Runway Demand/Capacity, Critical Aircraft and Runway Requirements

4.1 Airfield Demand/Capacity Assessment

The purpose of the airfield demand/capacity analysis is to determine the ability of an airfield to accommodate projected demand. This is measured both in terms of hourly and annual capacity. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay* outlines the methodologies for determining both hourly and annual capacity for the purposes of airport planning. Airfield capacity improvements have been the subject of numerous studies at RSW.

Planning for a south Parallel Runway at RSW dates back nearly to the origins of the airport. A widely spaced south runway and Midfield Terminal Complex was the focus of a 1994 Environmental Assessment (EA). The new terminal (Midfield Terminal Complex) opened in 2005 and various actions have been taken to both enable and prepare the Airport for development of the new Parallel Runway. Because the investment is substantial, it is important that the timing of the runway is calibrated with the actual operational need.

There have been numerous evaluations of capacity for RSW over the past decade as part of an effort to refine the implementation timeline for the new runway. In September 2019, a *Whitepaper on the Timing for a Second Runway at Southwest Florida International Airport (RSW)* was prepared by GRA, Inc. and Transolutions (Timing White Paper). The Timing Whitepaper included an analysis of various factors influencing capacity at RSW (this whitepaper is located in Appendix G: Airfield Demand/Capacity Assessment).

Hourly Capacity

An airport's hourly capacity is defined as the number of operations an airfield can process during continuous demand. The hourly capacity is dependent on the general configuration of the runway system, the type of aircraft operating at the airport, the percentage of touch-and-go (pattern) activity, the number and placement of taxiway exits, wind direction and the percentage of time the airport operates under poor weather conditions. RSW is currently a single runway system served by a homogeneous mix of Category C commercial aircraft (aircraft in the range of 12,500 to 300,000 lbs.) with little touch-and-go activity. As a result, touch-and-go activity has little influence on capacity at RSW. Based on a single runway configuration and fleet profile (and excluding consideration of taxiway exits), the estimated hourly capacity would range between 53 and 55 operations per hour for IFR and VFR conditions, respectively. Because the VFR and IFR capacities are very similar, changes in the percentage of time that the airport operates under IFR conditions has very little effect on capacity.

Reviewing the specific airfield layout indicates that there are nine (9) taxiway exits connecting the parallel taxiway to Runway 6-24. Two airfield taxiway exits are located in optimum range for the fleet (5,000-7,000 feet from the landing threshold). This corresponds to an FAA taxiway exit factor of 0.92 under IFR conditions or 0.94 under VFR. Applying these factors would provide an estimated hourly capacity for the actual airfield configuration at RSW of 48.76 operations under IFR conditions or 51.7 operations under VFR conditions. Based on FAA methodology, the weighted hourly capacity when considering the taxiway exit configuration would be 51.4 operations per hour. Since the fleet is very similar and the number of taxiway exits has not been noted as a capacity concern for current operations, the weighted hourly capacity without consideration of taxiway exits was used for the purposes of determining the theoretical capacity for the airfield as outlined in the subsequent sections.

Annual Service Volume

Annual Service Volume (ASV) is an airport's practical operational capacity. As activity at an airport approaches its ASV, delays begin to escalate exponentially and have the potential to inhibit additional demand. FAA Order 5090.5, Formulation of the NPIAS and Airport Capital Improvement Plan (ACIP), indicates that planning for capacity improvements should begin in earnest when an airport reaches between 60% of its ASV and implementation of improvements should begin when it reaches 80% and is within 5 years of reaching its ASV. As a result, the rate of growth is a key consideration in informing how quickly an airport should proceed with capacity improvements. ASV reflects the product of the weighted hourly capacity (Cw), the daily ratio (ratio of annual demand to average daily demand during the peak month or D), and the hourly ratio (ratio of daily demand to average peak hour demand during the peak month or H).

$$ASV = Cw \times D \times H$$

As average daily demand and peak hour demand fluctuate, the ASV will vary accordingly. Review of historic ASV calculation in the Timing Whitepaper indicates that the actual daily ratio since 2009 has ranged between 231.96 and 254.2 and was estimated at 234.42 for 2018 in the 2019 whitepaper calculation. Actual hourly ratio calculations have ranged between 9.8 and 11.36 during the same period, with 11.36 estimated for 2018. Overall, ASV calculations between 2004 and 2019 have ranged between approximately 125,000 and 146,000 operations. In 2019, the ASV was estimated at just over 146,000 operations. Table 4-1 provides the daily and hourly ratios and resulting ASV for 2019, the most recent year of normal activity.. Table 4-1 also indicates that RSW exceeded 60% of its current ASV for a single runway configuration in 2021 and will approach 80% of ASV in the PAL 2 or around 2033. While demand will continue to grow throughout the planning period the airport is not currently expected to reach 100% ASV until 2043.

Table 4-1 Estimated Annual Service Volume								
Component	**2019 (Est.)**	**2021**	**PAL 1/2025**	**PAL 2/2030**	**2033 (Est.)**	**PAL 3/2035**	**PAL 4/2040**	**2043**
Total Operations	85,227	60% of 2019 ASV reached	99,128	109,747	80% of 2019 ASV reached	122,340	135,401	100% of 2019 ASV reached

Notes: 2019 EST based on 2019 Timing Whitepaper calculations. Non-commercial peak month average day based on 2019 actuals. Non-commercial peak-hour activity based on commercial aircraft profile. Assumes no military aircraft in peak hour.

Sources: ESA, C&S Companies, Transolutions, 2021, FAA Air Traffic Activity System (ATADS), 2019

As demand exceeds 80% of ASV, airfield delays will escalate rapidly, especially during peak periods. Figure 4-1 from the FAA *Advisory Circular 150/5060-5, Airport Capacity and Delay*, reflects the estimated delay per aircraft based on the ratio of demand to ASV. With RSW's considerable seasonal activity profile, delays during the peak months/periods will be much higher than those during the balance of the year. Based on current FAA Guidance and RSW activity projections and peaking characteristics, design and development of the new runway should be planned within 5 years of reaching ASV or around the 2038-time period. Activity and peaking characteristics should be monitored periodically to further calibrate the timing of the new facility.

