



## Chapter 4 Demand Capacity and Facility Requirements

This chapter summarizes the analyses conducted, based on the approved Forecast, on how to meet the anticipated demand for activities at RSW throughout the Master Plan horizon. These include airfield, terminal, cargo, support facility improvements as well as other opportunities for development among others.

### 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 *White Paper on the Timing for a Second Runway at Southwest Florida International Airport (RSW)* was prepared by GRA, Inc. and TransSolutions (Timing White Paper). The Timing White Paper included an analysis of various factors influencing capacity at RSW. The White Paper 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 pounds) 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 Instrument Flight Rules (IFR) and Visual Flight Rules (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 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 ( $C_w$ ), 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):

$$ASV = C_w \times D \times H$$

As average daily demand and peak hour demand fluctuate, the ASV will vary accordingly. Review of historic ASV calculation in the Timing White Paper 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 Timing White Paper 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 1/2026	PAL 2/2030	2033 (Est.)	PAL 3/2036	PAL 4/2041	2043
Total Operations	85,227	60% of 2019 ASV reached	105,654	115,867	80% of 2019 ASV reached	126,079	136,291	100% of 2019 ASV reached

SOURCES: ESA, C&S Companies, TransSolutions, 2021; FAA Air Traffic Activity System (ATADS), 2019

NOTES: 2019 EST based on 2019 Timing White Paper 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.

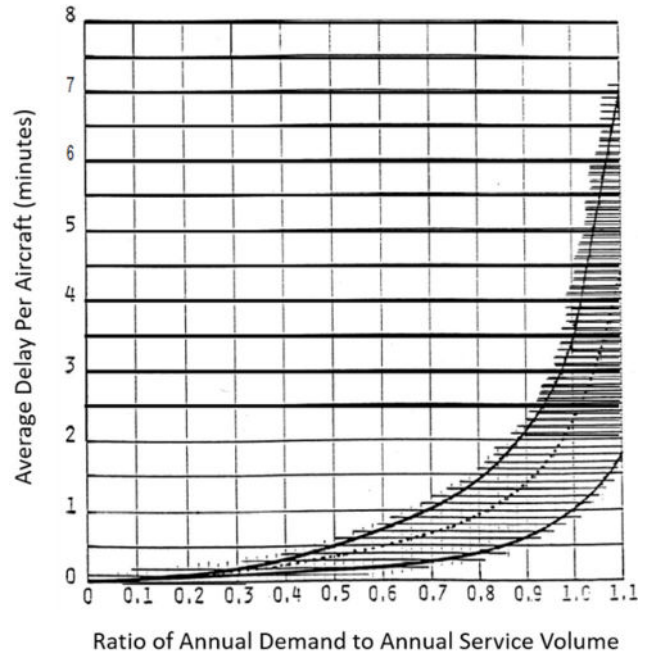
As demand exceeds 80% of ASV, airfield delays will escalate rapidly, especially during peak periods. **Figure 4-1** (from the FAA *Advisory Circular 150/5060-5, Airport Capacity and Delay*) reflects the estimated delay per aircraft based on the ratio of demand to ASV. With RSW’s considerable seasonal 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.

## 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 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.”



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

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

“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

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**. The AAC is one of the factors used to determine runway-design characteristics.
- 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 4-2 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

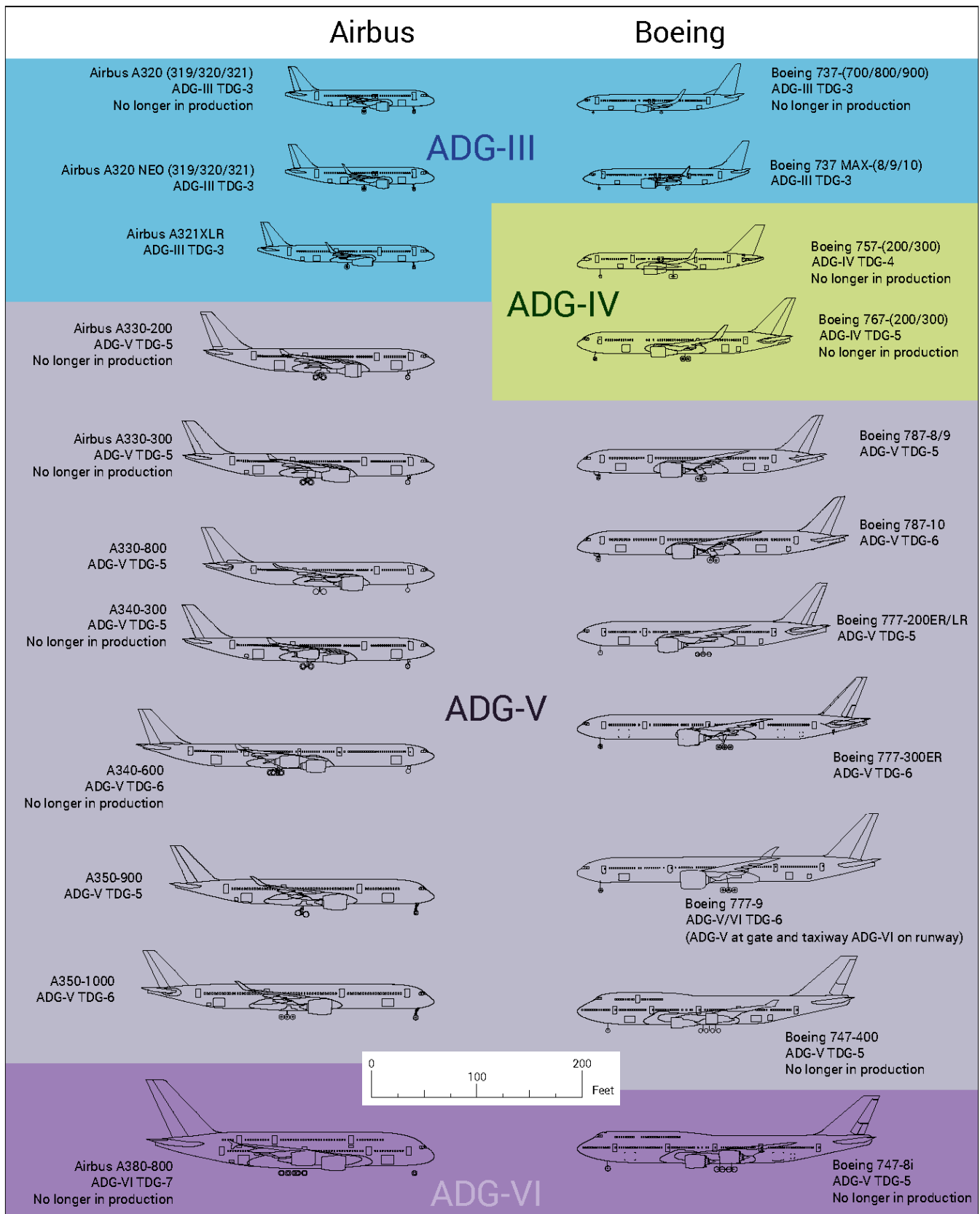
SOURCE: FAA Advisory Circular 150/5300-13B

**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' to < 30' (6 m to < 9 m)	49' to < 79' (15 m to < 24 m)
III	30' to < 45' (9 m to < 13.5 m)	79' to < 118' (24 m to < 36 m)
IV	45' to < 60' (13.5 m to < 18.5 m)	118' to < 171' (36 m to < 52 m)
V	60' to < 66' (18.5 m to < 20 m)	171' to < 214' (52 m to < 65 m)
VI	66' to < 80' (20 m to < 24.5 m)	214' to < 262' (65 m to < 80 m)

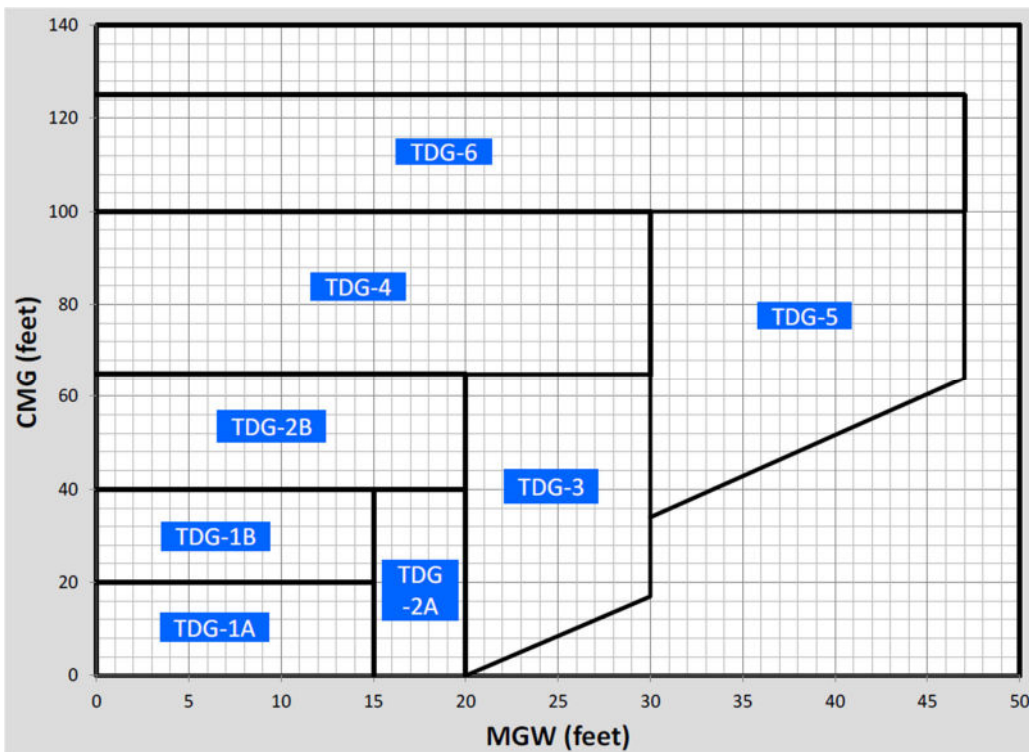
SOURCE: FAA Advisory Circular 150/5300-13B

- 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.



