9.9 Terminal Area Plan (Sheets 10, 11, and 12)

Sheets 10, 11, and 12 include scaled drawings depicting close-in features of all major aviation-related development in the main terminal/general aviation areas at MTH, as consistent with the ultimate ALP drawing. These drawings depicts detailed reference to buildings, apron/ramp areas, and motor vehicle–related features, including geometric dimensional areas, safety setbacks, NAVAID critical areas, and separation standards. Key areas shown on these drawings include aircraft parking positions, existing and future building footprints, aprons, taxiways and taxilanes, and primary access roadways and fencing. Also included are building data tables that identify the major existing and proposed structures and their associated elevation. Buildings and structures are identified by numerical codes.

9.10 Ultimate Airport Land Use Plan (Sheet 13)

Land use planning allows coordinating uses of the Airport property in a manner compatible with the functional design of the Airport facility. Airport land use planning is important for the orderly development and efficient use of available space. There are two primary considerations for Airport land use planning: first, to secure those areas essential to the safe and efficient operation of the Airport; and, second, to determine compatible land uses for the balance of the property that would be most advantageous to the Airport and to the community.

The Ultimate Airport Land Use Plan shows the use of property areas within the existing airport property boundary at MTH. Sheet 13 identifies land use designations for airport owned property for Airport Operations Areas and non-aviation use areas. On-airport land uses depicted on the Sheet 13 include:

- Aviation Area – This land use includes the land area reserved for activities supporting and sustaining the safe and efficient operation of aircraft, including land devoted to airfield facilities, such as the AOA, runways, taxiways, NAVAIDS, and property within the limits of the RPZ, as well as runway object-free areas and taxiway object-free areas. This land use also includes land intended for existing and ultimate general aviation–related development, such as aircraft hangars, fixed-base operators, and aprons. This category also includes fueling facilities, ground support equipment storage and maintenance, and maintenance facilities.
- Non-Aviation Area – This land use includes the areas where non-aviation revenue support uses are situated. These areas are intended for the development of compatible commercial and light industrial activities, as well as commercial/office–related land uses. Development may or may not be directly related to the aviation industry. This land use also includes the proposed Emergency Operations Center (EOC), the Monroe County Department of Public Works facilities, the Monroe County Humane Society facility, and the Disabled American Veterans Hall is located in the southwest corner of the Airport.
- Environmentally Sensitive Area – The area north of the Airport include hardwood hammock and mangrove swamps. Mangrove swamps are coastal wetlands characterized by one or more of three tropical species of mangroves, red mangrove (Rhizophora mangle), black mangrove (Avicennia germinans), and white mangrove (Laguncularia racemose). The existing tropical hardwood hammock

was historically part of a larger original tropical hardwood hammock system that extended to the north and east of the Airport. Remnant pieces of the larger tropical hardwood hammock system are still present to the north and northeast of the Airport and under state ownership and protection. Direct connection of the existing on-Airport tropical hardwood hammock to these remnant tropical hardwood hammocks has been severed by road (Aviation Boulevard) and residential construction.

- Wastewater Facility – This land use includes The Florida Keys Aqueduct Authority (FKAA) wastewater treatment facility that is located in the southeast corner of Airport property near the intersection of U.S. Highway 1 and Industrial Avenue.
- Future Drainage/Detention/Retention Ponds: This land use encompasses area currently used for drainage. Stormwater from the airfield area flows overland to grassed areas and excess runoff is collected in swales which store and eventually convey runoff to the north and to the south ends of the property. In addition, Monroe County currently leases two retention areas to the FDOT as part of the project that widened U.S. Highway 1 from two to four traffic lanes. The location to the east side of the Airport is 1.7 acres and the location to the west side is 5.8 acres.

The Ultimate Airport Land Use Plan also indicates the existing off-airport land uses. The Airport is bound geographically by Aviation Boulevard to the North and U.S. Highway 1 to the south and is surrounded by several land uses. Immediately abutting MTH to the west is Aviation Boulevard. On the west side of Aviation Boulevard is office space, low density residential and tracts of conservation and recreational lands. Aviation Boulevard turns to the east and forms the northern border of the Airport. North of Aviation Boulevard land use is predominantly low to medium density residential and recreational. Multiple tracts to the north have been recognized as conservation and recreation lands as part of the Florida Keys Wildlife and Environmental Area. Other land uses include industrial and office space at the northeastern corner of MTH. Immediately abutting the airport to the east are several light industrial and commercial land uses as well as the Florida Keys Mosquito Control facility. Further east is a continued mix of light industrial and commercial uses followed by medium density residential. To the south, commercial properties line the Atlantic Ocean side of U.S. Highway 1 with a few vacant tracts and the City of Marathon government offices. The predominant land use south of U.S. Highway 1 is medium-density residential. Two parks, the Children's Rotary Park and Oceanfront Park, are also located to the south of the Airport. Houses of worship located south of U.S. Highway 1 include Calvary Baptist Church and Jehovahs Witnesses Kingdom.

9.11 Airport Property Map (Sheet 14)

The Airport Property Map, Sheet 14, provides an overview of land conveyances associated with the Airport and how they were acquired. These land conveyances aid in creating the approximate Airport property boundary used in the ALP drawing sheets. A table is included that details the following information for each parcel: parcel identification number, acres, property interest document type, date of property interest, and method of acquisition. The legal descriptions of the land parcels is also provided on Sheet 14.

Florida Keys Marathon International Airport

Appendix A – MTH Forecast Summary

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

Appendix A MTH Forecast Summary

Table A-1 includes data provided for internal FAA review. Data are presented in a template provided in the document *Forecasting Aviation Activity by Airport*.[1]

[1] GRA, Incorporated, *Forecasting Aviation Activity by Airport*, July 2001.

Table A-1: Florida Keys Marathon International Airport Forecast Summary

	A. FORECAST LEVELS AND GROWTH RATES					AVERAGE ANNUAL COMPOUND GROWTH RATES			
BASE YEAR	BASE YEAR LEVEL	BASE YEAR + 1 YEAR	BASE YEAR + 5 YEARS	BASE YEAR + 10 YEARS	BASE YEAR + 20 YEARS	BASE YEAR + 1 YEAR	BASE YEAR + 5 YEARS	BASE YEAR + 10 YEARS	BASE YEAR + 20 YEARS
CY 2016	CY 2016	CY 2017	CY 2021	CY 2026	CY 2036	CY 2017	CY 2021	CY 2026	CY 2036
OPERATIONS									
Itinerant									
Air Carrier/Air Taxi[1/]	4,809	4,841	5,019	5,463	6,356	0.7%	0.9%	1.3%	1.4%
General Aviation	30,698	30,893	32,035	34,867	40,567	0.6%	0.9%	1.3%	1.4%
Military	420	420	420	420	420	0.0%	0.0%	0.0%	0.0%
Local									
General Aviation	39,073	39,320	40,775	44,380	51,635	0.6%	0.9%	1.3%	1.4%
Military	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Total Operations	**75,000**	**75,474**	**78,249**	**85,130**	**98,978**	**0.6%**	**0.9%**	**1.3%**	**1.4%**

NOTES:

CY – Calendar Year, FDOT FASP – Florida Department of Transportation Florida Aviation System Plan

1/ Air carrier operations are defined by the United States Department of Transportation as being operations carrying passengers or cargo on aircraft with more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Air taxi operations are defined to be operations transporting passengers or cargo on aircraft with no more than 30 seats and a maximum payload capacity of at most 7,500 pounds.

SOURCES: FDOT FASP, 2017; 2017 Woods & Poole Economics, Inc., May 2017; April 2017, Ricondo & Associates, Inc., May 2017 (Forecast); Monroe County Airports Department, April 2017.
PREPARED BY: Ricondo & Associates, Inc., May 2017.

Florida Keys Marathon International Airport

Appendix B – Presentation of the MPU Forecast to the FAA

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

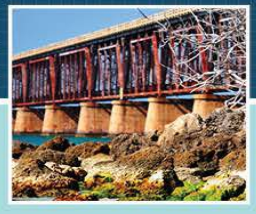
Appendix B Presentation of the Forecast Aviation Activity to the Federal Aviation Administration

Appendix B contains slides from the presentation of the forecast given to the FAA Airport District Office in Orlando at 10:00 EDT on Tuesday, July 18, 2017.

Florida Keys Marathon Airport

Forecast of Aviation Activity

Historical Trend and Forecast Discussions
June 20, 2017



JACOBS

RICONDO & ASSOCIATES

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Presentation Objectives

1. Present the Master Plan Forecast process
   - Planning Horizon: 2016 – 2036
   - Data sources used
2. Discuss the national and local trend of the aviation industry
3. Review forecast methodologies
   - Socioeconomic Regression Analyses
   - Operations per based aircraft
   - Market Share Analyses
   - Trend Analyses
4. Present forecast results/deliverables
   - Annual Aircraft Operations
     - Annual General Aviation (GA) Operations (Local vs. Itinerant)
   - Annual Fleet Mix Operations by Aircraft Types
   - Based Aircraft Totals
   - Based Aircraft by Type
5. Discuss forecast results and next steps

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Presentation Agenda

- Section 1: Master Plan Forecast Process
- Section 2: National and Local Trends
- Section 3: Airport Activity Forecasts
- Section 4: Comparison to Other Forecasts
- Section 5: Additional Considerations/Discussions

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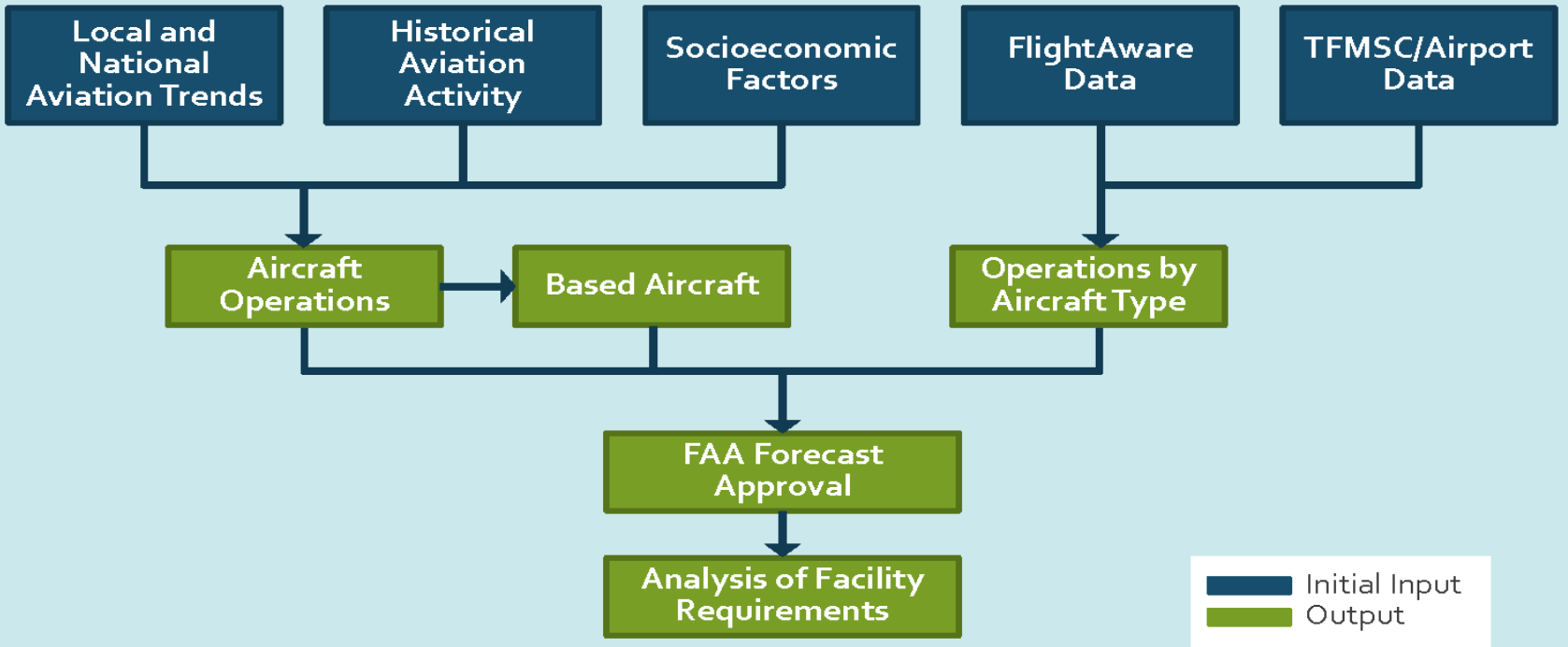
Section One

MASTER PLAN FORECAST PROCESS

The Master Plan Forecast Development Process



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Data Sources

- MTH historical operations from the Florida Department of Transportation (FDOT) Florida Aviation System Plan (FASP)
- 2015 – 2016 total airport operations at MTH provided by Monroe County Department of Airports
- April 2017 based aircraft data provided by Monroe County Department of Airports
- Fleet mix data from Traffic Flow Management System Counts (TFMSC)
- 2016 fleet mix data provided by Marathon Aviation Associates
- Socioeconomic data provided by Woods & Poole, Inc.

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Data Sources

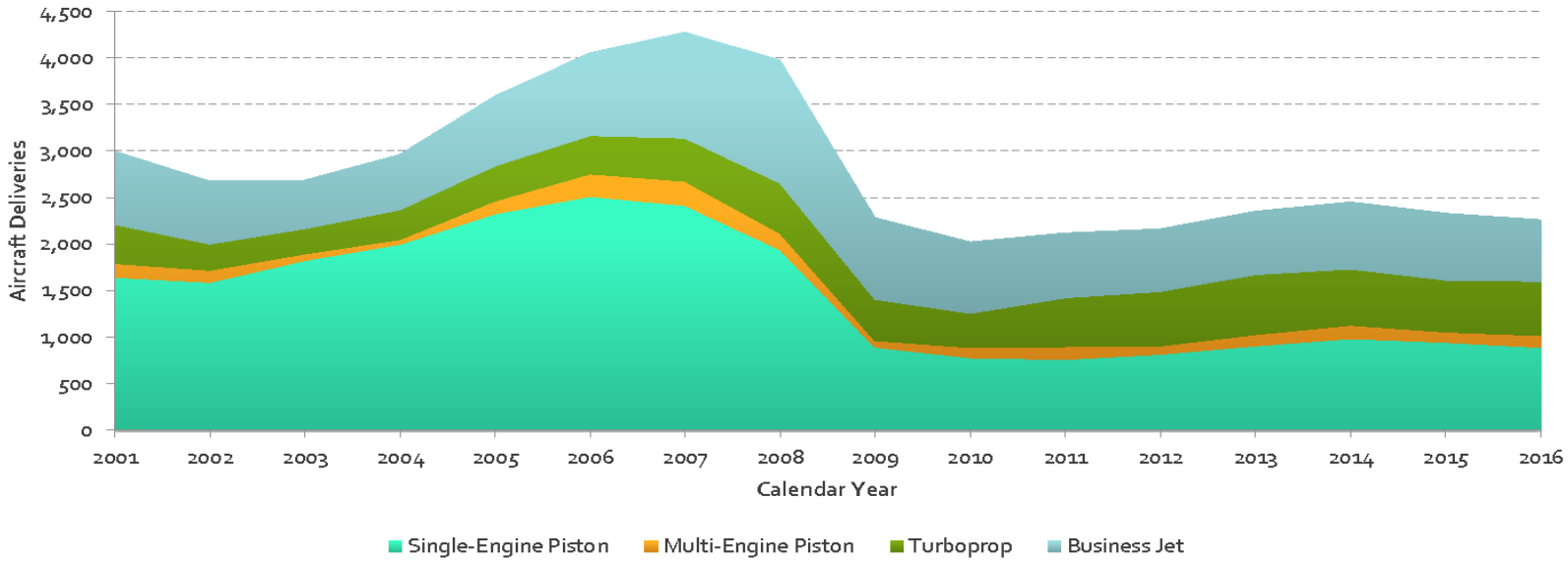
- Historical FDOT FASP Operations were used in regression analyses instead of FAA Terminal Area Forecast (TAF) data because:
  - FAA TAF shows a decline in activity level at airports with characteristics similar to MTH, such as Key West International Airport (EYW), but a continued increase in the aviation activity at MTH during the recession
  - FDOT FASP data show a decline in operations during the economic recession
  - FAA TAF shows an identical total operations at MTH from 2009 to 2010 and 2011 to 2012 which is uncommon at other airports
- There is no evidence that suggest the share of operations by type and based aircraft in TAF were not accurate

Section Two

NATIONAL AND LOCAL TRENDS

Global General Aviation Market Trends

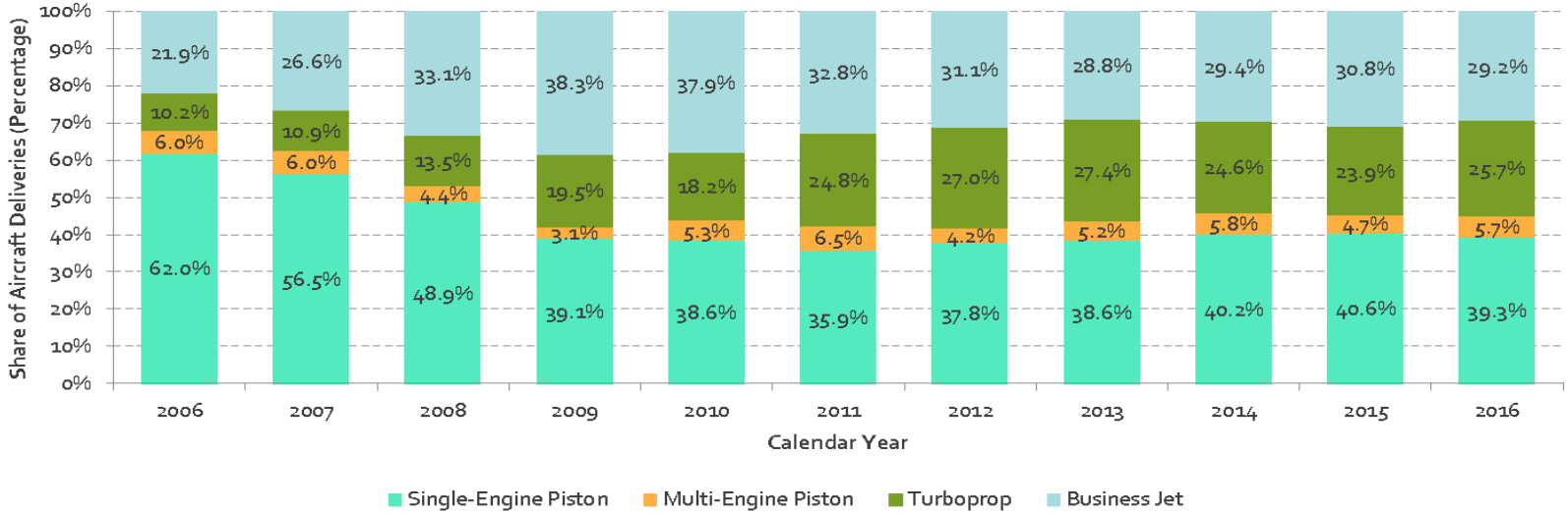
- Deliveries of general aviation aircraft increased at a CAGR of 4.1 percent from 2001 to 2008 but decreased at a CAGR of 6.8 percent from 2008 to 2016.



Source: GAMA, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.

Global General Aviation Market Trends

- Single-Engine piston aircraft comprise the highest share for GA aircraft deliveries. However, the share of single-engine piston deliveries declined 22.7 percentage points from 2006 to 2016.
- The share of jet aircraft deliveries has increased 7.3 percentage points from 2006 through 2016.



Source: GAMA, 2016 General Aviation Statistical Databook & 2017 Industry Outlook, June 2017.

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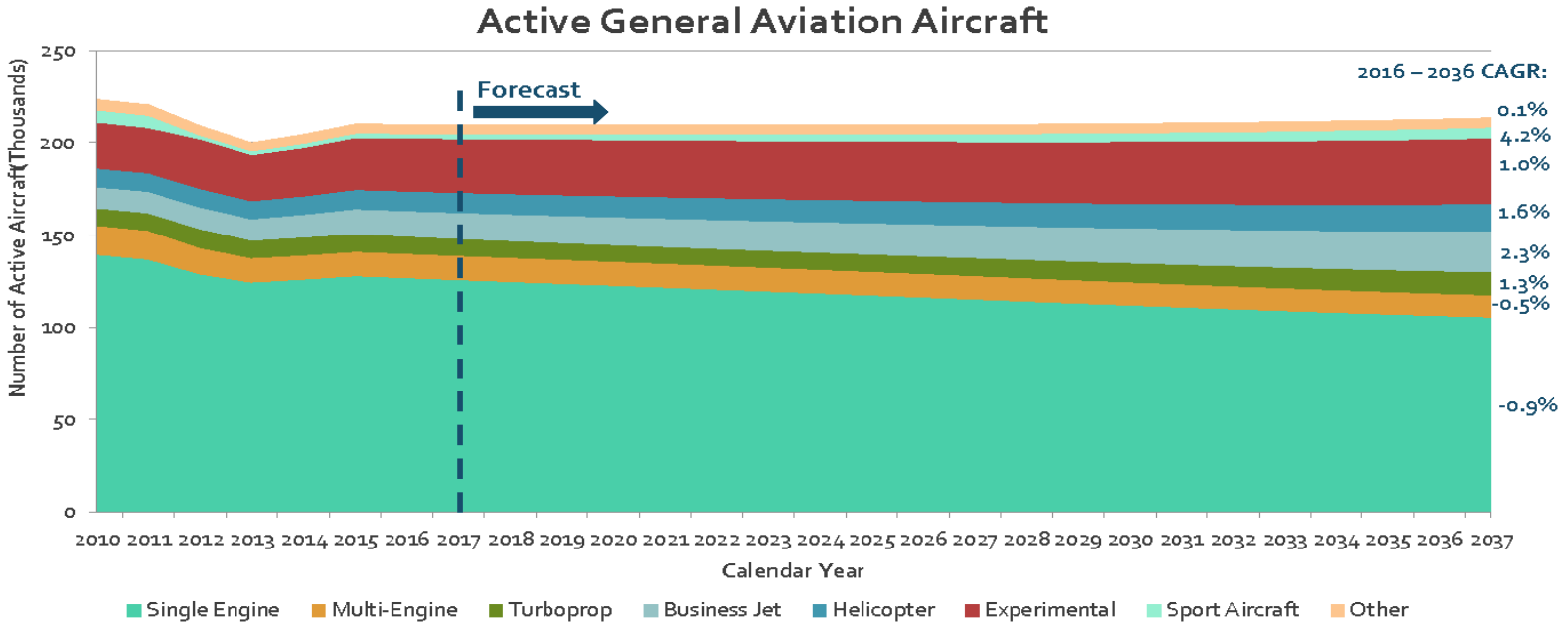
National General Aviation Market Trends

- Historically, active GA single-engine aircraft declined at a CAGR of 1.6 percent from 2010 to 2016.
- The FAA forecast the total active GA fleet to increase at a CAGR of 0.1 percent through 2036.
- Forecast growth varies by engine type.



Source: 2017 FAA Aerospace Forecast: Calendar Years 2017-2037, April 2017

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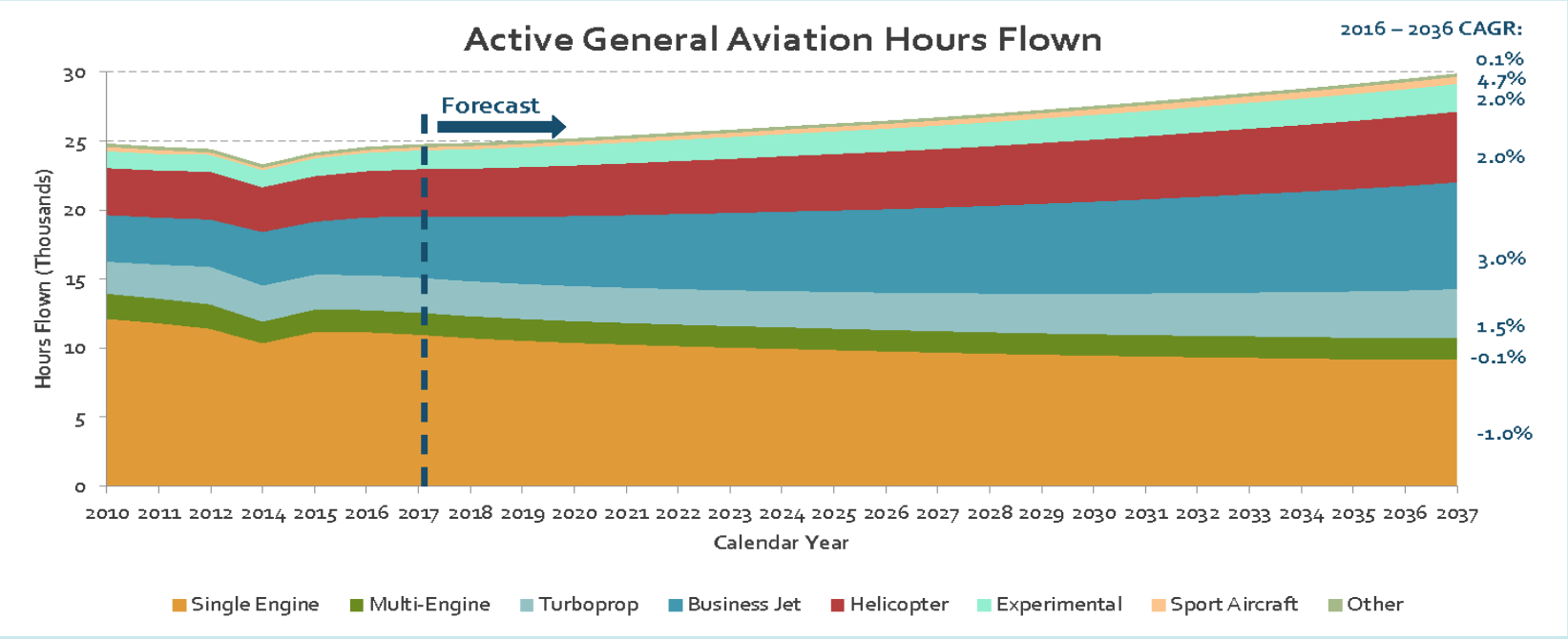
National General Aviation Market Trends

- The total number of GA hours flown is forecast to increase at a CAGR 0.9 percent through 2036.
- Single-engine aircraft hours flown are forecast to decline at a CAGR of 1.0 percent through 2036.
- Business jet hours flown are projected to grow at an average rate of 3.0 percent through 2036.



Source: 2017 FAA Aerospace Forecast: Calendar Years 2017-2037, April 2017

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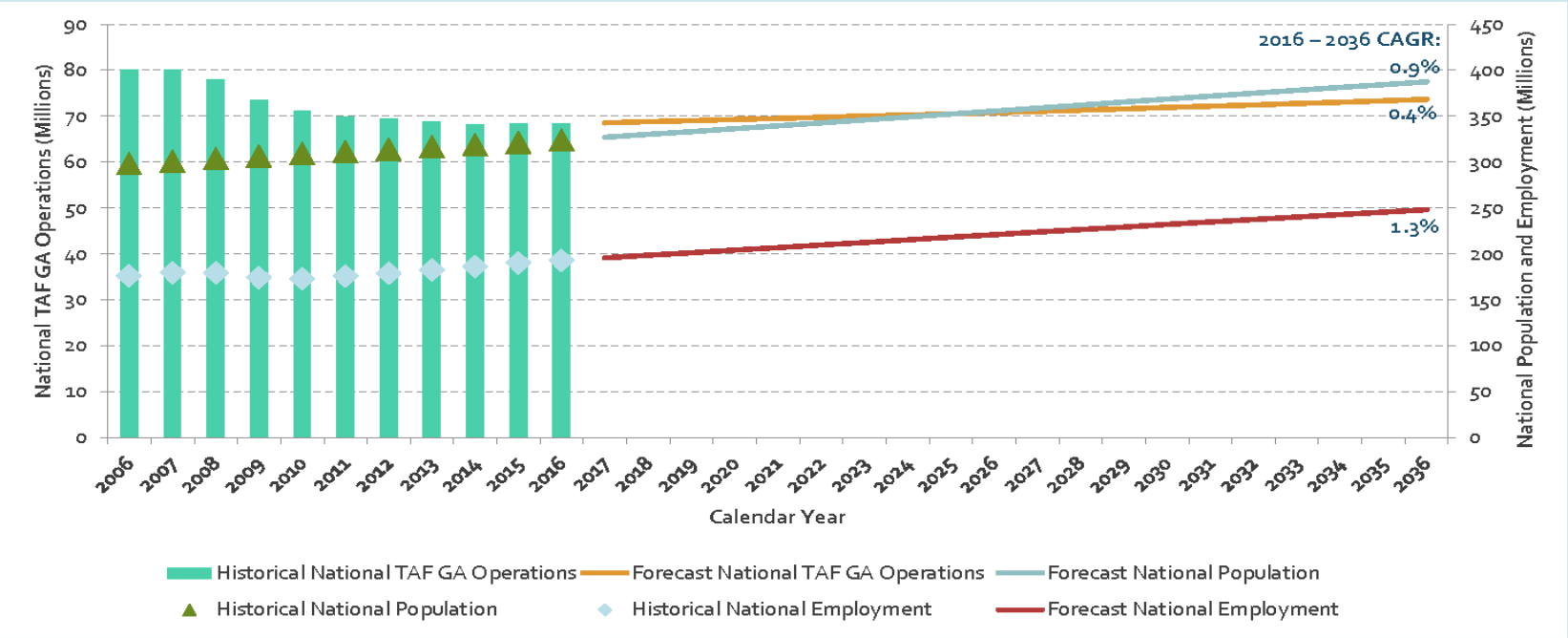
National Trends

- Total national GA operations have declined since 2008 while total national population continued to grow and total national employment has increased since 2011 following a decline in 2008–2011.
- GA operations, as well as total national population and employment, are projected to grow throughout the forecast period.



Note: Historical and Forecast National TAF GA operations are in Fiscal Year.
Sources: Woods & Poole, Inc., 2017; FAA 2016 TAF, January 2017.

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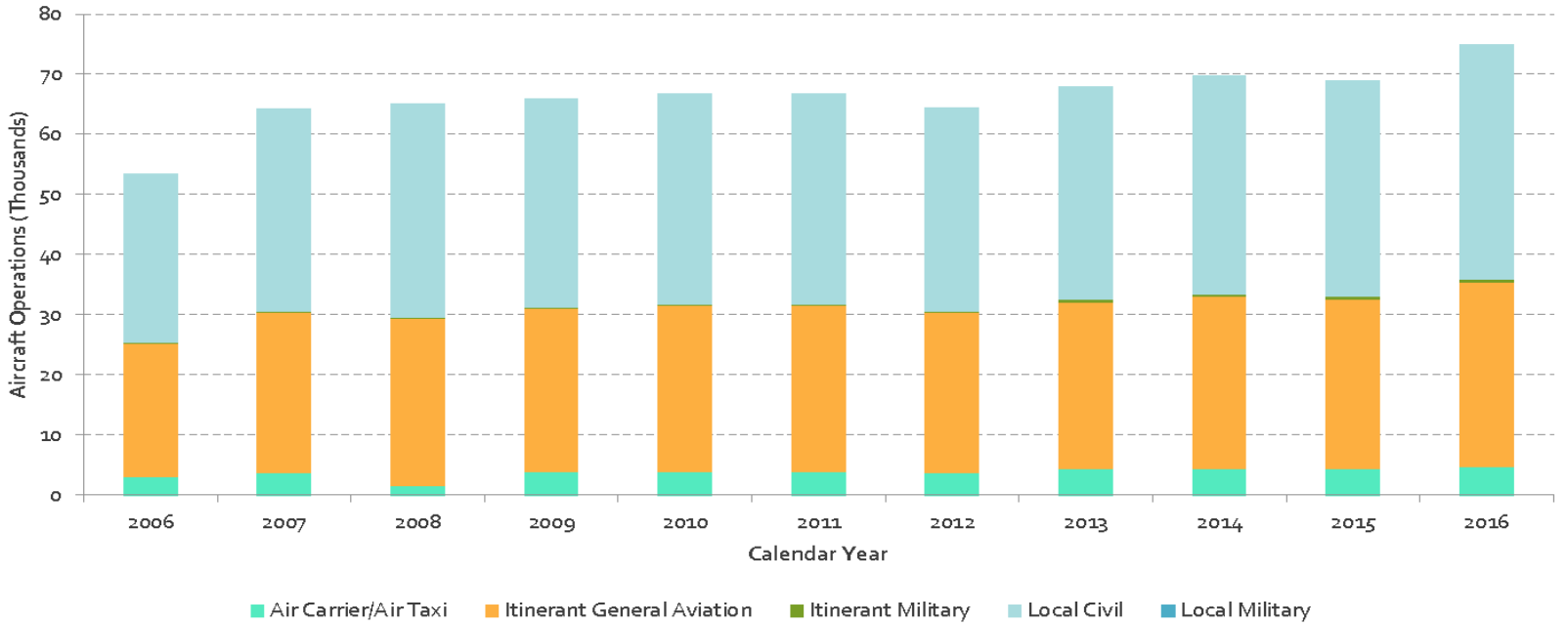
Local Activity Trends

- The total operations at MTH increased at a CAGR of 3.4 percent from CY 2006 to CY 2016 with a decline in 2012.
- Total itinerant operations have increased at a CAGR of 3.5 percent and local operations have increased at a CAGR of 3.4 percent.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2006-2014 MTH operations are values from FDOT FASP; MTH Operations by types were calculated using the share of total operations in TAF.

Sources: FDOT FASP, 2017; Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

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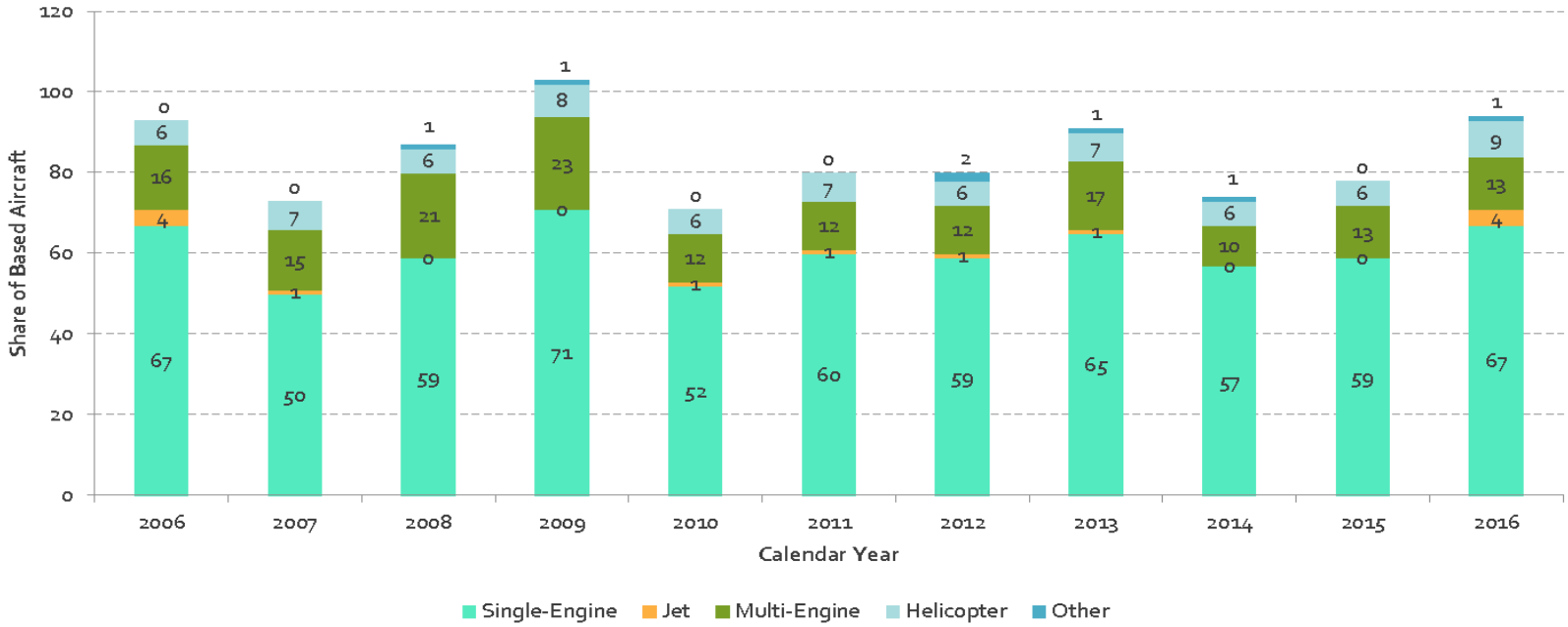
Local Based Aircraft Trends

- Single-engine aircraft represent the highest share of based aircraft at MTH. The share of jet aircraft remains low throughout CY 2006 to CY 2016.
- The total based aircraft increased at a CAGR of 0.11 percent from CY 2006 to CY 2016.



Notes: 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar year; all other values are from the FAA TAF, in Federal Fiscal Year. "Other" aircraft include aircraft such as gliders, military aircraft, and ultra-light aircraft .

Sources: Monroe County Airports Department, April 2017; FAA, Terminal Area Forecast (TAF), April 2017; FAA, Glossary for the 2016 Terminal Area Forecast (TAF), June 2017.

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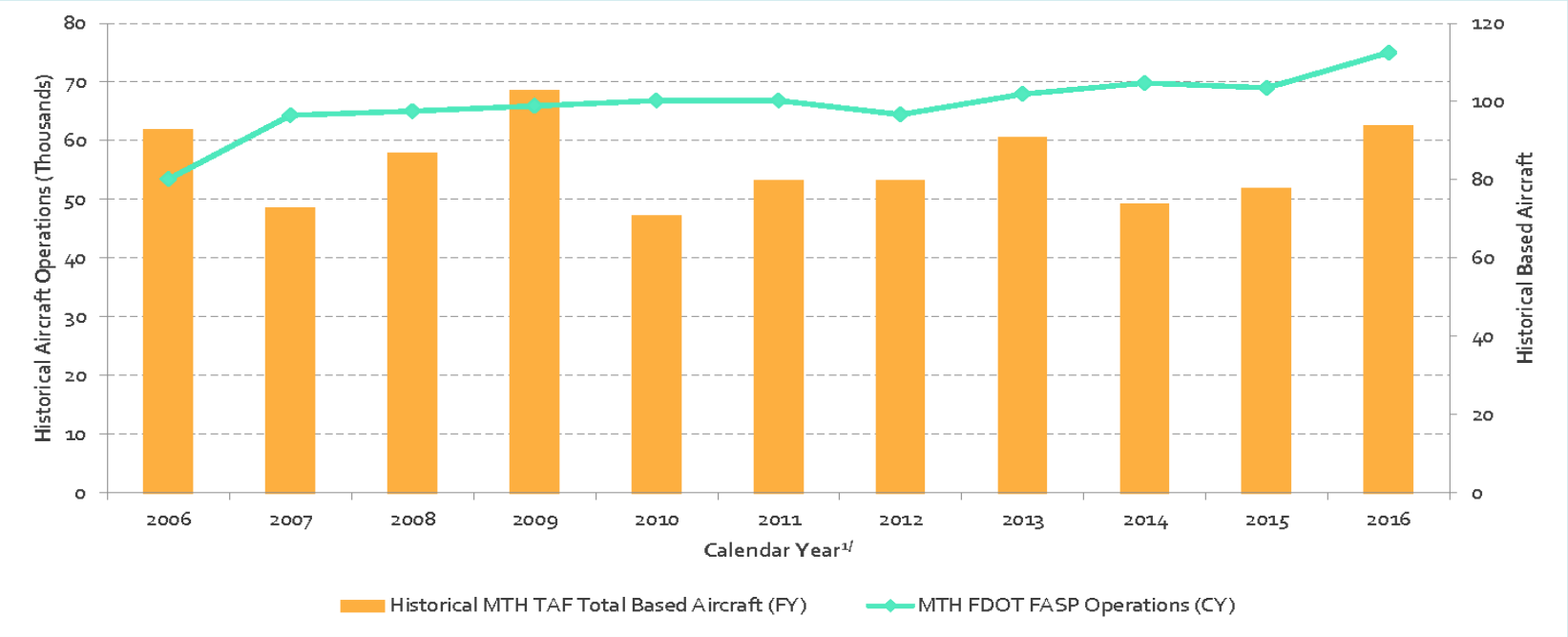
Local Historical Operations and Based Aircraft Trends

- Total Operations at MTH have increased at a CAGR of 3.4 percent in the past 10 years. Based aircraft shared similar trends with operations throughout the 10 years and increased at a CAGR of 0.1 percent.



Note: 1/ Historical MTH TAF Total Based Aircraft is in Fiscal Year; 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar Year; CY 2015-2016 operations are estimates provided by the Airport.
Sources: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

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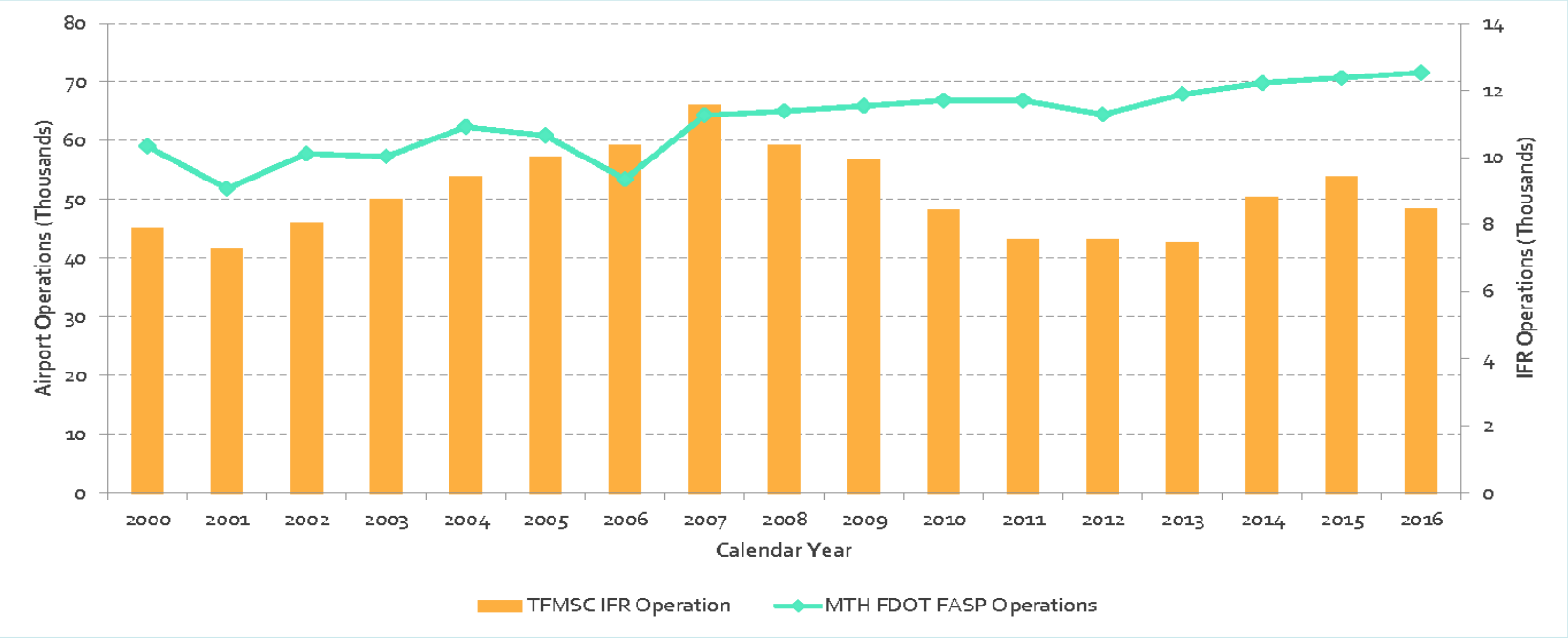
Local Historical IFR Operations and Airport Operations

- Total IFR operations as reported in the FAA TFMSC have similar historical trends as total airport operations at MTH.



Source: FDOT FASP, 2017; Federal Aviation Administration, TFMSC, June 2017

Section Three

AIRPORT ACTIVITY FORECAST

Methodologies Overview

- Reviewed and analyzed historical airport operations, national trends and national forecasts
- Market share analyses were conducted between total operations at MTH and total National/Regional operations reported by TAF to determine the percentage of MTH operations compared to National/Regional operations and how has the percentage has changed overtime
  - Market share analyses with total National operations were not preferred because there was an increasing share of operations at the Airport relative to the nation
  - Market share analyses with total Florida operations were not selected because of the inconsistency and fluctuation in shares

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Preferred Methodology

- Socioeconomic regression analyses were conducted to establish historical relationships between socioeconomic variables and operations at the Airport
- Forecasts of total MTH operations were developed using the outputs of the socioeconomic regression analyses
- The projected MTH operations were further segregated by local and itinerant operations on the basis of shares in the FAA TAF.

Socioeconomic Regression Analysis Results

- Historical national socioeconomic variables have strong correlation with the total MTH FDOT FASP operations. However, local economic variables have poor model fit with the total MTH operations.
- National population, employment, personal income, and GDP have the strongest correlation with the total MTH operations.

Dependent Variable	Independent Variable[1/]	R-squared Value[2/]
Total MTH Annual Operations	**National Population**	**84.60%**
	National Total Personal Income	**80.50%**
	National GDP	**78.80%**
	National Employment	**76.60%**
	National PCPI	74.20%
	National Total Earnings	73.30%
	Local GRP	65.00%
	Local Total Personal Income	63.90%
	Local Employment	63.40%
	Local PCPI	61.20%
	Local Total Earnings	59.20%
	Local Population	32.20%

Note:
1/ Local socioeconomic variables are for Monroe County, Florida.
2/ Adjusted R-Squared values are shown, which adjust for over-fitting. Adjusted R-squared values greater than or equal to 70.0 percent are generally considered indications of acceptable model fit. Adjusted R-squared values greater than 75.0 percent are highlighted.

Sources: Monroe County Airports Department, April 2017; FDOT FASP, 2017; Woods & Poole, Inc., 2017.

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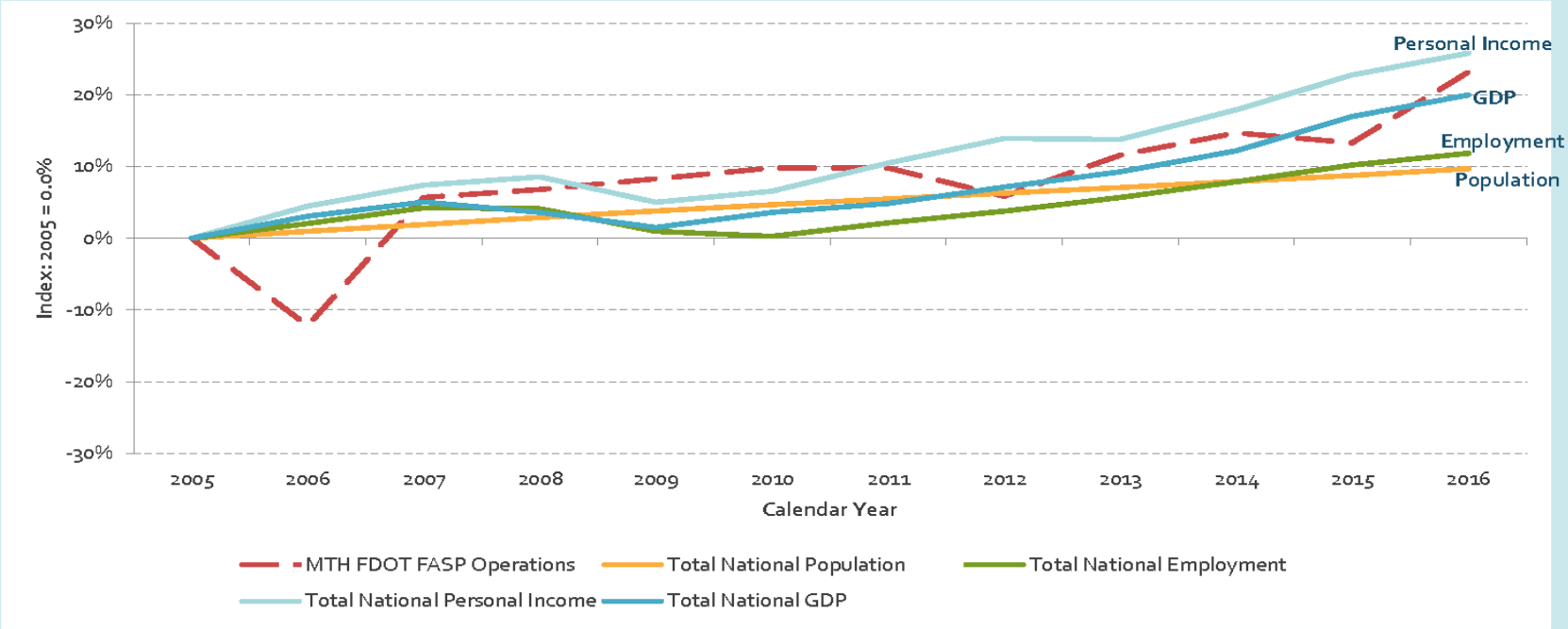
Historical Relationships

- Total MTH operations increased at a CAGR of 0.3 percent since 1995 with a decline in 2006. All socioeconomic variables increased continuously since 2005 through 2016.



Sources: FDOT FASP, 2017; Woods & Poole, Inc., 2017.

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Total Airport Operations Forecast

- Total operations at MTH are forecast to increase at a CAGR of 1.4 percent from 2016 through 2036 from 75,000 in 2016 to 98,978 in 2036.

Note: CY 2015-2016 operations are estimates provided by the Airport.
Source: FDOT FASP, 2017 ; 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

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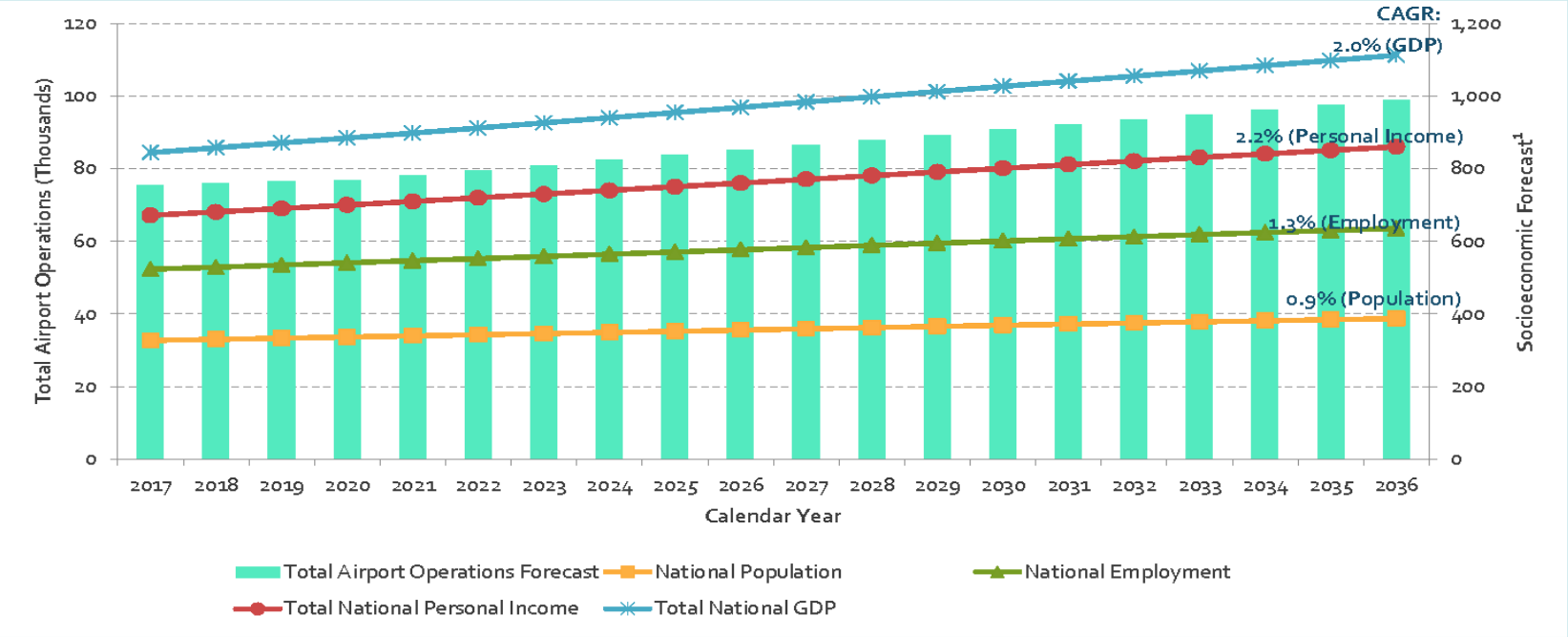
Total Airport Operations Forecast and Socioeconomic Forecast

- The National GDP is forecast to increase at a CAGR of 2.0 percent from 2017 to 2036, a slightly faster rate than the increase of total airport operations.



Note: 1/ National population and employment in millions and personal income and GDP in hundred billions.

Source: 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Total Airport Operations Forecast

- Total GA operations comprise the highest share of total operations through 2036.
- Total itinerant operations are forecast to increase at a CAGR of 1.3 percent and total local operations are forecast to increase at a CAGR of 1.4 percent.

	Air Carrier/ Air Taxi		Itinerant GA		Local Civil		Itinerant Military		Local Military	
Calendar Year	Operations	Share	Operations	Share	Operations	Share	Operations	Share	Operations	Share
Historical										
2016	4,809	6.4%	30,698	40.9%	39,073	52.1%	420	0.6%	0	0.0%
Forecast										
2022	5,106	6.4%	32,593	40.9%	41,485	52.1%	420	0.5%	0	0.0%
2026	5,463	6.4%	34,867	41.0%	44,380	52.1%	420	0.5%	0	0.0%
2036	6,356	6.4%	40,567	41.0%	51,635	52.2%	420	0.4%	0	0.0%

Note: Percentages may not sum to 100 percent due to rounding.

Sources: Monroe County Airports Department, April 2017; FDOT FASP, 2017; Woods & Poole, Inc., 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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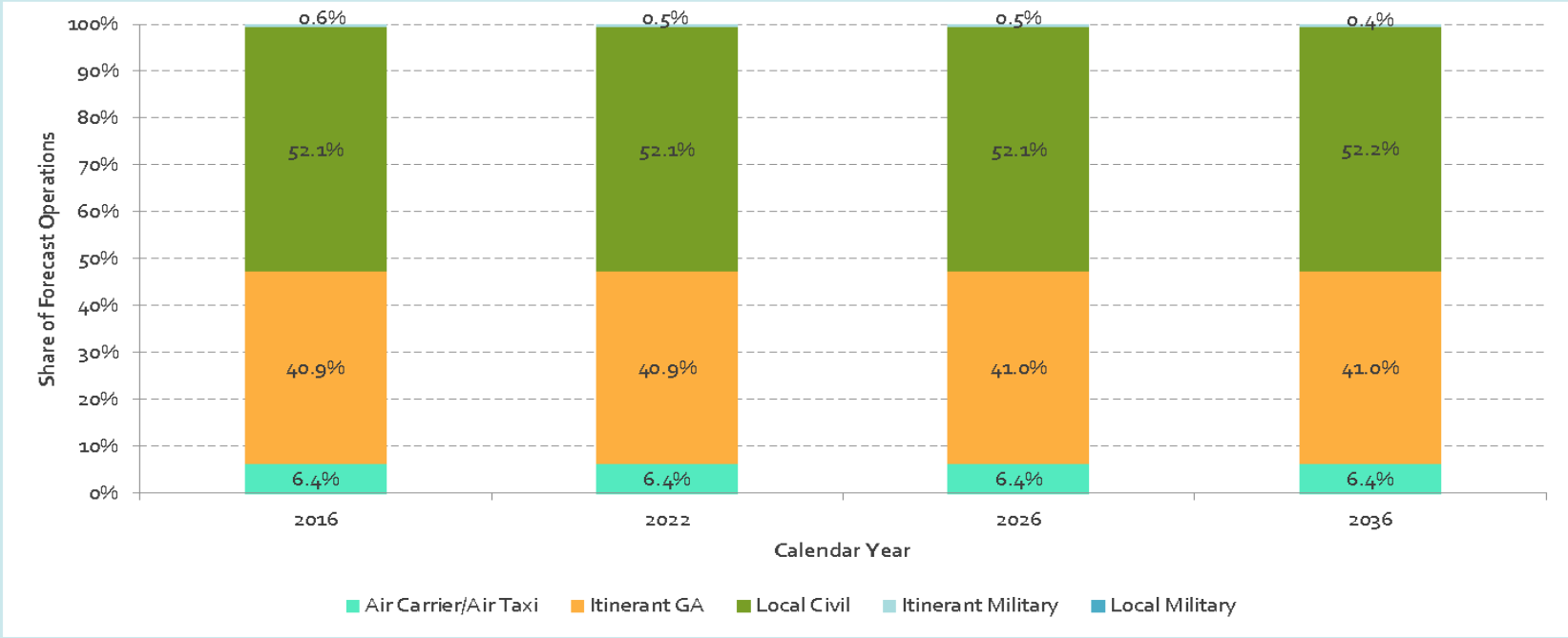
Total Airport Operations Forecast

- Itinerant and local GA operations have an average of 41 and 52 percent share of total operations through 2036 respectively.



Note: CY 2015-2016 operations are estimates provided by the Airport; MTH Operations by types were calculated using the share of total operations in FAA TAF.
Source: Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

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Methodology and Assumptions
Based Aircraft

- Airport Based Aircraft Forecast
  - Monroe County Department of Airports provided April 2017 based aircraft data at MTH which were used as 2016 based aircraft.
  - Total local operations per based aircraft in 2016 were calculated and used to forecast the total based aircraft through 2036 based on the forecast of local operations
  - Market share analyses were conducted to establish the historical proportions between each engine type and total based aircraft in 2016
  - The base year shares were used to forecast based aircraft by engine types through 2036

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Total Based Aircraft Forecast

- Total based aircraft at MTH are forecast to increase at a CAGR of 1.4 percent from 94 in 2016 to 123 in 2036.
- Jet aircraft are forecast to be the slowest growing category of based aircraft and Single-engine aircraft are forecast to have the highest share of total based aircraft throughout the forecast period.

	Single-Engine		Multi-Engine		Jet		Helicopter		Total	
Fiscal Year	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF
Historical										
2016	67	60	13	14	4	0	9	6	94	80
Forecast										
2022	71	69	14	19	4	0	10	6	100	94
2026	76	74	15	23	5	0	10	6	107	103
2036	88	84	17	33	5	0	12	6	123	123

Sources: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

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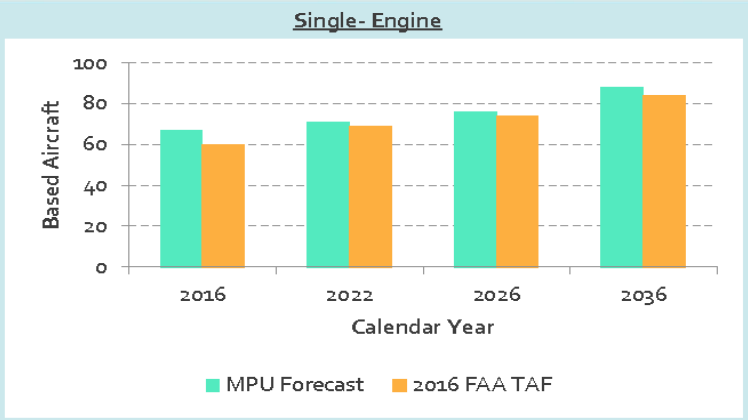
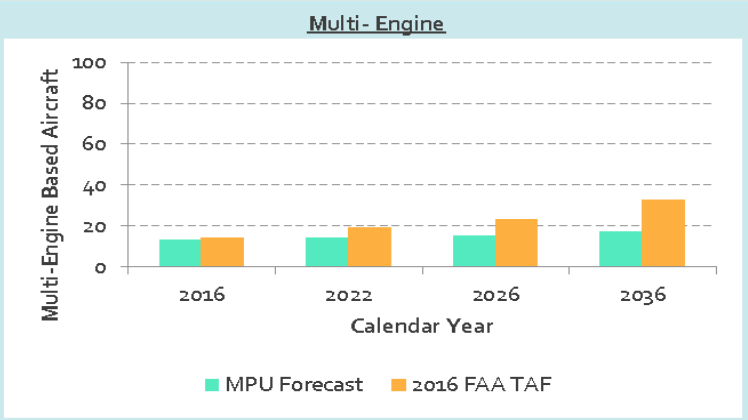
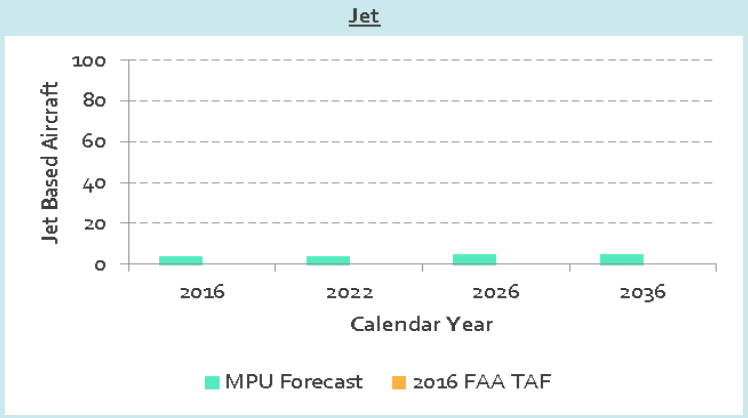
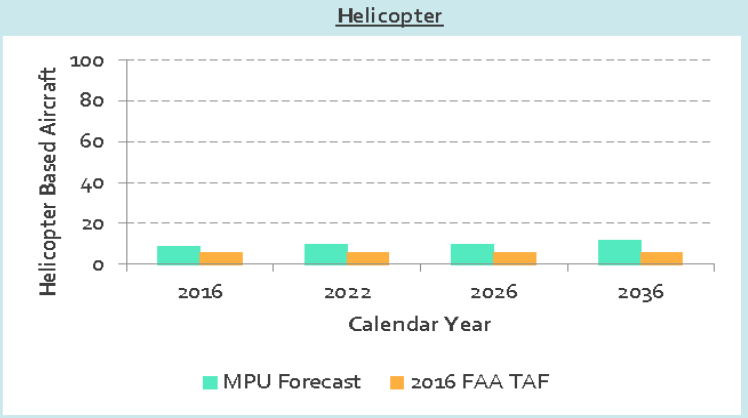
Total Based Aircraft Forecast









Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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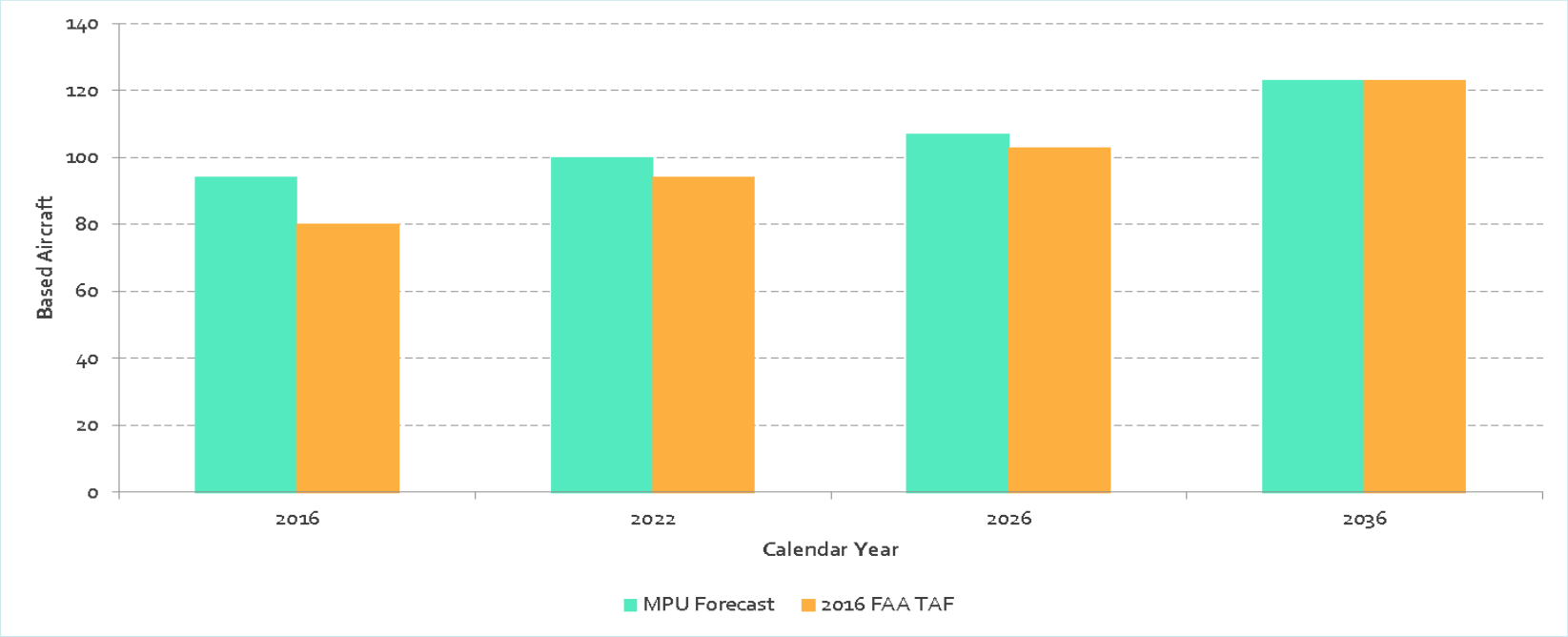
Total Based Aircraft Forecast

- Master Plan Update forecast of total based aircraft at MTH is generally higher than FAA TAF forecast. However, the forecast for based aircraft is identical in 2036.



Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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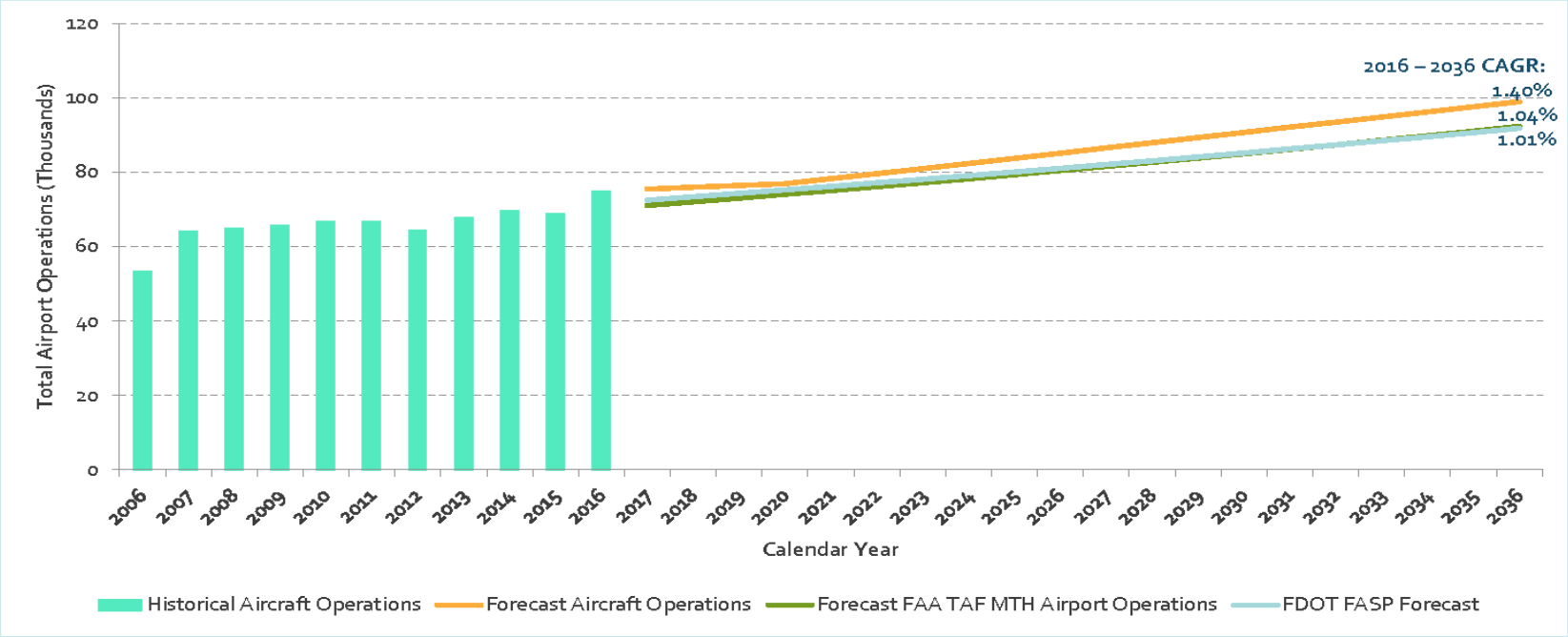
Section Four

FORECAST COMPARISON

Comparison to Other Forecasts

- Total operations at MTH have increased at a CAGR of 3.4 percent in the past 10 years and are forecast to grow at a CAGR of 1.4 percent through 2036, slightly above 2016 FAA TAF forecast. FDOT FASP forecast is similar to FAA TAF forecast.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2035 – CY 2036 FDOT FASP are estimated values.
Sources: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017; FDOT FASP, 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Operations Forecast Variance From TAF

- The total operations forecast is within the acceptable variance from the TAF.

	MTH Forecast		2016 FAA TAF Forecast
Calendar Year	Forecast Operations	Variance From TAF	Forecast Operations
2017	75,474	6.2%	71,065
2018	75,952	5.4%	72,048
2019	76,432	4.6%	73,044
2020	76,916	3.9%	74,054
2021	78,249	4.2%	75,075
2022	79,604	4.6%	76,115
2023	80,972	4.9%	77,168
2024	82,347	5.3%	78,235
2025	83,737	5.6%	79,320
2026	85,130	5.9%	80,419
2027	86,523	6.1%	81,536
2028	87,920	6.4%	82,667
2029	89,320	6.6%	83,812
2030	90,717	6.8%	84,975
2031	92,098	6.9%	86,155
2032	93,471	7.0%	87,351
2033	94,842	7.1%	88,565
2034	96,214	7.1%	89,795
2035	97,597	7.2%	91,042
2036	98,978	7.2%	92,308

Note: FAA TAF Forecast is in Fiscal Year; Acceptable variance is less than 10 percent in the 5-year forecast period and less than 15 percent in the 10-year forecast period.
Source: Federal Aviation Administration, Terminal Area Forecast, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

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Section Five

ADDITIONAL CONSIDERATIONS/DISCUSSIONS

Fleet Mix Forecast Discussion

- Fleet mix data
  - TFMSC data from 2000 through 2016 were used to examine fleet mix trends at the Airport
  - TFMSC data do not capture all operations at the Airport, including most operations conducted under Visual Flight Rules (VFR)
  - Marathon Aviation Associates provided additional data to determine the 2016 fleet mix
  - Airport stakeholders stated single-engine piston operations have been increasing, which was verified by recent TFMSC data
- Fleet Mix Forecast Methodology and Assumptions
  - Market share analyses were used to estimate the proportion of each engine type and determine the total operations by engine types in 2016 base year
  - The share of single-engine piston and jet aircraft operations were forecast to increase over the forecast period based on local and national trends
  - Other shares were forecast to decrease proportionally to their base year share

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Airport TFMSC Fleet Mix Trend

Calendar Year	Single Piston	Multi Piston	Single Turboprop	Multi Turboprop	Jet	Helicopter	Unknown	Total
2000	1,940	1,466	653	1,822	1,868	14	125	7,888
2001	1,834	1,580	847	886	2,074	5	59	7,285
2002	1,842	1,937	669	1,035	2,459	4	124	8,070
2003	1,800	2,259	761	1,154	2,634	3	153	8,764
2004	1,931	2,194	930	1,368	2,953	2	68	9,446
2005	2,088	2,437	1,040	1,379	3,025	2	49	10,020
2006	2,355	2,387	1,232	1,362	2,993	8	49	10,386
2007	2,544	2,598	1,189	1,409	3,760	8	53	11,561
2008	2,946	2,181	1,019	1,118	3,081	11	30	10,386
2009	3,224	2,338	1,007	803	2,493	14	44	9,923
2010	2,774	1,328	926	1,018	2,358	18	34	8,456
2011	2,157	1,083	975	958	2,351	19	34	7,577
2012	2,200	998	902	1,014	2,381	19	57	7,571
2013	2,173	1,048	948	958	2,313	24	22	7,486
2014	2,849	1,133	1,044	1,152	2,570	31	47	8,826
2015	3,183	998	1,210	1,235	2,749	19	56	9,450
2016	**2,109**	**893**	**1,277**	**1,247**	**2,878**	**16**	**47**	**8,467**

Source: Monroe County Airports Department, April 2017.

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Base Year Fleet Mix Analysis

- According to TFMSC data, single-engine piston operations have decreased in 2016 from 3,183 in 2015. However, not all operations are captured by TFMSC data, and the share of single-engine piston operations remain as one of the highest after Jet operations.

Engine Types	FlightAware June 2016 – May 2017	Share	TFMSC 2016 (CY)	Share	TFMSC May 2016 – April 2017	Share	Marathon Aviation Associates CY 2016[1/]	Share
Single-Engine Piston	2,696	29.95%	2,145	25.12%	2,338	26.06%	4,776	36.79%
Multi-Engine Piston	975	10.83%	893	10.46%	989	11.02%	1,257	9.68%
Single-Engine Turboprop	1,375	15.28%	1,277	14.96%	1,300	14.49%	1,279	9.85%
Multi-Engine Turboprop	1,098	12.20%	1,264	14.80%	1,333	14.86%	1,264	9.74%
Jet	2,704	30.04%	2,889	33.84%	2,912	32.46%	2,889	22.25%
Helicopter	24	0.27%	1	0.01%	22	0.25%	1,518	11.69%
Unknown	129	1.43%	69	0.81%	78	0.87%	0	0.00%
Total	9,001	100.00%	8,538	100.00%	8,972	100.00%	12,983	100.00%

Note: 1/ Based on data from TFMSC and the Airport. TFMSC data does not capture all operations at the Airport such as visual operations.
Source: Federal Aviation Administration, TFMSC, June 2017; FlightAware, June 2017; Monroe County Airports Department, April 2017.

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TFMSC Year-to Date Fleet Mix Comparison

- The share of single-engine piston operations increased 2.52 percentage points in January to April 2017 compared to the same period in 2016.

Engine Types	TFMSC January 2016 – April 2016	Share	TFMSC January 2017 – April 2017	Share
Single-Engine Piston	789	23.43%	995	25.95%
Multi-Engine Piston	301	8.94%	397	10.35%
Single-Engine Turboprop	509	15.12%	532	13.87%
Multi-Engine Turboprop	458	13.60%	547	14.26%
Jet	1,291	38.34%	1,327	34.60%
Helicopter	3	0.09%	6	0.16%
Unknown	16	0.48%	31	0.81%
Total	3,367	100.00%	3,835	100.00%

Note: April 2017 is the latest month for which TFMSC data are available.
Source: Federal Aviation Administration, TFMSC, June 2017.