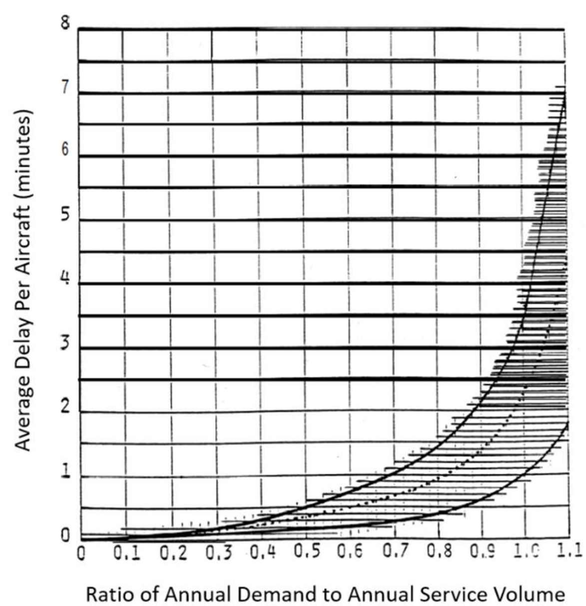


Figure 4-1: Average Aircraft Delay for Long-Range Planning

Source: FAA AC 150/5060-5, Figure 2-2

4.2 Critical Design Aircraft and Airport Reference Code

A critical design aircraft is usually the most demanding type of aircraft that regularly uses or is projected to regularly use an airport. The characteristics of this aircraft will help determine the Airport Reference Code, which is a categorization that summarizes the type of facility the airfield should be designed to handle. While being a simple categorization, there is more nuance behind the critical design aircraft and the Airport Reference Code.

Critical Design Aircraft

"The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing."
-FAA

The determination of the critical design aircraft (critical aircraft) is an essential component of airport planning. For example, runway, taxiway, apron and terminal facilities are designed to be able to handle existing and future critical aircraft. Furthermore, FAA AC 150/5000-17 mentions that, "The critical aircraft is the most-demanding aircraft type or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations, but excluding touch-and-go operations. An operation is either a takeoff or landing."

While many airports have one specific aircraft type designated as the critical aircraft, it is possible to create a composite critical aircraft that combines the most-demanding specifications of different aircraft that regularly use an airport. For example, while aircraft with the largest wingspan would require the largest amount of spacing between taxiways, another smaller aircraft could require a runway designated to handle faster approach speeds if it has a higher approach speed than the larger aircraft. It is also possible to group aircraft with similar dimensions and operational characteristics as one type of aircraft.

It should be noted that there is no requirement to build all airport facilities including runways, taxiways and terminals to meet the needs of the critical aircraft. In many cases, the critical design aircraft is not the majority aircraft type operating at an airport. Often, smaller categories of aircraft constitute the bulk of operations. Airfield and terminal planning should program future facilities to provide flexibility balancing the needs of the future fleet mix with operational and cost concerns.

Characteristics of the Critical Design Aircraft

The FAA has three aircraft categories that are used to classify the characteristics of a critical aircraft. These categories help airport sponsors determine the appropriate facilities that need to be planned and designed to handle the aircraft.

- Aircraft Approach Category (AAC): The aircraft approach category is determined by the aircraft manufacturer approach speed when landing the aircraft at the maximum certificated landing weight (V_{ref}). The AAC categorizations can be seen in Table 4-2 below. The AAC is one of the factors used to determine runway-design characteristics.

Table 4-2 FAA Aircraft Approach Categories (AAC)

AAC	VREF/Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: FAA Advisory Circular 150/5300-13A Change 1

- Aircraft Design Group (ADG): The ADG classification is based on two exterior dimensions of an aircraft: the wingspan and the tail height. The ADG is one of the factors used to determine runway-design characteristics; runway, taxiway and taxilane centerline separations; safety area requirements; aircraft parking requirements; and terminal planning requirements. The ADG classification can be seen in Table 4-3 and examples of different aircraft in different ADG categories can be seen in Figure 4-2.

Table 4-3 Aircraft Design Group Categories (ADG)

Group #	Tail Height (ft [m])	Wingspan (ft [m])
I	< 20′ (< 6 m)	< 49′ (< 15 m)
II	20′ - < 30′ (6 m - < 9 m)	49′ - < 79′ (15 m - < 24 m)
III	30′ - < 45′ (9 m - < 13.5 m)	79′ - < 118′ (24 m - < 36 m)
IV	45′ - < 60′ (13.5 m - < 18.5 m)	118′ - < 171′ (36 m - < 52 m)
V	60′ - < 66′ (18.5 m - < 20 m)	171′ - < 214′ (52 m - < 65 m)
VI	66′ - < 80′ (20 m - < 24.5 m)	214′ - < 262′ (65 m - < 80 m)

Source: FAA Advisory Circular 150/5300-13A Change 1

Taxiway Design Group (TDG): The TDG classification was implemented within the last decade to address new aircraft that entered service, which were primarily longer versions of existing aircraft. Though these aircraft share many of the same characteristics as the original shorter versions, their longer fuselage and wheel-base created ground maneuvering challenges when using airfields with then-existing taxiway design standards. As a result, a new aircraft classification system was implemented in addition to the ADG classification for the purposes of taxiway design. The TDG focuses on the landing gear configuration of aircraft to help determine taxiway pavement fillet requirements. The new TDG classification led to updated pavement filler designs for taxiway turns and intersections by widening them to avoid aircraft movement into non-paved areas. Figure 4-3 delineates the TDG categorization.

