Final Environmental Assessment for the South-Central Florida Metroplex Project

October 2020

Prepared by:

United States Department of Transportation

Federal Aviation Administration

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1 Introduction

The National Environmental Policy Act of 1969 (NEPA), [42 United States Code (U.S.C.) § 4321 *et seq.*], requires federal agencies to disclose to decision makers and the interested public a clear, accurate description of the potential environmental impacts that could arise from proposed federal actions. Through NEPA, Congress has directed federal agencies to consider environmental factors in their planning and decision-making processes and to encourage public involvement in decisions that affect the quality of the human environment. As part of the NEPA process, federal agencies are required to consider the environmental effects of a proposed action, reasonable alternatives to the proposed action, and a no action alternative (i.e., analyzing the potential environmental effects of not undertaking the proposed action). The Federal Aviation Administration (FAA) has established a process to ensure compliance with the provisions of NEPA through FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1F).

The Proposed Action, the subject of this Environmental Assessment (EA), is called the South-Central Florida Metroplex Project.[1] The South-Central Florida Metroplex Project seeks to optimize aircraft arrival and departure procedures in the South-Central Florida Metroplex by employing advanced navigational technology. The procedures designed for the South-Central Florida Metroplex Project would be used by aircraft operating under Instrument Flight Rules at the study area airports ("the Study Airports").

This EA, prepared in accordance with FAA Order 1050.1F, documents the potential effects to the environment that may result from the optimization of Air Traffic Control (ATC) procedures at the Study Airports. These airports were selected based on whether they would be directly served by a proposed procedure and if so, whether they served the required number of annual Instrument Flight Rules (IFR) filed operations under FAA Order 1050.1F. The Study Airports consist of five Major Airports and 16 Satellite Study Airports Identified in **Table 1-1** and further profiled in **Section 1.4**:

Table 1-1 Study Airports by Name and FAA Identifier

Major Study Airports	**Satellite Study Airports**
Fort Lauderdale/Hollywood International Airport – FLL	Leesburg International Airport – LEE
Orlando International Airport – MCO	Melbourne International Airport – MLB
Miami International Airport – MIA	Miami-Opa Locka Executive Airport – OPF[2]
Palm Beach International Airport – PBI	Orlando Executive Airport – ORL
Tampa International Airport – TPA	Punta Gorda Airport – PGD
Satellite Study Airports	St Pete-Clearwater International Airport – PIE
Ocean Reef Club Airport – 07FA	Orlando Sanford International Airport – SFB
Boca Raton Airport – BCT	Sarasota/Bradenton International Airport – SRQ
Fort Lauderdale Executive Airport – FXE	Witham Field Airport – SUA
Kissimmee Gateway Airport – ISM	Miami Executive Airport – TMB
Lakeland Linder Regional – LAL	Venice Municipal Airport – VNC

Source: FAA Design and Implementation Team, ATAC Corporation. 2018
Prepared By: ATAC Corporation, January 2020

1 The Metroplex initiative was formerly referred to as the Optimization of Airspace and Procedures in the Metroplex (OAPM) initiative. A Metroplex is a geographic area covering several airports, serving major metropolitan areas and a diversity of aviation stakeholders.

2 When this Metroplex Project began in 2012, the airport was known as *Opa-Locka Executive Airport*. The name changed in 2014 to *Miami-Opa Locka Executive Airport*. Chapters 1-5 of this EA adopt the revised name for current reference. Other references to the prior name may exist in supporting Appendices due to reference timing and context.

This EA includes the following Chapters and appendices:

- **Chapter 1: Introduction.** Chapter 1 provides basic background information on the air traffic system, the Next Generation Air Transportation System (NextGen) program, Performance-Based Navigation (PBN), the FAA's Metroplex initiative, and information on the South-Central Florida Metroplex and the identified Study Airports.
- **Chapter 2: Purpose and Need.** Chapter 2 discusses the need (i.e., problem) and purpose (i.e., solution) for airspace and procedure optimization in the South-Central Florida Metroplex area, and identifies the Proposed Action.
- **Chapter 3: Alternatives.** Chapter 3 discusses the Proposed Action and the No Action alternatives analyzed as part of the environmental review process and designates the Proposed Action for further analysis.
- **Chapter 4: Affected Environment.** Chapter 4 discusses existing environmental conditions within the South-Central Florida Metroplex area.
- **Chapter 5: Environmental Consequences.** Chapter 5 discusses the potential environmental impacts associated with the Proposed Action and the No Action alternatives.
- **Appendix A: Agency and Public Coordination and List of Receiving Parties.** Appendix A documents agency and public coordination associated with the EA process and lists the local agencies and parties identified to receive copies of the EA documents.
- **Appendix B: List of Preparers.** Appendix B lists the names and qualifications of the principal persons contributing information to this EA.
- **Appendix C: References.** Appendix C provides a compilation of the footnotes that contain references to documents used to prepare this EA.
- **Appendix D: List of Acronyms and Glossary.** Appendix D lists acronyms and provides a glossary of terms used in this EA.
- **Appendix E: Basics of Noise.** Appendix E presents information on aircraft noise as well as the general methodology used to analyze noise associated with aviation projects.
- **Appendix F: South-Central Florida Metroplex Study Team Final Report.** Appendix F contains the conceptual FAA Study Team methodology, findings, and designs used subsequently by the FAA Design and Implementation Team to craft Preliminary and Proposed Final Designs.
- **Appendix G: South-Central Florida Metroplex Design and Implementation Team Report.** Appendix G contains a summary of the design effort and detailed summaries of the Preliminary Final Designs for the Proposed Action air traffic control procedures analyzed in this EA.
- **Appendix H: Flight Schedule.** Appendix H describes the methodology and inputs used to forecast air traffic for the Study Airports described in this EA.
- **Appendix I: Noise Technical Report.** Appendix I presents detailed and technical information on the noise analysis conducted in support of this EA.

- **Appendix J: Comments on the Draft EA and FAA Responses**. Appendix J contains the comments received on the Draft EA during the Draft EA public comment period and the associated FAA responses. This Appendix contains multiple volumes due to the number of comments.

1.1 Project Background

On January 16, 2009, the FAA asked RTCA[3] to create a joint government-industry task force to make recommendations for implementation of NextGen operational improvements for the nation's air transportation system. In response, RTCA assembled the NextGen Mid-Term Implementation Task Force (Task Force 5), which included more than 300 representatives from commercial airlines, general aviation, the military, aerospace manufacturers, and airport stakeholders. **Section 1.2.5** discusses the NextGen Program in more detail.

On September 9, 2009, RTCA issued the NextGen Mid-Term Implementation Task Force Report,[4] which provided the Task Force 5 recommendations. One of these recommendations directed the FAA to undertake planning for implementing Performance-Based Navigation PBN[5] procedures on a Metroplex basis, including Area Navigation (RNAV) and Required Navigation Performance (RNP), which are discussed further in **Sections 1.2.5.1 and 1.2.5.2**. Based on this recommendation, the FAA began the Metroplex initiative.

The purpose of the Metroplex initiative is to optimize air traffic procedures and airspace on a regional scale. This is accomplished by developing procedures that take advantage of technological advances in navigation, such as RNAV, while ensuring that aircraft not equipped to use RNAV continue to have access to the National Airspace System (NAS). This approach addresses congestion and other factors that reduce efficiency in busy Metroplex areas and accounts for key airports and airspace in the Metroplex. The South-Central Florida Metroplex Study Airports are further discussed in **Section 1.4**. The Metroplex initiative also addresses connectivity with other Metroplex areas. The overall intent is to use limited airspace as efficiently as possible for congested Metroplex areas.[6]

1.2 Air Traffic Control and the National Airspace System

The following sections provide basic background information on air traffic control and the NAS. This information includes a description of the NAS, the role of air traffic control (ATC), the methods air traffic controllers use to provide services within the air traffic control system, and the different phases of aircraft flight within the NAS. Following this discussion, information is provided on the FAA's NextGen program and the Metroplex initiative.

3 RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance (CNS), and air traffic management (ATM) system issues. RTCA functions as a federal advisory committee and includes roughly 400 government, industry, and academic organizations from the United States and around the world. Members represent all facets of the aviation community, including government organizations, airlines, airspace users, airport associations, labor unions, and aviation service and equipment suppliers. More information is available at http://www.rtca.org.

4 RTCA, Inc. Executive Summary, *NextGen Mid-Term Implementation Task Force Report*, September 9, 2009.

5 Additional information on Performance-Based Navigation (PBN) is provided at [https://www.faa.gov/nextgen/cip/pbn/ (Accessed May 1, 2020)].

6 U.S. Department of Transportation, Federal Aviation Administration, *FAA Response to Recommendations of the RTCA NextGen Mid-Term Implementation Task Force*, January 2010, p. 14.

1.2.1 National Airspace System

Under the Federal Aviation Act of 1958 (49 USC § 40101 *et seq*.), the FAA is delegated control over use of the nation's navigable airspace and regulation of domestic civil and military aircraft operations in the interest of maintaining safety and efficiency. To help fulfill this mandate, the FAA established the NAS. Within the NAS, the FAA provides air traffic services for aircraft takeoffs, landings, and the flow of aircraft between airports through a system of infrastructure (e.g., air traffic control facilities), people (e.g., air traffic controllers, maintenance, and support personnel), and technology (e.g., radar, communications equipment, ground-based navigational aids [NAVAIDs],[7] etc.) The NAS is governed by various FAA rules and regulations.

The NAS is one of the most complex aviation networks in the world. The FAA continuously reviews the design of all NAS resources to ensure they are effectively and efficiently managed. The FAA Air Traffic Organization (ATO) is the primary organization responsible for managing airspace and flight procedures in the NAS. When changes to the NAS are proposed, the FAA works to ensure that the changes maintain or enhance system safety and improve efficiency. One way to accomplish this mission is to employ emerging technologies to increase system flexibility and predictability.[8]

1.2.2 Air Traffic Control within the National Airspace System

The combination of infrastructure, people, and technology used to monitor and guide (or direct) aircraft within the NAS is referred to collectively as ATC. One of ATC's responsibilities is to maintain safety and expedite the flow of traffic in the NAS by applying defined minimum distances or altitudes between aircraft (referred to as "separation"). This is accomplished through required communications between air traffic controllers and pilots and the use of navigational technologies.

Aircraft operate under two distinct categories of flight rules: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).[9] Under VFR, pilots are responsible to "see and avoid" other aircraft and obstacles such as terrain to maintain safe separation. Under IFR, aircraft operators are required to file flight plans and use navigational instruments to operate within the NAS. The majority of commercial air traffic operates under IFR.

Depending on whether aircraft are operating under IFR or VFR, air traffic controllers apply various techniques to maintain separation between aircraft,[10] including the following:

- **Vertical or "Altitude" Separation:** separation between aircraft operating at different altitudes
- **Longitudinal or "In-Trail" Separation:** separation between two aircraft operating along the same flight route, referring to the distance between a lead and a following aircraft

7 NAVAIDs are facilities that transmit signals that define key points or routes.

8 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.2M *Procedures for Handling Airspace Matters* (with Change 1 and Change 2), February 28, 2019.

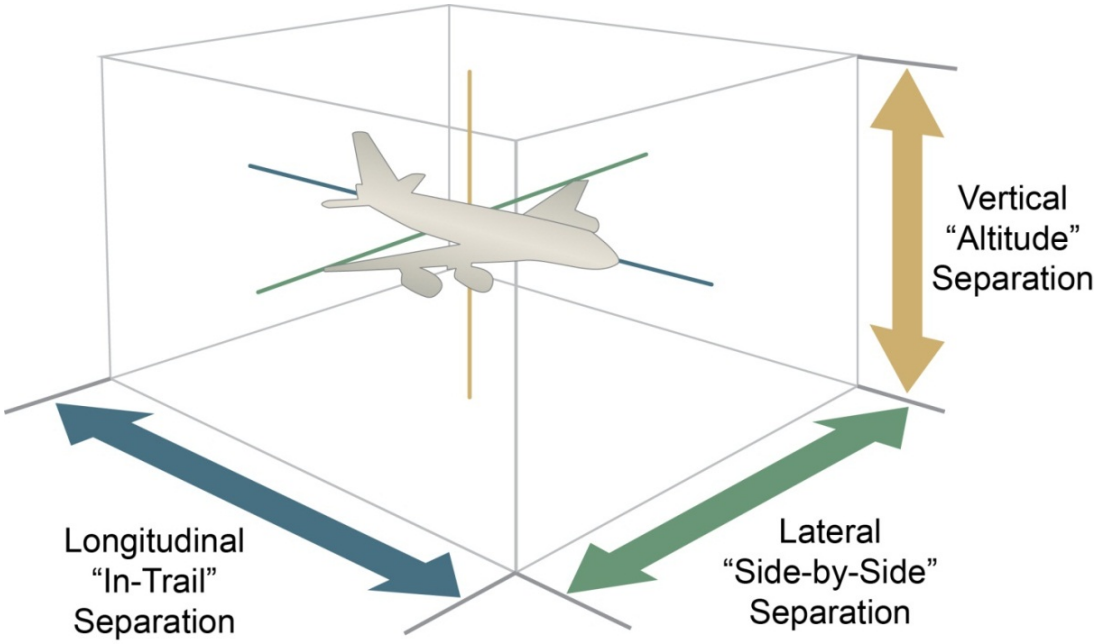
9 14 Code of Federal Regulations (C.F.R.), Part 91.

10 Defined in FAA Order JO 7110.65Y, *Air Traffic Control*.

- **Lateral or "Side-by-Side" Separation:** separation between aircraft (left or right side) operating along two separate but nearby flight routes.