SOURCE: ESA Analysis, October 8, 2021

Figure 4-2 ADG Category Examples



SOURCE: FAA Advisory Circular 150/5300-13B

**Figure 4-3 FAA Taxiway Design Group Classification**

## 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
<b>Total</b>		<b>63,712</b>	<b>7,040</b>	<b>308</b>	<b>18,206</b>

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, Passenger and Operations Forecast, 2020, C&S Companies & TransSolutions. 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

<b>Table 4-5 Forecasted ADG-IV/V Peak Month Operations</b>					
<b>Year</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>
<b>ADG-IV (B757, B767)</b>					
March	310	46	0	0	0
April	214	52	0	0	0
<b>ADG-V (B747, B787, B777, A330, A340, A350)</b>					
March	4	298	390	412	554
April	4	190	292	340	340
<b>PEAK MONTHS TOTAL</b>					
ADG-IV	524	98	0	0	0
ADG-V	9	488	682	752	894

SOURCE: TransSolutions and C&S, ESA Analysis, October 2021

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** shows the forecasted operations for the peak months of March and April for ADG-IV and V aircraft.

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 Reference 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 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 150/5300-13B. 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 150/5300-13B, 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 2, 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.

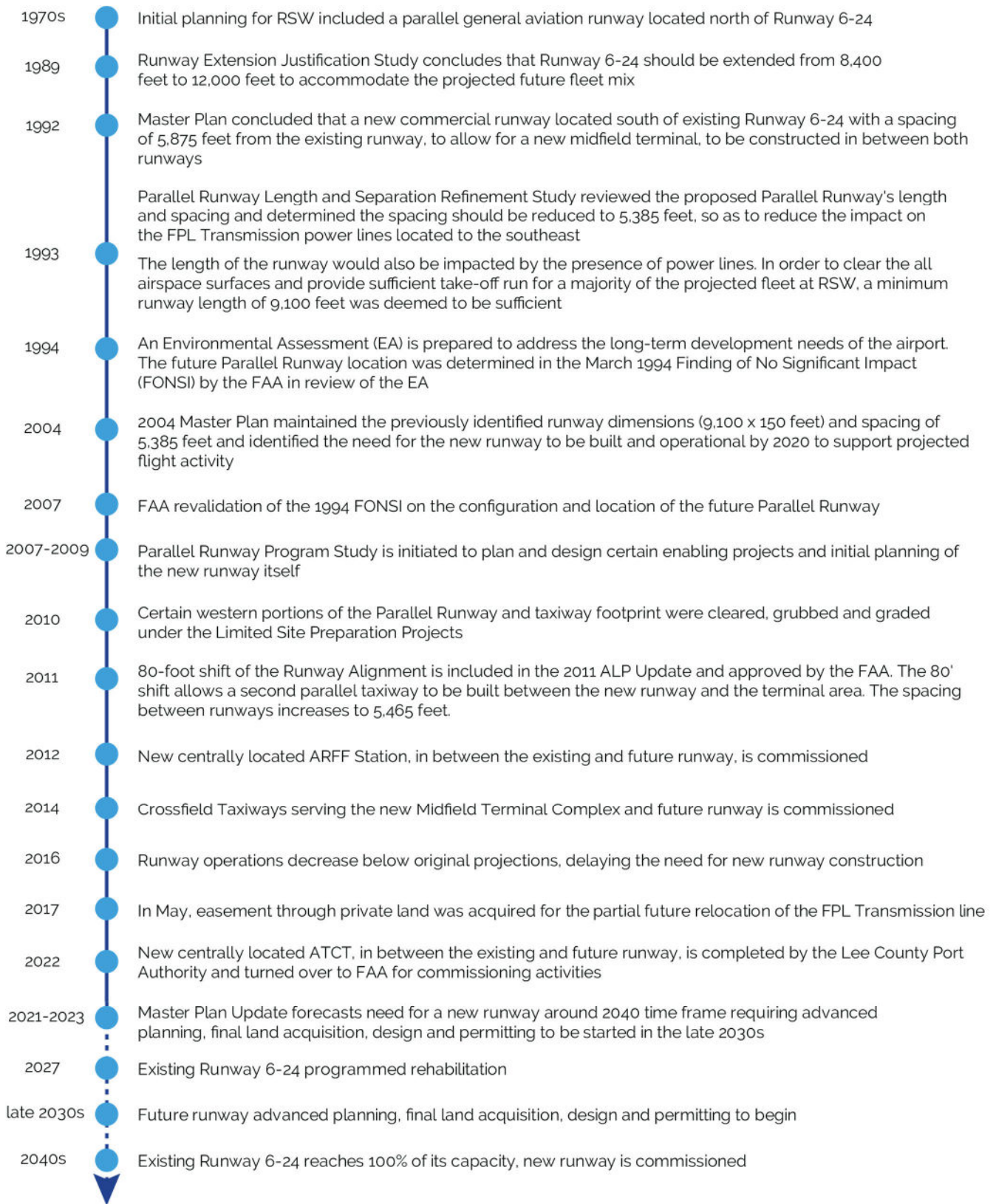
### ***Runway Condition***

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 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, 2017, by AECOM.



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.

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.

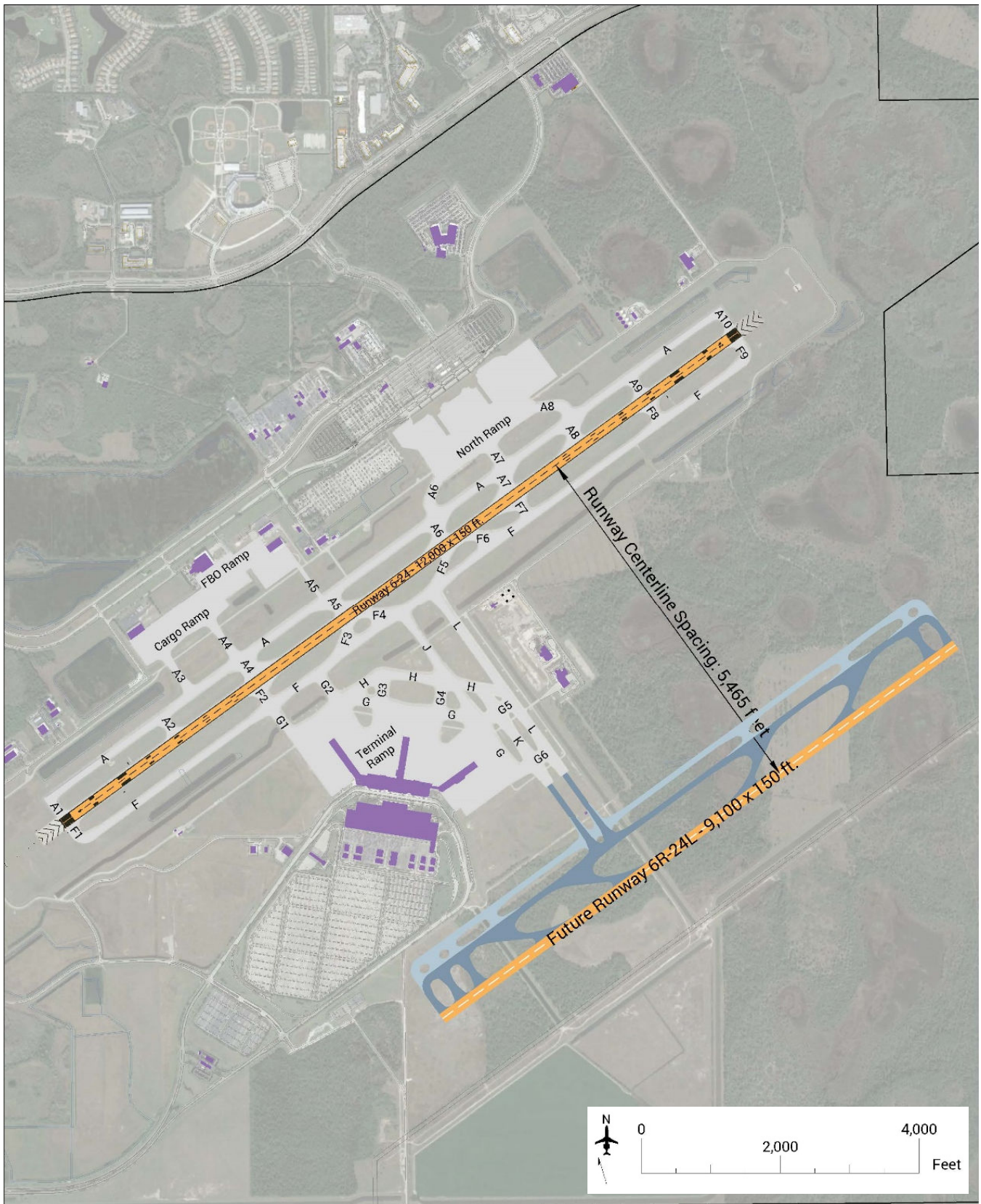
### ***Orientation/Configuration***

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.

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. The general layout of the new runway can be seen in **Figure 4-4**.

### ***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 150/5300-13B, which states that for D-V designations, a runway width of 150 feet is adequate.



SOURCE: ESA Analysis

**Figure 4-4 Future Proposed Runway Configuration**

## ***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 to/from Germany. Potential future intercontinental routes to/from RSW are most likely to be less than 5,000 nautical miles (NM) 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 between 5,000 and 6,500 NM. 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 NM 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% 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. Using **Figure 4-5**, Runway Takeoff performance chart for an Airbus A330-300; and calibrating performance for routes for a maximum of 5,000 NM based on historical international routes (**Figure 4-6**) such as Germany, a takeoff performance analysis supports these findings. This runway would also be to accommodate other widebody aircraft such as the Boeing 787 and Airbus A350.