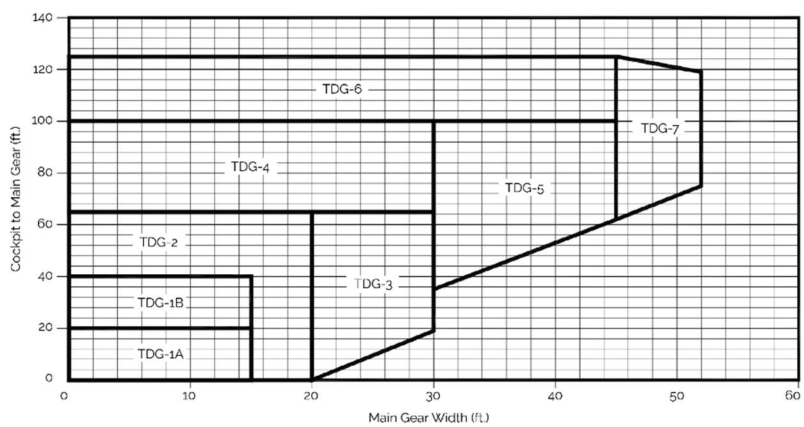
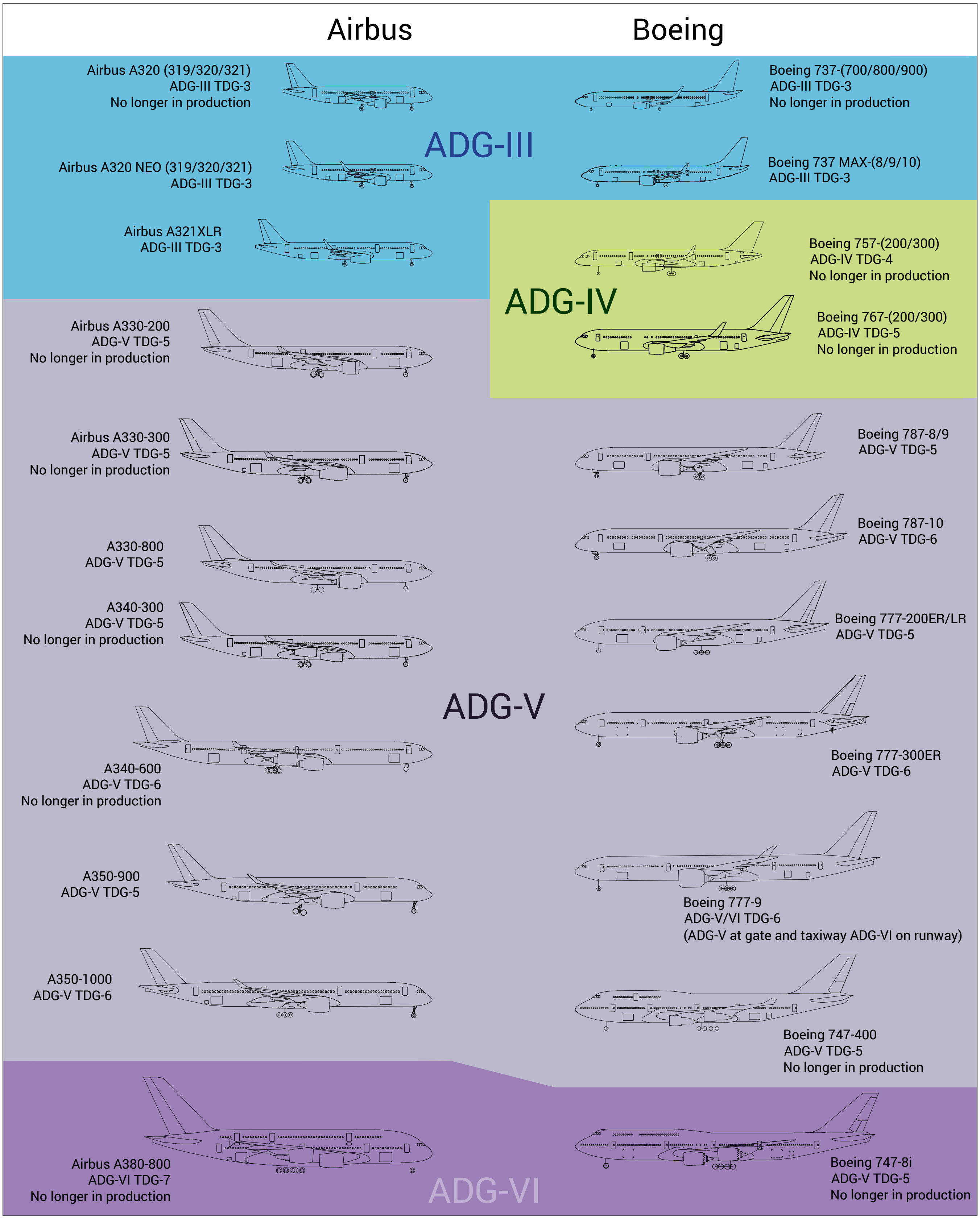


Figure 4-3 FAA Taxiway Design Group Classification

Source: FAA Advisory Circular 150/5300-13A Change 1



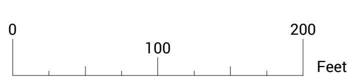


Figure 4-2 ADG Category Examples

Source: ESA Analysis October 8, 2021

Existing RSW Critical Design Aircraft

The 1992 and 2004 RSW Master Plan Updates recommended that the critical aircraft be designated as a composite ADG-V aircraft referring to the Boeing 747, Airbus A330 and A340 families. However, based on a pre-COVID traffic count, the existing critical design aircraft for RSW would be a Boeing 757/767 combination with approximately 7,040 operations between October 2018 and September 2019. For the AAC rating, RSW saw 18,206 operations for AAC Category D aircraft during the same time period. A summary of operations by aircraft category can be seen in Table 4-4. The resulting existing critical aircraft categories would be ADG-IV, TDG-5 and AAC-D.

Table 4-4 Pre-COVID One Year Passenger Aircraft Operations

Aircraft Category		ADG-III	ADG-IV	ADG-V	AAC-D
2018	Oct	3,604	512	32	908
	Nov	5,290	584	24	1,606
	Dec	6,642	642	34	1,900
2019	Jan	7,196	762	22	1,922
	Feb	6,906	750	24	2,702
	Mar	8,794	1,134	26	2,146
	Apr	7,106	766	26	1,788
	May	4,564	482	28	1,482
	Jun	3,710	382	20	982
	Jul	3,512	372	24	818
	Aug	3,370	262	28	1,064
	Sep	3,018	392	20	888
Total		63,712	7,040	308	18,206

Source: LCPA, ESA Analysis October 2021

Future RSW Critical Design Aircraft

International widebody aircraft, traditionally large ADG-IV or V aircraft have been operating at RSW since 1994. For example, Air Berlin (followed by Eurowings) operated up to four weekly flights to Germany in 2018. Flights to Germany are expected to resume in 2022 with Eurowings Discover (a Deutsche Lufthansa subsidiary) Airbus A330-300. As the Southwest Florida region continues to grow demographically and economically, passenger growth for domestic and Canadian markets is forecasted to be strong, leading airlines to potentially upgauge aircraft in operation at RSW.

The largest domestic aircraft that regularly operates at RSW is the Boeing 757-200 and 757-300. The Boeing 757 and 767 families are the only commercial aircraft still in use by U.S. airlines that are classified as ADG-IV aircraft. However, the 757 and 767 aircraft types have not been produced for U.S. commercial airlines since 2004 and 2003, respectively, and have already been permanently retired by some airlines. It is assumed, based on average fleet age and average aircraft retirement age, that the rest of these aircraft will be retired within a decade. These retirements are included in the forecasting analysis found in "Appendix F Forecast." All the 767 and 757 aircraft types were phased out by 2030. In the case of Air Canada, an Airbus 330 with 285 seats, was substituted for their 767 with 282 seats. There are no ADG-IV aircraft currently being designed by any western aircraft manufacturer.