Monroe County Department of Airports

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Fleet Mix Forecast Results

- Single-engine piston operations are forecast to increase at a CAGR of 1.6 percent through 2036. The share of single-engine piston operations remain as the highest.
- Jet aircraft operations were forecast to increase over the forecast period at a CAGR of 2.4 percent based on national and local trends
- Other shares were forecast to decrease proportionally to their base year share

	Piston				Turboprop				Jet		Helicopter		Total	
Calendar Year	Single-Engine	Share	Multi-Engine	Share	Single-Engine	Share	Multi-Engine	Share	Jet	Share	Helicopter	Share	Total	Share
Historical														
2016	27,594	36.8%	7,263	9.7%	7,378	9.8%	7,303	9.7%	16,692	22.3%	8,771	11.7%	75,000	100%
Forecast														
2022	29,577	37.2%	7,372	9.3%	7,490	9.4%	7,413	9.3%	18,849	23.7%	8,903	11.2%	79,604	100%
2026	31,835	37.4%	7,644	9.0%	7,766	9.1%	7,687	9.0%	20,966	24.6%	9,232	10.8%	85,130	100%
2036	37,612	38.0%	8,191	8.3%	8,322	8.4%	8,237	8.3%	26,724	27.0%	9,892	10.0%	98,978	100%
CAGR 2016-2036	1.6%		0.6%		0.6%		0.6%		2.4%		0.6%		1.4%	

Note: CY 2016 operations are estimates provided by the Airport.
Source: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

Florida Keys Marathon International Airport

Appendix C – Airport Layout Plan Drawing Set

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO
& ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

AIRPORT LAYOUT PLAN
FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT (MTH)
MARATHON, FLORIDA

VICINITY MAP

PREPARED FOR:

BOARD OF COUNTY COMMISSIONERS

MONROE COUNTY, FLORIDA

BOARD OF COUNTY COMMISSIONERS

CRAIG CATES	DISTRICT ONE
MICHELLE COLDIRON	DISTRICT TWO
HEATHER CARRUTHERS	DISTRICT THREE
DAVID RICE	DISTRICT FOUR
SYLVIA MURPHY	DISTRICT FIVE

DIRECTOR OF AIRPORTS

RICHARD STRICKLAND

AIRPORT MANAGER

MICHAEL LEGERE

PREPARED BY:

JACOBS

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200 EAST ROBINSON STREET, SUITE 300
ORLANDO, FLORIDA 32801
PHONE: (407) 381-5730

JUNE 2020

LOCATION MAP

ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE FAA TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE GENERAL LOCATION OF FUTURE FACILITIES DEPICTED. DURING THE PRELIMINARY DESIGN PHASE THE AIRPORT OWNER IS REQUIRED TO RESUBMIT FOR APPROVAL FINAL LOCATIONS, HEIGHTS AND EXTERIOR FINISH OF STRUCTURES WHICH COULD ADVERSELY AFFECT SAFETY, EFFICIENCY OR UTILITY OF THE AIRPORT. FAA CONCERN IS OBSTRUCTIONS, IMPACT ON ELECTRONIC AIDS OR ADVERSE EFFECT ON CONTROLLER VIEW OF AIRCRAFT APPROACHES AND GROUND MOVEMENT AREAS.

INDEX OF DRAWINGS

SHEET NO.	DRAWING TITLE	REVISION	DATE
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2	AIRPORT DATA SHEET		
3	EXISTING AIRPORT LAYOUT PLAN		
4	ULTIMATE AIRPORT LAYOUT PLAN		
5	14 CFR PART 77 AIRPORT AIRSPACE PLAN		
6	14 CFR PART 77 AIRPORT AIRSPACE INSETS		
7	14 CFR PART 77 AIRSPACE DATA SHEET		
8	INNER PORTION OF THE APPROACH SURFACE DRAWING - RUNWAY 7		
9	INNER PORTION OF THE APPROACH SURFACE DRAWING - RUNWAY 25		
10	TERMINAL AREA PLAN - (SHEET 1 OF 3)		
11	TERMINAL AREA PLAN - (SHEET 2 OF 3)		
12	TERMINAL AREA PLAN - (SHEET 3 OF 3)		
13	ULTIMATE AIRPORT LAND USE PLAN		
14	EXHIBIT 'A' PROPERTY INVENTORY MAP		

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET01_COVER.dwg_Layout: Sheet 01 - COVER SHEET_Jul 06, 2020, 10:20am

RUNWAY DATA

DESCRIPTION		RUNWAY 7-25			
		EXISTING		ULTIMATE	
		RUNWAY 7	RUNWAY 25	RUNWAY 7	RUNWAY 25
RUNWAY DESIGN CODE (RDC)		B/II/5000	B/II/5000	SAME	SAME
CRITICAL AIRCRAFT		CESSNA CITATION CJ4		SAME	
APPROACH REFERENCE CODE (APRC)		B/I(S)/5000	B/I(S)/5000	B/II/5000	B/II/5000
DEPARTURE REFERENCE CODE (DPRC)		B/I	B/I	B/II	B/II
RUNWAY LENGTH		5008'		5400'	
RUNWAY WIDTH		100'		75'	
PAVEMENT STRENGTH BY:	WHEEL LOADING (x 1000 lbs.)	75 (S)		SAME	
		129 (D)		SAME	
		191 (2D)		SAME	
TRUE BEARING		067°	247°	SAME	SAME
MAGNETIC BEARING		071°	251°	SAME	SAME
RUNWAY SHOULDER WIDTH		0'/50'		N/A	
BLAST PAD LENGTH		408'	408'	150'	150'
BLAST PAD WIDTH		100'	100'	95'	95'
RUNWAY END ELEVATION (MSL)		4.6'	5.3'	SAME	SAME
RUNWAY END COORDINATES	LATITUDE	24° 43' 24.68" N	24° 43' 43.84" N	24° 43' 23.54" N	24° 43' 44.20" N
	LONGITUDE	81° 03' 29.98" W	81° 02' 39.87" W	81° 03' 34.07" W	81° 02' 40.04" W
DISPLACED THRESHOLD COORDINATES	LATITUDE	N/A	N/A	24° 43' 25.05" N	N/A
	LONGITUDE	N/A	N/A	81° 03' 30.14" W	N/A
DISPLACED THRESHOLD DISTANCE		N/A	N/A	392'	N/A
DISPLACED RUNWAY THRESHOLD ELEVATION (MSL)		N/A	N/A	4.6'	N/A
RUNWAY TOUCHDOWN ZONE ELEVATION (TDZE)		4.8 (HP)	5.3' (HP)	SAME	4.0' EST.
HIGHEST POINT ON RUNWAY CENTERLINE (MSL)		5.3'		SAME	
LOWEST POINT ON RUNWAY CENTERLINE (MSL)		4.6'		4.0' EST.	
EFFECTIVE GRADIENT (IN %)		0.00%		SAME	
PAVEMENT STRENGTH BY:	PCN	94 /F/A/W/T		SAME	
SURFACE COMPOSITION		ASPHALT		SAME	
SURFACE CONDITION		GOOD		SAME	
SURFACE TREATMENT		GROOVED		SAME	
RUNWAY LIGHTING		MIRL		SAME	
RUNWAY MARKING		NON-PRECISION		SAME	
NAVAIDS		PAPI-4L, GPS/LPV, NDB, REIL	PAPI-4L, GPS/LPV, NDB	SAME	SAME
APPROACH LIGHTING		N/A	N/A	SAME	SAME
APPROACH VISIBILITY MINIMUMS		1.25-MILE	1-MILE	SAME	SAME
AERONAUTICAL SURVEY REQUIRED FOR APPROACH		VERTICALLY GUIDED	VERTICALLY GUIDED	SAME	SAME
PART 77 APPROACH CATEGORY		TYPE C (NPI)	TYPE C (NPI)	SAME	SAME
PART 77 APPROACH SLOPE		34:1	34:1	SAME	SAME
THRESHOLD SITING SURFACE (TSS) SLOPE - ADVISORY CIRCULAR 150/5300-13A, CHANGE		TYPE 4 (20:1)	TYPE 4 (20:1)	SAME	SAME
THRESHOLD SITING SURFACE (TSS) SLOPE - ENGINEERING BRIEF #99		TYPE 4 (20:1)	TYPE 4 (20:1)	SAME	SAME
TERPS DEPARTURE SURFACE/OCS SLOPE		YES (40:1)	YES (40:1)	SAME	SAME
GLIDEPATH QUALIFICATION SURFACE (GQS) SLOPE		30:1	30:1	SAME	SAME
APPROACH RUNWAY PROTECTION ZONE (RPZ)	LENGTH	1,000'	1,000'	SAME	SAME
	INNER WIDTH	500'	500'	SAME	SAME
	OUTER WIDTH	700'	700'	SAME	SAME
DEPARTURE RUNWAY PROTECTION ZONE (RPZ)	LENGTH	1,000'	1,000'	SAME	SAME
	INNER WIDTH	500'	500'	SAME	SAME
	OUTER WIDTH	700'	700'	SAME	SAME
RUNWAY SAFETY AREA (RSA)	LENGTH BEYOND RUNWAY END	300'		SAME	
	WIDTH	150'		SAME	
RUNWAY OBJECT FREE AREA (ROFA)	LENGTH BEYOND RUNWAY END	300'		SAME	
	WIDTH	500'		SAME	
OBSTACLE FREE ZONE (OFZ)	LENGTH BEYOND RUNWAY END	200'		SAME	
	WIDTH	400'		SAME	
PRECISION OBSTACLE FREE ZONE (POFZ)	LENGTH	N/A	N/A	N/A	N/A
	WIDTH	N/A	N/A	N/A	N/A
INNER APPROACH OBSTACLE FREE ZONE	LENGTH	N/A	N/A	N/A	N/A
	WIDTH	N/A	N/A	N/A	N/A

ABBREVIATIONS/ACRONYMS

AOA	AIRPORT OPERATIONS AREA	NCEI	NATIONAL CENTERS OF ENVIRONMENTAL INFORMATION
ARP	AIRPORT REFERENCE POINT	NOAA	NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION
ASOS	AUTOMATED SURFACE OBSERVATION SYSTEM	NPI	NON-PRECISION INSTRUMENT
ATCT	AIR TRAFFIC CONTROL TOWER	OCS	OBSTACLE CLEARANCE SURFACE
AVE	AVENUE	OFA	OBJECT FREE AREA
CL	CENTERLINE	PACS	PRIMARY AIRPORT CONTROL STATION
BLVD	BOULEVARD	PAPI	PRECISION APPROACH PATH INDICATOR
BRL	BUILDING RESTRICTION LINE	PCN	PAVEMENT CLASSIFICATION NUMBER
DECL	DECLINATION	RCO	REMOTE COMMUNICATIONS OUTLET
DR	DRIVE	RD	ROAD
EL	ELEVATION	REIL	RUNWAY END IDENTIFIER LIGHTS
FAA	FEDERAL AVIATION ADMINISTRATION	ROFA	RUNWAY OBJECT FREE AREA
FAR	FEDERAL AVIATION REGULATION	RPZ	RUNWAY PROTECTION ZONE
GPS	GLOBAL POSITIONING SYSTEM	RSA	RUNWAY SAFETY AREA
HP	HIGH POINT	R/W	RUNWAY
IFR	INSTRUMENT FLIGHT RULES	SACS	SECONDARY AIRPORT CONTROL STATION
LAT	LATITUDE	SMALL	SMALL AIRCRAFT (LESS THAN 12,500 POUNDS)
LAWRS	LIMITED AVIATION WEATHER REPORTING STATION	ST	STREET
LONG	LONGITUDE	TBD	TO BE DETERMINED
LP	LOW POINT	TDZE	TOUCHDOWN ZONE ELEVATION
MIRL	MEDIUM INTENSITY RUNWAY LIGHTING	TESM	TAXIWAY EDGE SAFETY MARGIN
MITL	MEDIUM INTENSITY TAXIWAY LIGHTING	T/L	TAXILANE
MOS	MODIFICATION OF DESIGN STANDARDS	TOFA	TAXIWAY OBJECT FREE AREA
MPH	MILES PER HOUR	TSA	TAXIWAY SAFETY AREA
MSL	MEAN SEA LEVEL	T/W	TAXIWAY
NAD83	NORTH AMERICAN DATUM OF 1983	VFR	VISUAL FLIGHT RULES
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988	VOR	VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE
NCDC	NATIONAL CLIMATIC DATA CENTER	WS	WIND SOCK

AIRPORT DATA

DESCRIPTION		EXISTING	ULTIMATE
AIRPORT IDENTIFIER		MTH	SAME
AIRPORT AREA (ACRES)		197	SAME
AIRPORT ELEVATION (MSL)		5.2'	SAME
AIRPORT REFERENCE CODE (ARC)		B-II	SAME
AIRPORT REFERENCE POINT (ARP)	LATITUDE	24° 43' 34.21" N	24° 43' 33.78" N
	LONGITUDE	081° 03' 04.92" W	081° 03' 07.28" W
MEAN MAXIMUM TEMPERATURE - HOTTEST MONTH		85.9° F - JULY	SAME
DESIGN AIRCRAFT (AIRFIELD)		CESSNA CITATION CJ4	SAME
AIRPORT NAVAIDs		AIRPORT BEACON, GPS/LPV, NDB, PAPI, REIL (RWY 7), MIRL, LIGHTED WIND CONE	SAME
WEATHER AIDS		ASOS III	SAME
MAGNETIC VARIATION	DECLINATION	6° 7' W	SAME
	ANNUAL RATE OF CHANGE	0° 06' W	SAME
	DATE	SEPTEMBER 2019	SAME
	SOURCE	NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	SAME
NPIAS SERVICE LEVEL		REGION	SAME
STATE SERVICE LEVEL		GENERAL AVIATION	SAME

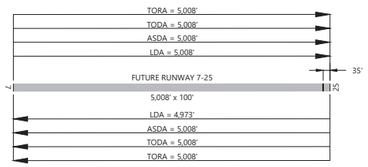
EXISTING TAXIWAY DATA

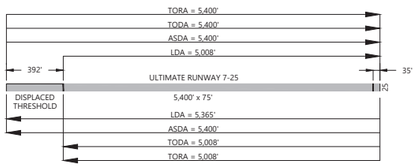
NAME	ADG	TDG	WIDTH					LIGHTING	OBJECTS INSIDE TSA AND TOFA	SEPARATION FROM TAXIWAY CL TO FIXED MOVABLE OBJECT
			TAXIWAY	SHOULDER	TSA	TOFA	TESM			
A	II	3	49'	N/A	79'	131'	10'	MITL	NO	65.5'
B	II	5	99'	N/A	79'	131'	15'	MITL	NO	65.5'
C	II	3	63'	N/A	79'	131'	10'	MITL	NO	65.5'
D	II	3	60'	N/A	79'	131'	10'	MITL	NO	65.5'
E	I	1B	25'	N/A	49'	89'	5'	MITL	YES	44.5'
A1	II	2	48'	N/A	79'	131'	7.5'	MITL	NO	65.5'
A2	II	4	50'	N/A	79'	131'	10'	MITL	NO	65.5'
A3	II	2	N/A	N/A	79'	131'	7.5'	MITL	NO	65.5'
A4	II	2	42'	N/A	79'	131'	7.5'	MITL	NO	65.5'
A5	II	2	N/A	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L Z5	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L Z6	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L Z7	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L Z8	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L Z9	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'

ULTIMATE TAXIWAY DATA

NAME	ADG	TDG	WIDTH					LIGHTING	OBJECTS INSIDE TSA AND TOFA	SEPARATION FROM TAXIWAY CL TO FIXED MOVABLE OBJECT
			TAXIWAY	SHOULDER	TSA	TOFA	TESM			
A	II	2	49'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A1	II	2	57'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A2 (B)*	II	2	56'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A3 (C)*	II	2	56'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A4 (D)*	II	2	56'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A5 (E)*	II	2	49'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
A6	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B1	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B2	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B3	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B4	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B5	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B6 (Z5)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B7 (Z6)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B8 (Z7)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B9 (Z8)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B10 (Z9)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'
T/L B11 (A1)*	II	2	48'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B12 (A2)*	II	2	50'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B13 (A4)*	II	2	42'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B14 (A5)*	II	2	N/A	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B15	II	2	35'	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B16	II	2	35'	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B17	II	2	40'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B18	II	2	36'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B19	II	2	35'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B20	II	2	41'**	N/A	79'	131'	7.5'	MITL	NO	65.5'
T/L B21 (E)*	I	1B	25'	N/A	49'	89'	5'	MITL	NO	44.5'

* EXISTING TAXIWAY DESIGNATOR SHOWN IN PARENTHESIS TO BE REDESIGNATED IN FUTURE AIRFIELD DEVELOPMENT.
** STANDARD AC 150/5300-13A TAXIWAY CONNECTOR PAVEMENT DIMENSIONS MAY BE EXCEEDED TO MEET REQUIRED FILLET GEOMETRY.

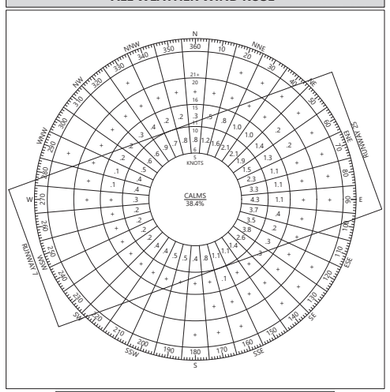




DECLARED DISTANCES

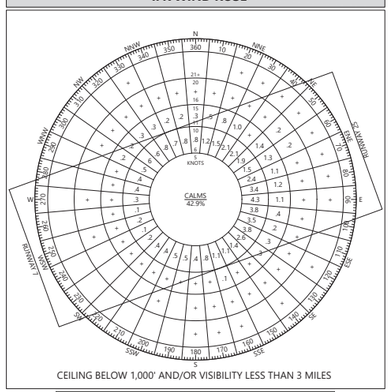
	EXISTING	FUTURE	ULTIMATE
RUNWAY 7			
TAKE-OFF RUN AVAILABLE (TORA)	5,008'	5,008'	5,400'
TAKE-OFF DISTANCE AVAILABLE (TODA)	5,008'	5,008'	5,400'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	5,008'	5,008'	5,400'
LANDING DISTANCE AVAILABLE (LDA)	5,008'	5,008'	5,008'
RUNWAY 25			
TAKE-OFF RUN AVAILABLE (TORA)	5,008'	5,008'	5,008'
TAKE-OFF DISTANCE AVAILABLE (TODA)	5,008'	5,008'	5,008'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	5,008'	5,008'	5,400'
LANDING DISTANCE AVAILABLE (LDA)	5,008'	4,973'	5,365'

ALL WEATHER WIND ROSE



ALL WEATHER WIND ROSE			
CROSSWIND COMPONENT		RUNWAY COVERAGE	
		Runway 7	Runway 25
10.5 KTS	(12 mph)	88.07%	47.77%
		97.40%	
13 KTS	(15 mph)	89.22%	48.71%
		99.48%	
16 KTS	(18.4 mph)	89.38%	48.89%
		99.83%	
20 KTS	(23 mph)	89.45%	48.98%
		99.99%	

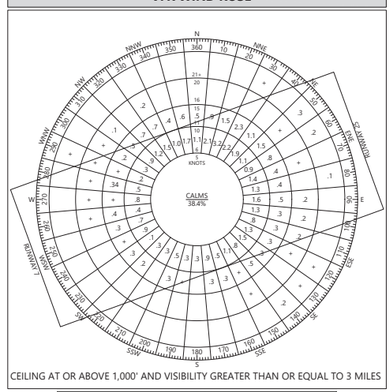
IFR WIND ROSE



CEILING BELOW 1,000' AND/OR VISIBILITY LESS THAN 3 MILES

IFR WIND ROSE			
CROSSWIND COMPONENT		RUNWAY COVERAGE	
		Runway 7	Runway 25
10.5 KTS	(12 mph)	80.22%	55.82%
		93.24%	
13 KTS	(15 mph)	83.13%	57.62%
		97.95%	
16 KTS	(18.4 mph)	83.30%	58.73%
		99.23%	
20 KTS	(23 mph)	83.48%	58.90%
		99.57%	

VFR WIND ROSE



CEILING AT OR ABOVE 1,000' AND VISIBILITY GREATER THAN OR EQUAL TO 3 MILES

VFR WIND ROSE			
CROSSWIND COMPONENT		RUNWAY COVERAGE	
		Runway 7	Runway 25
10.5 KTS	(12 mph)	88.18%	47.67%
		97.46%	
13 KTS	(15 mph)	89.30%	48.59%
		99.50%	
16 KTS	(18.4 mph)	89.46%	48.76%
		99.84%	
20 KTS	(23 mph)	89.53%	48.85%
		99.99%	

WIND DATA SOURCE: NATIONAL CLIMATIC DATA CENTER (NCDC), 3505 SURFACE HOURLY WEATHER OBSERVATIONS FOR FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT (722016), 2008 - 2017 (87,534 OBSERVATIONS), ACCESSED OCTOBER 3, 2018

MODIFICATION OF STANDARDS (MOS)

APPROVAL DATE	DESCRIPTION	FAA STANDARD	EXISTING OPERATIONAL RESTRICTION	MITIGATING ACTION
4/3/2017	RUNWAY TO TAXIWAY SEPARATION DISTANCE: 200'	240' PER FAA AC 150-5300-13A CHANGE 1	TAXIWAY A CLOSED TO ALL TAXIING AIRCRAFT WHEN AIRCRAFT WITH A WINGSPAN OF 95' OR GREATER IS ARRIVING OR DEPARTING ON RUNWAY 7-25	RUNWAY 7-25 RELOCATION 40' NORTH TO BE COMPLETED 2023

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PHONE (407) 381-5730

NO.	REVISIONS	DATE

AIRPORT DATA SHEET

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: KS
CHECKED BY: SC

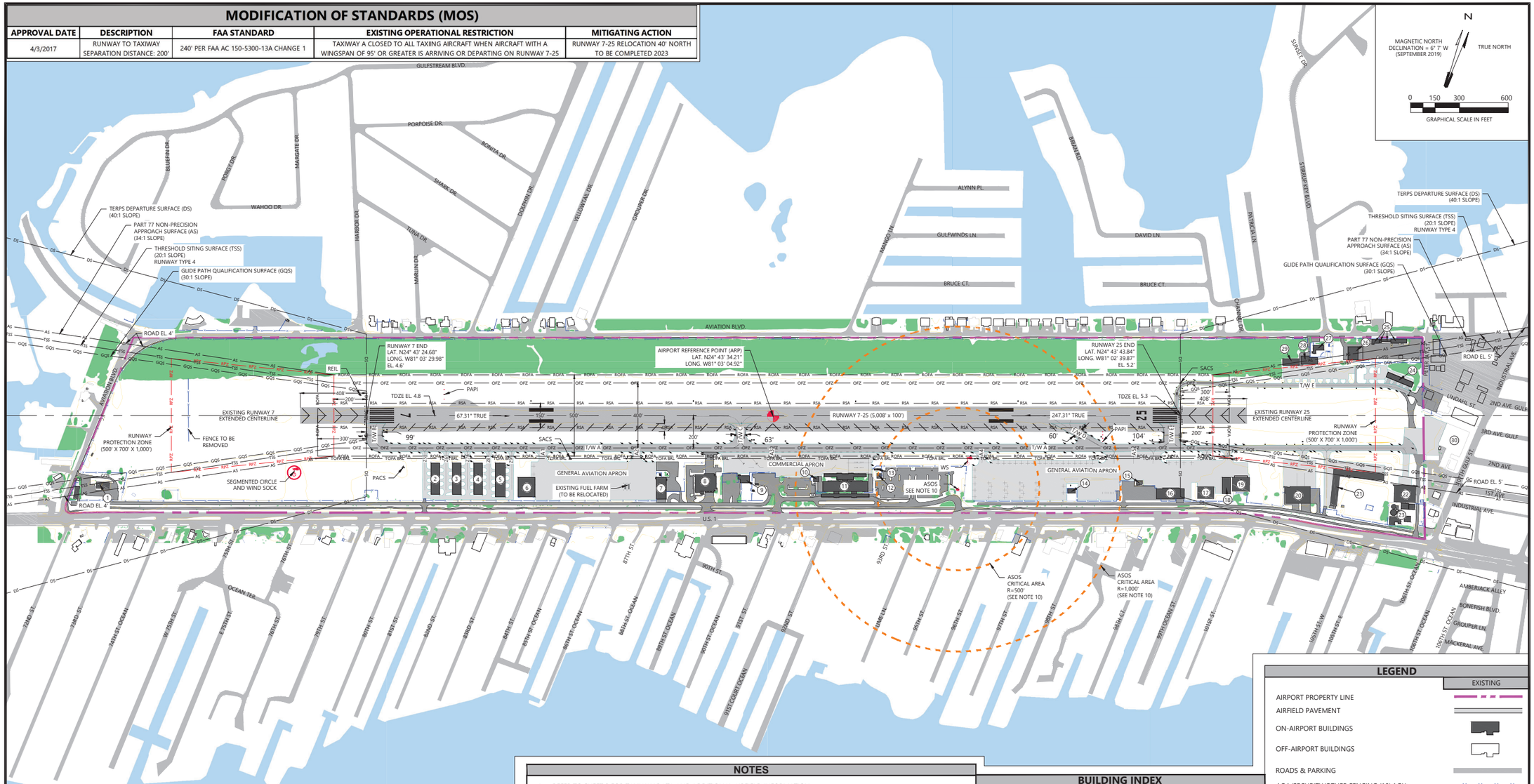
PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET02_DATA TABLES.dwg_Layout: Sheet 02 - DATA TABLES_Jul 06, 2020, 10:21am

MODIFICATION OF STANDARDS (MOS)

APPROVAL DATE	DESCRIPTION	FAA STANDARD	EXISTING OPERATIONAL RESTRICTION	MITIGATING ACTION
4/3/2017	RUNWAY TO TAXIWAY SEPARATION DISTANCE: 200'	240' PER FAA AC 150-5300-13A CHANGE 1	TAXIWAY A CLOSED TO ALL TAXIING AIRCRAFT WHEN AIRCRAFT WITH A WINGSPAN OF 95' OR GREATER IS ARRIVING OR DEPARTING ON RUNWAY 7-25	RUNWAY 7-25 RELOCATION 40' NORTH TO BE COMPLETED 2023



NOTES

1. REFER TO SHEET 2 FOR TAXIWAY DATA AND ADDITIONAL AIRFIELD INFORMATION.
2. REFER TO SHEET 4 FOR ULTIMATE CONDITIONS.
3. REFER TO SHEETS 10 THROUGH 12 FOR TERMINAL AREA PLAN AND APRON ARE DIMENSIONS.
4. ALL ELEVATIONS ARE IN FEET (MSL).
5. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
6. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
7. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
8. APPROACH SLOPES AND RUNWAY PROTECTION ZONES CONFORM WITH FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
9. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
10. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017).
11. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
12. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
13. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018, AS PART OF MTH MASTER PLAN UPDATE.
14. NO OBJECTS PENETRATE THE OBJECT FREE ZONE (OFZ).

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
1	DISABLED AMERICAN VETERANS	22'
2	T-HANGAR	21'
3	T-HANGAR	21'
4	T-HANGAR	21'
5	T-HANGAR	23'
6	CORPORATE HANGAR	31'
7	MARATHON JET CENTER (MJC) - FBO	25'
8	CITY FIRE STATION/AIRCRAFT RESCUE & FIRE FIGHTING	48'
9	CARGO BUILDING	12'
10	AIR CHILLER BUILDING	28'
11	PASSENGER TERMINAL	41'
12	ELECTRICAL VAULT/GENERATOR BUILDING	32'
13	SPRINKLER WATER TANK	13'
14	FUEL TANKS	21'
15	FBO LINE OFFICES BY MJC	23'
16	FBO HANGAR BY MJC	39'
17	HANGAR	35'
18	HANGAR	30'
19	HANGAR	35'
20	MONROE COUNTY SHERIFFS OFFICE	36'
21	T-HANGARS	36'
22	ANTIQUE AIRCRAFT RESTORATION HANGAR	30'
23	WASTE WATER FACILITY STRUCTURES	42'
24	HANGARS	21'
25	DEPARTMENT OF PUBLIC WORKS BUILDING	21'
26	DEPARTMENT OF PUBLIC WORKS BUILDING	38'
27	HUMANE SOCIETY	25'
28	HANGARS	34'
29	HANGARS	31'
30	MOSQUITO CONTROL DISTRICT FACILITIES	39'
31	AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS) - TO BE RELOCATED	30' EST.

* - APPROXIMATE TOP ELEVATION (MSL)

LEGEND

	EXISTING
AIRPORT PROPERTY LINE	
AIRFIELD PAVEMENT	
ON-AIRPORT BUILDINGS	
OFF-AIRPORT BUILDINGS	
ROADS & PARKING	
AOA/SECURITY/OTHER FENCING (10' AGL)	—X—X—X—X—
VEGETATION	
GROUND CONTOURS	
NAVIGATIONAL AIDS	
WIND SOCK (WS)	
BUILDING NUMBER	2
AIRPORT REFERENCE POINT	
AIRPORT MONUMENT (PACS/SACS)	
RUNWAY SAFETY AREA (RSA)	RSA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ
RUNWAY PROTECTION ZONE (RPZ)	RPZ
TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)	TOFA BRL
AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS) CRITICAL AREAS	
14 CFR PART 77 APPROACH SURFACE (AS)	AS
THRESHOLD SITING SURFACE (TSS)	TSS
TERPS DEPARTURE SURFACE (DS)	DS
GLIDE PATH QUALIFICATION SURFACE (GQS)	GQS
WATER FEATURES	

MONROE COUNTY

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NO.	REVISIONS	DATE

EXISTING AIRPORT LAYOUT PLAN

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: KS

CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

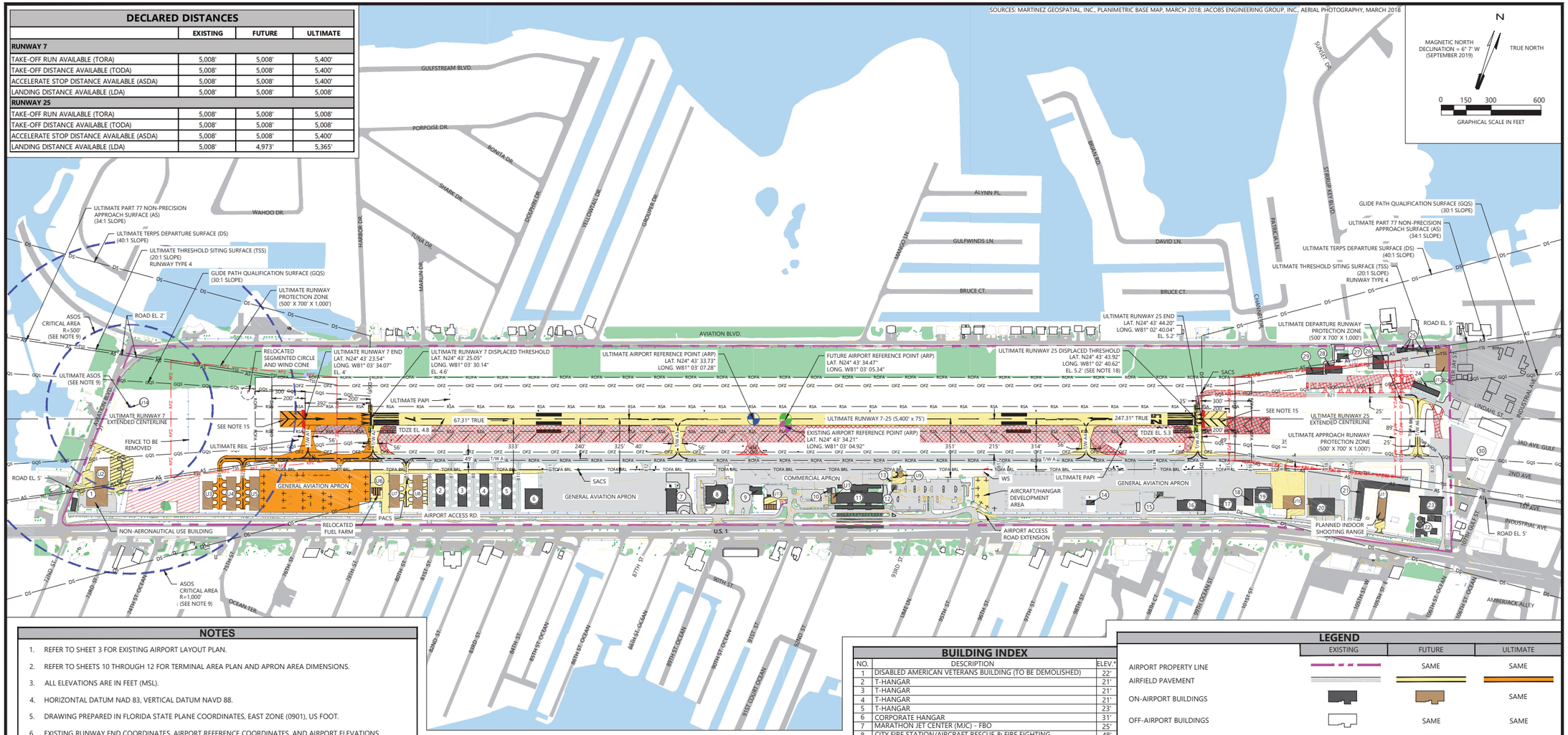
DATE:
JUNE 2020

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET03_EXISTING_ALP.dwg_Layout: Sheet 03 - EXISTING ALP_Jul 06, 2020, 10:23am

DECLARED DISTANCES

	EXISTING	FUTURE	ULTIMATE
RUNWAY 7			
TAKE-OFF RUN AVAILABLE (TORA)	5,008'	5,008'	5,400'
TAKE-OFF DISTANCE AVAILABLE (TODA)	5,008'	5,008'	5,400'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	5,008'	5,008'	5,400'
LANDING DISTANCE AVAILABLE (LDA)	5,008'	5,008'	5,008'
RUNWAY 25			
TAKE-OFF RUN AVAILABLE (TORA)	5,008'	5,008'	5,008'
TAKE-OFF DISTANCE AVAILABLE (TODA)	5,008'	5,008'	5,008'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	5,008'	5,008'	5,400'
LANDING DISTANCE AVAILABLE (LDA)	5,008'	4,973'	5,365'

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018



NOTES

1. REFER TO SHEET 3 FOR EXISTING AIRPORT LAYOUT PLAN.
2. REFER TO SHEETS 10 THROUGH 12 FOR TERMINAL AREA PLAN AND APRON AREA DIMENSIONS.
3. ALL ELEVATIONS ARE IN FEET (MSL).
4. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
5. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
6. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
7. APPROACH SLOPES AND RUNWAY PROTECTION ZONES CONFORM WITH FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
8. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
9. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017). THE ELEVATION OF THE WIND SENSOR WILL NEED TO BE DETERMINED DURING THE DESIGN OF THE ASOS TO MINIMIZE THE NUMBER OF OBSTRUCTIONS WITHIN THE 500 FOOT RADIUS.
10. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
11. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
12. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 FEET NORTH AS SHOWN IN THE ULTIMATE CONDITION.
13. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
14. ROAD ELEVATIONS WHERE TRAVERSE WAYS INTERSECT THE PART 77 APPROACH SURFACES ARE ACTUAL.
15. BLAST PADS MAY NOT BE ELIGIBLE FOR FUNDING UNDER THE FAA AIRPORT IMPROVEMENT PROGRAM (AIP).
16. FAA IS CURRENTLY CONSIDERING MODIFYING AND REDUCING THE SIZE OF THE DEPARTURE SURFACE (40:1 DS). OBJECTS PENETRATING THIS SURFACE WOULD BE SUBJECT TO FURTHER AERONAUTICAL STUDIES/AIRSPACE REVIEW UNDER FAA OBSTRUCTION EVALUATION/AIRPORT AIRSPACE ANALYSIS (OE/AAA) PROCESS (7460).
17. NO OBJECTS PENETRATE THE OBJECT FREE ZONE (OFZ).
18. THE RUNWAY 25 END ELEVATION WILL BE DEFINED DURING THE DESIGN PROCESS. THE FUTURE/ULTIMATE RUNWAY END ELEVATION MAY ELIMINATE THE NEED FOR A DISPLACED THRESHOLD.
19. A WILDLIFE HAZARD ASSESSMENT (WHA) WAS COMPLETED ON 09/14/2012 AND A WILDLIFE HAZARD MANAGEMENT PLAN (WHMP) WAS UPDATED ON 02/05/2020.

APPROVED BY

FEDERAL AVIATION ADMINISTRATION — DATE

MONROE COUNTY DIRECTOR OF AIRPORTS — DATE

BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
1	DISABLED AMERICAN VETERANS BUILDING (TO BE DEMOLISHED)	22'
2	T-HANGAR	21'
3	T-HANGAR	21'
4	T-HANGAR	21'
5	T-HANGAR	23'
6	CORPORATE HANGAR	31'
7	MARATHON JET CENTER (MJC) - FBO	25'
8	CITY FIRE STATION/AIRCRAFT RESCUE & FIRE FIGHTING	48'
9	CARGO BUILDING	12'
10	AIR CHILLER BUILDING	28'
11	PASSENGER TERMINAL	41'
12	ELECTRICAL VAULT/GENERATOR BUILDING	32'
13	SPRINKLER WATER TANK	13'
14	FUEL TANKS	21'
15	FBO LINE OFFICES BY MJC	23'
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17	HANGAR	35'
18	HANGAR	30'
19	HANGAR	35'
20	MONROE COUNTY SHERIFFS OFFICE	36'
21	T-HANGARS	36'
22	WASTE WATER FACILITY STRUCTURES	30'
23	ANTIQUE AIRCRAFT RESTORATION HANGAR	42'
24	HANGARS	21'
25	DEPARTMENT OF PUBLIC WORKS BUILDING	21'
26	DEPARTMENT OF PUBLIC WORKS MAINTENANCE BUILDING	38'
27	HUMANE SOCIETY	25'
28	HANGARS	34'
29	HANGARS	31'
30	MOSQUITO CONTROL DISTRICT FACILITIES	39'

* - APPROXIMATE TOP ELEVATION (MSL)

ULTIMATE BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
U1	MAINTENANCE FACILITY/STORAGE AREA	TBD
U2	NON-AERONAUTICAL USE BUILDING	TBD
U3	T-HANGARS	TBD
U4	T-HANGARS	TBD
U5	T-HANGARS	TBD
U6	RELOCATED MARATHON JET CENTER/FUEL FARM	TBD
U7	T-HANGARS	TBD
U8	T-HANGARS	TBD
U9	AIR TRAFFIC CONTROL TOWER	TBD
U10	CORPORATE HANGAR	TBD
U11	INDOOR SHOOTING RANGE	TBD
U12	REMOTE COMMUNICATIONS AIR/GROUND (RCAG) FACILITY	TBD
U13	CAR WASH FACILITY	TBD
U14	RELOCATED AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS)	TBD

* - APPROXIMATE TOP ELEVATION (MSL)

LEGEND

	EXISTING	FUTURE	ULTIMATE
AIRPORT PROPERTY LINE		SAME	SAME
AIRFIELD PAVEMENT			
ON-AIRPORT BUILDINGS			SAME
OFF-AIRPORT BUILDINGS		SAME	SAME
EXISTING/ULTIMATE STORM WATER DRAINAGE	N/A		SAME
OBJECT/PAVEMENT TO BE DEMOLISHED	N/A		SAME
ROADS & PARKING			SAME
AOA/SECURITY/OTHER FENCING (10' AGL)	—X—X—X—X—	X——X——X——X	SAME
VEGETATION		SAME	SAME
GROUND CONTOURS		SAME	SAME
NAVIGATIONAL AIDS			SAME
WIND SOCK (WS)		SAME	SAME
BUILDING NUMBER	(2)	N/A	(U1)
AIRPORT REFERENCE POINT			
AIRPORT MONUMENT (PACS/SACS)		SAME	SAME
RUNWAY SAFETY AREA (RSA)	N/A	N/A	RSA
RUNWAY OBJECT FREE AREA (ROFA)	N/A	N/A	ROFA
RUNWAY OBJECT FREE ZONE (ROFZ)	N/A	N/A	OFZ
RUNWAY PROTECTION ZONES (RPZ) - APPROACH/DEPARTURE	N/A	SAME	RPZ-A/D
TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)	TOFA BRL	SAME	SAME
AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS) CRITICAL AREAS	N/A		SAME
14 CFR PART 77 APPROACH SURFACE (AS)	N/A	N/A	AS
THRESHOLD SITING SURFACE (TSS)	N/A	N/A	TSS
TERPS DEPARTURE SURFACE (DS)	N/A	N/A	DS
GLIDE PATH QUALIFICATION SURFACE (GQS)	N/A	N/A	GQS
WATER FEATURES		SAME	SAME

MONROE COUNTY

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NO.	REVISIONS	DATE

ULTIMATE AIRPORT LAYOUT PLAN

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: KS

CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

SHEET 4 OF 14

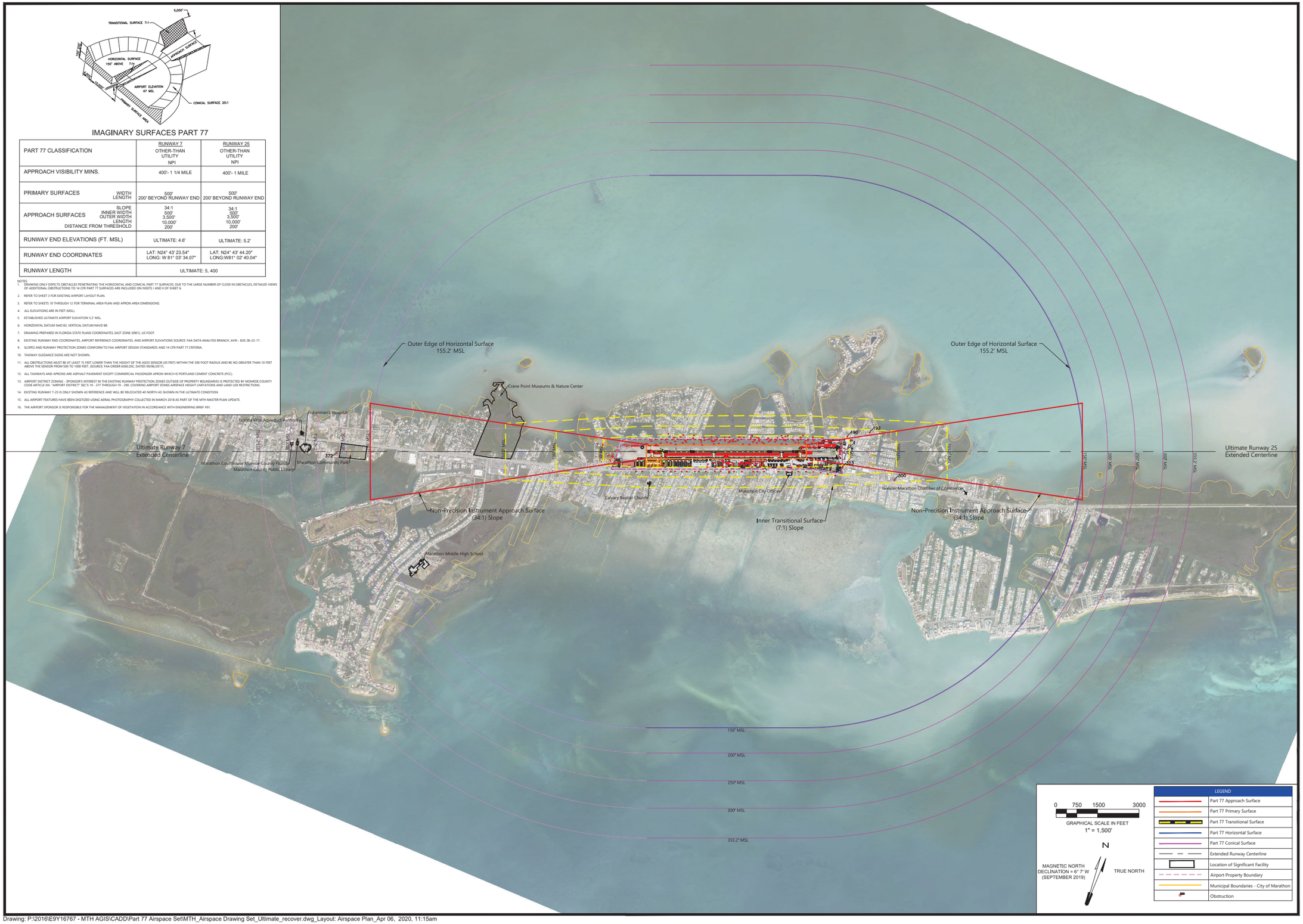
Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET04_ULTIMATE_ALP.dwg_Layout: Sheet 04 - ULTIMATE ALP_Jul 06, 2020, 10:32am

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

IMAGINARY SURFACES PART 77

PART 77 CLASSIFICATION		RUNWAY 7 OTHER-THAN UTILITY NPI	RUNWAY 25 OTHER-THAN UTILITY NPI
APPROACH VISIBILITY MINS.		400'- 1 1/4 MILE	400'- 1 MILE
PRIMARY SURFACES	WIDTH LENGTH	500' 200' BEYOND RUNWAY END	500' 200' BEYOND RUNWAY END
APPROACH SURFACES	SLOPE INNER WIDTH OUTER WIDTH LENGTH DISTANCE FROM THRESHOLD	34:1 500' 3,500' 10,000' 200'	34:1 500' 3,500' 10,000' 200'
RUNWAY END ELEVATIONS (FT. MSL)		ULTIMATE: 4.6'	ULTIMATE: 5.2'
RUNWAY END COORDINATES		LAT: N24° 43' 23.54" LONG: W 81° 03' 34.07"	LAT: N24° 43' 44.20" LONG:W81° 02' 40.04"
RUNWAY LENGTH		ULTIMATE: 5, 400	

NOTES:
1. DRAWING ONLY DEPICTS OBSTACLES PENETRATING THE HORIZONTAL AND CONICAL PART 77 SURFACES. DUE TO THE LARGE NUMBER OF CLOSE IN OBSTACLES, DETAILED VIEWS OF ADDITIONAL OBSTRUCTIONS TO 14 CFR PART 77 SURFACES ARE INCLUDED ON INSETS I AND II OF SHEET 6.
2. REFER TO SHEET 3 FOR EXISTING AIRPORT LAYOUT PLAN.
3. REFER TO SHEETS 10 THROUGH 12 FOR TERMINAL AREA PLAN AND APRON AREA DIMENSIONS.
4. ALL ELEVATIONS ARE IN FEET (MSL).
5. ESTABLISHED ULTIMATE AIRPORT ELEVATION 5.2' MSL.
6. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
7. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
8. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - B20, 06-22-17.
9. SLOPES AND RUNWAY PROTECTION ZONES CONFORM TO FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
10. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
11. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET. (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017).
12. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
13. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290, COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
14. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 NORTH AS SHOWN IN THE ULTIMATE CONDITION.
15. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
16. THE AIRPORT SPONSOR IS RESPONSIBLE FOR THE MANAGEMENT OF VEGETATION IN ACCORDANCE WITH ENGINEERING BRIEF #91.



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NO.	REVISIONS	DATE

14 CFR PART 77 AIRPORT AIRSPACE PLAN

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: NFP
CHECKED BY: HHM

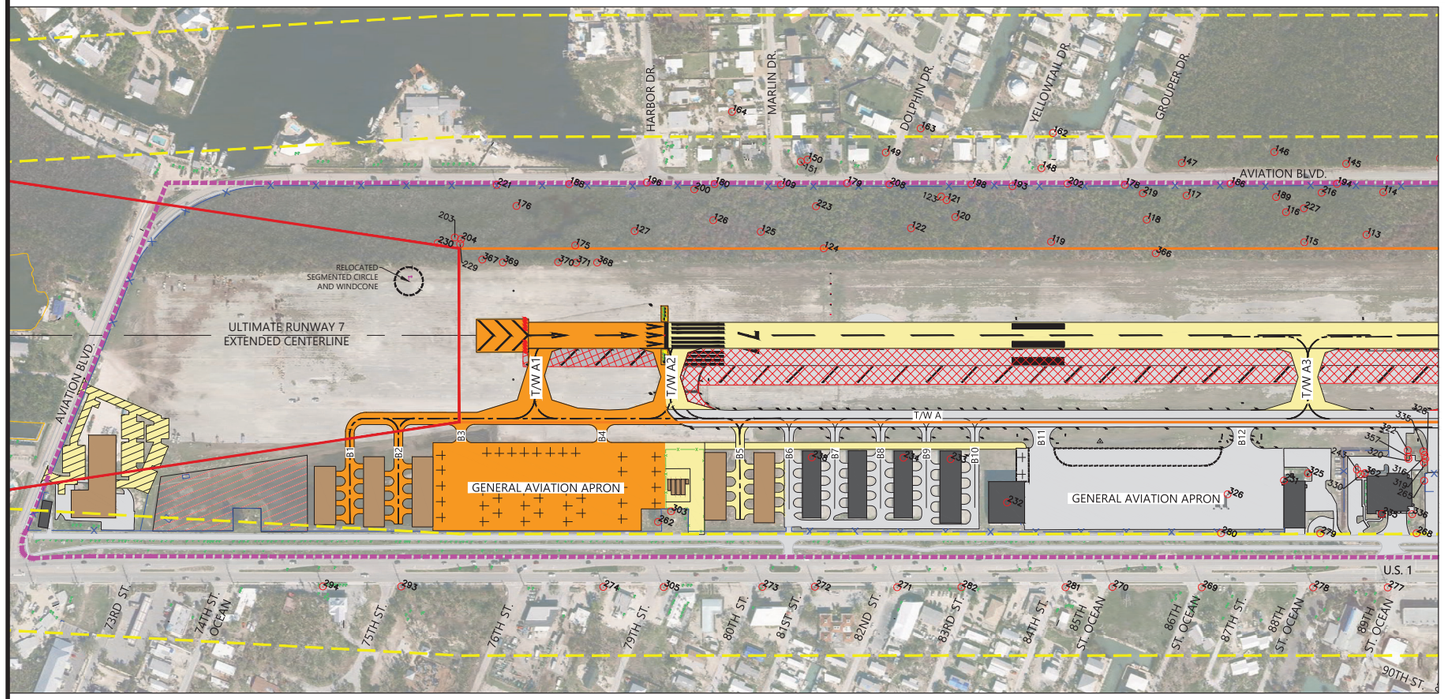
PREPARED BY:
JACOBS

DATE:
JUNE 2020

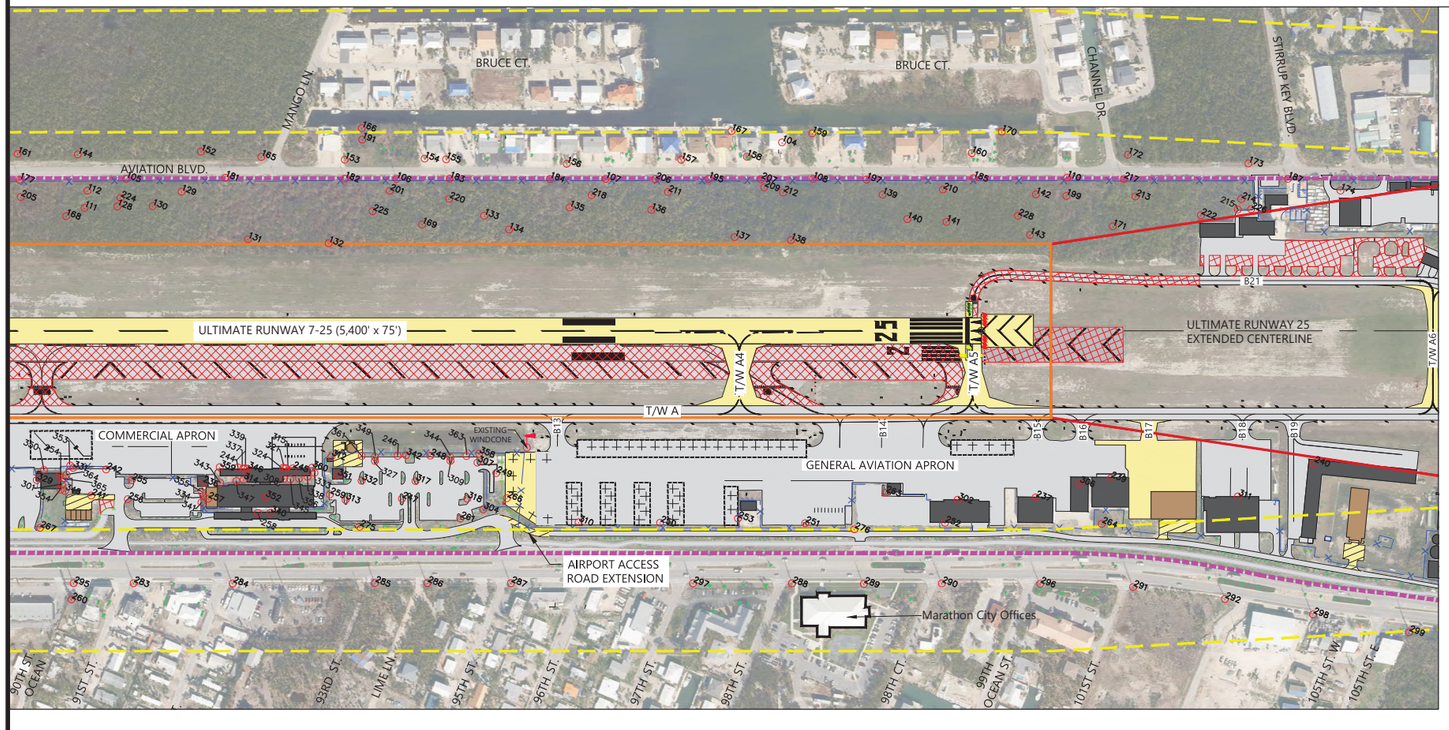
Drawing: P:\2016\E9Y16767 - MTH AGIS\CADD\Part 77 Airspace Set\MTH_Airspace Drawing Set_Ultimate_recover.dwg_Layout: Airspace Plan_Apr 06, 2020, 11:15am

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

Runway 7-25
Obstruction Inset I *West*



Runway 7-25
Obstruction Inset II *East*



0 100 200 400
GRAPHICAL SCALE IN FEET
1" = 200'

N
MAGNETIC NORTH DECLINATION = 6° 7' W (SEPTEMBER 2019)
TRUE NORTH

NOTES:

(1) REFERENCE INSETS #1 AND #2.

(2.) SEE INNER SEE INNER APPROACH DRAWING 8 AND 9 FOR DETAILED OBSTRUCTIONS TO APPROACH SURFACE. SEE SHEET 7 FOR OBSTRUCTION DATA.

(3.) OBSTACLE ANALYSIS CONDUCTED BY MARTINEZ GEOSPATIAL BASED ON AERIAL MAPPING OBTAINED FROM SANBORN MAPPING COMPANY, APRIL 30, 2016.

(4.) ULTIMATE AIRPORT ELEVATION = 5.2' MSL.

(5.) BASE MAP SOURCE: AERIAL IMAGERY OBTAINED FROM SANBORN MAPPING COMPANY, APRIL 30, 2016.

(6.) LOCAL ZONING ORDINANCE ESTABLISHED FOR PART 77 PROTECTED AIRSPACE SURFACES. SEE KEY WEST, FLORIDA CODE OF ORDINANCES SEC. 122-1438. AIRPORT ZONES AND AIRPORT HEIGHT LIMITATIONS.

(7.) THE AIRPORT SPONSOR IS RESPONSIBLE FOR THE MANAGEMENT OF VEGETATION IN ACCORDANCE WITH ENGINEERING BRIEF #91.

LEGEND	
	Part 77 Approach Surface
	Part 77 Primary Surface
	Part 77 Transitional Surface
	Extended Runway Centerline
	Airport Property Boundary
300	Obstruction
	Future Airfield Pavement
	Ultimate Airfield Pavement
	Airfield Pavement to be Demolished
	Existing On-Airport Building
	Existing Airfield Pavement
	ADA/ Security/ Other Fencing
	Future Fence
	Future Roads and Parking
	Existing /Ultimate Stormwater Drainage Area
	Future On-Airport Buildings
	Location of Significant Facility

MONROE COUNTY

JACOBS
JACOBS ENGINEERING GROUP INC.
841 PRUDENTIAL DRIVE 1330
JACKSONVILLE, FLORIDA 32207
PHONE: 904.636.5432

RICONDO®
RICONDO & ASSOCIATES, INC.
200 EAST ROBINSON STREET, SUITE 300
ORLANDO, FL 32801
PHONE (407) 381-5730

NO.	REVISIONS	DATE

14 CFR PART 77
AIRPORT AIRSPACE PLAN

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: NFP
CHECKED BY: HHM

PREPARED BY:
JACOBS

DATE:
JUNE 2020

Drawing: P:\2016\E9Y16767 - MTH AGIS\CADD\Part 77 Airspace Set\MTH_Airspace Drawing Set_Ultimate_recover.dwg_Layout: Airspace Inset_Apr 20, 2020, 11:25am

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

14 CFR PART 77
AIRSPACE DATA SHEET

NOTES:

(1.) * INDICATES OBSTRUCTIONS THAT EXIST WITH IN THE DIMENSIONS OF THE EXISTING FAA FAR PART 77 SURFACES.
(2.) SEE INNER APPROACH DRAWINGS 8 AND 9 FOR DETAILED OBSTRUCTIONS TO APPROACH SURFACE.
(3.) OBSTACLE ANALYSIS CONDUCTED BY MARTINEZ GEOSPATIAL BASED ON AERIAL MAPPING OBTAINED FROM SANBORN MAPPING COMPANY, APRIL 30, 2016.
(4.) REMAINING OBSTACLES HAVE BEEN ASSIGNED A PRIORITY RATING LEVEL AND MITIGATION DUE DATE TO ENSURE EFFICIENT REMOVAL OF OBSTRUCTIONS IN A TIMELY MANNER.
(5.) THE AIRPORT SPONSOR IS RESPONSIBLE FOR THE MANAGEMENT OF VEGETATION IN ACCORDANCE WITH ENGINEERING BRIEF #91.
(6.) POTENTIAL OBSTRUCTION MITIGATION NEEDS WILL BE IDENTIFIED IN CONSULTATION WITH THE FAA DURING THE DESIGN PHASE OF THE RUNWAY 7-25 RELOCATION PROJECT.

Point ID	Obstruction Information	Northing	Easting	Elevation (MSL ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	SURFACE	Obstacle Located ON or OFF Airport	Under Sponsor Control	Recommended Action
1	TREETOP	141771.87	636064.79	25.90	6.91	18.99	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
2	ANTENNA	139641.90	633375.07	140.90	104.03	36.87	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
3	TREETOP	141060.67	635110.66	34.50	40.87	-6.37	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
4	UTILITY POLE	141188.04	635235.84	31.90	36.06	-4.16	14 CFR PART 77 APPROACH SURFACE	OFF	NO	NO ACTION
5	UTILITY POLE	140965.27	634932.89	40.70	46.83	-6.13	14 CFR PART 77 APPROACH SURFACE	OFF	NO	NO ACTION
6	TREETOP	141198.82	635233.52	39.70	36.30	2.40	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
7	TREETOP	141049.73	635174.76	33.80	39.22	-5.42	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
8	TREETOP	141203.56	635212.22	41.40	36.51	4.89	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
9	TREETOP	141241.42	635254.48	46.10	34.89	11.21	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
10	TREETOP	140970.65	635063.94	42.90	43.25	-0.35	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
11	TREETOP	141253.21	635258.97	32.40	34.78	-2.38	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
12	TREETOP	141254.67	635248.84	44.90	35.00	9.90	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
13	TREETOP	141001.61	635156.82	34.40	40.33	-5.93	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
14	TREETOP	140935.09	635028.84	40.60	44.59	-3.99	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
15	TREETOP	140916.66	635023.44	40.00	44.95	-4.95	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
16	TREETOP	140981.63	635198.38	35.20	39.47	-4.27	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
17	TREETOP	140983.34	635208.75	37.60	39.14	-1.54	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
18	TREETOP	140967.13	635178.79	38.30	40.18	-1.88	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
19	TREETOP	140948.77	635143.73	35.10	41.30	-6.20	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
20	TREETOP	140735.74	634628.86	54.40	57.71	-3.31	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
21	TREETOP	140935.36	635185.52	34.20	39.98	-5.78	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
22	UTILITY POLE	141355.99	635231.17	36.20	34.27	1.93	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
23	UTILITY POLE	140928.75	635281.30	37.10	38.27	-1.17	14 CFR PART 77 APPROACH SURFACE	OFF	NO	NO ACTION
24	TREETOP	141560.04	636580.90	24.20	19.74	4.46	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
25	TREETOP	141610.79	635782.24	22.50	16.46	6.04	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
26	TREETOP	141499.52	635497.38	27.60	25.49	2.11	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
27	TREETOP	141507.31	635522.72	33.10	24.70	8.40	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
28	TREETOP	141590.79	635714.71	29.00	18.45	10.55	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
29	TREETOP	141638.26	635829.44	24.90	14.82	10.08	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
30	TREETOP	141680.14	635919.59	26.90	11.87	15.03	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
31	TREETOP	141520.75	635532.82	30.10	24.26	5.84	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
32	TREETOP	141689.51	635937.80	22.20	11.35	10.85	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
33	TREETOP	141648.76	635838.55	25.40	14.51	10.89	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
34	TREETOP	141629.06	635789.47	24.80	15.96	8.84	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
35	TREETOP	141590.30	635692.75	28.40	19.13	9.27	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
36	TREETOP	141664.03	635869.88	23.00	13.39	9.61	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
37	TREETOP	141645.18	635820.37	21.70	14.98	6.72	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
38	TREETOP	141703.70	635956.87	19.90	10.63	9.27	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
39	TREETOP	141641.32	635798.71	23.70	15.71	7.99	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
40	TREETOP	141615.46	635762.98	24.40	16.17	8.23	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
41	TREETOP	141712.62	635864.16	20.00	10.44	9.56	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
42	TREETOP	141623.86	635747.21	26.70	17.24	9.46	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
43	TREETOP	141650.56	635808.47	24.00	15.33	8.67	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
44	TREETOP	141684.63	635889.34	25.60	12.62	12.98	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
45	TREETOP	141661.76	635831.93	26.50	14.53	11.97	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
46	TREETOP	141564.83	635597.38	24.30	22.12	2.18	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
47	TREETOP	141671.05	635848.72	25.40	14.01	11.39	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
48	TREETOP	141597.97	635670.88	26.30	19.61	6.69	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
49	TREETOP	141610.64	635701.23	23.00	18.63	4.37	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
50	TREETOP	141677.64	635858.87	24.90	13.69	11.21	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
51	TREETOP	141640.48	635759.11	26.80	16.80	10.00	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
52	TREETOP	141640.63	635759.13	26.80	15.71	11.09	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
53	TREETOP	141649.72	635780.67	26.50	16.00	10.50	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
54	TREETOP	141630.44	635730.16	25.80	17.59	8.21	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
55	TREETOP	141641.97	635744.52	26.60	15.93	11.07	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
56	TREETOP	141213.77	634713.09	40.40	49.96	-9.56	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
57	TREETOP	141566.15	635565.09	25.90	22.80	3.10	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
58	TREETOP	141209.92	634692.75	24.40	54.29	-29.89	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
59	TREETOP	141610.64	635671.43	26.30	19.44	6.86	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
60	TREETOP	140802.34	635125.85	35.80	43.41	-7.61	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
61	TREETOP	141211.81	634683.57	44.90	50.70	-5.80	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
62	TREETOP	140813.77	635165.11	36.40	42.16	-5.76	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
63	TREETOP	141495.87	635363.33	30.30	29.15	1.15	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
64	TREETOP	141556.62	635498.30	29.50	24.81	4.69	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
65	TREETOP	141523.87	635418.74	33.00	27.32	5.68	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
66	TREETOP	141154.13	634517.66	46.00	55.93	-9.93	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
67	TREETOP	141538.34	635440.39	29.40	32.26	-2.87	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
68	TREETOP	141225.35	634683.75	42.70	50.66	-7.96	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
69	TREETOP	141525.28	635405.30	32.40	27.59	4.81	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
70	TREETOP	141227.04	634673.90	41.60	50.80	-9.20	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
71	TREETOP	140653.07	634814.10	46.00	53.66	-7.66	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
72	TREETOP	141737.96	635701.23	34.00	41.94	-7.94	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
73	TREETOP	140773.80	635195.21	42.00	41.80	0.20	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
74	TREETOP	140463.11	634467.19	56.60	65.17	-8.57	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
75	TREETOP	140633.82	634884.57	47.10	51.79	-4.69	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
76	TREETOP	141700.65	635863.20	27.00	13.27	13.73	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
77	TREETOP	141769.05	636054.95	21.50	7.18	14.32	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
78	TREETOP	144251.77	641809.36	24.10	14.52	19.68	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
79	TREETOP	144225.43	641899.19	39.60	16.55	23.05	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
80	TREETOP	144406.58	642220.70	30.20	27.40	2.80	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
81	TREETOP	144438.58	642241.75	32.20	20.29	11.21	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
82	LIGHT POLE	144312.84	642867.87	34.60	43.82	-9.22	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
83	UTILITY POLE	144490.14	642925.15	37.60	47.49	-9.89	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
84	TREETOP	144788.50	643638.96	67.20	70.01	-2.81	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*TO BE CLEARED OR TRIMMED
85	UTILITY POLE	144484.43	642839.47	37.90	45.13	-7.23	14 CFR PART 77 APPROACH SURFACE	OFF	NO	NO ACTION
86	UTILITY POLE	144460.55	642725.97	32.10	41.72	-9.62	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
87	UTILITY POLE	144472.54	642727.26	39.50	41.84	-2.34	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
88	UTILITY POLE	144179.46	643138.54	39.90	49.67	-9.77	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
89	BUILDING ELEVATION	144072.49	642923.78	34.30	42.59	-8.29	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
90	TREETOP	144506.09	642677.10	42.10	40.88	1.22	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
91	FLAGPOLE	144125.74	643126.29	45.30	48.77	-3.47	14 CFR PART 77 APPROACH SURFACE	ON	YES	NO ACTION
92	LIGHT POLE	144649.04	643019.65	43.80	49.17	-5.37	14 CFR PART 77 APPROACH SURFACE	OFF	NO	NO ACTION
93	LIGHT POLE	144739.74	642616.78	48.50	41.92	6.58	14 CFR PART 77 APPROACH SURFACE	OFF	NO	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
94	UTILITY POLE	144652.44	642507.60	42.30	37.91	4.39	14 CFR PART 77 APPROACH SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
95	TREETOP	144053.11	642523.23	28.30	23.04	5.26	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
96	VENT ON BUILDING	144454.06	642263.72	37.60	29.05	8.55	14 CFR PART 77 APPROACH SURFACE	ON	YES	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
97	FLAGPOLE	144821.28	642916.39	59.70	50.96	8.74	14 CFR PART 77 APPROACH SURFACE	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
98	TREETOP	144443.54	642727.93	38.20	29.35	9.05	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
99	BUILDING ELEVATION	144322.65	642036.80	33.90	21.42	12.48	14 CFR PART 77 APPROACH SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
100	BUILDING ELEVATION	144272.55	641935.23	30.80	18.14	12.66	14 CFR PART 77 APPROACH SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
101	TREETOP	144138.75	642372.31	25.90	11.92	13.98	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
102	TREETOP	144202.54	641840.77	33.00	14.77	18.23	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
103	TREETOP	144088.76	641609.82	26.30	7.28	19.02	14 CFR PART 77 APPROACH SURFACE	ON	YES	*TO BE CLEARED OR TRIMMED
104	BUILDING ELEVATION	144040.22	640673.80	45.70	36.78	9.38	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	NO ACTION
105	LIGHT POLE	143215.34	638971.38	39.00	30.73	8.27	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
106	LIGHT POLE	143514.73	639689.49	37.10	30.59	6.51	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
107	LIGHT POLE	143747.25	640245.09	39.00	30.48	8.52	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
108	LIGHT POLE	143977.79	640795.83	39.80	30.98	8.82	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
109	LIGHT POLE	142153.37	636933.51	35.20	30.47	4.73	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
110	LIGHT POLE	142623.37	641469.52	38.40	31.73	6.67	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 6)
111	TREETOP	143091.11	638892.62	30.70	18.67	12.03	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
112	TREETOP	143140.17	638782.84	37.50	29.61	7.89	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
113	TREETOP	142876.10	638544.85	31.60	9.34	22.26	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
114	TREETOP	143007.68	638541.96	35.90	27.41	8.49	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
115	TREETOP	142787.13	638387.84	37.50	6.96	30.54	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
116	TREETOP	142846.55	638305.63	38.90	18.62	20.28	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
117	TREETOP	142780.18	638023.28	36.20	25.76	10.44	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
118	TREETOP	142671.82	637943.84	34.20	16.05	18.15	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
119	TREETOP	142506.88	637714.43	31.70	6.98	24.72	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
120	TREETOP	142466.13	637432.67	35.20	16.76	18.44	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
121	TREETOP	142501.64	637390.73	39.50	23.57	15.93	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
122	TREETOP	142387.49	637327.36	39.50	12.66	26.84	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
123	TREETOP	142505.04	637372.29	43.90	25.34	18.56	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
124	TREETOP	142236.96	637117.84	40.10	4.46	35.64	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
125	TREETOP	142211.00	636932.08	34.40	10.70	23.70	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
126	TREETOP	142188.89	636792.94	30.60	15.78	14.82	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
127	TREETOP	142072.64	636596.06	23.80	11.37	12.43	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
128	TREETOP	143131.93	638978.43	33.40	19.91	13.49	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
129	TREETOP	143242.46	639132.35	38.20	25.87	12.33	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
130	TREETOP	143171.63	639071.52	34.00	19.29	14.71	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
131	TREETOP	143189.88	639361.95	29.00	5.95	23.05	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
132	TREETOP	143268.56	639580.55	27.30	4.36	22.94	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
133	TREETOP	143514.73	639963.43	29.10	15.71	13.39	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
134	TREETOP	143505.28	640044.47	39.10	9.71	29.39	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
135	TREETOP	143631.47	640181.11	35.70	18.74	16.96	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
136	TREETOP	143715.50	640400.79	32.80	17.82	14.98	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
137	TREETOP	143735.96	640652.19	37.00	6.68	30.32	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
138	TREETOP	143790.28	640805.34	41.10	5.39	35.71	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
139	TREETOP	144013.17	640998.13	38.90	24.57	14.33	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
140	TREETOP	143975.73	641091.12	39.20	14.06	25.14	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
141	TREETOP	144011.54	641198.37	30.60	12.89	17.71	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
142	TREETOP	144184.10	641405.30	36.50	24.38	12.12	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
143	TREETOP	144070.10	641434.70	36.10	7.57	28.53	14 CFR PART 77 TRANSITIONAL SURFACE	ON	YES	TO BE CLEARED OR TRIMMED
144	TREETOP	143225.80	638815.50	41.60	40.59	1.01	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
145	TREETOP	143041.71	638411.97	40.60	38.53	2.07	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
146	TREETOP	142993.50	638207.88	40.70	43.90	-3.20	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
147	TREETOP	142861.30	637877.21	40.50	38.78	1.68	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
148	TREETOP	142693.88	637607.02	63.00	37.43	25.57	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
149	TREETOP	142560.16	637176.10	43.20	43.33	-0.13	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
150	TREETOP	142454.69	636970.60	63.30	40.51	22.79	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
151	TREETOP	142442.12	636960.55	54.00	40.02	13.98	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
152	TREETOP	143370.20	639139.43	39.70	41.79	-2.09	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
153	TREETOP	143508.21	639390.60	34.80	38.75	-3.95	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
154	TREETOP	143600.10	639741.56	62.60	39.04	23.56	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
155	TREETOP	143622.20	639799.47	65.60	39.03	26.57	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
156	TREETOP	143744.27	640124.69	39.80	36.93	2.87	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
157	TREETOP	143882.13	640424.31	40.20	38.85	1.35	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
158	TREETOP	143963.14	640595.28	44.00	40.03	3.97	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
159	TREETOP	144097.67	640743.09	60.70	49.83	10.87	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
160	TREETOP	144222.66	641189.12	36.40	41.50	-5.10	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
161	TREETOP	143160.65	638654.93	32.70	40.84	-8.14	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
162	TREETOP	142797.73	637598.43	42.10	51.82	-9.72	14 CFR PART 77 TRANSITIONAL SURFACE	OFF	NO	TO BE CLEARED OR TRIMMED
163	TREETOP	142663.12	637241.94	44.30	53.59	-9.29	14 CFR PART 77 TRANSITI