## ***Runway Strength***

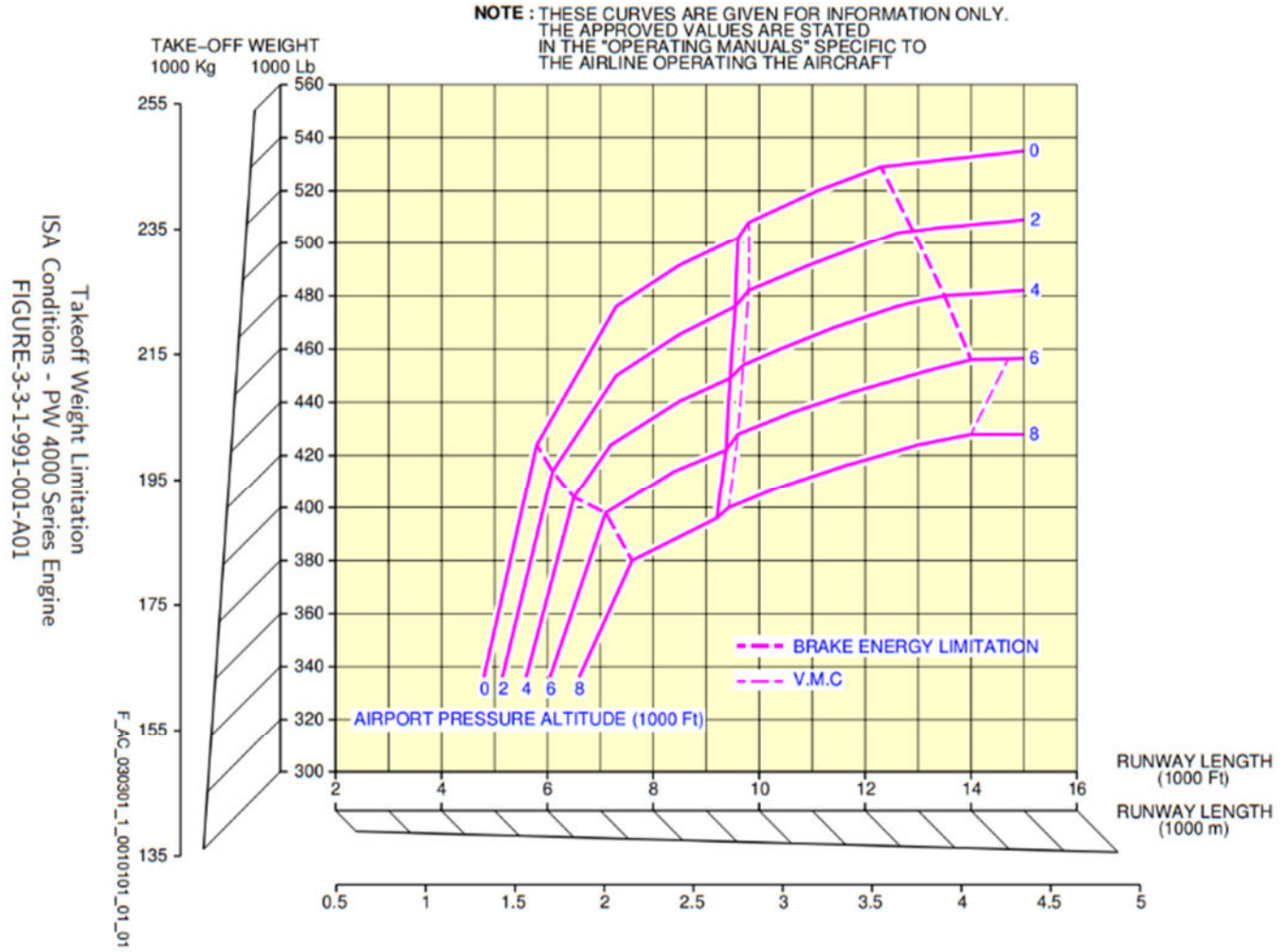
The strength of the existing runway at RSW is designed to accommodate aircraft within the ADG-V category. As this designation represents the critical aircraft expected to use the facilities, it is recommended that the new runway be designed to the same D-V standards similar to that of the existing runway.

## ***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, 2017, by AECOM (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 for CAT-I instrument landing systems, 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.

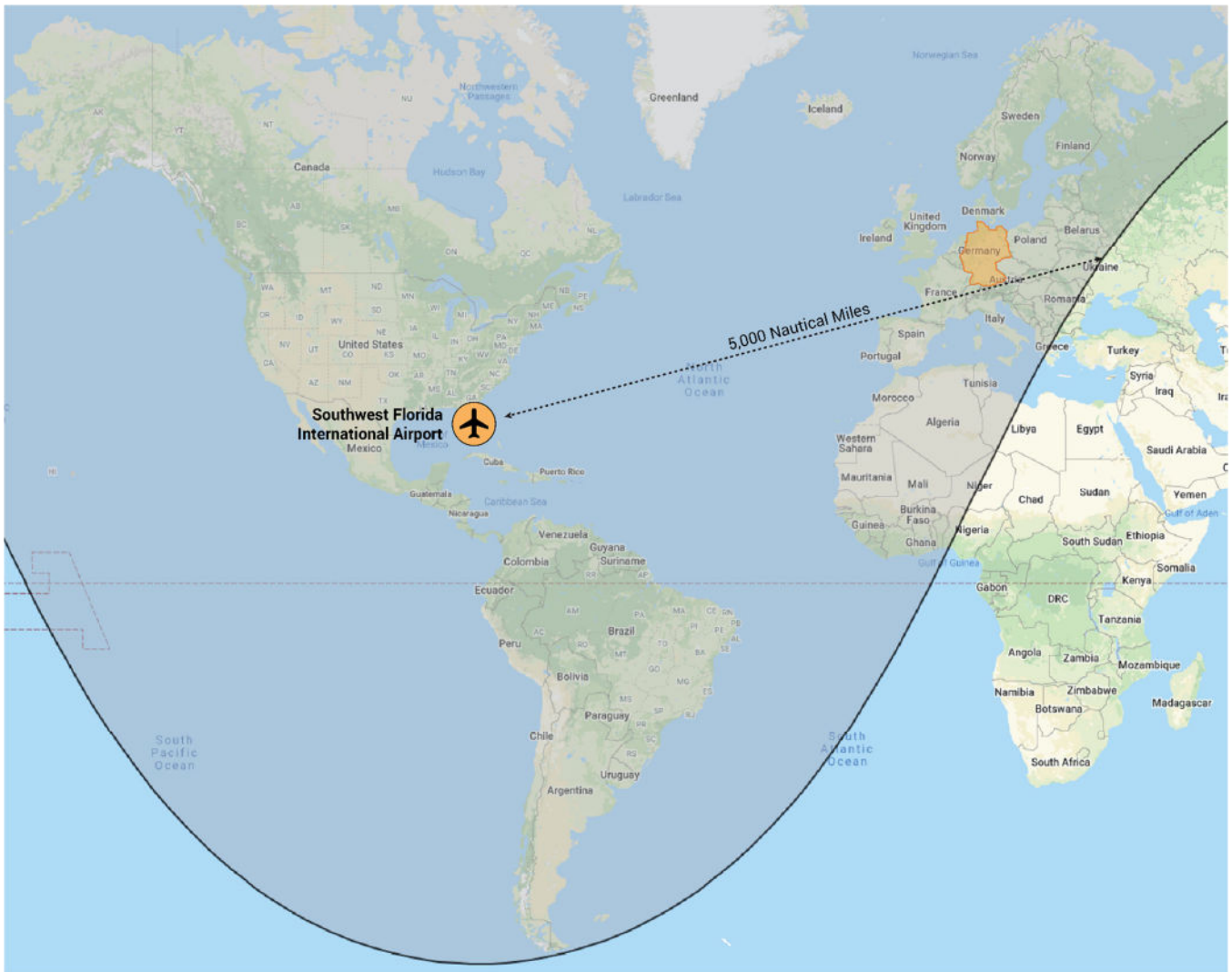
To address the airspace issues, preliminary environmental surveys were performed, and the reviewing agencies were identified. A portion of the required realignment lies within the boundaries of Lee County Conservation 20/20 lands, so a Lee County review process was necessary to secure approval of the 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 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.



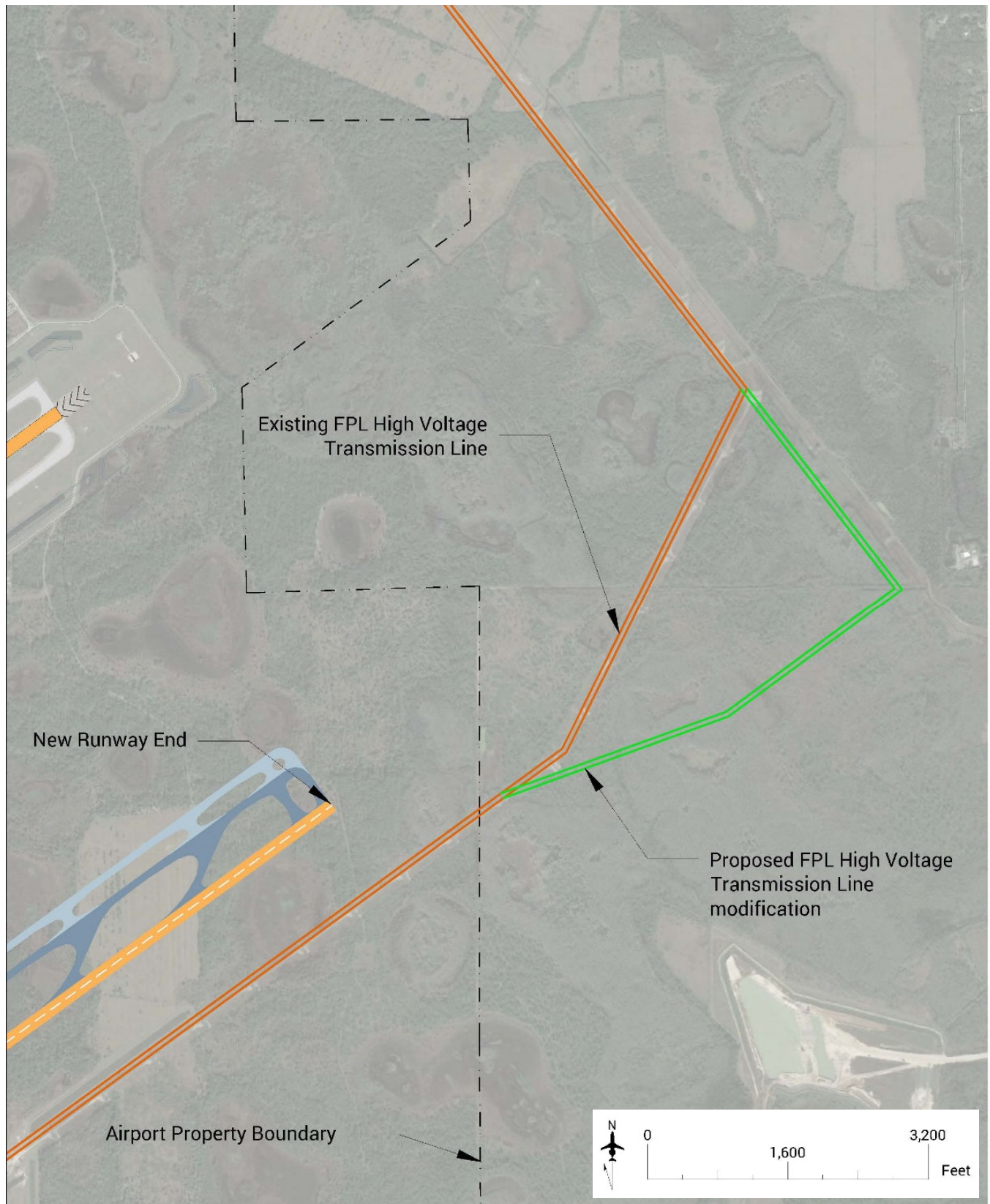
SOURCE: Airbus A330 Aircraft Characteristics Airport and Maintenance Planning, July 2021

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



SOURCE: ESA Analysis

**Figure 4-6 5,000-Nautical-Mile Range from RSW**



SOURCE: AECOM, Parallel Runway Close-Out Report, 2017

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

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.