As part of Chapter 3: Forecast of Aviation Demand, a design day schedule was created for the peak months of March and April using existing schedule information for 2020 and then forecasted for 2025, 2030, 2035 and 2040. RSW has different peaking characteristics than most airports in the United States, which results in most passenger activity occurring during peak months. Based on the peak month schedule for those two months, there are 488 operations projected for ADG-V aircraft in 2025. That number increases to 894 in 2040, with a complete phase-out of ADG-IV flights projected between 2025 and 2030. It is anticipated that the majority of ADG-V flights will be operated with the Airbus A330 family of aircraft. Table 4-5 below shows the forecasted operations for the peak months of March and April for ADG-IV and V aircraft.

Table 4-5 Forecasted ADG-IV/V Peak Month Operations

Year	2020	2025	2030	2035	2040
ADG-IV (B757 & B767)					
March	310	46	0	0	0
April	214	52	0	0	0
ADG-V (B747, B787, B777, A330, A340, A350)					
March	4	298	390	412	554
April	4	190	292	340	340
Peak Months Total					
ADG-IV	524	98	0	0	0
ADG-V	9	488	682	752	894

Source: TransSolutions & C&S, ESA Analysis, October 2021

The Airbus A330, currently the dominant ADG-V aircraft at RSW, first entered service more than 30 years ago is expected to remain in service until the 2030s. For long-term planning, it can be anticipated that its eventual replacement by more modern aircraft of similar size and capacity will most likely start in the 2030s and into the 2040s. Similar aircraft in size and capacity should be considered when determining the critical aircraft, such as the Airbus A350 or Boeing 787 family or even modernized and larger versions of the A330. Although these aircraft are of a newer design, they are of also ADG-V and are AAC-C aircraft like the A330.

For future critical-aircraft planning purposes, a composite aircraft meeting dimensional requirements of an A330-300, A350-900 or B787-9 should be used. These aircraft are all ADG-V and TDG-5. For the AAC rating, RSW saw 18,206 operations for AAC Category D aircraft between October 2018 and September 2019. Based on this flight history, we assume that the number of operations of Category D aircraft will continue to largely exceed 500 annual operations. The resulting composite critical aircraft should use the characteristics detailed below.

- Aircraft Approach Category: D (B737-800/900)
- Aircraft Design Group: ADG-V (A330, A350, B787)
- Taxiway Design Group: TDG-5 (A330, A350, B787)
- Wingspan: 212.42' (A350-900)
- Length: 219' (A350-900)

Airport Reference Code

The Airport Refence Code (ARC) is composed of the ADG and the AAC of the future critical aircraft combined into one code. Having determined that the critical aircraft for RSW is a composite aircraft being ADG-V and AAC-D, the resulting ARC is D-V (a combination of ADG-V and AAC-D).

Summary of findings for Critical Design Aircraft

- The existing Critical Design Aircraft is considered to be a composite aircraft with the following categorizations: ADG-IV, TDG-5 and AAC-D.
- The future Critical Design Aircraft starting in 2024 will be and ADG-V, TDG-5 and AAC-D type aircraft.
- The future ARC is D-V.

4.3 Airfield Requirements

Runways

This section addresses the specific requirements relative to Runway 6-24, as well as a new Parallel Runway. As a primary airfield facility at any airport, a runway must have the proper width, length and strength to safely accommodate the critical aircraft expected to use the airfield.

Runway width requirements for airport design are included in FAA AC 150/5300-13A, Change 1. The design standards are based on the critical aircraft's Approach Category, Design Group and the approach visibility minimums at the airport.

FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, provides guidelines to determine the ultimate runway length required at an airport facility. These guidelines consider airfield conditions, such as the elevation, mean daily maximum temperature and effective runway gradient. Length determinations also consider critical aircraft data, such as takeoff weight, length of haul and payload using individual aircraft performance manuals published by the manufacturers.

The runway's pavement strength is also an important factor to consider in future runway requirements. Airport pavement strength is evaluated to establish load-carrying capacity for expected operations, to assess the ability of pavements to support significant changes from expected volumes or types of traffic, and to determine the condition of existing pavements for use in the planning or design of improvements, which may be required to upgrade a facility.

Runway 6-24

Runway Width

The current width of Runway 6-24 is 150 feet. Criteria contained in FAA AC 150/5300-13A, Change 1, states that for the D-V designation, a runway width of 150 feet is adequate.

Runway Length Analysis

Runway 6-24 is 12,000-feet long and is capable of handling long-range flights by large ADG-V type aircraft, the most common type in the Airbus A330 family. Using Airport Planning and Aircraft Performance manuals from aircraft manufacturers (Airbus and Boeing), the 12,000-foot runway is capable of handling all the types of aircraft currently and project to use RSW. This includes the newer short-haul jets such as the 737 MAX, A220 and A320NEO families; and larger long-haul aircraft such as the B777, B787, B747-8 and A350 families. As such, no improvements are recommended with regard to the Runway 6-24 length.

Runway Pavement Strength

As indicated in Chapter 3 Existing Conditions, the Runway 6-24 pavement is currently strength rated at 120,000 pounds single wheel loading (SWL); 250,000 pounds double wheel loading (DWL); 538,000 pounds dual-tandem loading and 1,045,000 pounds double-dual-tandem loading (DDTL). The 1,045,000-pound, double-dual tandem strength rating satisfies the demands of the heaviest double dual tandem aircraft that could serve RSW. As such, the pavement strength of Runway 6-24 is considered to be adequate throughout the planning period for all aircraft currently serving or projected to serve RSW.

Runway Condition

The existing runway is generally noted in satisfactory or fair condition. The runway was last rehabilitated in 2007, during which Taxiway A was converted into a temporary runway for the duration of the runway rehabilitation (approximately six (6) months). A runway rehabilitation has been programmed within the Airport Capital Improvement Plan to be completed by the end of 2027.

New Runway

Planning for a Parallel Runway at RSW dates back to the original concepts for the airport proposed in the 1970s. The original airport plan provided for a general aviation-only parallel runway located north of Runway 6-24. Updated activity projections, along with a change in aircraft fleet-mix projections outlined in the 1992 Master Plan resulted in a proposed longer widely spaced south Parallel Runway that could accommodate air carrier aircraft and provide for simultaneous instrument approaches. This configuration would allow RSW to maximize its long-range flexibility in serving the growing demand for air service in the Southwest Florida region. The 2004 Master Plan forecasted the need for the new runway to be operational by 2020, the point at which the existing runway was projected to reach capacity. In the following years, several planning studies, preliminary design of site preparation and permitting work was done in order to prepare for full the design and construction.