Exhibit 1-1 depicts the three dimensions around an aircraft used to determine separation.

Exhibit 1-1 Three Dimensions Around an Aircraft



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, February 2020.

In its effort to modernize the NAS, the FAA is developing instrument ATC procedures that use advanced technologies. A primary technology in this effort is RNAV. RNAV uses technology, including Global Positioning System (GPS), to allow an RNAV-equipped aircraft to fly a more efficient route. This route is based on instrument guidance that references an aircraft's position relative to ground-based NAVAIDs or satellites.

ATC uses a variety of methods and coordination techniques to maintain safety within the NAS, including:

- **Vectors:** Directional headings issued to aircraft to provide navigational guidance and to maintain separation between aircraft and/or obstacles.
- **Speed Control:** Instructions issued to aircraft to reduce or increase aircraft speed to maintain separation between aircraft.
- **Holding Pattern/Ground Hold:** Controllers assign aircraft to a holding pattern in the air or hold aircraft on the ground before departure to maintain separation between aircraft and to manage arrival/departure volume.
- **Altitude Assignment/Level-off:** Controllers assign altitudes to maintain separation between aircraft and/or to protect airspace. This may result in aircraft "leveling off" during ascent or descent.

- **Reroute:** Controllers may change an aircraft's route for a variety of reasons, such as avoidance of inclement weather, to maintain separation between aircraft, and/or to protect airspace.
- **Point-out:** Notification issued by one controller when an aircraft might pass through or affect another controller's airspace and radio communications will not be transferred.

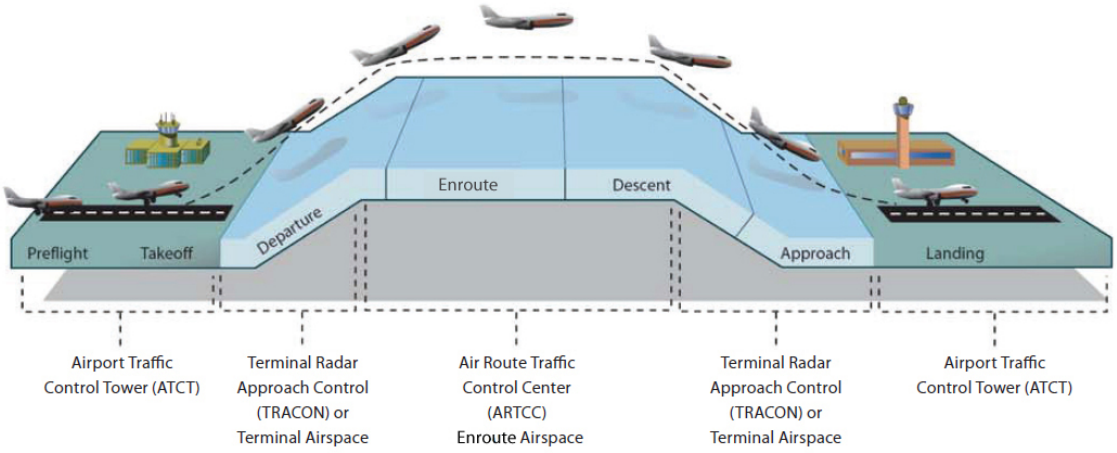
As an aircraft moves from origin to destination, ATC personnel function as a team and transfer control of the aircraft from one controller to the next, and from one ATC facility to the next.

1.2.3 Aircraft Flow within the National Airspace System

An aircraft traveling from airport to airport typically operates through six phases of flight (plus a "preflight" phase). **Exhibit 1-2** depicts the typical phases of flight for a commercial aircraft. These phases include:

- **Preflight (Flight Planning):** The preflight route planning and flight checks performed in preparation for takeoff.
- **Push Back/Taxi/Takeoff:** The aircraft's transition across the airfield from push-back at the gate (i.e., backing away from the gate), taxiing to an assigned runway, and takeoff from the runway.
- **Departure:** The aircraft's in-flight transition from takeoff to the en route phase of flight, during which it climbs to the assigned cruising altitude.
- **En Route:** Generally, the level segment of flight (i.e., cruising altitude) between the departure and destination airports.
- **Descent:** The aircraft's in-flight transition from an assigned cruising altitude to the point at which the pilot initiates the approach to a runway at the destination airport.
- **Approach:** The segment of flight during which an aircraft follows a standard procedure that guides the aircraft to the landing runway.
- **Landing:** Touch-down of the aircraft at the destination airport and taxiing from the runway to the gate or parking position.

Exhibit 1-2 Typical Phases of a Commercial Aircraft Flight



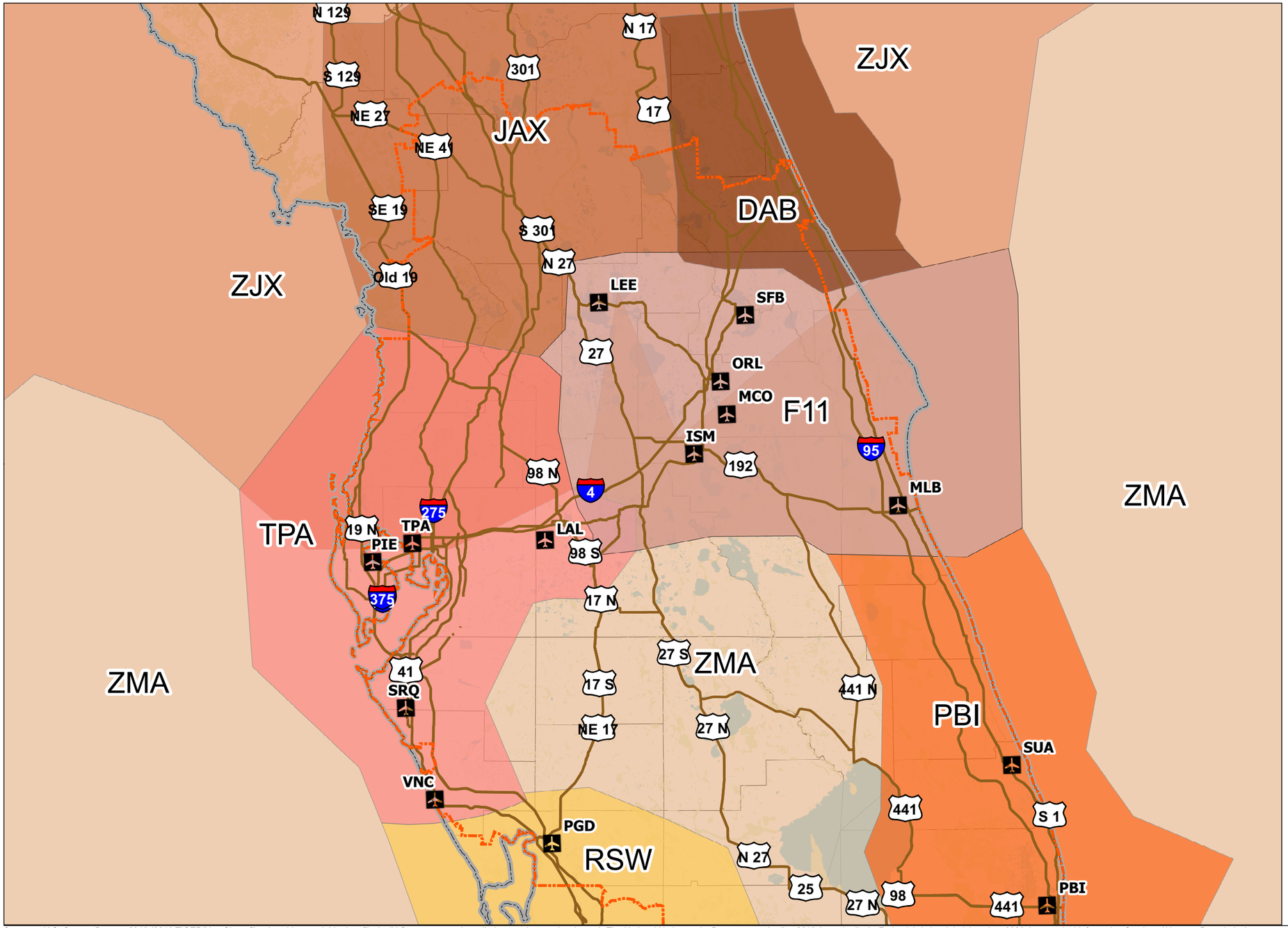
Source: U.S. Department of Transportation, Federal Aviation Administration, Houston Area Air Traffic System (HAATS), Airspace Redesign, Final Environmental Assessment, Figure 1.1.1-1, March 2008.
Prepared by: ATAC Corporation, February 2020.

1.2.4 Air Traffic Control Facilities

The NAS is organized into three-dimensional areas of navigable airspace that are defined by a floor, a ceiling, and a lateral boundary. Each is controlled by different types of ATC facilities including:

- **Air Traffic Control Tower:** Controllers at an Air Traffic Control Tower (ATCT) located at an airport provide air traffic services for phases of flight associated with aircraft takeoff and landing. The ATCT typically controls airspace extending from the airport out to a distance of several miles. All major Study Airports (FLL, MCO, MIA, PBI, and TPA) and the following satellite Study Airports have ATCT facilities: BCT, FXE, ISM, LAL, LEE, MLB, OPF, ORL, PGD, PIE, SFB, SRQ, SUA, and TMB. 07FA and VNC do not have ATCT facilities.
- **Terminal Radar Approach Control:** Controllers at a Terminal Radar Approach Control (TRACON) provide air traffic service to aircraft as they transition between an airport and the en route phase of flight, and from the en route phase of flight to an airport. This includes the departure, climb, descent, and approach phases of flights. The TRACON airspace is broken down into sectors. As an aircraft moves between sectors, responsibility for it transfers from controller to controller. Controllers maintain separation between aircraft that operate within their sectors. The terminal airspace in the South-Central Florida Metroplex area is controlled by one stand-alone facility (the Central Florida TRACON, referred to as F11) and a number of ATCT co-located facilities at MIA, PBI, and TPA. Southwest Florida International Airport (RSW) has an ATCT/TRACON but is not a Study Airport as does Daytona Beach International Airport (DAB), which is outside the General Study Area (See **Section 4.1** for a description of the General Study Area and related boundary). These airspace lateral boundaries are shown in plan view (i.e. overhead) in **Exhibits 1-3 and 1-4**.

- **Air Route Traffic Control Centers:** Controllers at Air Route Traffic Control Centers (ARTCCs or "Centers") provide air traffic services during the en route phase of flight. Similar to TRACON airspace, the Center airspace is broken down into sectors. As shown in **Exhibits 1-3 and 1-4**, the South-Central Florida Metroplex is comprised of airspace delegated to the Miami ARTCC (ZMA) located approximately 3 miles northwest of MIA, and the Jacksonville ARTCC (ZJX) located in Hilliard, FL.



LEGEND

- Study Airports
- General Study Area
- US and Interstate Highways - Publically Owned and Operated
- State Boundaries
- DAB TRACON Airspace
- F11 TRACON Airspace
- JAX TRACON Airspace
- PBI TRACON Airspace
- RSW TRACON Airspace
- TPA TRACON Airspace
- ZJX ARTCC Airspace
- ZMA ARTCC Airspace
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Study Area Counties

Notes:

Major Study Airports

Orlando International Airport	**MCO**
Palm Beach International Airport	**PBI**
Tampa International Airport	**TPA**

Satellite Study Airports

Kissimmee Gateway Airport	**ISM**
Lakeland Linder International Airport	**LAL**
Leesburg International Airport	**LEE**
Melbourne International Airport	**MLB**
Orlando Executive Airport	**ORL**
Punta Gorda Airport	**PGD**
St. Pete-Clearwater International Airport	**PIE**
Orlando Sanford International Airport	**SFB**
Sarasota Bradenton International Airport	**SRQ**
Witham Field Airport	**SUA**
Venice Municipal Airport	**VNC**

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
Scale: 1:1,601,151

0 5 10 20 Miles

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief). ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, August 2020.