As part of the facility requirements analysis, a preliminary recommendation is that at least one of the runways, either existing or the future planned runway, should be equipped with equipment to allow a CAT-II approach during strong instrument meteorological conditions (IMC). CAT-II IMC occurs approximately for 100 hours spread out over the course of a year. In 2008, Ohio University studied the compatibility of a new parallel runway with either a CAT-I or CAT-II approach with the FPL transmission line. The study found that a CAT-I approach on the new parallel runway would not be impacted by the existing FPL transmission line. However, the FPL transmission line would interfere with the approach equipment needed to handle a CAT-II approach. Should a CAT-II approach be required on the new parallel runway, the section of FPL line that runs parallel to the new runway would need to be relocated in addition to what would be required to mitigate airspace issues.

## Taxiways

A proper taxiway system should provide freedom of movement to and from the runways of an airport under a variety of operating conditions. This includes entrance and exit taxiways, taxiway run-up areas, apron taxiways, and taxilanes. Some of the basic design principles for an efficient taxiway system includes the following:

- Provide each active runway with a full parallel taxiway.
- Construct as many by-pass, multiple access, or connector taxiways as required to ensure efficient access to each runway and runway end.
- Provide taxiway hold areas for each runway end.
- Build all taxiway routes as direct as possible while avoiding direct connections between the runway and the parking aprons.
- Provide adequate curve and fillet radii.
- Avoid developing areas which might create ground traffic congestion.
- Ensure taxiways are adequate to serve projected aircraft ARC.

Improvements to a taxiway system can be warranted for more than just capacity enhancement reasons. A key consideration for taxiway enhancements is the safety of aircraft movements, as well as the efficiency of aircraft movements on the airfield and to access developing portions of the Airport.

The taxiway system at RSW was largely built before new taxiway design standards were codified in FAA AC 150/5300-13B. While taxiway separations and fillets were previously based on the ADG rating of the critical aircraft for that taxiway; the new AC created a new categorization system called Taxiway Design Group (TDG). Under the new system, aircraft are

categorized into different TDG categories based on a combination of wheel-base length and width. The purpose of the new TDG categorization system is to avoid taxiway excursions of newer aircraft being designed with longer or wider wheelbases. The new TDG requirements detail new taxiway fillets that generally provide increased pavement area to allow an aircraft to turn without leaving the pavement area.

The following sections outline requirements needed for the existing and potential future taxiway system at RSW.

## Taxiway A

Taxiway A is the full-length parallel taxiway serving Runway 6-24. This taxiway, which is located on the north side of Runway 6-24, has been constructed to a width of 75 feet, and meets the design Group V's minimum taxiway width. Taxiway A's runway centerline to taxiway centerline spacing of 400 feet also meets the separation standards for Design Group V aircraft. The parallel taxiway has a total of nine taxiway connectors, all of which provide access to and from the parallel taxiway and the runway. Five of these taxiways, Taxiways A4 through A8, are high-speed exit taxiways. Only two (A3 and A5 connecting to the Cargo Ramp) of the nine connector taxiways meet TDG-5 fillet requirements. Any future rehabilitations or improvements should be made to TDG-5 standards. As noted in the Existing Conditions chapter, the full-length taxiway is in "fair" condition with the end sections including Taxiways A1 and A10 in "good" condition having completed pavement rehabilitation in 2020-2021.

Further in this chapter, a discussion will focus on potential airside development opportunities on the North side of the airfield. As part of this study, a close parallel taxiway could be needed. The area that would be required for such a parallel taxiway meeting ADG-5 and TDG 5 taxiway design standards should be protected for future study and development.

## Taxiway F

Taxiway F is the full-length parallel taxiway serving Runway 6-24. This taxiway, which is located on the south side of Runway 6-24, has been constructed to a width of 75 feet, and meets the design Group V's minimum taxiway width. Taxiway F's runway centerline to taxiway centerline spacing of 400 feet also meets the separation standards for Design Group V aircraft. The parallel taxiway has a total of nine taxiway connectors, all of which provide access to and from the parallel taxiway and the runway. Five of these taxiways, Taxiways F3 through F6, are high-speed exit taxiways. Only Taxiway F1 meets TDG-5 fillet requirements, any future rehabilitations or improvements to the other taxiways should be made to TDG-5 standards. As noted in the Existing Conditions chapter, the full-length taxiway is in "good" overall condition having completed pavement rehabilitation in 2020-2021.

Taxiway F is the primary parallel taxiway to Runway 6-24 for commercial operations. The majority of operations at RSW are commercial aircraft and, all departing and arriving commercial aircraft use Taxiway F. As traffic increases, Taxiway F will reach capacity with the need for a second parallel taxiway to allow for improved aircraft queueing as well as removing aircraft from the queue in case of irregular needs. This taxiway should be designed to meet ADG-V and TDG-5 taxiway design standards.

## Cross-Field Connector Taxiways

After the completion of the Midfield Terminal in 2005, a pair of "Cross-Field" taxiways were constructed. In the short to medium-term, these connector taxiways would allow easier access from the existing runway to the terminal area. In the long-term, their configuration was optimized so as to be extended and reach the new parallel runway whenever it would be activated. A potential third parallel crossfield taxiway to the east of the existing crossfield taxiways has been planned

and its location is depicted on the latest approved ALP. As these taxiways were built after the implementation of FAA AC 150/5300-13A Change 1, their configuration meets TDG-5 fillet standards.

## New Runway North Parallel Taxiway(s)

In reviewing projected demand and the configuration of the ultimate midfield program, it is recommended that the new runway be configured with at least a single parallel taxiway. A second parallel taxiway could improve aircraft flow and operations at peak times. Provisions should be made that if only one taxiway is initially built, a second parallel should be protected for and included in its design. It is recommended that the taxiways be built on the north side of the new runway to provide easy access to and from the midfield terminal. The new taxiways should be built to meet TDG-5 taxiway design standards.

## New Terminal Apron for Concourse E

The proposed Concourse E will require appropriate aircraft apron and taxiway/lane access for aircraft. The description and configuration of this apron will be further discussed in the Terminal Facility requirements section.

## Airfield Geometry Study

In January 2018, an "Existing Airfield Geometry Evaluation Study" was commissioned to identify potential issues with the existing taxiway pavement geometry (Appendix I).

The study placed taxiway issues into two groups; taxiways that did not need immediate attention, and taxiways where mitigation was proposed.

While dimensionally the airfield meets the taxiway width and centerline separations for ADG-V aircraft requirements; as noted in the Existing Conditions chapter in Table 2-5, many of the taxiway intersections or turns do not meet TDG-5 pavement fillet requirements. The 2018 study in most cases generally found that taxiways, while not meeting TDG-5 requirements, for the most part did not require immediate modification to meet standards. Through simulation it was found that the identified aircraft used for modeling, an A330-200 did in most cases navigate the taxiways without much issue. However, it should be noted in certain cases that the aircraft taxi track reached the limit of acceptable use of pavement and that the aircraft used for simulation is shorter than the aircraft that will be used by European carrier EuroWings to replace the legacy RSW-Germany route flown previously by Air Berlin. The new aircraft is 16 feet longer and has more demanding taxi track. In addition, cargo aircraft such as the MD-11 operated by Western Global are TDG-6, (which requires more pavement than TDG-5). While the MD-11 is not the level critical aircraft, the use of RSW by MD-11 type aircraft reinforces the need for improved turning fillets meeting at least TDG-5 requirements.

While maintaining the overall recommendation to keep taxiway fillets in their current configuration, it is also recommended for them to be upgraded to TDG-5 standards whenever there is significant pavement or rehabilitation work on these taxiways, or if a pattern of aircraft incidents due to pavement excursions arise.

The 2018 study had more immediate recommendations for the following identified issues.

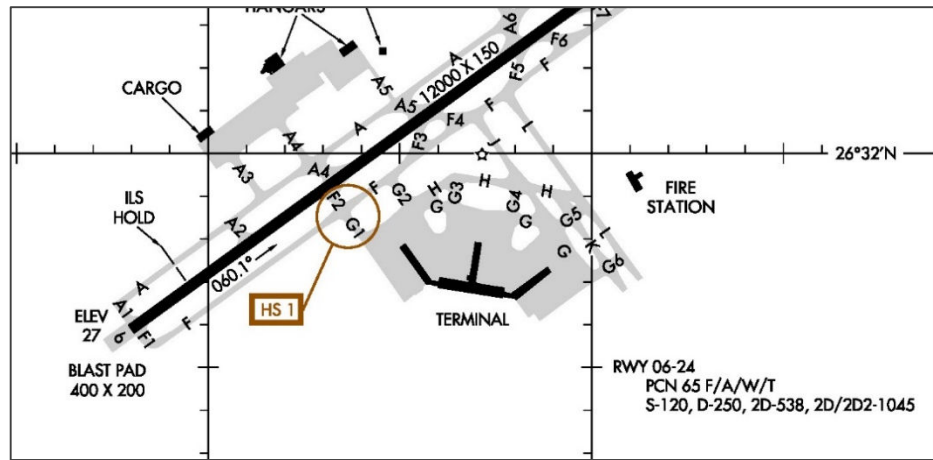
### *Location 1: Taxiways G1 and F2*

This area has been designated as a hot spot (No. 1 in the current Airport Diagram, **Figure 4-8**) due to the entrance of taxiway leading directly from the apron onto the runway without requiring a turn. This configuration can lead to a confusion when a pilot typically expects to encounter a parallel taxiway but instead accidentally enters a runway.