The Great Recession and resulting airline consolidation resulted in the upgauging of aircraft (larger capacity narrow body aircraft) at RSW. This resulted in more passengers being moved with less aircraft and slower growth in aircraft operations, delaying the operational need for a new Parallel Runway. Based on the updated forecast and capacity analysis, a new runway will be needed by the early 2040s. More information on the new runway can be found in Appendix H Parallel Runway Close-out Report by AECOM, August 2017.

The additional operational capabilities provided by a new runway are not necessarily proportional to the number of runways, but is dependent on a number of factors that impact the use of each runway in the system. These include:

- Runway orientation/configuration
- Runway length
- Runway width
- Runway strength

A runway's utilization is determined in part by its length, strength, instrumentation, and separation from and orientation to, the other runways at the airport. For example, adding a shorter, commuter-length runway will limit its utility since larger aircraft will not be able to use it.

1970s	Initial planning for RSW included a parallel general aviation runway located north of Runway 6-24
1989	Runway Extension Justification Study concludes that Runway 6-24 should be extended from 8,400 feet to 12,000 feet to accommodate the projected future fleet mix
1992	Master Plan concluded that a new commercial runway located south of existing Runway 6-24 with a spacing of 5,875 feet from the existing runway, to allow for a new midfield terminal, to be constructed in between both runways
1993	Parallel Runway Length and Separation Refinement Study reviewed the proposed Parallel Runway's length and spacing and determined the spacing should be reduced to 5,385 feet, so as to reduce the impact on the FPL Transmission power lines located to the southeast The length of the runway would also be impacted by the presence of power lines. In order to clear the all airspace surfaces and provide sufficient take-off run for a majority of the projected fleet at RSW, a minimum runway length of 9,100 feet was deemed to be sufficient
1994	An Environmental Assessment (EA) is prepared to address the long-term development needs of the airport. The future Parallel Runway location was determined in the March 1994 Finding of No Significant Impact (FONSI) by the FAA in review of the EA
2004	2004 Master Plan maintained the previously identified runway dimensions (9,100 x 150 feet) and spacing of 5,385 feet and identified the need for the new runway to be built and operational by 2020 to support projected flight activity
2007	FAA revalidation of the 1994 FONSI on the configuration and location of the future Parallel Runway
2007-2009	Parallel Runway Program Study is initiated to plan and design certain enabling projects and initial planning of the new runway itself
2010	Certain western portions of the Parallel Runway and taxiway footprint were cleared, grubbed and graded under the Limited Site Preparation Projects
2011	80-foot shift of the Runway Alignment is included in the 2011 ALP Update and approved by the FAA. The 80' shift allows a second parallel taxiway to be built between the new runway and the terminal area. The spacing between runways increases to 5,465 feet.
2012	New centrally located ARFF Station, in between the existing and future runway, is commissioned
2014	Crossfield Taxiways serving the new Midfield Terminal Complex and future runway is commissioned
2016	Runway operations decrease below original projections, delaying the need for new runway construction
2017	In May, easement through private land was acquired for the partial future relocation of the FPL Transmission line
2022	New centrally located ATCT, in between the existing and future runway, is completed by the Lee County Port Authority and turned over to FAA for commissioning activities
2021-2023	Master Plan Update forecasts need for a new runway around 2040 time frame requiring advanced planning, final land acquisition, design and permitting to be started in the late 2030s
2027	Existing Runway 6-24 programmed rehabilitation
late 2030s	Future runway advanced planning, final land acquisition, design and permitting to begin
2040s	Existing Runway 6-24 reaches 100% of its capacity, new runway is commissioned

Similarly, new runways oriented in a parallel manner to an existing runway system generally provide greater utility since aircraft approaches will not intersect with approaches to other runways. Runway spacing is also a major factor in determining runway system capacity as it affects the dependency of runway operations, meaning that inadequate spacing between two parallel runways dictates that the use of one runway is dependent or constrained by activity on the other.

The following sections outline key factors in developing a new runway to serve RSW.

Orientation/Configuration

As mentioned in the existing conditions chapter, wind conditions are ideally suited to provide for such a configuration with 98.13% wind coverage for the 6-24 orientation. Thus, a parallel runway would be the optimal choice for a new runway. The 1992 Master Plan concluded that a parallel runway of the same length as the existing runway should be planned, with a 5,875-foot spacing from the existing runway. This spacing was to allow the maximum possible development area for a midfield terminal without impacting the major inland slough to the south, as well as meet the FAA's minimum recommended separation of 4,300 feet required for simultaneous instrument approaches. The general layout of the new runway can be seen in Figure 4-4.

In 1993, the Parallel Runway Length and Separation Refinement Study reviewed the proposed new parallel runway's length and spacing to determine if development costs and impacts could be reduced. Based on this review, the Refinement Study suggested a reduction in spacing to 5,385 feet from the 5,875-foot spacing originally proposed. By doing so, it was determined the Florida Power & Light (FPL) triple row of 230 Kv power lines to the south would not require relocation along the length of the runway, only where they passed beyond the new runway's northern end. The 5,385-foot spacing provided 1,095 feet of horizontal clearance from the 88-foot MSL power line poles, plus an additional 6-foot clearance margin of safety. According to the 1994 Environmental Assessment, the reduced parallel runway spacing would reduce the length of power lines requiring relocation from approximately 19,000 feet to 4,500 feet. The future parallel runway location was initially determined in the March 1994 Finding of No Significant Impact (FONSI), which the FAA later revalidated in 2007. The spacing was later increased by 80 feet to 5,465 feet in order to accommodate a potential second parallel taxiway to the new runway. This shift would have minimal impact to the power line relocation and was included in the 2011 ALP update that was approved by the FAA the same year.

Runway Width

As the new runway will be planned to accommodate simultaneous precision instrument approaches and the same commercial aircraft serving the current runway, the width of the new runway should adhere to Aircraft Design Group D-V as stipulated in FAA AC 150/5300-13A, Change 1, which states that for D-V designations, a runway width of 150 feet is adequate.

Runway Length

The 1992 Master Plan Update and the 1993 New Runway Length and Separation Refinement Study initially looked at replicating the existing 12,000 by 150-foot runway, so as to have maximum air-traffic control flexibility with runway assignments. As the studies progressed, the presence of the FPL high-voltage transmission lines to the east of the planned runway area presented a constraint that had to be mitigated. A solution was found by reducing the runway length to 9,100', establishing the runway separation at 5,465', as well as relocating a portion of the FPL transmission lines to avoid airspace interference issues.