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

Runway 7 Obstruction Data Table

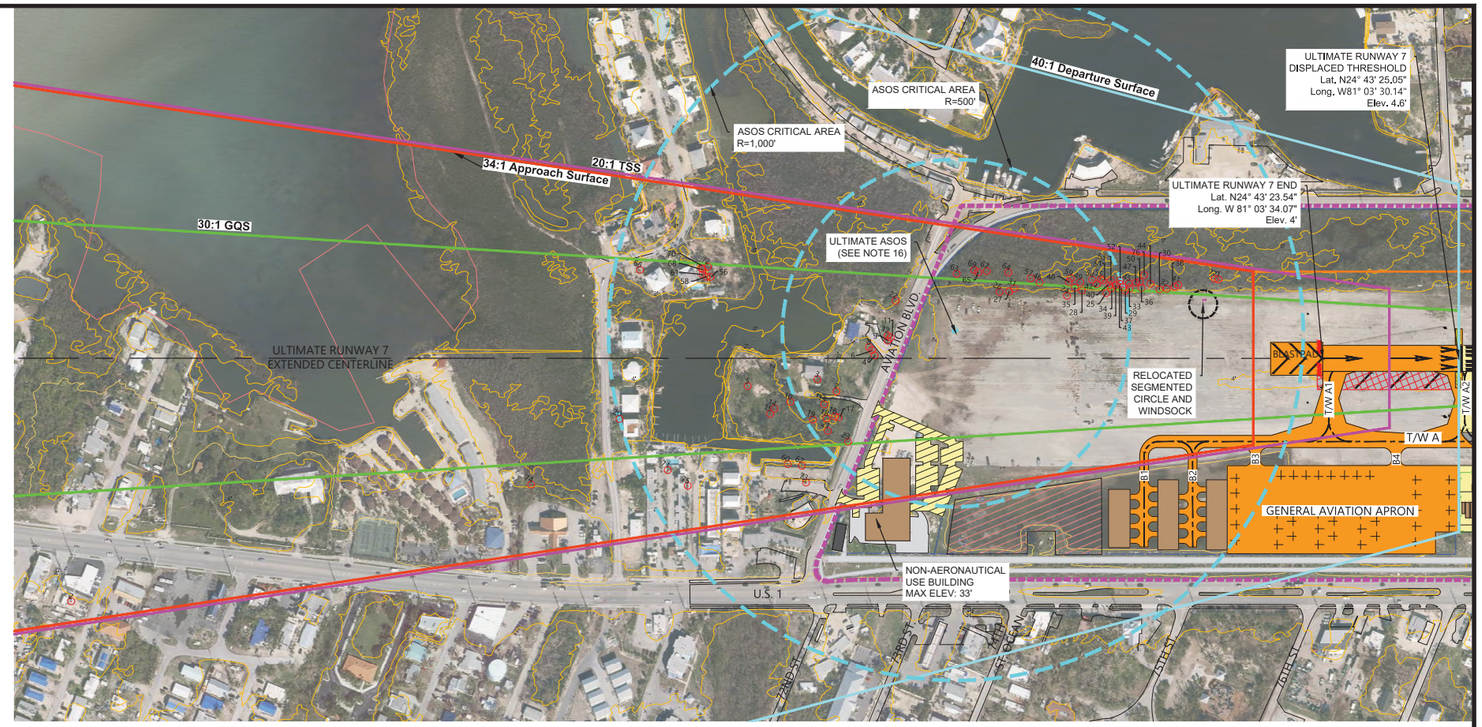
Obstruction Identification					34 CFR 77 Approach - RWY 7		Runway 7 Departure Surface (25 Feet)		Threshold Siting Surface (Row 4**)		Glidepath Qualification Surface (GQS)				
Point ID	Obstruction Information	Northing	Easting	Elevation (MSL ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Obstacle Located ON or OFF Airport	Under Sponsor Control	Recommended Action
1	TREETOP	1417718.87	634064.78	25.50	6.91	18.99	21.86	4.04	29.28	+3.38	27.64	+1.74	ON	YES	*TO BE CLEARED OR TRIMMED
2	ANTENNA	1396419	631375.07	140.90	104.03	36.87	104.45	36.45	N/A***	N/A***	0.00	140.90	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 17)
3	TREETOP	1410065.07	635115.06	34.50	40.87	+6.37	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
4	UTILITY POLE	1411180.04	635233.84	31.90	36.06	+4.16	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*NO ACTION
5	UTILITY POLE	1409865.27	634953.89	40.70	40.83	+6.13	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*NO ACTION
6	TREETOP	1411186.83	635223.52	38.70	36.30	2.40	46.90	+8.20	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
7	TREETOP	1410499.71	635174.76	33.80	39.22	-5.42	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
8	TREETOP	1412035.56	635212.23	41.40	36.51	4.89	47.08	+5.68	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
9	TREETOP	1413414.42	635254.48	46.10	34.89	11.21	45.66	0.44	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
10	TREETOP	1409765.03	635063.94	42.90	43.25	+0.35	52.69	+9.79	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
11	TREETOP	1413523.21	635258.57	52.40	34.78	+2.38	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
12	TREETOP	1412354.01	635248.84	44.90	35.00	9.90	45.68	+0.78	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
13	TREETOP	1410814.91	635156.82	56.40	40.33	+16.1	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
14	TREETOP	1409550.09	635028.84	40.60	44.59	+3.99	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
15	TREETOP	1409166.66	635023.46	40.00	44.95	+4.95	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
16	TREETOP	1409881.63	635198.38	35.20	39.47	+4.27	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
17	TREETOP	1409863.34	635208.75	37.60	39.14	+1.54	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
18	TREETOP	1409857.12	635178.79	38.30	40.18	+1.88	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
19	TREETOP	1409849.77	635143.73	35.10	41.30	+6.20	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
20	TREETOP	1417735.74	634628.86	54.40	57.71	+3.31	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
21	TREETOP	1409935.36	635195.52	34.20	39.98	+5.78	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
22	UTILITY POLE	1413535.89	635233.17	56.20	54.27	1.93	65.17	+8.97	N/A***	N/A***	N/A***	N/A***	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 17)
23	UTILITY POLE	1409078.71	635265.51	37.10	38.27	+1.17	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*NO ACTION
24	TREETOP	1415830.04	635669.9	34.20	19.74	4.46	32.82	+4.62	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
25	TREETOP	1416167.79	635782.26	37.50	16.46	6.04	30.03	+7.53	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
26	TREETOP	1414495.52	635487.28	27.60	25.49	2.11	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
27	TREETOP	1415107.31	635522.72	33.10	24.70	8.40	36.99	+3.89	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
28	TREETOP	1415930.79	635714.73	29.00	18.45	10.55	31.72	+2.72	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
29	TREETOP	1416536.29	635829.44	24.90	14.82	10.08	28.59	+3.69	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
30	TREETOP	1414580.14	635919.59	26.90	11.87	15.03	26.13	0.77	N/A***	N/A***	33.26	+6.36	ON	YES	*TO BE CLEARED OR TRIMMED
31	TREETOP	1415270.71	635532.82	30.10	24.26	5.84	35.66	+5.56	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
32	TREETOP	1416895.51	635937.8	22.20	11.35	10.85	25.68	+3.48	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
33	TREETOP	1414468.78	635818.55	25.40	14.51	10.89	28.38	+2.98	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
34	TREETOP	1416229.06	635789.47	24.80	15.96	8.84	29.61	+4.81	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
35	TREETOP	1411080.3	635692.79	28.40	19.13	9.27	32.30	+3.90	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
36	TREETOP	1410664.03	635669.88	23.00	13.39	9.61	27.42	+4.42	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
37	TREETOP	1410445.18	635600.37	21.70	14.98	6.72	28.77	+7.07	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
38	TREETOP	1411703.7	635956.87	19.90	10.63	9.27	25.08	+5.18	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
39	TREETOP	1410641.32	635798.71	23.70	13.71	7.99	29.23	+5.53	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
40	TREETOP	1410145.46	635782.96	24.40	16.17	8.23	29.79	+5.39	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
41	TREETOP	1417124.2	635964.16	20.40	10.44	9.96	24.75	+4.35	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
42	TREETOP	1414623.86	635747.21	26.10	17.24	8.86	30.69	+4.59	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
43	TREETOP	1416550.56	635808.47	24.00	15.33	8.67	29.07	+5.07	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
44	TREETOP	1410844.63	635889.34	25.60	12.62	12.98	28.77	+3.17	N/A***	N/A***	34.11	+8.51	ON	YES	*TO BE CLEARED OR TRIMMED
45	TREETOP	1416661.76	635851.95	26.50	14.53	11.97	28.35	+1.85	N/A***	N/A***	36.28	+9.78	ON	YES	*TO BE CLEARED OR TRIMMED
46	TREETOP	1411644.01	635593.39	24.30	22.12	2.18	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
47	TREETOP	1416719.91	635848.72	25.40	14.01	11.39	27.64	+2.44	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
48	TREETOP	1411597.97	635670.88	26.30	19.81	6.49	32.66	+6.36	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
49	TREETOP	1416164.64	635791.27	23.00	18.63	4.37	31.87	+8.87	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
50	TREETOP	1416177.64	635858.87	24.90	13.69	11.21	27.51	+2.61	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
51	TREETOP	1416540.48	635759.11	26.80	16.80	10.00	30.20	+3.40	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
52	TREETOP	1416939.36	635804.48	27.00	15.21	11.79	28.97	+1.97	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
53	TREETOP	1411649.72	635780.67	26.50	16.00	10.50	29.64	+3.14	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
54	TREETOP	1416530.44	635730.16	25.80	17.59	8.21	30.99	+5.19	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
55	TREETOP	1416641.97	635752.22	28.50	16.93	11.57	30.58	+2.08	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
56	TREETOP	1412137.7	634113.09	40.40	49.96	+9.56	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
57	TREETOP	1415661.75	635565.09	25.90	22.80	3.10	35.42	+9.52	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
58	TREETOP	1412093.92	634702.26	41.00	50.29	+9.29	N/A*	N/A*	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
59	TREETOP	1416163.64	635671.43	26.30	19.44	6.86	32.57	+6.27	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
60	TREETOP	1409802.34	635125.85	33.80	43.41	+7.61	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
61	TREETOP	1412131.81	634688.57	44.90	50.70	+5.80	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
62	TREETOP	1408813.77	635165.11	36.40	42.16	+5.76	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
63	TREETOP	1413490.87	635563.33	30.30	29.15	1.15	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
64	TREETOP	1417054.62	635699.13	39.50	24.81	4.69	36.92	2.42	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
65	TREETOP	1415238.87	635418.74	33.00	27.32	5.68	39.15	+6.15	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
66	TREETOP	1411154.13	634517.46	46.00	55.93	+9.93	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
67	TREETOP	1413536.34	635440.39	29.40	26.53	2.87	38.55	+9.15	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
68	TREETOP	1412225.35	634685.75	42.70	50.66	+7.96	N/A*	N/A*	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
69	TREETOP	1413525.28	635405.89	32.40	27.59	4.81	39.50	+7.10	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
70	TREETOP	1412227.04	634679.3	41.00	50.80	+9.80	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
71	TREETOP	1408053.07	634834.1	46.00	53.66	+7.66	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
72	TREETOP	1412227.86	634694.65	42.20	50.14	+7.94	N/A*	N/A*	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
73	TREETOP	1407713.8	635195.21	42.00	41.80	0.20	51.57	+9.57	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
74	TREETOP	1406463.17	634661.78	56.60	65.17	+8.57	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
75	TREETOP	1406533.82	634864.57	43.40	51.79	+8.39	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
76	TREETOP	1411700.65	635863.2	27.00	13.27	13.73	27.32	-0.32	N/A***	N/A***	34.84	+7.84	ON	YES	*TO BE CLEARED OR TRIMMED
77	TREETOP	1411769.05	636054.95	21.50	7.18	14.32	22.14	-0.64	29.83	+8.33	27.95	+6.45	ON	YES	*TO BE CLEARED OR TRIMMED

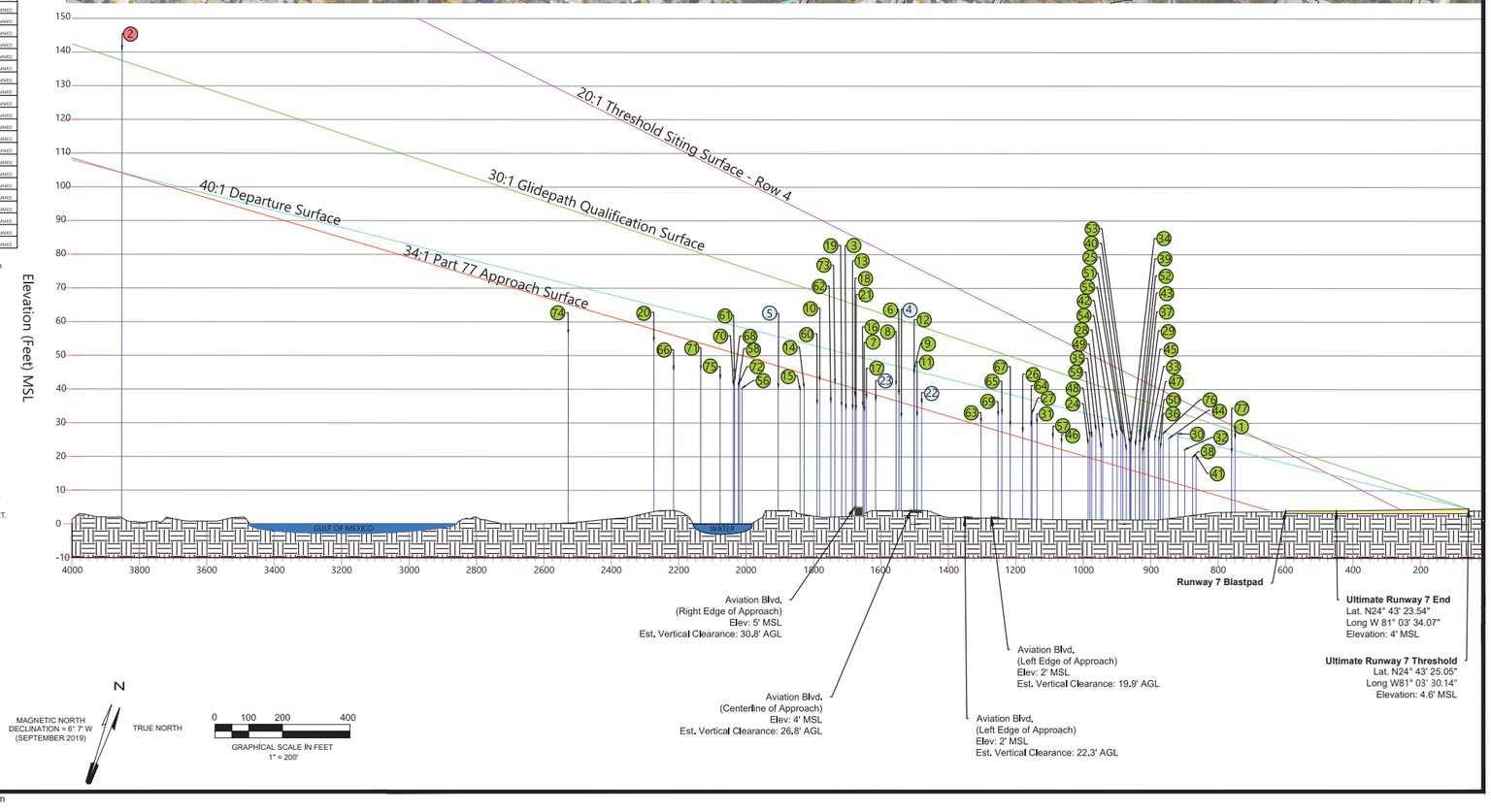
*RECOMMENDED ACTION INDICATES OBSTRUCTIONS THAT EXIST WITHIN THE DIMENSIONS OF THE EXISTING FAA FAR PART 77 SURFACES.
**DIMENSIONAL STANDARDS APPLICABLE TO THRESHOLD SITING SURFACE BASED ON LATEST VERSION OF TABLE 3-2 AS DIRECTED IN FAA ENGINEERING BRIEF #99 AUTHORIZED 09.20.2019.
***N/A INDICATES THAT OBSTRUCTION DOES NOT PENETRATE SURFACE INDICATED IN THE APPLICABLE COLUMN IN DATA TABLE.

NOTES:
1. SEE AIRSPACE DRAWINGS FOR DETAILED OBSTRUCTIONS TO PRIMARY SURFACE. SEE SHEET 7 FOR OBSTRUCTION DATA.
2. OBSTACLE ANALYSIS CONDUCTED BY MARTINEZ GEOSPATIAL BASED ON AERIAL MAPPING OBTAINED FROM SANBORN MAPPING COMPANY APRIL 2016.
3. ESTABLISHED ULTIMATE AIRPORT ELEVATION 5.2' MSL.
4. BASE MAP SOURCE: AERIAL IMAGERY OBTAINED FROM SANBORN MAPPING COMPANY APRIL 2016.
5. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
6. GROUND PROFILE DRAWN FROM CONTOURS OBTAINED FROM FLORIDA GEOGRAPHIC DATA LIBRARY.
7. ALL ELEVATIONS ARE IN FEET (MSL).
8. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
9. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
10. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
11. SLOPES AND RUNWAY PROTECTION ZONES CONFORM TO FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
12. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
13. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 NORTH AS SHOWN IN THE ULTIMATE CONDITION.
14. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
15. THE AIRPORT SPONSOR IS RESPONSIBLE FOR THE MANAGEMENT OF VEGETATION IN ACCORDANCE WITH ENGINEERING BRIEF #91.
16. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017). THE ELEVATION OF THE WIND SENSOR WILL NEED TO BE DETERMINED DURING THE DESIGN OF THE ASOS TO MINIMIZE THE NUMBER OF OBSTRUCTIONS WITHIN THE 500 FOOT RADIUS.
17. POTENTIAL OBSTRUCTION MITIGATION NEEDS WILL BE IDENTIFIED IN CONSULTATION WITH THE FAA DURING THE DESIGN PHASE OF THE RUNWAY 7-25 RELOCATION PROJECT.

LEGEND

	PART 77 APPROACH SURFACE		TREE OBSTRUCTION
	PART 77 PRIMARY SURFACE		UTILITY OBSTRUCTION
	GLIDEPATH QUALIFICATION SURFACE		ANTENNA OBSTRUCTION
	THRESHOLD SITING SURFACE		2' GROUND CONTOURS
	DEPARTURE SURFACE		EXISTING AIRFIELD PAVEMENT
	PARCEL BOUNDARIES		GROUND PROFILE
	EXTENDED RUNWAY CENTERLINE		AIRFIELD PAVEMENT TO BE DEMOLISHED
	AIRPORT PROPERTY BOUNDARY		FUTURE AIRFIELD PAVEMENT
RPZ	RUNWAY PROTECTION ZONE (RPZ)		ULTIMATE AIRFIELD PAVEMENT
OFZ	RUNWAY OBSTACLE FREE ZONE (OFZ)		MARATHON MUNICIPAL BOUNDARY
ROFA	RUNWAY OBJECT FREE AREA (ROFA)		FUTURE ON-AIRPORT BUILDINGS
RSA	RUNWAY SAFETY AREA (RSA)		EXISTING ON-AIRPORT BUILDINGS
	AOA/ SECURITY/ OTHER FENCING		EXISTING/FUTURE STORMWATER DRAINAGE AREA
	AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS) CRITICAL AREAS		





MONROE COUNTY 18 23

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NO.	REVISIONS	DATE

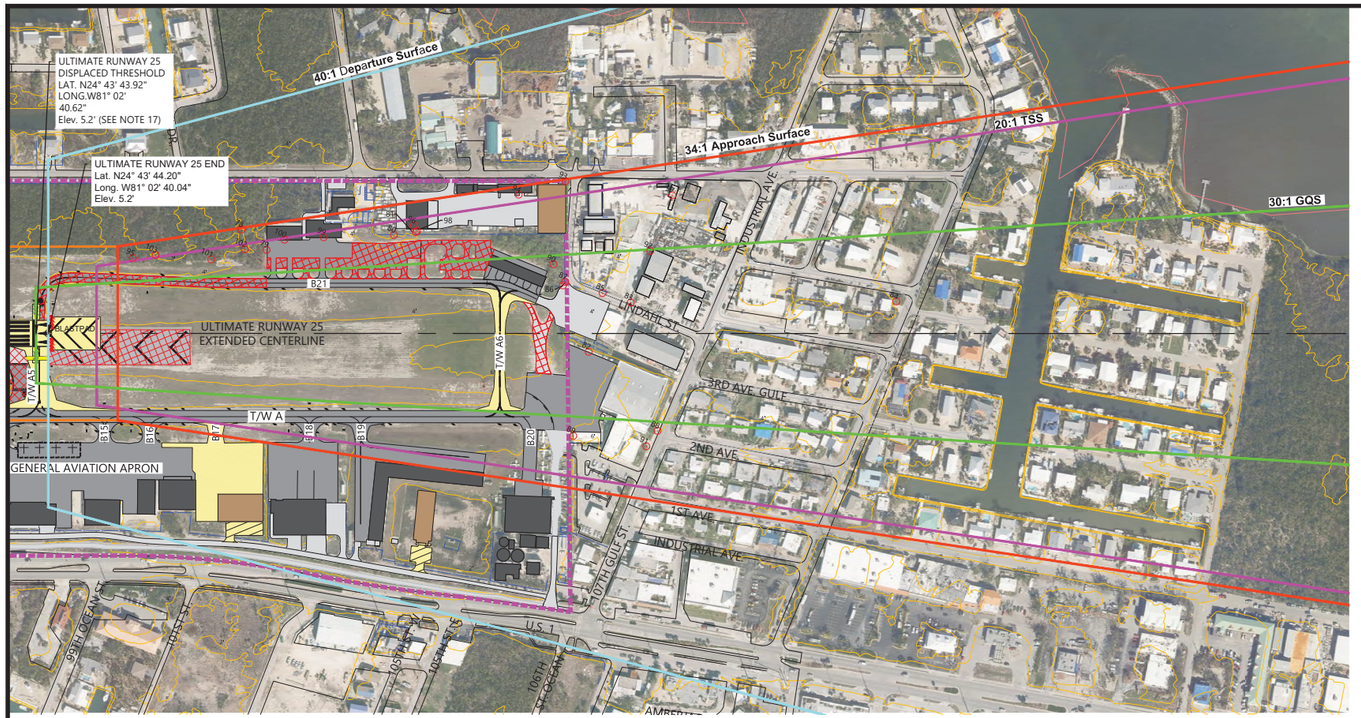
INNER PORTION OF THE APPROACH SURFACE - RUNWAY 7

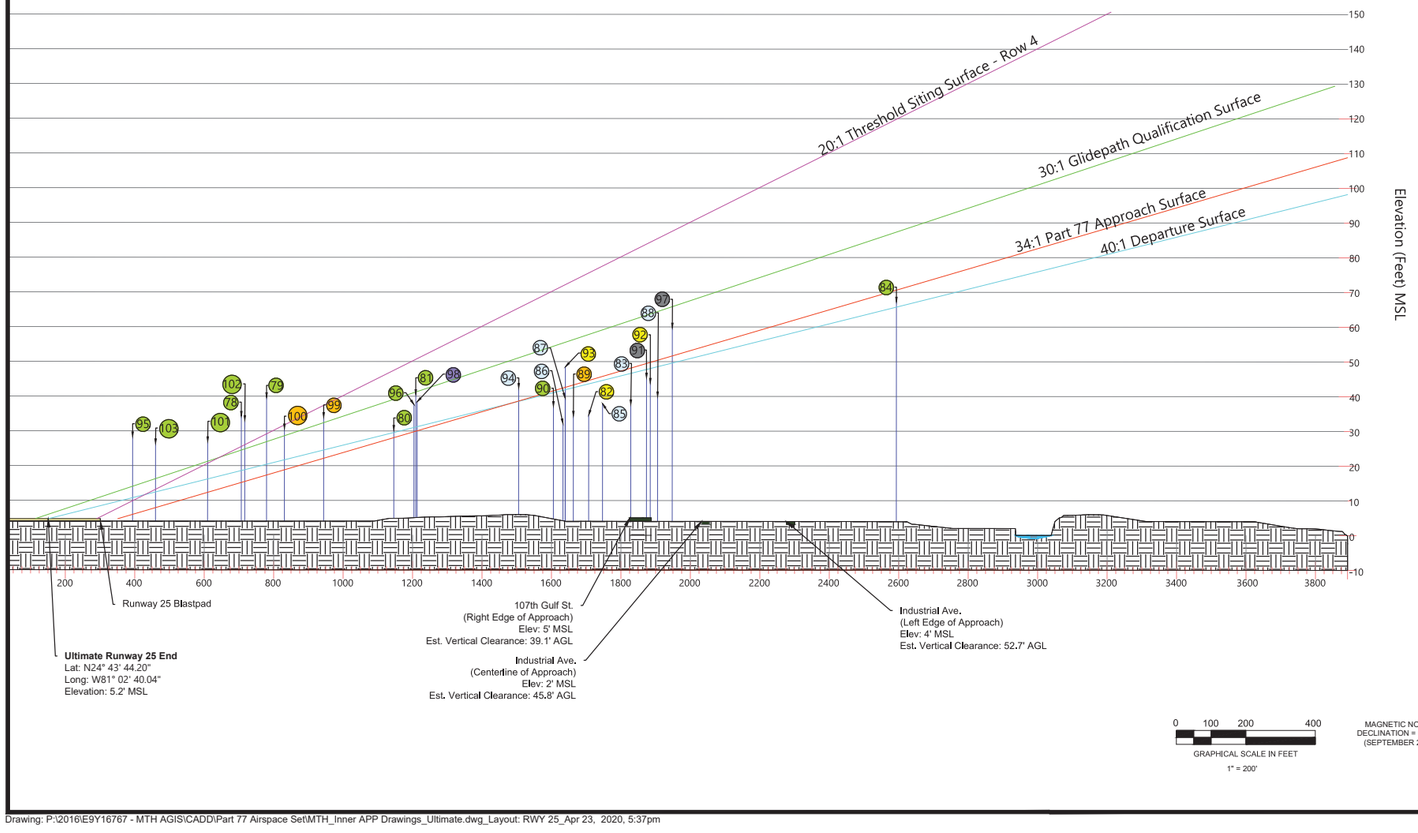
FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: NFP
CHECKED BY: HHM
PREPARED BY: JACOBS
DATE: JUNE 2020

Drawing: P:\2016\E9Y16767 - MTH AGIS\CADD\Part 77 Airspace Set\MTH_Inner APP Drawings_Ultimate.dwg_Layout: RWY 7_Apr 23, 2020, 6:08pm

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018





0 100 200 400
GRAPHICAL SCALE IN FEET
1" = 200'

N
MAGNETIC NORTH
DECLINATION = 6° 7' W
(SEPTEMBER 2019)
TRUE NORTH

Runway 25 Obstruction Data Table

Obstructions Information					14 CFR 77 Approach - RWY 25		Runway 25 Departure Surface (7 End)		Threshold Siting Surface (Row 4**)		Glidepath Qualification Surface (GQS)				
Point ID	Obstruction Information	Northing	Easting	Elevation (MSL ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Surface Elevation (MSL ft.)	Surface Penetration (ft.)	Obstacle Located ON or OFF Airport	Under Sponsor Control	Recommended Action
78	TREETOP	144251.77	641809.36	34.2	14.52	19.68	17.96	16.24	N/A***	N/A***	N/A***	N/A***	ON	YES	TO BE CLEARED OR TRIMMED
79	TREETOP	144225.43	641899.10	39.6	16.55	23.05	19.75	19.85	29.39	10.21	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
80	TREETOP	144406.58	642220.67	30.2	27.4	2.8	28.91	1.29	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
81	TREETOP	144438.58	642275.73	40.5	29.29	11.21	30.47	10.03	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
82	LIGHT POLE	144312.84	642867.07	34.6	43.82	-9.22	42.87	-8.27	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
83	UTILITY POLE	144490.14	642925.15	37.6	47.69	-10.09	45.94	-8.34	N/A***	N/A***	N/A***	N/A***	ON	NO	*NO ACTION
84	TREETOP	144788.5	643629.36	67.2	70.01	-2.81	65.1	2.1	N/A***	N/A***	N/A***	N/A***	OFF	NO	*TO BE CLEARED OR TRIMMED
85	UTILITY POLE	144484.43	642839.47	37.9	41.13	-3.23	40.94	-3.04	N/A***	N/A***	N/A***	N/A***	OFF	NO	*NO ACTION
86	UTILITY POLE	144460.55	642725.97	32.1	41.72	-9.62	41.04	-8.94	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
87	UTILITY POLE	144472.54	642727.70	39.5	41.84	-2.34	41.19	-1.69	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
88	UTILITY POLE	144179.46	643138.54	39.9	49.67	-9.77	47.8	-7.9	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
89	BUILDING ELEVATION	144072.49	642920.36	34.3	42.59	-8.29	41.83	-7.53	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
90	TREETOP	144506.09	642677.1	37.1	40.88	-3.78	40.32	-3.22	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
91	FLAGPOLE	144125.74	643126.29	45.3	49.77	-4.47	47.04	-1.74	N/A***	N/A***	N/A***	N/A***	ON	YES	*NO ACTION
92	LIGHT POLE	144649.04	642919.65	43.8	49.17	-5.37	47.37	-3.57	N/A***	N/A***	N/A***	N/A***	OFF	NO	*NO ACTION
93	LIGHT POLE	144739.74	642616.98	48.5	41.92	6.58	41.21	7.29	N/A***	N/A***	N/A***	N/A***	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
94	UTILITY POLE	144652.44	642507.6	42.3	37.91	4.39	37.85	4.45	N/A***	N/A***	N/A***	N/A***	ON	YES	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
95	TREETOP	144051.11	641552.33	28.3	5.26	23.04	10.04	18.26	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
96	VENT ON BUILDING	144454.06	642263.72	37.6	29.05	8.55	30.38	7.22	N/A***	N/A***	N/A***	N/A***	ON	YES	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
97	FLAGPOLE	144821.28	642916.39	59.7	50.96	8.74	48.94	10.76	N/A***	N/A***	N/A***	N/A***	OFF	NO	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
98	TREETOP	144461.54	642277.93	38.4	29.35	9.05	30.52	7.88	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
99	BUILDING ELEVATION	144332.45	642018.8	33.9	21.42	12.48	23.83	10.07	37.63	-3.71	N/A***	N/A***	ON	YES	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
100	BUILDING ELEVATION	144272.15	641935.23	30.8	18.14	12.66	21.04	9.76	33.96	-3.16	N/A***	N/A***	ON	YES	*FURTHER AERONAUTICAL STUDY REQUIRED (SEE NOTE 18)
101	TREETOP	144138.75	641762.33	26.9	11.93	14.98	15.7	11.2	27.41	-5.49	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
102	TREETOP	144202.54	641840.77	33	14.77	18.23	18.17	14.83	26.25	6.75	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED
103	TREETOP	144088.76	641699.85	26.3	7.28	19.02	11.76	14.54	N/A***	N/A***	N/A***	N/A***	ON	YES	*TO BE CLEARED OR TRIMMED

*RECOMMENDED ACTION INDICATES OBSTRUCTIONS THAT EXIST WITHIN THE DIMENSIONS OF THE EXISTING FAA FAR PART 77 SURFACES.
**DIMENSIONAL STANDARDS APPLICABLE TO THRESHOLD SITING SURFACE BASED ON LATEST VERSION OF TABLE 3-2 AS DIRECTED IN FAA ENGINEERING BRIEF #99 AUTHORIZED 09.20.2019.
***N/A INDICATES THAT OBSTRUCTION DOES NOT PENETRATE SURFACE INDICATED IN THE APPLICABLE COLUMN IN DATA TABLE.

NOTES:

1. SEE AIRSPACE DRAWINGS FOR DETAILED OBSTRUCTIONS TO PRIMARY SURFACE. SEE SHEET 7 FOR OBSTRUCTION DATA.
2. OBSTACLE ANALYSIS CONDUCTED BY MARTINEZ GEOSPATIAL BASED ON AERIAL MAPPING OBTAINED FROM SANBORN MAPPING COMPANY APRIL 2016.
3. ESTABLISHED ULTIMATE AIRPORT ELEVATION 5.2' MSL.
4. BASE MAP SOURCE: AERIAL IMAGERY OBTAINED FROM SANBORN MAPPING COMPANY APRIL 2016.
5. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
6. GROUND PROFILE DRAWN FROM CONTOURS OBTAINED FROM FLORIDA GEOGRAPHIC DATA LIBRARY.
7. ALL ELEVATIONS ARE IN FEET (MSL).
8. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
9. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET. (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017).
10. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
11. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
12. SLOPES AND RUNWAY PROTECTION ZONES CONFORM TO FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
13. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
14. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40' NORTH AS SHOWN IN THE ULTIMATE CONDITION.
15. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
16. THE AIRPORT SPONSOR IS RESPONSIBLE FOR THE MANAGEMENT OF VEGETATION IN ACCORDANCE WITH ENGINEERING BRIEF #91.
17. THE RUNWAY 25 END ELEVATION WILL BE DEFINED DURING THE DESIGN PROCESS. THE FUTURE/ULTIMATE RUNWAY END ELEVATION MAY ELIMINATE THE NEED FOR A DISPLACED THRESHOLD.
18. POTENTIAL OBSTRUCTION MITIGATION NEEDS WILL BE IDENTIFIED IN CONSULTATION WITH THE FAA DURING THE DESIGN PHASE OF THE RUNWAY 7-25 RELOCATION PROJECT.

LEGEND

	PART 77 APPROACH SURFACE		TREE OBSTRUCTION
	PART 77 PRIMARY SURFACE		UTILITY OBSTRUCTION
	GLIDEPATH QUALIFICATION SURFACE		LIGHT POLE OBSTRUCTION
	THRESHOLD SITING SURFACE		FLAGPOLE OBSTRUCTION
	DEPARTURE SURFACE		BUILDING ELEVATION OBSTRUCTION
	PARCEL BOUNDARIES		BUILDING VENT OBSTRUCTION
	EXTENDED RUNWAY CENTERLINE		2' GROUND CONTOURS
	AIRPORT PROPERTY BOUNDARY		AIRFIELD PAVEMENT
OFZ	RUNWAY OBSTACLE FREE ZONE (OFZ)		GROUND PROFILE
ROFA	RUNWAY OBJECT FREE AREA (ROFA)		AIRFIELD PAVEMENT TO BE DEMOLISHED
RSA	RUNWAY SAFETY AREA (RSA)		FUTURE AIRFIELD PAVEMENT
	AOA/ SECURITY/ OTHER FENCING		MARATHON MUNICIPAL BOUNDARY
	FUTURE ON-AIRPORT BUILDINGS		EXISTING ON-AIRPORT BUILDINGS
RPZ	APPROACH/DEPARTUE RUNWAY PROTECTION ZONES (RPZ)		EXISTING/ULTIMATE STORMWATER DRAINAGE AREA

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NO.	REVISIONS	DATE

INNER PORTION OF THE APPROACH SURFACE - RUNWAY 25

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

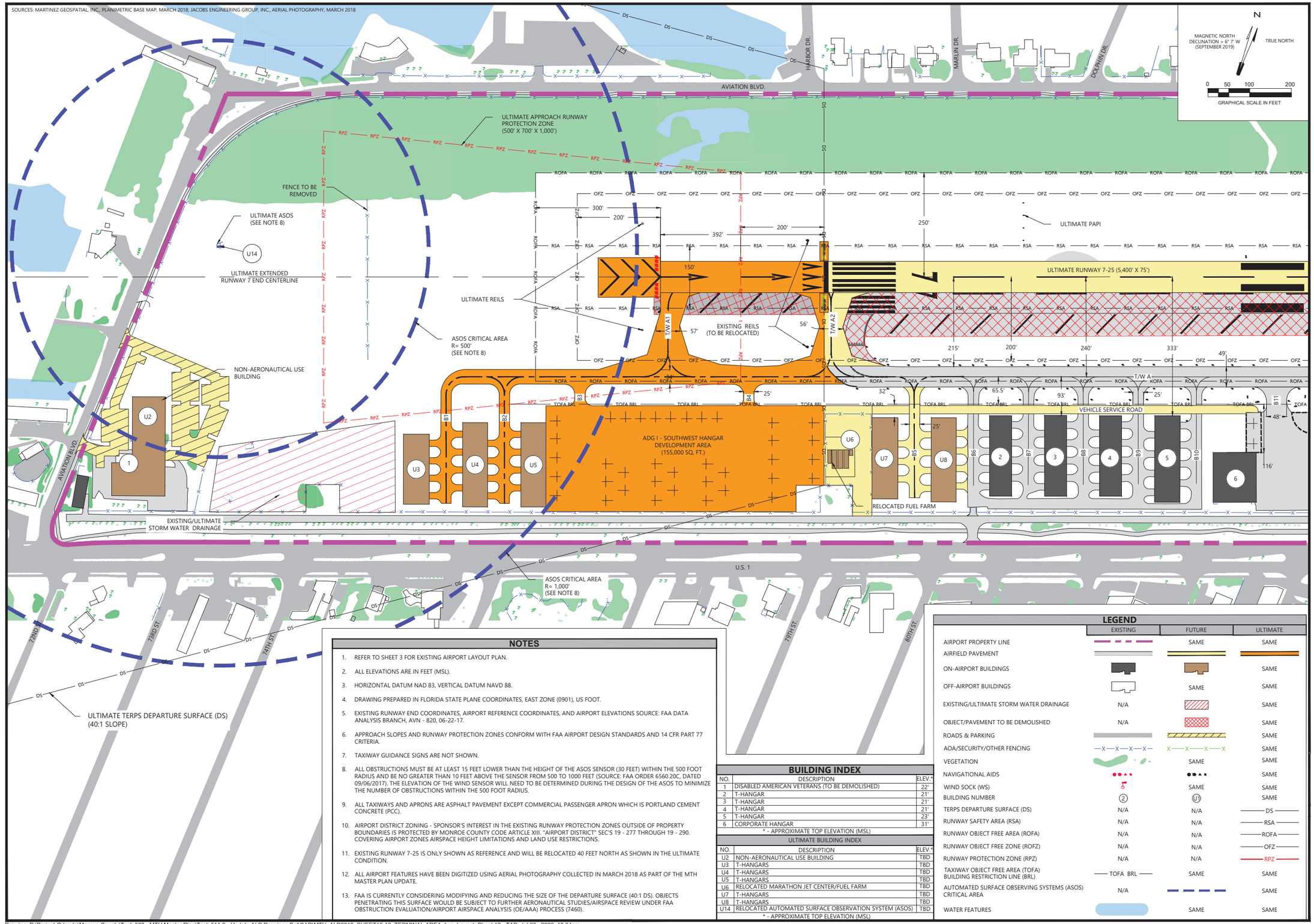
DRAWN BY: NFP
CHECKED BY: HHM

PREPARED BY:
JACOBS

DATE:
JUNE 2020

Drawing: P:\2016\E9Y16767 - MTH AGIS\CADD\Part 77 Airspace Set\MTH_Inner APP Drawings_Ultimate.dwg_Layout: RWY 25_Apr 23, 2020, 5:37pm

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018



NOTES

1. REFER TO SHEET 3 FOR EXISTING AIRPORT LAYOUT PLAN.
2. ALL ELEVATIONS ARE IN FEET (MSL).
3. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
4. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
5. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
6. APPROACH SLOPES AND RUNWAY PROTECTION ZONES CONFORM WITH FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
7. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
8. ALL OBSTRUCTIONS MUST BE AT LEAST 15 FEET LOWER THAN THE HEIGHT OF THE ASOS SENSOR (30 FEET) WITHIN THE 500 FOOT RADIUS AND BE NO GREATER THAN 10 FEET ABOVE THE SENSOR FROM 500 TO 1000 FEET (SOURCE: FAA ORDER 6560.20C, DATED 09/06/2017). THE ELEVATION OF THE WIND SENSOR WILL NEED TO BE DETERMINED DURING THE DESIGN OF THE ASOS TO MINIMIZE THE NUMBER OF OBSTRUCTIONS WITHIN THE 500 FOOT RADIUS.
9. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
10. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
11. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 FEET NORTH AS SHOWN IN THE ULTIMATE CONDITION.
12. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
13. FAA IS CURRENTLY CONSIDERING MODIFYING AND REDUCING THE SIZE OF THE DEPARTURE SURFACE (40:1 DS). OBJECTS PENETRATING THIS SURFACE WOULD BE SUBJECT TO FURTHER AERONAUTICAL STUDIES/AIRSPACE REVIEW UNDER FAA OBSTRUCTION EVALUATION/AIRPORT AIRSPACE ANALYSIS (OE/AAA) PROCESS (7460).

BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
1	DISABLED AMERICAN VETERANS (TO BE DEMOLISHED)	22'
2	T-HANGAR	21'
3	T-HANGAR	21'
4	T-HANGAR	21'
5	T-HANGAR	23'
6	CORPORATE HANGAR	31'

* - APPROXIMATE TOP ELEVATION (MSL)

ULTIMATE BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
U2	NON-AERONAUTICAL USE BUILDING	TBD
U3	T-HANGARS	TBD
U4	T-HANGARS	TBD
U5	T-HANGARS	TBD
U6	RELOCATED MARATHON JET CENTER/FUEL FARM	TBD
U7	T-HANGARS	TBD
U8	T-HANGARS	TBD
U14	RELOCATED AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS)	TBD

* - APPROXIMATE TOP ELEVATION (MSL)

LEGEND

	EXISTING	FUTURE	ULTIMATE
AIRPORT PROPERTY LINE		SAME	SAME
AIRFIELD PAVEMENT			
ON-AIRPORT BUILDINGS			SAME
OFF-AIRPORT BUILDINGS		SAME	SAME
EXISTING/ULTIMATE STORM WATER DRAINAGE	N/A		SAME
OBJECT/PAVEMENT TO BE DEMOLISHED	N/A		SAME
ROADS & PARKING			SAME
AOA/SECURITY/OTHER FENCING			SAME
VEGETATION		SAME	SAME
NAVIGATIONAL AIDS			SAME
WIND SOCK (WS)		SAME	SAME
BUILDING NUMBER	(2)	(U1)	SAME
TERPS DEPARTURE SURFACE (DS)	N/A	N/A	DS
RUNWAY SAFETY AREA (RSA)	N/A	N/A	RSA
RUNWAY OBJECT FREE AREA (ROFA)	N/A	N/A	ROFA
RUNWAY OBJECT FREE ZONE (ROFZ)	N/A	N/A	OFZ
RUNWAY PROTECTION ZONE (RPZ)	N/A	N/A	RPZ
TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)	TOFA BRL	SAME	SAME
AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS) CRITICAL AREA	N/A		SAME
WATER FEATURES		SAME	SAME

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ORLANDO, FL 32801
PHONE (407) 381-5730

NO.	REVISIONS	DATE

TERMINAL AREA PLAN (SHEET 1 OF 3)

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: KS

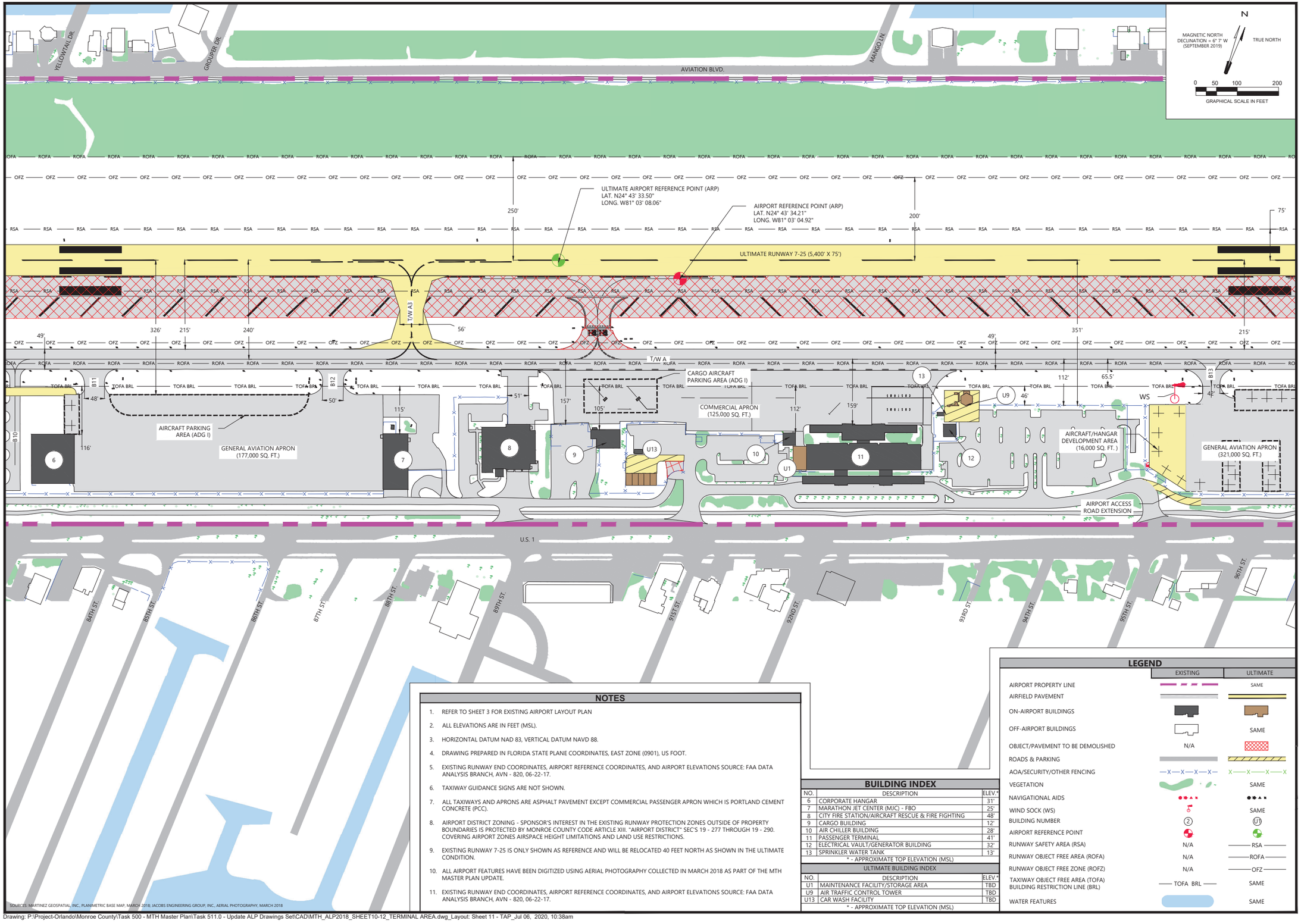
CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

SHEET 10 OF 14

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET10-12_TERMINAL AREA.dwg_Layout: Sheet 10 - TAP_Jul 06, 2020, 10:34am



NOTES

1. REFER TO SHEET 3 FOR EXISTING AIRPORT LAYOUT PLAN
2. ALL ELEVATIONS ARE IN FEET (MSL).
3. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
4. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
5. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
6. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
7. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
8. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
9. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 FEET NORTH AS SHOWN IN THE ULTIMATE CONDITION.
10. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
11. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.

BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
6	CORPORATE HANGAR	31'
7	MARATHON JET CENTER (MJC) - FBO	25'
8	CITY FIRE STATION/AIRCRAFT RESCUE & FIRE FIGHTING	48'
9	CARGO BUILDING	12'
10	AIR CHILLER BUILDING	28'
11	PASSENGER TERMINAL	41'
12	ELECTRICAL VAULT/GENERATOR BUILDING	32'
13	SPRINKLER WATER TANK	13'

* - APPROXIMATE TOP ELEVATION (MSL)

ULTIMATE BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
U1	MAINTENANCE FACILITY/STORAGE AREA	TBD
U9	AIR TRAFFIC CONTROL TOWER	TBD
U13	CAR WASH FACILITY	TBD

* - APPROXIMATE TOP ELEVATION (MSL)

LEGEND

	EXISTING	ULTIMATE
AIRPORT PROPERTY LINE		SAME
AIRFIELD PAVEMENT		
ON-AIRPORT BUILDINGS		
OFF-AIRPORT BUILDINGS		SAME
OBJECT/PAVEMENT TO BE DEMOLISHED	N/A	
ROADS & PARKING		
AOA/SECURITY/OTHER FENCING		
VEGETATION		SAME
NAVIGATIONAL AIDS		SAME
WIND SOCK (WS)		SAME
BUILDING NUMBER	(2)	(U1)
AIRPORT REFERENCE POINT		
RUNWAY SAFETY AREA (RSA)	N/A	RSA
RUNWAY OBJECT FREE AREA (ROFA)	N/A	ROFA
RUNWAY OBJECT FREE ZONE (ROFZ)	N/A	OFZ
TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)	TOFA BRL	SAME
WATER FEATURES		SAME

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

MONROE COUNTY

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PHONE (407) 381-5730

NO.	REVISIONS	DATE

TERMINAL AREA PLAN (SHEET 2 OF 3)

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: KS

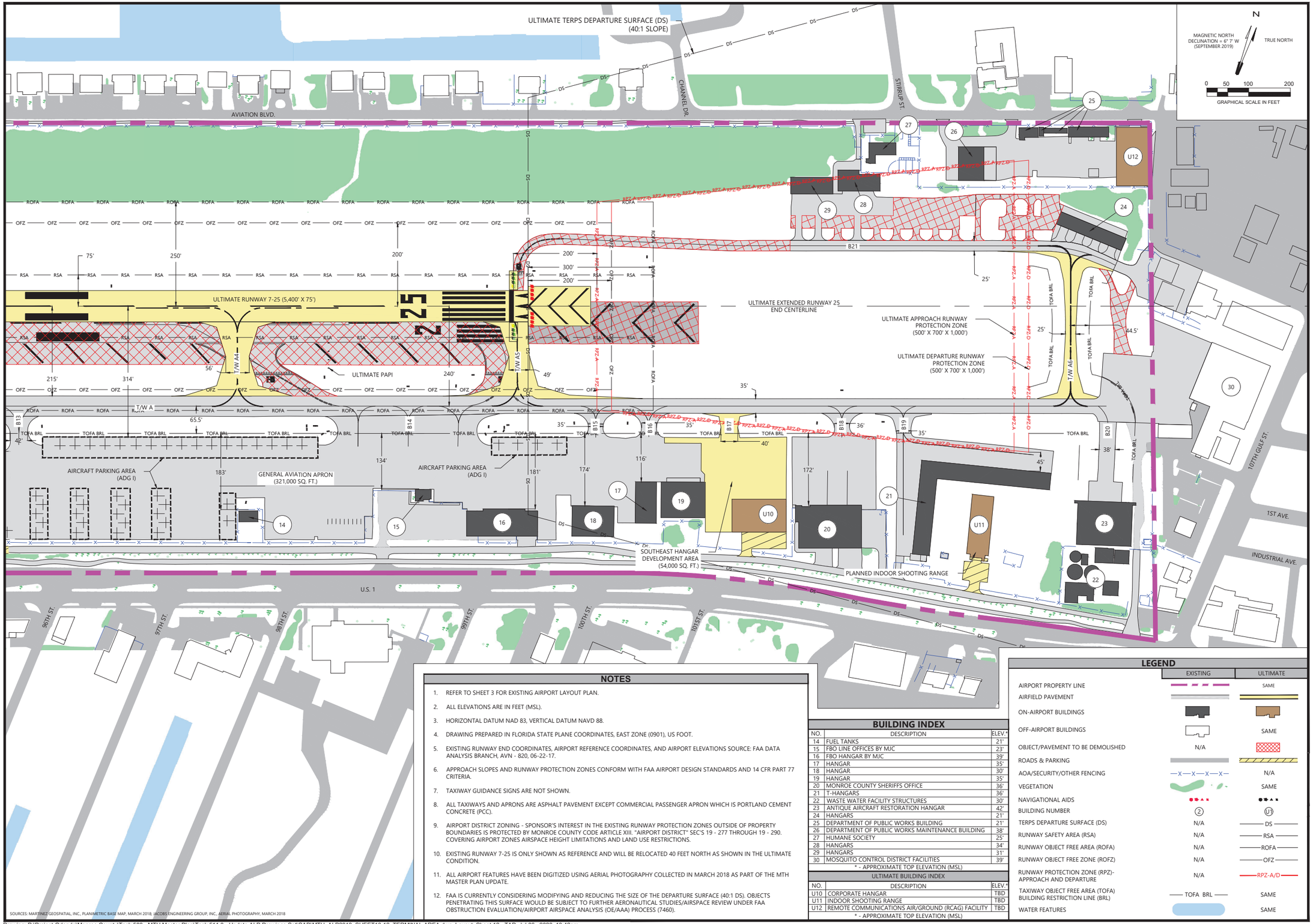
CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

SHEET 11 OF 14

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET10-12_TERMINAL AREA.dwg_Layout: Sheet 11 - TAP_Jul 06, 2020, 10:38am



NOTES

1. REFER TO SHEET 3 FOR EXISTING AIRPORT LAYOUT PLAN.
2. ALL ELEVATIONS ARE IN FEET (MSL).
3. HORIZONTAL DATUM NAD 83, VERTICAL DATUM NAVD 88.
4. DRAWING PREPARED IN FLORIDA STATE PLANE COORDINATES, EAST ZONE (0901), US FOOT.
5. EXISTING RUNWAY END COORDINATES, AIRPORT REFERENCE COORDINATES, AND AIRPORT ELEVATIONS SOURCE: FAA DATA ANALYSIS BRANCH, AVN - 820, 06-22-17.
6. APPROACH SLOPES AND RUNWAY PROTECTION ZONES CONFORM WITH FAA AIRPORT DESIGN STANDARDS AND 14 CFR PART 77 CRITERIA.
7. TAXIWAY GUIDANCE SIGNS ARE NOT SHOWN.
8. ALL TAXIWAYS AND APRONS ARE ASPHALT PAVEMENT EXCEPT COMMERCIAL PASSENGER APRON WHICH IS PORTLAND CEMENT CONCRETE (PCC).
9. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.
10. EXISTING RUNWAY 7-25 IS ONLY SHOWN AS REFERENCE AND WILL BE RELOCATED 40 FEET NORTH AS SHOWN IN THE ULTIMATE CONDITION.
11. ALL AIRPORT FEATURES HAVE BEEN DIGITIZED USING AERIAL PHOTOGRAPHY COLLECTED IN MARCH 2018 AS PART OF THE MTH MASTER PLAN UPDATE.
12. FAA IS CURRENTLY CONSIDERING MODIFYING AND REDUCING THE SIZE OF THE DEPARTURE SURFACE (40:1 DS). OBJECTS PENETRATING THIS SURFACE WOULD BE SUBJECT TO FURTHER AERONAUTICAL STUDIES/AIRSPACE REVIEW UNDER FAA OBSTRUCTION EVALUATION/AIRPORT AIRSPACE ANALYSIS (OE/AAA) PROCESS (7460).

BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
14	FUEL TANKS	21'
15	FBO LINE OFFICES BY MJC	23'
16	FBO HANGAR BY MJC	39'
17	HANGAR	35'
18	HANGAR	30'
19	HANGAR	35'
20	MONROE COUNTY SHERIFFS OFFICE	36'
21	T-HANGARS	36'
22	WASTE WATER FACILITY STRUCTURES	30'
23	ANTIQUE AIRCRAFT RESTORATION HANGAR	42'
24	HANGARS	21'
25	DEPARTMENT OF PUBLIC WORKS BUILDING	21'
26	DEPARTMENT OF PUBLIC WORKS MAINTENANCE BUILDING	38'
27	HUMANE SOCIETY	25'
28	HANGARS	34'
29	HANGARS	31'
30	MOSQUITO CONTROL DISTRICT FACILITIES	39'

* - APPROXIMATE TOP ELEVATION (MSL)

ULTIMATE BUILDING INDEX

NO.	DESCRIPTION	ELEV.*
U10	CORPORATE HANGAR	TBD
U11	INDOOR SHOOTING RANGE	TBD
U12	REMOTE COMMUNICATIONS AIR/GROUND (RCAG) FACILITY	TBD

* - APPROXIMATE TOP ELEVATION (MSL)

LEGEND

	EXISTING	ULTIMATE
AIRPORT PROPERTY LINE		SAME
AIRFIELD PAVEMENT		
ON-AIRPORT BUILDINGS		
OFF-AIRPORT BUILDINGS		SAME
OBJECT/PAVEMENT TO BE DEMOLISHED	N/A	
ROADS & PARKING		
AOA/SECURITY/OTHER FENCING	—X—X—X—X—	N/A
VEGETATION		SAME
NAVIGATIONAL AIDS		
BUILDING NUMBER	(2)	(U1)
TERPS DEPARTURE SURFACE (DS)	N/A	DS
RUNWAY SAFETY AREA (RSA)	N/A	RSA
RUNWAY OBJECT FREE AREA (ROFA)	N/A	ROFA
RUNWAY OBJECT FREE ZONE (ROFZ)	N/A	OFZ
RUNWAY PROTECTION ZONE (RPZ)-APPROACH AND DEPARTURE	N/A	RPZ-A/D
TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)	TOFA BRL	SAME
WATER FEATURES		SAME

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018

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NO.	REVISIONS	DATE

TERMINAL AREA PLAN (SHEET 3 OF 3)

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

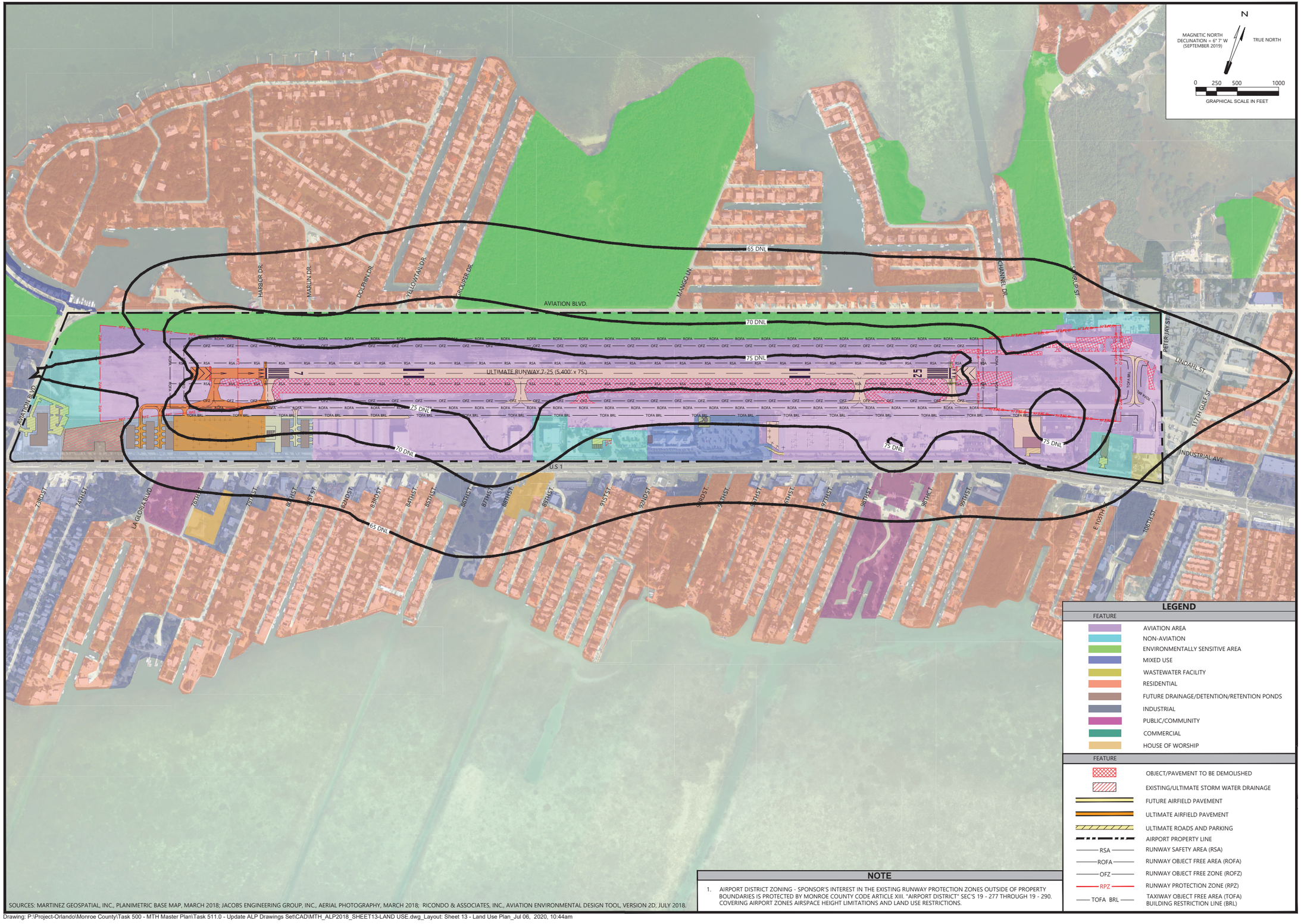
DRAWN BY: KS
CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

SHEET 12 OF 14

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET10-12_TERMINAL AREA.dwg_Layout: Sheet 12 - TAP_Jul 06, 2020, 10:42am



SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018; RICONDO & ASSOCIATES, INC., AVIATION ENVIRONMENTAL DESIGN TOOL, VERSION 2D, JULY 2018.

NOTE

1. AIRPORT DISTRICT ZONING - SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT" SEC'S 19 - 277 THROUGH 19 - 290. COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.

LEGEND

FEATURE	
	AVIATION AREA
	NON-AVIATION
	ENVIRONMENTALLY SENSITIVE AREA
	MIXED USE
	WASTEWATER FACILITY
	RESIDENTIAL
	FUTURE DRAINAGE/DETENTION/RETENTION PONDS
	INDUSTRIAL
	PUBLIC/COMMUNITY
	COMMERCIAL
	HOUSE OF WORSHIP

FEATURE	
	OBJECT/PAVEMENT TO BE DEMOLISHED
	EXISTING/ULTIMATE STORM WATER DRAINAGE
	FUTURE AIRFIELD PAVEMENT
	ULTIMATE AIRFIELD PAVEMENT
	ULTIMATE ROADS AND PARKING
	AIRPORT PROPERTY LINE
RSA	RUNWAY SAFETY AREA (RSA)
ROFA	RUNWAY OBJECT FREE AREA (ROFA)
OFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RPZ	RUNWAY PROTECTION ZONE (RPZ)
TOFA BRL	TAXIWAY OBJECT FREE AREA (TOFA) BUILDING RESTRICTION LINE (BRL)

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NO.	REVISIONS	DATE

ULTIMATE AIRPORT LAND USE PLAN

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

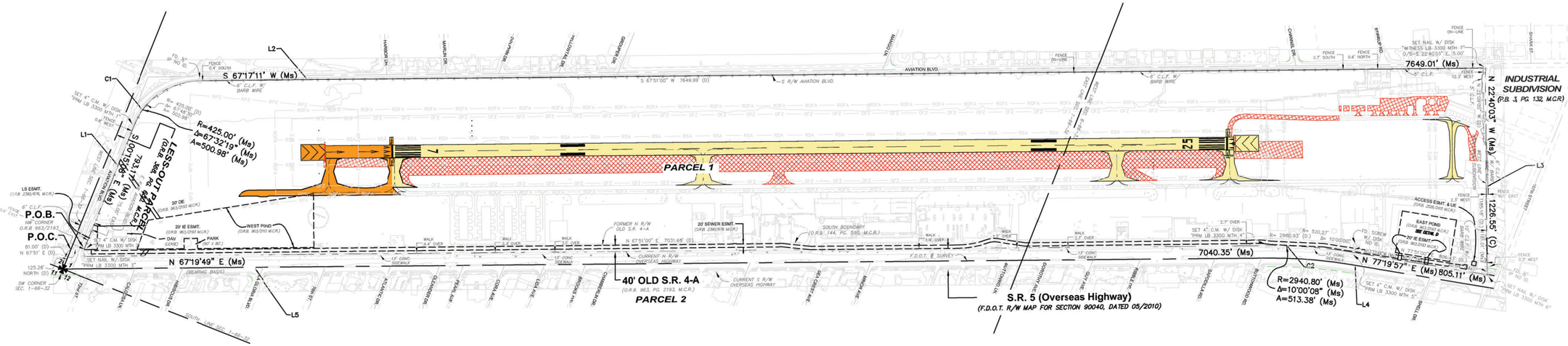
DRAWN BY: KS
CHECKED BY: SC

PREPARED BY:
RICONDO & ASSOCIATES, INC.

DATE:
JUNE 2020

Drawing: P:\Project-Orlando\Monroe County\Task 500 - MTH Master Plan\Task 511.0 - Update ALP Drawings Set\CAD\MTH_ALP2018_SHEET13-LAND USE.dwg_Layout: Sheet 13 - Land Use Plan_Jul 06, 2020, 10:44am

SOURCES: MARTINEZ GEOSPATIAL, INC., PLANIMETRIC BASE MAP, MARCH 2018; JACOBS ENGINEERING GROUP, INC., AERIAL PHOTOGRAPHY, MARCH 2018



PROPERTY ACQUISITION LEGEND:				
PARCEL NUMBER	ACRES	ACQUISITION TYPE	DATE ACQUIRED	METHOD ACQUIRED
1	189.72	FEE SIMPLE	1958	QUIT CLAIM DEED
2	7.68	FEE SIMPLE	1985	QUIT CLAIM DEED

LINE DATA:		
LINE	BEARING	DISTANCE
L1	S 00°15'08" E	793.17'
L2	S 67°17'11" W	7649.01'
L3	N 22°40'03" W	1226.55'
L4	N 77°19'57" E	805.11'
L5	N 67°19'49" E	7040.35'

CURVE DATA:			
CURVE	RADIUS	DELTA	LENGTH
C1	425.00'	67°32'19"	500.98'
C2	2940.80'	10°00'08"	513.38'

LEGAL DESCRIPTION (PARCEL "1")

A PARCEL OF LAND DESCRIBED AS COMMENCING AT A CONCRETE MONUMENT ON THE WEST BOUNDARY OF SECTION 1, TOWNSHIP 66 SOUTH, RANGE 32 EAST, AT A POINT 125.28 FEET NORTH OF THE SOUTHWEST CORNER OF SAID SECTION 1, AND RUN NORTH 67°51' EAST 54 FEET FOR POINT OF BEGINNING: THENCE CONTINUE NORTH 67°51' EAST 7058.68 FEET TO THE BEGINNING OF A CURVE TO RIGHT HAVING A RADIUS OF 2980.93 FEET AND CENTRAL ANGLE OF 10°00'; THENCE NORTHEASTERLY ALONG SAID CURVE TO RIGHT 520.27 FEET TO POINT OF TANGENCY; THENCE NORTH 77°51' EAST 896.43 FEET; THENCE NORTH 22°09' WEST 1185.18 FEET; THENCE SOUTH 67°51' WEST 7962.84 FEET TO A POINT 50 FEET EAST OF THE WEST LINE OF SECTION 1; THENCE SOUTH 00°02'30" WEST 1077.41 FEET TO THE POINT OF BEGINNING:
CONTAINING 189.72 ACRES, MORE OR LESS

LEGAL DESCRIPTION (PARCEL "2")

A PARCEL OF LAND IN SECTION 1, TOWNSHIP 66 SOUTH, RANGE 32 EAST AND IN SECTION 6, TOWNSHIP 66 SOUTH, RANGE 33 EAST, VACA KEY, MONROE COUNTY, FLORIDA, BEING THE NORTHERLY 40.00 REET OF STATE ROAD 4-A ADJOINING THE SOUTHERLY BOUNDARY OF THAT CERTAIN PARCEL "1" ACQUIRED FROM THE STATE OF FLORIDA, STATE ROAD DEPARTMENT BY QUIT CLAIM DEED, DATED DECEMBER 29, 1958, AND RECORDED IN OFFICIAL RECORDS BOOK 144, PAGE 590 AND 591 OF THE PUBLIC RECORDS OF MONROE COUNTY, FLORIDA LESS IN THE WEST 26.99 FEET THEREOF. SAID PARCEL CONTAINS 7.68 ACRES MORE OR LESS.

PARCEL "1"
(189.72 ACRES MORE OR LESS) ACQUIRED FROM THE STATE OF FLORIDA, STATE ROAD DEPT. BY QUIT CLAIM DEED DATED DECEMBER 29,1958, RECORDED IN BOOK 144, PAGE 590 OF THE OFFICIAL RECORDS OF MONROE COUNTY, FLORIDA

PARCEL "2" (40' R.O.W.)
(7.68 ACRES MORE OR LESS) ACQUIRED BY QUIT CLAIM DEED PER FDOT AGREEMENT DATED 1/29/85

NOTE NO.1
SPONSOR'S INTEREST IN THE EXISTING RUNWAY PROTECTION ZONES OUTSIDE OF PROPERTY BOUNDARIES IS PROTECTED BY MONROE COUNTY CODE ARTICLE XIII. "AIRPORT DISTRICT", SEC.'S 19-277 THROUGH 19-280, COVERING AIRPORT ZONES AIRSPACE HEIGHT LIMITATIONS AND LAND USE RESTRICTIONS.

TOTAL ACREAGE PARCELS 1 & 2 = 197.40

Boundary Survey Prepared by Avirom and Associates Inc.
July 2019

SURVEYOR'S REPORT:

1. Reproductions of this Sketch are not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
2. No Title Opinion or Abstract to the subject property has been provided. It is possible that there are Deeds, Easements, or other instruments (recorded or unrecorded) which may affect the subject property. No search of the Public Records has been made by the Surveyor.
3. The land description shown hereon was provided by the Client.
4. No underground improvements were located.
5. Improvements within 10 feet along the boundary lines were field located; however, the interior improvements were not field located, but is based on an imported digital file provided by Jacobs Project Management Co. of a planimetric drawing drawing produced from an aerial photogrammetric flight flown by Sanborn on September 2017.
6. Bearings and coordinates shown hereon are referenced to Grid North, based on the North American Datum of 1983, adjustment of 2011 (NAD 83/2011) Epoch 2010.00, of the Florida State Plane Coordinate System (Transverse Mercator Projection), East Zone established by a Real-time Network (RTN) GPS Control Survey which is certified to a 2 centimeter local accuracy, relative to the National Geodetic Control station "872 4459 E TIDAL" (P.I.D. AA0909), as surveyed in the field on May 16, 2013, with the current north right-of-way line of Overseas Highway having a bearing of N 67°19'49" E.
   Equipment Used:
   a) GPS Receivers: Trimble R8 GNSS, Serial Number 4627118155, 4625117640 & 4626117777.
   b) Processing Software: Trimble Geomatics Office, Version 1.63.
   c) Method: Virtual Reference Station (VRS) GPS Network.
   The following ties were made to NGS control station "872 4459 E TIDAL":
   Published: N: 94943.38 E: 435121.54
   Measured: N: 94943.29 E: 435121.34
7. The property described hereon lies within Flood Zones AE (EL 10), VE (EL 12) & VE (EL 14), Community Panel No. 125129 1533 K, dated February 18, 2005 & Community Panel No. 125129 1531 K, dated February 18, 2005.
8. This map is intended to be displayed at a scale of 1:3600 (1"=300') or smaller.
9. Units of measurement are in U.S. Survey Feet and decimal parts thereof. Well identified features in this survey were field measured to a horizontal positional accuracy of 0.10'. The elevations on impervious surfaces were field measured to 0.03' and on ground surfaces to 0.1'.
10. Symbols shown hereon and in the legend may have been enlarged for clarity. These symbols have been plotted at the center of the field location and may not represent the actual shape or size of the feature.
11. Abbreviation Legend: A= Arc Length; ℄= Baseline; ℄= Centerline; C.L.F.= Chain-Link Fence; C.M.= Concrete Monument; CONC.= Concrete; Δ= Central Angle; D= Per Deed; D.B.= Deed Book; DE= Drainage Easement; ELEC.= Electric; ESMT.= Easement; FD.= Found; F.D.O.T.= Florida Department of Transportation; ID.= Identification; IE= Ingress-Egress; I.P.= Iron Pipe; I.R.= Iron Rod; LAT.= Latitude; LON.= Longitude; L.B.= Licensed Business; LS= Lift Station; M= Measured; M.C.R.= Monroe County Records; NAD= North American Datum; NGS= National Geodetic Survey; No.= Number; O.R.B.= Official Records Book; O/S= Offset; OW= Overhead Wires; P= Per Record Plat; P.B.= Plat Book; PG(S).= Page(s); P.I.= Point of Intersection; P.I.D.= Point Identifier; P.L.S.= Professional Land Surveyor; P.O.B.= Point of Beginning; P.O.C.= Point of Commencement; P.R.M.= Permanent Reference Monument; R= Radius; RE= Real Estate Number; R/W= Right-of-Way; SEC.= Section; S.R.= State Road; W/= With; W/CAP= With Surveyor's Cap.

LEGEND	
	AIRFIELD PAVEMENT TO BE DEMOLISHED
	FUTURE AIRFIELD PAVEMENT
	EXISTING PAVEMENT
	ULTIMATE AIRFIELD PAVEMENT
ROFA	RUNWAY OBJECT FREE AREA (ROFA)- FUTURE
RSA	RUNWAY SAFETY AREA (RSA)- FUTURE
RPZ	APPROACH/DEPARTURE RUNWAY PROTECTION ZONE (RPZ)- FUTURE

N
MAGNETIC NORTH DECLINATION = 6° 7' W (SEPTEMBER 2019)
TRUE NORTH
0 150 300 600
GRAPHICAL SCALE IN FEET
1" = 300'

MONROE COUNTY 18 23

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NO.	REVISIONS	DATE

EXHIBIT 'A' PROPERTY INVENTORY MAP

FLORIDA KEYS MARATHON INTERNATIONAL AIRPORT
MARATHON, FLORIDA

DRAWN BY: NFP
CHECKED BY: HHM

PREPARED BY:
JACOBS

DATE:
JUNE 2020

Drawing: P:\2016\E9Y1671 - MTH AGIS\CADD\Part 77 AirspaceSet\MTH_Exhibit A_Ultimate.dwg_Layout: Data Table_Mar 26, 2020, 10:37am

Florida Keys Marathon International Airport

Appendix D – FAA SOP 2.0 ALP Review Checklist

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

APPENDIX A. ALP REVIEW CHECKLIST

The following checklist shall be used in lieu of FAA AC 150/5070-6B, Appendix F, Airport Layout Plan Drawing set. This checklist is intended for use when submitting a new or updated ALP to the FAA for review and approval. Consultants and/or sponsors should indicate "Yes," "No" or "N/A" (not applicable) for every item on the checklist. The same checklist shall be provided to FAA for review and verification. For all reviewers: It is important that each item listed be shown on the respective plan.

Airport Identification (to be completed by Sponsor or Consultant)			
Airport	**Florida Keys Marathon International Airport**		
City and State	**Marathon, Florida**	Location Identifier	**MTH**
Airport Owner	**Monroe County**		

ALP Submission Information (to be completed by Sponsor or Consultant)		
ALP Prepared by:	**Ricondo (Cover, Airport Data Tables, Existing/Future ALP, Terminal Area, Land Use); Jacobs (Inner Portion of the Approach, Airspace, Property Map)** Name of Consulting Firm	
	Kyle Stevens (Ricondo); Natalie Pavelock (Jacobs) Name of Individual	**April 2020** Date
	(407) 459-7079 Telephone	
	kstevens@ricondo.com Email	
Consulting QA/QC Review:	**Sebastien Carreau (Ricondo); Heath Marsden (Jacobs)** Name and Title of Individual	**April 2020** Date
Sponsor Review:	**Richard Strickland, CM – Director of Airports** Name and Title of Individual	**April 2020** Date

FAA Review (to be completed by FAA)	
Name and Title of Individual	Date

Critical Design Aircraft or Family of Aircraft:

	Make	Model	Annual Itinerant Operations
Existing	**Cessna**	**Citation**	**B-II Aircraft: 75,000 (CY 2016 – Total Operations)**
Future	**Cessna**	**Citation**	**B-II Aircraft: 98,978 (CY 2036 – Total Operations)**

Source: MTH Master Plan Update: Aviation Activity Forecasts, *Ricondo & Associates, Inc.*, June 2016.