Exhibit 1-3

Airspace in the South-Central Florida Metroplex Area North

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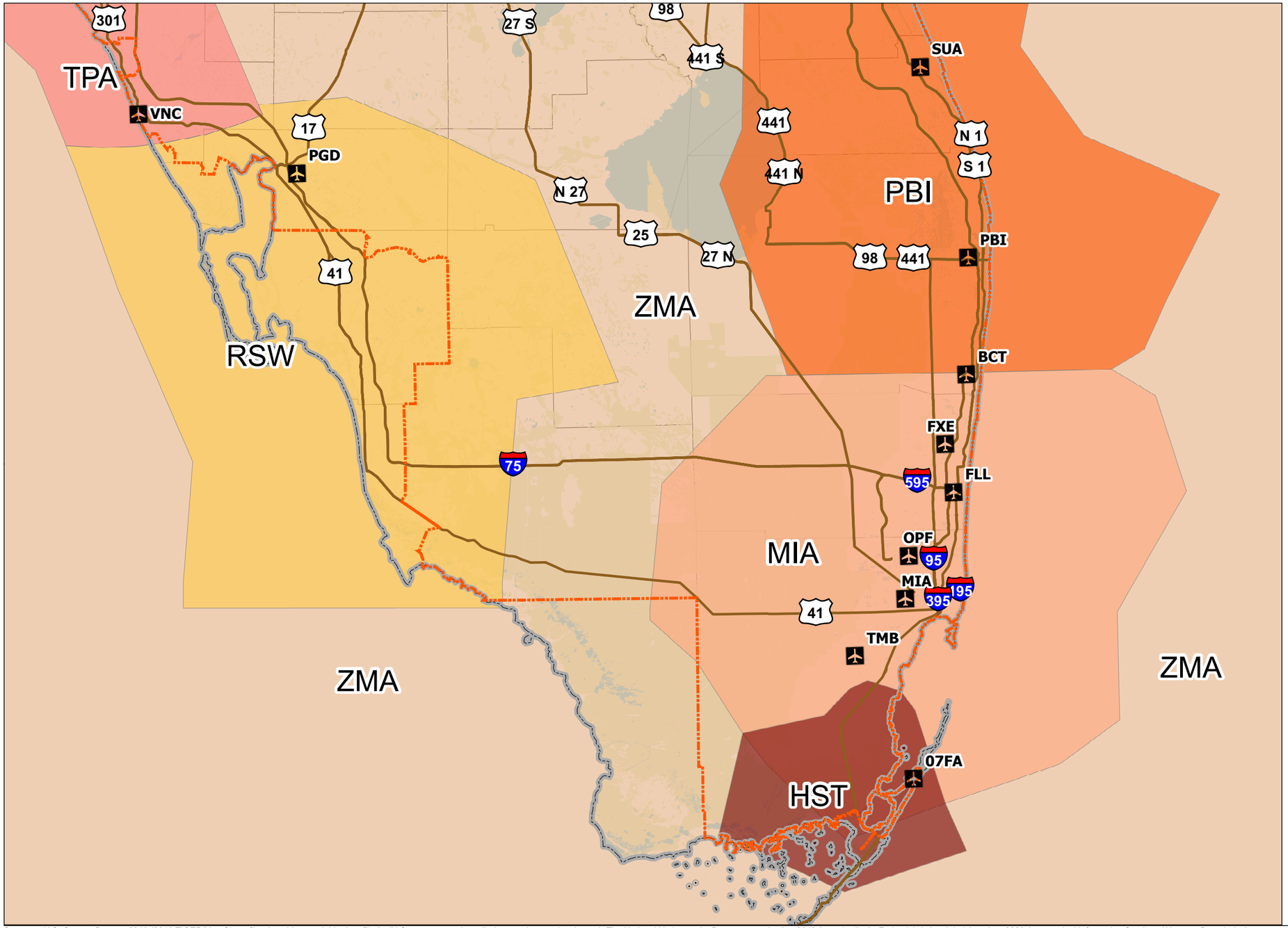

LEGEND

- Study
- General Study
- US and Interstate Highways - Publically Owned and Operated
- State Boundaries
- HST TRACON Airspace
- MIA TRACON Airspace
- PBI TRACON Airspace
- RSW TRACON Airspace
- TPA TRACON Airspace
- ZMA ARTCC Airspace
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Study Area

Notes:

Major Study Airports

Fort Lauderdale-Hollywood International Airport	**FLL**
Miami International Airport	**MIA**
Palm Beach International Airport	**PBI**

Satellite Study Airports

Ocean Reef Club Airport	**07FA**
Boca Raton Airport	**BCT**
Fort Lauderdale Executive Airport	**FXE**
Miami-Opa Locka Executive Airport	**OPF**
Punta Gorda Airport	**PGD**
Witham Field Airport	**SUA**
Miami Executive Airport	**TMB**
Venice Municipal Airport	**VNC**

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
Scale: 1:1,181,797

0 4.25 8.5 17 Miles

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief).ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, August 2020.

Exhibit 1-4

Airspace in the South-Central Florida Metroplex Area South

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The following sections discuss how air traffic controllers at these ATC facilities control the phases of flight for aircraft operating under IFR.

1.2.4.1 Departure Flow

As an aircraft operating under IFR, also known as an "IFR aircraft," departs a runway and follows its assigned heading, it moves from the ATCT airspace, through the terminal airspace, and into en route airspace where it proceeds on a specific route to its destination airport.

Within the terminal airspace, TRACON controllers provide services to aircraft departing from the ATCT airspace to transfer control points referred to as "exit points." An exit point represents an area along the boundary between terminal airspace and en route airspace. Exit points are generally established near commonly used routes to transfer aircraft efficiently between terminal and en route airspace. When aircraft pass through the exit point, control transfers from TRACON to ARTCC controllers as the aircraft joins a specific route.

Standard Instrument Departures

Departing IFR aircraft use a procedure called a Standard Instrument Departure (SID). A SID provides pilots with defined lateral and vertical guidance to facilitate safe and predictable navigation from an airport through the terminal airspace to a specific route in the en route airspace. A "conventional" SID follows a route defined by ground-based NAVAIDs, may be based on vectoring, or both. Because of the increased precision inherent in RNAV technology, an RNAV SID defines a more predictable route through the airspace than a conventional SID.

Some RNAV SIDs may be designed to include paths called "runway transitions" that serve particular runways at airports. Transitions are a series of fixes leading to/from a common route. They serve as the entry and exit points into terminal and en route airspace. A SID may have several runway transitions serving one or more runways at one or more airports. From the runway transition, aircraft may follow a common path before being directed along one or several diverging routes referred to as "en route transitions." En route transitions may terminate at exit fixes or continue into en route airspace where aircraft join a specific route.

1.2.4.2 Arrival Flow

An aircraft begins the descent phase of flight within the en route airspace. During descent, the aircraft bound for the destination airport transitions into the terminal airspace through an "entry point." The entry point represents a point along the boundary between terminal airspace and en route airspace where control of the aircraft transfers from ARTCC to TRACON controllers.

Standard Terminal Arrivals

Aircraft that arrive in the terminal airspace normally follow an instrument procedure called a Standard Terminal Arrival (STAR). Aircraft leaving en route airspace and entering terminal airspace may follow an en route transition from an entry fix to the STAR's common route in the terminal airspace. From the common route segment, aircraft may follow a runway transition before making an approach to the airport.

1.2.4.3 Required Aircraft Separation

As controllers manage the flow of aircraft into, out of, and within the NAS, they maintain some of the following separation distances between aircraft:[11]

- **Altitude Separation (vertical):** When operating below 41,000 feet above mean sea level (MSL), two aircraft must be at least 1,000 feet above/below each other until or unless lateral separation is ensured.
- **In-Trail Separation (longitudinal):** Within a radar-controlled area, the minimum distance between two aircraft on the same route (i.e., in-trail) can be between 2.5 to 10 nautical miles (NM),[12] depending on factors such as aircraft Class, weight, and type of airspace.
- **Side-by-Side Separation (lateral):** Similar to in-trail separation, the minimum side-by-side separation between aircraft must be at least three NM in terminal airspace and five NM in en route airspace.
- **Visual Separation:** Aircraft may be separated by visual means when other approved separation is assured before and after the application of visual separation.

1.2.5 Next Generation Air Transportation System

The NextGen program is the FAA's long-term plan to modernize the NAS from a ground-based system of air traffic control to a GPS-based system of air traffic management that allows for the development of PBN (Performance-Based Navigation) procedures.[13] The Metroplex initiative is a key step in the overall process of transitioning to the NextGen system. Achieving the NextGen system requires implementing RNAV (Area Navigation) and RNP (Required Navigation Performance) PBN procedures and aircraft "auto-pilot" and Flight Management System (FMS) capabilities.[14] RNAV and RNP capabilities are now readily available, and PBN can serve as the primary means aircraft use to navigate along a route. More than 90 percent of U.S. scheduled air carriers are equipped for some level of RNAV. The following sections describe PBN procedures in greater detail.

1.2.5.1 RNAV

Exhibit 1-5 compares conventional and RNAV routes. RNAV enables aircraft traveling through terminal and en route airspace to follow more accurate and better-defined routes. This results in more predictable routes and altitudes that can be pre-planned by the pilot and air traffic control. Predictable routes improve the ability to ensure vertical, longitudinal, and lateral separation between aircraft.

Routes based on ground-based NAVAIDs rely on the aircraft equipment directly communicating with the NAVAID radio signal and are often limited by issues such as line-of-sight and signal reception accuracy. NAVAIDs such as Very High Frequency (VHF) Omnidirectional Ranges (VORs) are affected by variable terrain and other obstructions that can limit their signal accuracy. Consequently, a route that is dependent upon ground-based

11 For a detailed explanation of separation standards, see FAA Order 7110.65Y, *Air Traffic Control*.

12 A nautical mile is equivalent to 1.15 statute miles.

13 U.S. Department of Transportation, Federal Aviation Administration, [https://www.faa.gov/nextgen/faqs/ (Accessed February 11, 2020)].

14 A Flight Management System (FMS) is an onboard computer that uses inputs from various sensors (e.g., GPS and inertial navigation systems) to determine the geographic position of an aircraft and help guide it along its flight path.

NAVAIDS requires at least six NM of clearance on either side of its main path to ensure accurate signal reception. As demonstrated by the dashed lines in **Exhibit 1-5**, this clearance requirement increases with an aircraft's distance from the VOR. In comparison, RNAV signal accuracy requires only two NM of clearance on either side of a route's main path.

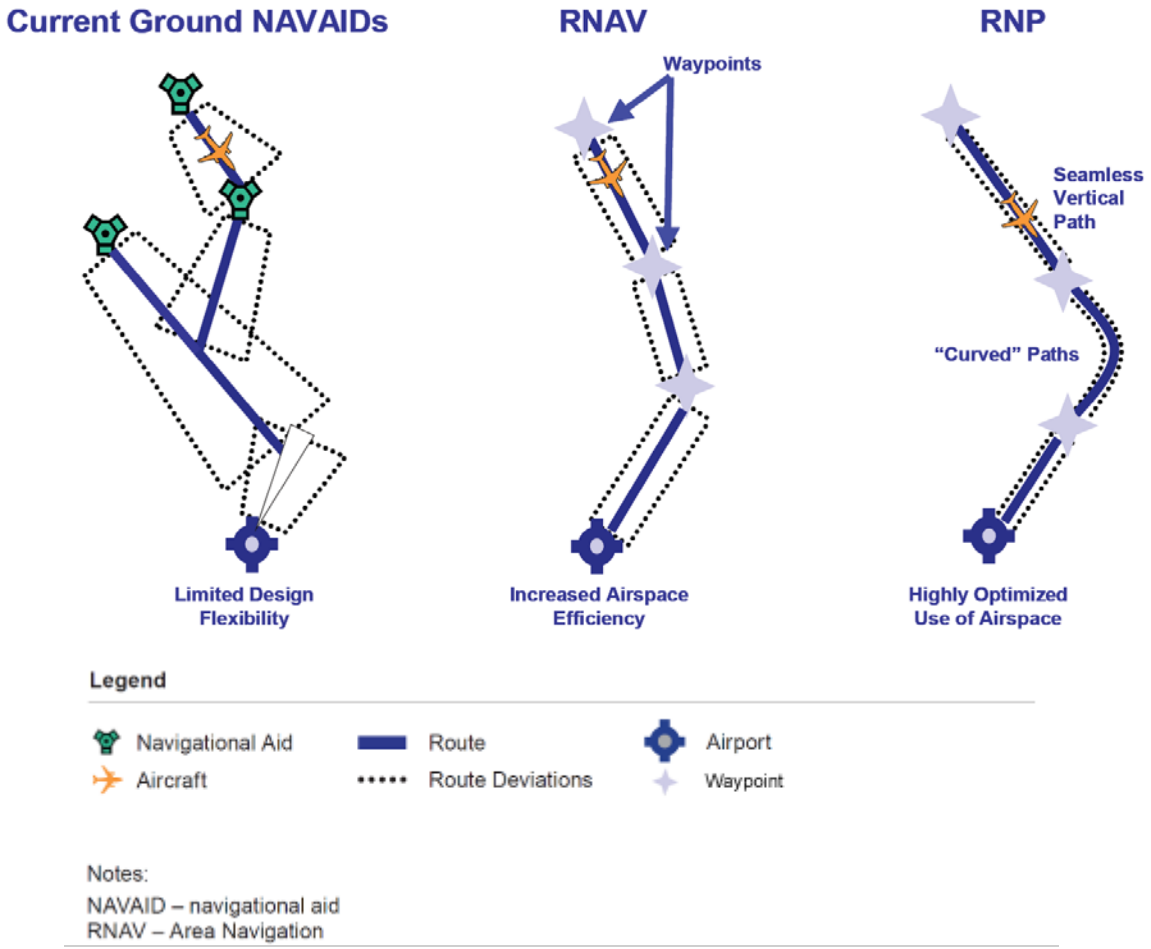
RNAV routes can mirror conventional routes or, by using satellite technology, provide paths within the airspace that were not previously possible with ground-based NAVAIDs.

1.2.5.2 RNP

RNP is an RNAV procedure with signal accuracy that is increased through the use of onboard performance monitoring and alerting systems. A defining characteristic of an RNP operation is the ability for an RNP-capable aircraft navigation system to monitor the accuracy of its navigation (based on the number of GPS satellite signals available to pinpoint the aircraft location) and inform the crew if the required data becomes unavailable.

Exhibit 1-5 compares conventional, RNAV, and RNP procedures. It shows how an RNP-capable aircraft navigation system provides a more accurate location (down to less than a mile from the intended path) and will follow a highly predictable path. The enhanced accuracy and predictability make it possible to implement procedures within controlled airspace that are not always possible under the current air traffic system.

Exhibit 1-5 Navigational Comparison – Conventional/RNAV/RNP



Source: U.S. Department of Transportation, Federal Aviation Administration, "Performance-Based (PBN) Brochure," October 2009.
Prepared by: ATAC Corporation, March 2020.