Existing intercontinental traffic at RSW has historically been with Germany. Potential future intercontinental routes to/from RSW are most likely to be less than 5,000 nautical miles in length (enough for most of Western Europe including all of Germany and South America). Original plans accounted for heavier and less efficient ADG-V aircraft to fly routes

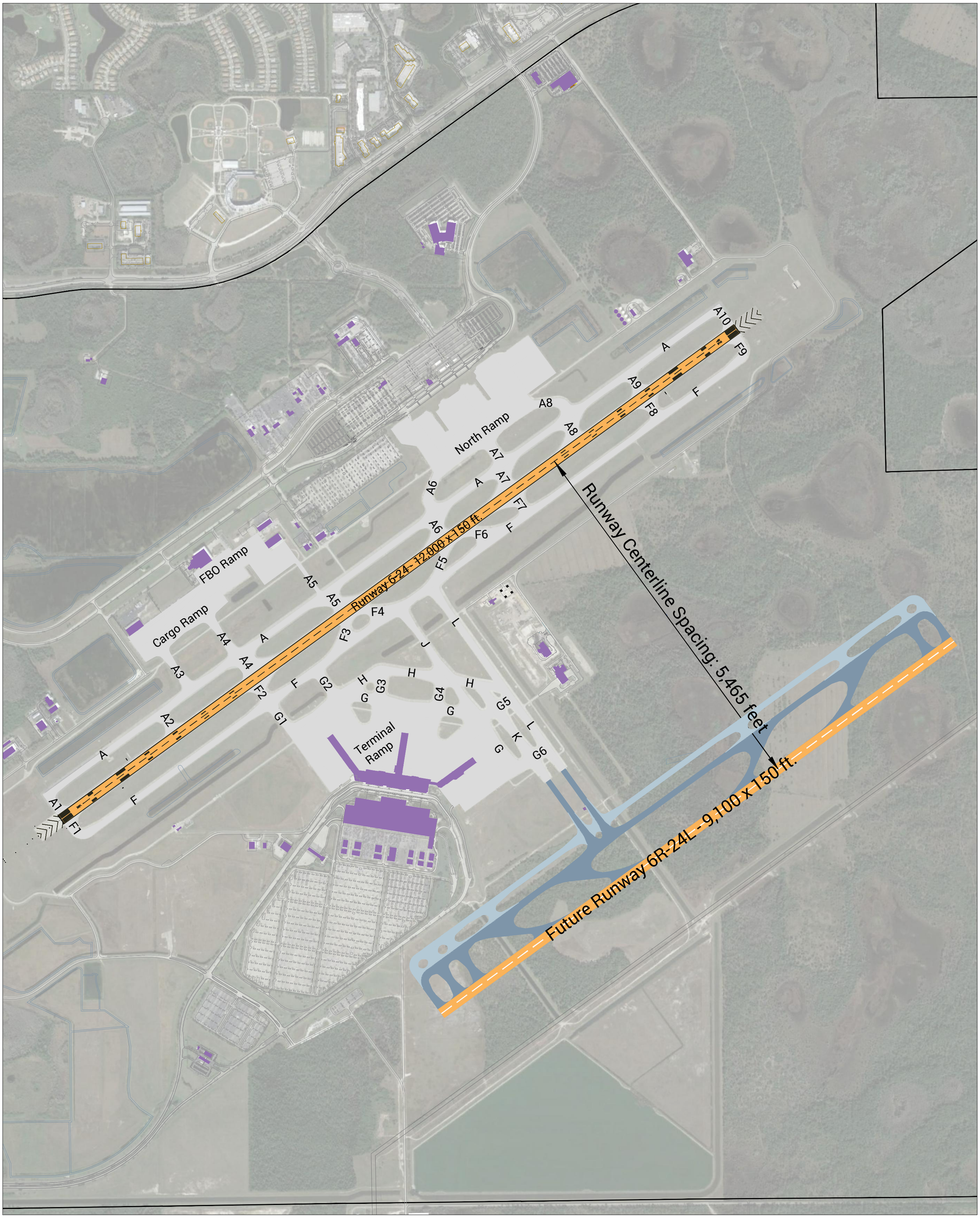


Figure 4-4 Future Proposed Runway Configuration

Source: ESA Analysis

DRAFT

between 5,000 and 6,500 nautical miles. The 12,000-foot length of the runway was optimized for this type of traffic. Using data from airport planning manuals provided by Airbus, the A330-300, the aircraft forecasted to be used for most intercontinental flights, could depart to intercontinental destinations of 5,000 nautical miles or less at commercial weight using 9,100 feet of runway. Based on a review of current and projected activity, it is anticipated that a length of 9,100 feet would provide the necessary capacity and capability to accommodate more than 95 percent of current and projected aircraft departures through the year 2040. Therefore, 9,100 feet is recommended as the minimum runway length to satisfy demand throughout the planning period. In the rare case where more take-off run would be required, the existing runway with 12,000 feet of take-off run could be used. (Example Figure 4-5, Runway Takeoff performance chart for an Airbus) A330-300) and calibrating performance for routes for a maximum of 5,000 nautical miles based on historical international routes (Figure 4-6).