Forecasted Year: **FY 2036**

Airport Reference Code (ARC): **B-II (Existing); B=II (Ultimate)**

Runway Design Code (RDC) & Runway Reference (RRC):

Runway	RDC	RRC
See Sheet A-3		

Approach Minimums:

Rwy End	Minimum	Rwy End	Minimum
7	**5,000**	**25**	**5,000**

Runways (Existing and Future):

Runway	Existing		Future		Departure Surface (Y or N/A)
	Length (ft)	Width (ft)	Length (ft)	Width (ft)	
7-25	**5,008'**	**100**	**5,400'**	**75**	**Y**

Existing			
Runway	**RDC**	**APRC**	**DPRC**
7	B-II-5000	B-I(S)-5000	B-I
25	B-II-5000	B-I(S)-5000	B-I

Ultimate			
Runway	**RDC**	**APRC**	**DPRC**
7	SAME	B-II-5000	B-II
25	SAME	B-II-5000	B-II

A.1. Narrative Report

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Executive Summary – A concise summary of the findings/ recommendations of the master planning effort or changes to the ALP. This should include a description of planned projects, an implementation plan/timeline, and identification of benchmarks or actions that will be conducted to either verify the original planning assumptions or proceed with project implementation.	From AC 150/5070-6, Section 202: An accompanying ALP Narrative Report should explain and document those changes and contain at least the following elements: – Basic aeronautical forecasts. – Basis for the proposed items of development. – Rationale for unusual design features and/or modifications to FAA Airport Design Standards. – Summary of the various stages of airport development and layout sketches of the major items of development in each stage. – An environmental overview to document environmental conditions that should be considered in the identification and analysis of airport development alternatives and proposed projects.	REFER TO THE IMPLEMENTATION PLAN (CHAPTER 8 OF MASTER PLAN UPDATE)			
1. Identify Projects along with description					
2. Create a Timeline for each Project					
3. Identify and List:					
a. Proposed Projects (e.g., Hangar development)					
b. Milestones/ Triggering Events (e.g., 1. All hangars are full, 2. There is a waiting list long enough to fill a new development, 3. Hangars have reached their useful life, etc.)			✓		
c. Action items/Next Steps (e.g., 1. Maintain log and gather data, 2. Discuss plan with ADO, 3. Coordinate with ADO regarding potential for inclusion in FAA ACIP (Airports Capital Improvement Program), 4. Identify funding sources.)			✓		
d. Funding Plan	Capital Improvement Plan for the forecast horizons. See AC 150/5070-6, Chapter 11. Only a rough, order-of-magnitude report is needed in the executive summary.	REFER TO THE IMPLEMENTATION PLAN (CHAPTER 8 OF MASTER PLAN UPDATE)			

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
B. Basic aeronautical forecasts (0-5, 6-10, 11-20 years): Basic aeronautical forecasts (0-5, 6-10, 11-20 years):	Forecasts of future levels of aviation activity as approved by the FAA. These projections are used to determine the need for new or expanded facilities. See AC 150/5070-6, Chapter 7.	REFER TO THE AVIATION ACTIVITY FORECASTS (CHAPTER 3 OF MASTER PLAN UPDATE)			
1. Total annual operations	Total local and itinerant aircraft operations at the airport.				
2. Annual itinerant operations by all aircraft	Itinerant operations by aircraft that leaves the local airspace, generally 25 miles or more from the airport. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
3. Annual itinerant operations by current critical aircraft					
4. Annual itinerant operations by future critical aircraft					
5. Number of based aircraft	Aircraft that use the subject airport as a home base, i.e., have hangar or tie-down space agreements. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
6. Annual instrument approaches	Number of instrument approaches expected to be executed during a 12-month period. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
7. Number of enplanements	See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
8. Critical Aircraft (also referred as "design aircraft" or "critical design aircraft)	The critical aircraft is the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that the critical aircraft will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations or scheduled service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. Provide the aircraft, AAC, and ADG. (e.g. Boeing 737-400, C-III) See AC 150/5300-13A, Paragraph 105(b) and FAA Order 5090.3C, 3-4.	✓			
9. Runway Design Code (RDC)	Describe the RDC for each runway. For the purpose of airport geometric design, each runway will contain a RDC which signifies the design standards to which the runway is to be built. The RDC consists of three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and the approach visibility minimums. These parameters represent the aircraft that are intended to be accommodated by the airport, regardless of substantial use. See AC 150/5300-13A, Paragraph 105(c).	✓			
10. Runway Reference Code (RRC)	Describe the RRC for each runway. The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. The RRC consists of the same three components as the RDC, but is based on planned development and has no operational application. See AC 150/5300-13A, Paragraph 318.	**1/**			
C. Alternatives/Proposed Development		✓			

Narrative Report					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
11. Explanation of proposed development items	Specific projects can be described as project listings on a master table, on individual project data sheets, or in projects booklets.	✓			
12. Discuss near-term and future Approach Procedure Requirements or effects (e.g., LPV, Circling, etc.)	Based on existing or forecast usage. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	2/			
13. Navigational Aids or Other Equipment Needs (e.g., Approach Lights, Wind Cones, AWOS, etc.)	The need for new or additional navigational aids is a function of the fleet mix, the percentage of time that poor weather conditions are present, and the cost to the users of not being able to use the airport while it is not accessible.	✓			
14. Wind coverage. Is it adequate for existing and future runway layouts? Has wind data been updated?	This analysis determines if additional runways are needed to provide the necessary wind coverage. Reference AC 150/5300-13A, Appendix 2 for guidance on wind coverage analysis techniques.	✓			
D. Modification to Standards.	Any approved nonconformance to FAA standards, other than dimensional standards for RSAs and OFZs, require FAA approval. A description of all approved modification to standards shall be provided. See AC 150/5300-13A, Paragraph 106(b) and FAA Order 5300.1.	✓			
E. Obstruction Surfaces (14 CFR Part 77 and Threshold Siting Surface)	Reference 14 CFR Part 77 and AC 150/5300-13A, Paragraph 303.	✓			
F. Runway Protection Zone	A description of any incompatible land uses inside the RPZ shall be provided. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	✓			

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
G. Development summary (including sketches, schedules, and cost estimates) for stages of construction for: Development summary (including sketches, schedules, and cost estimates) for stages of construction for:	Documentation provided should include any electronic spreadsheets and files to facilitate in modifying the financial plan on an as-needed basis.	REFER TO THE ALTERNATIVES SESCTION (CHAPTER 5 OF MASTER PLAN UPDATE)			
15. Development Projects Completed Since Last ALP			✓		
16. 0-5 years		REFER TO THE IMPLEMENTATION PLAN (CHAPTER 8 OF MASTER PLAN UPDATE)			
17. 6-10 years					
18. 11-20 years					
H. Shadow or line-of-sight study for towered airports (negative or positive statements are required).	Reference FAA Order 6480.4. This can be from the Airway Facilities Tower Integration Laboratory (AFTIL) or simpler GIS-generated studies.			✓	
I. Letters of coordination with all levels of government, as needed.	Affected private and/or governmental groups, agencies, commissions, etc., that may have input on the plans. See AC 150/5070-6, Chapter 3.	✓			
J. Wildlife Hazard Management Issues Review (in narrative).	Reference AC 150/5200-33.	✓			
K. Preliminary Identification of Environmental Features	Potential or known features only. Further environmental analysis will be necessary. Reference FAA Order 5050.4B. Begin framework for NEPA analysis.	✓			
19. Major airport drainage ditches		✓			
20. Wetlands		✓			
21. Flood Zones		✓			
22. Historic or Cultural features		✓			
23. Section 4(f) features				✓	

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
24. Flora/Fauna		REFER TO THE ENVIRONMENTAL OVERVIEW SECTION (CHAPTER 6 OF MASTER PLAN UPDATE)			
25. Natural Resources					
26. Etc. (other features identified in Order 5050.4B)					
L. Note Action Items from Runway Safety Program Office	List and note status of items from Runway Safety Program Office or Runway Safety Action Plan.			✓	
M. Declared Distance (DD)	The narrative on declared distances is used to aid in understanding the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The narrative shall also provide clarification on why declared distances have been implemented. Declared distances data must be listed for all runway ends. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearway, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.	✓			

Remarks

1/ RRC replaced by APRC and DPRC (See sheet A-3)

2/ No future change expected

A.2. Title Sheet

- The scale of the Title Sheet should be developed to include the items listed below.
- The minimum size for the final drawing set is 22" X 34" (ANSI D) and 24" X 36" (ARCH D). Coordinate use of 34" x 44" (ANSI E) and 26" X 48" (ARCH E) with FAA. Color drawings may be acceptable if they are still usable if reproduced in grey scale.

Title Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and revision blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Airport sponsor approval block	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.	✓			
C. Date of ALP (date the airport sponsor signs the ALP)	The month and year of signature prominently shown near the title.			✓	
D. Index of sheets (including revision date column)	Airport Layout Drawing, Airport Airspace Drawing, Inner Portion of the Approach Surface Drawing, Terminal Area Drawing, Land Use Drawing, Airport Property Map, Airport Departure Surface, etc.	✓			
E. State Aeronautics Agency Approval Block (as needed)	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.			✓	
F. State outline with county boundaries. County in which airport is located should be highlighted.	Provide as needed.			✓	
G. Location map (general area)		✓			
H. Vicinity map (specific airport area)		✓			
Remarks					

A.3. Airport Data Sheet

- For smaller airports, some of the ALP sheets may be combined if practical and approved FAA.

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Wind Rose (all weather and IFR) with appropriate airport reference code and runway orientation depicted, crosswind coverage, and combined coverage, source of wind information and time period covered (for IFR runways applicable minimums should be included):	Assembly and analysis of wind data to determine ultimate runway orientation and also provides the operational impact of winds on existing runways. If instrument procedures are present or will be requested then both all-weather and instrument meteorological condition wind roses are required. See AC 150/5300-13A, Appendix 2.	✓			
1. 10.5, 13, 16, 20 knots wind rose (based on appropriate airport reference code)	When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See also AC 150/5300-13A, Paragraph 302(c)(3) and AC 150/5300-13A, Appendix 2.	✓			
2. Percentage of wind coverage/crosswind		✓			
3. Source of data	Wind data may be obtained from NOAA at http://www.ncdc.noaa.gov/ Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5 and A2-6.	✓			

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Age of data (last 10 consecutive years of data with most current data no older than 10 years)	Data must be from the latest 10-year period from the reporting station closest to the airport. Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5.	✓			
C. Airport Data Table					
1. ARC for Airport	List the Airport Reference Code (ARC) for airport. 5300-13AARC is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. Reference AC 150/5300-13A.	✓			
2. Mean maximum temperature of hottest month	List the mean maximum temperature and the hottest month for the airport location as listed in "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree-Days" (Climatography of the United States No. 81). See AC 150/5325-4, 506.b.	✓			
3. Airport elevation (highest point of the landing areas, nearest 0.1 foot) – using North American Vertical Datum of 1988 (NAVD88)	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88. Reference AC 150/5300-13A, Paragraph 102(g) All elevations shall be in NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	✓			
4. Airport Navigational Aids, including ownership (NDB, TVOR, ASR, Beacon, etc.)	List the electronic aids available at the airport.	✓			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
5. Airport reference point coordinates, nearest second (existing, future if appropriate, and ultimate) - NAD83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the North American Datum of 1983 (NAD83) coordinate system. See AC 150/5300-13A, Paragraph 207. All latitude/longitude coordinates shall be in NAD83. A note shall be put on the Airport Layout Drawing that denotes that the NAD83 coordinate system was used.	✓			
6. Miscellaneous facilities (taxiway lighting, lighted wind cone(s), AWOS, etc.) [Including type/model and any facility critical areas]	List any other facilities available at the airport.	✓			
7. Airport Reference Code and Critical Aircraft (existing & future)	List the existing and ultimate Airport Reference Code and Critical Aircraft, the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes. See AC 150/5325-4, 102.a.(8) and AC 150/5070-6, 702.a. Indicated dimensions for wingspan and undercarriage, along with approach speed.	✓			
8. Airport magnetic variation, date and source	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✓			
9. NPIAS service level (GA, RL, P, CS, etc.)	See FAA Order 5090.3C.	✓			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
10. State equivalent service role	As applicable pursuant to State Aviation Department System Plan.	✓			
D. Runway Data Table	The Runway Data Table should show information for both existing and ultimate runways.	✓			
1. Runway identification (Include identifying runways that are "utility")	A column for each runway end should be present. List the runway end number and if pavement strength is less than 12,500 pounds (single-wheel), then note as utility.	✓			
2. Runway Design Code (RDC)	5300-13AThe first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics); whichever is more restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1200, 1600, 2400, and 4000. List the RDC for each runway. See AC 150/5300-13A, Paragraph 105(c).	✓			
3. Runway Reference Code (RRC)	The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. Like the RDC, it is composed of three components: AAC, ADG, and visibility minimums. List the RRC for each Runway. See AC 150/5300-13A, Paragraph 318.	**3/**			
4. Pavement Strength & Material Type	Indicate the runway surface material type, e.g., turf, asphalt, concrete, water, etc.	✓			
a. Strength by wheel loading	List the existing and ultimate design strength of the landing surface. See AC 150/5320-6, Chapter 3.	✓			
b. Strength by PCN	See AC 150/5335-5.	✓			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
c. Surface treatment	Note any surface treatment: grooved, PFC, etc.	✓			
5. Effective Runway Gradient (%) Author to note maximum grade within runway length. Note to included statement that the runway meets line of sight requirements	List the maximum longitudinal grade of each runway centerline. See AC 150/5300-13A, Paragraph 313.	✓			
6. Percent (%) Wind Coverage (each runway)	List the percent wind coverage for each runway for each Aircraft Approach Category. See AC 150/5300-13A, Appendix 2.	✓			
7. Runway dimensions (length and width)	Dimensions determined for the Critical Design Aircraft by using graphical information in AC 150/5325-4.	✓			
8. Displaced Threshold	Provide the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(2).	✓			
9. Runway safety area dimensions (actual existing and design standard)	List the existing and ultimate dimensions of the Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307.	✓			
10. Runway end coordinates (NAD83) (include displaced threshold coordinates, if applicable) to the nearest 0.01 second and 0.1 foot of elevation.	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second and 0.1 foot of elevation.	✓			
11. Runway lighting type (LIRL, MIRL, HIRL)	List the existing and ultimate type of runway lighting system for each runway, e.g., Reflectors, Low Intensity Runway Lighting (LIRL), Medium Intensity Runway Lighting (MIRL), or High Intensity Runway Lighting (HIRL). LIRLs will typically not be shown for new systems. See AC 150/5340-30, Ch. 2.	✓			

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
12. Runway Protection Zone (RPZ) Dimensions	List the existing and ultimate Runway Protection Zone (RPZ) dimensions. See AC 150/5300-13A, Paragraph 310. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	✓			
13. Runway marking type (visual or basic, non-precision, precision)	Indicate the existing and ultimate pavement markings for each runway. See AC 150/5340-1, Section 2.	✓			
14. 14 CFR Part 77 approach category (50:1; 34:1; 20:1) Existing and Future	List the existing and ultimate approach surface slope. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	✓			
15. Approach Type (precision, non-precision, visual)	List the existing and ultimate Part 77 Approach Use Types. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	✓			
16. Visibility minimums (existing and future)	List the existing and ultimate visibility minimums for each runway. See AC 150/5300-13A, Table 1-3.	✓			
17. Type of Aeronautical Survey Required for Approach (Vertically Guided, not Vert. Guided)	List the type of aeronautical survey required for the visibility minimums given. See AC 150/5300-18, Section 2.7 and AC 150/5300-13A, Table 3-4 and Table 3-5.	✓			
18. Runway Departure Surface (Yes or N/A)"	Determine applicability of 40:1 Departure Obstacle Clearance Surface (OCS) as defined in Paragraph 303(c) of AC 150/5300-13A.	✓			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
19. Runway Object Free Area	List the existing and ultimate dimensions of the Runway Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA, unless a modification to standard has been approved.	✓			
20. Obstacle Free Zone	The OFZ clearing standard precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Modification to standards does not apply to the OFZ. List the Runway OFZ, Inner-approach OFZ, Inner-transitional OFZ, and Precision OFZ if applicable.	✓			
21. Threshold siting surface (TSS)	List the existing and ultimate threshold siting surface (i.e. approach and departure surfaces). Identify any objects penetrating the surface. If none, state “No TSS Penetrations”. Reference AC 150/5300-13A, Paragraph 303.	✓			
22. Visual and instrument NAVAIDs (Localizer, GS, PAPI, etc.)	List the existing and ultimate visual navigational aids serving each runway.	✓			
23. Touchdown Zone Elevation	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	✓			
23. Taxiway and Taxilane width	List the existing and ultimate width of the taxiways and taxilane. Reference AC 150/5300-13A, Paragraph 403 and Table 4-2.	✓			
24. Taxiway and Taxilane Safety Area dimensions	List the existing and ultimate taxiway and taxilane safety area dimensions. Reference AC 150/5300-13A, Paragraph 404(c) and Table 4-1.	✓			

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
25. Taxiway and Taxilane Object Free Area	List the existing and ultimate taxiway and taxilane object free area dimensions. Reference AC 150/5300-13A, Paragraph 404(b) and Table 4-1.	✓			
26. Taxiway and Taxilane Separation	List any objects located inside the Taxiway/Taxilane Safety Area and Taxiway/Taxilane Object Free Area. Also provide the distance from the taxiway/taxilane centerline to the fix ed or movable object. Reference Paragraph 404(a) and Table 4-1.	✓			
27. Taxiway/Taxilane lighting	List the existing and ultimate type of taxiway lighting system, e.g., Reflectors, Low Intensity Taxiway Lighting (LITL), Medium Intensity Taxiway Lighting (MITL), or High Intensity Taxiway Lighting (HITL). LITLs will typically not be shown for new systems. See AC 150/5340-30, Chapter 4.	✓			
28. Identify the vertical and horizontal datum	All latitude/longitude coordinates shall be in North American Datum of 1983 (NAD 83). A note shall be put on the Airport Layout Drawing that denotes that the NAD 83 coordinate system was used. All elevations shall be NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	✓			
E. Modification to Standards Approval Table (if applicable, a separate written request, including justification, should accompany the modification to standards). Show: Approval Date/ Airspace Case No. / Standard to be Modified / Description	Provide a table to list all FAA approved Modifications to Standards. See AC 150/5300-13A, Paragraph 106(b), and FAA Order 5300.1. List “None Required” on the table if no Modifications have yet been proposed or approved.	✓			

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
F. Declared Distances Table	Required even if Declared Distances are not in effect. Declared distances are only to be used for runways with turbine-powered aircraft. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearways, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.	✓			
1. Take Off Run Available (TORA)	List the runway length declared available and suitable for the ground run of an airplane taking off, i.e., Take Off Run Available (TORA). The TORA may be reduced such that it ends prior to the runway to resolve incompatible land uses in the departure RPZ, and/or to mitigate environmental effects. Reference AC 150/5300-13A, Paragraph 323(d)(1).	✓			
2. Take Off Distance Available (TODA)	List the length of remaining runway or clearway (CWY) beyond the far end of the TORA ADDED TO the TORA. The resulting sum is the Take Off Distance Available (TODA) for the runway. The TODA may be reduced to mitigate penetrations to the 40:1 instrument departure surface, if applicable. The TODA may also extend beyond the runway end through the use of a clearway Reference AC 150/5300-13A, Paragraph 323(d)(2).	✓			
3. Accelerate Stop Distance Available (ASDA)	5300-13A List the length the length of runway plus stopway (if any) declared available and suitable for satisfying accelerate-stop distance requirements for a rejected takeoff. Additional RSA and ROFA can be obtained by reducing the ASDA. Reference AC 150/5300-13A, Paragraph 323(d)(3).	✓			

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Landing Distance Available (LDA)	5300-13A List the length of runway declared available and suitable for satisfying landing distance requirements. The LDA may be reduced to satisfy the approach RPZ, RSA, and ROFA requirements. Reference AC 150/5300-13A, Paragraph 323(e).	✓			
G. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	**4/**			
Remarks **3/ RRC replaced by APRC and DPRC (See sheet A-3)** **4/ Legend is provided on the Existing and Ultimate ALP drawings, Sheets 3 and 4.**					

A.4. Airport Layout Plan Drawing

- For smaller airports, some of the ALP sheets may be combined if practical and approved by FAA.
- Two, or more, sheets may be necessary for clarity, existing and proposed. The reviewer should be able to differentiate between existing, future, and ultimate development. If clarity is an issue, some features of this drawing may be placed in tabular format. North should be pointed towards the top of the page or to the left. (scale 1"=200' to 1"=600')

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Space for the FAA approval stamp	Leave a blank four-inch by four-inch area for the FAA approval stamp.	✓			
C. Layout of existing and proposed facilities and features:	To assure full consideration of future airport development in 14 CFR Part 77 studies, airport owners must have their plans on file with the FAA. The necessary plan data includes, as a minimum, planned runway end coordinates, elevation, and type of approach for any new runway or runway extension. See AC 150/5300-13A, Paragraph 106.	✓			
1. True and magnetic North arrow with year of magnetic declination	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✓			
2. Airport reference point – locate by symbol a Lat./Long. To nearest second (existing, future, and ultimate) NAD 83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the NAD 83 coordinate system. See AC 150/5300-13A, Paragraph 207.	✓			
3. Wind cones, segmented circle, beacon, AWOS, etc.	Show as applicable pursuant to AC 150/5300-13A, Chapter 6.	✓			

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Contours (showing only significant terrain differences)	Topography, budget, and future uses of the base mapping, will dictate what intervals of topographical contours to use on the maps. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, 1005.	✓			
5. Elevations: All NAVD88	All latitude/longitude coordinates shall be in NAD83/NAVD88.				
a. Runway – existing, future, and ultimate ends (nearest 0.1 ft.)	Show the latitude and longitude of the threshold center and end of pavement.	✓			
b. Touchdown Zone Elevation (highest point in first 3,000 ft. of runway)	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	✓			
c. Runway high/low points (existing and future)	For all runways identify high and low points (centerline) and provide elevation information.	**5/**			
d. Label runway/runway intersection elevations	Label the pavement elevation of runway intersections where the centerlines cross.			✓	
e. Displaced Thresholds (if any)	Label the pavement elevation and coordinates of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).	✓			
f. Roadways & Railroads (where they intersect Approach surfaces, the extended runway centerline, and at the most critical points)	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	✓			

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
g. Structures, Buildings, and Facilities	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL. If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation. Don't forget navigation aid shelters, AWOS/ASOS, RVRs, PAPIs, Fueling systems, REILs, etc. Also identify the structure use (hangar, FBO, crew quarters, etc.), as needed. Some lesser objects may be identified by symbols in the legend.	✓			
h. Define features to include: trees streams, water bodies, etc.	Provide information and delineate trees, streams, water bodies, etc., on or near airport property and approach surfaces.	✓			
6. Runway Details					
a. Runway Design – runway length, runway width, shoulder width, blast pad width, blast pad length, and cross wind component. (existing, future, and ultimate)	AC 150/5325-4 describes procedures for establishing the appropriate runway length. AC 150/5300-13A, Table 3-4 and Table 3-5 provides the minimum runway length. AC 150/5300-13A, Table 3-8 provides the standard dimensions of the runway width, shoulder width, blast pad width, blast pad length, and crosswind component based on RDC. Clearly denote the runway numbers at the thresholds. Show location of existing and future threshold lights.	**5/**			
b. Orientation – true bearing to nearest 0.01 second (and runway numbers)	Show the true bearing to the nearest .01 of a degree of the runway centerline.	✓			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
c. End Coordinates – existing, future, and ultimate degrees, minutes, seconds (to the nearest 0.01 second)	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second.	✓			
d. Runway Safety Areas (RSA) – actual, existing, future, and ultimate (including dimensions)	Show the extents of the existing and ultimate RSA 5300-13A. Reference AC 150/5300-13A, Paragraph 307.	✓			
e. Runway Object Free Areas (ROFA)	Show the extents of the existing and ultimate ROFA. Reference AC 150/5300-13A, Paragraph 309.	✓			
f. Precision Obstacle Free Zone (POFZ)	Show the extents of the existing and ultimate POFZ. Reference AC 150/5300-13A, Paragraph 308(d).	✓			
g. Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ. Reference AC 150/5300-13A, Paragraph 308.	✓			
h. Clearways and Stopways	Show any/all clearways and stopways/overruns and the markings used to denote these areas. See AC 150/5300-13A, Paragraph 311 and 312; and AC 150/5340-1, Section 2, Paragraph 14.			✓	
i. Runway Protection Zone (RPZ) - Dimensions (existing, future, and ultimate)	Show existing and ultimate RPZ. See AC 150/5300-13A, Paragraph 310. Show the existing and ultimate protective area/zone type of ownership. Identify any incompatible objects and activities inside the RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	✓			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
j. 14 CFR Part 77 Approach Surfaces	Show the portion of the existing and ultimate approach surfaces that are over airport and adjacent property and identify the approach surface dimensions and slope. See FAA Order 7400.2, Figure 6-3-9.	✓			
k. Threshold Siting Criteria: Approach/Departure Surface (existing, future, and ultimate) 5300-13A	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(b) and 303(c).	✓			
l. Terminal Instrument Procedures (TERPS) surface and TERPS GQS, if applicable.	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(a)(4)(a), Table 3-4, and Table 3-5. Reference FAA Order 8260.3.	✓			
m. Navigation Aids (NAVAIDS) – PAPI, ILS, GS, LOC, ALS, MALSR, REIL, etc., (plus facility critical area's)	Show all NAVAIDS and provide clearance distances from runways, taxiways, etc. Reference AC 150/5300-13A, Chapter 6.	✓			
n. Marking – thresholds, hold lines, etc.	Show on the runway the type and location of markings, existing and ultimate. See AC 150/5340-1, Section 2.	✓			
o. Displaced threshold coordinates and elevation	Show the latitude, longitude, and the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).5300-13A.	✓			
p. Runway centerline separation distances	Show the runway centerline separation distances to parallel runway centerline, holding position, parallel taxiway/taxilane centerline, aircraft parking area, and helicopter touchdown pad, if applicable. Reference AC 150/5300-13A, Paragraph 321 and Table 3-8.	✓			
7. Taxiway Details	Show the taxiway centerline separation distances to parallel taxiway/taxilane centerlines, fixed or movable objects.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
a. Dimensions – width (existing & ultimate)	Taxiway width based on Taxiway Design Group (TDG). See AC 150/5300-13A, Table 4-2.	✓			
b. Taxiway Edge Safety Margin (TESM)	TESM dimension based on TDG. See AC 150/5300-13A, Table 4-2.	**6/**			
c. Taxiway Shoulder Width	Taxiway shoulder width based on TDG. See AC 150/5300-13A, Table 4-2.	**6/**			
d. Taxiway/Taxilane Object Free Area (TOFA)	TOFA width based on Taxiway Design Group (TDG). TOFA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	**6/**			
e. Taxiway/Taxilane Safety Area (TSA)	TSA width based on TDG. TSA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	**6/**			
f. Taxiway/Taxilane Centerline Separation from:					
i. Runway centerline	Show the distance from centerline of runway to centerline of taxiway. See AC 150/5300-13A, Table 4-1.	**5/**			
ii. Parallel taxiway	Show the distance from centerline of taxiway to centerline of parallel taxiway. See AC 150/5300-13A, Table 4-1.	**5/**			
iii. Aircraft parking	Show the distance from centerline of taxiway to marked aircraft parking/tie downs. See AC 150/5300-13A, Table 4-1.	**5/**			
iv. Fixed or Movable Objects	Show the distance from centerline of taxiway to airport objects such as buildings, facilities, poles, etc. See AC 150/5300-13A, Table 4-1.	**5/**			
8. Fences (identify height)	Show the location of existing and ultimate fences and identify height.	✓			

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
9. Aprons					
a. Dimensions (square footage, dimension, or length and width)	Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.	✓			
b. Identify aircraft tie-down layout	Show proposed tie-down layout on the apron area. See AC 150/5300-13A, Figure A5-1, AC 20-35, and AC 150/5340-1.	**5/**			
c. Identify Special Use Areas (e.g., deicing or aerial application areas on or near apron)	Show as applicable and pursuant to representative ACs.	✓			
10. Roads	Label all roads.	✓			
11. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	✓			
12. Items to be identified with distinct line types	Use distinct line types to identify different items and differentiate between existing and ultimate.				
a. NAVAID Critical Areas (Glide Slope, Localizer, AWOS, ASOS, VOR, RVR, etc.)	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.	✓			
b. Building Restriction Lines 5300-13A(BRL)	The BRL is the line indicating where airport buildings must not be located, limiting building proximity to aircraft movement areas. See AC 150/5300-13A, Paragraph 213(a).	✓			
c. Runway Visibility Zone (RVZ)	Show the RVZ for the existing and ultimate airport configurations. See AC 150/5300-13A, 305(c).			✓	

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
d. Airport Property Lines and Easements (existing, future, and ultimate)	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations.	✓			
13. Survey Documentation					
a. Survey Monuments (PACS/SACS, see AC 150/5300-16)	Show the location of all established survey monuments located on or near the airport property. Identify Primary and Secondary Airport Control Stations (PACS/SACS) if they exist. See AC 150/5300-16. Show the location of all section corners on or near the airport property.	✓			
b. Offsets, stations, etc.	Show as applicable.			✓	
14. Any Air Traffic Control Tower (ATCT) line of sight/shadow study areas (use separate sheet if necessary)	Reference FAA Order 6480.4.			✓	
15. General Aviation development area (e.g., fuel facilities, FBO, hangars, etc.) – greater detail can be shown on the terminal area drawing	Show as applicable.	**5/**			
16. Facilities and movement areas that are to be phased out, if any, are described	Show as applicable.	✓			

Remarks

5/ Refer to the Terminal Area Plan (Sheets 10-12)

6/ Refer to Data Tables (Sheet 2)

A.5. Airport Airspace Drawing

- A required drawing.
- Scale 1" = 2000' plan view, 1" = 1000' approach profiles, 1"=100' (vertical) for approach profiles.
- 14 CFR Part 77, Objects Affecting Navigable Airspace, defines this as a drawing depicting obstacle identification surfaces for the full extent of all airport development. It should also depict airspace obstructions for the portions of the surfaces excluded from the Inner Portion of the Approach Surface Drawing.

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Plan view (based on ultimate runway lengths) Include location of water or sewage facilities if inside horizontal surface.					
1. U.S. Geological Survey (USGS) Quad Sheet for base map	Use the most current USGS Quadrangle(s) as a base map for the airspace drawing.			✓	
2. Runway end numbers	Show the ultimate runways and runway numbers. Contact the FAA before renumbering existing runways.	✓			
3. Part 77 Surfaces (Horizontal, Conical, Transition, based on ultimate). Including elevations at the point where surfaces change.	Show the extents of the Part 77 imaginary surfaces. For airports that have precision approach runways show balance of the 40,000' approach on a second sheet, if necessary. See 14 CFR Part 77.19.	✓			
4. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on all sloping Part 77 imaginary surfaces. See 14 CFR Part 77.19.	✓			
5. Top elevations of penetrating objects for the inner portion of the approach surface drawing	Identify by unique alphanumeric symbol all objects beyond the Runway Protection Zones that penetrate any of the Part 77 surfaces. See 14 CFR Part 77.	✓			
6. Note specifying height restriction (ordinances/statutes)	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	✓			

Airport Airspace Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
7. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✓			
C. Profile view					
1. Airport Elevation	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88 datum. See AC 150/5300-13A, Chapter 1, Paragraph 102(g).	**7/**			
2. Composite Ground Profile along extended Runway Centerline (Representing the composite profile, based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface.	**7/**			
3. Significant objects (bluffs, rivers, roads, schools, towers, etc.) and elevations	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects' same alphanumeric identifier that was used on the plan view. Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.	✓			
4. Existing, future, and ultimate runway ends and approach slopes	Show existing and ultimate runway ends and FAR Part 77 approach surface slopes. See 14 CFR Part 77.19.	**7/**			
D. Obstruction Data Tables (identify obstacles not depicted on the Inner Portion of the Approach Surface Drawing)					

Airport Airspace Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects alphanumeric identifier that was used on the plan view. Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.	✓			
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.	✓			
3. Date of Obstruction Survey	Provide the date of latest obstruction survey.	✓			
4. Ground Surface Elevation	Provide the ground surface elevation (MSL) at the base of each object.	✓			
5. Object Elevation	List the above ground level (AGL) height and the top of object elevation (above mean sea level / AMSL / MSL) for each object.	✓			
6. Amount of surface penetration	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77.	✓			
7. Proposed or existing disposition of the obstruction	Provide a proposed or existing disposition of the object to remedy the penetration. See AC 70/7460-1.	✓			
a. Proposed Disposition (existing)				✓	
b. Proposed Disposition (future)		✓			

Remarks:

7/ Obstructions have been analyzed against the future Part 77 surfaces. Separate Airspace Outer Approach drawings have been provided. (Inner Portion of the Approach Sheets 8-9)

A.6. Inner Portion of the Approach Surface Drawing

- A required drawing.
- Scale 1"=200' Horizontal, 1"=20' Vertical, two sheets may be necessary for clarity. Typically, the plan view is on the top half of the drawing and the profile view is on the bottom half. Views should be drawn from the runway threshold to a point on the approach slope 100 feet above the runway threshold elevation, at a minimum, or the limits of the RPZ, whichever is further.
- Drawings containing the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface penetrations. The drawing will depict the obstacle identification approach surfaces contained in 14 CFR Part 77, Objects Affecting Navigable Airspace. The drawing may also depict other surfaces, including the threshold-siting surface, Glideslope Qualification Surface (GQS), those surfaces associated with United States Standards for Instrument Procedures (TERPS), or those required by the local FAA office or state agency. The extent of the approach surface and the number of airspace obstructions shown may restrict each sheet to only one runway end or approach.

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Plan View (existing, future, and ultimate)					
1. Inner portion of approach surface	Show the area from the runway threshold out to where the ultimate approach surface slope is 100 feet above the threshold elevation.	✓			
2. Aerial photo for base map	Use an aerial photograph for the base map.	✓			
3. Objects (identified by numbers)	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	✓			
4. Property line within approaches	Show the property lines that are within the area/portion of airport shown.	✓			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
5. Road & railroad elevations, plus movable object heights	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverse way elevation plus the traverse way adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	✓			
6. Part 77 Approach Surface clearance over Roads and Railroads at the most critical points, the Centerline and Edge of the surface.	Provide elevation information for the traverse ways where they intersect the edges and centerline of the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	✓			
7. Physical end of runway, end number, elevation (NAVD88) Nearest 0.1 foot	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center.	✓			
8. Airport Design Surfaces					
a. Runway Safety Area	Show the extents of the existing and ultimate Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307 and Table 3-8.	✓			
b. Runway Object Free Area	Show the extents of the existing and ultimate Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309 and Table 3-8.	✓			
c. Runway Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ which includes the inner-approach OFZ, inner-transitional OFZ, and the Precision OFZ (POFZ), if applicable. See AC 150/5300-13A, Paragraph 308.	✓			

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
d. Runway Protection Zone (RPZ)	Show the extents of the existing and ultimate RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310, Table 3-5 and FAA memorandum dated September 27, 2012.	✓			
e. NAVAID critical area	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.			✓	
9. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, Paragraph 1005.	✓			
10. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, Chapter 2, Section 5, for further information.	✓			
C. Profile view					
1. Existing and proposed runway centerline ground profile (list elevations at runway ends & at all points of grade changes) (representing the composite profile based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface to where the ultimate approach surface slope is 100 feet above the threshold elevation. A more effective presentation may be a rendering of a composite critical profile.	**8/**			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Future development from plan view	Identify future development using same alphanumeric identifier that was used on the plan view.	✓			
3. Part 77 Approach/transition surface; existing and future VASI/PAPI siting surface	Show the boundaries of the existing and ultimate Part 77 Approach Surface. See FAA Order 7400.2, Figure 6-3-9, See also 14 CFR Part 77.	✓			
4. Threshold Siting Surface	Depict any applicable siting requirements pursuant to Table 3-2 of FAA AC 150/5300-13A.	✓			
5. Terrain in approach area (fences, streams, etc.)	Show all significant terrain (fences, streams, mountains, etc.) within the approach surfaces, regardless of whether or not they are obstructions	✓			
6. Objects – identify the controlling object (same numbers as plan view)	Show all significant objects (roads, rivers, railroads, towers, sign and power poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Identify the objects using same alphanumeric identifier that was used on the plan view.	✓			
7. Cross section of road & railroad	Show the cross-section of any roads and/or railroads that cross the area shown. Indicate cross section elevations of roads and railroads at edges and extended centerlines that cross the area shown.	✓			
8. Existing and proposed property and easement lines	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations. AC 5300-13A Note easements for pipelines and residential through the fence gateways.	✓			
D. Obstruction tables for each approach surface (surface should be identified)	A separate table for each runway end must be used to enhance information clarity.	✓			
1. Object identification number	List each object by the same alphanumeric symbol used in the plan view.	✓			

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.	✓			
3. Date of Obstruction Survey and Survey Accuracy	Provide the date of latest obstruction survey.	✓			
4. Surface Penetrations	5300-13A For any object that penetrates the Part 77 surface, the approach surface, or the obstacle free zone, describe the vertical length the object protrudes.	✓			
5. Proposed disposition of surface penetrations	Provide a proposed disposition of the object to remedy the penetration as described in item 4 above. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303 and 308.	✓			
6. Object elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.	✓			
7. Triggering Event (e.g., a runway extension) – Timeframe/expected date for removal	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77 and AC 150/5300-13A, Paragraphs 303 and 308.	**9/**			
8. Allowable approach surface elevation (if applicable)		✓			
9. Amount of approach surface penetration (if applicable)		✓			
10. Proposed disposition of approach surface obstruction (if applicable)	Provide a proposed disposition of the object to remedy the penetration. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303.	✓			

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
11. Obstacle Free Zone (OFZ)	Determine and depict the applicable OFZ surfaces, see AC 150/5300-13A, Paragraph 308. Provide a proposed disposition of the object to remedy the penetration. Note: Modification to the OFZ standard is not permitted.	**9/**			
E. Runway Centerline Profile	This may be shown on the Inner Portion of the Approach Surface drawing if there is space to show the runway and Runway Safety Area in sufficient detail otherwise a separate sheet may be necessary. At a minimum this drawing is to show the full length of the runway and Runway Safety Area including: runway elevations, runway and Runway Safety Area gradients, all vertical curves, and a line representing the 5' line-of-sight. See AC 150/5300-13A, Paragraph 305.	✓			
1. Scale	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Paragraph 305.	✓			
2. Elevation	Show runway elevations, runway and Runway Safety Area gradients, and all vertical curve data. See AC 150/5300-13A, Paragraph 318.	✓			
3. Line of Sight	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Section 305.			✓	

Remarks

7/ Ground profile is drawn for ultimate runway and depicts ultimate runway, existing and ultimate runway are depicted in plan view.
8/ Requested by Ricondo to remove the time frame for obstruction removal (mitigation due date) and priority level because obstructions are analyzed for ultimate runway.
9/ No obstruction were located within the OFZ therefore it is not included in the data table, but is depicted on the plan view drawing.

A.7. Runway Departure Surface Drawing

- Required where applicable. For each runway that is designated for instrument departures.
- This drawing depicts the applicable departure surfaces as defined in Paragraph 303 of FAA AC 150/5300-13A. The surfaces are shown for runway end(s) designated for instrument departures.
- 40:1 for Instrument Procedure Runways (Scale, 1" = 1000' Horizontal, 1" = 100' Vertical, Out to 10,200' beyond Runway threshold) 62.5:1 for Commercial Service Runways (Scale, 1" = 2000' Horizontal, 1" = 100' Vertical, Out to 50,000' beyond Runway threshold).
- Contact the FAA if the scale does not allow the entire area to fit on a single sheet. The depiction of the One Engine Inoperative (OEI) surface is optional; it is not currently required.

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	**10/**			
B. Plan view (existing & future)	See AC 150/5300-13A, Paragraph 303(c).	**10/**			
1. Aerial Photo for base map	Use an aerial photograph for the base map. A USGS 7.5 minute series map is also acceptable.	**10/**			
2. Runway end numbers and elevations (nearest 1/10 of a foot)	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center. For runways that have a clearway, depict this surface and the relocated departure surface. Reference AC 150/5300-13A, Paragraph 303(c)(1).	**10/**			
3. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on the Part 77 imaginary surfaces. See 14 CFR Part 77.19.	**10/**			
4. Depict property line, including easements	Show the property line(s) that are within the area/portion of airport shown.	**10/**			
5. Identify, by numbers, all traverse ways with elevations and computed vertical clearance in the departure surface	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters.	**10/**			

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
6. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used.	**10/**			
C. Profile view (existing & future)					
1. Ground profile	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the departure surface to extents of the surface dimensions.	**10/**			
2. Significant objects (bluffs, rivers, roads, buildings, fences, structures, etc.)	Show all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	**10/**			
3. Identify obstructions with numbers on the plan view	Identify the objects using same alphanumeric identifier that was used on the plan view.	**10/**			
4. Show roads and railroads with dashed lines at edge of the departure surface	Show the cross-section of any roads and/or railroads that cross the area shown.	**10/**			
D. Obstruction Data Tables					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters. List each object by the same alphanumeric symbol used in the plan view.	**10/**			
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Tree, Natural Gas Flare, etc.	**10/**			
3. Object Elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.	**10/**			

Runway Departure Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Amount of surface penetration	List the object protrudes above the departure surface. See AC 150/5300-13A, Paragraph 303(c).	**10/**			
5. Proposed or existing disposition of the obstruction	Provide a proposed disposition of the object to remedy the penetration. See AC 150/5300-13A, Paragraph 303(c).	**10/**			
6. Separate table for each departure surface	A separate table for each runway end must be used to enhance information clarity.	**10/**			
Remarks **10/ Refer to Sheets 8 and 9 Inner Portion of the Approach Surface Drawings.**					

A.8. Terminal Area Drawing

- Scale 1"=50' or 1"=100'. Plan view of aprons, buildings, hangars, parking lots, roads.
- This plan consists of one or more drawings that present a large-scale depiction of areas with significant terminal facility development. Such a drawing is typically an enlargement of a portion of the ALP. At a commercial service airport, the drawing would include the passenger terminal area, but might also include general aviation facilities and cargo facilities. See AC 150/5300-13A, Appendix 5.
- Use scale that allows the extent of the terminal/FBO apron area to best fit the chosen sheet size, e.g., typical GA airports may be able to use 1"=50' scale on a 22" X 34" sheet, but a complex hub airport with multiple terminal areas may require a 1"=100' scale on a 36" X 48" sheet. Contact FAA if an airport layout requires scaling or sheet sizing other than what is listed.
- This drawing is not needed at every airport type and is therefore optional.

Terminal Area Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Building data table	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL.	✓			
1. Structure identification number		✓			
2. Top elevation of structures (AMSL)		✓			
3. Obstruction marking/lighting (existing/future)	Show the location of existing and ultimate hangars. Include dimensions of apron and distance from runway and taxiway centerlines. See AC 150/5300-13A, Appendix 5. Show the elevation of the highest point of each structure.	✓			
C. Buildings to be removed or relocated noted	If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation.	✓			
D. Fueling facilities, existing and future	Show the location of existing and ultimate fueling facilities. Include dimensions of apron and distance from runway and taxiway centerlines.	✓			

Terminal Area Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
E. Air carrier gates positions shown (existing/future)	Show the existing and ultimate air carrier gate positions. See AC 150/5300-13A, Chapter 5.	✓			
F. Existing and future security fencing with gates	Show the existing and ultimate security fencing and gates. See AC 150/5300-13A, Paragraph 606.	✓			
G. Building restriction line (BRL)	Show the Building Restriction Line (BRL) that is within the area/portion of airport shown. The BRL identifies suitable building area locations on airports. This should be located where the Part 77 surfaces are at 35' above the airport elevation unless a different height is coordinated with the FAA. See AC 150/5300-13A, Paragraph 213(a).	✓			
H. Taxiway or Taxilane centerlines designated	Show centerlines of all taxiway and taxilanes within the area/portion of airport shown.	✓			
I. Dimensions					
1. Clearance Dimensions between runway, taxiway, and taxilane centerlines and hangars, buildings, aircraft parking, and other objects.	Show the location of existing and ultimate apron. Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75. Show the dimensions between existing and ultimate runway, taxiway, and taxilane centerlines and existing and ultimate hangars, buildings, aircraft parking, and other fixed or movable objects. See AC 150/5300-13A, Chapter 3 and Chapter 4. Show proposed tie-down layout on the apron area as well as taxilane marking plan. See AC 150/5300-13A, Appendix 5, AC 20-35, and AC 150/5340-1.	✓			
2. Dimensions of aprons, taxiways, etc. Apron/Hangar areas that do not meet dimensional standards of the critical aircraft should be identified and the wingspan/design group of the aircraft that can use that area depicted. Include tie down location with clearances		✓			

Terminal Area Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
J. Property Line	Show the property line(s) that are within the area/portion of airport shown.	✓			
K. Auto parking (existing & ultimate)	Show the existing and ultimate auto parking areas. See AC 150/5300-13A, Appendix 5.	✓			
L. Major airport drainage ditches or storm sewers	Show any significant airport drainage ditches or storm sewers within the area/portion of airport shown.	✓			
M. Special Use Area (e.g., Agricultural spraying support, Deicing, or Containment)	Show any special use areas within the area/portion of airport shown.		✓		
N. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✓			
O. Fence	Show the existing and ultimate perimeter fencing or general area fencing.	✓			
P. Entrance Road	Show the existing and ultimate entrance road. See 5300-13AFAA Order 5100.38, Chapter 6, Section 2.	✓			
Remarks					

A.9. Land Use Drawing

- Scale 1”=200’ to 1”=600’.
- A drawing depicting on- and off-airport land uses and zoning in the area around the airport. At a minimum, the drawing must contain land within the 65 DNL noise contour. For medium or high activity commercial service airports, on-airport land use and off-airport land use may be on separate drawings. The Airport Layout Drawing should be used as a base map.
- Drawing optional. Need based on scope of work.

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	✓			
B. Airport boundaries/property, existing & future (fee and easement)	Show the existing and ultimate property lines. If known, show property lines for parcels surrounding the airport.	✓			
C. Plan view of land uses by category (Agricultural, Aeronautical, Commercial, Residential, etc.). Use local land use categories.		✓			
1. On-Airport (existing & future)	Label existing and ultimate on-airport property by usage, e.g., Terminal Area, Air Cargo, Public Ramp, Airfield - Movement, Airfield - Non-movement, etc. Include existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids).	✓			
2. Off-Airport (existing & future) [to the 65 DNL Contour at a minimum, if contour known]	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.	✓			
D. Boundaries of local government	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	✓			
E. Land use legend	Provide a legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	✓			

Land Use Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
F. Public facilities (schools, hospitals, parks, churches etc.)	Identify public facilities, e.g., schools, parks, etc.	✓			
G. Runway visibility zone for intersecting runways	Show the Runway Visibility Zone(s) for the existing and ultimate airport configurations. See AC 150/5300-13A, Section 305.			✓	
H. Show off-airport property out to 65 DNL if available	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.	✓			
I. Airport Overlay Zoning or Zoning Restrictions	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	✓			
J. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✓			
K. Drawing details to include runways, taxiways, aprons, RPZ, terminal buildings and NAVAIDS	Show existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids, etc.). See AC 150/5300-13A.	✓			
L. Crop Restrictions	Show the Crop Restriction Line (CRL). See AC 150/5300-13A, Paragraph 322 and AC 150/5200-33.			✓	
Remarks					

A.10. Airport Property Map / Exhibit A

- Scale 1"=200' to 1"=600'.

Airport Property Map / Exhibit A					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Will Property Map serve as Exhibit A? – **If YES,** follow the directions to the right. – **If NO,** go to item B below.	If prepared in accordance with AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects, use ARP SOP no. 3.00 Exhibit A guidance instead of below checklist.	**11/**			
If Property Map *will not* serve as Exhibit A: B. Title and Revision Blocks					
C. Plan view showing parcels of land (existing, future, and ultimate)					
1. Fee land interests (existing and future)					
2. Easement interests (existing and future)					
a. Part 77 protection					
b. Compatible Land Use					
c. RPZ protection					
3. Airport Property Line					
D. Legend – shading/cross hatching, survey monuments, etc.					
E. Data Table					
1. Depiction of various tracts of land acquired to develop airport	If any obligations were incurred as a result of obtaining property, or an interest therein, they should be noted. Obligations that stem from Federal grant or an FAA-administered land transfer program, such as surplus property programs, should also be noted. The drawing should also depict easements beyond the airport boundary.				

Airport Property Map / Exhibit A					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
2. Method of acquisition or property status (fee simple, easement, etc.)					
3. Type of Acquisition Indicated	(e.g., AIP-noise, AIP-entitlement, PFC, surplus property, local purchase, local donation, condemnation, other)				
4. Acreage					
F. Access point(s) for through-the-fence arrangements including residential					
Remarks **11/ Exhibit A Property Inventory Map will be submitted as a separate document with SOP 3.0 Checklist**					

Florida Keys Marathon International Airport

Appendix E – Technical Review Committee (TRC) Presentations

PREPARED FOR:

Monroe County

PREPARED BY:

RICONDO & ASSOCIATES, INC.

RICONDO & ASSOCIATES

Ricondo & Associates, Inc. (R&A) prepared this document for the stated purposes as expressly set forth herein and for the sole use of Monroe County – Key West International Airport and its intended recipients. The techniques and methodologies used in preparing this document are consistent with industry practices at the time of preparation.

Florida Keys Marathon Int'l Airport

Master Plan Update

JACOBS

RICONDO & ASSOCIATES

Technical Review Committee #1

December 4, 2017

Overview

- Introductions
- Presentation of the Study
- Technical Review Committee
- Forecast of Aviation Activity Summary
- Commercial Air Service Analysis Summary
- Demand/Capacity Analyses/Facility Requirements
- Next Steps
- Open Discussion

INTRODUCTIONS

Introductions

- Your name
- Which organization you represent
- What does your organization do?
- Tell us how the Airport is important to your organization

Project Team

Closely collaborating with:

Deborah Murphy Lagos & Associates, LLC.

- Primary Points of Contact:
  - Monroe County: Don DeGraw / Thomas J. Henderson
  - Program Manager (Jacobs): Chris Bowker
  - Master Plan Team (R&A/AID): Sebastien Carreau/Matt Beamer
    Jeff Alexander / Timeka Carter

PRESENTATION OF THE STUDY

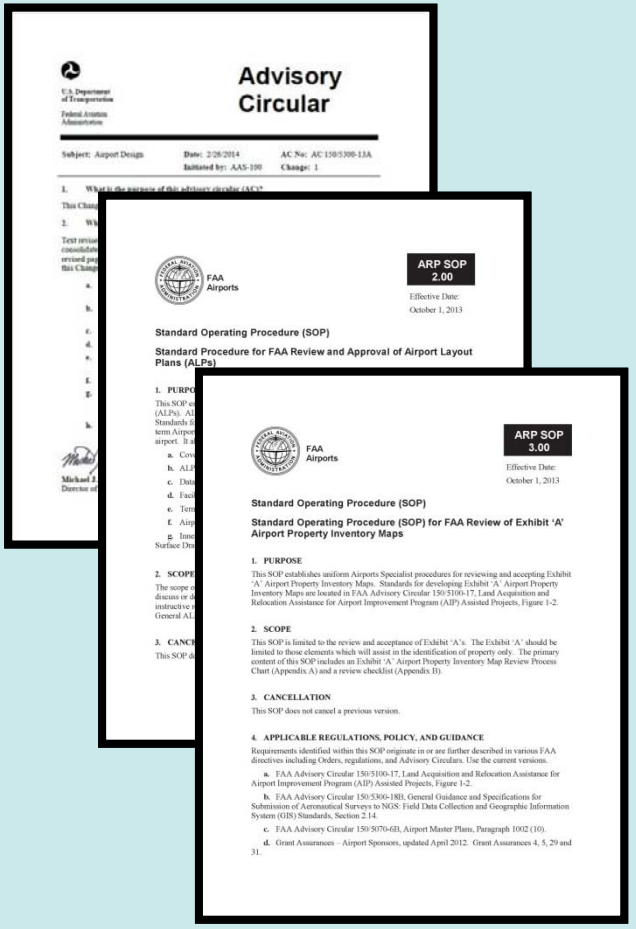
Master Planning Process

- Decision-making tool to guide orderly development of airport facilities
- FAA recommends updating an airport master plan every 5 to 10 years.
- Specific elements of the Master Plan require approval from the Federal Aviation Administration (FAA)
  - Forecast
  - Airport Layout Plan (ALP) Drawing Set

"An airport master plan is a comprehensive study of an airport and usually describes the short-, medium-, and long-term development plans to meet future aviation demand."
FAA Advisory Circular 150/5070 – 6B – Airport Master Plans

Project Background

- Previous Airport Master Plan completed in 2002 and an interim ALP completed in 2016
- Runway and Parallel Taxiway Alternatives Study completed in 2015/2016
- Environmental Assessment - Ongoing
- Major changes since the FAA-approval of the ALP:
  - AC 150/5300-13A Change 1, Airport Design
  - SOPs 2.00 and 3.00
  - AC 150/5300-16A, 17C and 18C
  - Draft AC on Critical Aircraft & Regular Use Determination

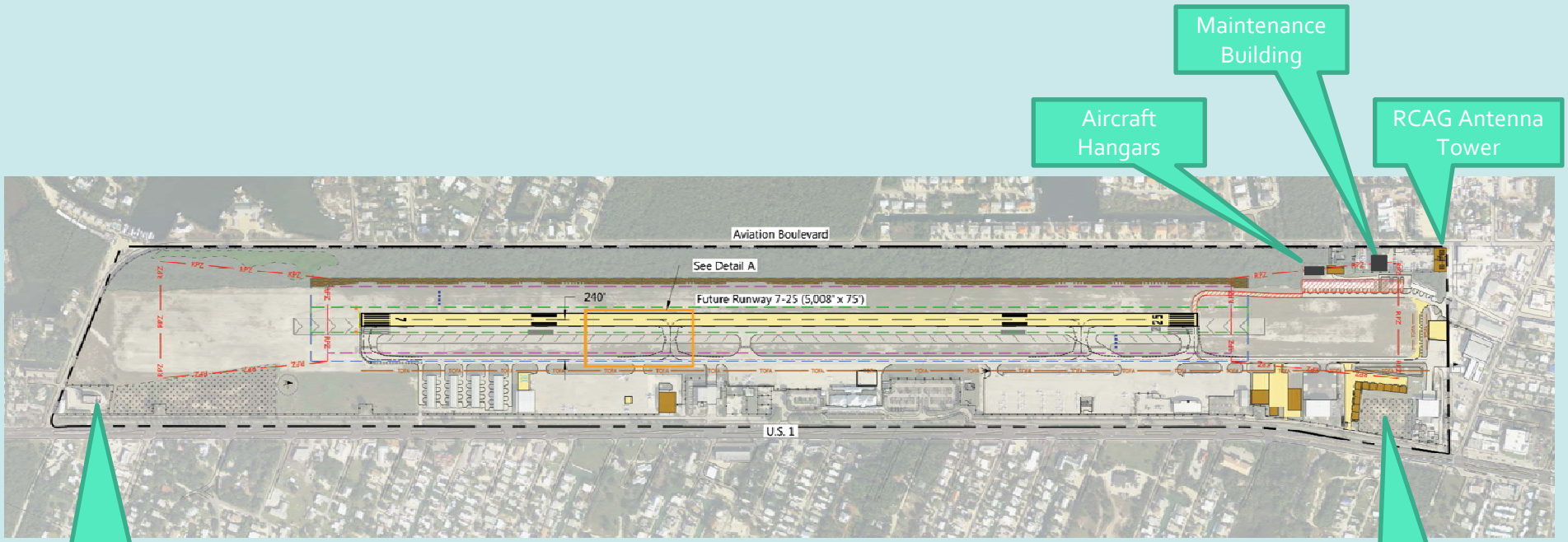


Key Goals and Objectives

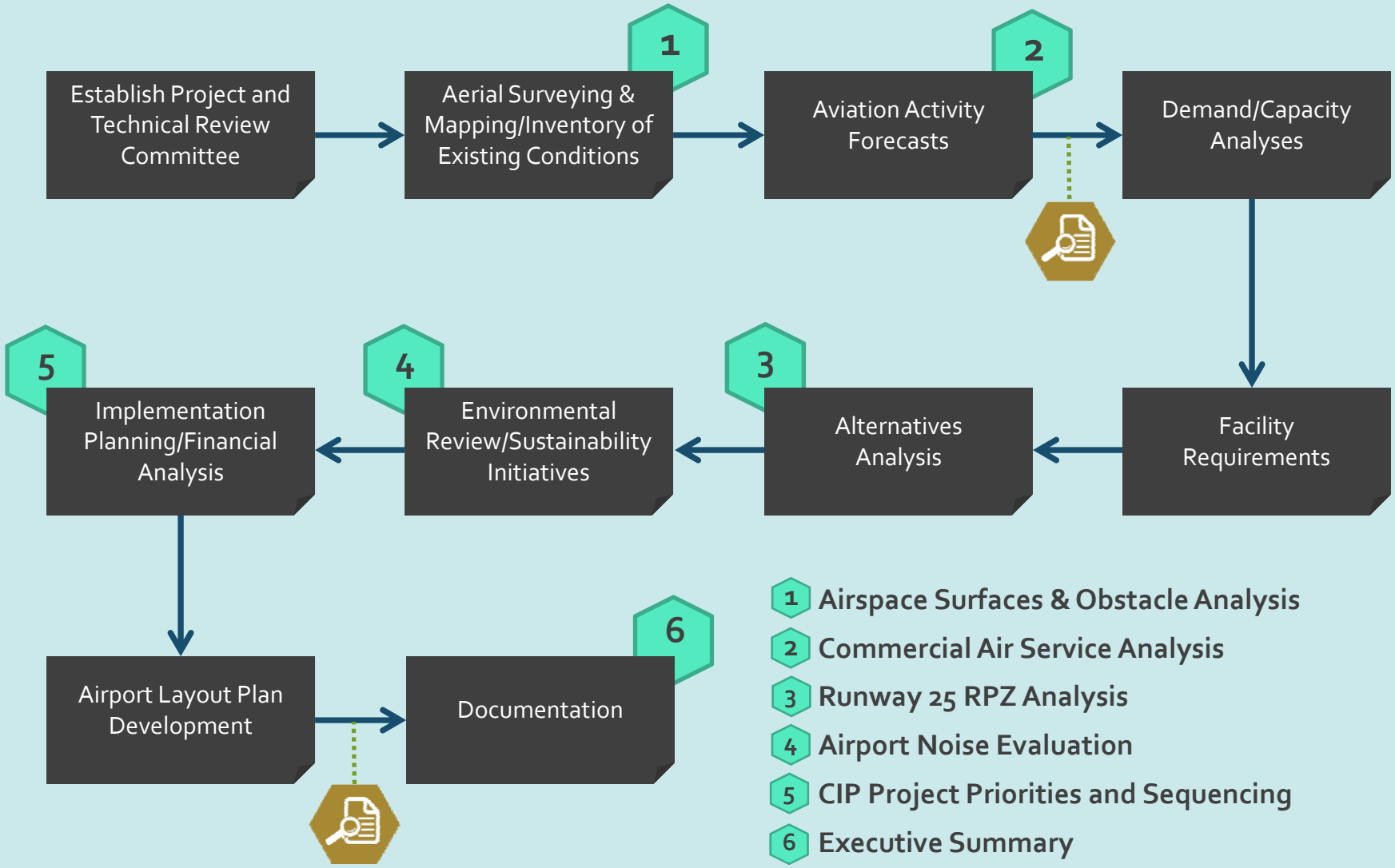
- Identification of potential developable parcels
- Evaluation of the long-term potential for scheduled air service
- Development of airfield alternatives to increase the takeoff runway length available while maintaining the RPZ in place
- Identification of potential sites for:
  - An air traffic control tower
  - An emergency operations center
- Evaluation of Airfield Taxiway Geometry
- Preparation of an Obstacle Action Plan (OAP)

Key Goals and Objectives

- Review of existing incompatible land uses
- Incorporation of ongoing planning study recommendations:
  - Monroe County Sheriff's Office Shooting Range
  - Remote Communications Air-Ground (RCAG) Antenna Tower



Airport Master Plan Process



1. Airspace Surfaces & Obstacle Analysis
2. Commercial Air Service Analysis
3. Runway 25 RPZ Analysis
4. Airport Noise Evaluation
5. CIP Project Priorities and Sequencing
6. Executive Summary

FAA Review and Approval

Project Schedule

- Approval of Aviation Activity Forecasts: October 13, 2017
- Demand/Capacity Analyses and Facility Requirements: Winter 2017/2018
- Alternatives Analysis: Winter 2018
- Environmental Review: Spring 2018
- Financial Analysis: Spring 2018
- Airport Layout Plan Development: Summer 2018
- Documentation/Complete Master Plan Update: Summer 2018

TECHNICAL REVIEW COMMITTEE

Technical Review Committee Role

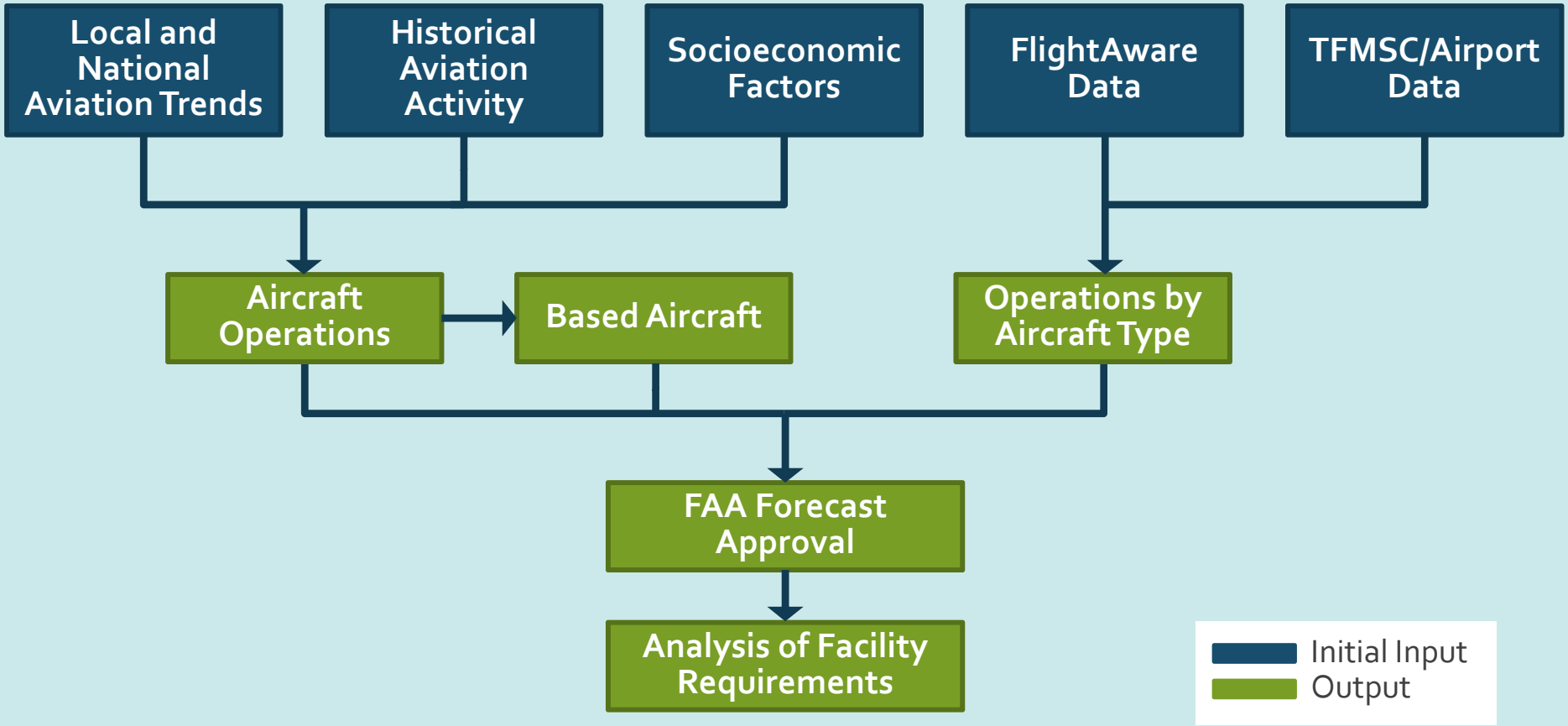
- Advisory in nature. Will provide consensus opinion for Airport staff to consider when making planning decisions.
- Provide feedback and technical guidance on each element of the Master Plan Update:
  - Bring various master local perspectives to the master planning process
  - Reach consensus on key master plan issues

Technical Review Committee Responsibilities

- Attend three meetings over the course of the study
- Provide input and guidance on technical analyses
- Review and comment on technical work products
- Provide ideas for consideration in the Master Plan
- Stay engaged in the planning process
- Help build the Airport's future by sharing what you learn from your participation in the Technical Review Committee

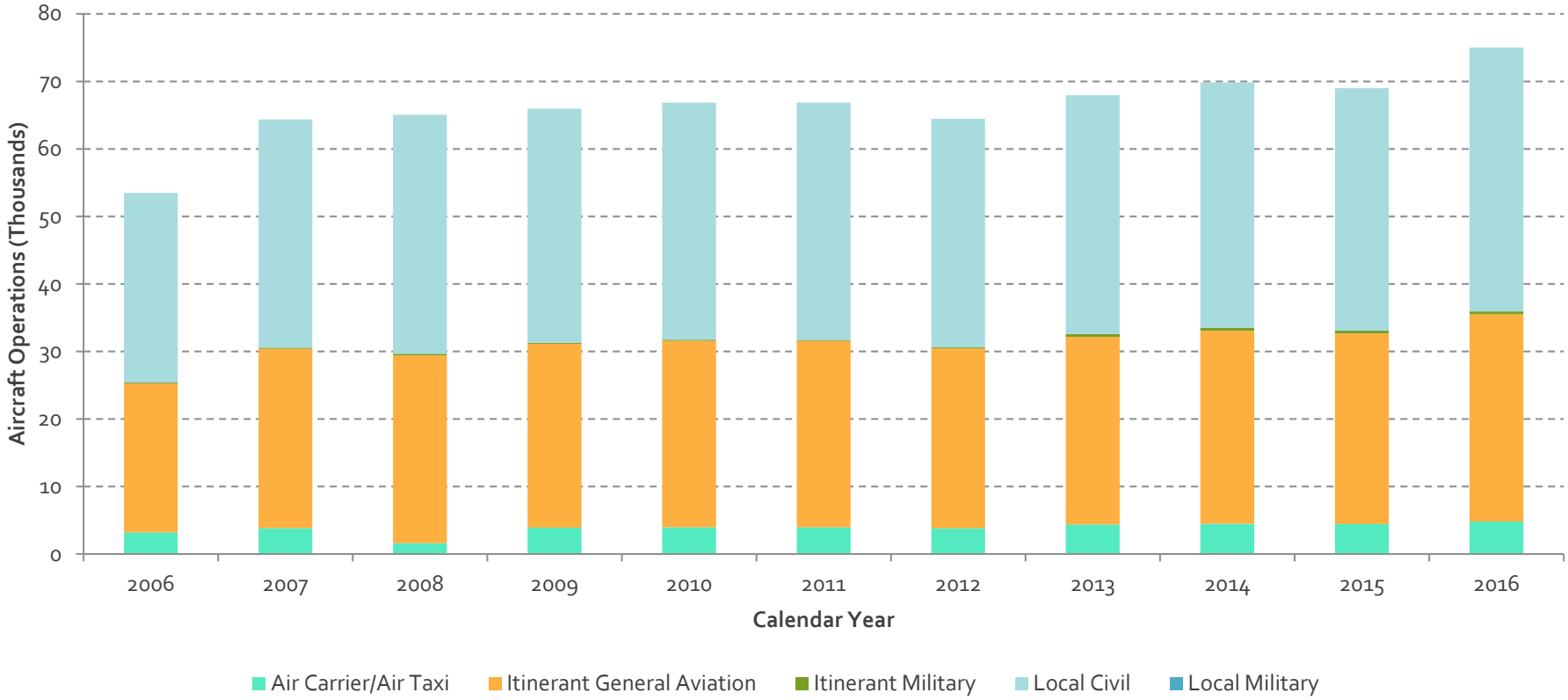
FORECAST OF AVIATION ACTIVITY SUMMARY

Forecast Development Process



Local Activity Trends

- The total operations at MTH increased at a CAGR of 3.4 percent from CY 2006 to CY 2016 with a decline in 2012.
- Total itinerant operations have increased at a CAGR of 3.5 percent and local operations have increased at a CAGR of 3.4 percent.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2006-2014 MTH operations are values from FDOT FASP; MTH Operations by types were calculated using the share of total operations in TAF.

Sources: FDOT FASP, 2017; Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017.

Forecast Methodology

- Socioeconomic regression analyses were conducted to establish historical relationships between socioeconomic variables and operations at the Airport
- Forecasts of total MTH operations were developed using the outputs of the socioeconomic regression analyses
- The projected MTH operations were further segregated by local and itinerant operations on the basis of shares in the FAA TAF.

Socioeconomic Regression

- Historical national socioeconomic variables have strong correlation with the total MTH FDOT FASP operations. However, local economic variables have poor model fit with the total MTH operations.
- National population, employment, personal income, and GDP have the strongest correlation with the total MTH operations.

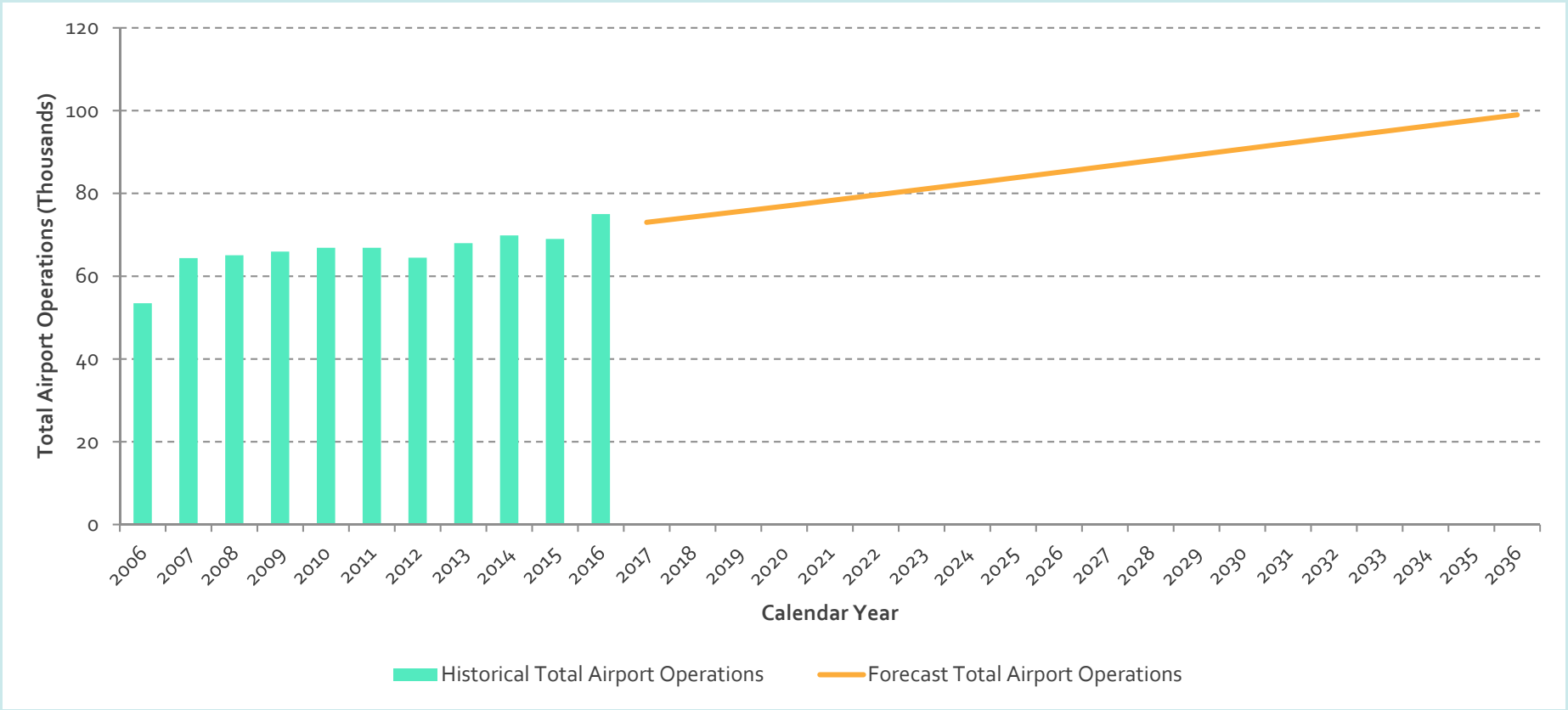
Dependent Variable	Independent Variable[1/]	R-squared Value[2/]
Total MTH Annual Operations	**National Population**	**84.60%**
	National Total Personal Income	**80.50%**
	National GDP	**78.80%**
	National Employment	**76.60%**
	National PCPI	74.20%
	National Total Earnings	73.30%
	Local GRP	65.00%
	Local Total Personal Income	63.90%
	Local Employment	63.40%
	Local PCPI	61.20%
	Local Total Earnings	59.20%
	Local Population	32.20%

Note:
1/ Local socioeconomic variables are for Monroe County, Florida.
2/ Adjusted R-Squared values are shown, which adjust for over-fitting. Adjusted R-squared values greater than or equal to 70.0 percent are generally considered indications of acceptable model fit. Adjusted R-squared values greater than 75.0 percent are highlighted.

Sources: Monroe County Airports Department, April 2017 ; FDOT FASP, 2017; Woods & Poole, Inc., 2017.

Total Airport Operations Forecast

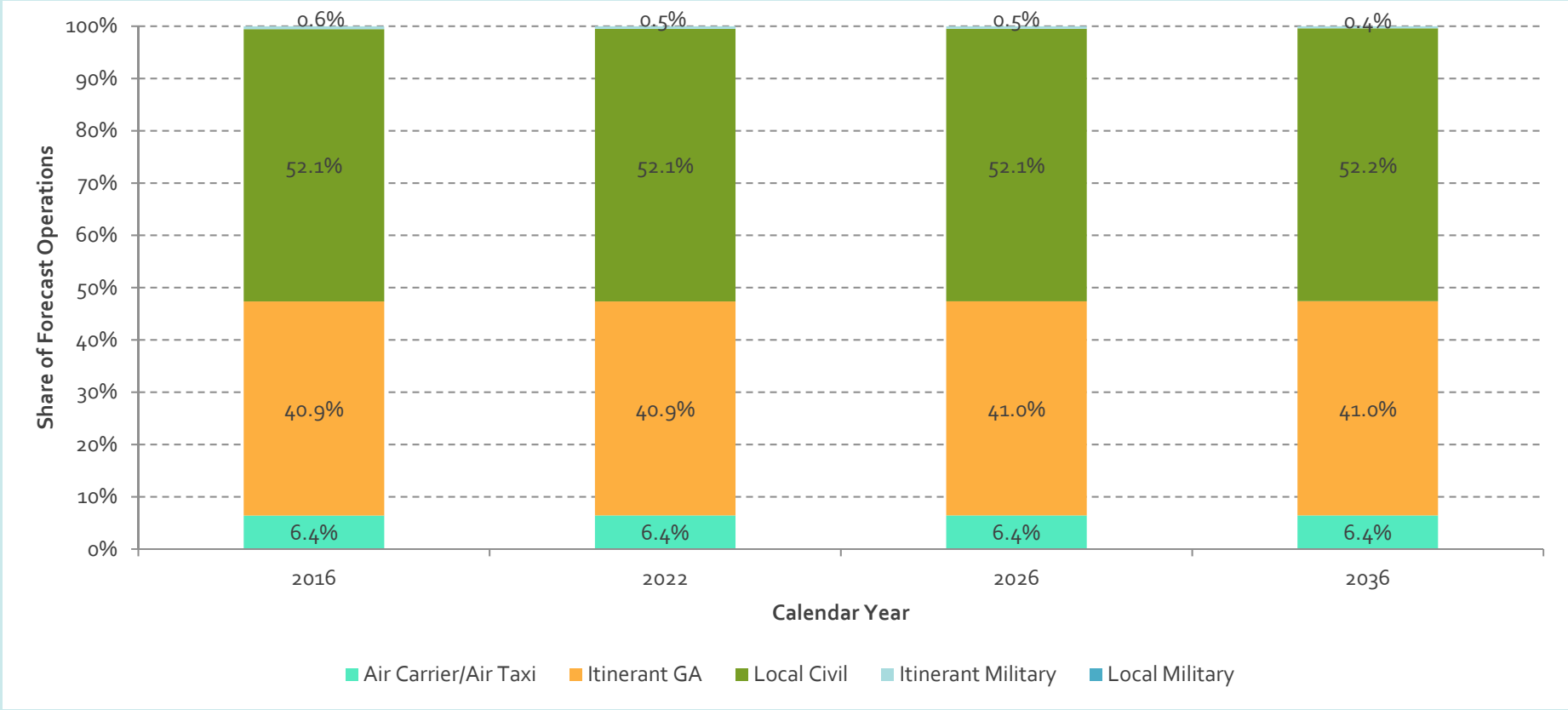
- Total operations at MTH are forecast to increase at a CAGR of 1.4 percent from 2016 through 2036 from 75,000 in 2016 to 98,978 in 2036.