To improve the current situation in this area, the location of Taxiway G1 should be moved.

**Location 2: Runway 6-24 and Taxiways F3 and F4**

Taxiways F3 and F4 are closely spaced high-speed exit points from Runway 6-24. F3 is a high-speed exit for Runways 24 and F4 is a high-speed exit for Runway 6. Advisory Circular 150/5300-13A Change 1 recommends the addition of a “no-taxi” island at the intersection of Taxiways F3 and F and at the intersection of Taxiways F4 and F. This island would prevent aircraft from performing judgmental oversteer movements. This addition should be considered as an improvement to this intersection.



SOURCE: FAA RSW Airport Diagram (valid December 29, 2022, to January 26, 2023)

**Figure 4-8 Hot Spot 1 at RSW, Taxiway G1**

**Location 3: Runway 6-24 and Taxiways F5 and F6**

This area has been designated as a hot spot (No. 2 in the current Airport Diagram) due to the entrance of Taxiway F6 high-speed exit sign being located immediately before the Taxiway F5 reverse high-speed exit. This configuration can lead to a confusion when a pilot typically expects to encounter a taxiway but instead accidentally enters another taxiway. To improve the situation, the Taxiway F6 sign should be moved after the reverse Taxiway F5 exit when possible to avoid any confusion with the high-speed exit of Foxtrot 6 for the pilots. This recommendation has been designed and is awaiting construction.

The current Advisory Circular recommends the addition of a “no-taxi” island at the intersection of Taxiways F and F6. This island would prevent aircraft from performing judgmental oversteer movements. The addition of this “no taxi” island should be considered as an improvement to this intersection.

**Additional Possible Airfield Enhancements**

In addition to the “hot-spot” areas shown in the Airport Diagram, the Airport has identified additional areas that could enhance safety.

**LOCATION A: TAXIWAY F1 AND RUNWAY 6**

Aircraft traveling on Taxiway F west toward the Runway 6 threshold will stop at the runway hold position marking and turn into Taxiway F1. In order to increase safety, the improvement to this area should include in-pavement runway guard lights. Elevated runway guard lights will be evaluated during the design phase to determine if additional enhancement is required. These additions should be considered as improvements to this intersection.

**LOCATION B: TAXIWAY A4 AND RUNWAY 6-24**

Taxiway A4 intersection connects to Runway 6-24. This taxiway intersection, or taxiway connector, is a wide throated runway entrance, at a 45-degree angle in reference to the runway. FAA guidance recommends all design turns to be 90 degrees wherever possible. In order to increase safety, the improvement to this area should include in-pavement runway

guard lights. Elevated runway guard lights will be evaluated during the design phase to determine if additional enhancement is required. These additions should be considered as improvements to this intersection.

#### **LOCATION C: TAXIWAY A5 AND RUNWAY 6-24**

Similar to Taxiway A4, the Taxiway A5 intersection connects to Runway 6-24. This taxiway intersection, or taxiway connector, is a wide throated runway entrance, at a 45-degree angle in reference to the runway. FAA guidance recommends all design turns to be 90 degrees wherever possible. In order to increase safety, the improvement to this area should include in-pavement runway guard lights. Elevated runway guard lights will be evaluated during the design phase to determine if additional enhancement is required. These additions should be considered as improvements to this intersection.

#### **LOCATION D: TAXIWAY A7 AND RUNWAY 6-24**

Similar to Taxiways A4 and A5, the A7 intersection connects to Runway 6-24. This taxiway intersection, or taxiway connector, is a wide throated runway entrance, at a 45-degree angle in reference to the runway. FAA guidance recommends all design turns to be 90 degrees wherever possible. Aircraft traveling on Taxiway A7 onto crossing Runway 6-24, will stop at the runway hold position marking. In order to increase safety, the improvement to this area should include in-pavement runway guard lights. Elevated runway guard lights will be evaluated during the design phase to determine if additional enhancement is required. These additions should be considered as improvements to this intersection.

#### **LOCATION E: TAXIWAY F9 AND RUNWAY 24**

Similar to the issues at Taxiways F and F1, this area has been designated as a possible area for runway incursion. Aircraft traveling on Taxiway F in direction to Runway 24 threshold will stop at the runway hold position marking and turn onto F9. In order to increase safety, the improvement to this area should include in-pavement runway guard lights. Elevated runway guard lights will be evaluated during the design phase to determine if additional enhancement is required. These additions should be considered as improvements to this intersection.

## **Electronic, Visual, and Satellite Aids to Navigation Requirements**

### **Runway Approaches, Lighting, and Instrument Landing Systems**

Based on the inventory conducted in the Existing Conditions chapter, Runway 6-24 is equipped with a Category I ILS/GS and medium intensity approach light system with runway alignment indicator lights (MALSR) on the Runway 6 approach end, and has RNAV Category I (CAT I) approaches approved for either Runway 6 or 24. With increased future operations and the likelihood of more extreme weather conditions, the 2019 ALP update recommended that at least one approach on the existing runway be upgraded to Category II to allow landing in more demanding inclement weather conditions.

For consideration of the future parallel runway, based on the Parallel Runway Close-Out Report (Appendix H), both runway ends will be served by at least CAT I precision approach systems using either ILS or GPS technology. The 2019 FAA Approved ALP depicts MALSR approach lights on either end of the new runway as well as an ILS Critical Area and Glide Slope.

There was a concern in the preliminary planning of the new runway in the early 90s that the FPL High Voltage Transmission Lines could create interference with an ILS Navaid system so as to render it unusable. An ILS modeling study, performed by Ohio University Avionics Engineering Center (OUAEC), determined the necessary Category I ILS operational requirements are attainable within the acceptable FAA signal interference tolerances with the power lines. This study evaluated the potential impacts of the lines on the proposed ILS localizer array and the glide slope antenna signals; GPS approaches would not be subject to potential power line interference.

New approach/departure procedures will need to be designed for the new runway to meet similar CAT requirements as the existing runway. In addition, the existing approaches and departures to Runway 6-24 should be reviewed and/or revised in parallel to the design of the new runway procedures so as to ensure simultaneous non-conflicting operation of both runways for an ARC D-V type aircraft (same as existing).

In 2016, RSW commissioned an Airfield Electrical Site Investigation & Associated Recommendations Study by Atkins (Appendix J), which included a comprehensive survey of the electrical system at RSW. The report made several recommendations which have been implemented, including significant upgrades to the airfield electrical and lighting infrastructure, upgrading airfield signage to light-emitting diode (LED) systems as well as several operational improvements to be carried out by the Airport within its organization.

As previously mentioned earlier in this chapter, the installation of runway guard lights is recommended at certain taxiway/runway intersections to reduce the likelihood of a runway incursion.

## Airport Beacon

The current airport rotating beacon (or airport beacon) is located in between taxiways northeast of the Terminal area. With potential future development in the Terminal area, a new location for the airport beacon may need to be studied to ensure site compatibility.

# Summary of Findings for Airfield Requirements

## Existing Runway

A runway rehabilitation is currently planned to occur on or before 2027.

## New Runway

- A new parallel 9,100- by 150-foot runway is recommended to be built to the south of the Terminal complex.
- The runway design should commence in the mid-2030s and be operational by the early-2040s.
- A portion of the FPL High Voltage Transmission Lines to the east of the Airport will need to be relocated in order to clear the future runway airspace.

## Runway NAVAIDS

Improving the approach to CAT-II on at least one arrival approach is recommended for continuity of operations. Further study is recommended to determine benefit and feasibility.

## Taxiways

- Taxiway intersections and turns should be brought up to TDG-5 standards when significant work is required.
- Potential new parallel taxiways to Taxiway A and Taxiway F.
- New elevated and in-pavement runway guard lights are proposed at runway/taxiway intersections.

## Apron

A new Concourse E will require, a new aircraft parking apron to accommodate this new facility.

## 4.4 Airspace Requirements

### Instrument Approach Procedures

Instrument approach procedures provide pilots with instructions for transitioning from the beginning of an initial approach to specific runway ends, or in some cases the Airport environment, during periods of poor visibility. Runway 6 has a precision instrument approach, which utilizes ground-based navigation equipment to provide both vertical and horizontal guidance to pilots on approach to the Airport. Runway 24 has a non-precision instrument approach, which uses global positioning system (GPS) technology to provide guidance to pilots approaching the runway end. The instrument approach procedures for RSW are discussed in detail in Section 2.5. **Table 4-6** summarizes the published instrument approach information, along with the lowest vertical and horizontal visibility minimums, available for each runway end. This information is critical to identifying the appropriate approach and departure surface requirements.

Runway	Approach Type	Approach Classification	Visibility Minimum	Vertical Minimum (Above Ground Level)
6	ILS CAT-I	Precision	RVR of at least 1,800 feet	200 feet
6	RNAV (GPS) LPV	Non-Precision	2400 feet	303 feet
6	Visual	Visual	5 miles	4,000 feet
24	RNAV (GPS) LPV	Non-Precision	0.75 miles	250 feet
24	VOR/DME or TACAN	Non-Precision	1 mile	370 feet

SOURCE: Federal Aviation Administration, [https://www.faa.gov/air\\_traffic/flight\\_info/aeronav/procedures/application/?event=procedure.results&nasId=RSW#searchResultsTop](https://www.faa.gov/air_traffic/flight_info/aeronav/procedures/application/?event=procedure.results&nasId=RSW#searchResultsTop) (accessed November 18, 2021).