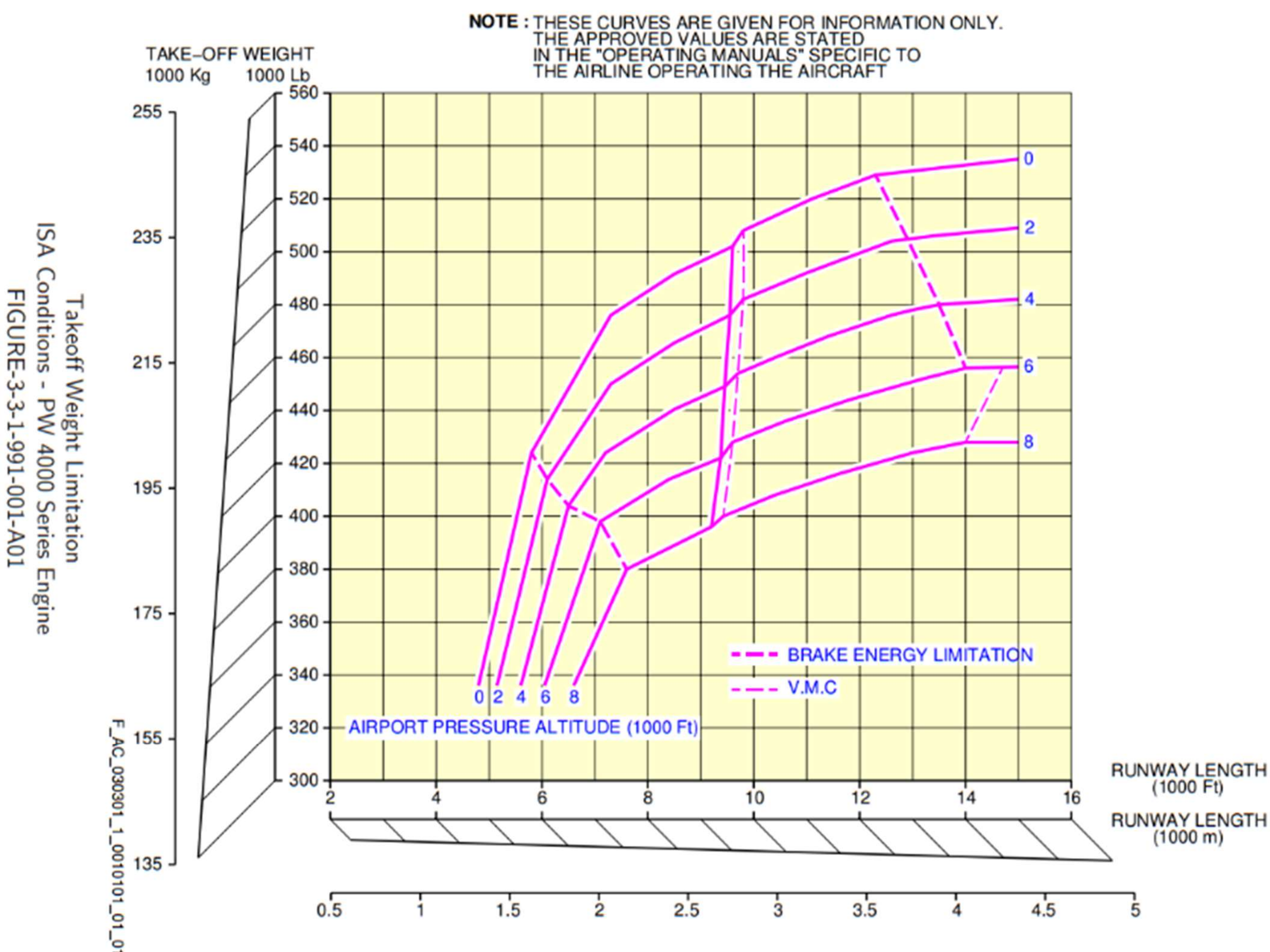


Figure 4-5 Airbus A330-300 Runway Takeoff Performance Chart

Source: Airbus A330 Aircraft Characteristics Airport and Maintenance Planning, July 2021

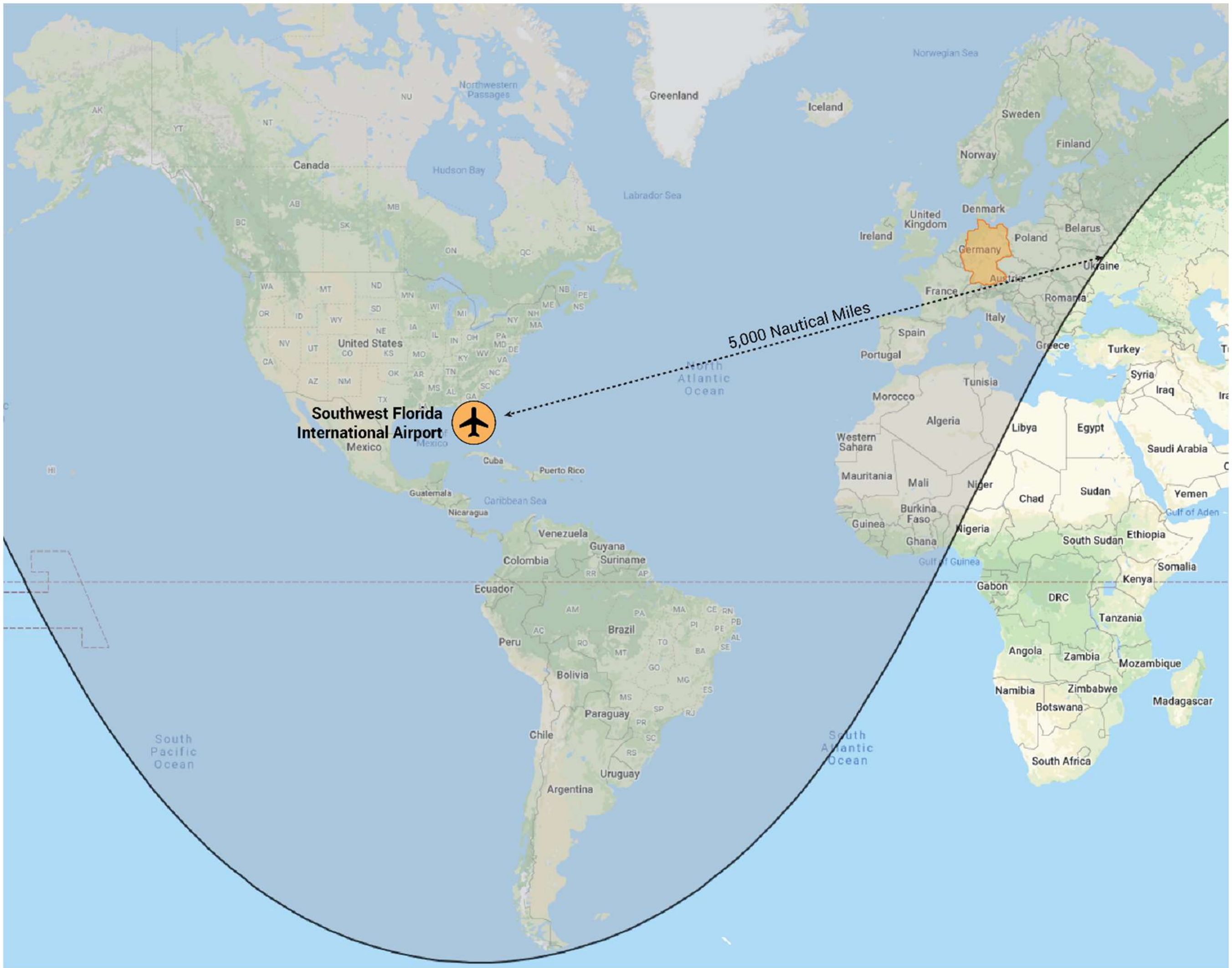


Figure 4-6 5,000 Nautical Mile range from RSW

Source: ESA Analysis

Runway Strength

The strength of the existing runway at RSW is designed to accommodate aircraft within the ADG-V category. As this designation represents the most critical aircraft expected to use the facilities, it is recommended that the new runway be designed to the same D-V standards similar to that of the existing runway.