1.2.5.3 Optimized Profile Descent

An Optimized Profile Descent (OPD)[15] is a flight procedure that allows an aircraft using FMS to fly continuously from the top of descent to landing with minimal level-off segments. **Exhibit 1-6** illustrates an OPD procedure compared to a conventional descent. Aircraft that fly OPDs can maintain higher altitudes and lower thrust for longer periods thereby reducing emissions and noise. As level-off segments are minimized, OPDs reduce the need for communication between controllers and pilots.

1.2.5.4 Optimized Profile Climb

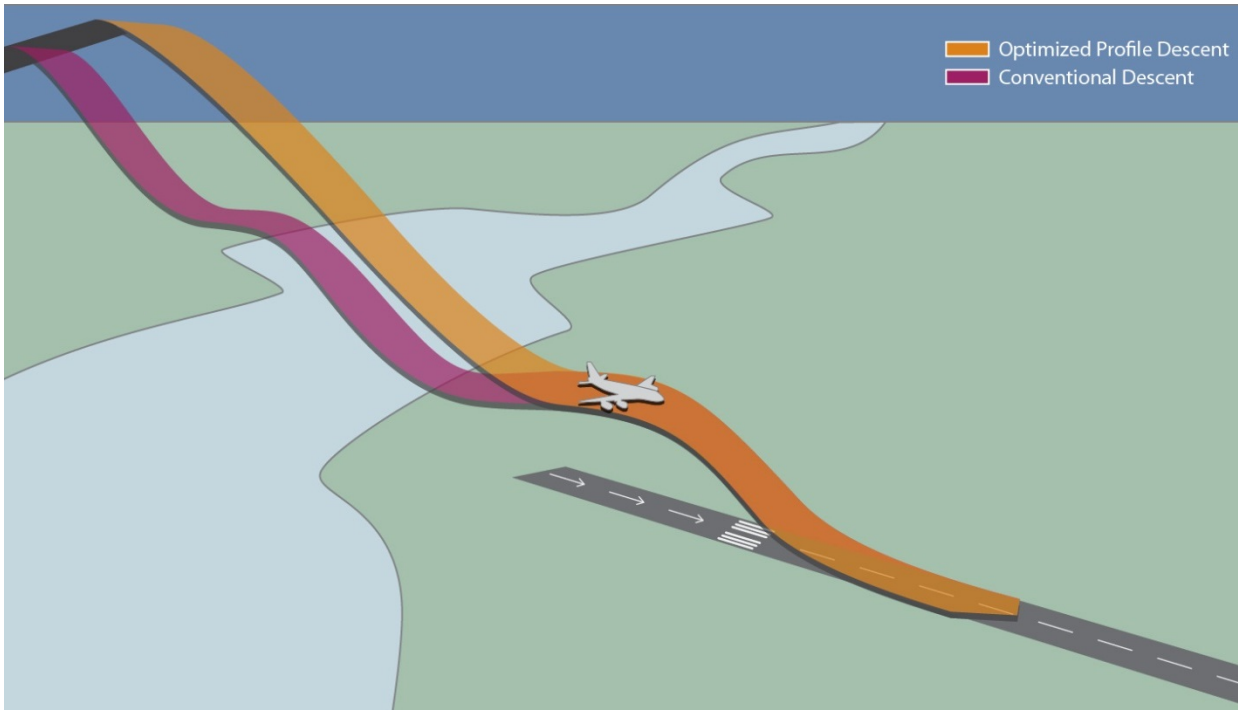
An Optimized Profile Climb (OPC)[16] is similar to OPD, but related to departures. An OPC is a flight procedure that allows an aircraft using FMS to fly continuously from the runway to top of climb with minimal level-off segments. Aircraft that fly OPCs can get to higher altitudes

15 U.S. Department of Transportation, Federal Aviation Administration. *Concept of Operations for NextGen Alternative Positioning, Navigation, and Timing (APNT)*, p. 78. March 19, 2012.

16 *Id.* (NOTE: *Idem* is the Latin term meaning "the same" and is abbreviated herein as *Id.* It is used in this document to reference an immediately prior footnote).

sooner with minimal changes in thrust. As level-off segments are minimized, OPCs reduce the need for communications between controllers and pilots.

Exhibit 1-6 Optimized Profile Descent Compared to a Conventional Descent



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, January 2020

1.2.6 The Metroplex Initiative

As part of the Metroplex initiative, the FAA is designing and implementing RNAV procedures that take advantage of the technology available in a majority of commercial service aircraft. The Metroplex initiative specifically addresses congestion, airports in close geographical proximity, and other limiting factors that reduce the operational efficiency of busy Metroplex airspace. Efficiency is improved by implementing more RNAV-based standard instrument procedures and connecting the routes defined by the standard instrument procedures to high- and low-altitude RNAV routes. Efficiency is further improved by using RNAV to optimize the use of the limited airspace in congested Metroplex environments.

1.3 The South-Central Florida Metroplex

The following sections describe the airspace structure and existing standard instrument procedures of the South-Central Florida Metroplex that would be affected by the South-Central Florida Metroplex Project.

1.3.1 South-Central Florida Metroplex Airspace

Exhibits 1-3 and 1-4, presented previously, depict the plan view (i.e. overhead view) for the airspace structure in the South-Central Florida Metroplex that consists of en route and oceanic airspace delegated to ZJX and ZMA, in addition to the relevant TRACONs. It is

important to note that FAA airspace is a highly complex 3-dimensional area with multiple vertical boundaries. In general total coverage terms, ZJX and ZMA provide air traffic services to 780,864 square miles of airspace covering the southeastern United States and overlay parts of the Gulf of Mexico, the coastal Atlantic Ocean, the Bahamas, and the north Caribbean. ZMA and ZJX are the en route facilities responsible for all private and commercial aircraft traversing within the lateral boundaries when operating under Instrument Flight Rules (IFR) and offers select services to aircraft operating under Visual Flight Rules (VFR).

The ZMA airspace extent covers the southern portion of Florida with a boundary extending from approximately PIE on the Gulf Coast, to TPA then MCO, then to approximately Edgewater on the Atlantic Coast. All en route airspace north of this imaginary line to the General Study Area on the northern boundary is controlled by ZJX. A large portion of the central Florida area is controlled by ZMA down to a much lower altitude than normal en route airspace (i.e. below 18,000 feet MSL) and is largely surrounded by TRACON controlled airspace. Out of the en route environment, TRACONs shown in **Exhibits 1-3 and 1-4** are responsible for aircraft transitioning from en route to arrival and conversely, departure to en route portions of flight.

The TRACON airspace delegated to the facilities previously identified in **Section 1.2.4** is designed to handle the extensive coastal and applicable inland air traffic over each geographic area. Tower facilities under the TRACON airspace generally operate with that specific TRACON facility.

1.3.2 South-Central Florida Metroplex Airspace Constraints

The following provide a general overview of the constraints related to controlling aircraft within the South-Central Florida Metroplex area airspace.

1.3.2.1 Cape Canaveral Space Launch Complex

The South-Central Florida Metroplex area has the unique presence of an active military and civilian space launch complex. The Cape Canaveral area in the northeast Atlantic coast portion of Florida is home to the Cape Canaveral Air Force Station and NASA's Kennedy Space Center. Approximately 34 numbered pad sites (some numbered pads are split into pads A and B and pad numbering is not consecutive) have served as the easternmost launch area for the US since 1950. Currently, five of the launch and recovery complexes are actively used for unmanned launches, primarily by private space companies such as SpaceX and United Launch Alliance. The FAA has four primary restricted airspace areas (R-2932, R-2933, R-2934, and R-2935) and a number of warning areas (W-136 B-F, W-137 A-F and L, W138 A-E and L, W139 C-E, W-470 A-F, and W-497 A-B)[17] that are offshore and are intermittent to continuously active from between the surface and 11,000 feet AGL to an unlimited altitude (see **Section 1.3.2.3**). Any individual or combination of these restricted and warning areas influences aircrew and ATC interaction for arriving and departing traffic along the Atlantic coast of Florida and the larger east coast en route structure.

1.3.2.2 Class B Airspace

Class B airspace is regulatory airspace, generally located around major airports, such as FLL, MCO, MIA, PBI, and TPA. The rules for flying within Class B airspace are more restrictive for

17 U.S. Department of Transportation, Federal Aviation Administration. *Jacksonville Sectional Aeronautical Chart, 105th Edition*. Effective 30 Jan 2020 to 13 Aug 2020. Issued 5 December 2019.

pilot qualifications and aircraft equipment than for other types of terminal airspace. These rules make for a more orderly flow of traffic within Class B airspace. Class B airspace design and operation has a direct impact on the flow of traffic within the South-Central Florida Metroplex area.

1.3.2.3 South-Central Florida Metroplex Special Use Airspace

Exhibits 1-7 and 1-8 depicts the boundaries of Special Use Airspace (SUA)[18] in the South-Central Florida Metroplex, illustrating the limited available options for entering and exiting the South-Central Florida Metroplex airspace. SUA is airspace with defined vertical and lateral boundaries containing certain hazardous activities such as military flight training and air-to-ground military exercises that must be confined. SUA defined dimensions are identified by an area on the surface of the earth within which certain air traffic activities must be confined or where certain restrictions are imposed on aircraft operations that are not a part of those activities, or both. SUA is an important component of the NAS that allows for the safe use of the airspace by military and non-military air traffic. In addition to aviation activity, SUA can accommodate ground and combined arms training and testing. These areas either limit aircraft activity allowed within the airspace or restrict other aircraft from entering during specific days and/or times. Four types of SUA are found within the South-Central Florida Metroplex:[19]

- **Alert Areas:** Alert areas are depicted on an aeronautical chart to inform pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of non-participating pilots.
- **Restricted Area:** Restricted areas contain airspace within which aircraft, while not wholly prohibited, are subject to restrictions when the area is being used. The area denotes the existence of unusual, often invisible hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Entering a restricted area without authorization may be extremely hazardous to the aircraft and its occupants. When the area is not being used, control of the airspace is released to the FAA, and ATC may use the area for normal operations.
- **Warning Areas:** A warning area extends from three NM outward from the US coastline that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.
- **Military Operations Area:** A Military Operations Area (MOA) is airspace established outside of Class A airspace to separate/segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are established to contain certain military activities such as air combat maneuvers, air intercepts, acrobatics, etc.

18 Witham Field Airport, one of the identified Study Airports, has the FAA identifier "SUA" and although the acronyms are the same as Special Use Airspace, the context is largely separate and uniquely associated where used throughout this document.

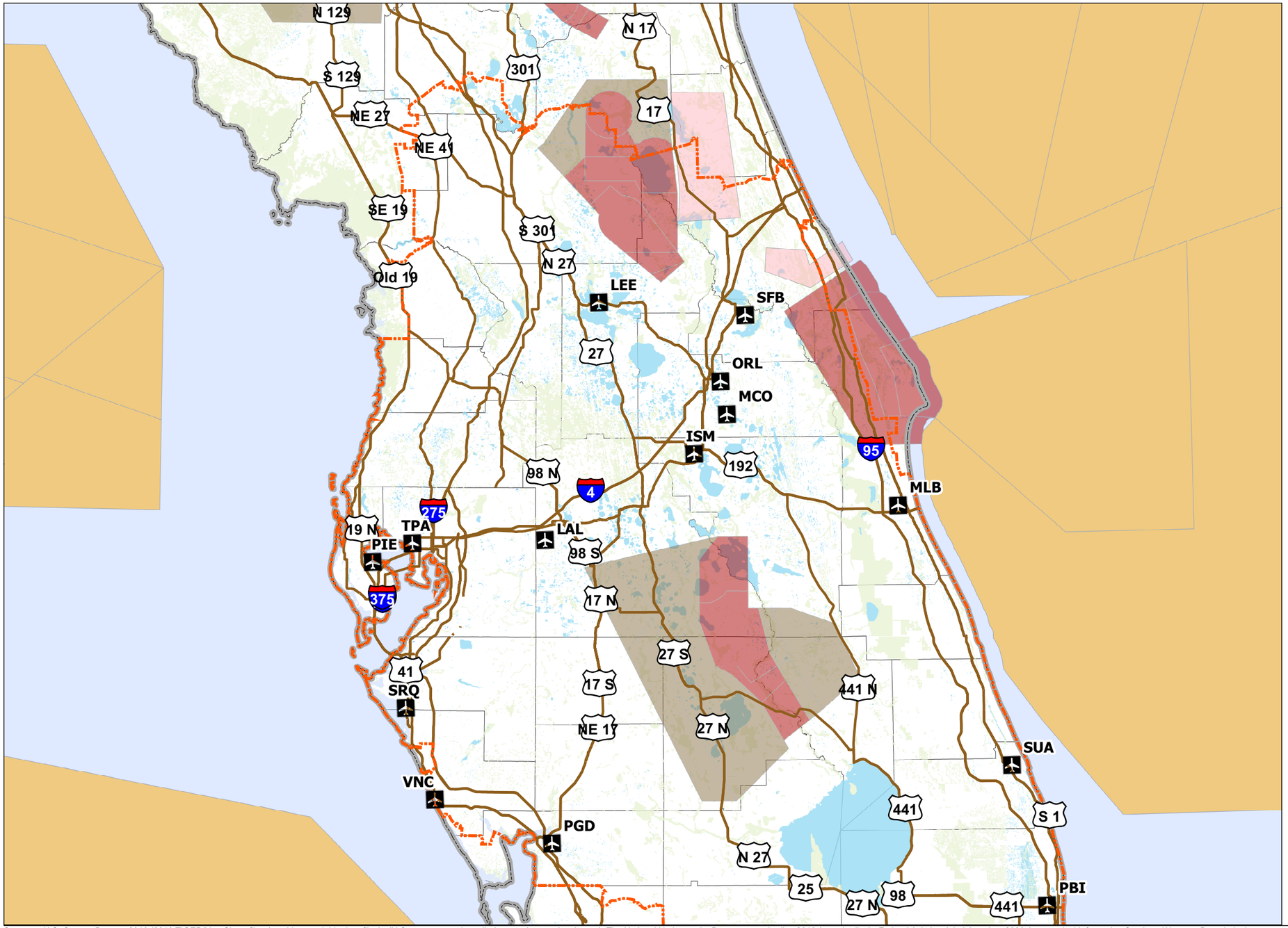
19 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.10B, *Special Use Airspace*, February 14, 2020 and Department of Transportation, Federal Aviation Administration, *Airman Information Manual*, Chapter 3-Section 4. Special Use Airspace [https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap3_section_4.html (Accessed February 22, 2020)].