NOTES: CAT: Category; DME: Distance Measuring Equipment; GPS: Global Positioning System; ILS: Instrument Landing System; RNAV: Area Navigation; RVR: Runway Visual Range; TACAN: Tactical Air Navigation System; VOR: Very High-Frequency Omi-Directional Range

As mentioned in the previous section, Airfield Requirements: Electronic, Visual and Satellite Aids to Navigation Requirements, when a new runway is built, new approaches that meet existing CAT-I requirements should be designed for the new runway and existing approaches for the existing runway should be revised to ensure compatibility with the new runway approaches. It is also recommended to design at least one CAT-II approach on the existing runway (as it will be the longest) at some point in the future to ensure continuity of operations during IMC conditions. A CAT II approach can provide a decision height as low as 100 feet and visibility minima as low as RVR 1200.

### Airspace Surface Analysis

This section identifies the existing and future airport airspace surfaces for Runway 6-24 and the future parallel Runway 6R-24L. The airspace surfaces prescribed in the following documents will be discussed in the sections below:

- Title 14 *Code of Federal Regulations* (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*
- Federal Aviation Administration (FAA) *Engineering Brief 99A, Changes to Tables 3-2 and 3-4 of Advisory Circular 150/5300-13A, Airport Design*

### Title 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace

To enhance the safe operation of aircraft in the airspace around airports, the FAA has adopted Title 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (Part 77). Subpart C of Part 77 establishes imaginary surfaces for

determining obstructions to air navigation. Part 77 surfaces are utilized in zoning and land use planning adjacent to the Airport to protect the navigable airspace from encroachment by hazards that would potentially affect the safety of airport operations. The specific imaginary surfaces which should be protected from obstructions include:

- **Primary Surfaces** – Longitudinally centered on each runway, this surface extends 200 feet beyond each end of the runway and has an elevation equal to that of the runway centerline. The width of the primary surface is that prescribed for the most precise instrument approach procedure, existing or planned, for either end of the runway. The primary surfaces for the existing and future runways at RSW are 1,000 feet wide.
- **Approach Surfaces** – These surfaces begin at the end of the Primary Surface (200 feet beyond the runway end) and slope upward at a ratio determined by the runway category and type of approach available to the runway. The width and elevation of the inner ends of the approach surfaces conform to that of the Primary Surface. The length and width of the outer ends are governed by the runway category and approach procedure available. **Table 4-7** summarizes the dimensions of the existing and future approach surfaces at the Airport.

<b>Table 4-7 Approach Surface Characteristics at RSW</b>			
<b>Runway</b>	<b>Overall Length (feet)</b>	<b>Outer Width (feet)</b>	<b>Slope</b>
6 – Existing and Future	50,000	16,000	50:1 <sup>a</sup>
24 – Existing	10,000	4,000	34:1
24 – Future	50,000	16,000	50:1 <sup>a</sup>
6R – Future	50,000	16,000	50:1 <sup>a</sup>
24L – Future	50,000	16,000	50:1 <sup>a</sup>

SOURCE: Federal Aviation Administration, [https://www.faa.gov/air\\_traffic/flight\\_info/aeronav/procedures/application/?event=procedure.results&nasId=RSW#searchResultsTop](https://www.faa.gov/air_traffic/flight_info/aeronav/procedures/application/?event=procedure.results&nasId=RSW#searchResultsTop) (accessed November 18, 2021)

<sup>a</sup> The precision instrument approach surface slope is 50:1 for the inner 10,000 feet and 40:1 for an additional 40,000 feet.

- **Transitional Surfaces** – These surfaces extend outward and upward from the lateral edges of all primary and approach surfaces at a slope of 7:1. The transitional surface extends until intersecting the Horizontal and/or Conical Surfaces.
- **Horizontal Surface** – This surface is a horizontal plane located 150 feet above the established Airport elevation of 30 feet. At RSW, the perimeter of the horizontal surface consists of arcs with a radii of 10,000 feet, connected by lines tangential to the arcs. The arcs are centered on the midpoint of the ends of all primary surfaces.
- **Conical Surface** – This surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1, for a horizontal distance of 4,000 feet.

The Part 77 surfaces, along with other pertinent approach and departure surfaces, were evaluated as a part of the airspace drawings in the February 2011 ALP drawing set. These drawings present plan views and profile views of obstructions to these surfaces by type (e.g., tree, pole, building, etc.), their elevation, surface penetrated, and proposed disposition. In 2011, there were 14 obstructions to the Part 77 surfaces for Runway 6-24. Of these 14 obstructions, four were in the approach surface, three were in the primary surface, six were in the transitional surface, and one was in the horizontal surface. Of the identified obstructions, seven are classified as a tree or vegetation and seven are manmade structures. The drawings also identified potential obstructions to the future parallel Runway 6R-24L. A total of 71 obstructions were identified, including 26 trees and 45 man-made structures. The manmade structures include light poles, power poles, and signs.

The airspace drawings referenced above are a snapshot of obstructions at the time the data was collected for the development of the drawings, in this case prior to 2011. Given trees have the potential to grow, are trimmed, removed, or

subject to damage from high winds or other natural causes, it is important to develop new mapping and surveying to assess airspace impacts. Therefore, as a part of this Master Plan Update, new mapping and surveying is being obtained to assess penetrations to the Part 77 surfaces, as well as other approach and departure surfaces. This information will be detailed on the airspace sheets of the ALP drawing set and submitted to the FAA for inclusion into their databases. The FAA utilizes the information for the development of approach procedures and evaluation of future airspace case studies. This section will be updated when the current ALP update effort will be completed in early 2023.

## Threshold Siting Surfaces

The FAA has developed threshold siting surfaces to aid in the identification of obstructions that could impact existing and future approach surfaces. Maintaining clear threshold siting surfaces in accordance with FAA guidance is critical to retaining existing approach capabilities and ensuring approaches are published with the lowest possible minima. Threshold siting surfaces have a trapezoidal shape that extends away from the runway along the extended centerline at a specific slope, with a starting point at the runway threshold elevation. The most recent threshold siting surface guidance is found in *FAA Engineering Brief 99A, Changes to Tables 3-2 and 3-4 of Advisory Circular 150/5300-13A, Airport Design* (EB 99A).

**Table 4-8** lists the threshold siting surface dimensions for the existing (and future) Runway 6-24 and future Runway 6R-24L.

All instrument approach types with vertical guidance, including instrument landing system (ILS) and localizer performance with vertical

guidance (LPV) require evaluation and clearing of an additional surface, the Glideslope Qualification Surface (GQS). This protected area is intended to provide assurance to the pilot that once the aircraft acquires the runway during a vertically guided approach that no obstacle will interfere with the continuous descent to the runway threshold. At RSW, both existing runway ends require a clear GQS to maintain their existing approach capabilities with vertical guidance. It would also be prudent to protect the airspace at the ends of the future parallel Runway 6R-24L to provide a clear GQS and approaches with vertical guidance. The GQS begins at the runway threshold, has an inner width of 350 feet, an outer width of 1,520 feet, and extends outward for a distance of 10,000 feet at a slope of 30:1.

The threshold siting surfaces and GQSs for the existing and future runway ends will be evaluated as part of this Master Plan Update and detailed on the airspace drawings in the ALP set. As discussed above, new mapping and surveying are being collected to provide the necessary data for analyses.

## Instrument Departure Surfaces

The instrument departure surface, when clear, allows pilots to follow standard departure procedures. The departure surfaces start at the elevation of the Departure End of the Runway (DER) and rise at a slope of 40:1. If the departure surface is penetrated, several possibilities exist for mitigation including, but not limited to, decreasing takeoff distance available to preclude object penetration and/or modifying the required departure minimums/climb gradients or departure procedures. The departure surface is applicable to all existing and future runways at RSW. The most recent

Runway	Distance from Threshold (feet)	Inner Width (feet)	Outer Width (feet)	Overall Length (feet)	Slope
6 – Existing and Future	200	800	3,400	10,000 <sup>a</sup>	34:1
24 – Existing	200	400	3,400	10,000 <sup>a</sup>	20:1
24 – Future	200	800	3,400	10,000 <sup>a</sup>	34:1
6R – Future	200	800	3,400	10,000 <sup>a</sup>	34:1
24L – Future	200	800	3,400	10,000 <sup>a</sup>	34:1

SOURCE: Federal Aviation Administration, *Engineering Brief 99A, Changes to Tables 3-2 and 3-4 of Advisory Circular 150/5300-13A, Airport Design*, July 24, 2020

<sup>a</sup> According to FAA criteria, 10,000 feet (3,048 meters) represents a nominal value for planning purposes.

FAA guidance regarding instrument departure surfaces is found in EB 99A. Impacts to the departure surfaces will be evaluated as part of the ALP drawing set.

## 4.5 Terminal Demand/Capacity and Requirements

### Terminal Requirements

This section details the demand/capacity analysis and the future facility requirements for each of the individual functions associated with the Southwest Florida International Airport commercial passenger terminal building.

The following sections provide more explanation on the major functional areas including:

- Aircraft Gates
- Ticketing/Check-in Area
- TSA Passenger Screening and Federal Inspection Services (FIS)
- Baggage Handling
- Hold Rooms
- Concessions
- Terminal Services
- Circulation

### Methodology and Basis of Planning

Terminal facilities planning involves the application of industry standards and guidelines and reasonable assumptions about current and future trends. The facility program is based on projected growth developed in the forecast, the requirements of local and state building codes and regulations, federal standards and guidelines, and data collected from physical site visits. The program is created within the framework of the following codes and regulations, as well as other industry accepted planning factors:

- FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans
- FAA AC 150/5360-13A, Airport Terminal Planning
- Airport Cooperative Research Program (ACRP) Report 25 Airport Passenger Terminal Planning and Design, v1: Guidebook
- International Air Transport Association (IATA) Airport Development Reference Manual 11th Edition; in particular, the following sections:
  - Section F1: Capacity and Level of Service
  - Section J1: Outline of Principle Functions
  - Section J2: Categories of Passenger Terminal
  - Section J6: Passenger Processing Facilities Planning
  - Section J7: Concession Planning
  - Section J8: Maintenance
  - Section J9: Check-In

Specific assumptions are made to determine the terminal building's capacity by functional area for each Planning Activity Level (PAL). The PALs are based on the five-year increments in the forecast (PAL 1 – 2026, PAL 2 – 2031, PAL 3 – 2036, and PAL 4 – 2041). Using PALs allows for the requirements to be implemented based on the specific demand levels as activity warrants, and not necessarily the specific year. Assumptions regarding passenger types and origins; future flight schedules, and peaking characteristics; as well as desired levels of service (LOS), were made to derive the recommended terminal and landside requirements.