FPL Transmission Line Relocation

An existing FPL transmission line corridor is located southeast of and parallel to proposed Runway 6R-24L. This existing facility was analyzed in the Parallel Runway Close-out Report, by AECOM August 2017 (Appendix H) both for potential interference with navigational aids (NAVAIDs) as well as for any penetrations to protected approach and departure surfaces for the proposed runway. The majority of the existing corridor posed neither interference, nor any airspace impact to the proposed runway; however, a 5,450 linear-foot segment of the corridor that crossed the eastern extended runway centerline would pose an impact to airspace. A variety of routes were evaluated and options were proposed before determining the most cost-effective and least environmentally invasive route. The proposed new alignment was coordinated with FPL transmission line engineering staff (Figure 4-7) and a non-binding estimate was received.

Preliminary environmental surveys were performed, and the reviewing agencies were identified. A portion of the required realignment lies within the boundaries of Lee County Conservation 20/20 lands, so a Lee County review process was necessary to secure approval of the alignment, the acquisition of these lands will need to be finalized prior to design and construction. Another portion of the realignment lies on privately owned property. Initial discussions with the private landowner indicated their willingness to discuss granting a right-of-way through their property. The required easement was identified, for which a legal sketch and description was secured. Coordination with the Lee County Department of Lands to led to a fair appraisal value for acquisition. A negotiation to purchase the easement was initiated and an agreement on the purchase was executed in May 2017.

During meetings with FPL representatives, the procedure for design and execution of a relocation of this magnitude was discussed. FPL requires the entity whose activity precipitates the need for relocation, in this case LCPA, to obtain the easement and secure all required local, state and federal agency approvals (permits) by designing a corridor footprint that meets FPL requirements. LCPA would also be responsible for designing and constructing the new corridor embankment and agree to pay FPL's design and construction fees for the actual construction of transmission line towers and lines along with development of all documents necessary to remove the existing lines and towers and vacate the existing easement.

At the time of the coordination in 2016, projected operations did not warrant construction of runway 6R-24L in the near future; therefore, the relocation of FPL facilities would be delayed until a later time in coordination with commissioning of the Parallel Runway.

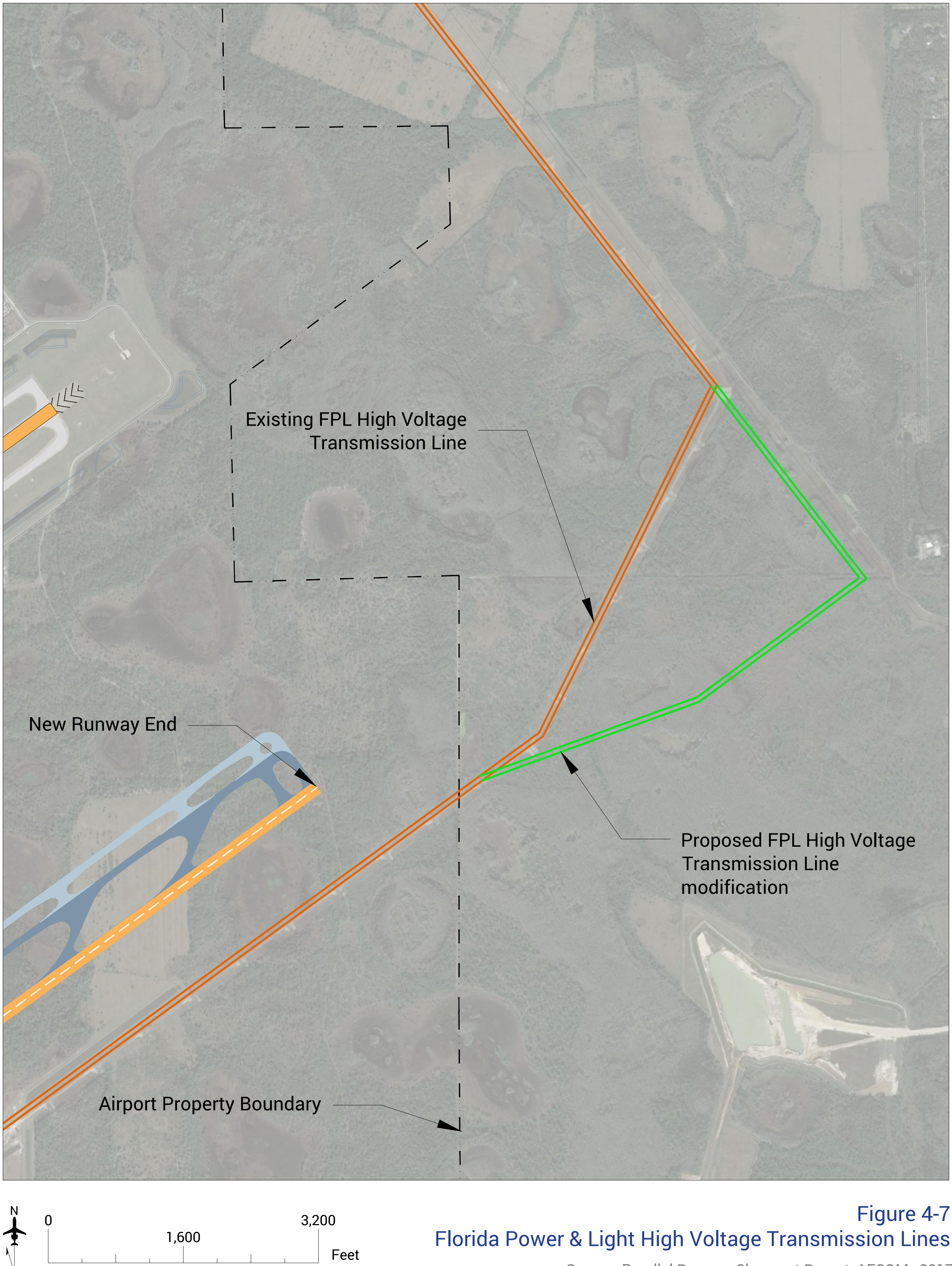


Figure 4-7
Florida Power & Light High Voltage Transmission Lines

Source: Parallel Runway Close-out Report, AECOM , 2017

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