Note: CY 2015-2016 operations are estimates provided by the Airport.
Source: FDOT FASP, 2017 ; 2017 Woods & Poole Economics, Inc., May 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

Total Airport Operations Forecast

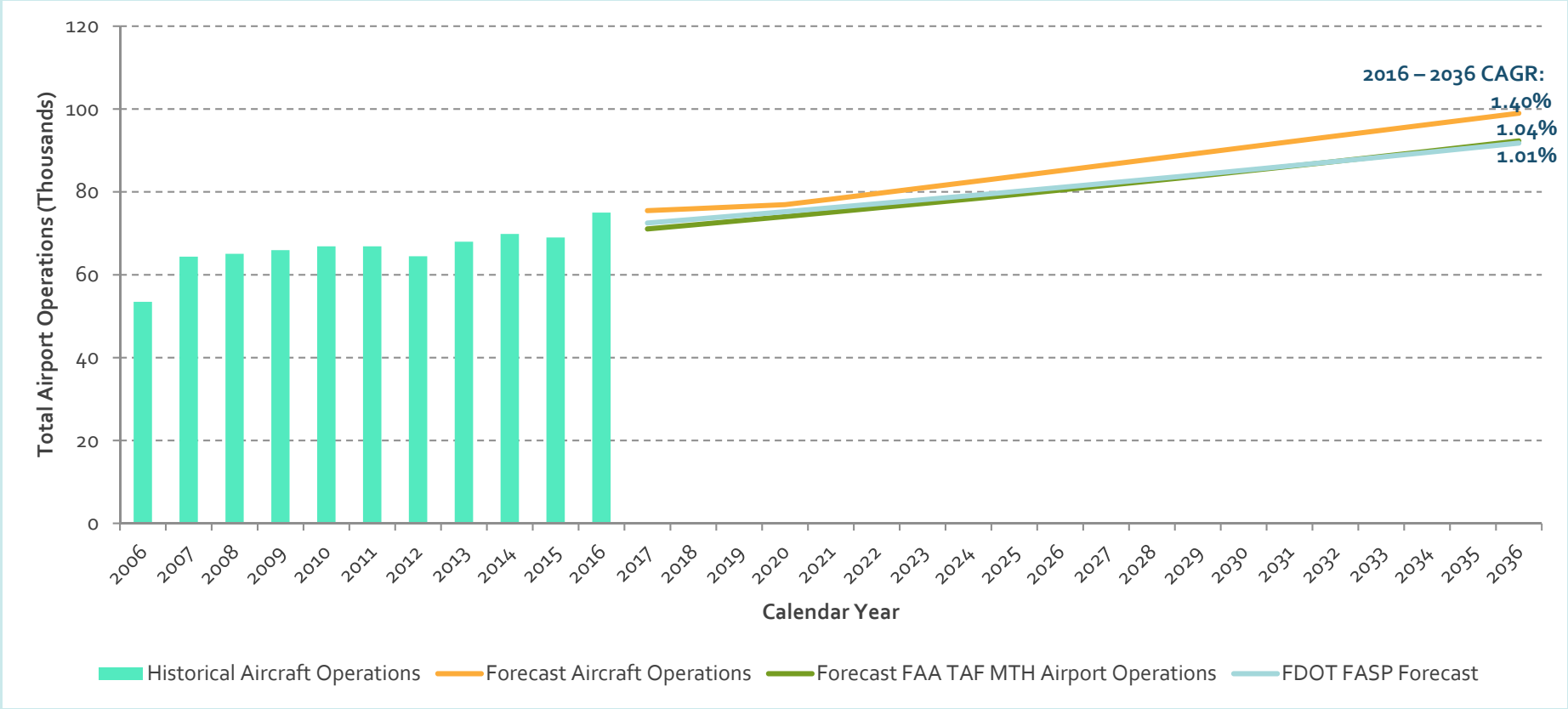
- Itinerant and local GA operations have an average of 41 and 52 percent share of total operations through 2036 respectively.



Note: CY 2015-2016 operations are estimates provided by the Airport; MTH Operations by types were calculated using the share of total operations in FAA TAF.
Source: Ricondo & Associates, Inc., April 2017 (Forecast); Monroe County Airports Department, April 2017.

Comparison to Other Forecasts

- Total operations at MTH have increased at a CAGR of 3.4 percent in the past 10 years and are forecast to grow at a CAGR of 1.4 percent through 2036, slightly above 2016 FAA TAF forecast. FDOT FASP forecast is similar to FAA TAF forecast.



Note: CY 2015-2016 operations are estimates provided by the Airport; CY 2035 – CY 2036 FDOT FASP are estimated values.
Sources: Monroe County Airports Department, April 2017; Federal Aviation Administration, Terminal Area Forecast, April 2017; FDOT FASP, 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

Fleet Mix Forecast Discussion

- Fleet mix data
  - TFMSC data from 2000 through 2016 were used to examine fleet mix trends at the Airport
  - TFMSC data do not capture all operations at the Airport, including most operations conducted under Visual Flight Rules (VFR)
  - Marathon Aviation Associates provided additional data to determine the 2016 fleet mix
  - Airport stakeholders stated single-engine piston operations have been increasing, which was verified by recent TFMSC data
- Fleet Mix Forecast Methodology and Assumptions
  - Market share analyses were used to estimate the proportion of each engine type and determine the total operations by engine types in 2016 base year
  - The share of single-engine piston and jet aircraft operations were forecast to increase over the forecast period based on local and national trends
  - Other shares were forecast to decrease proportionally to their base year share

Fleet Mix Forecast Results

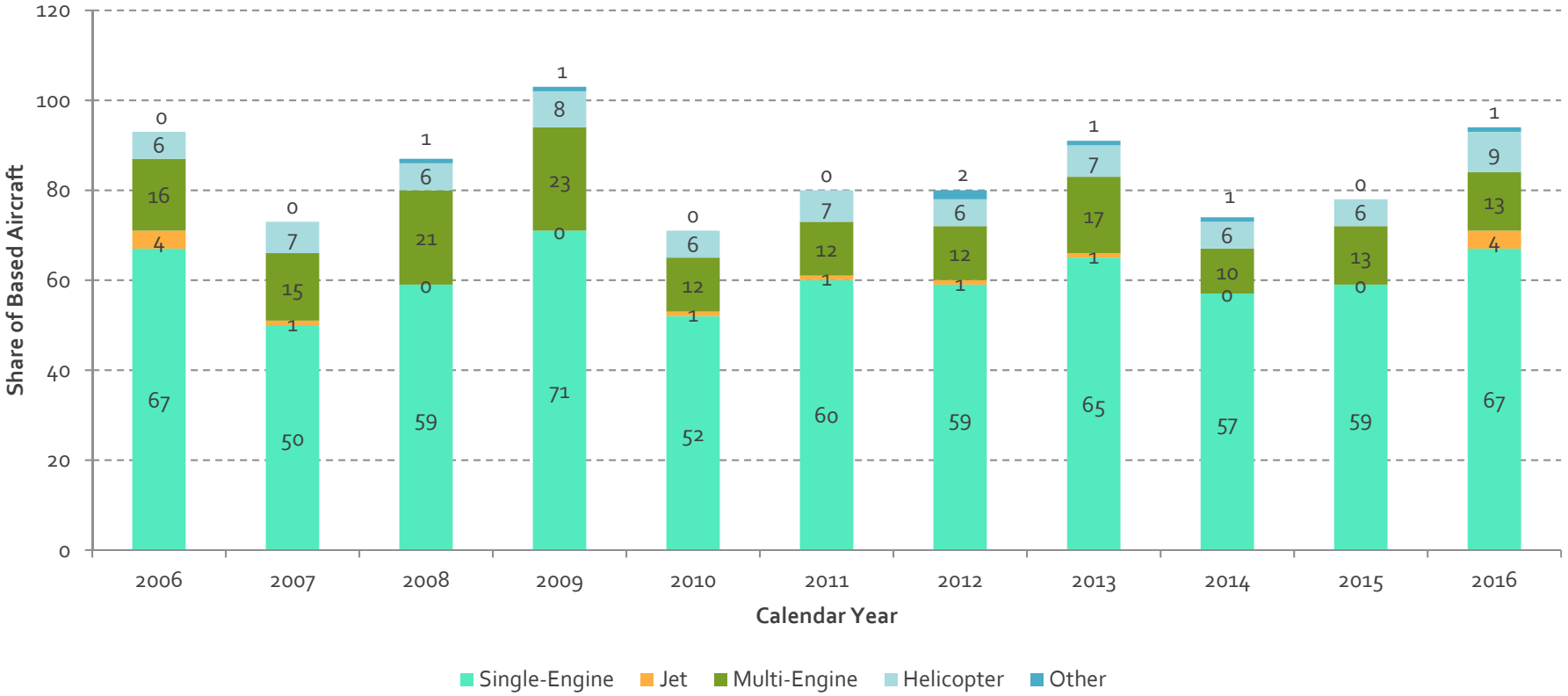
- Single-engine piston operations are forecast to increase at a CAGR of 1.6 percent through 2036. The share of single-engine piston operations remain as the highest.
- Jet aircraft operations were forecast to increase over the forecast period at a CAGR of 2.4 percent based on national and local trends
- Other shares were forecast to decrease proportionally to their base year share

	Piston				Turboprop				Jet		Helicopter		Total	
Calendar Year	Single-Engine	Share	Multi-Engine	Share	Single-Engine	Share	Multi-Engine	Share	Jet	Share	Helicopter	Share	Total	Share
Historical														
2016	27,594	36.8%	7,263	9.7%	7,378	9.8%	7,303	9.7%	16,692	22.3%	8,771	11.7%	75,000	100%
Forecast														
2022	29,577	37.2%	7,372	9.3%	7,490	9.4%	7,413	9.3%	18,849	23.7%	8,903	11.2%	79,604	100%
2026	31,835	37.4%	7,644	9.0%	7,766	9.1%	7,687	9.0%	20,966	24.6%	9,232	10.8%	85,130	100%
2036	37,612	38.0%	8,191	8.3%	8,322	8.4%	8,237	8.3%	26,724	27.0%	9,892	10.0%	98,978	100%
CAGR 2016-2036	1.6%		0.6%		0.6%		0.6%		2.4%		0.6%		1.4%	

Note: CY 2016 operations are estimates provided by the Airport.
Source: Federal Aviation Administration, Traffic Flow Management System Counts, April 2017; Marathon Aviation Associates, Estimated Activity at KMTH for 2016, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

Local Based Aircraft Trends

- Single-engine aircraft represent the highest share of based aircraft at MTH. The share of jet aircraft remains low throughout CY 2006 to CY 2016.
- The total based aircraft increased at a CAGR of 0.11 percent from CY 2006 to CY 2016.



Notes: 2016 Based Aircraft values for MTH are actual values provided by Monroe County Airports Department, in Calendar year; all other values are from the FAA TAF, in Federal Fiscal Year. "Other" aircraft include aircraft such as gliders, military aircraft, and ultra-light aircraft .

Sources: Monroe County Airports Department, April 2017; FAA, Terminal Area Forecast (TAF), April 2017; FAA, Glossary for the 2016 Terminal Area Forecast (TAF), June 2017.

Methodology and Assumptions
Based Aircraft

- Airport Based Aircraft Forecast
  - Monroe County Department of Airports provided April 2017 based aircraft data at MTH which were used as 2016 based aircraft.
  - Total local operations per based aircraft in 2016 were calculated and used to forecast the total based aircraft through 2036 based on the forecast of local operations
  - Market share analyses were conducted to establish the historical proportions between each engine type and total based aircraft in 2016
  - The base year shares were used to forecast based aircraft by engine types through 2036

Total Based Aircraft Forecast

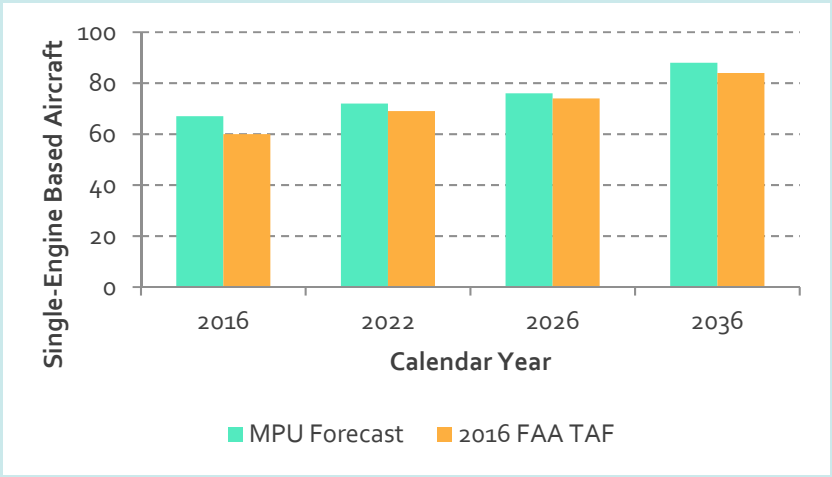
- Total based aircraft at MTH are forecast to increase at a CAGR of 1.4 percent from 94 in 2016 to 123 in 2036.
- Jet aircraft are forecast to be the slowest growing category of based aircraft and Single-engine aircraft are forecast to have the highest share of total based aircraft throughout the forecast period.

	Single-Engine		Multi-Engine		Jet		Helicopter		Total	
Fiscal Year	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF	MPU Forecast	2016 FAA TAF
Historical										
2016	67	60	13	14	4	0	9	6	94	80
Forecast										
2022	72	69	14	19	4	0	10	6	101	94
2026	76	74	15	23	5	0	10	6	107	103
2036	88	84	17	33	5	0	12	6	123	123

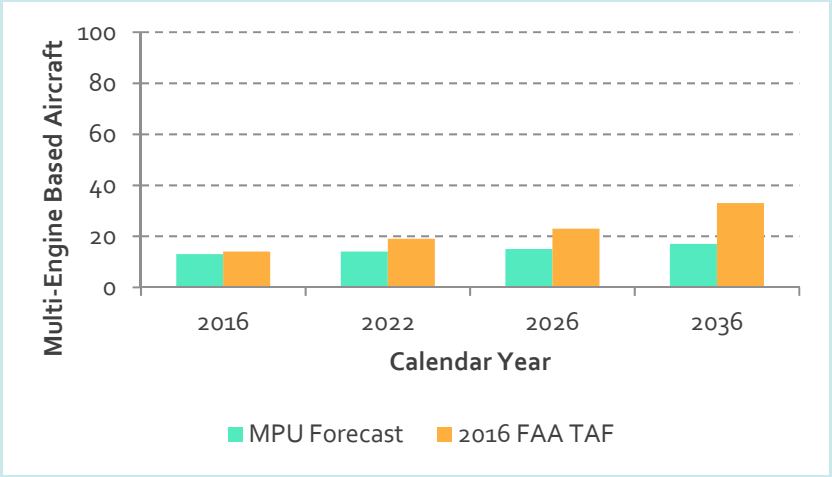
Sources: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast); Federal Aviation Administration, Terminal Area Forecast, April 2017.

Total Based Aircraft Forecast

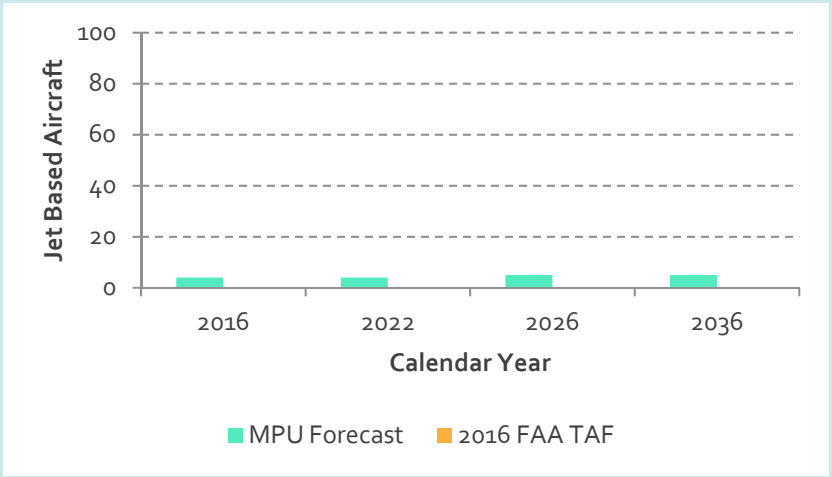
Single- Engine



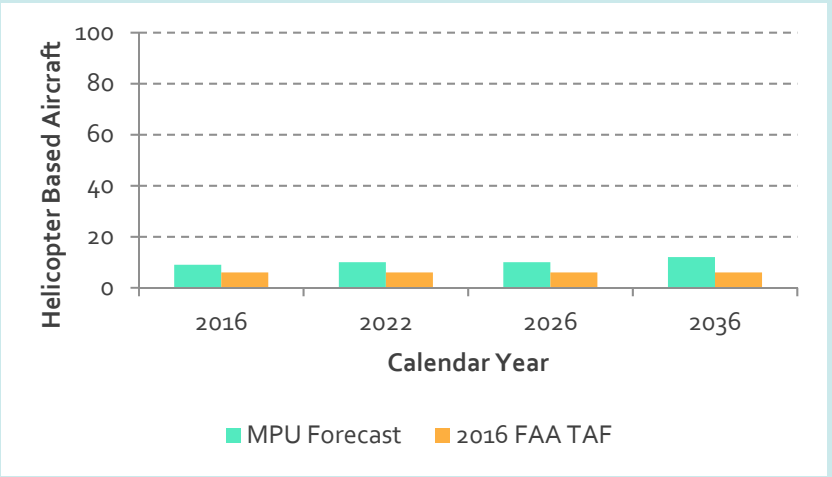
Multi- Engine



Jet



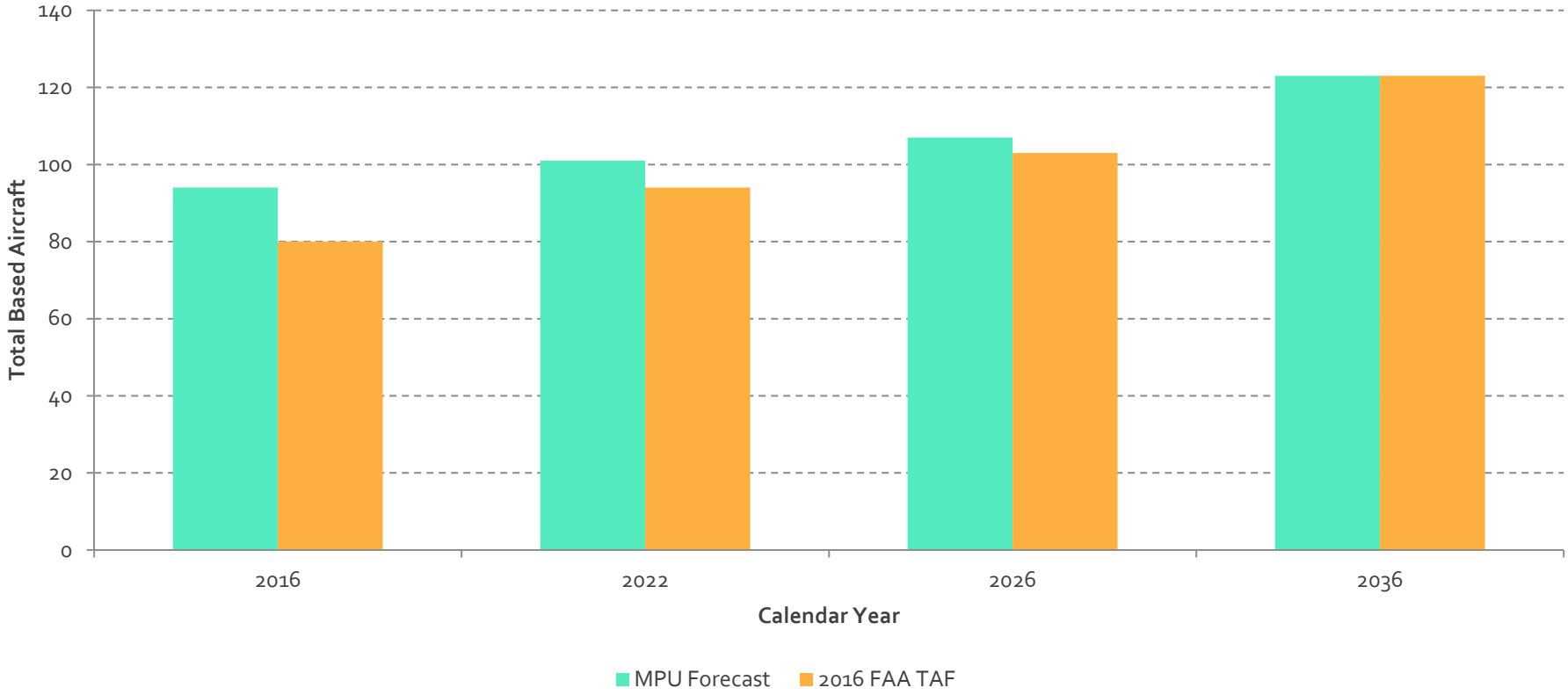
Helicopter



Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

Total Based Aircraft Forecast

- Master Plan Update forecast of total based aircraft at MTH is generally higher than FAA TAF forecast. However, the forecast for based aircraft is identical in 2036.



Source: Florida Keys Marathon International Airport Based Aircraft, April 2017; Ricondo & Associates, Inc., April 2017 (Forecast).

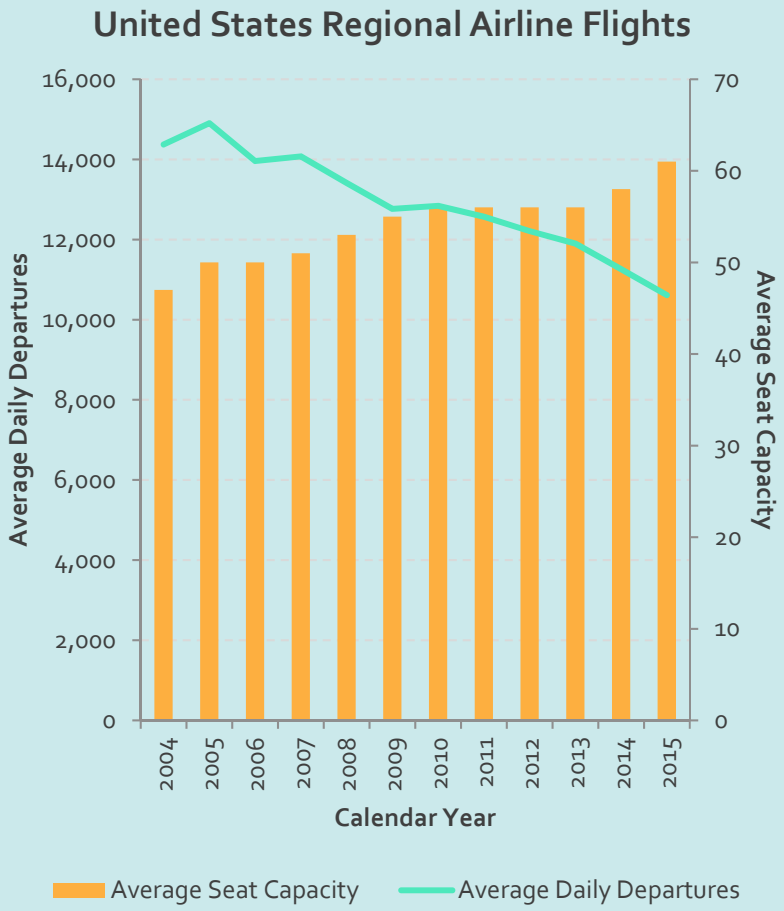
COMMERCIAL AIR SERVICE ANALYSIS SUMMARY

Commercial Air Service Analysis

- MTH had consistent commercial air service during the 1990s
- Commercial air service was more sporadic in the 2000s, with the last commercial service offered in April 2009
- Commercial air service at the Airport has been characterized by
  - Regional service (mostly destinations in Florida, with some service to Atlanta)
  - Small turboprop aircraft or regional jet aircraft (9 to 50 seats)
- Due to industry consolidation, consumer behavior, and competition from nearby airports, commercial air service would be difficult to sustain at MTH

Commercial Air Service Analysis

Positive Factors for Air Service	Negative Factors for Air Service
• Greater global and regional demand for air travel	• Airline mergers and acquisitions • Cost-sensitive demand base of the Airport
• Increased regional capacity	• Fewer small aircraft • Pilot shortage
• Improving socioeconomic conditions	• Increasing service at neighboring airports
• Lower fuel costs	• Rising labor costs



Sources: Regional Airline Association, http://www.raa.org/ (accessed August 15, 2017); Ricondo & Associates, August 2017.

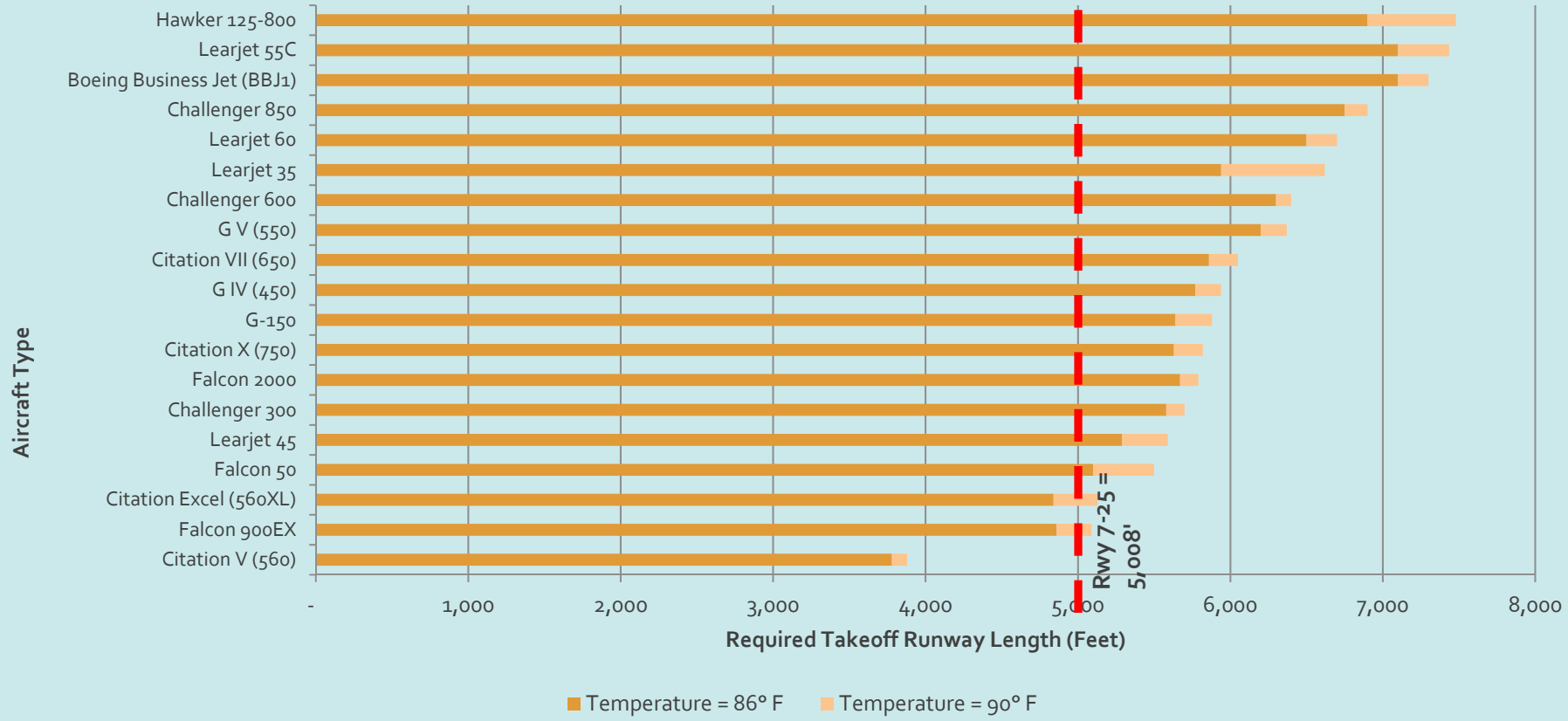
DEMAND/CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

Requirements Analysis

General Dimensional Runway and Taxiway Characteristics			
	Dimension	**FAA Requirements**	**ADG II Compliance**
Runway			
Runway CL to Parallel Taxiway CL	200′	240′	No
Width	100′	75′	Yes (Exceed Requirements by 25′)
Shoulder Width	0′/50′	10′	No (Mitigated by the wider runway width)
Safety Area Width	150′	150′	Yes
Object Free Area Width	500′	500′	Yes
Safety Area & Object Free Area Length	300′	300′	Yes
Taxiway			
Width	50′	35′	Yes (Exceed Requirements by 15′)
Safety Area Width	79′	79′	Yes
Object Free Area Width	131′	131′	Yes
Blast Pad			
Width	100′	95′	Yes
Length	>400′	150′	Yes (Exceed Requirements by 250′)

Takeoff Runway Length Requirements (MTOW)

- Destinations served? Type of aircraft?



Potential Improvements

- As a stakeholder of the airport, what type of additional facilities and improvements at MTH would best suit your needs and those of your customers?
  - What airside improvements (including NAVAIDs and instrument approaches) would help improve your services at MTH? (e.g., apron improvements)
  - What landside improvements would help improve your services at MTH? (e.g., automobile parking)

NEXT STEPS

Next Steps

- Demand / Capacity Analysis (In Progress)
- Facility Requirements (In Progress)
- Alternatives Evaluation
- ALP Development
- Environmental Overview
- Implementation Plan
- Public Outreach

Questions / Comments / Open Discussion

Thank You!

Florida Keys Marathon Airport Master Plan Update
Technical Review Committee #1

Florida Keys Marathon Int'l Airport

Master Plan Update

JACOBS

RICONDO & ASSOCIATES

Technical Review Committee #2

March 19, 2018

Meeting Agenda

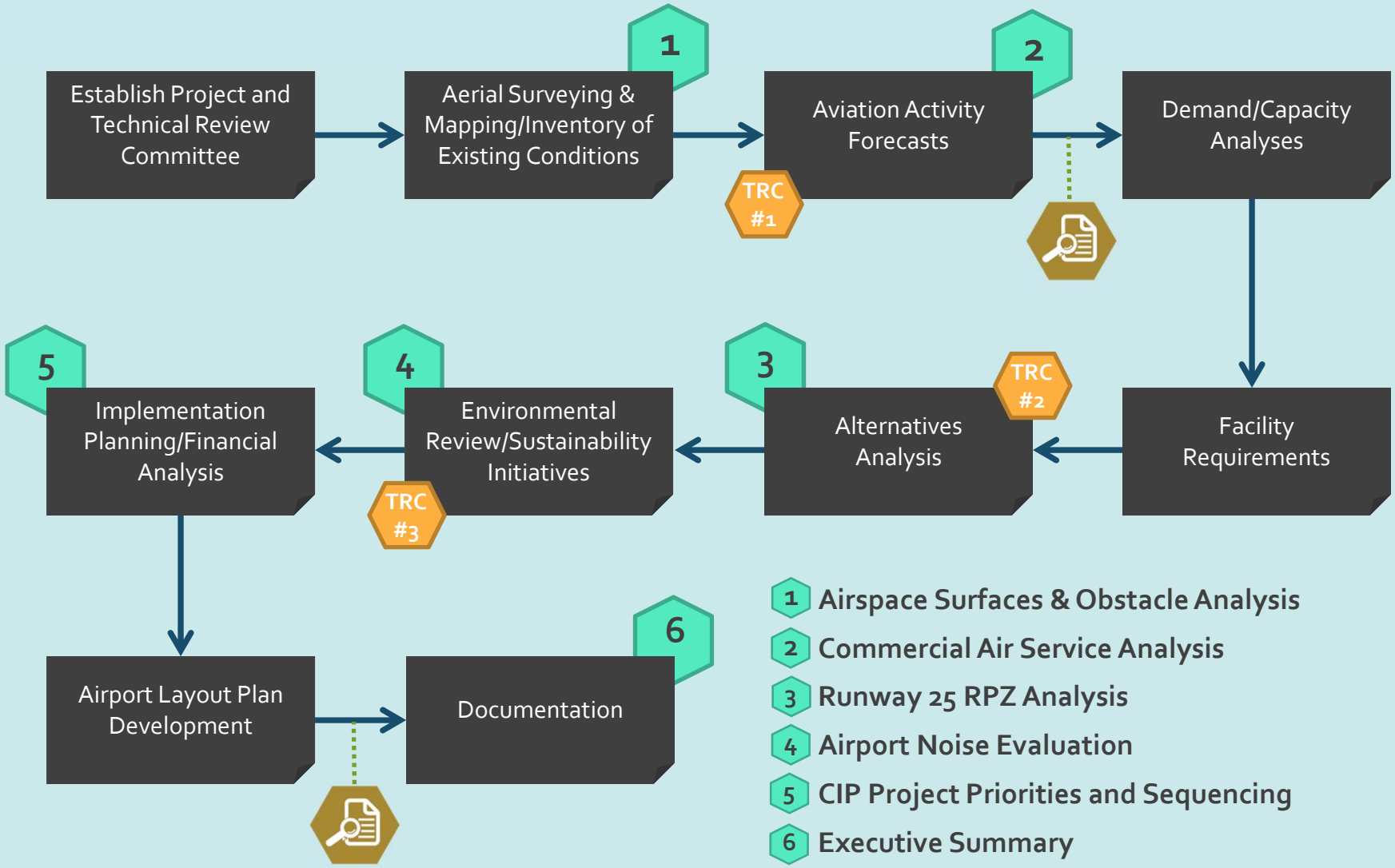
- Introductions
- Demand/Capacity and Facility Requirements and Preliminary Alternatives:
  - Airfield
  - Terminal
  - On-Airport Roadways
  - Fixed Base Operators and General Aviation Facilities
  - Airport Support
  - Non-Aeronautical
- Next Steps
- Open Discussion

INTRODUCTIONS

Introductions

- Your name
- Which organization you represent
- What does your organization do?
- Tell us how the Airport is important to your organization

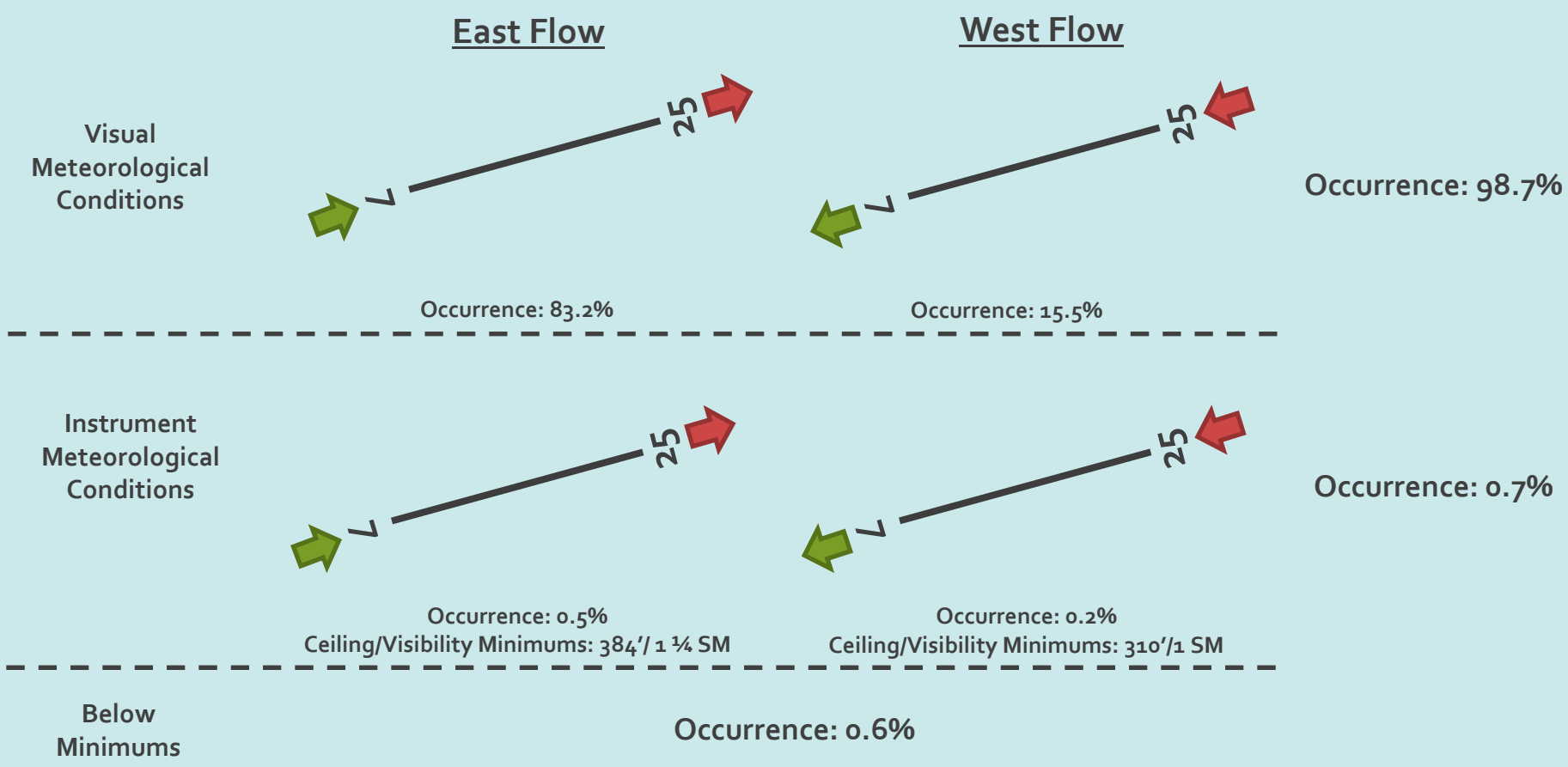
Airport Master Plan Process



AIRFIELD FACILITIES

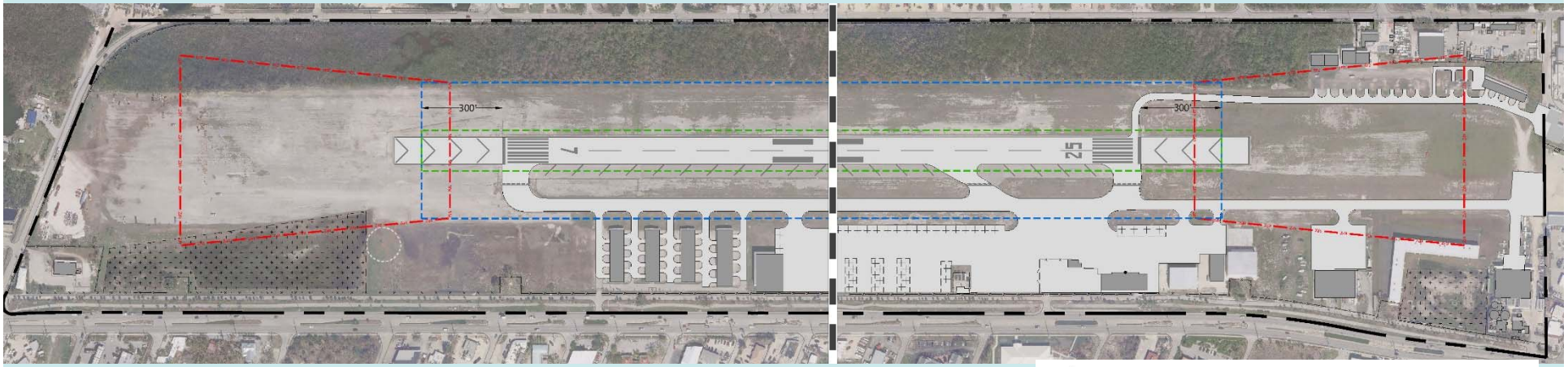
AIRFIELD BACKGROUND INFORMATION

Runway Use



Source: National Centers for Environmental Information, 3505 Surface Hourly Weather Observations for The Florida Keys Marathon International Airport (January 1, 2008 – December 31, 2017), retrieved January 19, 2018.

Runway 7-25 Airfield Surfaces (Existing)



- Runway Safety Area (**RSA**): 150' x 5,601'
- Runway Object Free Area (**ROFA**): 500' x 5,601'
- Runway Protection Zone (**RPZ**):
  - Runway 7: 500' x 700' x 1,000' (visibility ≥ 1 SM)
  - Runway 25: 500' x 700' x 1,000' (visibility ≥ 1 SM)

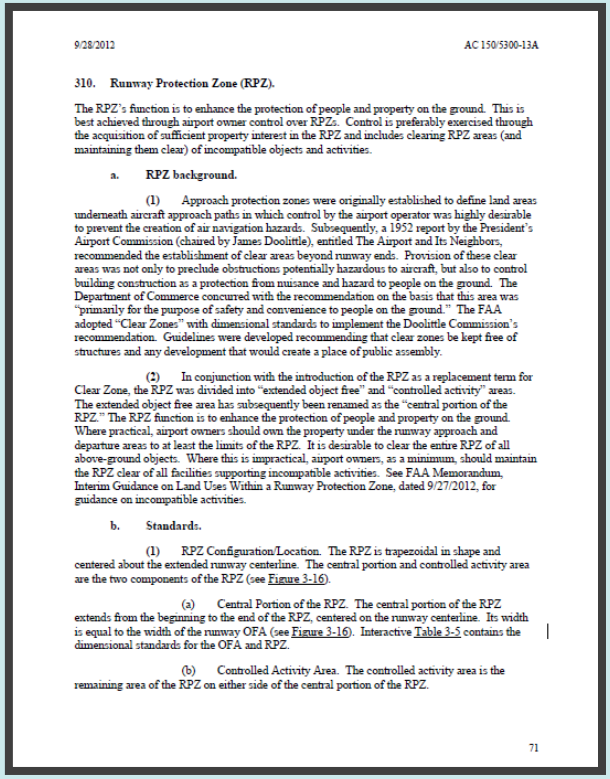
LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Existing Buildings
- Retention/Detention Pond

Runway Protection Zone Land Use Guidance

Acceptable without Further Evaluation	Requiring Coordination with FAA
Farming	Transportation facilities
Irrigation channels	Above-ground utility infrastructure
Airport service roads	Hazardous material storage (above and below ground)
Underground facilities	Wastewater treatment facilities
Unstaffed NAVAIDs and Facilities	Fuel storage facilities (above and below ground)
	Buildings and structures
	Recreational land use

Legend: Facilities in RPZ



9/28/2012 AC 150/5300-13A

310. Runway Protection Zone (RPZ).

The RPZ's function is to enhance the protection of people and property on the ground. This is best achieved through airport owner control over RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities.

a. RPZ background.

(1) Approach protection zones were originally established to define land areas underneath aircraft approach paths in which control by the airport operator was highly desirable to prevent the creation of air navigation hazards. Subsequently, a 1952 report by the President's Airport Commission (chaired by James Doolittle), entitled The Airport and Its Neighbors, recommended the establishment of clear areas beyond runway ends. Provision of these clear areas was not only to preclude obstructions potentially hazardous to aircraft, but also to control building construction as a protection from nuisance and hazard to people on the ground. The Department of Commerce concurred with the recommendation on the basis that this area was "primarily for the purpose of safety and convenience to people on the ground." The FAA adopted "Clear Zones" with dimensional standards to implement the Doolittle Commission's recommendation. Guidelines were developed recommending that clear zones be kept free of structures and any development that would create a place of public assembly.

(2) In conjunction with the introduction of the RPZ as a replacement term for Clear Zone, the RPZ was divided into "extended object free" and "controlled activity" areas. The extended object free area has subsequently been renamed as the "central portion of the RPZ." The RPZ function is to enhance the protection of people and property on the ground. Where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. It is desirable to clear the entire RPZ of all above-ground objects. Where this is impractical, airport owners, as a minimum, should maintain the RPZ clear of all facilities supporting incompatible activities. See FAA Memorandum, Interim Guidance on Land Uses Within a Runway Protection Zone, dated 9/27/2012, for guidance on incompatible activities.

b. Standards.

(1) RPZ Configuration/Location. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The central portion and controlled activity area are the two components of the RPZ (see Figure 3-16).

(a) Central Portion of the RPZ. The central portion of the RPZ extends from the beginning to the end of the RPZ, centered on the runway centerline. Its width is equal to the width of the runway OFA (see Figure 3-16). Interactive Table 3-5 contains the dimensional standards for the OFA and RPZ.

(b) Controlled Activity Area. The controlled activity area is the remaining area of the RPZ on either side of the central portion of the RPZ.

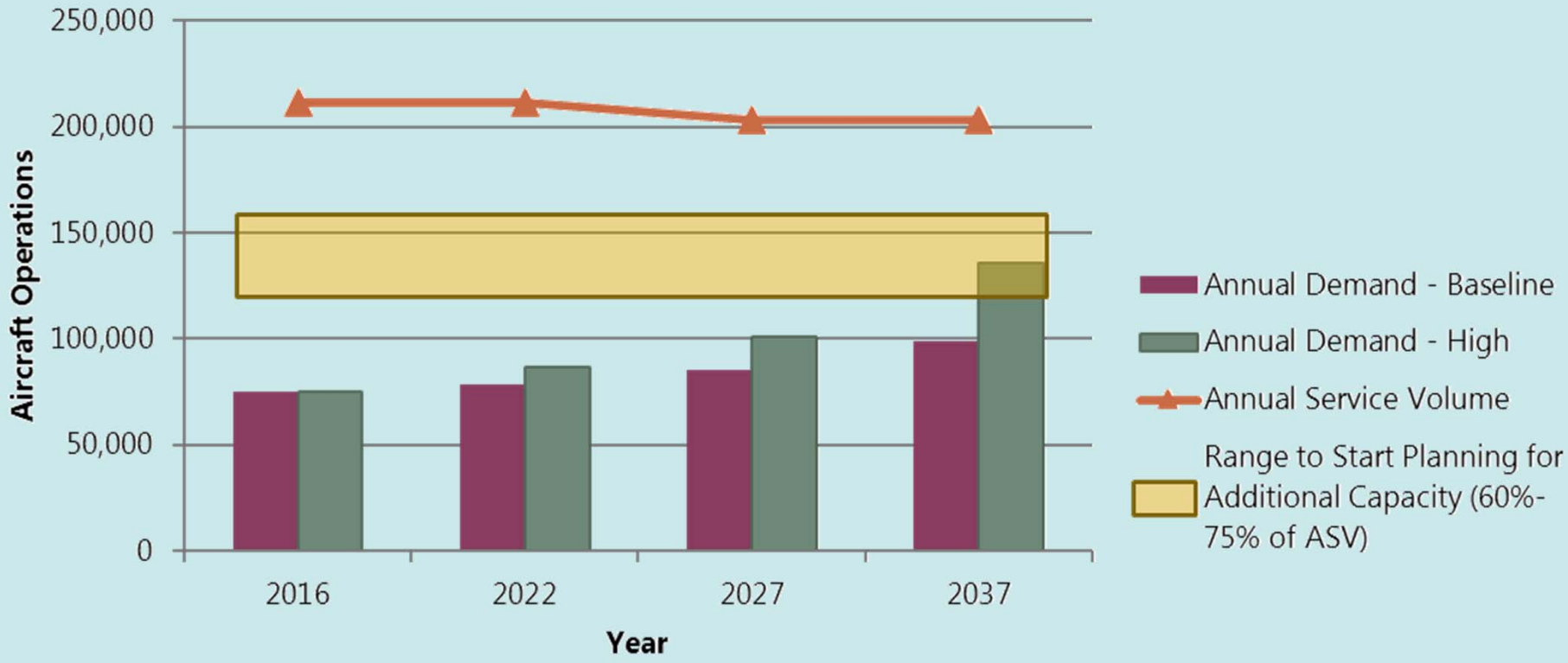
71

Sources: Federal Aviation Administration, FAA AC 150/5300-13A, Airport Design, Change 1; Federal Aviation Administration, Interim Guidance on Land Uses Within a Runway Protection Zone, September 27, 2012.

- Change in RPZ size and/or location would require compliance with FAA standards.

AIRFIELD CAPACITY

Airfield Capacity



Sources: Federal Aviation Administration, Airport Capacity and Delay, Advisory Circular 150/5060-5, September 1983; Ricondo & Associates, Inc., MTH Master Plan Update, 2017.

- No need for additional airfield capacity during the planning horizon.

AIRFIELD GEOMETRY

Airfield Geometry

- Design Aircraft: B-II
  - Cessna Citation family
- Runway Design Code: B/II/5000
  - Runway 7: RNAV/GPS - 1.25 mile visibility/384' ceilings
  - Runway 25: RNAV/GPS - 1.0 mile visibility/310' ceilings

The critical aircraft is projected to remain a B-II aircraft through the planning horizon

Airfield Layout

Areas of Noncompliance

Area 1:
Wide expanse of pavement

Area 2:
Direct access from apron to taxiway

Area 3:
Nonstandard Runway 7-25 to parallel taxiway separation

Area 4:
Wide expanse of pavement

Airfield Dimensions

Design Aircraft = B-II (Cessna Citation Family)

General Dimensional Runway and Taxiway Characteristics			
	Dimension	**FAA Requirements**	**ADG II Compliance**
Runway			
Runway CL to Parallel Taxiway CL	200′	240′	No
Runway CL to Holdline	130′	200′	No
Width	100′	75′	Yes (Exceed Requirements by 25′)
Shoulder Width	0′/50′	10′	No, but only recommended for ADG II aircraft.
Safety Area Width	150′	150′	Yes
Object Free Area Width	500′	500′	Yes
Safety Area & Object Free Area Length	300′	300′	Yes
Taxiway			
Width	50′	35′	Yes (Exceed Requirements by 15′)
Safety Area Width	79′	79′	Yes
Object Free Area Width	131′	131′	Yes
Blast Pad			
Width	100′	95′	Yes
Length	>400′	150′	Yes (Exceed Requirements by 250′)

Airfield Geometry

- Improvements to be implemented with runway shift:
  - Runway to Taxiway Separation:
    - Runway shift 40' north planned in short term
  - Redesign runway entrances
    - Remove areas of excess pavement
  - Relocate/redesign runway exit taxiways
    - Realign Taxiway D into a 90-degree exit

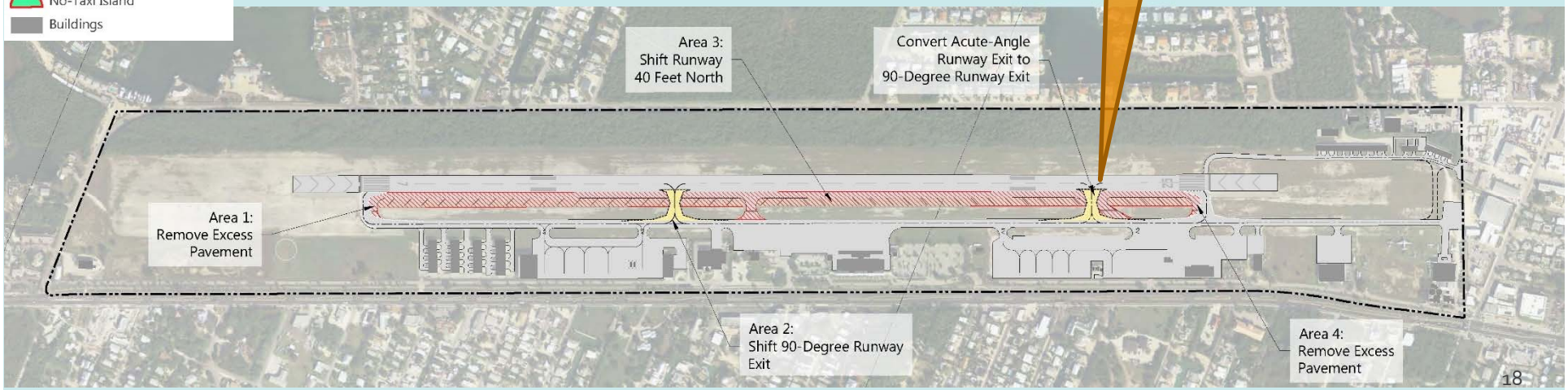
Airfield Geometry Improvements

Alternative 1

LEGEND
- Pavement Demolition
- Airport Property Boundary
- Existing Airfield Pavement
- Proposed Airfield Pavement
- No-Taxi Island
- Buildings

Acute-angle
exit not needed

Alternative 2



RUNWAY LENGTH

Takeoff Runway Length Requirements

- FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS):
  - *The critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations.*
- FAA Order 5100.38D, Table 3-4, Basic Tests to Determine if a Project is Justified
  - *There is an Actual Need. Per FAA policy, the ADO must determine if there is an actual need for the project at the airport within the next five years.*
- FAA AC 150/5325-4B, Paragraph 103,
  - *The design objective for the main primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions.*

Documentation from MTH tenants is required to support the need for a runway extension, such as:

- Weight penalties operators have taken
- Aircraft relocating to another airport
- Documentation of refueling stops on otherwise non-stop flights

Stage Length from MTH

June 2016-May 2017

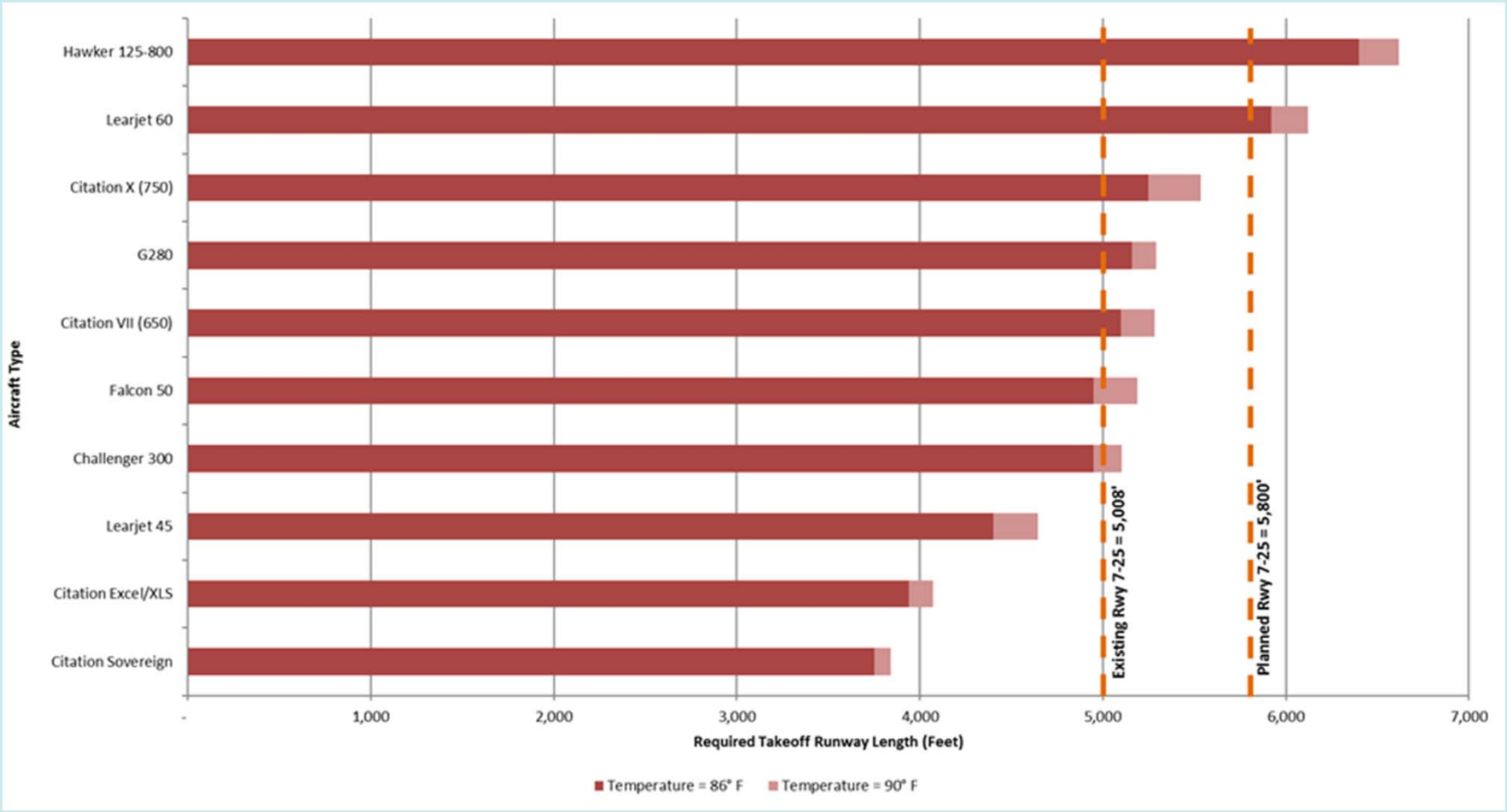
- Longest recorded stage lengths from MTH include:
  - PWT (Bremerton, Washington)
  - SFO (San Francisco, California)
  - VNY (Van Nuys, California)
- Majority of the flights originating at MTH travel to Florida destinations
  - FLL, FMY, APF, TMB, PIE, FXE, EYW, PBI, BCT, SRQ, SUA…

Stage Length	Aircraft Departures	Percentage of Total
500 NM or less	3,094	70%
500 NM to 999 NM	1,010	23%
1000 NM to 1,499 NM	304	7%
1,500 NM to 1,999 NM	7	0.2%
2,000 NM to 2,499 NM	7	0.2%
2,500 NM or greater	0	0%
	4,424	

Note: Only approximately 9,000 flights (4,424 departures) were recorded by FlightAware during this time period, out of 75,000 estimated annual operations. Remainder of flights is assumed to be conducted under visual flight rules (typically local/short range flights).
Source: FlightAware, June 2016 through May 2017.

Takeoff Runway Length Requirements

At Maximum Takeoff Weight



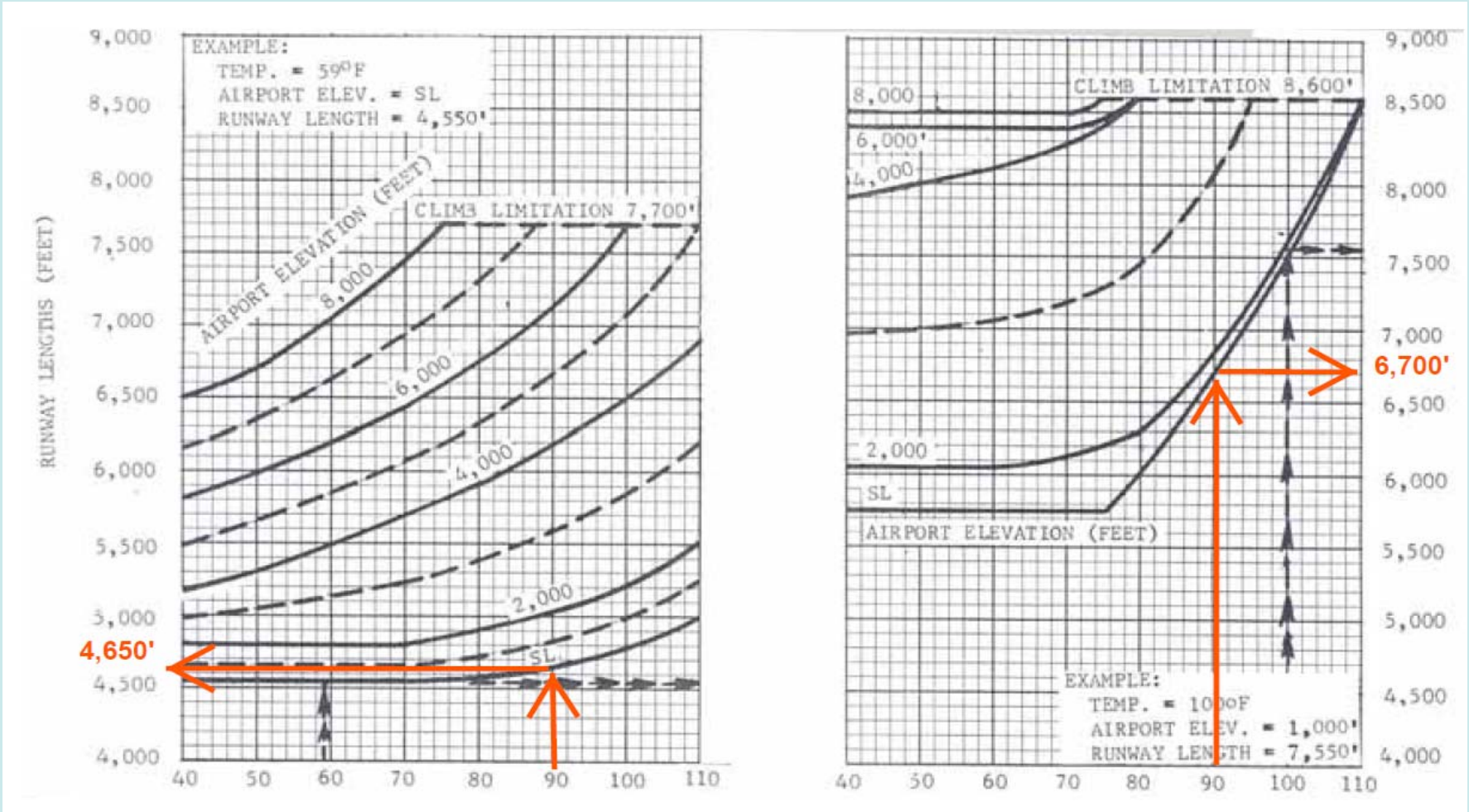
SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., January 2018.

Takeoff Runway Length Requirements

Based on Useful Load – 75% of the Fleet

60% Useful Load

90% Useful Load

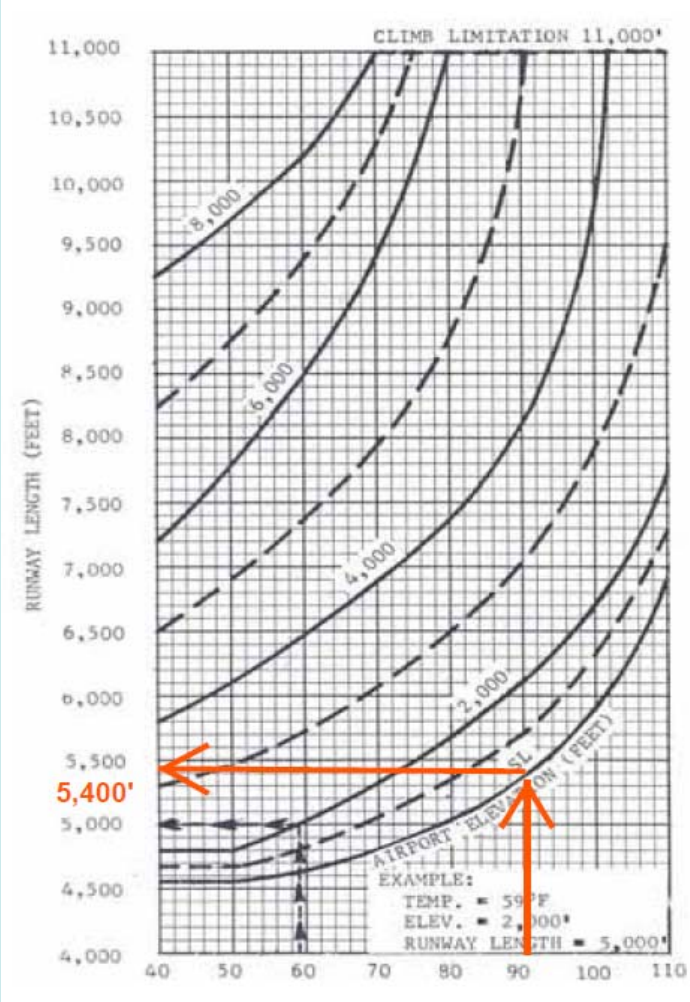


SOURCES: Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, July 2005; Ricondo & Associates, Inc., January 2018.

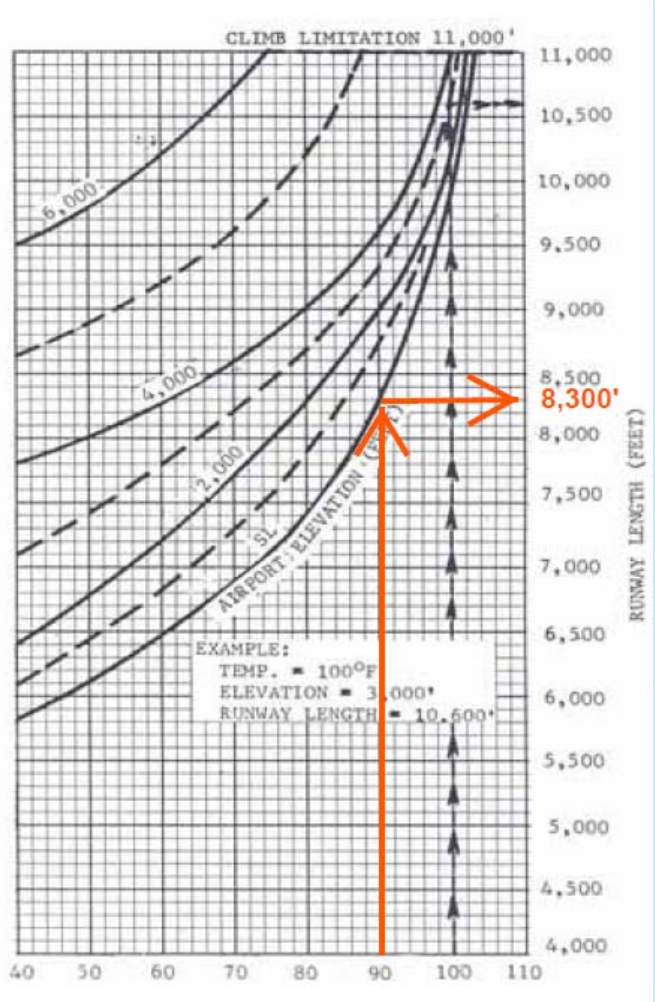
Takeoff Runway Length Requirements

Based on Useful Load – 100% of the Fleet

60% Useful Load



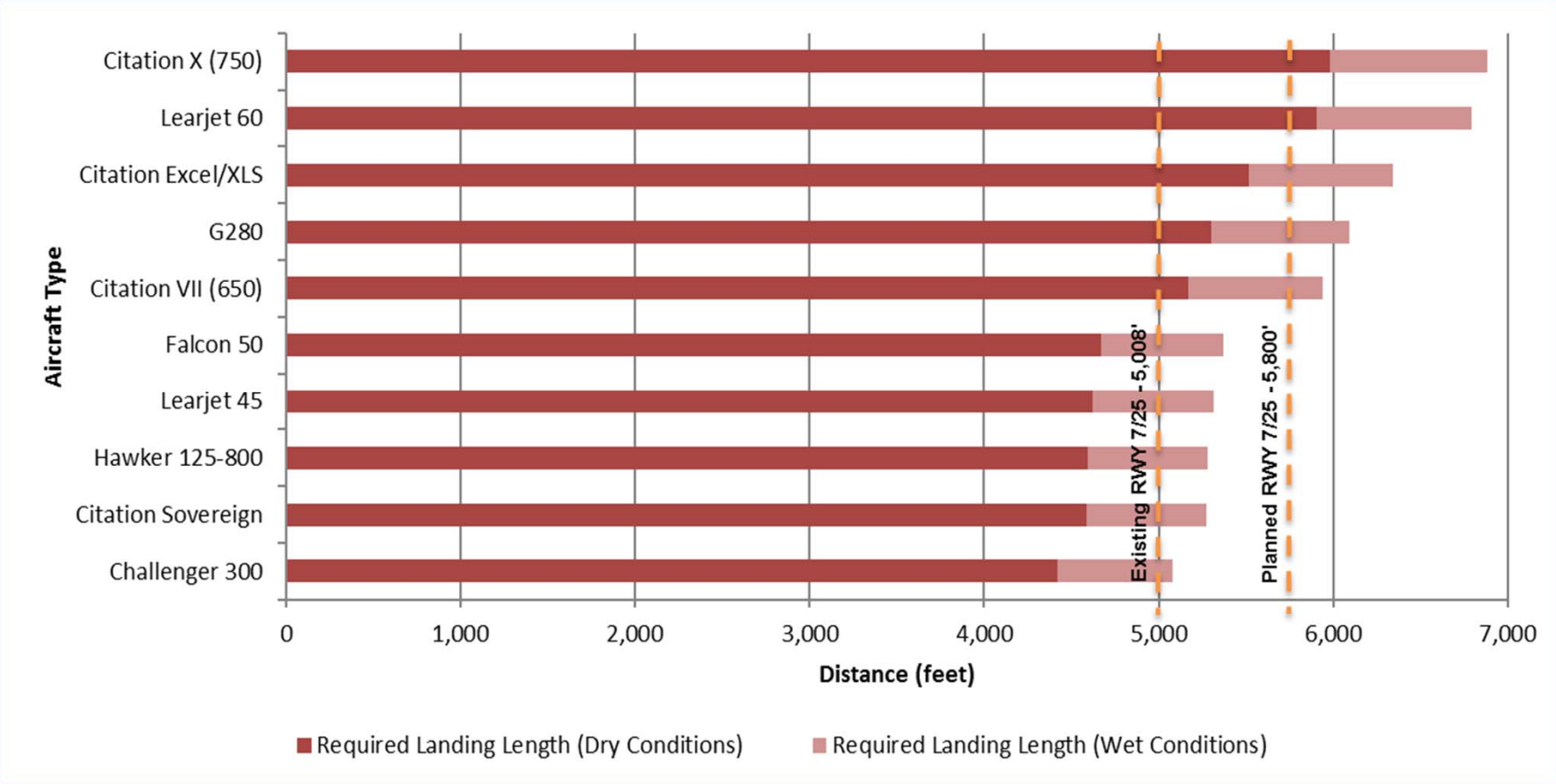
90% Useful Load



SOURCES: Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, July 2005; Ricondo & Associates, Inc., January 2018.

Landing Runway Length Requirements

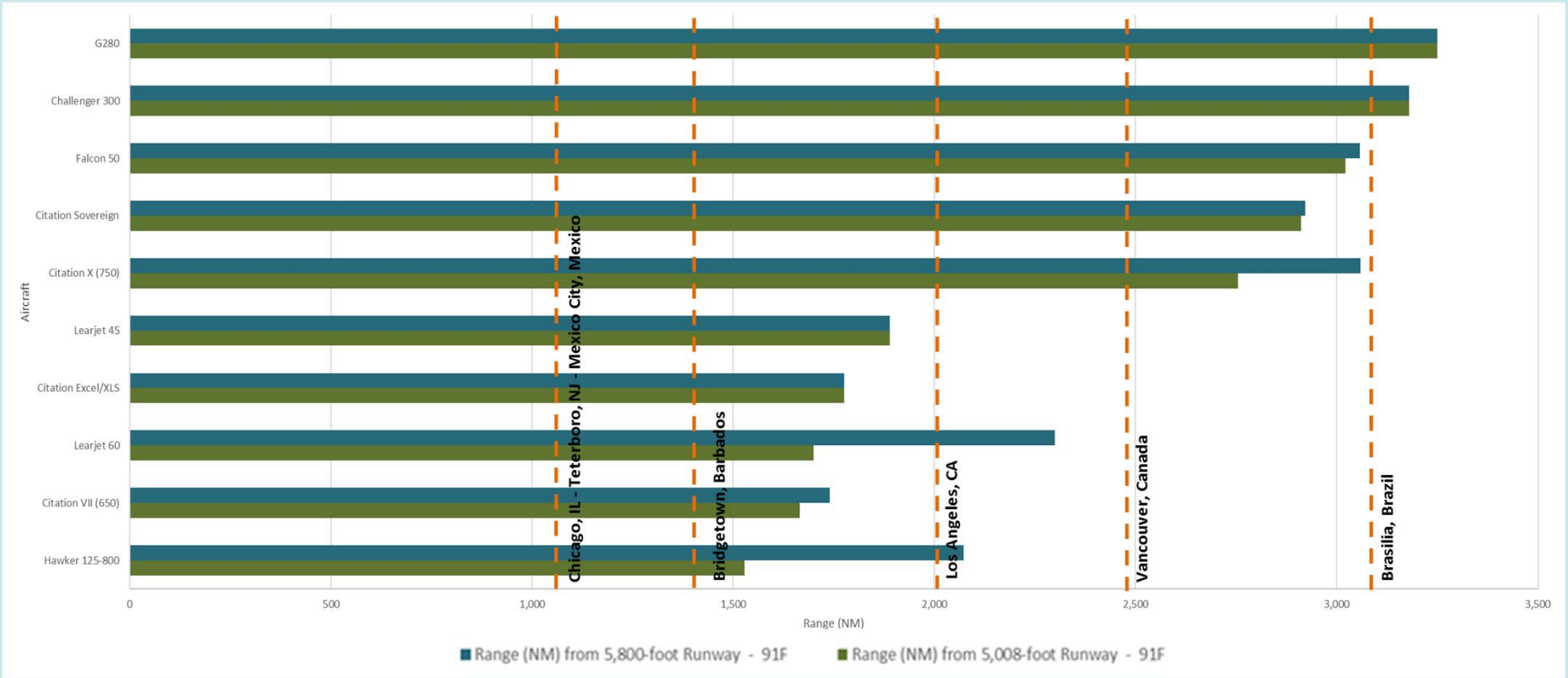
At Maximum Gross Landing Weight



SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., January 2018.

Maximum Aircraft Range

Based on Available Runway Lengths & Four Passengers



SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., January 2018.

Aircraft Range from MTH

Runway Length

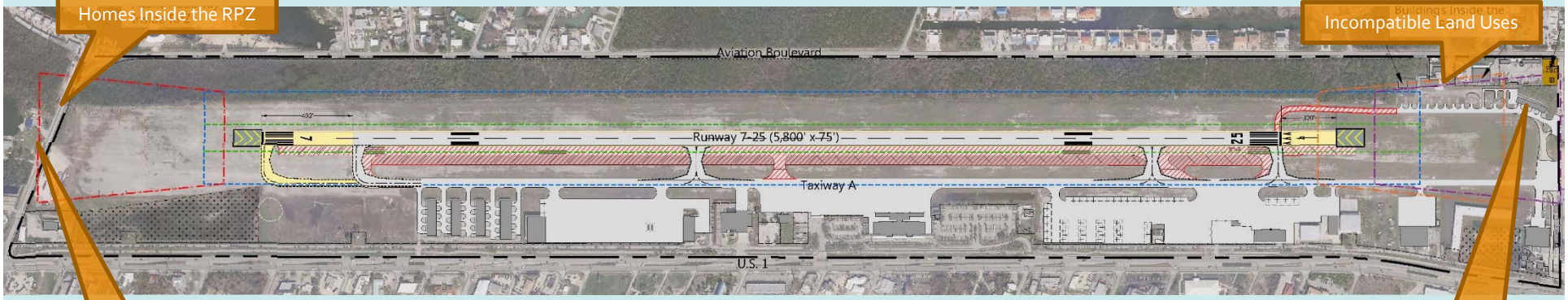
- Current Operational Restrictions:
  - Aircraft Type?
  - Weight penalties?
  - Destinations requiring refueling stops?