The planning criteria were based on the Peak Hour of the Average Day of the Peak Month (PHADPM) passenger profiles and operations for each PAL. These were derived from the FAA March 2020 flight schedule (March 13, 2020) and the Forecast of Aviation Activity. The 2020 flight schedule was used to establish the baseline passenger profile and peak hour operation characteristics. The baseline passenger profile ratio of enplaning, deplaning, and total passengers was then applied to the peak hour enplanements to establish the future passenger profiles. Similarly, the baseline arriving to departing peak hour operations ratio was applied to the peak hour operations forecast to derive the future peak hour operations characteristics. The type of aircraft and anticipated load factors also inform the terminal requirements.

**Table 4-9** presents PAL peak hour passenger profile, peak hour operations characteristics, and the anticipated aircraft and load factor.

<b>Table 4-9 Peak Hour Passenger, Commercial Operations, and Aircraft Assumptions</b>					
	<b>Baseline (2020)</b>	<b>PAL 1 (2026)</b>	<b>PAL 2 (2031)</b>	<b>PAL 3 (2036)</b>	<b>PAL 4 (2041)</b>
Annual Enplanements	5,354,436	6,131,288	6,909,961	7,801,346	8,714,104
Departing Peak Hour Passengers	2,472	3,131	3,576	4,095	4,633
Assumed Aircraft Types	ADG-III/IV/V	ADG-III/IV/V	ADG-III/V	ADG-III/V	ADG-III/V
Load factor	85–87%	85–89%	85–91%	85–92%	85–92%
Departing Peak Hour Operations	17	20	22	25	28
<b>Total Peak Hour Operations</b>	<b>33</b>	<b>34</b>	<b>39</b>	<b>44</b>	<b>49</b>

SOURCE: Atkins, 2022

In addition, numerous changes in terminal planning and design have taken place since the midfield terminal was originally designed. New technologies, expanded security requirements, and increased demand for passenger amenities are just a few of the factors that have influenced the evolution of terminal design. The facility requirements outlined in this chapter consider current and projected trends in terminal design including:

- Improved passenger check-in and processing technologies
- Increased passenger and baggage security requirements
- Increased demand for airside concessions and retail
- Increased amenities including restroom parity
- Modified passenger flows to maximize revenue generation opportunities

## Aircraft Gate Requirements

The gating analysis determines the number of gates required to accommodate the existing (2020) and future design day flight schedules (DDFSs). The number of gates required to meet demand is a primary driver for the terminal requirements in the secure airside portions of the facility.

The Airport terminal currently has 28 aircraft gates; however, Gate D9 can only accommodate ground loaded regional jets in its current configuration. There are 27 contact gates, or aircraft parking positions with passenger boarding bridge connections between the aircraft and the concourse. The capabilities of each existing gate to accommodate international flights, widebody aircraft, and current airline assignments are described in **Table 4-10**. All gates accommodate narrow-body (ADG III) aircraft unless otherwise noted.

The methodology used to generate gate and terminal space requirements utilized the forecasts of future aviation activity and DDFSs developed to represent the operational profile of that activity on an average weekday in the peak month. The analysis of gate requirements utilized a proprietary modelling software application that is designed to define requirements based on appropriate gating configurations and operational characteristics.

The model, vGates, utilizes a hierarchical decision tree methodology to assign gates iteratively by (1) gate availability based on defined operational buffer times between flight departures and flight arrivals, (2) airline gate assignments, (3) aircraft size (apron capacity), and (4) flight origin (typically domestic or international). The model analyzes each DDFS and assigns specific flights to specific gates ensuring that the candidate flights/aircraft can be accommodated on the assigned gates. Any flights that cannot be accommodated are identified as unassigned/ungated, reflecting a requirement of additional gate(s) or operational changes to allow the accommodation of the flight(s). Manual iterations and specific assumptions are applied to reassign flights as necessary to increase or decrease gate utilization and to reflect the unique physical and operational environment at the Airport.

The amount of time a gate is unoccupied between operations (buffer time) reflects airline practices/operations

**Table 4-10 Existing Commercial Aircraft Gate Capabilities and Airline Assignments**

Gate	Airline Assignment
<b>CONCOURSE B</b>	
B1 (Widebody)	Common use and International
B2	Southwest
B3 (Widebody)	Common use and International
B4	Southwest
B5 (Widebody)	Common use
B6	Southwest
B7	Frontier
B8	Southwest
B9	Common use
<i>Subtotal Concourse B</i>	<i>9 Contact Gates</i>
<b>CONCOURSE C</b>	
C1	Common use
C2	Delta
C3	United
C4 (767)	Delta
C5	United
C6 (Widebody)	Delta
C7	Common use
C8 (Widebody)	Delta
C9	Common use
<i>Subtotal Concourse C</i>	<i>9 Contact Gates</i>
<b>CONCOURSE D</b>	
D1	American
D2	Spirit
D3	American
D4	Spirit
D5	American
D6	JetBlue
D7	Common use
D8	JetBlue
D9A/B (Commuter Ramp)	Common use
D10 (767) – D10A	Common use
<i>Subtotal Concourse D</i>	<i>9 Contact Gates; 1 Commuter Ramp</i>
<b>Total All Concourses</b>	<b>27 Contact Gates; 1 Commuter Ramp</b>
SOURCE: Atkins, 2022	

and/or aircraft types. Since airlines use different scheduling parameters and strategies, there can be variations in buffer times among airlines. For this gating analysis, a 30-minute minimum buffer time was assumed.

Depending on utilization requirements defined by the Airport, aircraft with ground times greater than three hours can be towed off the gate to a remote parking position to allow other operations to utilize the gate. In these instances, the aircraft would subsequently be towed from the remote parking position to a vacant gate (typically operated by the same airline) for boarding prior to its subsequent departure. A minimum of 60 minutes is assumed to be required following arrival to tow a domestic aircraft from a gate to a hard stand and the domestic aircraft would be towed back onto one of the airline's gates 60 minutes prior to departure. International flights require 90 minutes for towing operations.

The average daily aircraft turns per gate was calculated to check the reasonableness gate utilization. A "turn" is a metric that defines the number of times that an aircraft arrives and subsequently departs or is towed to or from a gate. As airline schedules grow, future flights are accommodated within the operational gaps (unoccupied periods) on existing gates prior to the development of future gates or remote parking locations.

Manual iterations limit the average turns per gate for each airline on a concourse to approximately 6.2 turns per gate. During the gating analysis, if the average turns per gate on a concourse or by airline on a concourse exceeded the maximum turns per gate, aircraft were removed from gates and assigned to a "virtual" gate. These utilization thresholds are typical of an airport operating in the United States. Exceeding these levels of gate utilization may introduce operational challenges, such as the inability to effectively accommodate delays or irregular operations.

This methodology identified a need for 45 total gates by PAL 4, not including Gate D9, which is only capable of ground loading. The results of this methodology are depicted in **Table 4-11**. Up to five remote overnight stands are required by PAL 4 as shown in **Table 4-12**.

**Table 4-11 Aircraft Gate Requirements**

2020 Daily Average Turns per Gate	2020 Annual Average Enplanements per Gate	Existing Gates 2021	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/ (Deficiency)
6.2	19,790	27	32	35	41	45	(18)
ADG-III		0	27	30	36	39	(39)
ADG-IV		23	1	0	0	0	23
ADG-V		4	4	5	5	6	(2)

SOURCE: Atkins, 2022

**Table 4-12 Aircraft Remote Overnight Stand Requirements**

PAL 1	PAL 2	PAL 3	PAL 4
5	5	3	5

SOURCE: Atkins, 2022

## Hold Rooms

Within the concourse, hold room area requirements define the amount of space needed to accommodate the waiting area, boarding queue, egress aisles, and agent counter for the largest aircraft occupying each gate throughout the planning horizon. Dimensional criteria based on LOS criteria and spatial guidelines for hold room depth, agent counter areas, boarding and egress aisles, and adjacency are applied to the required waiting area to derive the initial space program. Hold rooms are sized based on the following factors:

- Largest aircraft type operating at the gate and number of aircraft seats
- Average narrow-body aircraft assumed to have 175 seats; average widebody aircraft assumed to have 293 seats

- 90% passenger load factor
- 70% occupancy factor – number of passengers sitting or standing in the hold room waiting area
- 42% of passengers assumed to be seated occupying 21.5 square feet per seat
- 28% of passengers assumed to be standing occupying 14.5 square feet per passenger
- 30% of passengers occupy a pre-boarding queue area during the boarding period, each occupying 11 square feet

In addition to the seating and standing areas, space is provided for two gate podiums for narrow-body aircraft and four gate podiums for widebody aircrafts as well as an egress corridor to/from the passenger boarding bridge door. Based on this methodology, space required per narrow-body gate hold room should be approximately 3,300 square feet and 5,400 square feet for widebody aircraft. A summary of the hold room requirements based on the projected gate requirements is shown in **Table 4-13**. **Figure 4-9** shows the indicative layout and area calculations for narrow-body and widebody hold rooms.