Within the General Study Area's 30,454 square miles of land coverage (See **Section 4.1**), 4,010 square miles (13.17%) consist of SUA coverage over the land area. The en route ATC facilities (ZMA and ZJX) are required to ensure that civilian and military aircraft (not under the authority of the United States Armed Forces)[20] are routed within the remaining 30,454 square miles of land coverage of non-SUA.

Due to the limited commercial airspace outside of SUA, there can be choke points for arrivals and departures into and out of the South-Central Florida area when SUAs such as Restricted Areas are in effect. As was mentioned in **Section 1.3.2.1**, this is caused by the funneling of air traffic into corridors that avoid SUA.

When developing procedures that transect Restricted Areas, it may be necessary to design a number of procedures to account for some of the limitations imposed on usage inherent with this type of SUA. Accordingly, it is generally less complex, more flexible, and more predictable to design SID and STAR procedures that avoid SUA altogether.

20 Aircraft under the direct control of the military air traffic control facilities are confined to Special Use Airspace (SUA) or departure and arrival patterns near military airfields. The SUA are specific areas of airspace that are used by military aircraft and are provided air traffic control services by the military. The United States military branches are specifically charged with management of that airspace when active.



LEGEND

- Study Airports
- General Study Area
- US and Interstate Highways - Publically Owned and Operated
- State Boundaries

Type

- Alert Area
- Military Operations Area
- Prohibited Area
- Restricted Area
- Warning Area
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Ocean or Sea
- Study Area Counties

Notes:

Major Study Airports

Orlando International Airport	**MCO**
Palm Beach International Airport	**PBI**
Tampa International Airport	**TPA**

Satellite Study Airports

Kissimmee Gateway Airport	**ISM**
Lakeland Linder International Airport	**LAL**
Leesburg International Airport	**LEE**
Melbourne International Airport	**MLB**
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Orlando Sanford International Airport	**SFB**
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0 5 10 20 Miles

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief).ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, August 2020.

Exhibit 1-7

Special Use Airspace - North

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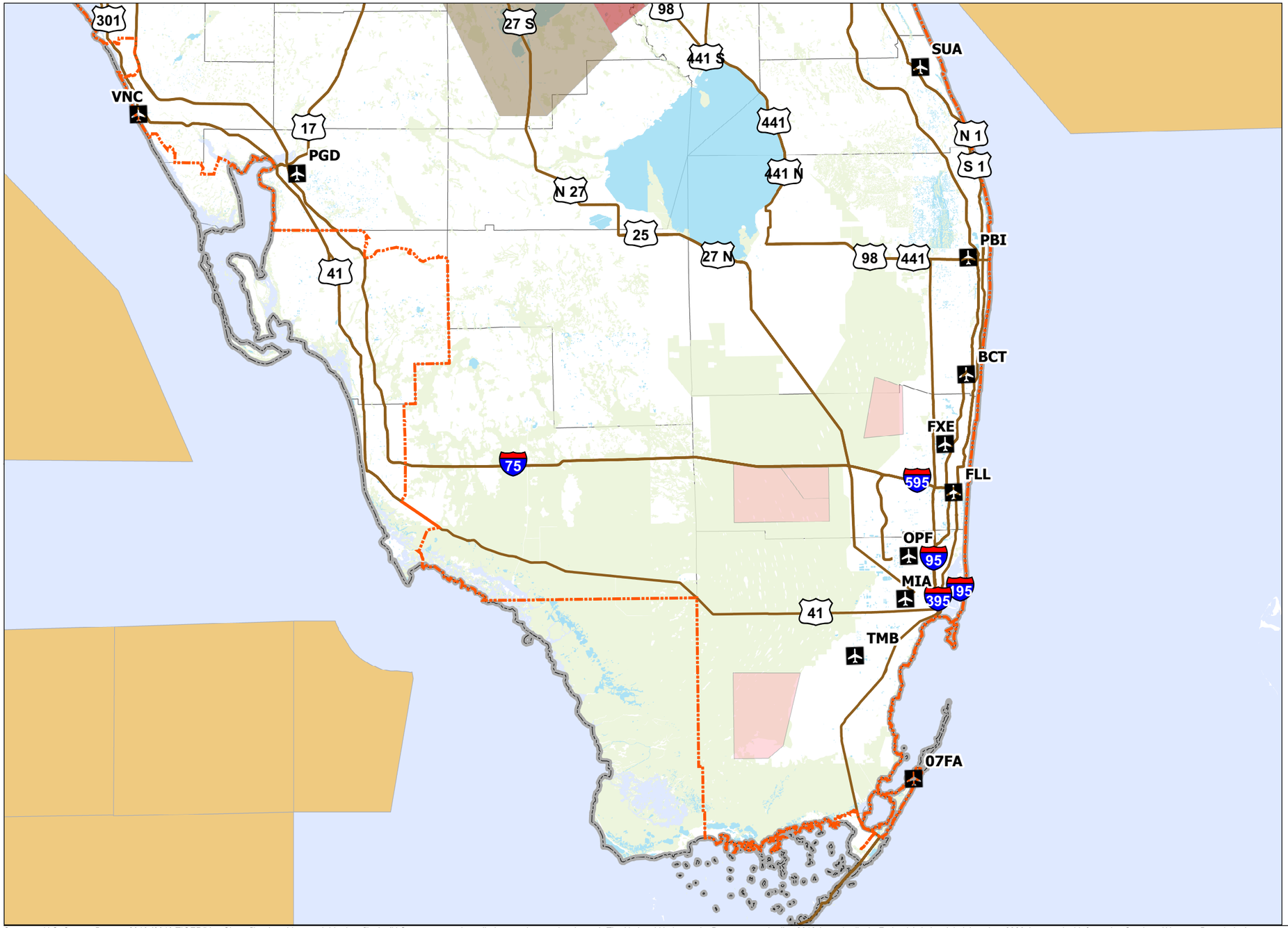

LEGEND

- Study Airports
- General Study Area
- US and Interstate Highways - Publically Owned and Operated

Type

- Alert Area
- Military Operations Area
- Prohibited Area
- Restricted Area
- Warning Area
- State Boundaries
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Ocean or Sea
- Study Area Counties

Notes:

Major Study Airports

Fort Lauderdale-Hollywood International Airport	**FLL**
Miami International Airport	**MIA**
Palm Beach International Airport	**PBI**

Satellite Study Airports

Ocean Reef Club Airport	**07FA**
Boca Raton Airport	**BCT**
Fort Lauderdale Executive Airport	**FXE**
Miami-Opa Locka Executive Airport	**OPF**
Punta Gorda Airport	**PGD**
Witham Field Airport	**SUA**
Miami Executive Airport	**TMB**
Venice Municipal Airport	**VNC**

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
Scale: 1:1,181,797

0 4.25 8.5 17 Miles

N

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief).ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, October 2020.

Exhibit 1-8

Airspace in the South-Central Florida Metroplex Area South

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1.3.3 STARs and SIDs Serving Study Airports

As of June 1, 2018;[21] 85 published STARs and SIDs serve the 21 Study Airports identified in **Table 1.1**. These 85 air traffic procedures to the Study Airports can be further characterized:

- 40 are STARs and 45 are SIDs
- 52 are RNAV and 33 are conventional

1.4 South-Central Florida Metroplex Study Airports

Exhibits 1-9 and 1-10 depicts the locations of the 21 South-Central Florida Metroplex Project Study Airports. The Study Airports were selected based on specific FAA criteria: each airport must have a minimum of 700 annual IFR-filed jet operations or 90,000 or more annual propeller aircraft operations. Airports that did not meet these thresholds were not included as Study Airports because the Proposed Action would result in little or no change to their operations.[22] In addition, airports where the majority of traffic operates under VFR were also excluded from selection as Study Airports because they would not be directly affected by the Proposed Action. VFR aircraft operating outside controlled airspace are not required to be in contact with ATC. Because these aircraft operate at the pilot's discretion on a "see and be seen" basis that does not required filed flight plans, the FAA generally has limited operational information.

The five major Study Airports are:

Fort Lauderdale/Hollywood International Airport (FLL) serves the northern Miami region of the Atlantic coast and is classified as a public commercial service primary large hub airport under the National Plan of Integrated Airport Systems (NPIAS) for 2019-2023.[23] FLL has two parallel runways (10R-28L and 10L-28R). IFR aircraft arriving to FLL may be assigned one of four RNAV STARs or five conventional STARs. Departing IFR aircraft may be assigned one of six RNAV SIDs or one conventional SID.

Orlando International Airport (MCO) Serves the greater Orlando region and is classified as a public commercial service primary large hub airport under the NPIAS. MCO has four parallel runways (36L-18R, 36R-18L, 35L-17R, and 35R-17L). IFR aircraft arriving to MCO may be assigned one of four RNAV STARs or five conventional STARs. Departing aircraft may be assigned one of six RNAV SIDs or three conventional SIDs.

Miami International Airport (MIA) serves the greater Miami region of the south-central and south Atlantic coast and is classified as a public commercial service primary large hub airport under the NPIAS. MIA has three parallel runways (08L-26R, 08R-26L, and 09-27) and one crosswind runway (12-30). IFR aircraft arriving to MIA may be assigned one of four RNAV

21 The June 1, 2018 date was chosen for the most immediate proximity to the concluding date of the annual Performance Data and Reporting System (PDARS) radar data sample used to define baseline conditions in this EA. References throughout the EA are made to the June 1, 2017-May 30, 2018 period of radar data used for defining the existing conditions in the FL Metroplex Project.

22 U.S. Department of Transportation, Federal Aviation Administration, *1050.1F Desk Reference (Version 2)*, Ch. 11, Noise and Noise-Compatible Land Use, Section 11.1.2, Projects Not Requiring a Noise Analysis, February 2020.

23 U.S. Department of Transportation, Federal Aviation Administration. *National Plan of Integrated Airport Systems, Appendix A: List of NPIAS Airports with 5-Year Forecast Activity and Development Estimate*. September 26, 2018. [https://www.faa.gov/airports/planning_capacity/npias/reports/media/NPIAS-Report-2019-2023-Appendix-A.pdf (Accessed February 12, 2020)].

STARs or five conventional STARs. Departing IFR aircraft may be assigned one of 11 RNAV SIDs or three conventional SIDs.

Palm Beach International Airport (PBI) serves the West Palm Beach area and is classified as a public commercial service primary medium hub airport under the NPIAS. PBI has two parallel runways (10R-28L and 10L-28R) and one crosswind runway (14-32). IFR aircraft arriving to PBI may be assigned one of four RNAV STARs or five conventional STARs. Departing IFR aircraft may be assigned one of six RNAV SIDs or three conventional SIDs.

Tampa International Airport (TPA) serves the greater Tampa Bay region on the Gulf coast and is classified as a public commercial service primary large hub airport under the NPIAS. TPA has two parallel runways (Runways 1L-19R and 1R-19L) and one crosswind runway (10-28). Aircraft arriving to TPA may be assigned one of two RNAV STARs or one conventional STAR. Departing aircraft may be assigned one of five RNAV SIDs or one conventional SID.

The 16 satellite Study Airports are:

Ocean Reef Club Airport (07FA) serves the Key Largo area on the southeast Atlantic coast and is operated as a privately owned private use airport and is not classified as part of the NPIAS. The airport has one runway (05-23). IFR aircraft arriving to 07FA may be assigned one of five RNAV STARs or four conventional STARs. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Boca Raton Airport (BCT) serves the Boca Raton area on the Atlantic coast and is classified as a public general aviation reliever airport under the NPIAS. BCT has one runway (05-23). IFR aircraft arriving to BCT may be assigned one of two RNAV STARs or one conventional STAR. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Fort Lauderdale Executive Airport (FXE) serves the Fort Lauderdale area on the Atlantic coast and is classified as a public general aviation reliever airport under the NPIAS. FXE has two runways (09-27 and 13-31). IFR aircraft arriving to FXE may be assigned one of four RNAV STARs or five conventional STARs. Departing IFR aircraft may be assigned one RNAV SID.