- Assumed 800-foot extension to the west for remainder of alternatives, for illustration purposes

Runway Extension Alternatives

Alternative 1 (2016 ALP):
492' Extension to the West & 300' Extension to the East

Public Road and Homes Inside the RPZ



Incompatible Land Uses

RPZ Extends Beyond the Property Line

Precludes development in this area

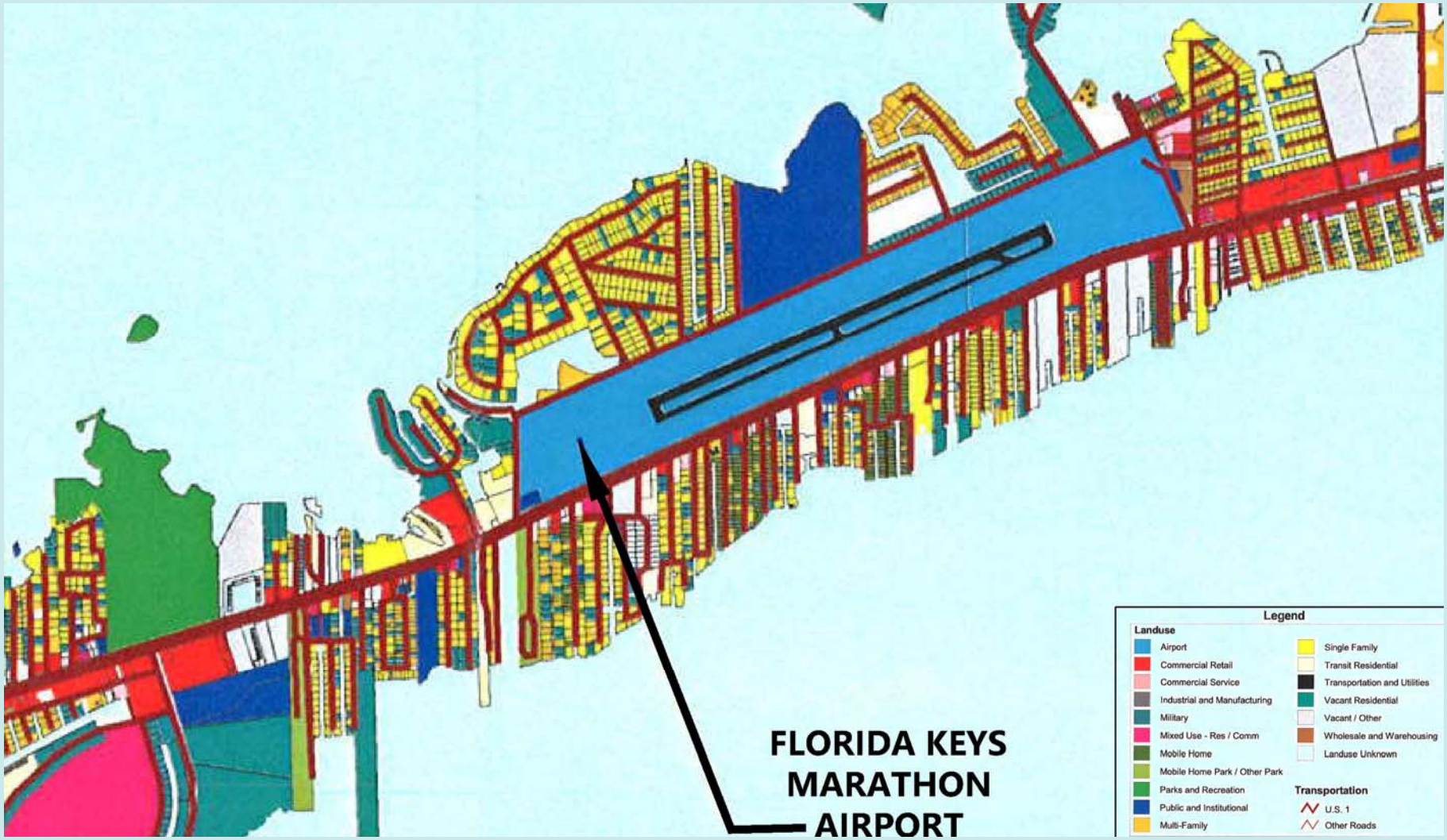
LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

	Runway 7	Runway 25
TORA	5,800'	5,800'
TODA	5,800'	5,800'
ASDA	5,800'	5,800'
LDA	5,800'	5,800'

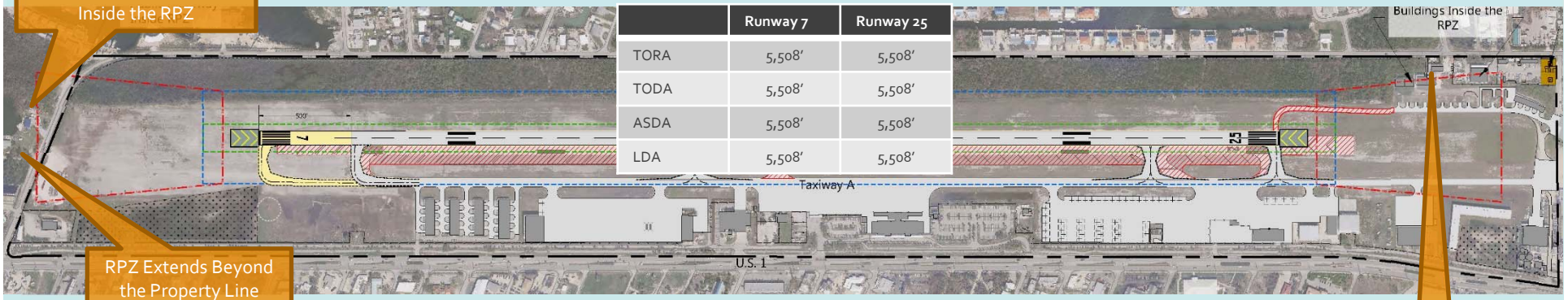
Note:
TODA subject to change pending a review of the obstructions in the departure surface.

Off-Airport Land Use



Runway Extension Alternatives

Alternative 2A: 500' Extension to the West



	Runway 7	Runway 25
TORA	5,508'	5,508'
TODA	5,508'	5,508'
ASDA	5,508'	5,508'
LDA	5,508'	5,508'

LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Note:
TODA subject to change pending a review of the obstructions in the departure surface.

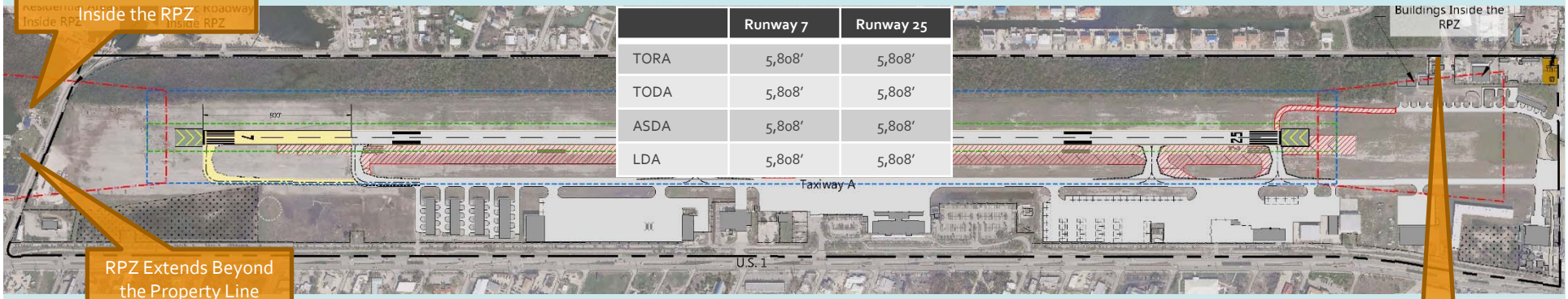
Incompatible Land Uses

Alternative 2B: 500' Extension to the West with Displaced Threshold

	Runway 7	Runway 25
TORA	5,508'	5,210'
TODA	5,508'	5,508'
ASDA	5,508'	5,508'
LDA	5,008'	5,508'

Runway Extension Alternatives

Alternative 3A: 800' Extension to the West



	Runway 7	Runway 25
TORA	5,808'	5,808'
TODA	5,808'	5,808'
ASDA	5,808'	5,808'
LDA	5,808'	5,808'

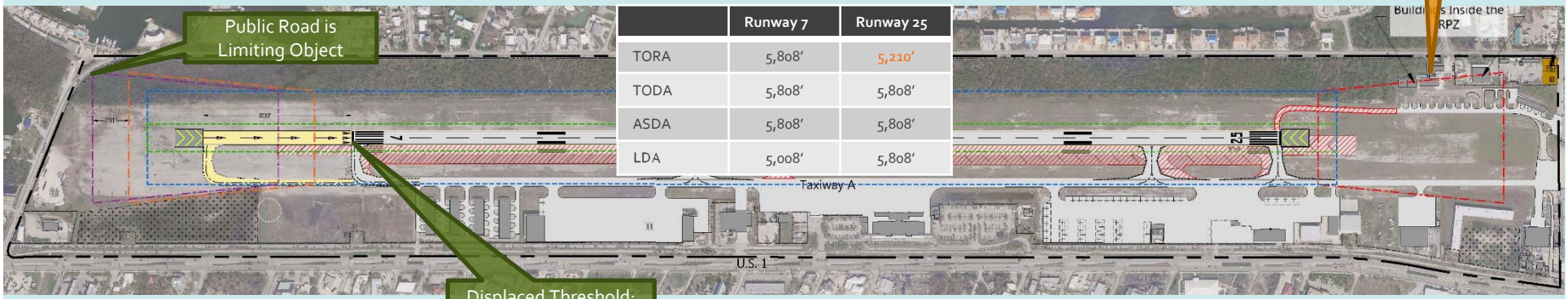
LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Note:
TODA subject to change pending a review of the obstructions in the departure surface.

Incompatible Land Uses

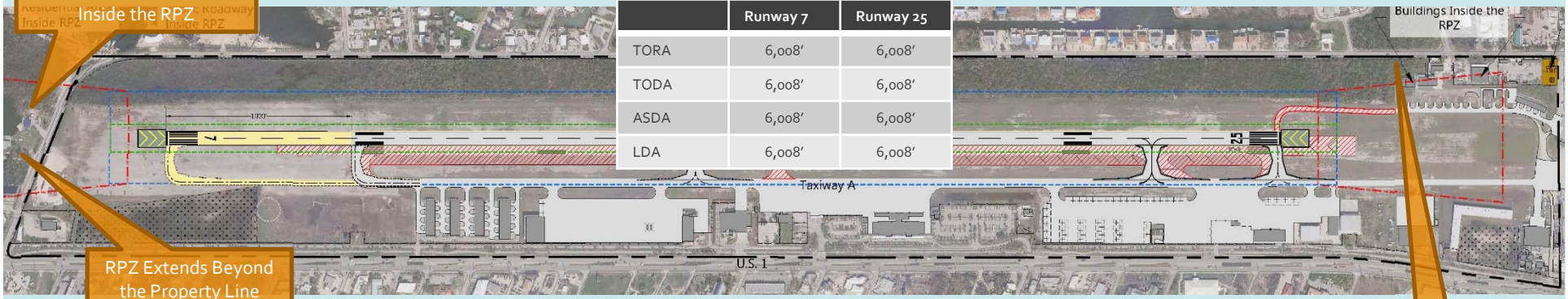
Alternative 3B: 800' Extension to the West with Displaced Threshold



	Runway 7	Runway 25
TORA	5,808'	5,210'
TODA	5,808'	5,808'
ASDA	5,808'	5,808'
LDA	5,008'	5,808'

Runway Extension Alternatives

Alternative 4A: 1,000' Extension to the West



	Runway 7	Runway 25
TORA	6,008'	6,008'
TODA	6,008'	6,008'
ASDA	6,008'	6,008'
LDA	6,008'	6,008'

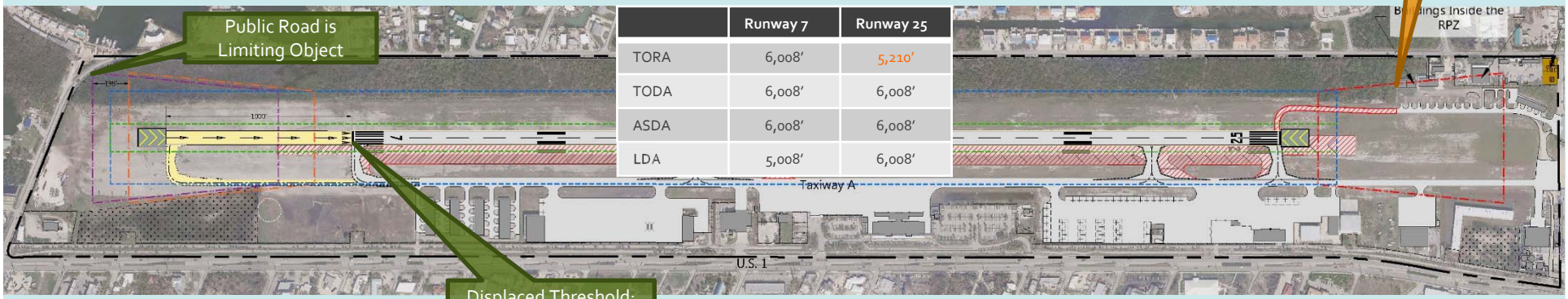
LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Note:
TODA subject to change pending a review of the obstructions in the departure surface.

Incompatible Land Uses

Alternative 4B: 1,000' Extension to the West with Displaced Threshold



	Runway 7	Runway 25
TORA	6,008'	5,210'
TODA	6,008'	6,008'
ASDA	6,008'	6,008'
LDA	5,008'	6,008'

Runway Extension Evaluation Criteria

- Runway Use/Available Runway Length
- Airfield Surfaces:
  - Runway Safety Area
  - Runway Object Free Area
  - Runway Protection Zones
- Airspace Surfaces:
  - Parts 77, TERPS Departure, Threshold Siting
- Cost

Runway Extension Evaluation Matrix

Alternative	Runway 7 Departure Length	Runway 25 Departure Length	Airfield Surfaces	Airspace Surfaces	Cost
Existing	5,001′	5,001′			
1 (2016 ALP)	5,800′	5,800′	Public road, hangars/apron inside RPZ		
2A	5,508′	5,508′	Public road, hangars/apron inside RPZ	TBD	
2B ★	5,508′	5,210′	Hangars/apron inside RPZ	TBD	
3A	5,808′	5,808′	Public road, hangars/apron inside RPZ	TBD	
3B ★	5,808′	5,210′	Hangars/apron inside RPZ	TBD	
4A	6,008′	6,008′	Public road, hangars/apron inside RPZ	TBD	
4B ★	6,008′	5,210′	Hangars/apron inside RPZ	TBD	

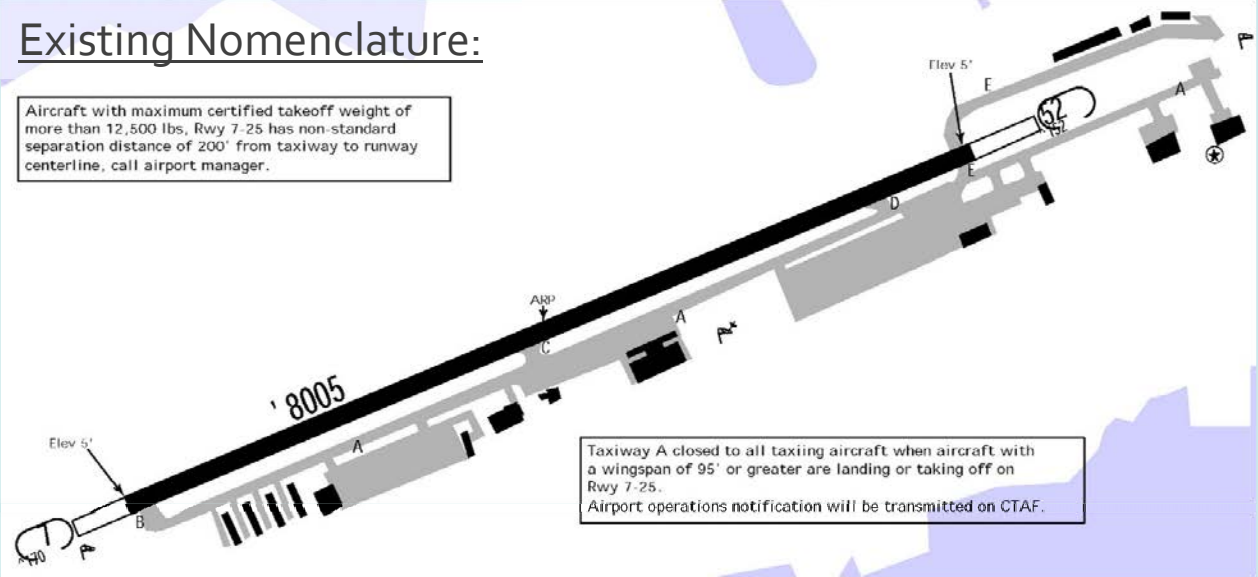
No or Minimal Impacts
Moderate Impacts
Significant Impacts

★ Alternatives with the Least Impacts

TAXIWAY NOMENCLATURE

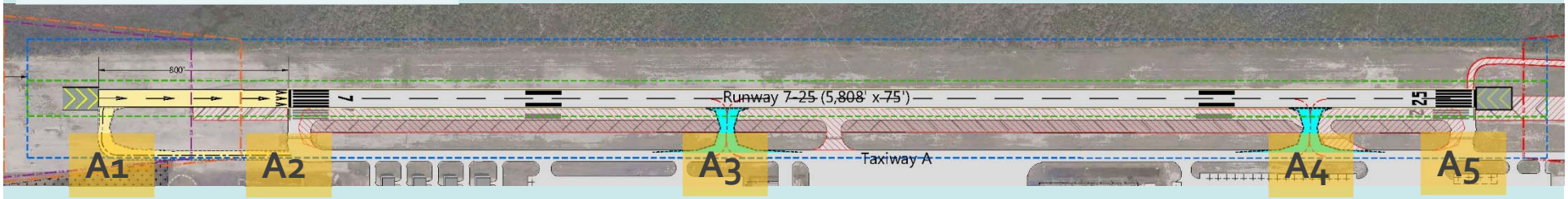
Taxiway Nomenclature

Existing Nomenclature:



- Parallel taxiway can remain Taxiway A
- Runway exits should include parallel taxiway letter: A1, A2, A3, …

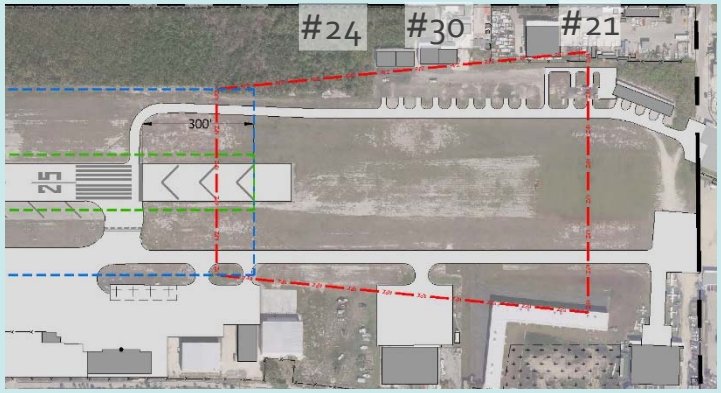
Proposed Nomenclature:



RUNWAY SAFETY AREAS

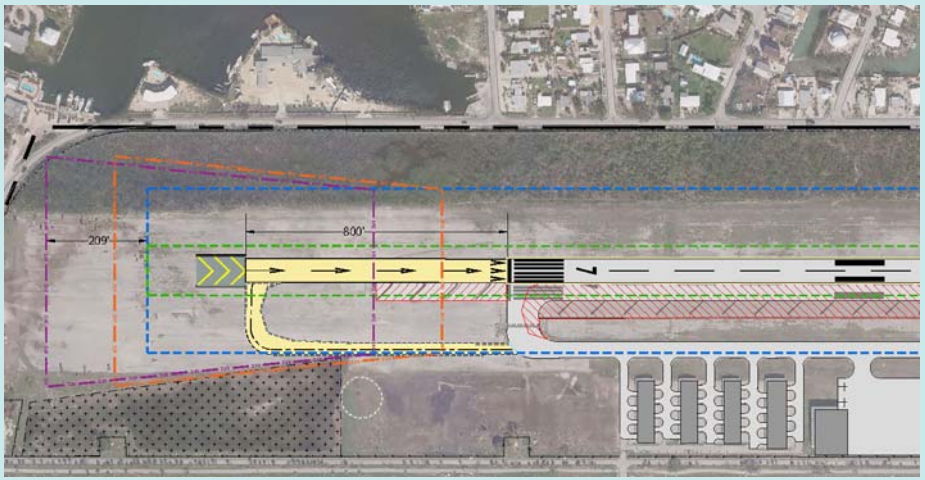
Existing Runway Surfaces

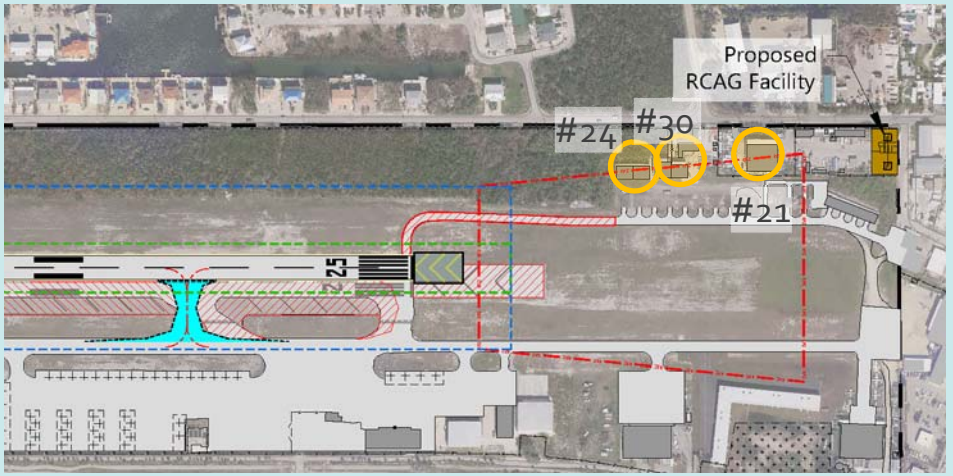
- Runway Safety Area: meets standards
- Runway Object Free Area: meets standards
- Runway Obstacle Free Zone: meets standards
- Runway Protection Zone:
  - Buildings #23 and #19 (aircraft shade hangars along Taxiway E) were located inside the Runway 25 approach RPZ : both buildings have been destroyed during Hurricane Irma
  - Building #21 (Public Works & Engineering Maintenance) southeast corner clips the RPZ
  - Building #24 and #30 aprons inside the RPZ



Proposed Runway Protection Zone
Risk Analysis

- Evaluate existing land uses inside proposed RPZ
  - West end: no incompatible land uses
  - East end:
    - Public Works & Engineering Maintenance building (#21)
    - Aircraft hangars (#24 & #30)





Runway Protection Zone Risk Analysis

- To be completed using the Runway Protection Zone (RPZ) Risk Assessment Tool that was developed as part of Airport Cooperative Research Program (ACRP)'s Research Report 168
- Required Input:
  - Flight logs to develop typical daily flight schedule
  - Other assumptions to complement flight logs
  - Building occupancy

MISCELLANEOUS

Miscellaneous Airfield Items

- Instrument approach capacity: adequate
- Airfield lighting:
  - Runway & taxiway edge lights would likely require upgrades
- Airfield signage: update taxiway nomenclature
- Pavement markings:
  - Some markings are fading
  - Will be addressed during recurring maintenance
- Visual landing aids: adequate
- Wind socks: adequate

PASSENGER TERMINAL FACILITIES

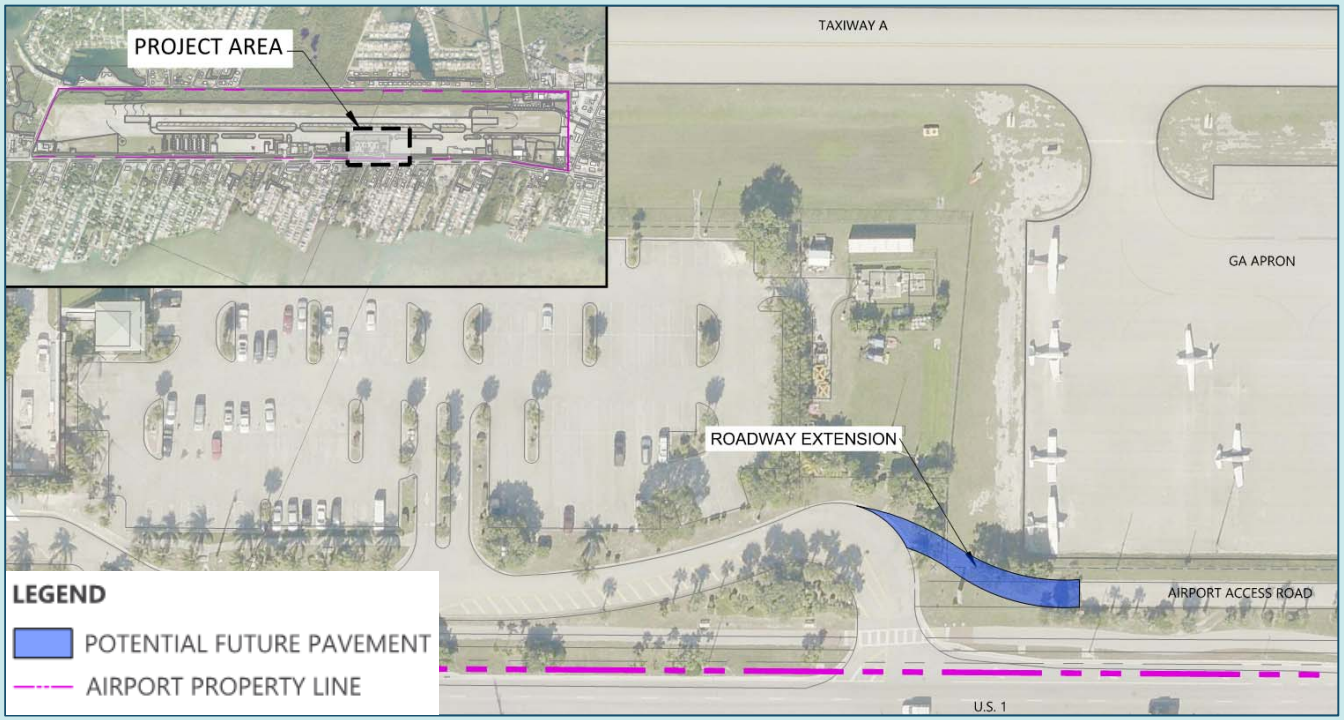
Passenger Terminal

- Based on current industry trends, commercial air service is not likely to materialize in the short-term
- Interim facility use:
  - FBO Operations
- Long-term facility use?

ON-AIRPORT ROADS

On-Airport Roads

- Airport Access Road is segmented along south side of Airport
  - Connect the two sections to provide continuous airport access from Airport Access Road



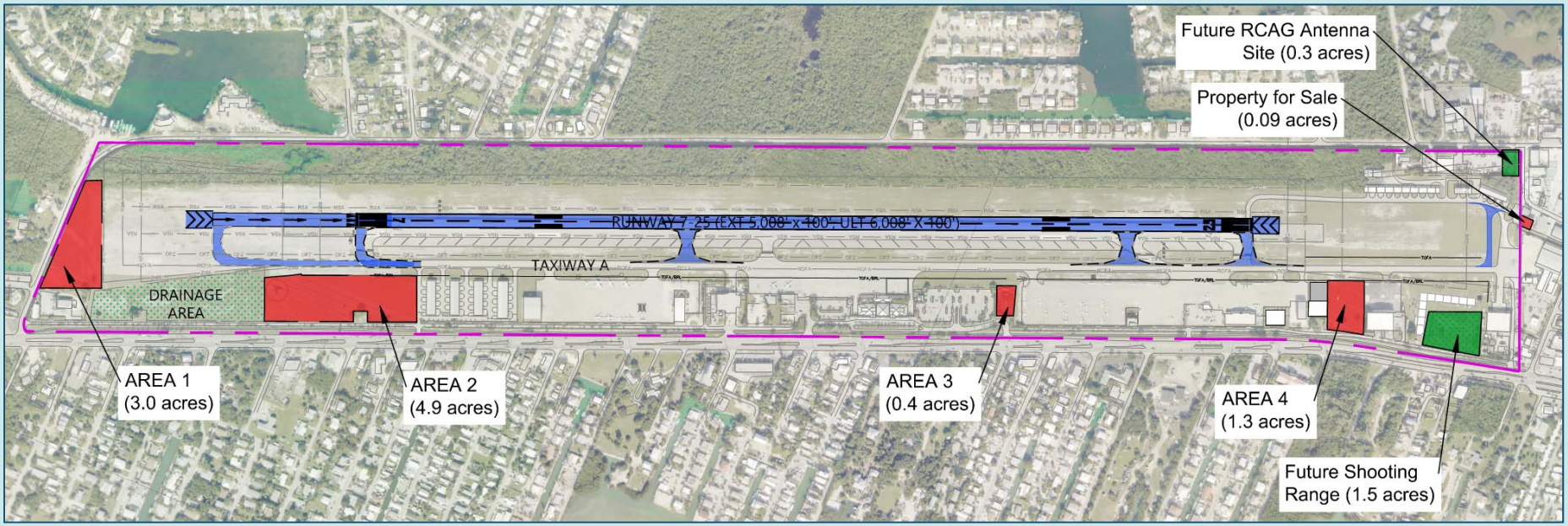
AVAILABLE LAND FOR DEVELOPMENT

Available Land for Development

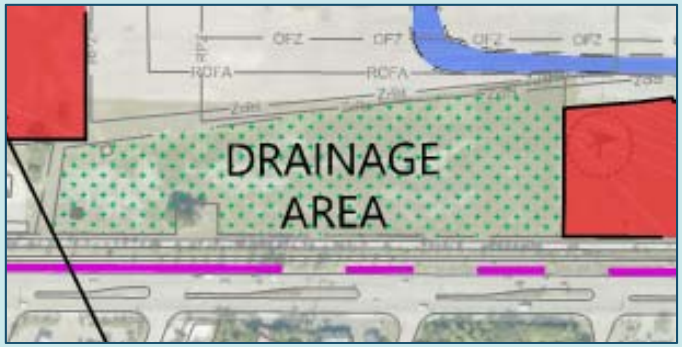
- Area 1 = 3 acres
- Area 2 = 4.9 acres
- Area 3 = 0.4 acres
  - site currently occupied by ASOS and maintenance equipment
- Area 4 = 1.3 acres
- **Total area for available development: 9.6 acres**

LEGEND

- POTENTIAL FUTURE PAVEMENT
- PLANNED DEVELOPMENT
- AREAS AVAILABLE FOR DEVELOPMENT
- DETENTION DRAINAGE AREA
- AIRPORT PROPERTY LINE

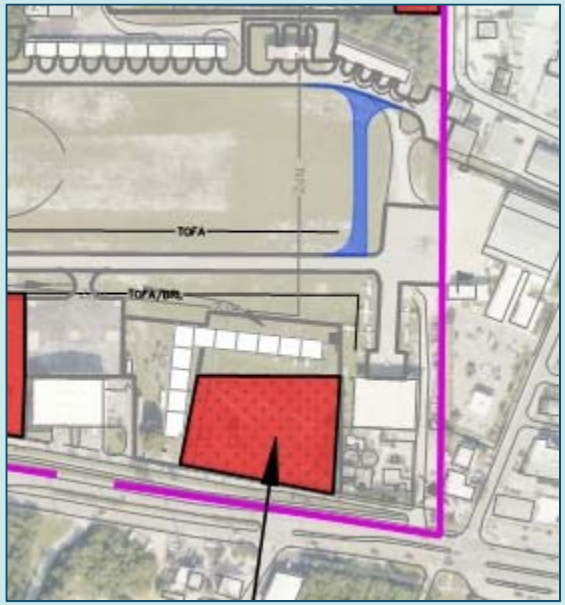


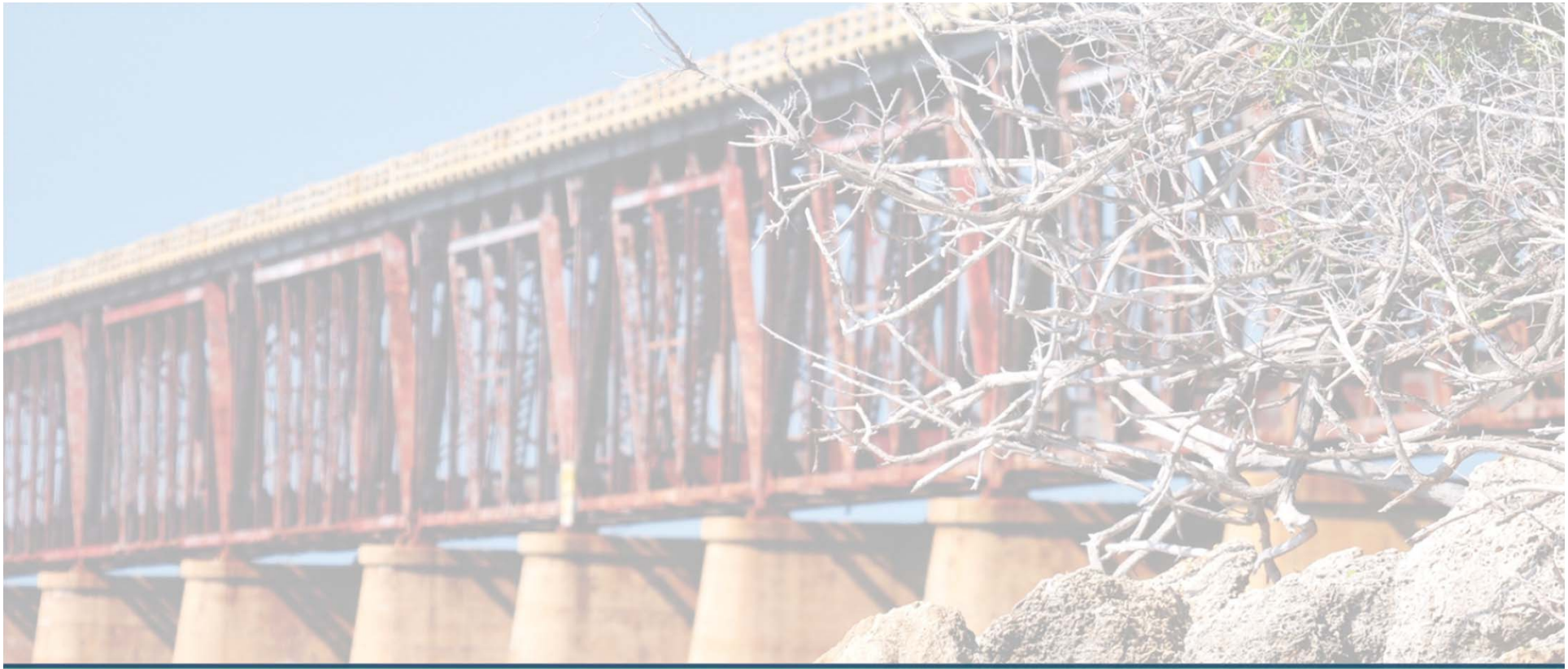
Drainage Areas



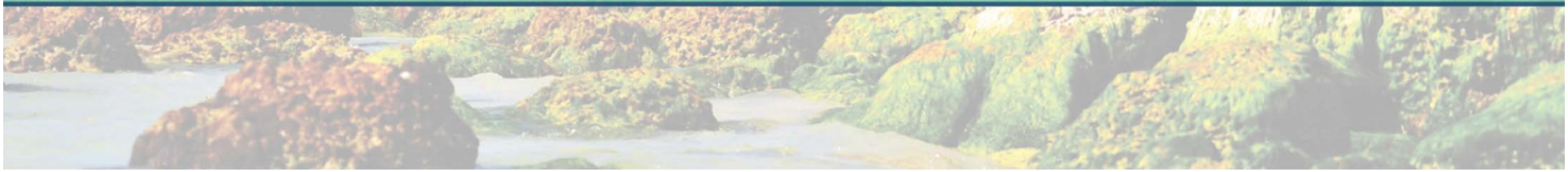
- 5.1 acre drainage pond utilized by the Florida Department of Transportation for drainage associated with widening of US-1.
- Design for drainage improvements currently underway. 60% (3.1 acres) of the existing site may be available for development in the future.
- Potential site for apron development

- 1.5 acre drainage pond
- Future site for the Sheriff's Department shooting range





FIXED BASE OPERATORS AND GENERAL AVIATION FACILITIES



FBO/GA Facilities

- FBO/GA Facility Development Plan:
  - Typically driven by tenant needs
  - Focuses on the identification of available areas for development
  - Identifies conceptually where facilities might be located at the Airport
  - Considers that aircraft fleet mix and tenant needs may change in the future

GENERAL AVIATION FACILITIES

Demand/Capacity Analysis Assumptions

- Based Aircraft Storage Assumptions:
  - 60% in hangars (split based on a combination of industry standards and visual counts during inventory site visit)
    - 73% T-Hangar
    - 27% Corporate/Conventional Hangar
  - 40% on apron
  - 50% of the Average Day Peak Month (ADPM) itinerant operations will concurrently occupy apron space
  - Existing Apron Available for Aircraft Parking = 46,132 square yards
  - Apron Fleet Mix & Apron Space Requirement
    - Single Engine = 72%, 400 square yards per aircraft
    - Multi-Engine = 14%, 420 square yards per aircraft
    - Jet – 4%, 500 square yards per aircraft
    - Helicopter = 10%, 400 square yards per aircraft

Minimum Requirements

- Capacity analysis based on the FAA-approved forecast indicates the need to provide additional hangar space for a minimum of 10 aircraft.
- Alternative analysis considers the development of all available land areas.

Aircraft Storage Minimum Requirements

Year	Total Aircraft Stored	T-Hangar / Shade Hangar Demand	T-Hangar/Shade Hangar Capacity	Corporate Hangar Demand	Corporate Hangar Capacity	T-Hangar / Shade Hangar Deficiency	Conventional Hangar Deficiency
2021	59	43	47	16	17	–	–
2026	64	47	47	17	17	–	–
2031	69	50	47	19	17	3	2
2036	74	54	47	20	17	7	3

Minimum Requirements

- Capacity analysis based on the FAA approved forecast indicates the minimum need to provide an additional 5,760 square yards (51,840 square feet) of apron for aircraft parking.
- Alternative analysis considers the development of all available land areas.

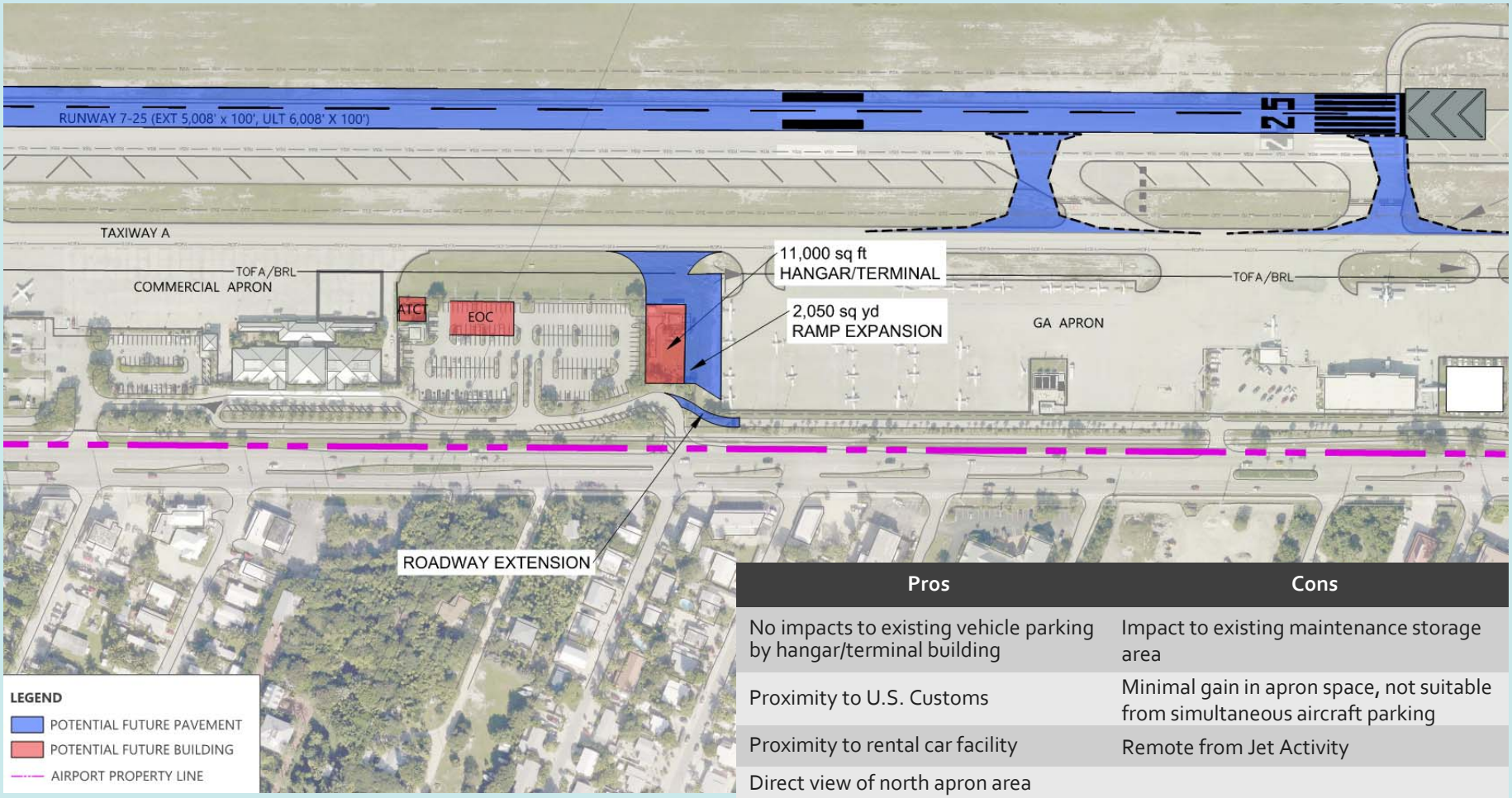
Apron Minimum Requirements (square yards)						
Year	Single Engine	Multi-Engine	Jet	Helicopter	Total	Deficiency
2021	29,277	5,901	2,033	3,967	41,178	–
2026	31,886	6,427	2,214	4,321	44,848	–
2031	34,401	6,934	2,389	4,661	48,385	2,253
2036	36,894	7,436	2,562	4,999	51,892	5,760

General Aviation Terminal

- Existing facility damaged during Hurricane Irma
- Temporarily relocated inside the passenger terminal

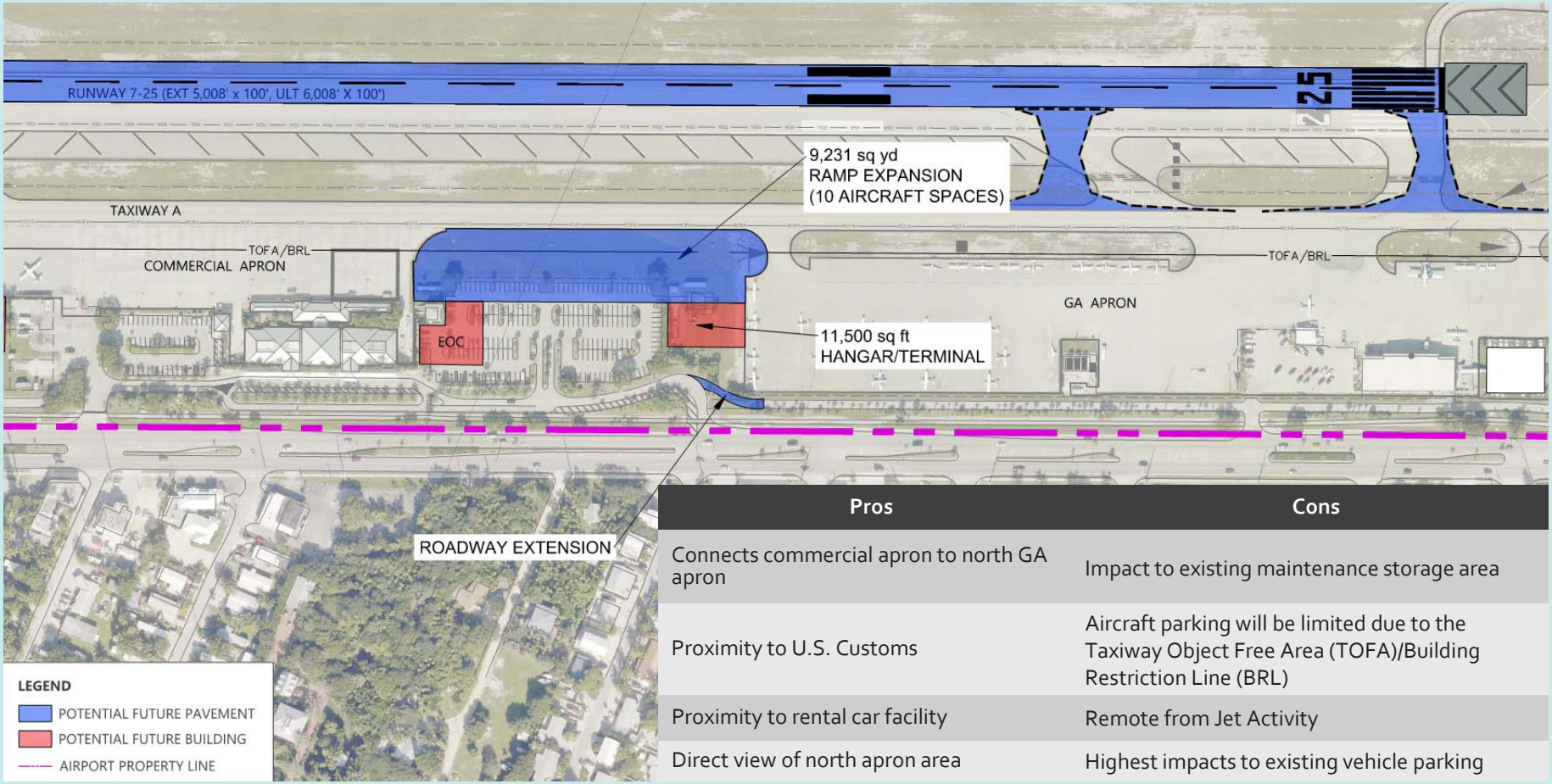
➢ Provide potential new sites for a general aviation terminal

General Aviation Terminal Relocation and Aircraft Apron Expansion - Site 1



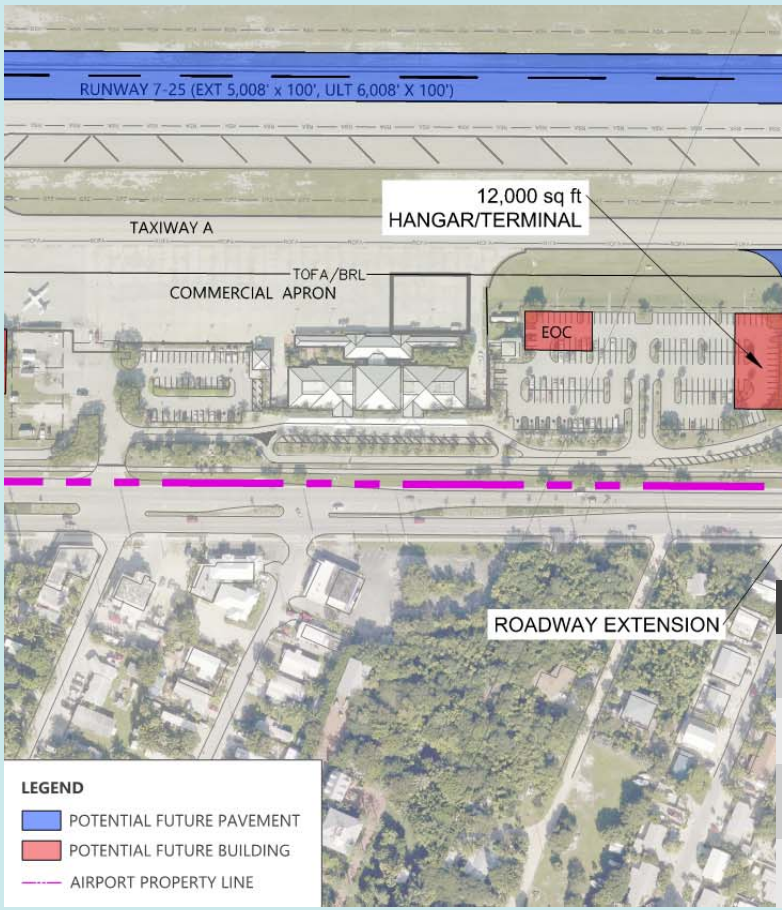
Pros	Cons
No impacts to existing vehicle parking by hangar/terminal building	Impact to existing maintenance storage area
Proximity to U.S. Customs	Minimal gain in apron space, not suitable from simultaneous aircraft parking
Proximity to rental car facility	Remote from Jet Activity
Direct view of north apron area	

General Aviation Terminal Relocation and Aircraft Apron Expansion - Site 2



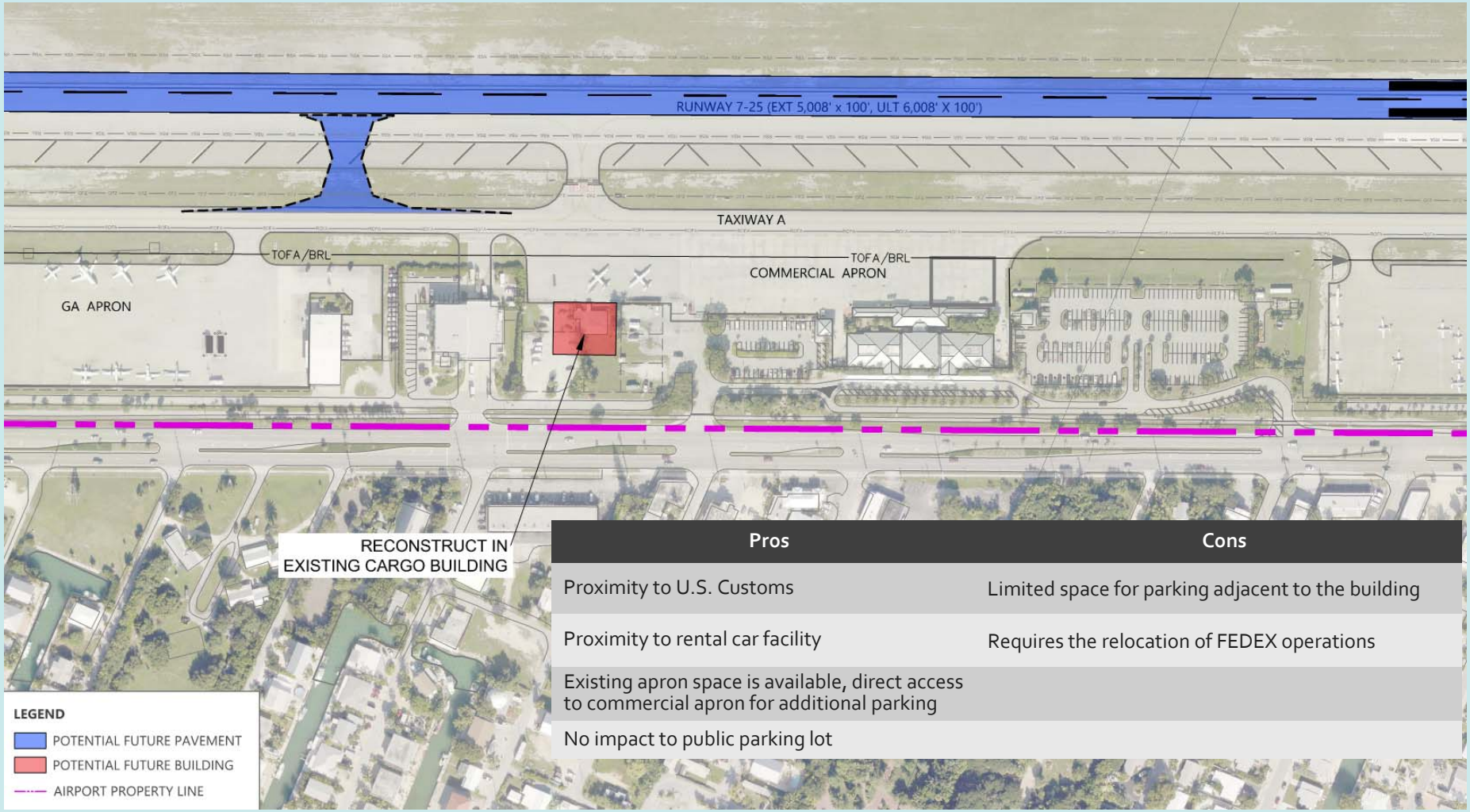
Pros	Cons
Connects commercial apron to north GA apron	Impact to existing maintenance storage area
Proximity to U.S. Customs	Aircraft parking will be limited due to the Taxiway Object Free Area (TOFA)/Building Restriction Line (BRL)
Proximity to rental car facility	Remote from Jet Activity
Direct view of north apron area	Highest impacts to existing vehicle parking

General Aviation Terminal Relocation and Aircraft Apron Expansion – Site 3



Pros	Cons
Proximity to U.S. Customs	Impact to existing maintenance storage area
Proximity to rental car facility	Remote from Jet Activity
Direct view of north apron area	Minimal impacts to existing vehicle parking
Increase in apron space suitable for aircraft parking	

General Aviation Terminal Relocation – Site 4



Pros	Cons
Proximity to U.S. Customs	Limited space for parking adjacent to the building
Proximity to rental car facility	Requires the relocation of FEDEX operations
Existing apron space is available, direct access to commercial apron for additional parking	
No impact to public parking lot	

General Aviation Terminal Relocation and Aircraft Apron Expansion - Alternatives Comparison

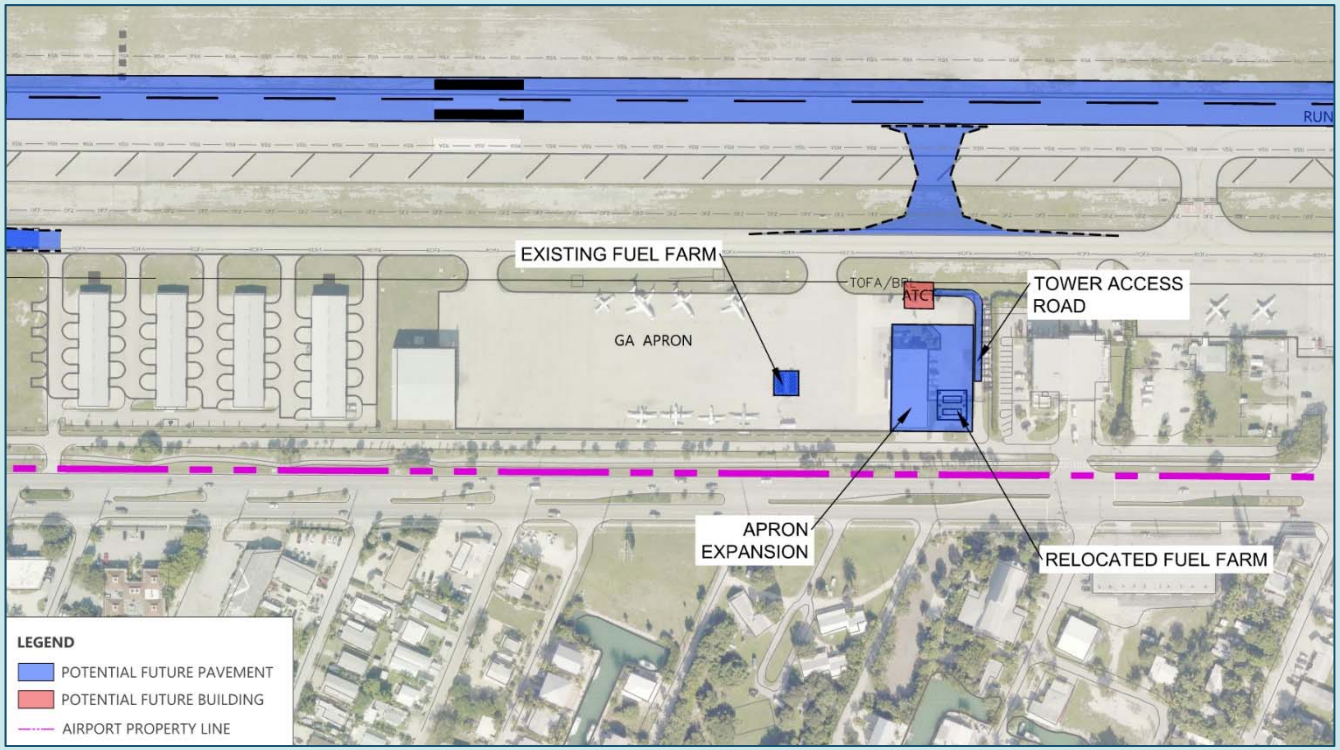
- Additional Discussion Points
  - Potential to re-building in existing location
  - Potential to renovate and remain in the passenger terminal building

GA Terminal Building and Apron Comparison			
	Alternative 1	Alterative 2	Alternative 3
GA Building/Hangar Size (sq.ft.)	11,000	11,500	12,000
Apron Size (sq.yrd.)	2,050	9,231	4,436
Estimated Jet Accommodation (Critical Aircraft Cessna Citation Excel 56X)	1*	10	4
EOC Building Size (sq.ft.)	7,700	11,400	6,300
Remaining Pubic Parking Lot Size (sq.ft.)	60,000	49,000	58,000

* Limited ability to simultaneous parking and movement of jet aircraft due to apron size and configuration.

Redevelopment of Existing General Aviation Terminal

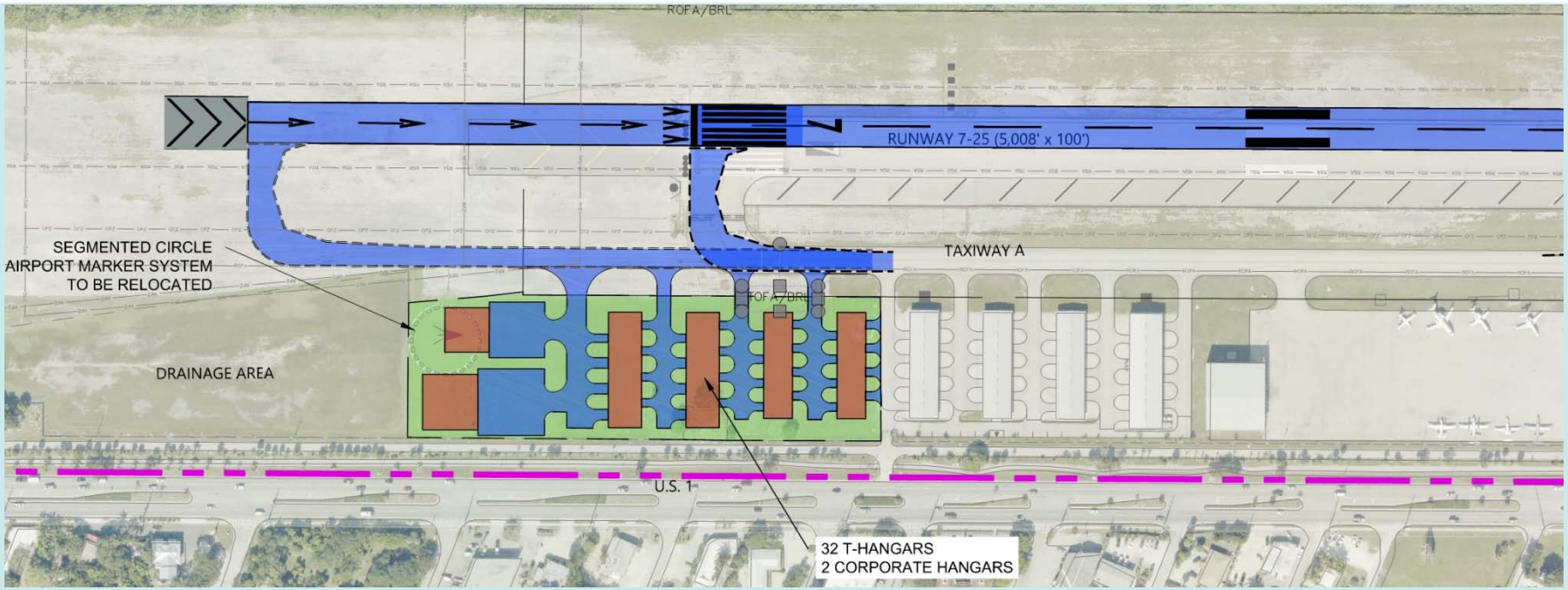
- Accompanies Alternatives 1 through 3 for redevelopment of existing general aviation terminal
- Assumes ATCT location within apron footprint
  - Vehicle Parking
  - Tower Access Road
- Assumes 2,700 sq.yrd. apron expansion to the east



AIRCRAFT PARKING AND STORAGE

Southwest Area

Alternative 1 (Conventional Hangars and T-Hangars)

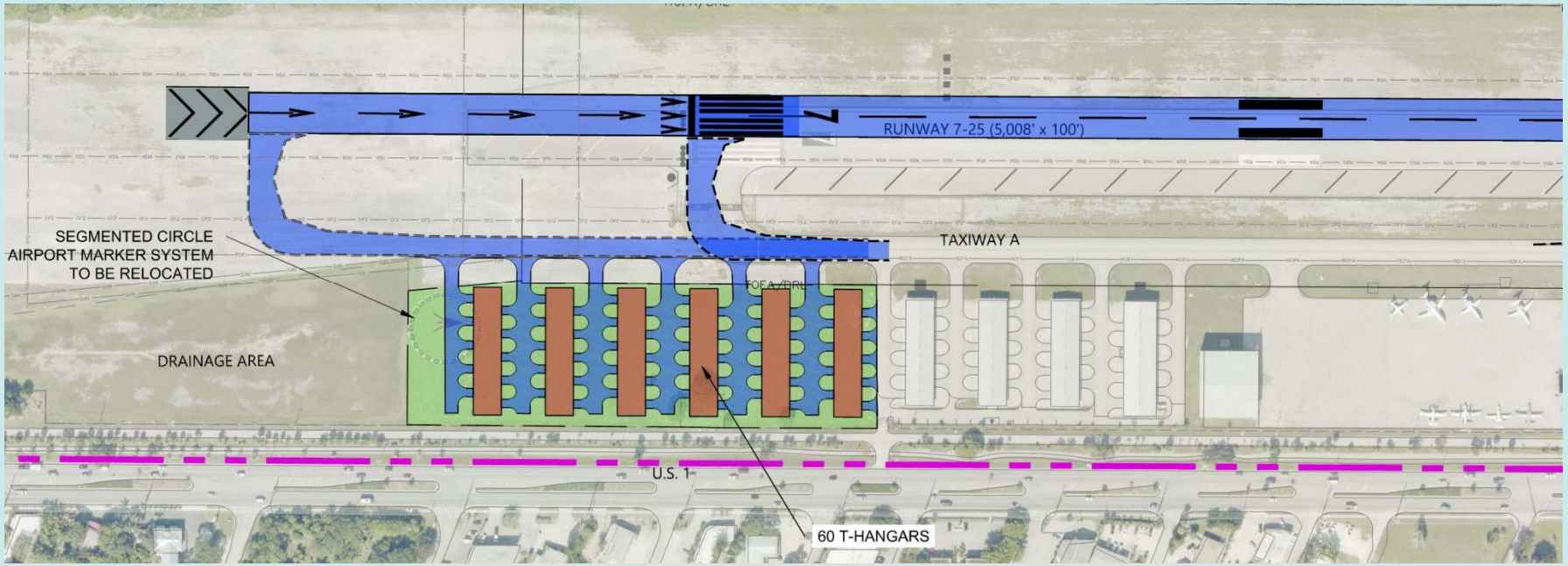


LEGEND

- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

- Layout as proposed in the current ALP
- Provides 32 new t-hangars
- One 100' x 100' box hangar with a 120' x 120' apron
- One 80' x 80' box hangar with a 100' x 100' apron
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

Southwest Area
Alternative 2A (Small T-Hangars)

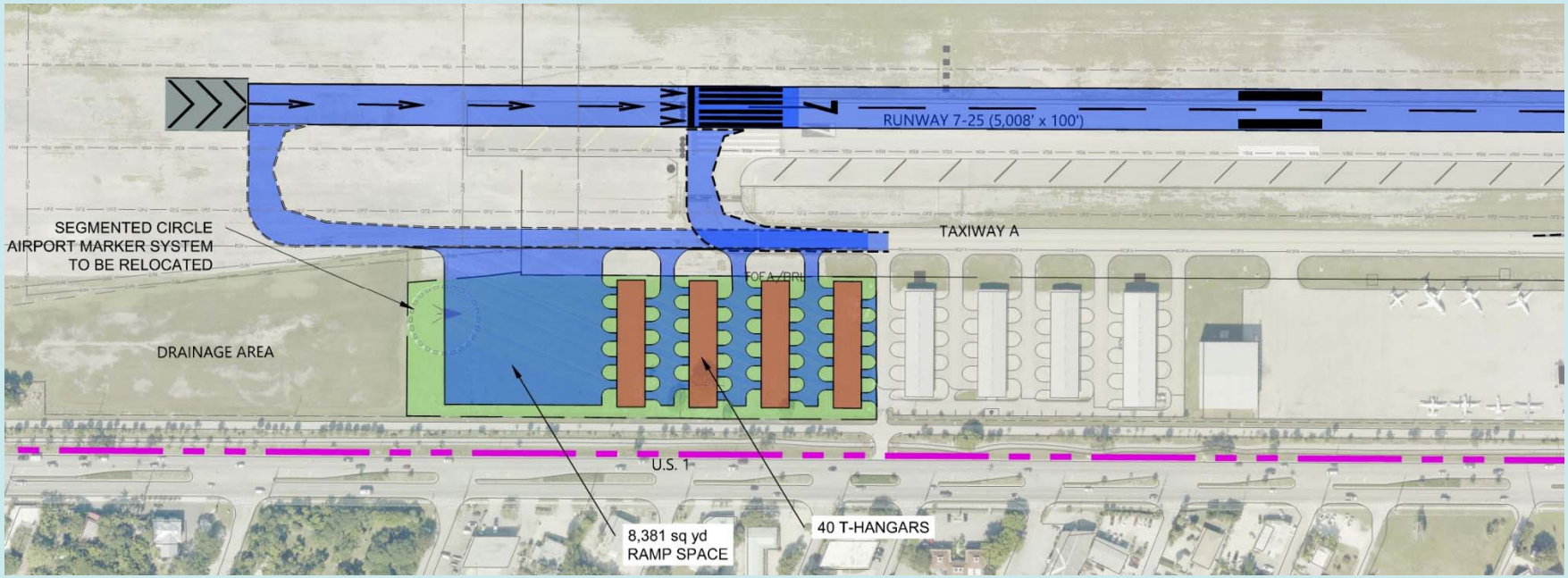


LEGEND

- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

- Provides 60 new t-hangars
- Assumes box hangar development on the north side of the airfield
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

Southwest Area
Alternative 2B (Small T-Hangars)

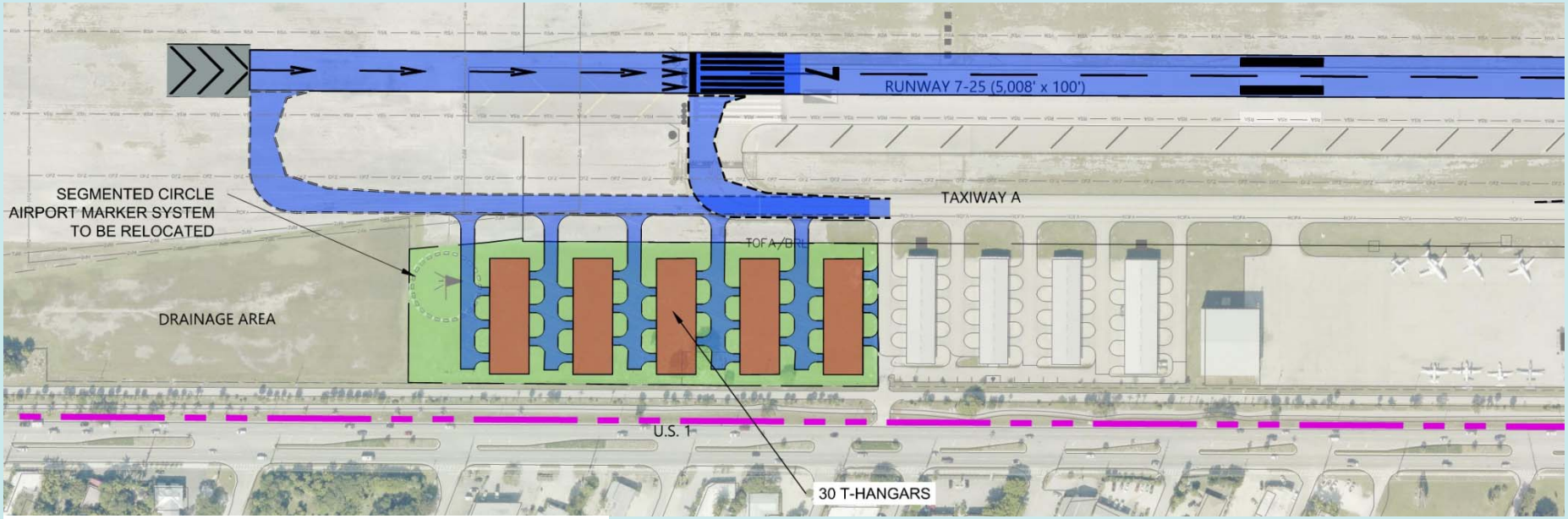


LEGEND

- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

- Provides 40 new t-hangars
- Provides 8,381 square yard apron
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

Southwest Area
Alternative 3A (Large T-Hangars)



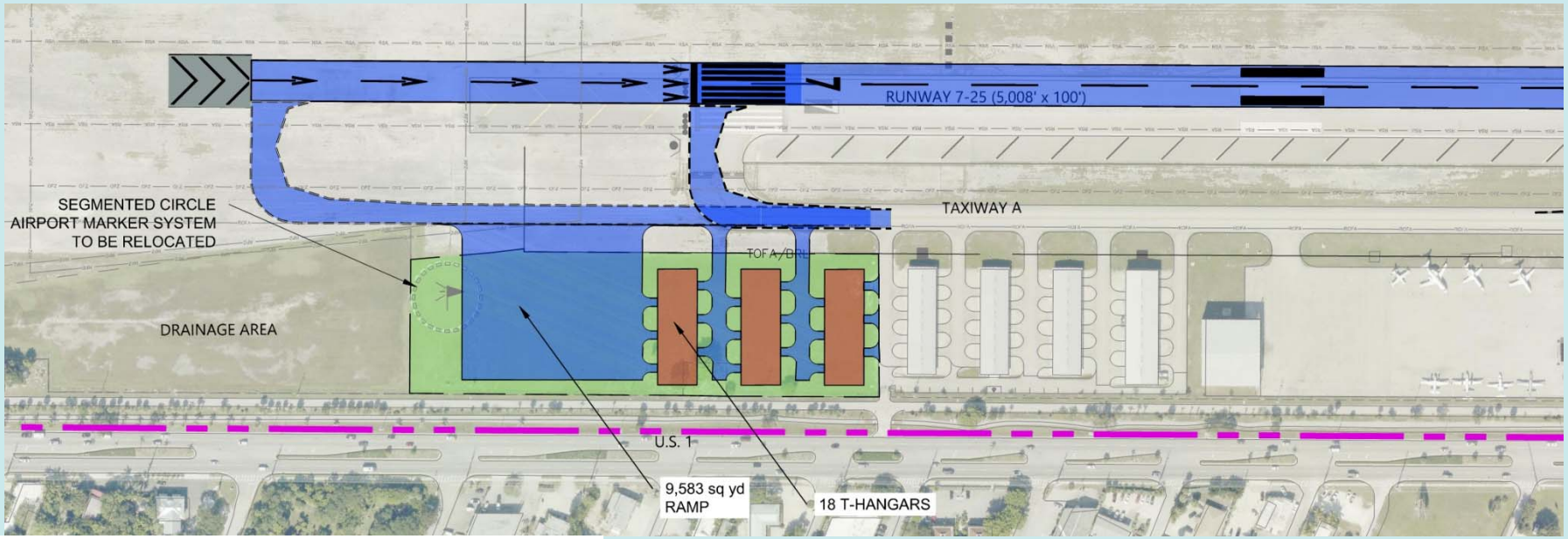
LEGEND

- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

- Provides 30 new large t-hangars
- Assumes box hangar development on the eastern side of the airfield
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

Southwest Area

Alternative 3B (Large T-Hangars)



LEGEND

- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

- Provides 18 new large t-hangars
- Provides 9,583 square yard apron
- Assumes box hangar development on the eastern side of the airfield
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

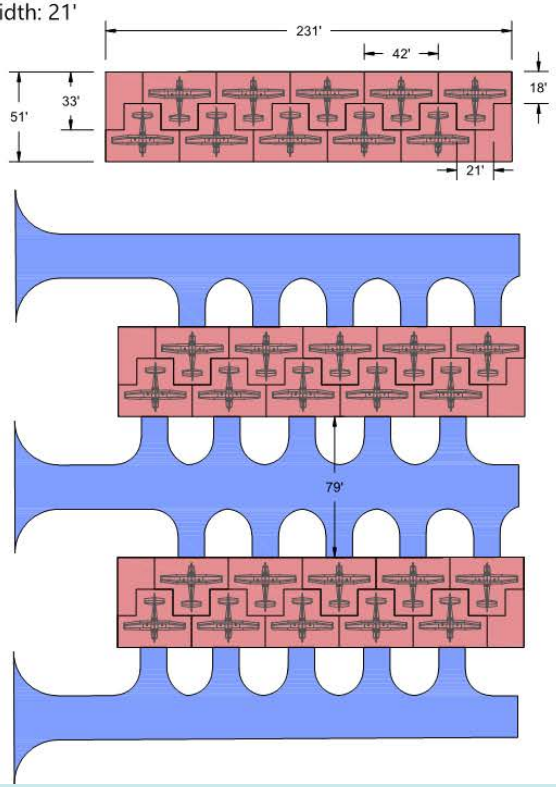
Comparison of Small and Large T-Hangars

ALTERNATIVE 2: Small Nested T-Hangars

Representative Aircraft Types: Cessna 150, Cessna 182, Cirrus SR20/SR22, Piper PA-28 Cherokee

Dimensions:
Depth: 33'
Width Depth: 18'
Tail Width: 21'

For 10 Units:
Overall Length: 231'
Overall Width: 51'

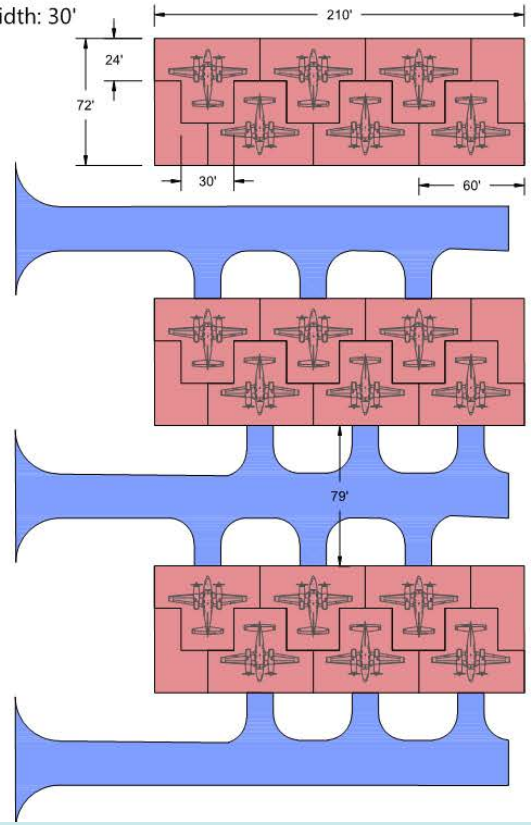


ALTERNATIVE 3: Large Nested T-Hangars

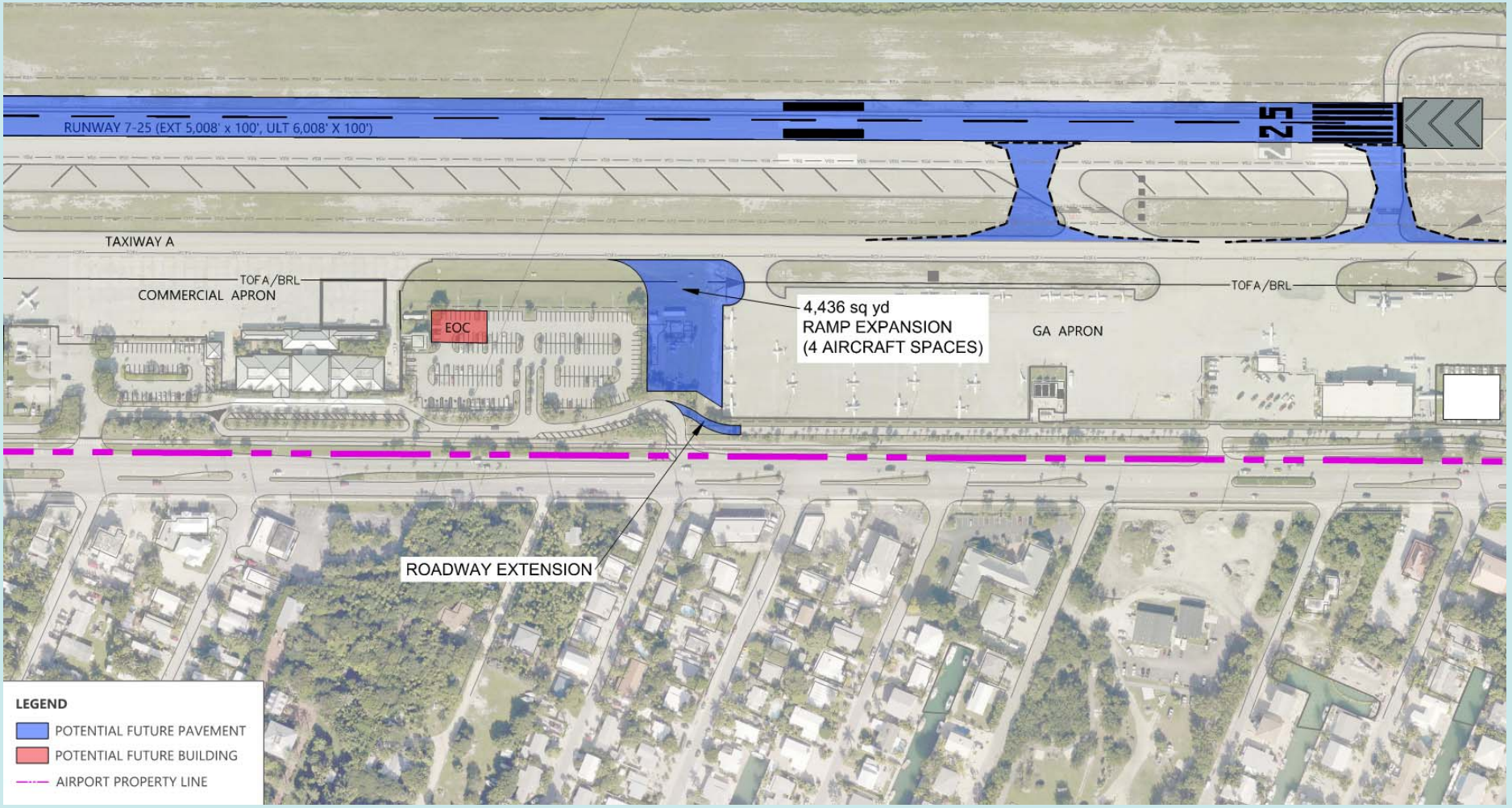
Representative Aircraft Types: Beechcraft Baron, Piper PA-31, Cessna 414, Cessna 402

Dimensions:
Depth: 48'
Width Depth: 24'
Tail Width: 30'

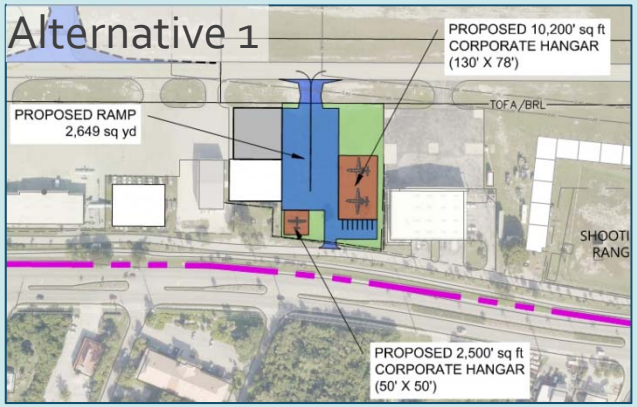
For 6 Units:
Overall Length: 210'
Overall Width: 72'

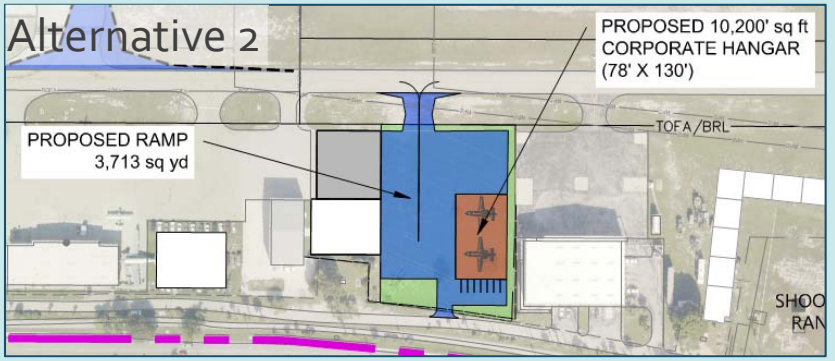


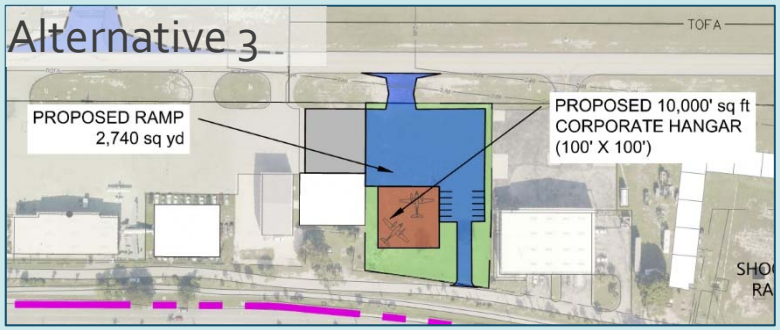
Midfield Area

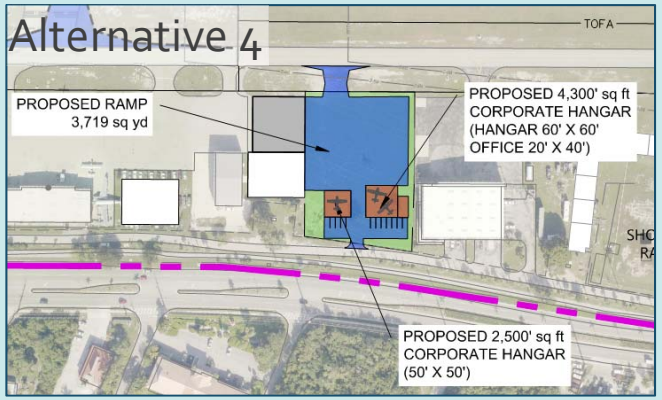


Southeast Area

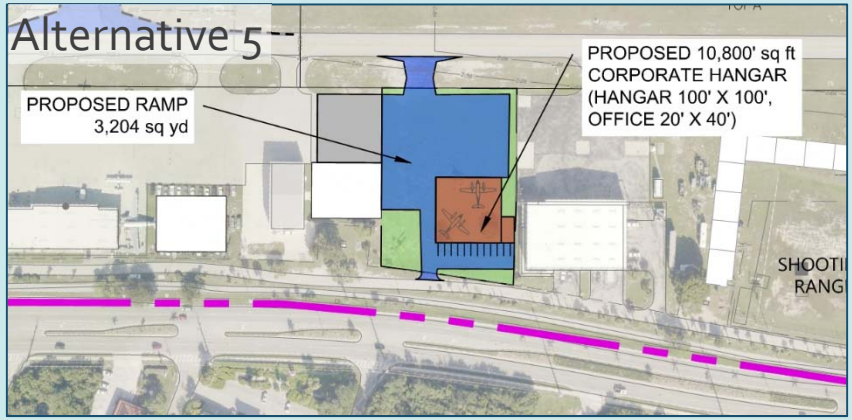


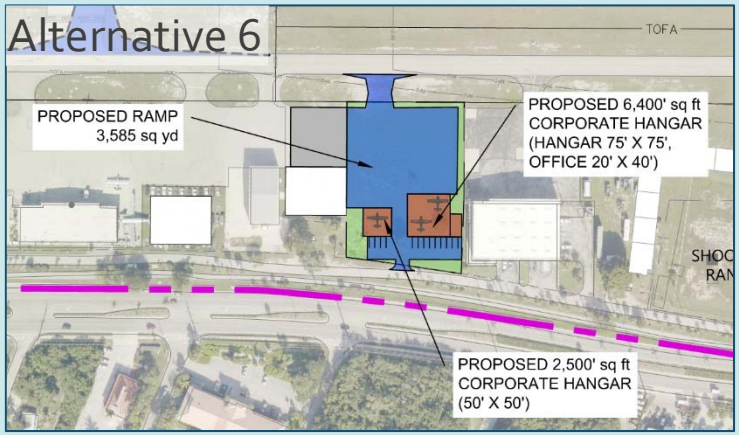


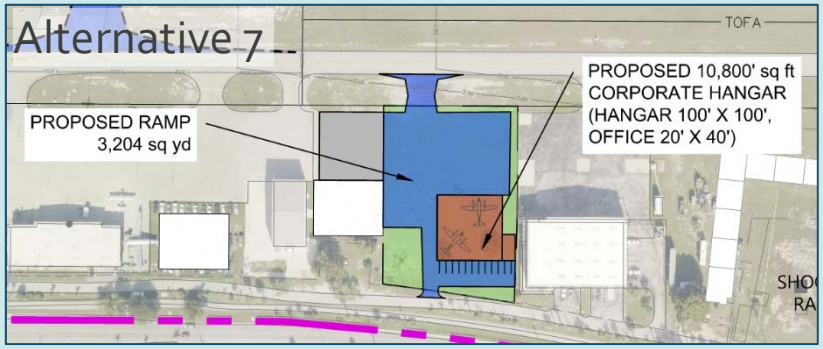




Southeast Area







AIRPORT SUPPORT FACILITIES

AIRPORT MAINTENANCE STORAGE FACILITY

Airport Maintenance Facility

- Provide a covered facility to replace the grass area and supplement Building #21
- Approximately 3,500 square feet of building space (1/2 acre minimum)
- Include:
  - Three equipment bays (800 sq.ft per bay)
  - Two staff offices (300 sq.ft per office)
  - Restroom/Breakroom (500 sq.ft)
  - Vehicle parking
  - Gated access

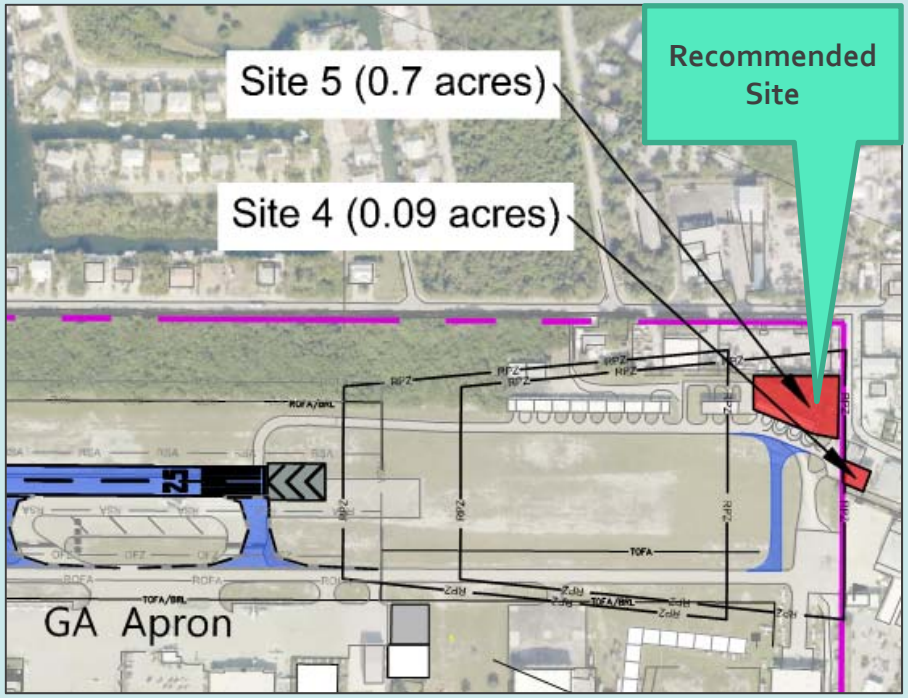
Airport Maintenance Storage Facility

Potential Relocation Sites

Maintenance Building Site Comparison

Maintenance Facility Site Comparison					
	Site 1	Site 2	Site 3	Site 4	Site 5
Site Acreage	1.2	0.7	0.4	0.09	0.7
Existing Airfield Access	Yes	Yes	Yes	Yes	Yes
Existing Surface Street Access	No	No	Yes	Yes	No
Existing Structures	No	No	No	Yes	Yes
Impacts to Revenue Producing Aeronautical Development	Limited	High	High	None	Limited

Recommended Maintenance Facility Site



- Limited impacts to Re-development of 0.7 acre site northeast of the airfield
- Requires the removal of 4 existing shade hangars
  - Additional T-Hangars to be constructed on the west side of the airfield as a replacement for the removed shade hangars.
- Surface vehicle access to be constructed off of Peter Ray Street

AIRCRAFT FUEL STORAGE

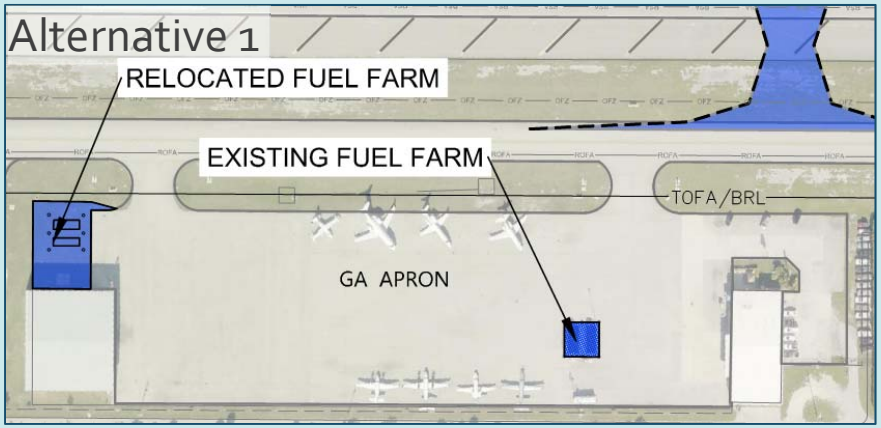
Aircraft Fuel Storage

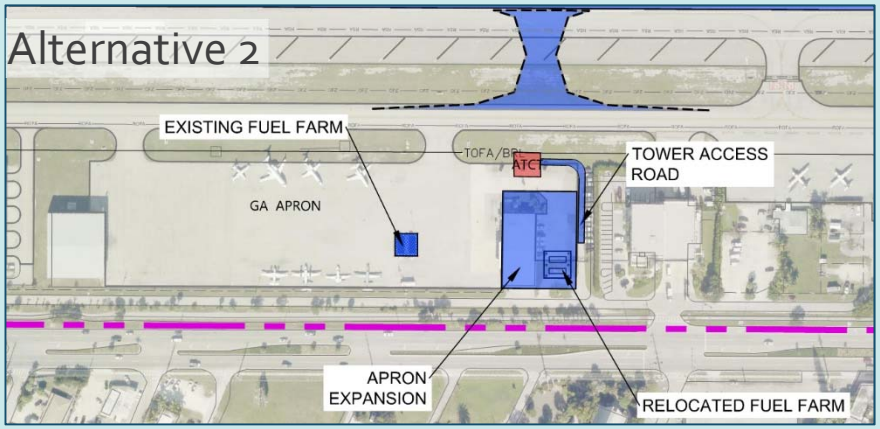
Jet Center Apron Fuel Farm

- Fuel storage capacity is adequate for the forecasted operations.
- Consider relocating the Jet Center Fuel Farm to increase apron space available for aircraft parking.

General Aviation Apron Fuel Farm

Aircraft Fuel Storage





- Fuel storage capacity is adequate for the forecasted operations.
- Relocate fuel farm to maximize apron parking space:
  - Alternative 1: Relocate fuel farm to the northwestern corner of apron
  - Alternative 2: Relocate fuel farm to the southeastern corner of expanded apron.
    - Project combined with re-development of Marathon Jet Center hangar site
  - Alternative 3: Co-locate Jet Center fuel farm with the General Aviation fuel farm

AIRPORT TRAFFIC CONTROL TOWER

Airport Traffic Control Tower

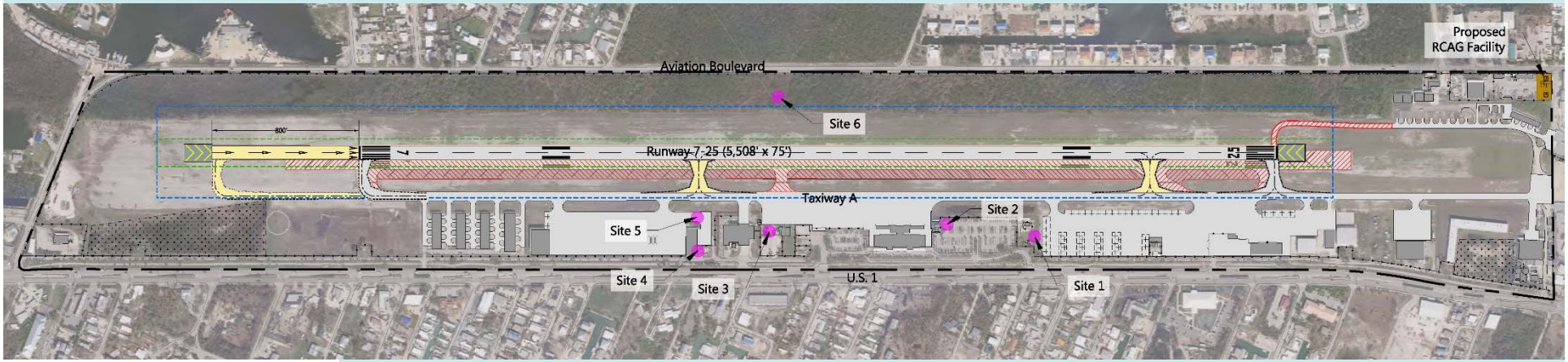
- The Monroe County expressed interest for an airport traffic control tower (ATCT) providing additional operational and safety benefits to its users

➢ Explore alternatives to ATCT:
  - ➢ On-Airport ATCT (FAA Contract Tower Program)
  - ➢ Remote Control Tower

Airport Traffic Control Tower
Key Siting Requirements

- Unobstructed view of:
  - All controlled movement areas of an airport (runways, taxiways, and any other landing areas)
  - Air traffic in the vicinity of the airport (runway approaches)
  - Also consider view of non-movement areas (ground operations of aircraft and of airport ground vehicles on ramps, aprons and tie-down areas, and test areas)
- Airspace protection:
  - Title 14 Code of Federal Regulations Part 77
  - Terminal Instrument Procedures
- Impacts to Communications/Navigation/Surveillance Equipment
- ATCT Orientation:
  - Primary operational view is to the north, then east, west and south, in that order of preference
  - Avoid direct sun glare, indirect sun glare off natural and manmade surfaces, nighttime lighting glare, external light sources, etc.
- Landside Access:
  - No interference with aircraft movements

Airport Traffic Control Tower Sites
Traditional/On-Airport



LEGEND

- Airport Property Boundary
- Runway Object Free Area (ROFA)
- Proposed ATCT Site
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Airport Traffic Control Tower Sites

Preliminary Evaluation

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Line-of-Sight	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind ARFF station	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind terminal building	Unobstructed
TERPS Impacts	None	None	None	None	None	None
Part 77 Impacts	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)
Landside Access	Existing Airport Road	Existing Airport Road	Existing Airport Road	Existing Airport Road	Existing Airport Road	Construct fenced and secured driveway from Aviation Blvd. (approx. 150 feet long)
Environmental Issues	None	None	None	None	None	Wetlands/ Mangrove
Potential Impacts to NAVAIDS	None	None	None	None	None	None

No or Minimal Impacts
Moderate Impacts
Significant Impacts

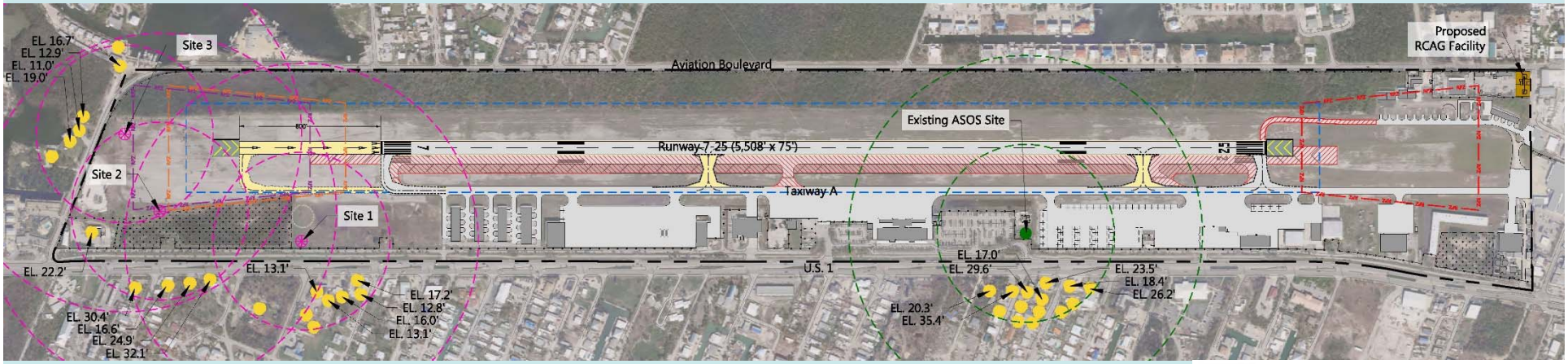
ASOS RELOCATION

ASOS Relocation

- Weather observation system:
  - reports at hourly intervals
  - also reports special observations if weather conditions change rapidly and cross aviation operation thresholds
- Existing location considered for future developments

ASOS Relocation

Potential Sites



LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Object Free Area (ROFA)
- Existing ASOS Site
- Existing ASOS Clearance Zone
- ASOS Relocation Site
- ASOS Clearance Zone
- Buildings Inside ASOS 500' Clearance Zone
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

ASOS clearance zones:

- 500-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be 15 feet lower than the height of the wind sensor
- 1,000-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be no greater than 10 feet above the height of the wind sensor

Wind sensors are typically 30 to 33 feet above the average ground height within a radius of 500 feet.

- airport elevation = 5 feet MSL
- Wind sensor elevation ≈ 35-38 feet MSL
- Facilities within 500 feet of ASOS cannot be taller than 20-23 feet MSL

ASOS Relocation
Sites Evaluation

	500-Foot Clearance Zone				
Alternative	Facilities Inside Zone	Facilities Elevation Greater than Permitted	Land Use	Airfield Surfaces	Airspace Surfaces
Existing	14	4	Potential hangar development		
Site 1	8	0	Potential hangar development		
Site 2	5	3			
Site 3 ★	6	0			TBD

★ Site with the least impacts

AIRPORT BEACON

Airport Rotating Beacon

- The Airport rotating beacon was destroyed during Hurricane Irma
  - Install a new beacon east of the passenger terminal

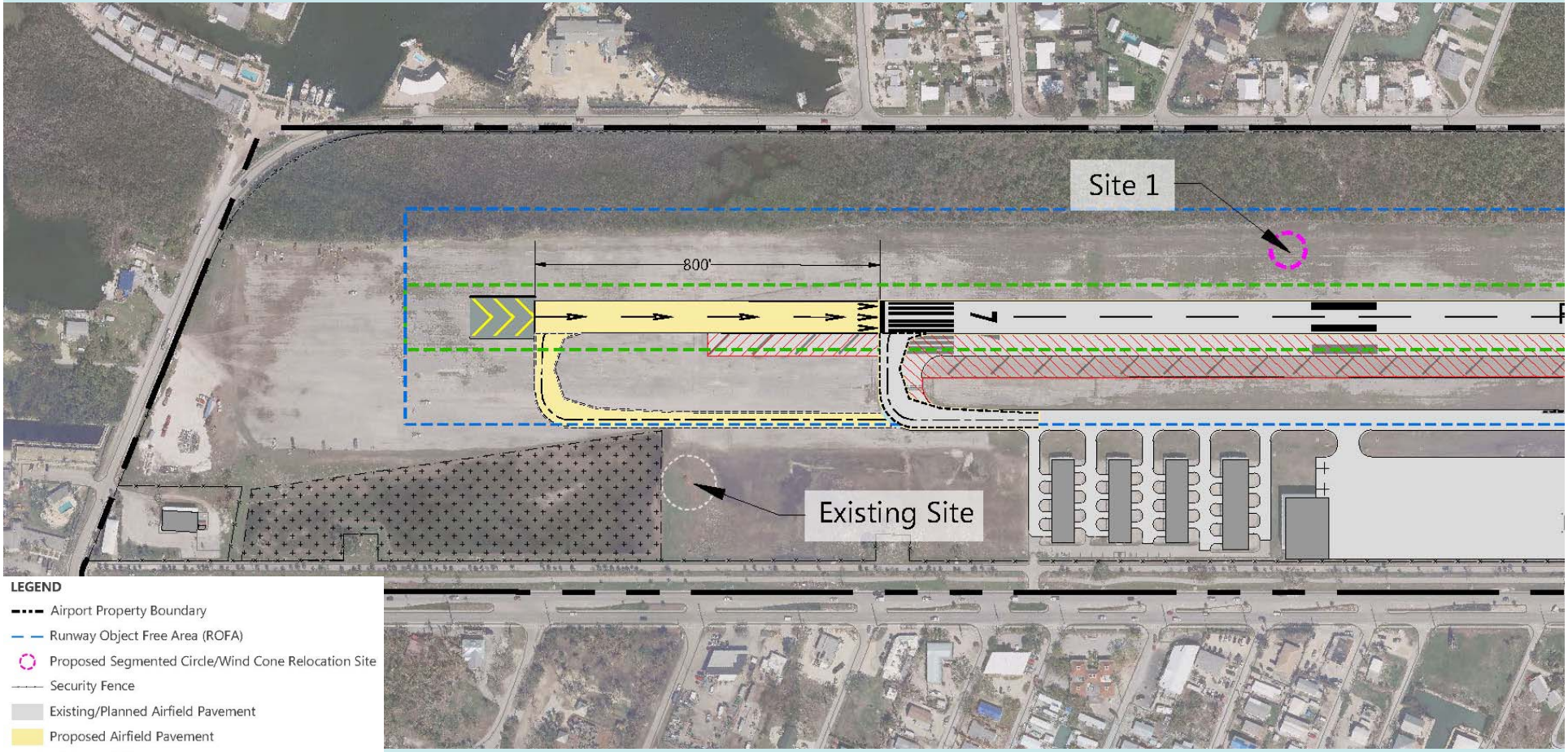
Monroe County Department of Airports

SEGMENTED CIRCLE/WIND CONE RELOCATION

Segmented Circle/Wind Cone Relocation

- Existing location is in an area considered for future developments

Segmented Circle/Wind Cone Relocation



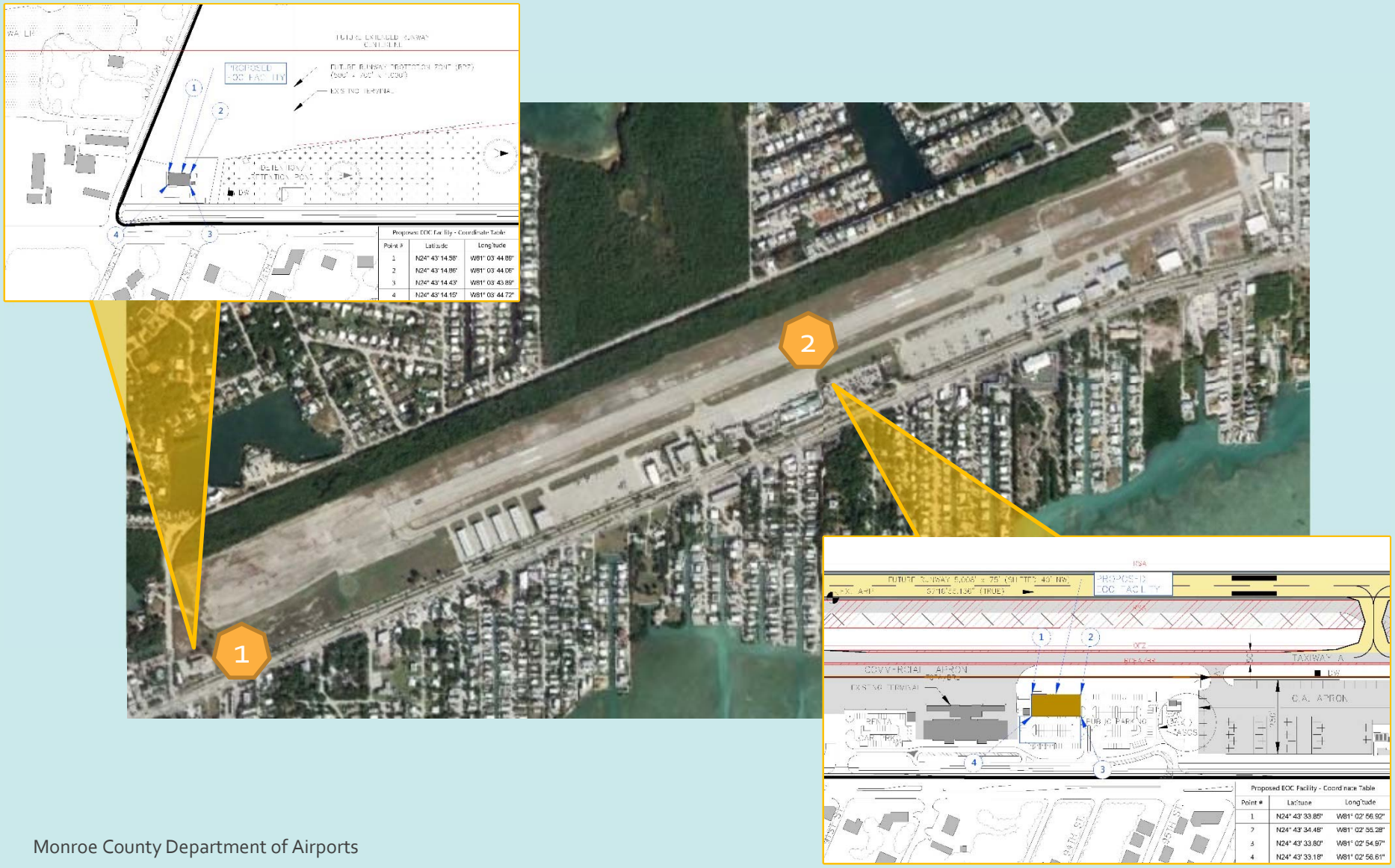
NON-AERONAUTICAL FACILITIES

Non-Aeronautical Facilities

- Marathon Emergency Operations Center (EOC) to be relocated from location off-Airport onto Airport property

Marathon Emergency Operations Center

Proposed On-airport Sites



Monroe County Department of Airports

NEXT STEPS

Next Steps

- Facility Requirements (Finalize)
- Alternatives Evaluation (Finalize)
- Airport Layout Plan Development
- Environmental Overview
- Implementation Plan
- Public Outreach

Questions?

Comments?

Open Discussion

Thank You!

Florida Keys Marathon Airport Master Plan Update

Technical Review Committee #2

Florida Keys Marathon Int'l Airport

Master Plan Update

JACOBS

RICONDO & ASSOCIATES

Technical Review Committee #3

September 17, 2018

Meeting Agenda

- Introductions
- Summary of Demand/Capacity and Facility Requirements and Preferred Alternatives:
  - Airfield
  - On-Airport Roadways
  - Airport Support
  - General Aviation Facilities
- Preliminary Implementation Plan
- Next Steps
- Open Discussion

AIRFIELD FACILITIES

AIRFIELD GEOMETRY

Airfield Geometry

- Design Aircraft: B-II
  - Cessna Citation family
- Runway Design Code: B/II/5000
  - Runway 7: RNAV/GPS - 1.25 mile visibility/384' ceilings
  - Runway 25: RNAV/GPS - 1.0 mile visibility/310' ceilings

Cessna Citation Excel

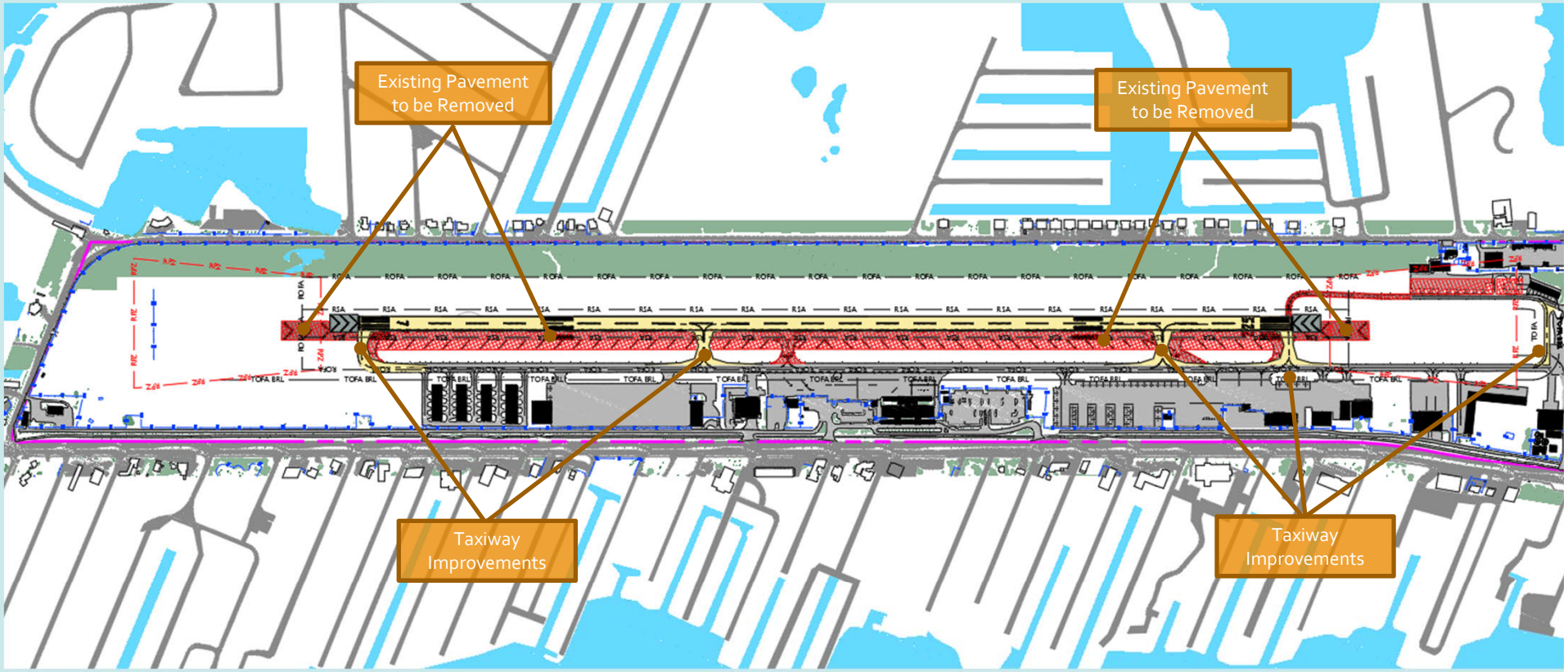
The critical aircraft is projected to remain a B-II aircraft through the planning horizon

Airfield Dimensions

Design Aircraft = B-II (Cessna Citation Family)

General Dimensional Runway and Taxiway Characteristics			
	Existing Dimension	FAA Requirements	ADG II Compliance
Runway			
Runway CL to Parallel Taxiway CL	200′	240′	No
Runway CL to Holdline	130′	200′	No
Width	100′	75′	Yes (Exceed Requirements by 25′)
Shoulder Width	0′/50′	10′	No, but only recommended for ADG II aircraft.
Safety Area Width	150′	150′	Yes
Object Free Area Width	500′	500′	Yes
Safety Area & Object Free Area Length	300′	300′	Yes
Taxiway			
Width	50′	35′	Yes (Exceed Requirements by 15′)
Safety Area Width	79′	79′	Yes
Object Free Area Width	131′	131′	Yes
Blast Pad			
Width	100′	95′	Yes
Length	>400′	150′	Yes (Exceed Requirements by 250′)

Airfield Geometry Improvements



RUNWAY LENGTH REQUIREMENTS

Takeoff Runway Length Requirements

- FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS):
  - *The critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations.*
- FAA Order 5100.38D, Table 3-4, Basic Tests to Determine if a Project is Justified
  - *There is an Actual Need. Per FAA policy, the ADO must determine if there is an actual need for the project at the airport within the next five years.*
- FAA AC 150/5325-4B, Paragraph 103,
  - *The design objective for the main primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions.*

Documentation from MTH tenants will be required to support the need for a runway extension, such as:

- Weight penalties operators have taken
- Aircraft relocating to another airport
- Documentation of refueling stops on otherwise non-stop flights

Stage Length from MTH

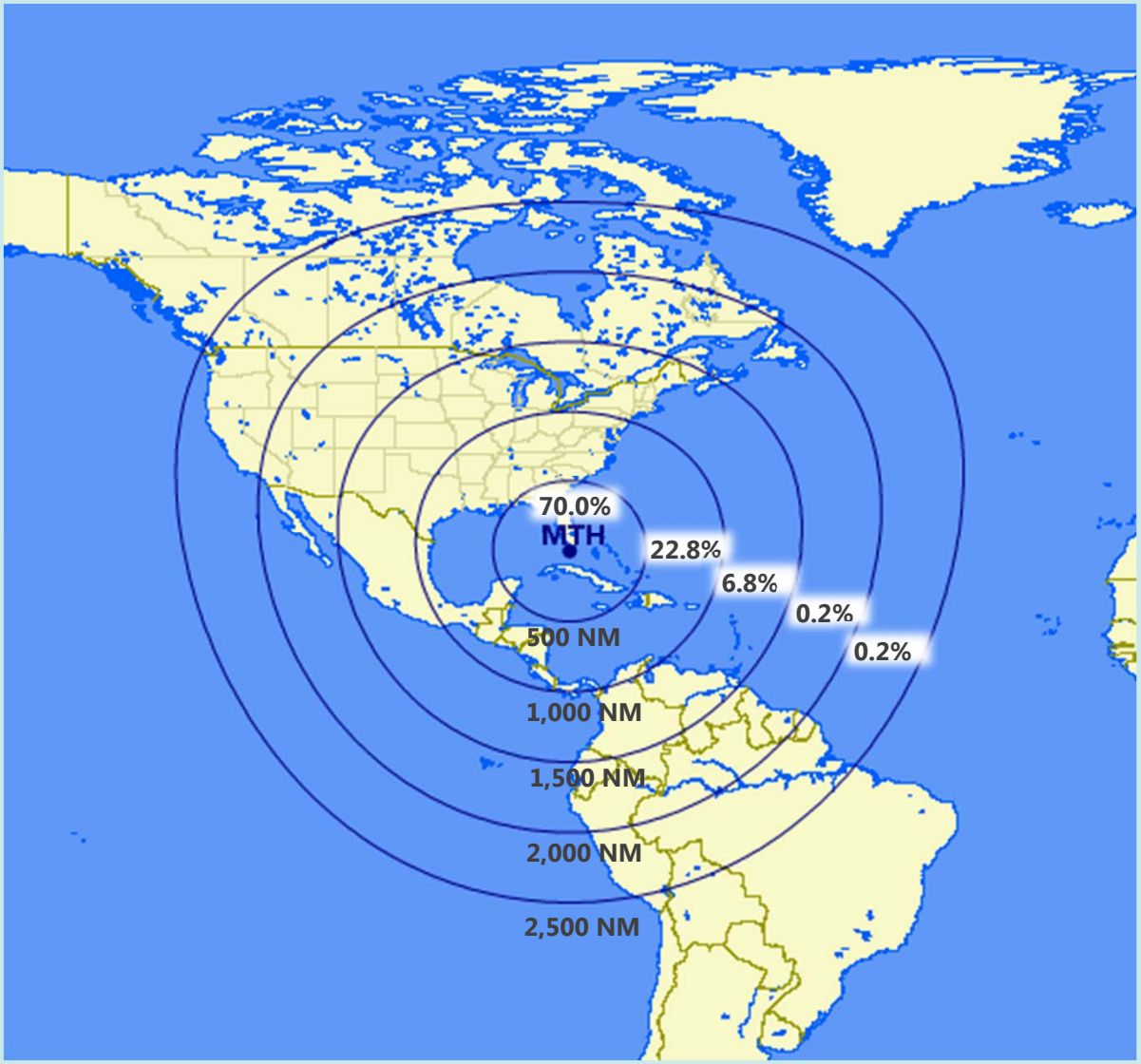
June 2016-May 2017

- Longest recorded stage lengths from MTH include:
  - PWT (Bremerton, Washington)
  - SFO (San Francisco, California)
  - VNY (Van Nuys, California)
- Majority of the flights originating at MTH travel to Florida destinations:
  - FLL, FMY, APF, TMB, PIE, FXE, EYW, PBI, BCT, SRQ, SUA

Stage Length	Aircraft Departures	Percentage of Total
≤ 500 NM	3,094	70.0%
501 – 1,000 NM	1,010	22.8%
1,001 - 1,500 NM	304	6.8%
1,501 – 2,000 NM	7	0.2%
2,001 - 2,500 NM	7	0.2%
> 2,500 NM	0	0.0%
	4,424	100.0%

Note: Only approximately 9,000 flights (4,424 departures) were recorded by FlightAware during this time period, out of 75,000 estimated annual operations. Remainder of flights is assumed to be conducted under visual flight rules (typically local/short range flights).
Source: FlightAware, June 2016 through May 2017.

Aircraft Range from MTH



Source: FlightAware, June 2016 through May 2017.

Runway Length Questionnaire
Distributed/Collected by FBOs

Florida Keys Marathon International Airport (MTH)

Runway Length Questionnaire

We need your feedback to assess the need for a runway extension at MTH.
Would you answer a few questions below?

1. What aircraft type(s) do you operate to/from MTH? _____
2. What destinations do you regularly serve from MTH? _____
3. Do you experience operational restrictions with the existing runway length at MTH? (Circle One) Yes No
   If Yes, please specify:
   - Typical weight penalties departing from MTH _____
   - Regular destinations requiring intermediate refueling stops from MTH _____
   - Required runway length to avoid refueling stops or weight penalties to the above destinations
     _____
4. Identify the number of annual operations at MTH that require a runway extension (this can be cumulative based on constrained operations of multiple aircraft, if you have a fleet of various aircraft)
   _____
5. Do you have any other comments/suggestions for improving the airport? _____
   _____

Please provide your contact information (optional):
Name: _____ Organization/Operator: _____
Phone Number: _____

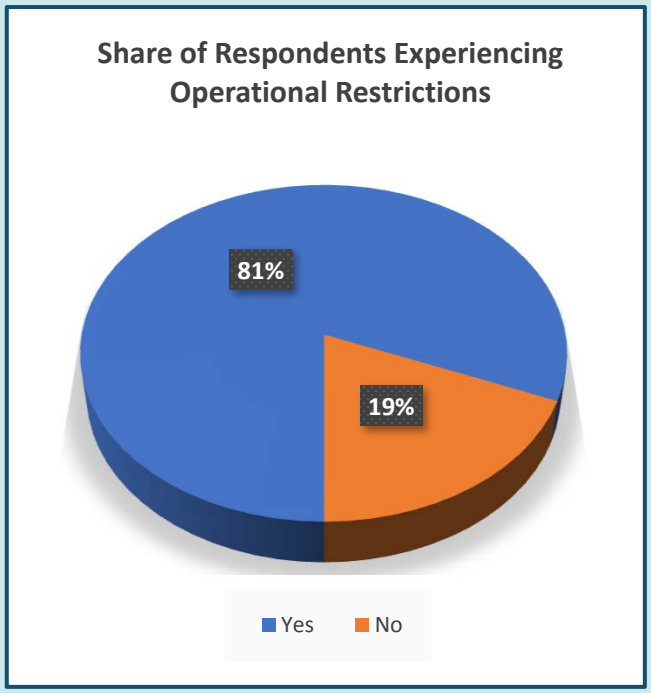
Thank you for helping us serve you better! - The Monroe County Department of Airports

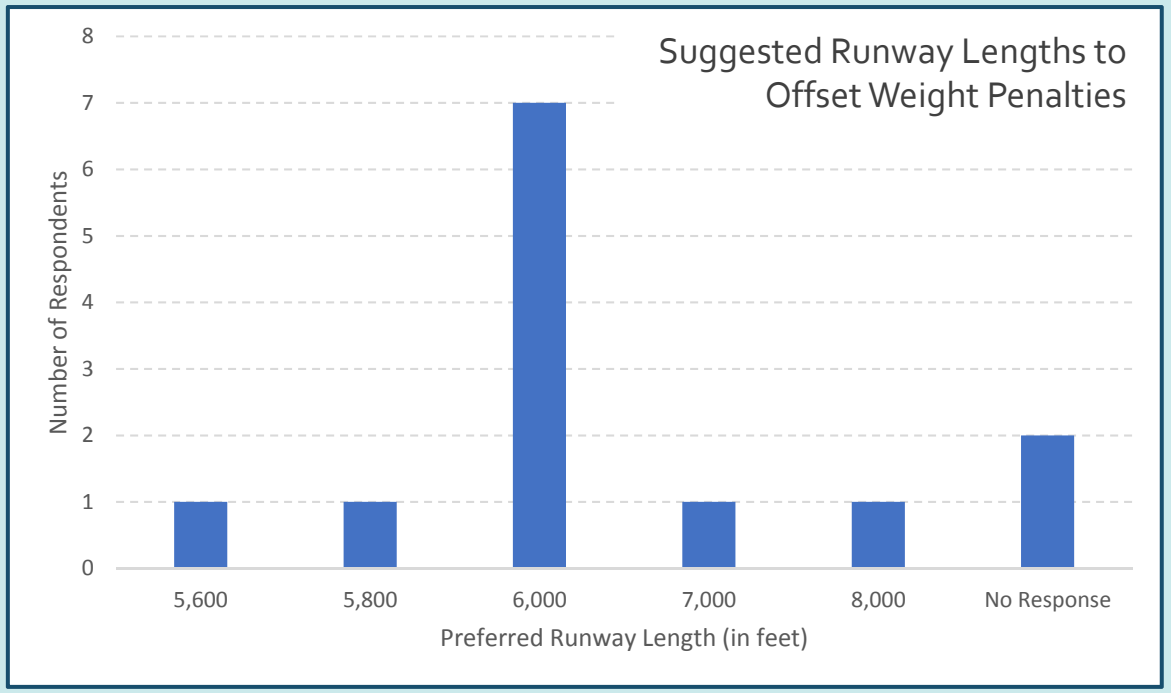
16 responses received over a 4-month period

Runway Length Questionnaire Results

Operational Restrictions

- 13 of the 16 respondents indicated their aircraft incur weight penalties when operating from MTH.
- 7 of the 13 respondents who indicated their aircraft incur weight penalties recommended a runway length of 6,000 feet.

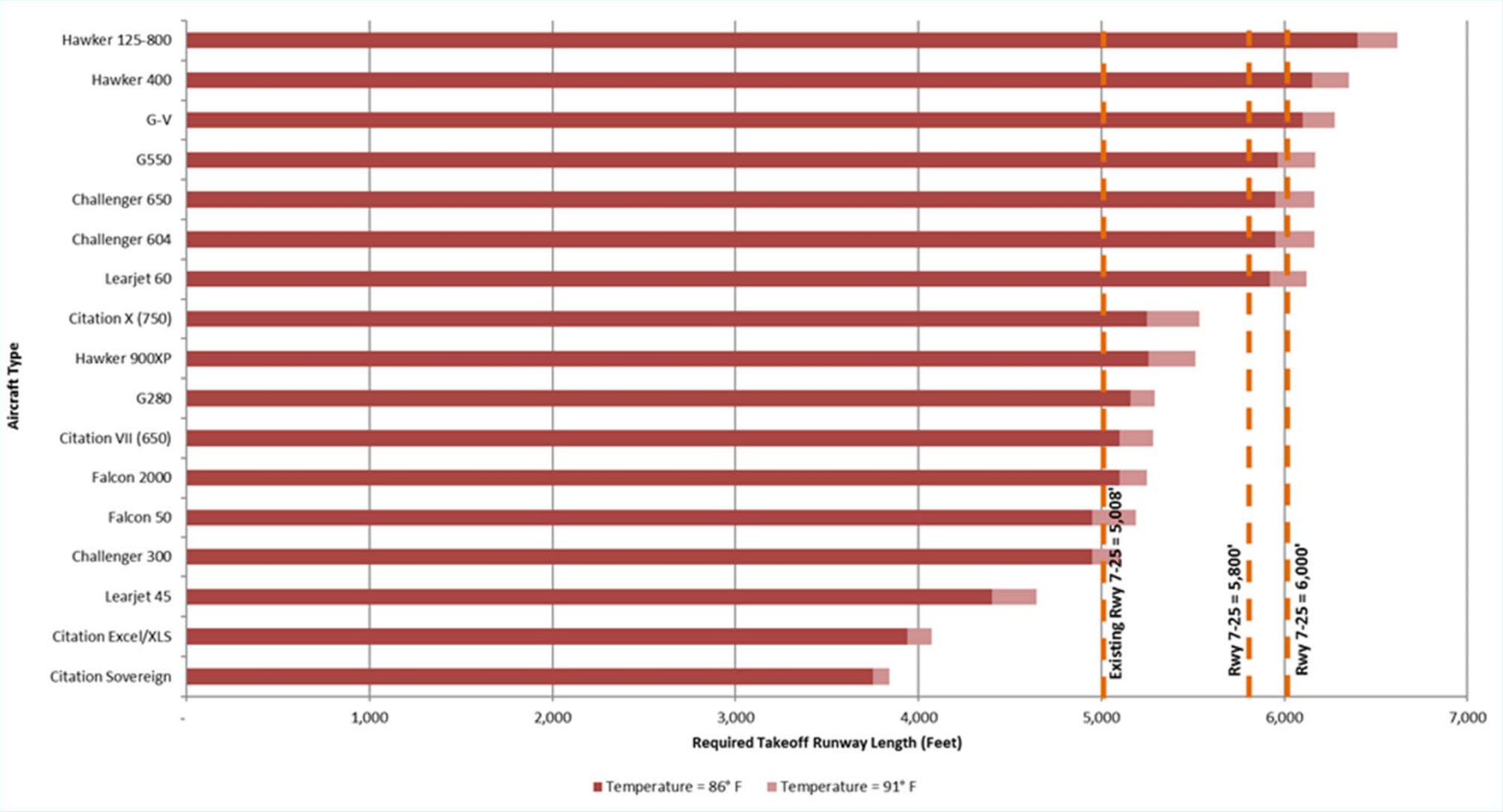




Takeoff Runway Length Requirements

At Maximum Takeoff Weight

- With a longer runway, less business jets would incur weight penalties during takeoff.

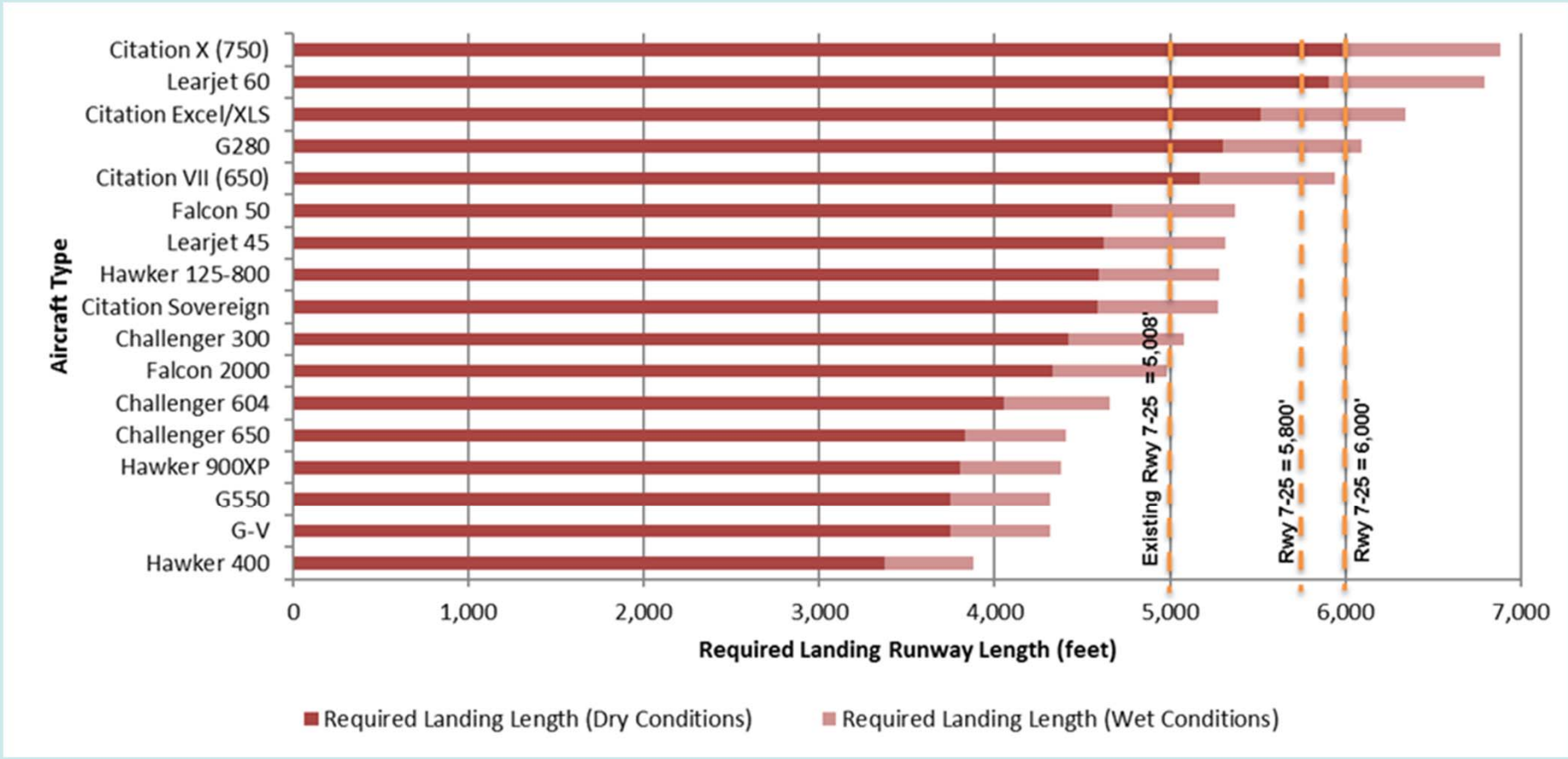


SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., September 2018.

Landing Runway Length Requirements

At Maximum Gross Landing Weight

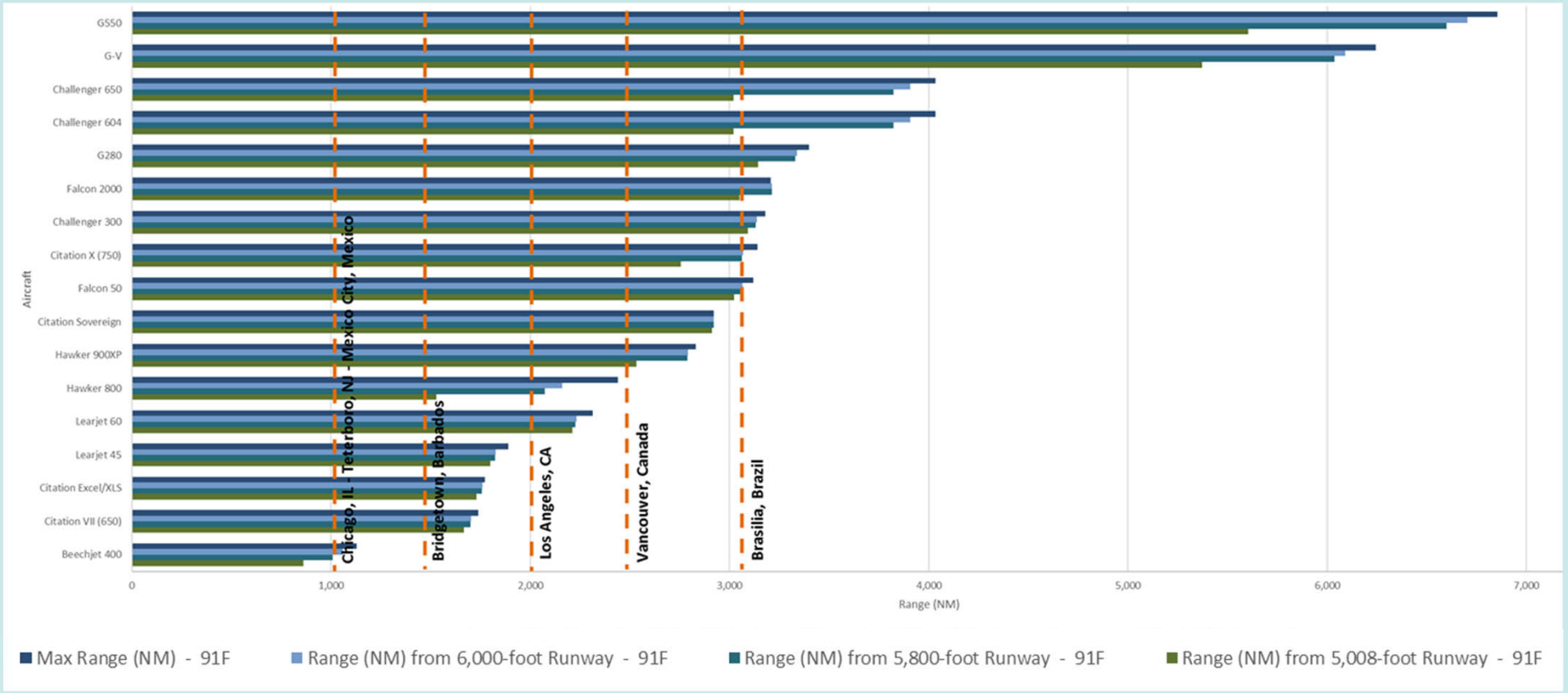
- A longer runway would also allow aircraft to land heavier and more safely in inclement weather.



SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., January 2018.

Maximum Allowable Aircraft Range

Four Passengers, at 91°F



SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., September 2018.

Maximum Allowable Aircraft Range (NM)

Based on Existing Runway Length & Four Passengers, at 91°F

- While not all business jets are able to takeoff at MTOW, the existing runway provides the necessary takeoff length to provide access to the majority of destinations currently served from MTH.

	Aircraft Range at MTH based on Runway Length Available	Maximum Aircraft Range (NM)
	5,008' - Existing	
Beechjet 400	950	1,100
Challenger 300	3,100	3,200
Challenger 604	3,000	4,050
Challenger 650	3,000	4,050
Citation Excel/XLS	1,750	1,750
Citation Sovereign	2,900	2,900
Citation VII (650)	1,650	1,750
Citation X (750)	2,750	3,150
Falcon 2000	3,050	3,200
Falcon 50	3,000	3,100
G280	3,150	3,400
G550	5,600	6,850
G-V	5,350	6,250
Hawker 800	1,550	3,450
Hawker 900XP	2,550	2,850
Learjet 45	1,800	1,800
Learjet 60	2,100	2,300

The majority of destinations served from MTH are within 1,500NM

SOURCES: Conklin & de Decker, Aircraft Performance Comparator, 2017; Ricondo & Associates, Inc., September 2018.

Note:
Orange text indicates maximum allowable range is less than maximum range.

Summary of Findings

Existing Runway Length (5,008') & 91°F

- The majority of destinations currently served from MTH are within 1,500 NM.
- Takeoff - of the 17 aircraft evaluated:
  - Only 3 can takeoff at MTOW
- Landing - of the 17 aircraft evaluated:
  - 12 can land at MLW in dry conditions
  - 7 can land at MLW in wet conditions
- Range - of the 17 aircraft evaluated:
  - 12 can serve destinations within 2,000 NM
  - 16 can serve destinations within 1,500 NM
- A longer runway (5,800 feet or 6,000 feet) would allow business jets to takeoff with higher payloads and fly nonstop to further destinations.

RUNWAY EXTENSION ALTERNATIVES

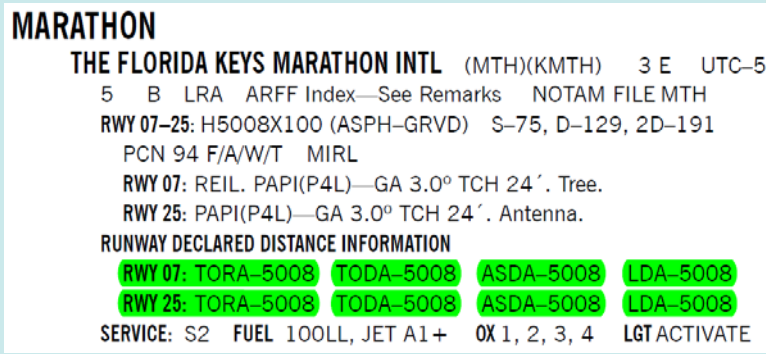
Runway Extension Evaluation

- Runway extension alternatives that were evaluated based on user feedback:
  - 5,500' (TRC #2)
  - 5,800'
  - 6,000'
  - 7,000'
- Two runway lengths were shortlisted for further consideration:
  - 5,800'
  - 6,000'

➢ The use of declared distances is required to avoid incompatible land uses within the RPZ.

Declared Distances Overview

- Declared distances for each runway end are published in the FAA Chart Supplements.


MARATHON
THE FLORIDA KEYS MARATHON INTL (MTH)(KMTH) 3 E UTC–5
5 B LRA ARFF Index—See Remarks NOTAM FILE MTH
RWY 07–25: H5008X100 (ASPH–GRVD) S–75, D–129, 2D–191
PCN 94 F/A/W/T MIRL
RWY 07: REIL. PAPI(P4L)—GA 3.0° TCH 24´. Tree.
RWY 25: PAPI(P4L)—GA 3.0° TCH 24´. Antenna.
RUNWAY DECLARED DISTANCE INFORMATION
RWY 07: TORA–5008 TODA–5008 ASDA–5008 LDA–5008
RWY 25: TORA–5008 TODA–5008 ASDA–5008 LDA–5008
SERVICE: S2 FUEL 100LL, JET A1+ OX 1, 2, 3, 4 LGT ACTIVATE

TAKEOFF:

- TORA = Takeoff Run Available
- TODA = Takeoff Distance Available
- ASDA = Accelerate-Stop Distance Available

- Pilots use the most critical of the 3 to determine the runway length available
  - Typically, it is the ASDA — Rwy 7
  - If obstruction in departure path: TODA — Rwy 25
  - If penetration to RPZ: TORA

LANDING:

- LDA = Landing Distance Available

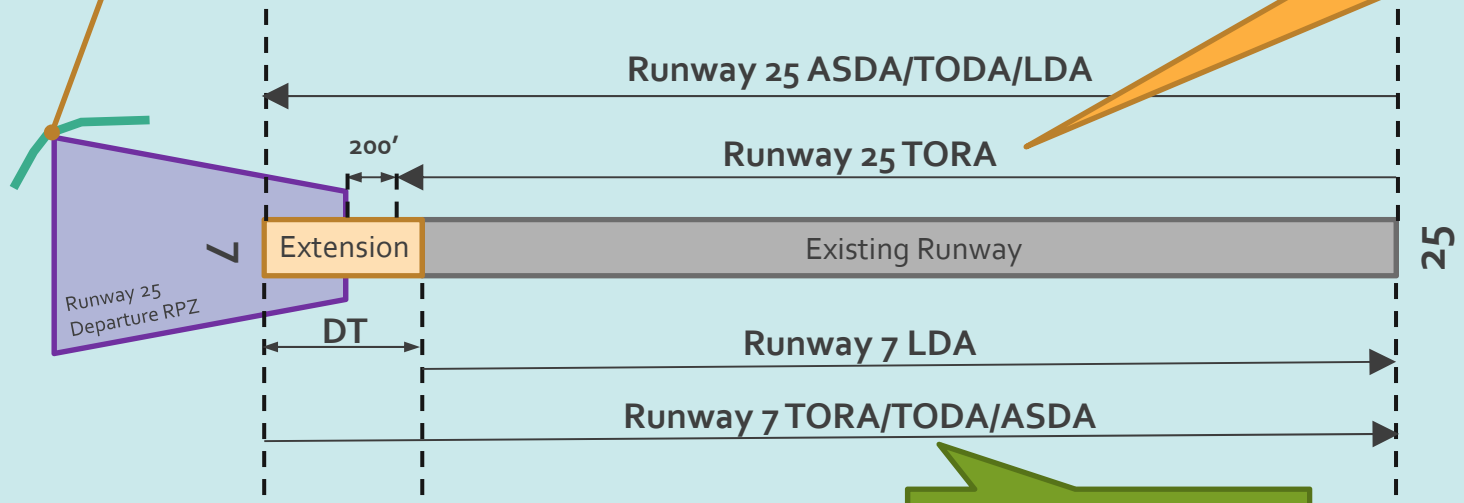
Declared Distances Overview with Proposed Runway Extension Scenarios

Declared distances can get confusing! For the MTH shortlisted runway extension alternatives:

- TORA applies to Runway 25 departures
- ASDA applies to Runway 7 departures

Runway 25 Departure RPZ Stops at Public Road

Most critical Runway 25 takeoff distance



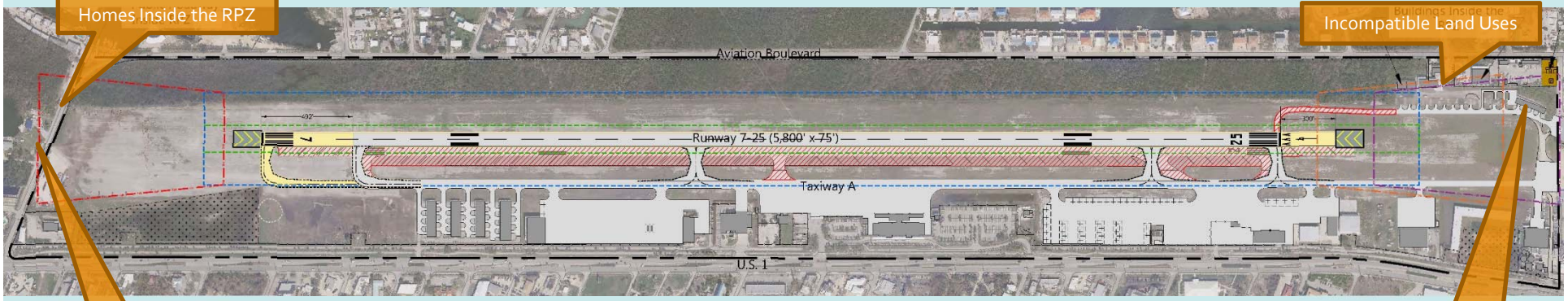
All Runway 7 takeoff distances are the same

Not to scale – for illustration purposes only.
DT stands for Displaced Threshold

Runway Extension Alternatives

Alternative 1 (ALP) - 5,800' Total Length

Alternative 1 (2016 ALP):
492' Extension to the West & 300' Extension to the East



LEGEND

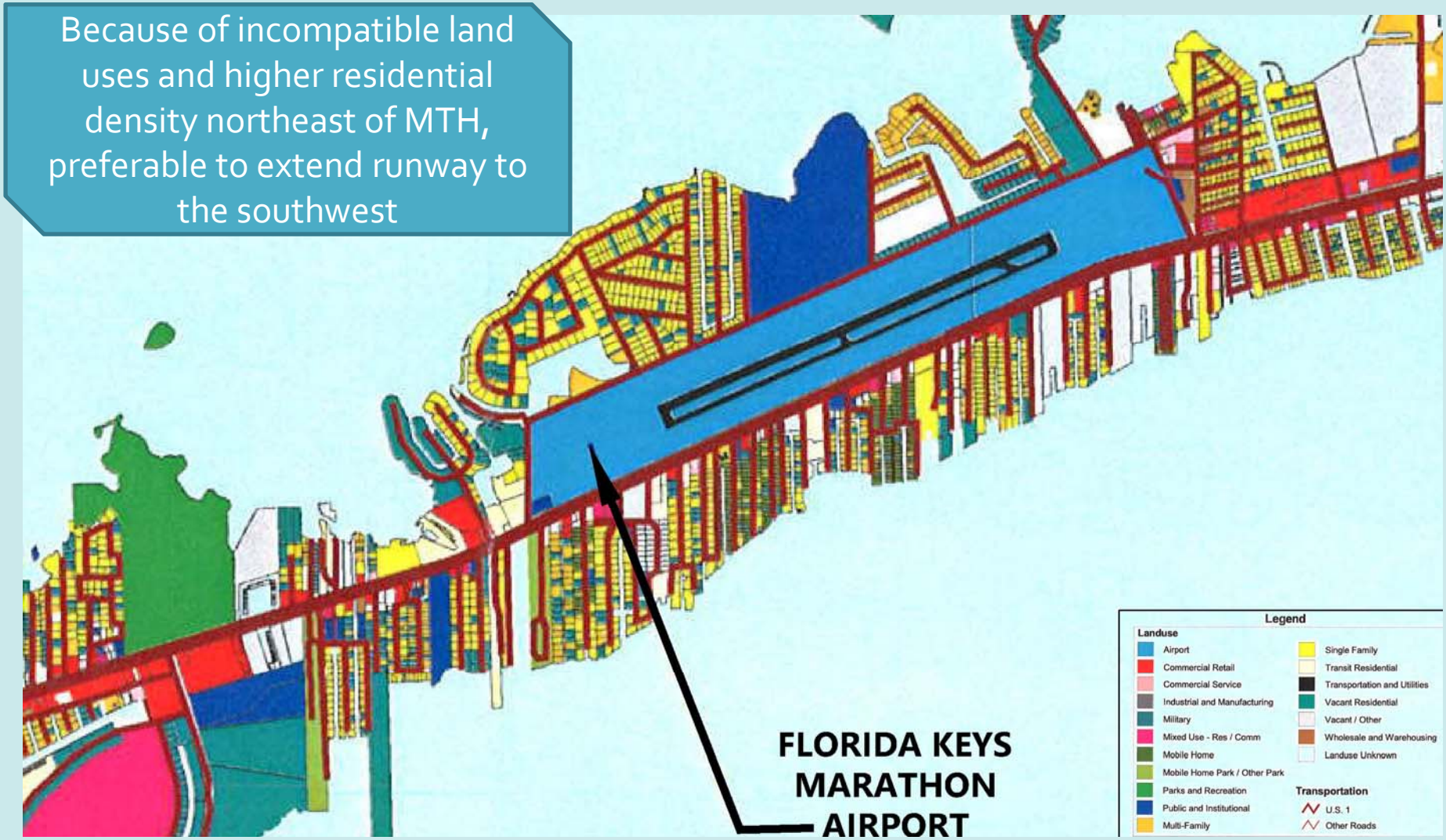
- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

	Runway 7	Runway 25
TORA	5,800'	5,800'
TODA	5,800'	5,800'
ASDA	5,800'	5,800'
LDA	5,800'	5,500'

Alternative on the current ALP
Shown for reference

Off-Airport Land Uses

Because of incompatible land uses and higher residential density northeast of MTH, preferable to extend runway to the southwest



Runway Extension Alternatives

Alternatives 3A and 3B – 5,800' Total Length

Alternative 3A: 792' Extension to the West

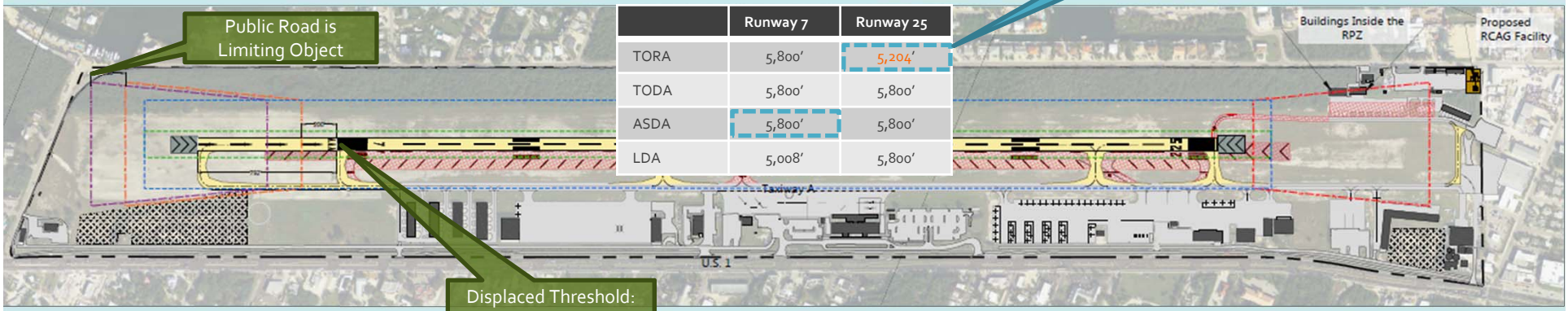
	Runway 7	Runway 25
TORA	5,800'	5,800'
TODA	5,800'	5,800'
ASDA	5,800'	5,800'
LDA	5,800'	5,800'

LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Rwy 25 departures = 16% of the time

Alternative 3B: 792' Extension to the West with Displaced Threshold



	Runway 7	Runway 25
TORA	5,800'	5,204'
TODA	5,800'	5,800'
ASDA	5,800'	5,800'
LDA	5,008'	5,800'