Kissimmee Gateway Airport (ISM) serves the greater Orlando area and is classified as a public general aviation reliever airport under the NPIAS. ISM has two runways (06-24 and 15-33). IFR aircraft arriving to ISM may be assigned one of five RNAV STARs or four conventional STARs. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Lakeland Linder Regional (LAL) serves the Lakeland area between the greater Tampa and Orlando regions and is classified as a public general aviation reliever airport under the NPIAS. LAL has two runways (05-23 and 09-27). IFR aircraft arriving to LAL may be assigned one RNAV STAR with no conventional STARs. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Leesburg International Airport (LEE) serves the Leesburg area northwest of Orlando and is classified as a public general aviation airport under the NPIAS. LEE has two runways (03-21 and 13-31). IFR aircraft arriving at LEE may be assigned one of three RNAV STARs or two conventional STARs. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Melbourne International Airport (MLB) serves the Melbourne and Space Coast Atlantic area and is classified as a public commercial service primary non-hub airport under the NPIAS. MLB has two parallel runways (09L-27R and 09R-27L) and one crosswind runway (05-23). IFR aircraft arriving at MLB may be assigned one RNAV STAR or one conventional STAR. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Miami-Opa Locka Executive Airport (OPF) serves the greater Miami area 9 miles north of MIA and is classified as a public general aviation reliever airport under the NPIAS. OPF has two parallel runways (09L-27R and 09R-27L) and one crosswind runway (12-30). IFR aircraft arriving at OPF may be assigned one of five RNAV STARs or six conventional STARs. Departing IFR aircraft may be assigned one conventional SID.

Executive Airport (ORL) serves the greater Orlando area and is classified as a public general aviation reliever airport under the NPIAS. ORL has two runways (07-25 and 13-31). IFR aircraft arriving at ORL may be assigned one of five RNAV STARs or four conventional STARs. Departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

Punta Gorda Airport (PGD) serves the Punta Gorda area and is classified as a public commercial service primary small hub airport under the NPIAS. PGD has three runways (04-22, 09-27, and 15-33). Arriving and departing IFR aircraft are radar vectored and/or have indirect access to other RNAV or conventional routings.

St Pete - Clearwater International Airport (PIE) serves the greater Tampa Bay area and is classified as a public commercial service primary small hub airport under the NPIAS. PIE has two runways (18-36 and 04-22). IFR aircraft arriving at PIE may be assigned one of five RNAV STARs or three conventional STARs. Departing IFR aircraft may be assigned one conventional SID.

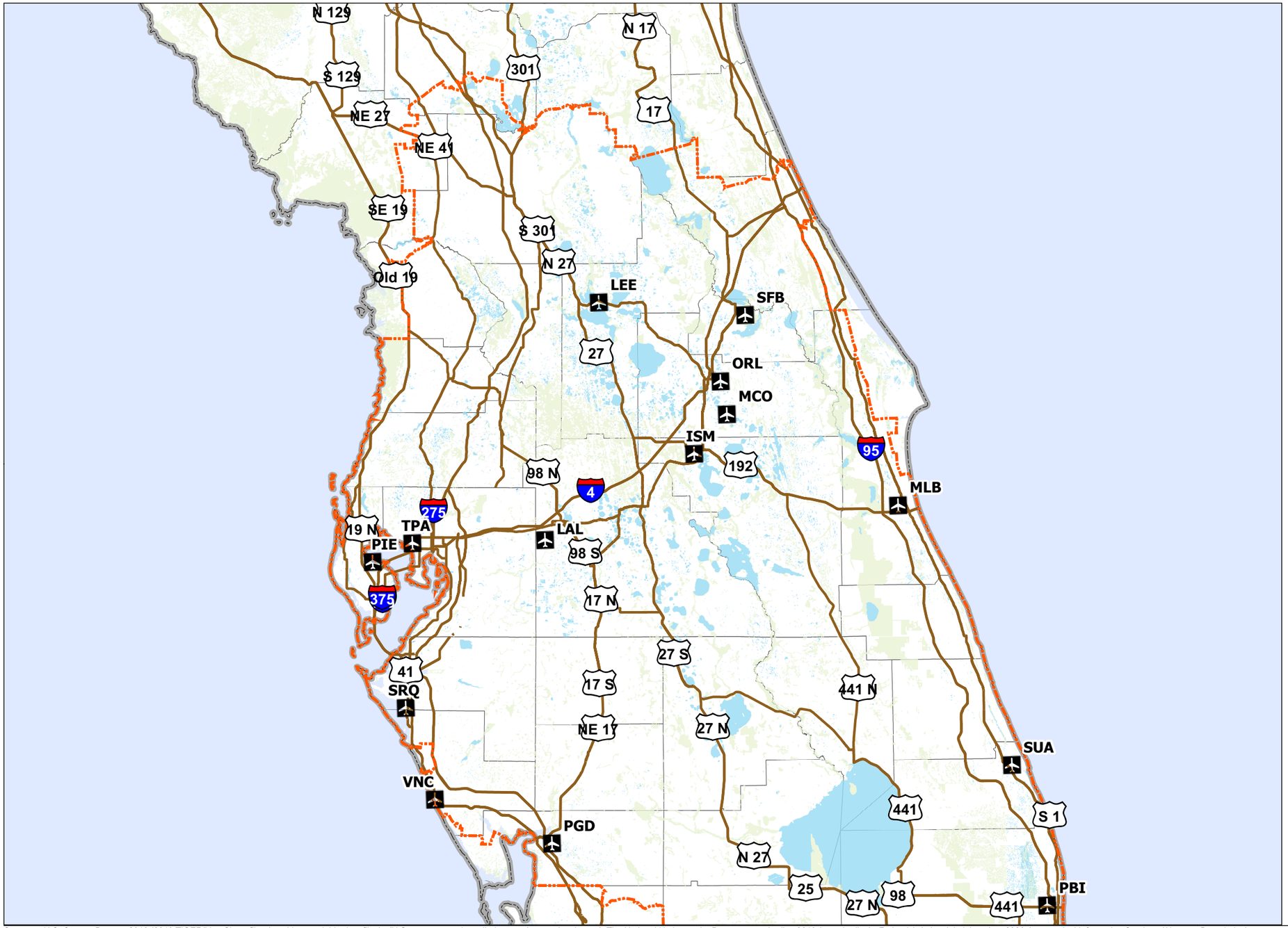
Orlando Sanford International Airport (SFB) serves the greater Orlando area and is classified as a public commercial service primary small hub airport under the NPIAS. SFB has three parallel runways (09L-27R, 09C-27C, and 09R-27L) and one crosswind runway (18-36). IFR aircraft arriving at SFB may be assigned one of three RNAV STARs or three conventional STARs. Departing IFR aircraft may be assigned one conventional SID.

Sarasota/Bradenton International Airport (SRQ) serves the Sarasota and Bradenton areas of the central Gulf coast and is classified as a public commercial service primary small hub airport under the NPIAS. SRQ has two runways (04-22 and 14-32). IFR aircraft arriving at SRQ may be assigned one of three RNAV STARs or one conventional STAR. Departing IFR aircraft may be assigned one RNAV SID or one conventional SID.

Witham Field Airport (SUA) serves the Port St Lucie and Stuart area in the east central Atlantic coast and is classified as a public general aviation reliever airport under the NPIAS. SUA has three runways (07-25, 12-30, and 16-34). IFR aircraft arriving at SUA may be assigned one RNAV STAR. Departing IFR aircraft may be assigned one of two RNAV SIDs.

Miami Executive Airport (TMB) serves the greater Miami area and is classified as a public general aviation reliever airport under the NPIAS. TMB has two parallel runways (09L-27R and 09R-27L) and one crosswind runway (13-31). IFR aircraft arriving at TMB may be assigned one of four RNAV STARs or five conventional STARs. Departing IFR aircraft may be assigned one conventional SID.

Venice Municipal Airport (VNC) serves the Venice area on the southern gulf coast and is classified as a public general aviation reliever airport under the NPIAS. VNC has two runways (05-23 and 13-31). IFR aircraft arriving at VNC may be assigned one of two RNAV STARs or one conventional STAR. Departing IFR aircraft may be assigned one conventional SID.



LEGEND

- Study Airports
- General Study Area
- US and Interstate Highways - Publically Owned and Operated
- State Boundaries
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Ocean or Sea
- Study Area Counties

Notes:

Major Study Airports

Orlando International Airport	**MCO**
Palm Beach International Airport	**PBI**
Tampa International Airport	**TPA**

Satellite Study Airports

Kissimmee Gateway Airport	**ISM**
Lakeland Linder International Airport	**LAL**
Leesburg International Airport	**LEE**
Melbourne International Airport	**MLB**
Orlando Executive Airport	**ORL**
Punta Gorda Airport	**PGD**
St. Pete-Clearwater International Airport	**PIE**
Orlando Sanford International Airport	**SFB**
Sarasota Bradenton International Airport	**SRQ**
Witham Field Airport	**SUA**
Venice Municipal Airport	**VNC**

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
Scale: 1:1,601,151

0 5 10 20 Miles

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief).ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, August 2020.

Exhibit 1-9

Study Airport Locations - North

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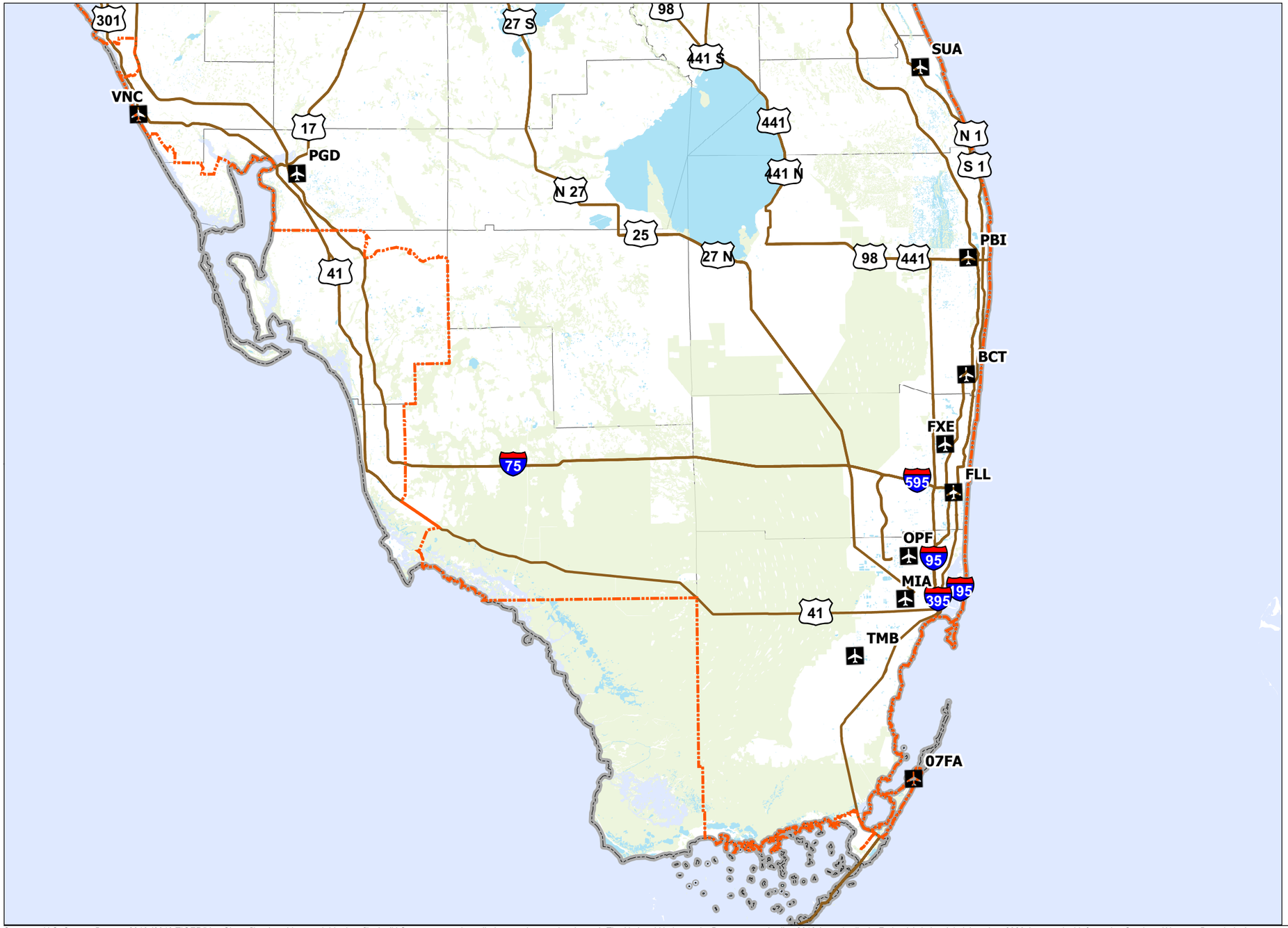

LEGEND

- Study Airports
- General Study Area
- US and Interstate Highways - Publically Owned and Operated
- State Boundaries
- Lake/Pond
- Reservoir
- Swamp/Marsh
- Ocean or Sea
- Study Area Counties

Notes:

Major Study Airports

Fort Lauderdale-Hollywood International Airport	**FLL**
Miami International Airport	**MIA**
Palm Beach International Airport	**PBI**

Satellite Study Airports

Ocean Reef Club Airport	**07FA**
Boca Raton Airport	**BCT**
Fort Lauderdale Executive Airport	**FXE**
Miami-Opa Locka Executive Airport	**OPF**
Punta Gorda Airport	**PGD**
Witham Field Airport	**SUA**
Miami Executive Airport	**TMB**
Venice Municipal Airport	**VNC**

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
Scale: 1:1,181,797

0 4.25 8.5 17 Miles

N

Sources: U.S. Census Bureau, 2018 (2018 TIGER/Line Shapefiles (machine-readable data files), (U.S. states, counties, tribal properties, roads, airports); The National Hydrography Dataset, waterbodies 2018 (waterbodies). Federal Aviation Administration, 2020 Aeronautical Information Services (Airspace Boundaries), ESRI World Water Bodies 2018 (Ocean and Sea). ESRI 2018 (Shaded Relief).ATAC Corporation, 2020, (2020 General Study Area boundary).
Prepared by: ATAC Corporation, August 2020.

Exhibit 1-10

Study Airport Locations - South

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As shown in **Table 1-2**, from June 1, 2017 to May 30, 2018 approximately 73.5 percent of all IFR traffic within the South-Central Florida Metroplex area operated at the major Study Airports (FLL, MCO, MIA, PBI, TPA).

Table 1-2 Distribution of IFR Traffic under FAA Control Among All Study Airports[24]

Airport	IFR Annual Operations	Percent of Total Annual Operations
Fort Lauderdale/Hollywood International Airport – FLL	306,272	16.4%
Orlando International Airport – MCO	342,297	18.4%
Miami International Airport – MIA	409,095	21.9%
Palm Beach International Airport – PBI	118,654	6.4%
Tampa International Airport – TPA	193,974	10.4%
Ocean Reef Club Airport – 07FA	4,393	0.2%
Boca Raton Airport – BCT	26,029	1.4%
Fort Lauderdale Executive Airport – FXE	52,706	2.8%
Kissimmee Gateway Airport – ISM	24,455	1.3%
Lakeland Linder Regional – LAL	20,719	1.1%
Leesburg International Airport – LEE	10,654	0.6%
Melbourne International Airport – MLB	32,701	1.8%
Miami-Opa Locka Executive Airport – OPF	54,611	2.9%
Orlando Executive Airport – ORL	27,231	1.5%
Punta Gorda Airport – PGD	20,045	1.1%
St Pete-Clearwater International Airport – PIE	44,151	2.4%
Orlando Sanford International Airport – SFB	65,858	3.5%
Sarasota/Bradenton International Airport – SRQ	44,808	2.4%
Witham Field Airport – SUA	22,535	1.2%
Miami Executive Airport – TMB	37,833	2.0%
Venice Municipal Airport – VNC	6,352	0.3%
Total IFR Operations	1,865,373	100.0%

Source: U.S. Department of Transportation, Federal Aviation Administration. Operations Network: Tower Counts [https://aspm.faa.gov/opsnet/sys/Airport.asp, https://aspm.faa.gov/tfms/sys/main.asp (Accessed October 2019)].
Prepared by: ATAC Corporation, March 2020.

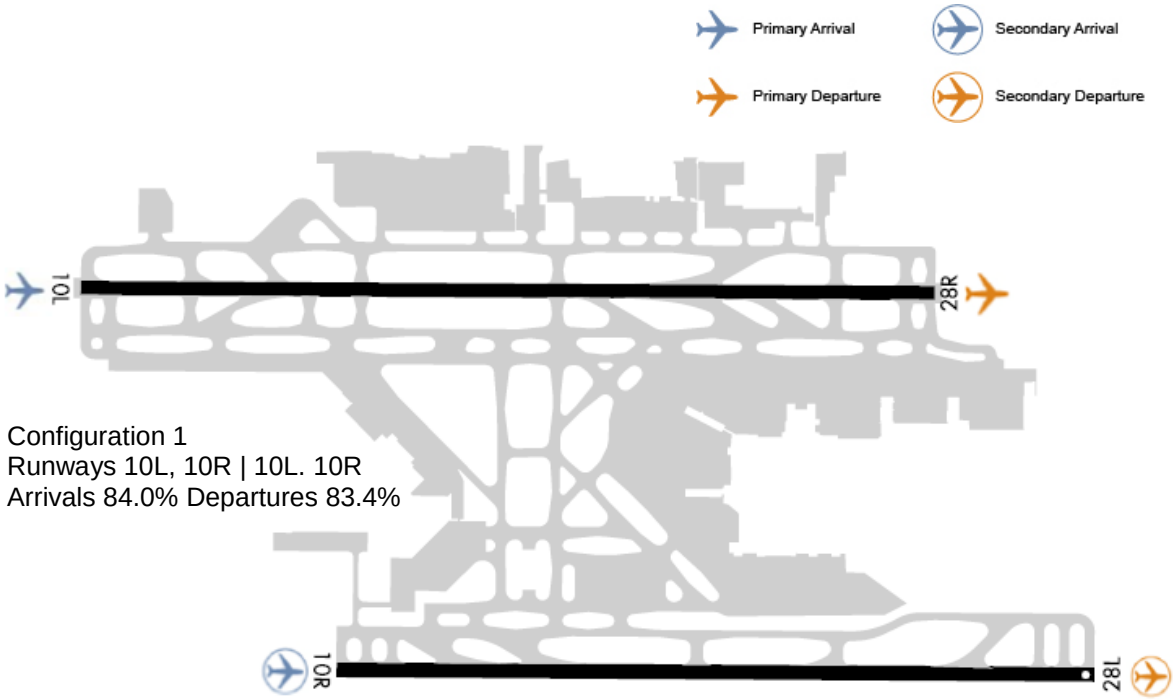
1.4.1 Major Study Airport Runway Operating Configurations

Each major Study Airport operates under several different runway operating configurations depending on factors such as weather, prevailing wind, and air traffic conditions. As a result, it is possible for the runway ends used for arrivals and departures to change several times throughout a day. Controllers use different runway operating configurations depending on prevailing conditions.

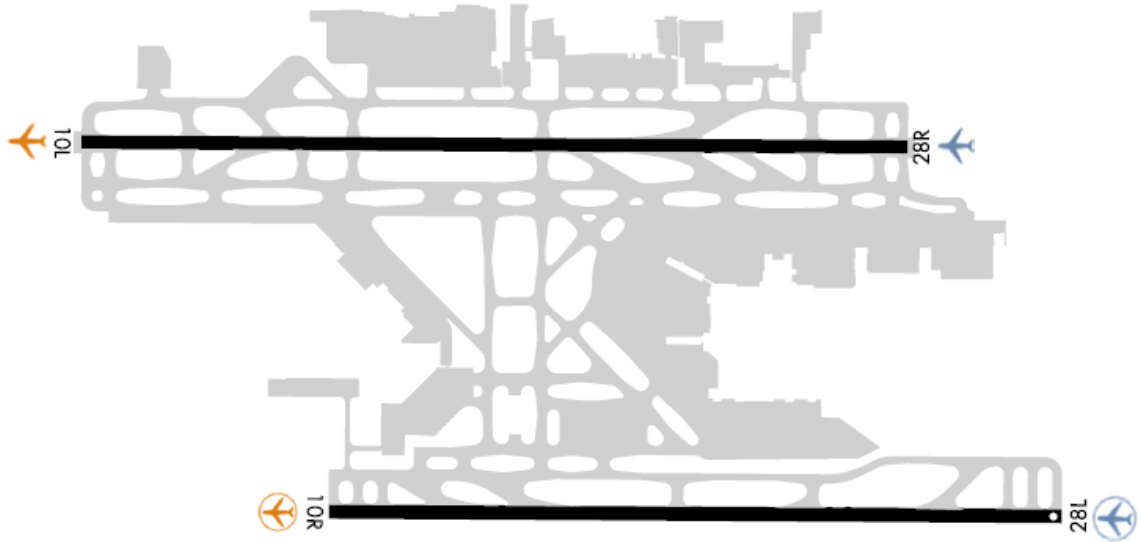
Exhibits 1-11 to 1-15 illustrate the primary runway operating configurations at the five major Study Airports. These configurations are based on the FAA's Aviation System Performance Metrics (ASPM) for June 2017 to May 2018.

24 Radar data obtained from the FAA's Performance Data Analysis and Reporting System (PDARS) identified 1,741,841 flight tracks to and from the Study Airports between June 1, 2017 and May 30, 2018.

Exhibit 1-11 FLL Runway Operating Configurations



Configuration 1
Runways 10L, 10R | 10L. 10R
Arrivals 84.0% Departures 83.4%



Configuration 2
Runways 28R, 28L | 28R, 28L
Arrivals 16.0% Departures 16.6%

Source: U.S. Department of Transportation, Federal Aviation Administration. *Airport Diagrams* [http://www.faa.gov/airports/runway_safety/diagrams/ (Accessed March 2020)]. ASPM: *Efficiency Report for FLL* [(https://aspm.faa.gov/apm/sys/main.asp (Accessed July 2018)].
Prepared By: ATAC Corporation, March 2020.

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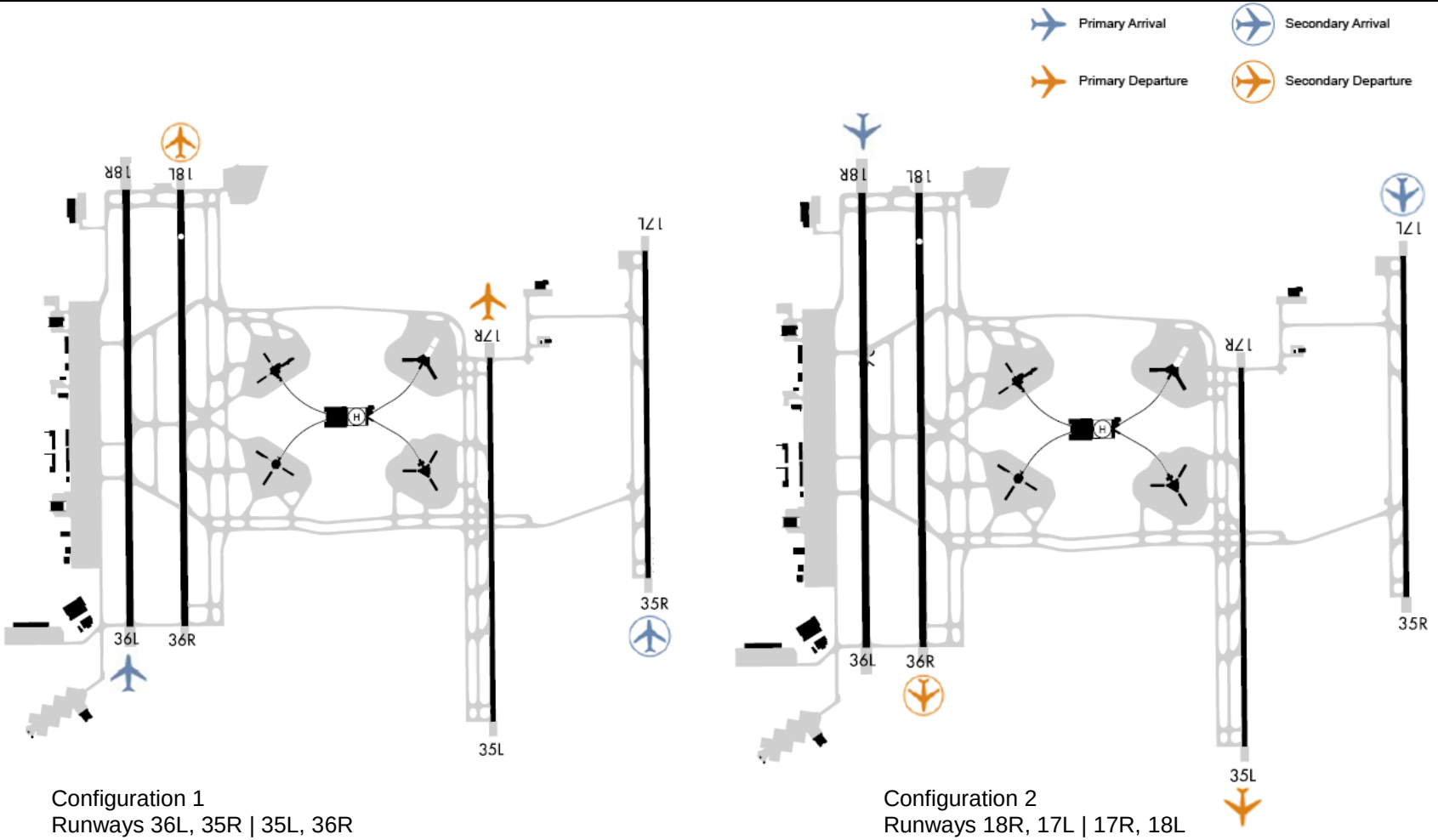
Exhibit 1-12 MCO Runway Operating Configurations



Configuration 1
Runways 36L, 35R | 35L, 36R
Arrivals 51.1% Departures 51.3%

Configuration 2
Runways 18R, 17L | 17R, 18L
Arrivals 48.9% Departures 48.7%

Source: U.S. Department of Transportation, Federal Aviation Administration. *Airport Diagrams* [http://www.faa.gov/airports/runway_safety/diagrams/ (Accessed March 2020)]. *ASPM: Efficiency Report for MCO* [(https://aspm.faa.gov/apm/sys/main.asp (Accessed July 2018)].
Prepared By: ATAC Corporation, March 2020.