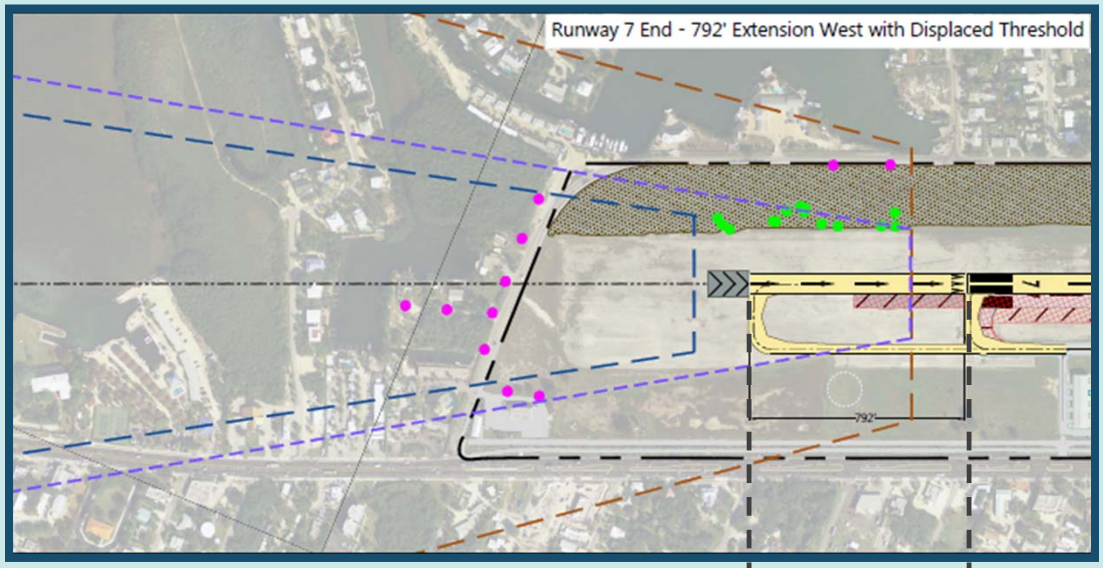
Runway Extension Alternatives

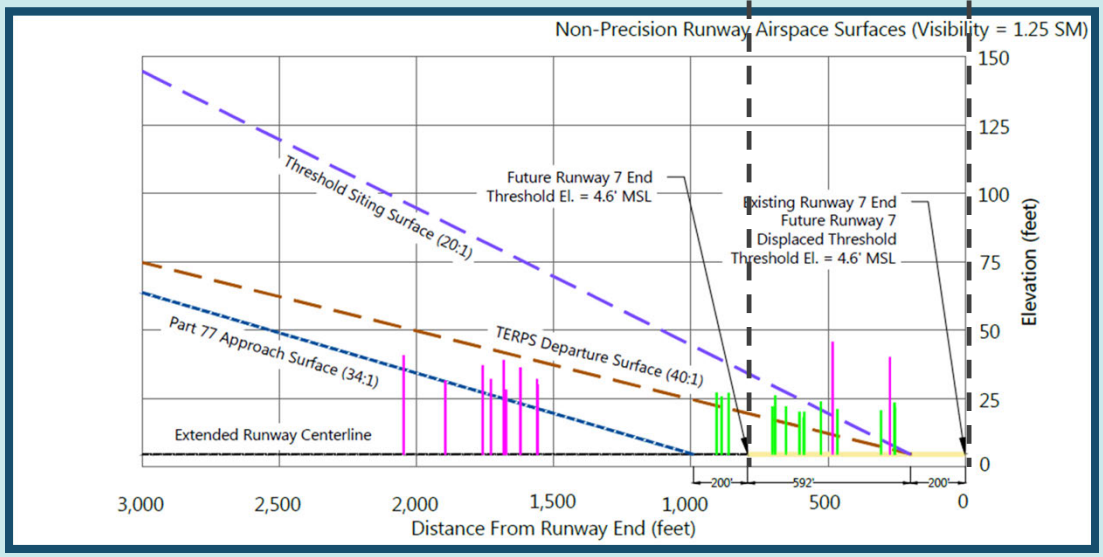
Airspace Surfaces – Alternative 3B

No Threshold Siting Surface penetrations

Two existing penetrations to the TERPS Departure Surface

Part 77 Approach Surface penetrations can be mitigated





LEGEND

- Airport Property Line
- Extended Runway Centerline
- Extended Runway/Taxiway Pavement
- Pole Penetration Points
- Treetop Penetration Points
- TERPS Departure Surface
- Threshold Siting Surface
- Part 77 Approach Surface
- Protected Areas North of Runway

NOTES

1/TERPS = Standard for Terminal Instrument Procedures
2/ MSL = Mean Sea Level
3/ SM = Statute Mile

Runway Extension Alternatives

Alternatives 4A and 4B – 6,000' Total Length

Alternative 4A: 992' Extension to the West

	Runway 7	Runway 25
TORA	6,000'	6,000'
TODA	6,000'	6,000'
ASDA	6,000'	6,000'
LDA	6,000'	6,000'

LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Rwy 25 departures = 16% of the time

Alternative 4B: 992' Extension to the West with Displaced Threshold

	Runway 7	Runway 25
TORA	6,000'	5,204'
TODA	6,000'	6,000'
ASDA	6,000'	6,000'
LDA	5,008'	6,000'

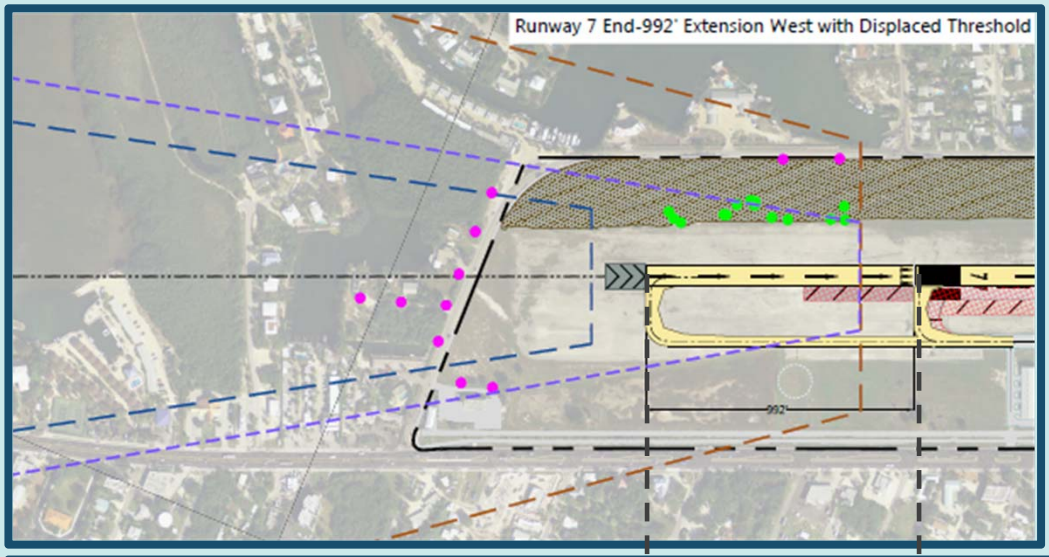
Runway Extension Alternatives

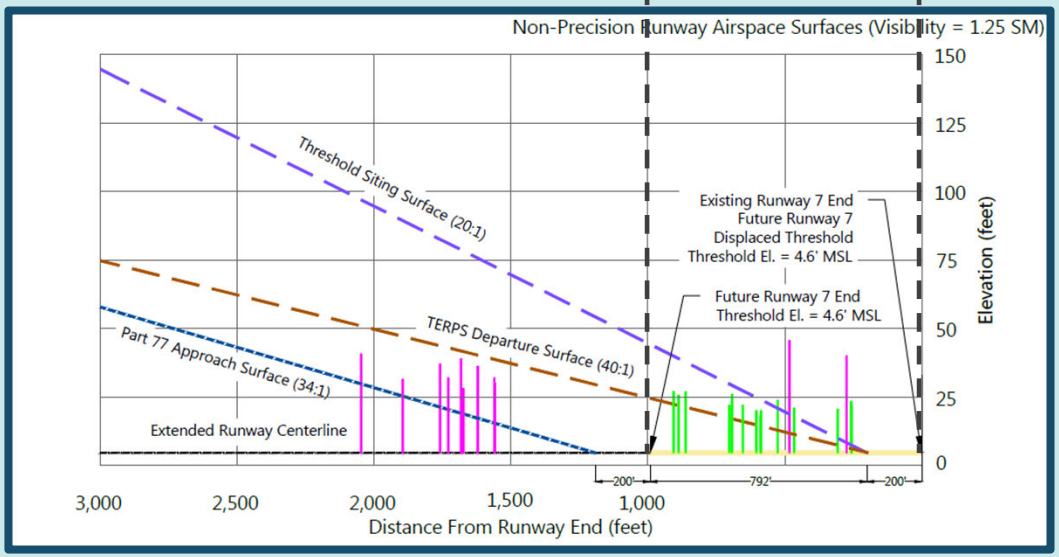
Airspace Surfaces – Alternative 4B

No Threshold Siting Surface penetrations

Two existing penetrations to the TERPS Departure Surface

Part 77 Approach Surface penetrations can be mitigated





LEGEND

- Airport Property Line
- Extended Runway Centerline
- Extended Runway/Taxiway Pavement
- Pole Penetration Points
- Treetop Penetration Points
- TERPS Departure Surface
- Threshold Siting Surface
- Part 77 Approach Surface
- Protected Areas North of Runway

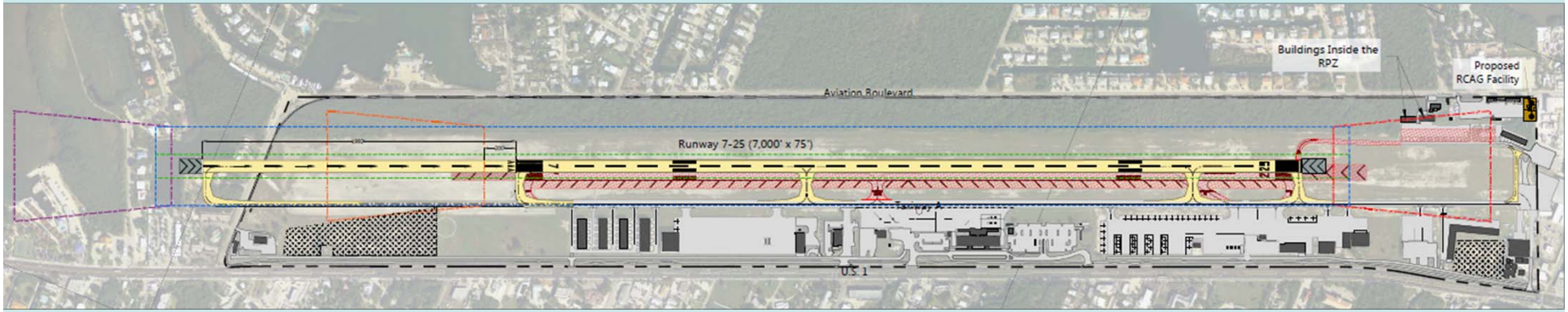
NOTES

1/TERPS = Standard for Terminal Instrument Procedures
2/ MSL = Mean Sea Level
3/ SM = Statute Mile

Runway Extension Alternatives

Alternative 5 – 7,000' Total Length

Alternative 5: 1,992' Extension to the West with Displaced Threshold



	Runway 7	Runway 25
TORA	7,000'	5,204'
TODA	7,000'	7,000'
ASDA	7,000'	7,000'
LDA	5,008'	7,000'

LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

Runway Extension Alternatives

Evaluation Matrix

	Alternative	Runway 7 Departure Length	Runway 25 Departure Length	Airfield Surfaces	Airspace Surfaces	Cost
	Existing	5,001′	5,001′			
	1 (2016 ALP)	5,800′	5,800′	Public road, hangars/apron inside RPZ		
Shortlisted Alternatives	3A	5,800′	5,800′	Public road, hangars/apron inside RPZ	Multiple/significant penetrations to Runway 25 TERPS Departure Surface	
Shortlisted Alternatives	3B ★	5,800′	5,204′	Hangars/apron inside RPZ (Runway 25 End)	2 penetrations to Runway 25 TERPS Departure Surface (similar to existing conditions)	
Shortlisted Alternatives	4A	6,000′	6,000′	Public road, hangars/apron inside RPZ	Multiple/significant penetrations to Runway 25 TERPS Departure Surface	
Shortlisted Alternatives	4B ★	6,000′	5,204′	Hangars/apron inside RPZ (Runway 25 End)	2 penetrations to Runway 25 TERPS Departure Surface (similar to existing conditions)	
	5	7,000′	5,204′	Runway overlaps existing homes & public road. Hangars/apron inside RPZ.	Did not evaluate	

No or Minimal Impacts
Moderate Impacts
Significant Impacts

★ Alternatives with the Least Impacts

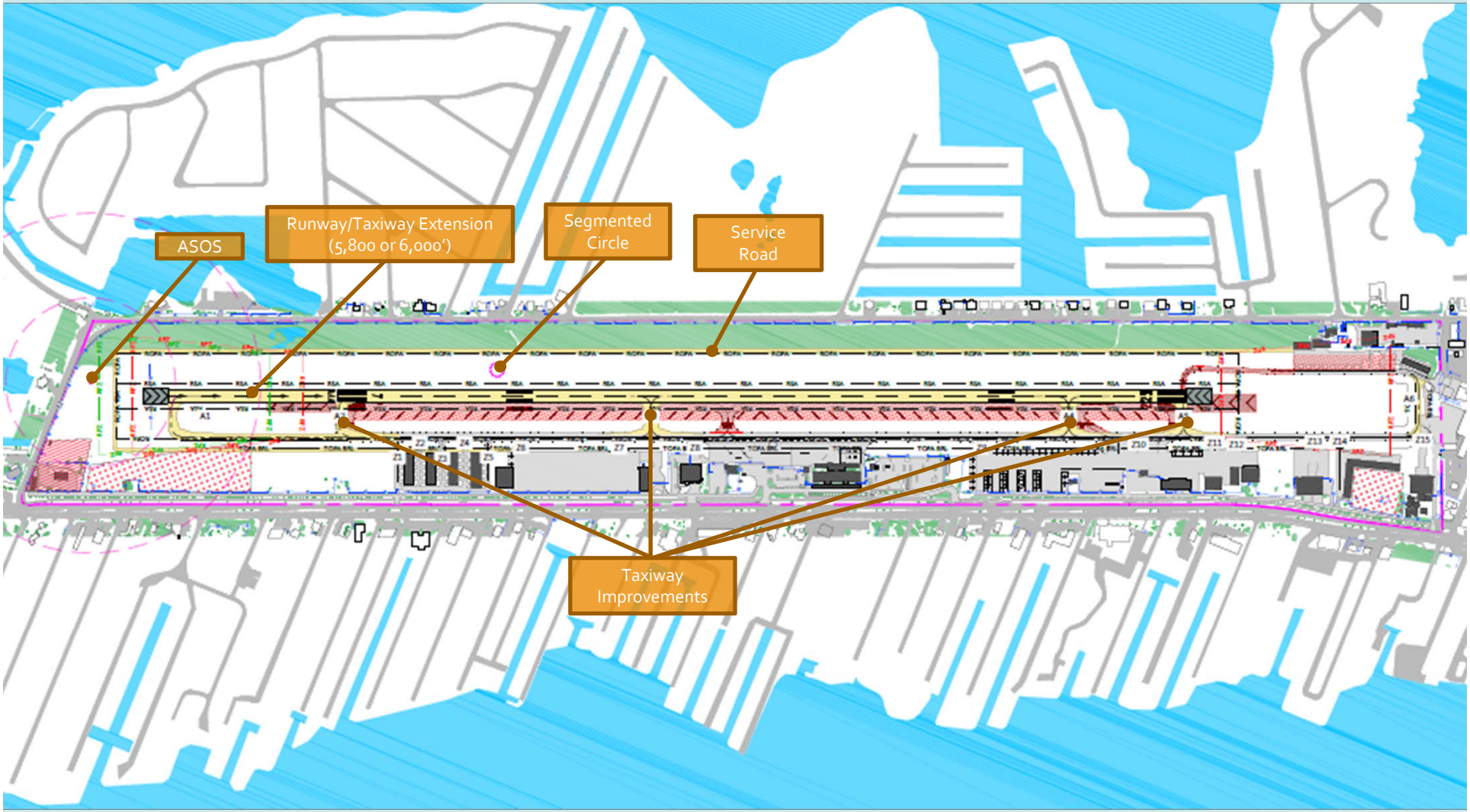
MISCELLANEOUS AIRFIELD ITEMS

Miscellaneous Airfield Items

- Instrument approach capacity: adequate
- Airfield lighting:
  - Runway & taxiway edge lights would likely require upgrades
- Airfield signage: update taxiway nomenclature
- Pavement markings:
  - Some markings are fading
  - Will be addressed during recurring maintenance
- Visual landing aids: adequate
- Wind socks: adequate

PREFERRED AIRFIELD DEVELOPMENT

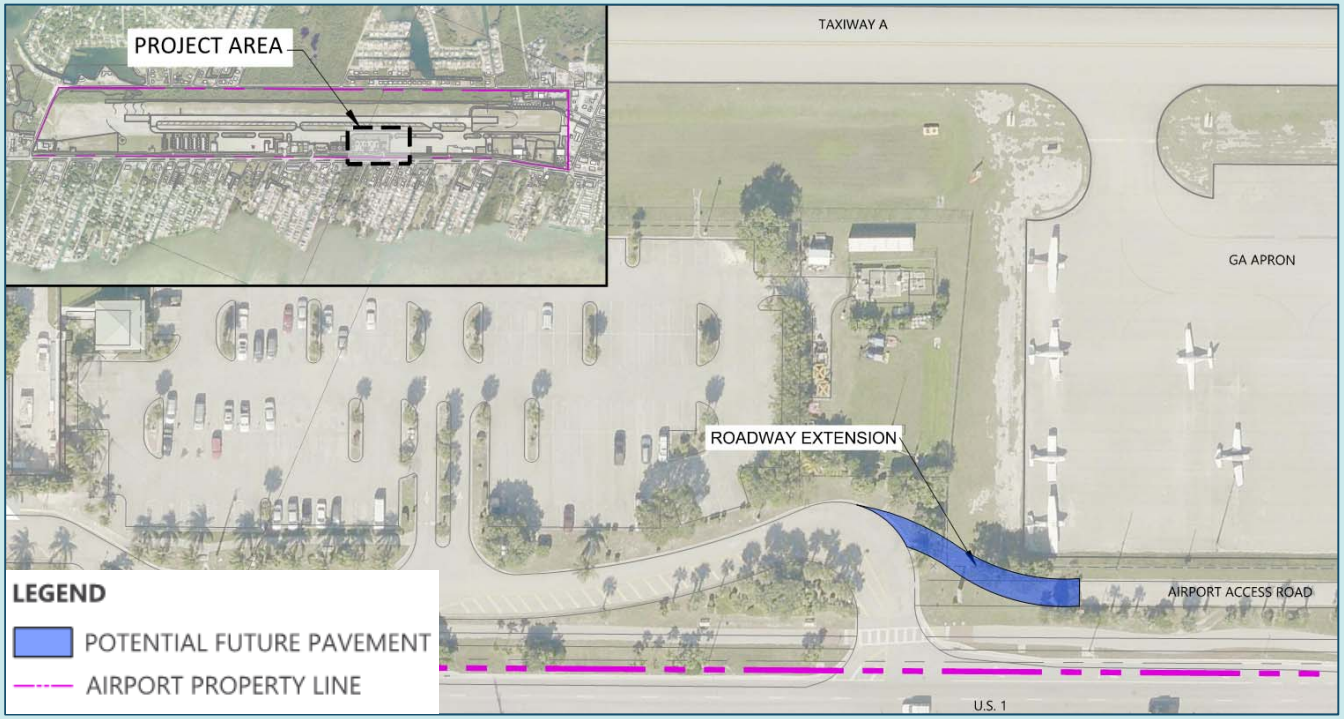
Preferred Airfield Development Plan

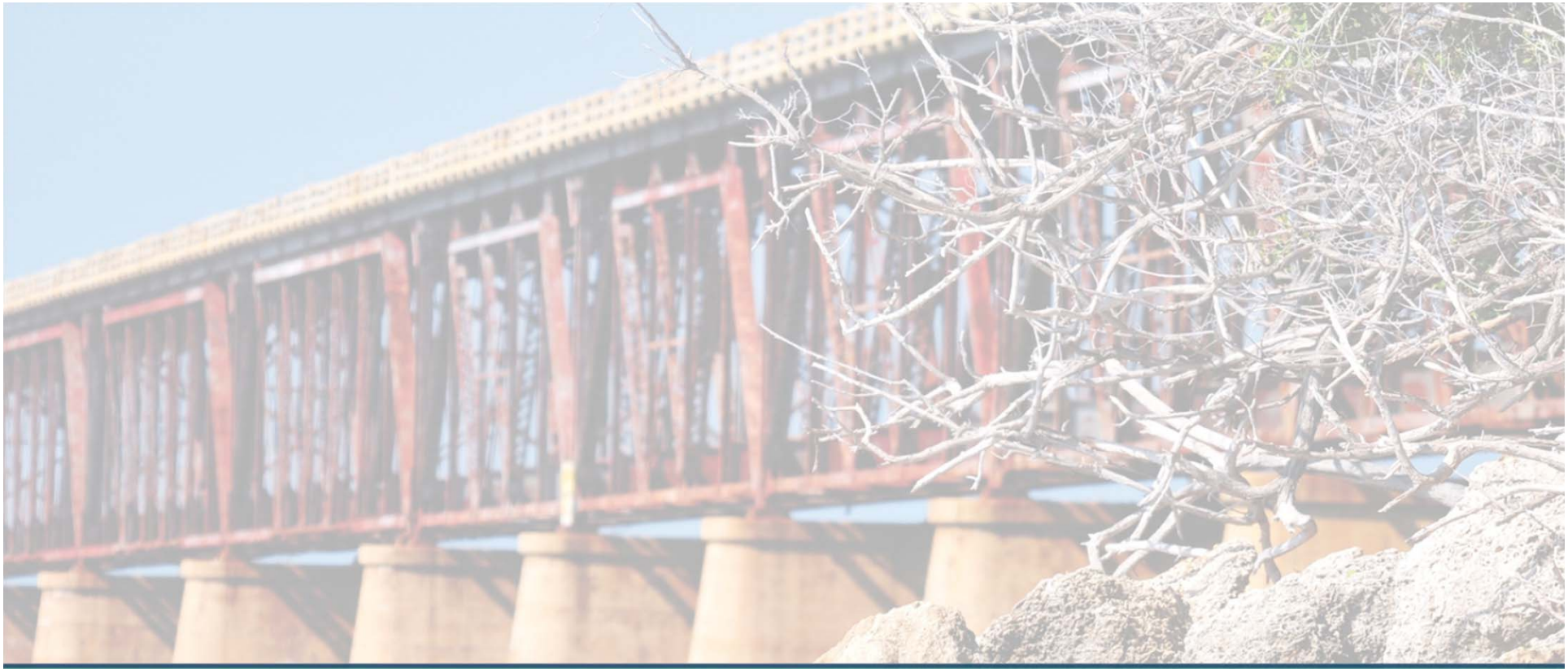


ON-AIRPORT ROADS

On-Airport Roads

- Airport Access Road is segmented along south side of Airport
  - Connect the two sections to provide continuous airport access from Airport Access Road

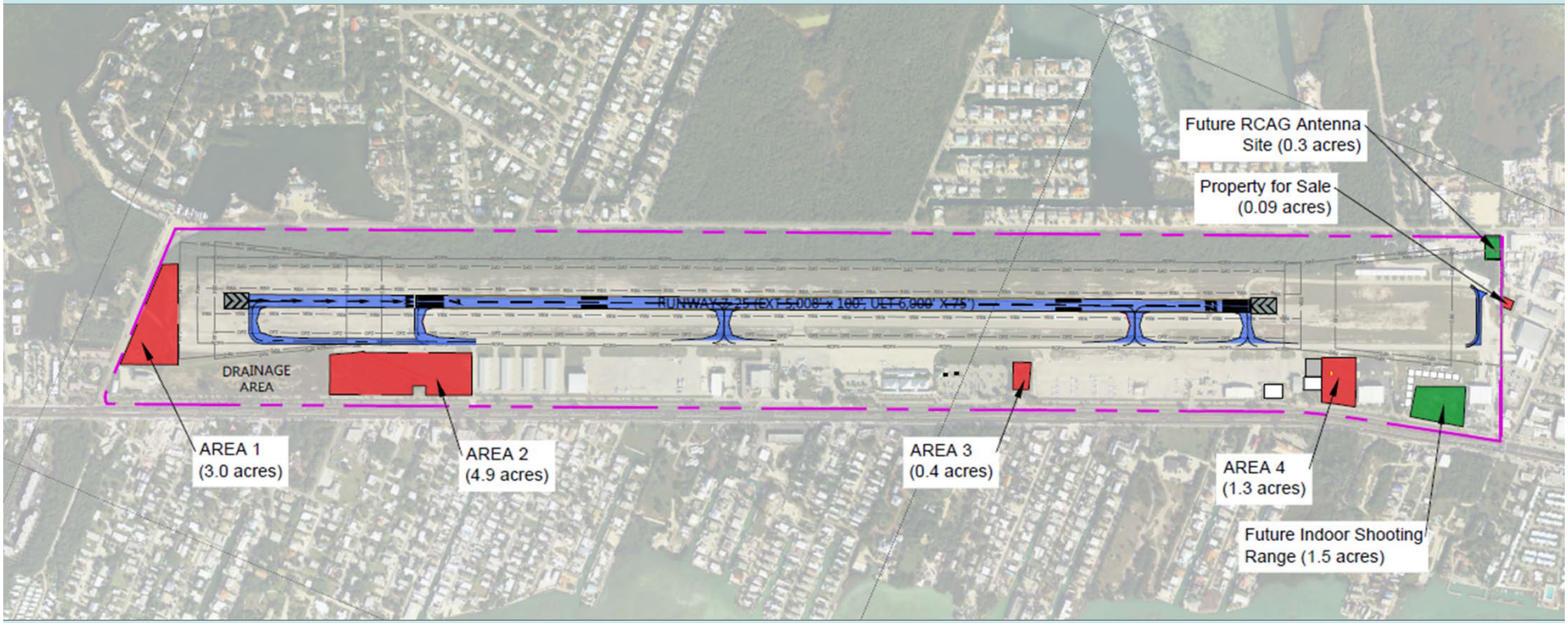




LAND AVAILABLE FOR DEVELOPMENT

Available Land for Development

- Area 1 = 3 acres
- Area 2 = 4.9 acres
- Area 3 = 0.4 acres
  - site currently occupied by ASOS and maintenance equipment
- Area 4 = 1.3 acres
- **Total area for available development: 9.6 acres**

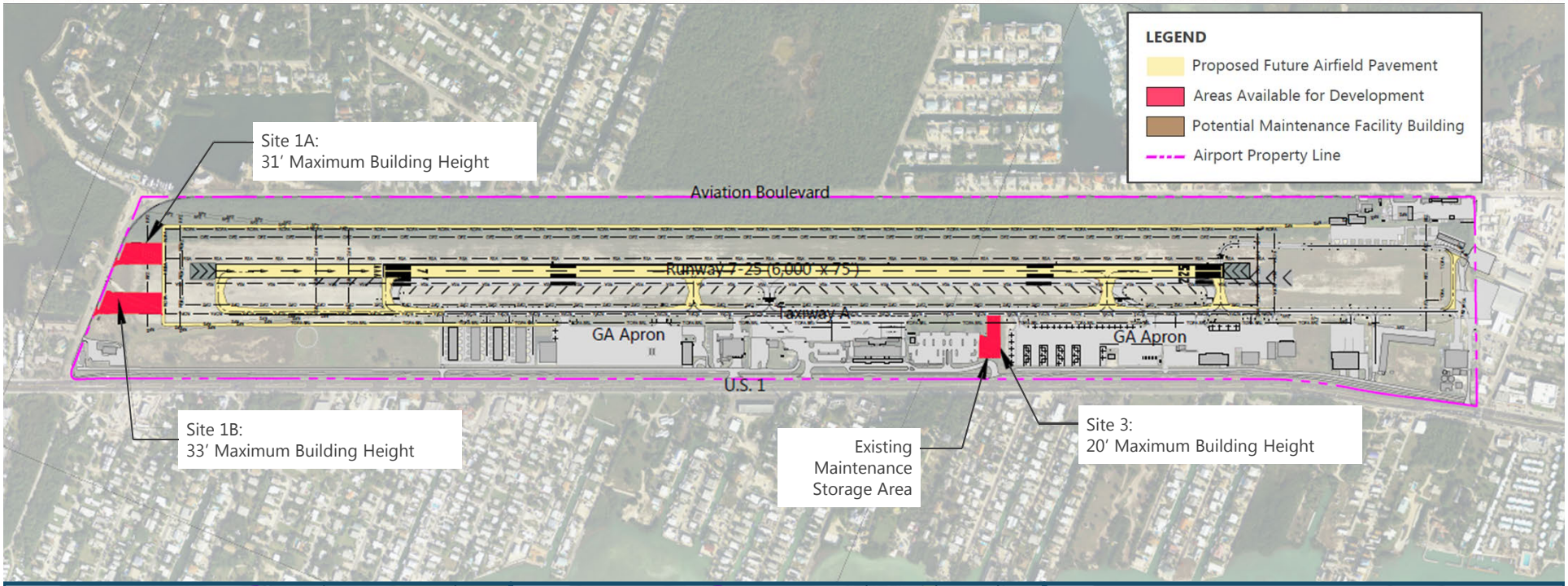


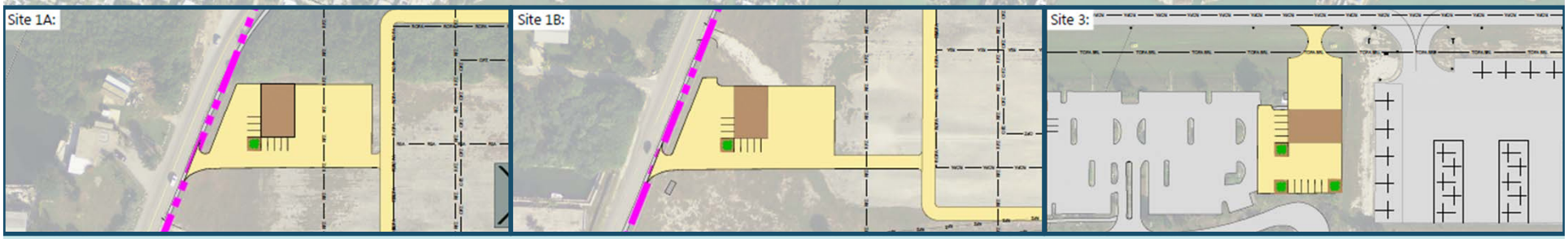
AIRPORT SUPPORT FACILITIES

AIRPORT MAINTENANCE STORAGE FACILITY

Airport Maintenance Storage Facility

Potential Relocation Sites





Maintenance Storage Facility

Sites Comparison Matrix

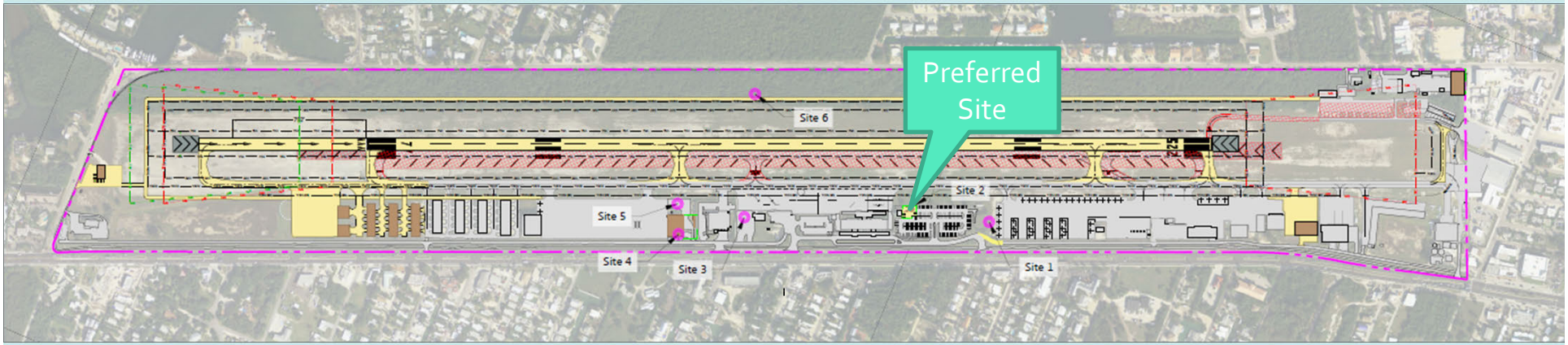
	Site 1A	Site 1B	Site 3
Site Acreage	1.2	1.2	0.4
Existing Airfield Access	Yes	Yes	Yes
Existing Surface Street Access	Yes	Yes	Yes
Maximum Height (Estimated)	31′	33′	20′
Enabling Project			ASOS Relocation
Higher/Better Use	ASOS		Apron and/or Aircraft Hangars

No or Minimal Impacts
Moderate Impacts
Significant Impacts

Preferred Site

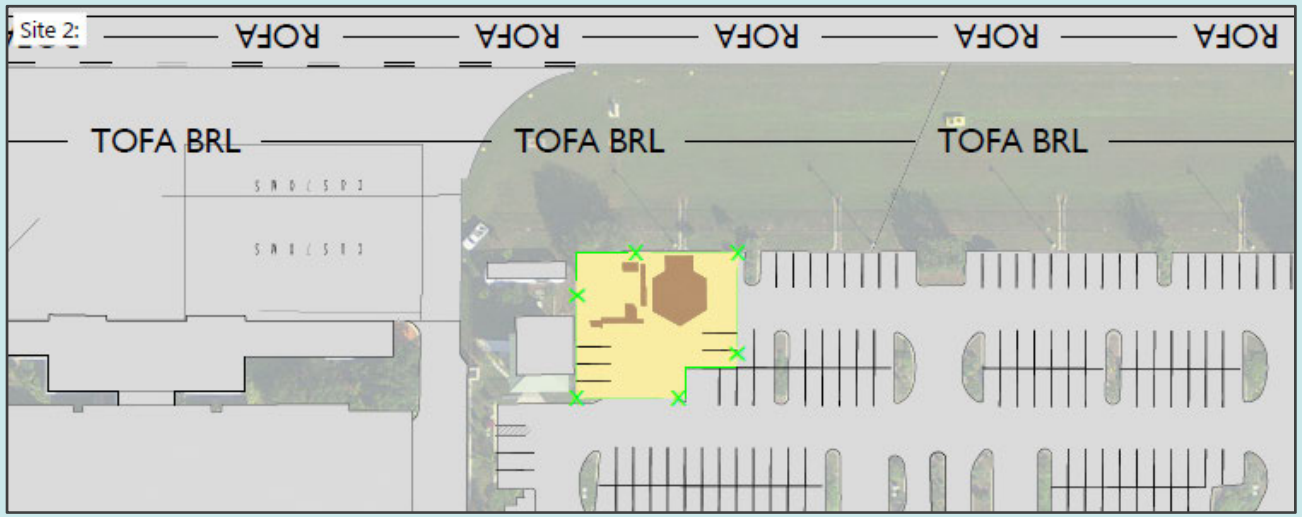
AIRPORT TRAFFIC CONTROL TOWER

Airport Traffic Control Tower Sites
Traditional/On-Airport



LEGEND

- Airport Property Boundary
- Runway Object Free Area (ROFA)
- Proposed ATCT Site
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Potential Air Traffic Control Tower Layout
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed



Airport Traffic Control Tower Sites

Preliminary Evaluation

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Line-of-Sight	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind ARFF station	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind terminal building and ARFF station	Potential obstructed views behind terminal building	Unobstructed
TERPS Impacts	None	None	None	None	None	None
Part 77 Impacts	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)	7:1 surface penetrated (obstruction light required)
Landside Access	Existing Airport Road	Existing Airport Road	Existing Airport Road	Existing Airport Road	Existing Airport Road	Construct fenced and secured driveway from Aviation Blvd. (approx. 150 feet long)
Environmental Issues	None	None	None	None	None	Wetlands/ Mangrove
Potential Impacts to NAVAIDS	None	None	None	None	None	None

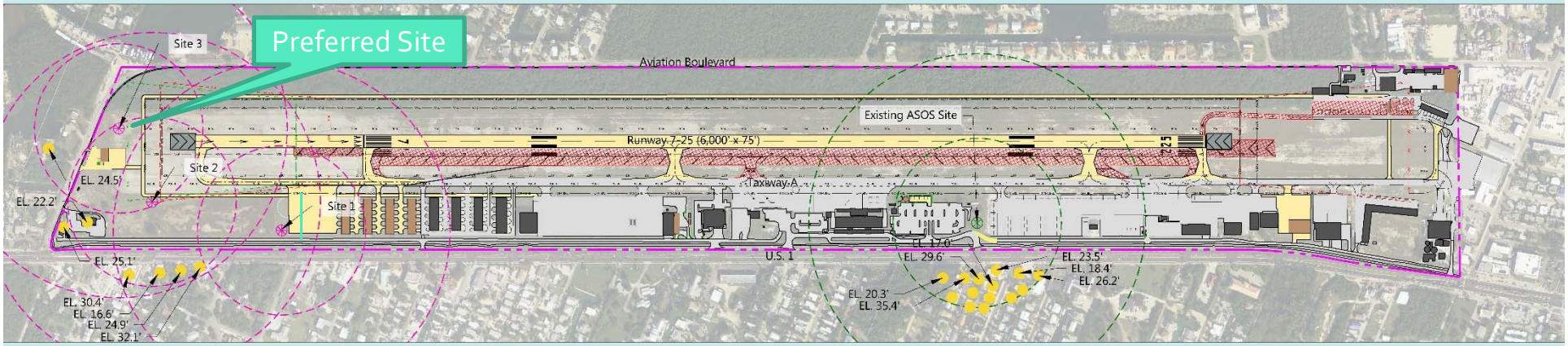
No or Minimal Impacts
Moderate Impacts
Significant Impacts

Preferred Site

ASOS RELOCATION

ASOS Relocation

Potential Sites



<u>ASOS clearance zones:</u>

- 500-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be <u>15 feet lower than the height of the wind sensor</u>
- 1,000-foot clearance zone: All obstructions (buildings, vegetation, etc.) must be <u>no greater than 10 feet above the height of the wind sensor</u>

Wind sensors are typically 30 to 33 feet above the average ground height within a radius of 500 feet.

- airport elevation = 5 feet MSL
- Wind sensor elevation ≈ 35-38 feet MSL
- Facilities within 500 feet of ASOS cannot be taller than 20-23 feet MSL

LEGEND

- Airport Property Boundary
- Approach & Departure Runway Protection Zone (RPZ)
- Approach Runway Protection Zone (RPZ)
- Departure Runway Protection Zone (RPZ)
- Runway Object Free Area (ROFA)
- Existing ASOS Site
- Existing ASOS Clearance Zone
- ASOS Relocation Site
- ASOS Clearance Zone
- Buildings Inside ASOS 500' Clearance Zone
- Security Fence
- Existing/Planned Airfield Pavement
- Proposed Airfield Pavement
- Existing Buildings
- Retention/Detention Pond
- Pavement/Airport Facility to be Removed

ASOS Relocation

Sites Evaluation

Alternative	500-Foot Clearance Zone: Facilities Inside Zone	500-Foot Clearance Zone: Facilities Elevation Greater than Permitted	Land Use	Airfield Surfaces	Airspace Surfaces
Existing	14	4	Potential hangar development		
Site 1	8	0	Potential hangar development		43.9′
Site 2	5	5			16.6′
Site 3 ★	6	2			18.0′

No or Minimal Impacts

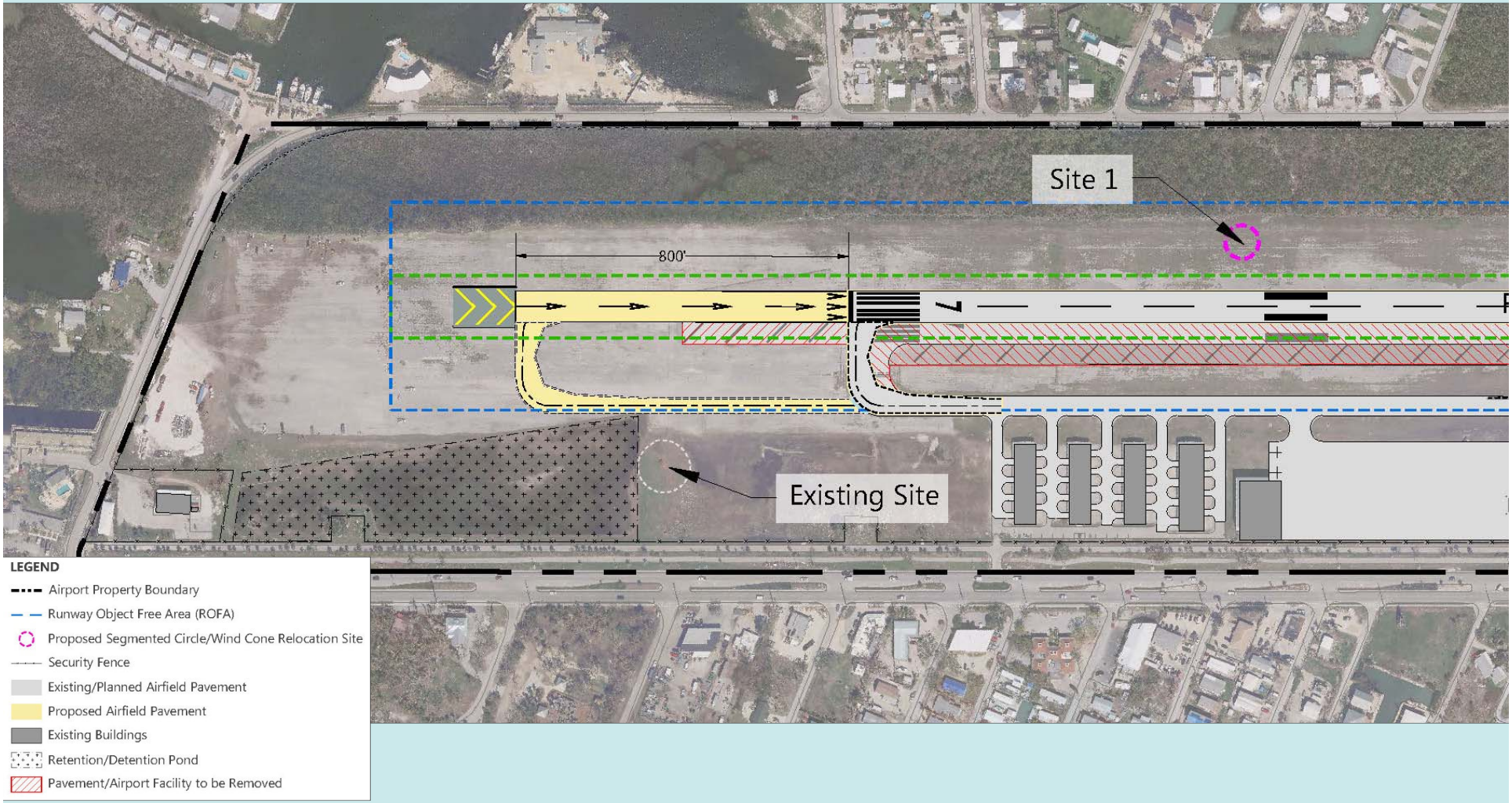
Moderate Impacts

★ Preferred Site

There is no "perfect" site on Airport property (ie, that would meet all the requirements)

SEGMENTED CIRCLE/WIND CONE RELOCATION

Segmented Circle/Wind Cone Relocation



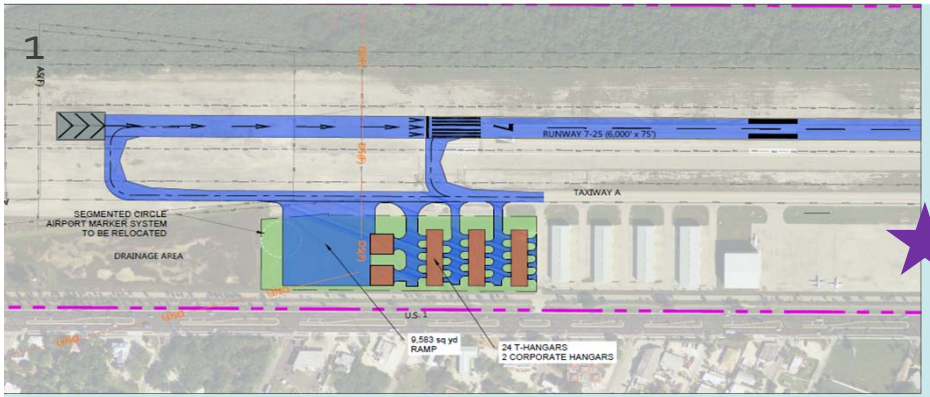
GENERAL AVIATION FACILITIES

General Aviation Facilities

- Identified need for additional aircraft parking/storage
- GA facility development:
  - Typically driven by tenant needs
  - Focuses on the identification of available areas for development
  - Identifies conceptually where aircraft parking/storage facilities might be located at the Airport
  - Considers that aircraft fleet mix and tenant needs may change in the future

Southwest Area

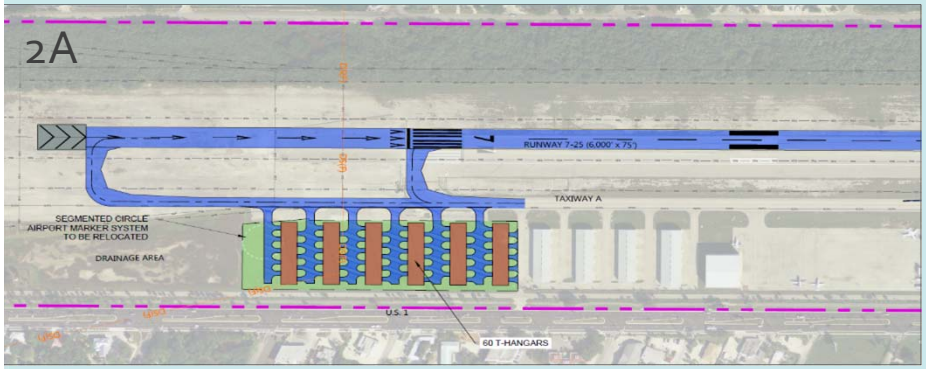
Aircraft Hangar Alternatives

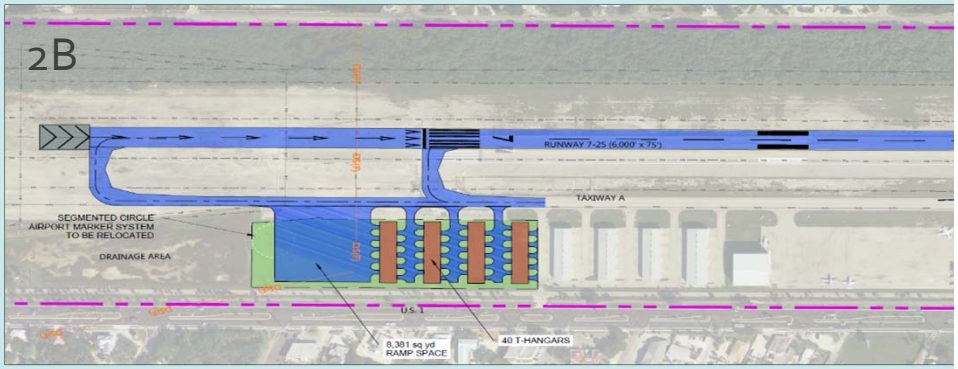


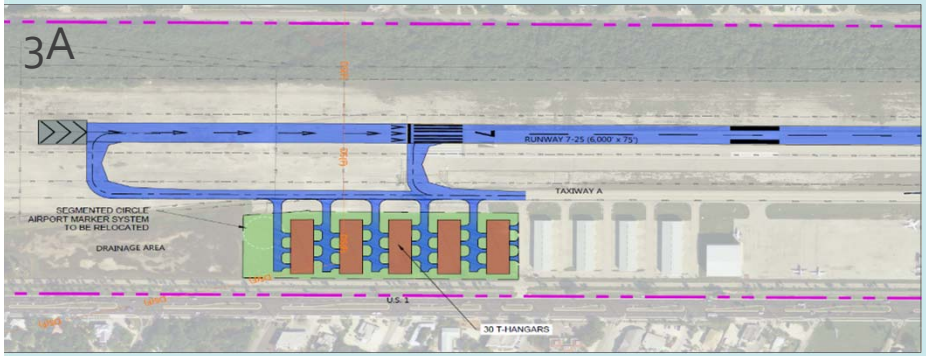
LEGEND

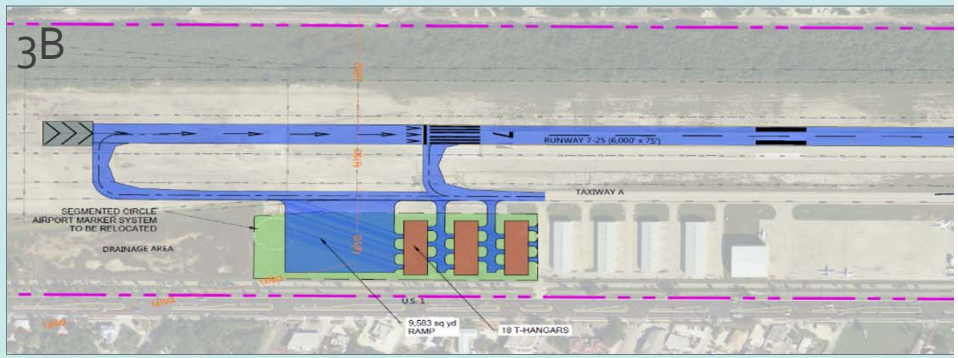
- PROPOSED BUILDING
- PROPOSED PAVEMENT
- AERONAUTICAL/NON-AERONAUTICAL DEVELOPMENT LAND
- AIRPORT PROPERTY LINE

★ Preferred Alternative



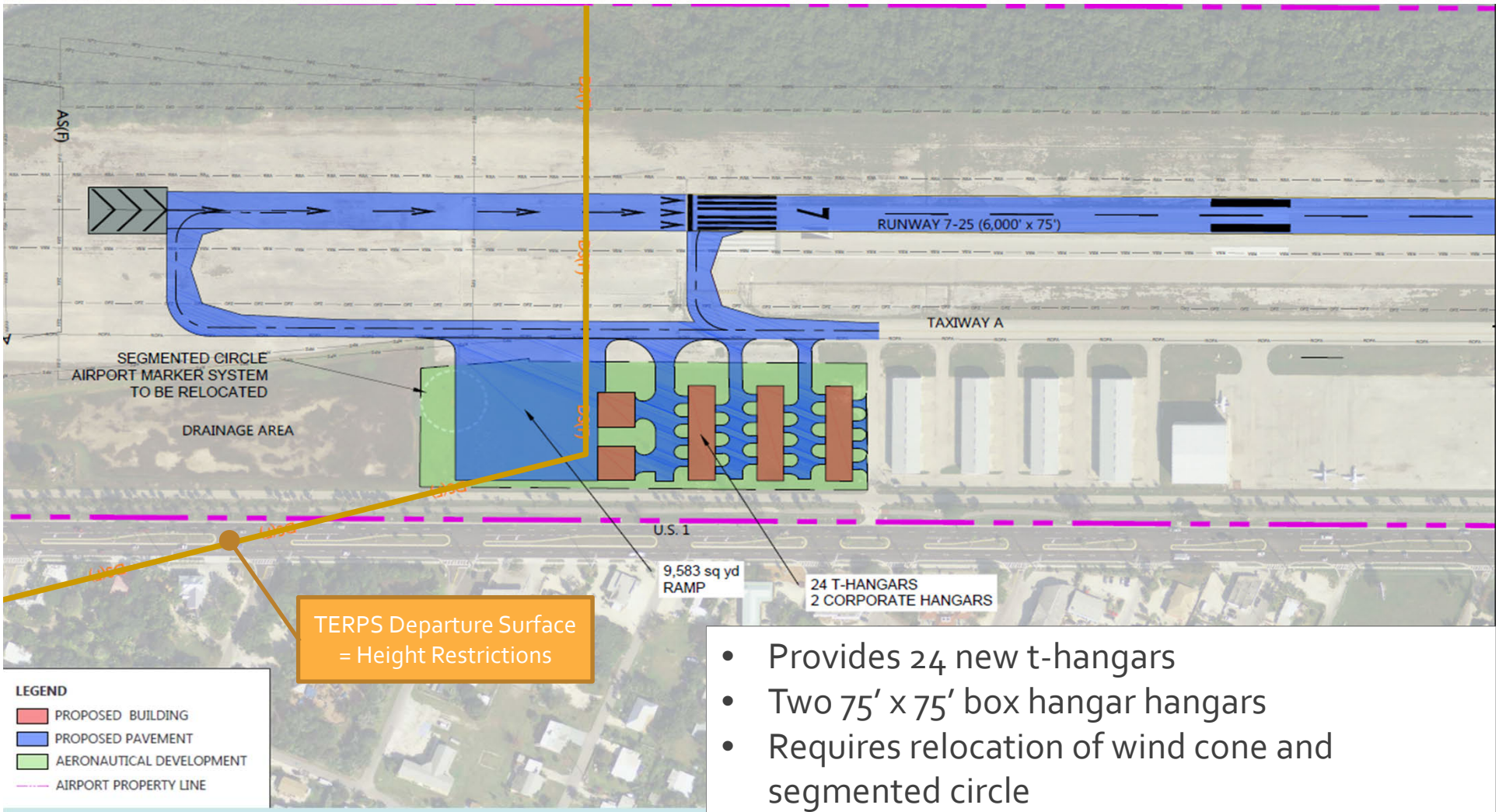






Southwest Area Preferred Alternative

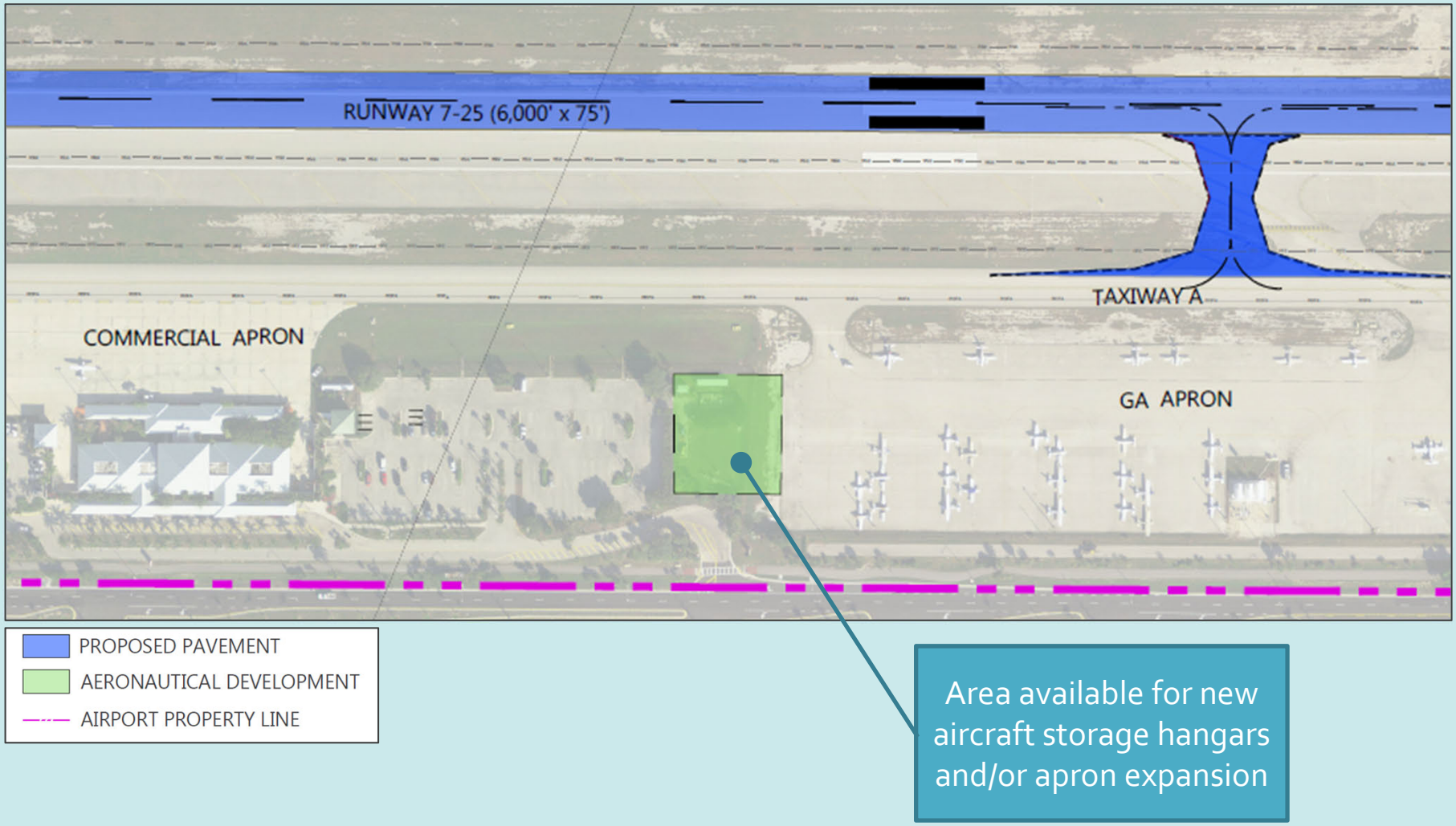
Alternative 1 (Conventional Hangars and T-Hangars)



- Provides 24 new t-hangars
- Two 75' x 75' box hangar hangars
- Requires relocation of wind cone and segmented circle
- Potentially impacts ASOS relocation site #1

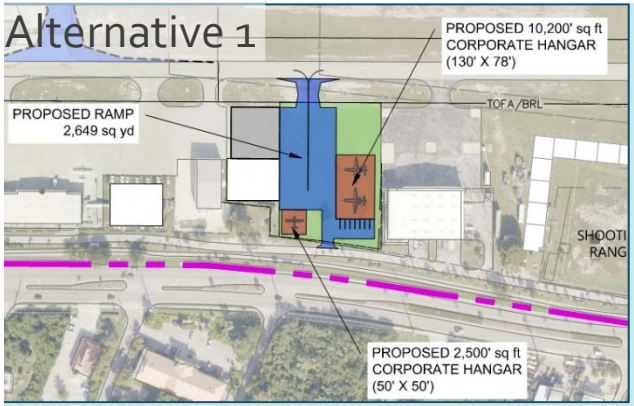
Midfield Area Preferred Alternative

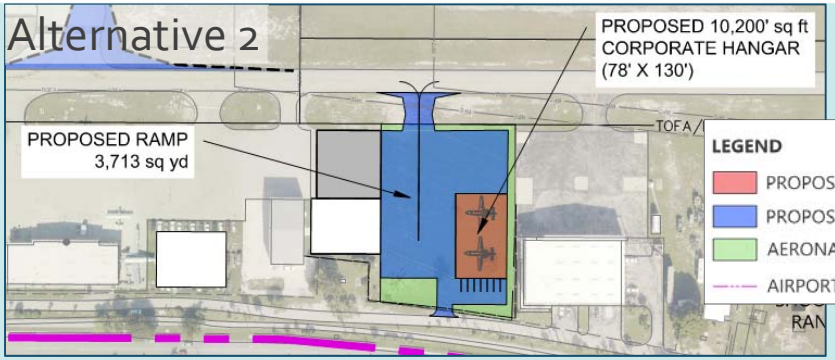
Hangar/Apron Expansion

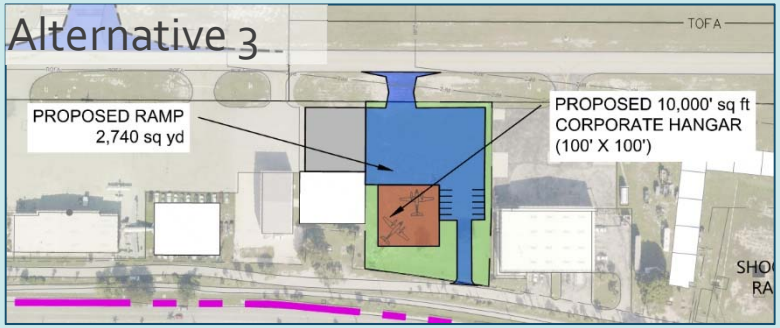


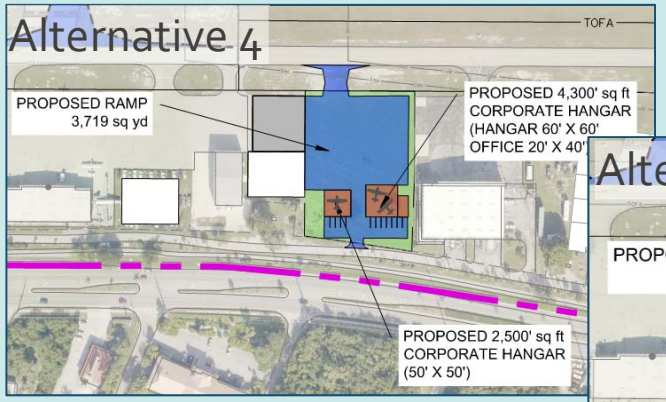
Southeast Area

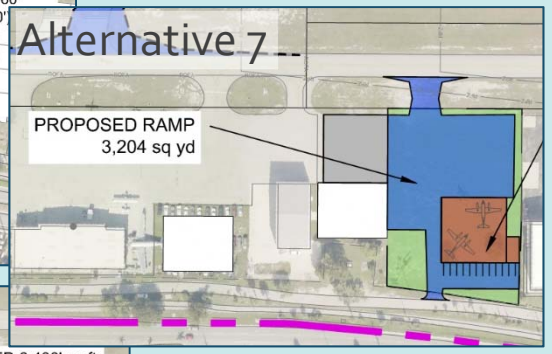
Aircraft Hangar Alternatives

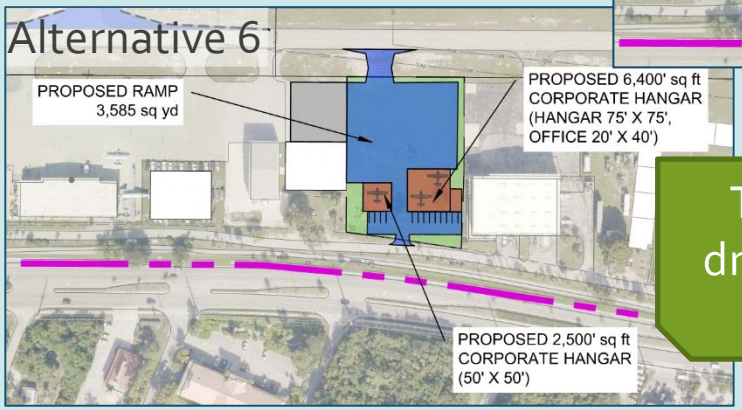








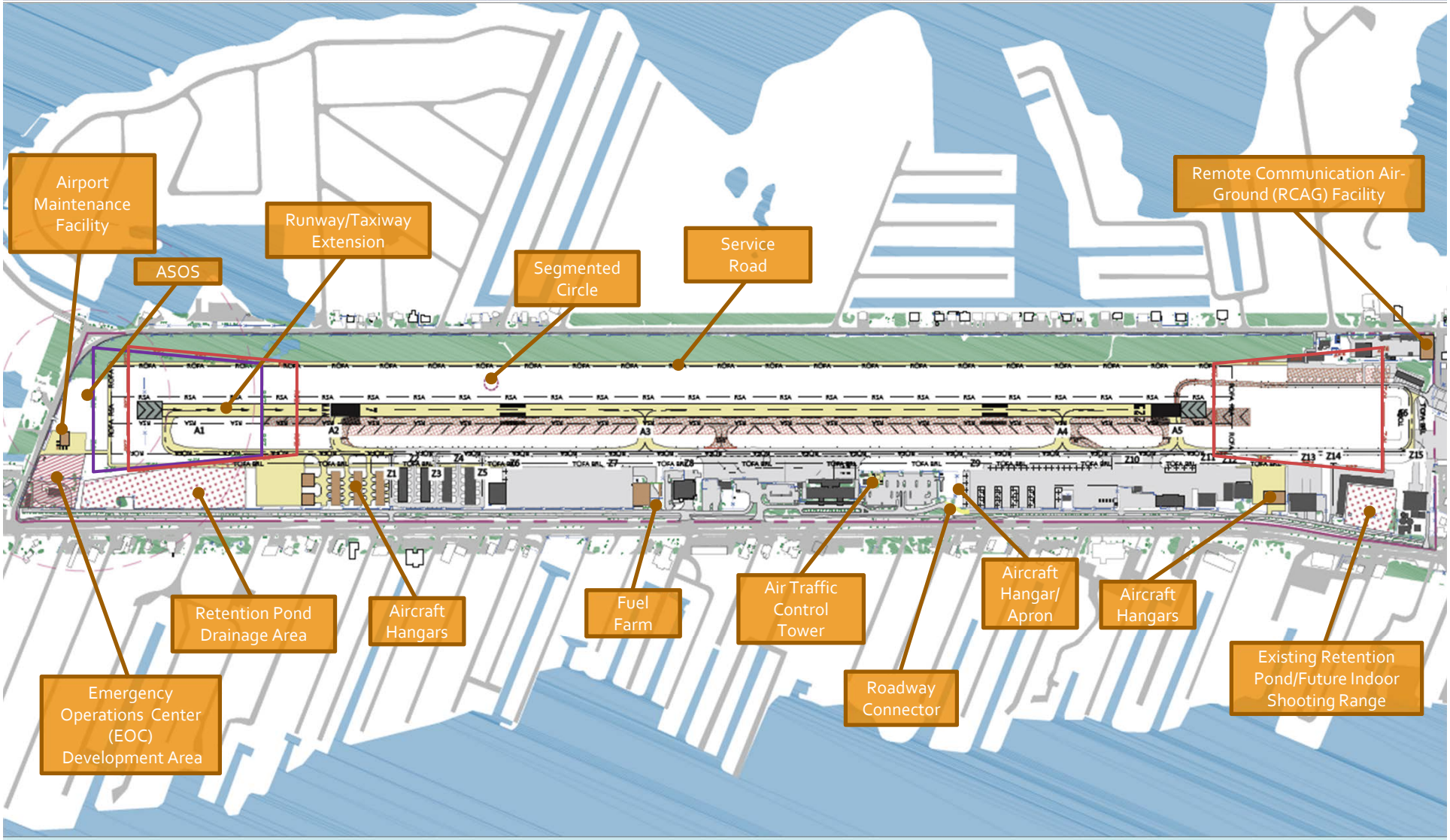


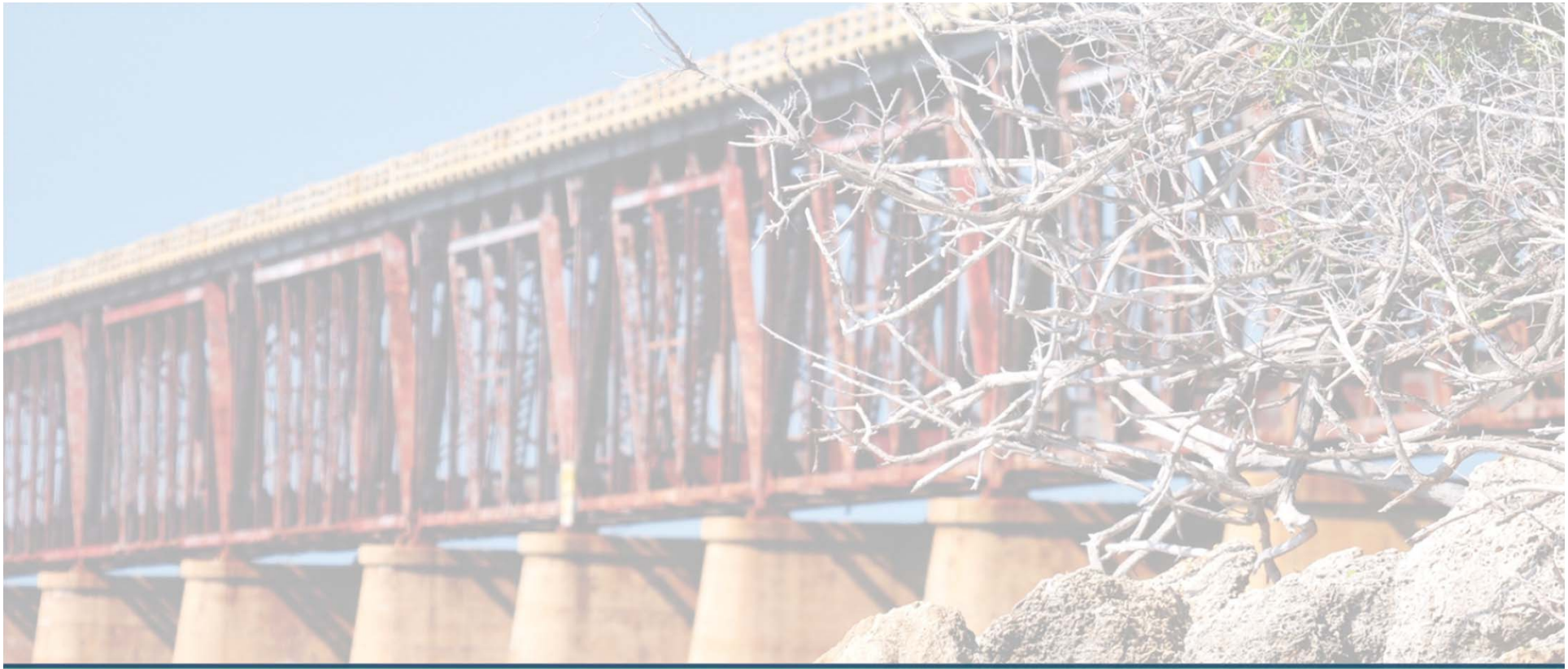


Tenant needs will drive the size/layout of the facilities

PREFERRED AIRPORT DEVELOPMENT PLAN

Preferred Airport Development Plan





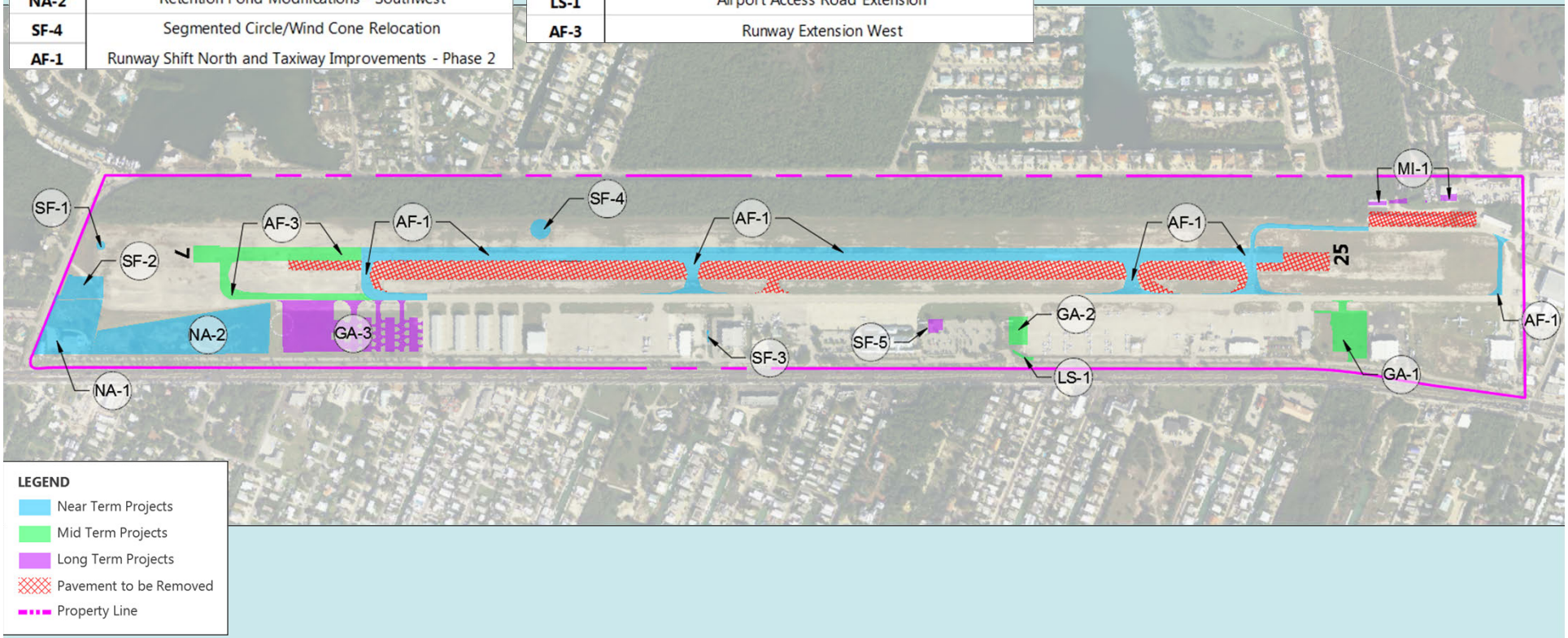
PRELIMINARY IMPLEMENTATION PLAN

Preliminary Implementation Plan

Short Term	
SF-1	ASOS Relocation
SF-2	Airport Maintenance Storage Facility Construction
SF-3	Fuel Storage Facility Relocation
NA-1	Emergency Operations Center Relocation
NA-2	Retention Pond Modifications - Southwest
SF-4	Segmented Circle/Wind Cone Relocation
AF-1	Runway Shift North and Taxiway Improvements - Phase 2

Mid Term	
GA-1	General Aviation Hangars Construction- Southeast
AF-1	Runway Shift North and Taxiway Improvements - Phase 3
AF-2	Taxiway Renaming (airfield-wide)
GA-2	General Aviation Apron Expansion - Midfield
LS-1	Airport Access Road Extension
AF-3	Runway Extension West

Long Term	
GA-3	General Aviation Hangars Construction- Southwest
SF-5	Airport Traffic Control Tower Construction
MI-1	RPZ Penetrations Mitigation
MI-2	Airpsace Obstructions Mitigation



NEXT STEPS

Next Steps

- Finalize Preferred Development Plan
- Complete Airport Layout Plan
- Complete Environmental Overview
- Complete Implementation Plan
- Conduct Public Meeting

Questions?

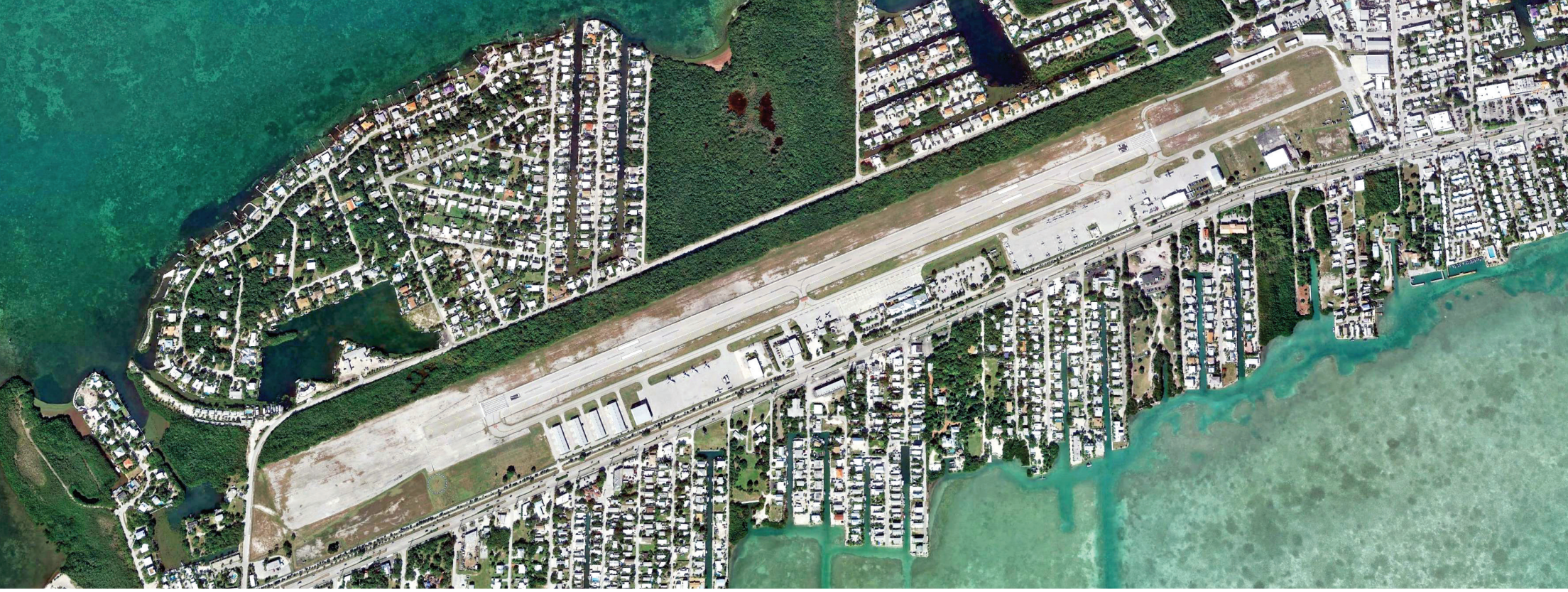
Comments?

Open Discussion

Thank You!

Florida Keys Marathon Airport Master Plan Update

Technical Review Committee #3



PREPARED BY

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