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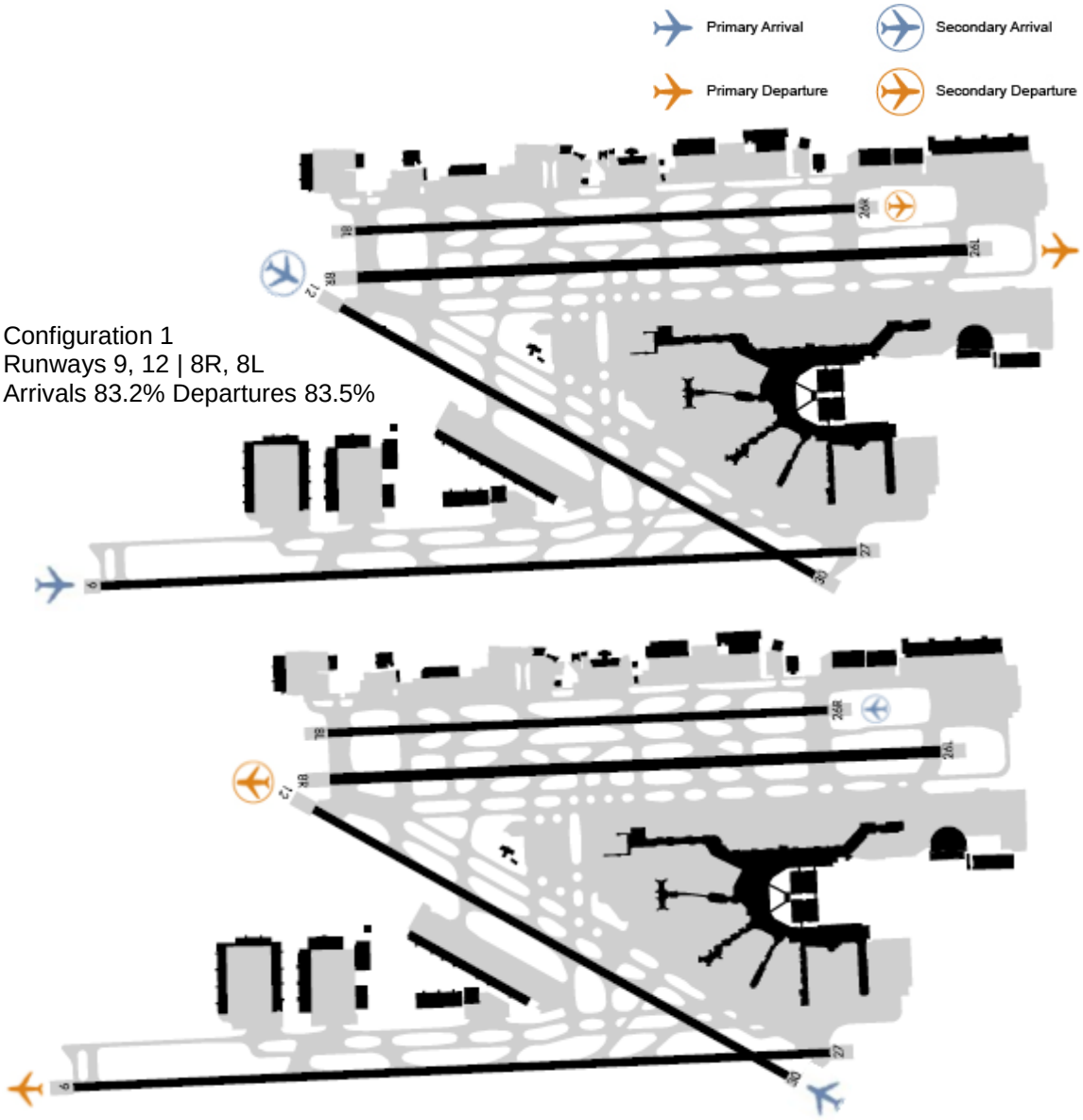
Exhibit 1-13 MIA Runway Operating Configurations



Source: U.S. Department of Transportation, Federal Aviation Administration. *Airport Diagrams* [http://www.faa.gov/airports/runway_safety/diagrams/ (Accessed March 2020)]. ASPM: *Efficiency Report for MIA* [(https://aspm.faa.gov/apm/sys/main.asp; (Accessed July 2018)].
Prepared By: ATAC Corporation, March 2020.

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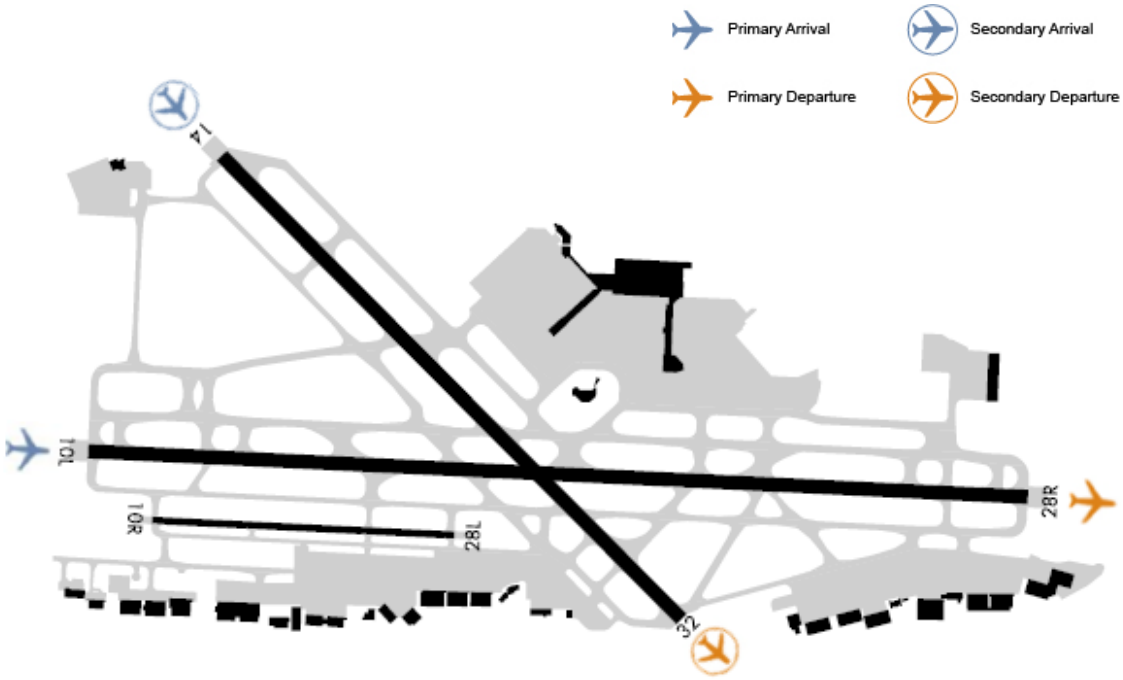
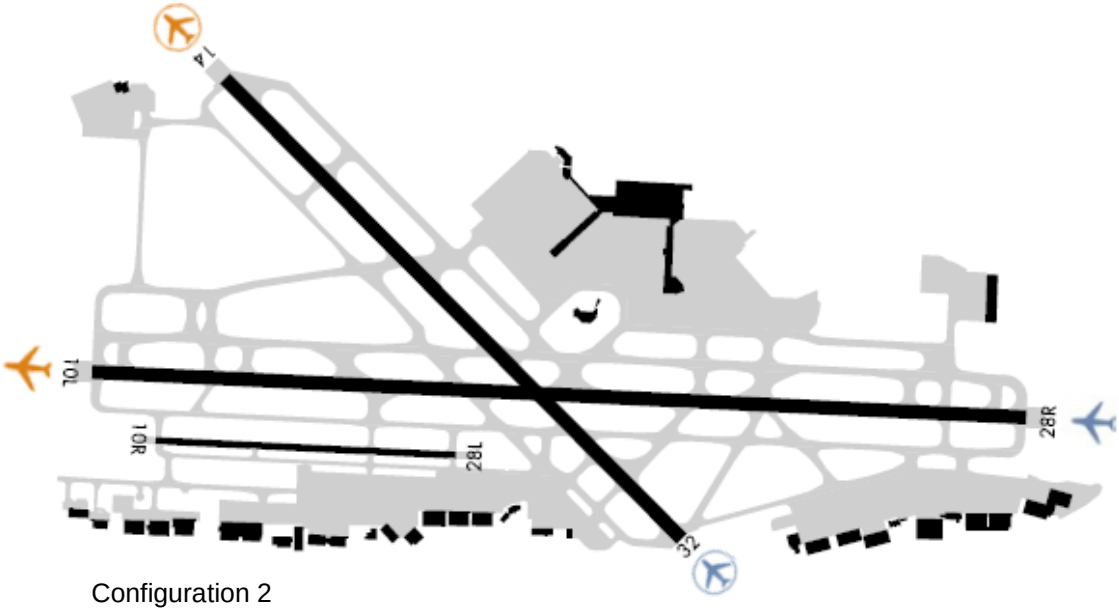
Exhibit 1-14 PBI Runway Operating Configurations



Configuration 1
Runways 10L, 14 | 10L, 14
Arrivals 79.1% Departures 77.4%



Configuration 2
Runways 28R, 32 | 28R, 32
Arrivals 20.9% Departures 22.6%

Source: U.S. Department of Transportation, Federal Aviation Administration. *Airport Diagrams* [http://www.faa.gov/airports/runway_safety/diagrams/ (Accessed March 2020)]. ASPM: *Efficiency Report for PBI* [https://aspm.faa.gov/apm/sys/main.asp; (Accessed July 2018)].
Prepared By: ATAC Corporation, March 2020

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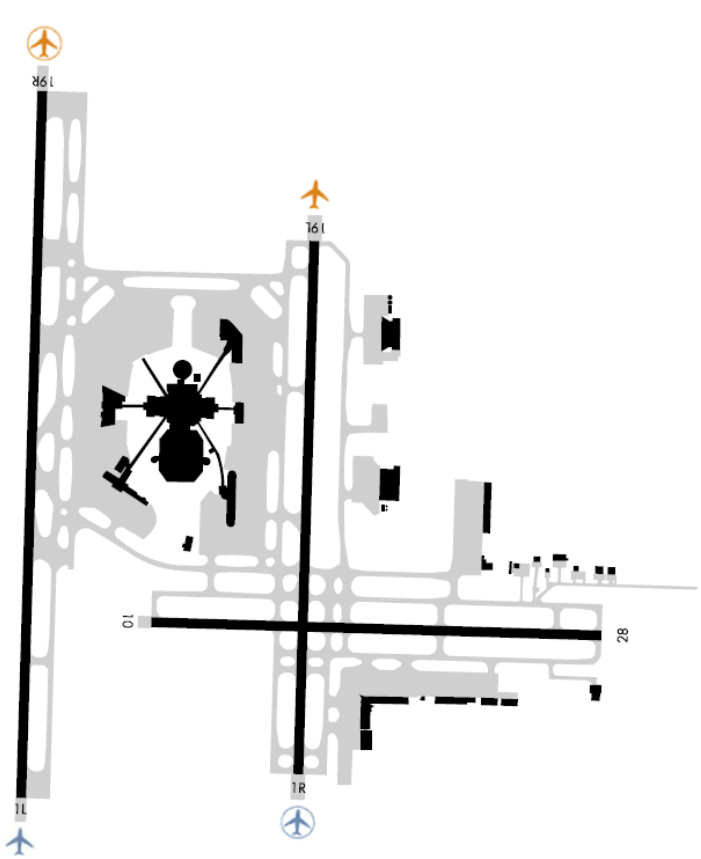
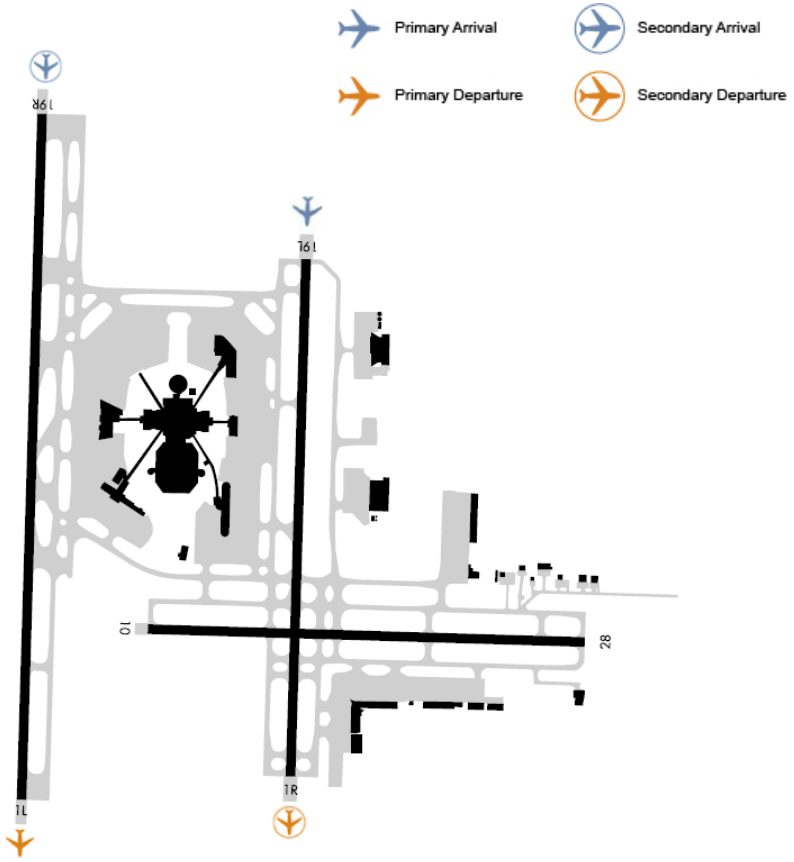
Exhibit 1-15 TPA Runway Operating Configurations



Configuration 1
Runways 1L, 1R | 1R, 1L
Arrivals 53.9% Departures 53.9%



Configuration 2
Runways 19L, 19R | 19R, 19L
Arrivals 46.1% Departures 46.1%

Source: U.S. Department of Transportation, Federal Aviation Administration. *Airport Diagrams* [http://www.faa.gov/airports/runway_safety/diagrams/ (Accessed March 2020)]. ASPM: *Efficiency Report for TPA* [https://aspm.faa.gov/apm/sys/main.asp (Accessed July 2018)].
Prepared By: ATAC Corporation, March 2020.

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