Table 4-13 Holdroom Requirements							
	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/ (Deficiency)
Total Hold Room Area (SF)	70,800	86,400	89,100	99,000	118,800	132,000	(61,200)

SOURCE: Atkins, 2021

## Ticketing/Check-in Area

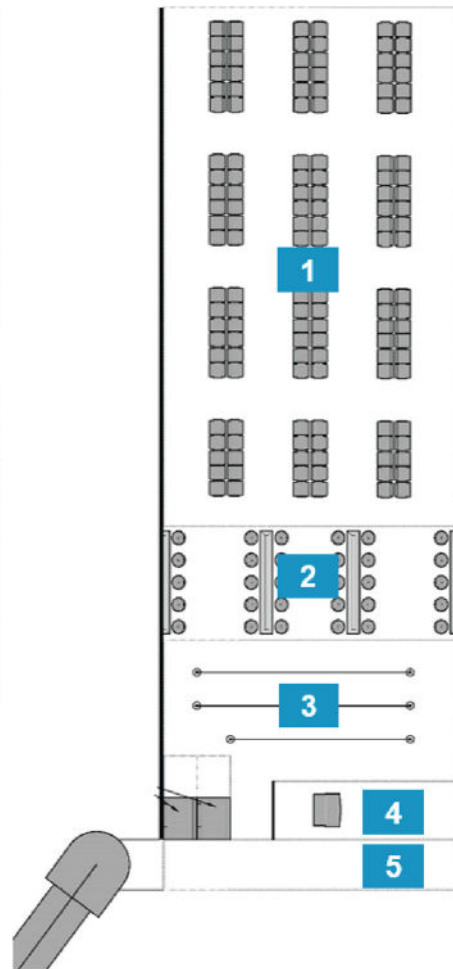
Check-in is the process by which passengers obtain boarding passes and/or bag tags and check bags prior to going through the security screening checkpoint (SSCP). Passengers may check-in via one of four different channels:

- **Bypass (Internet/Mobile Device) Check-In** – Passengers who do not check bags and check in remotely prior to arriving at the terminal and, consequently, do not need to use terminal check-in facilities.
- **Kiosks Only (No Bags)** – Passengers acquiring boarding passes at standalone kiosks located in front of in-line positions or located remotely from the check-in counter.
- **Bag-Drop** – Passengers acquiring boarding passes and/or printing bag tags at standalone kiosks and providing bags to airline staff at baggage acceptance points (BAPs).
- **Full-Service Counter Positions** – Passengers using full-service agent counter positions (economy, premium, curbside, or remote) where airline staff assist passengers with obtaining boarding passes, checking bags, rebooking flights, and other services.

The Check-in processes are transitioning away from passengers using full-service check-in counters. A growing number of passengers use personal mobile devices and self-service kiosks to check-in, obtain boarding passes and check bags. The terminal configuration should accommodate modern technologies such as self-service kiosks and automated bag drop systems (ABDs). Space requirements for check-in facilities are driven by the need to locate processing areas adjacent to bag induction belts. Bag induction belts are flanked by BAPs where agents or passengers introduce checked bags into the bag handling system. Each BAP has spatial requirements for queuing, equipment, circulation, and active processing to accommodate passenger demand at a given LOS.

Narrowbody Holdroom		90% Load Factor
Element		Mid Optimum
1	Seated Pax	1,419 sf
2	Standing Pax	638 sf
3	Boarding Queue*	517 sf
4	Gate Counter**	360 sf
5	Exit Aisle***	360 sf
<b>Holdroom Area Total</b>		<b>3,294 sf</b>

Widebody Holdroom		90% Load Factor
Element		Mid Optimum
1	Seated Pax	2,387 sf
2	Standing Pax	1,037 sf
3	Boarding Queue*	869 sf
4	Gate Counter**	720 sf
5	Exit Aisle***	360 sf
<b>Holdroom Area Total</b>		<b>5,373 sf</b>



SOURCE: International Air Transport Association, *Airport Development Reference Manual*, 11th edition, March 2019

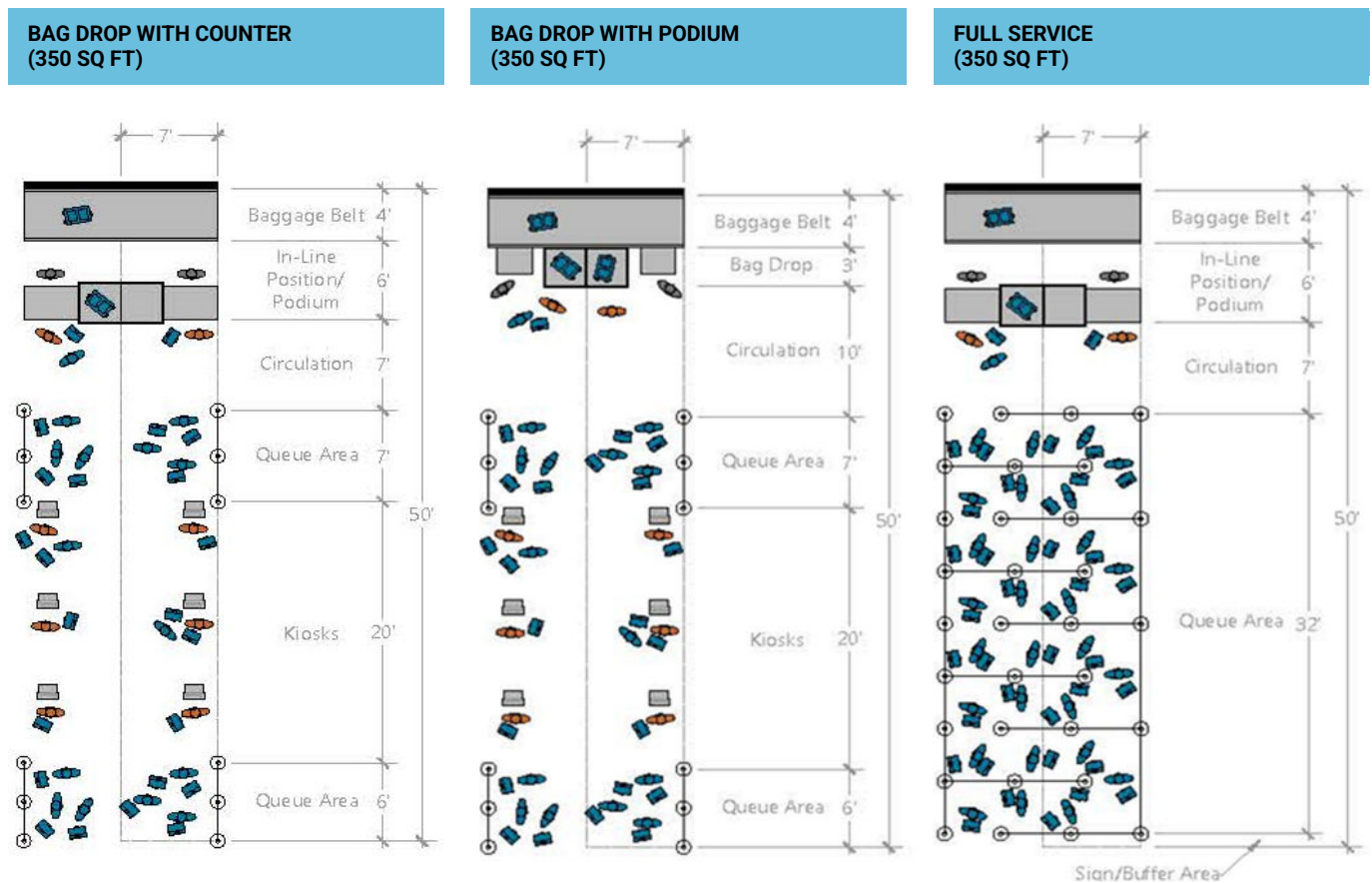
NOTES: \* Boarding Queue: 11 sf/pax  
 \*\* Gate Counter: Gate Counter per Position (30' x 6') | Narrowbody 2 pos. / Widebody 4 pos.  
 \*\*\* Exit Aisle: Assumed 30' x 12' Exit Aisle

**Figure 4-9 Hold Room Templates**

Figure 4-10 shows typical configurations for different types of check-in processes. The template allows for various arrangements of the check-in including kiosk or bag drop. All typical check-in configurations have a presentation width of 7 feet. These templates were used to estimate check-in spatial requirements.

Check-in facility resources are allotted using a preferential-use model within the Terminal. In this model, each carrier's check-in requirements are assessed separately. The check-in requirements are based on the sum of all carriers' requirements.

Airline Ticket Offices (ATO) directly support the check-in facilities. The ATO spatial requirements for support of the check-in are based on the total presentation length of all the BAPs. Each linear foot of presentation length requires 20 square feet of ATO support space.



SOURCES: International Air Transport Association, *Airport Development Reference Manual*, 10th Edition, 4th Release, October 2016 (LOS); Airport Cooperative Research Program, *Report 25: Air Passenger Terminal Planning and Design*, Volume 1: Guidebook, 2010 (critical dimensions); Benchmarked from comparable airports, Ricondo, January 2018 (space template).

**Figure 4-10 Indicative Check-in Configurations**

**Table 4-14** summarizes the ticketing/check-in requirements. Based on BAP requirements, the current ticketing/check-in area is insufficient to accommodate the demand anticipated for PAL 3 and PAL 4. Additional ticketing space will be required to accommodate demand by 2035. Queuing space for check-in is suboptimal and will likely need to expand or be reconfigured for the anticipated level of activity to maintain an acceptable level of service during peak periods.

Table 4-14 Ticketing/Check-In Area Requirements							
	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/ (Deficiency)
BAPs	113	92	96	105	114	125	(12)
BAP Length (lf)	620	478	528	578	627	687	(67)
BAP Area (sf)	24,340	31,075	26,400	28,875	31,350	34,375	(10,035)
Airline Ticket Office Area (sf)	11,620	12,880	13,440	14,700	15,960	17,500	(5,880)
<b>Total Ticketing Area (sf)</b>	<b>35,960</b>	<b>43,955</b>	<b>39,840</b>	<b>43,575</b>	<b>47,310</b>	<b>51,875</b>	<b>(15,915)</b>

SOURCE: Atkins, 2021

## Airline or Airport Lounges

The need for lounges is subject to airline and airport initiatives and policies related to level of service, and ultimately the availability of space and interest of airlines in operating their own lounges. Currently, Delta Airlines operates a 10,000 sf lounge in Concourse C. The decision to open a lounge at a non-airline hub destination remains a business decision exclusive to each individual airline. Should an airline request lounge space, an analysis will be conducted based on the airline's requirements and space available or potential new construction. Airline decisions to open a lounge typically are dependent on front of cabin enplanement counts passenger dwell times and passenger profiles and are more commonly located in hub airports where layovers occur. A typical lounge ranges from 8,000 to 12,000 square feet plus depending on the level of service offered. RSW, which is situated in southwest Florida is a destination, "end of route" location, does not experience any scheduled layovers. As a result of its location, passenger demand will likely drive the decision for an airline to add a lounge to the facility. The planned addition of a common use lounge capable of servicing a broad profile of passengers, is an increasingly common approach used at other airports. **Table 4-15** summarizes the airline and airport lounge requirements.

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/ (Deficiency)
VIP Airline Lounge (sf)	10,000	10,000	10,000	10,000	10,000	10,000	0
VIP Common Use Lounge (sf)	0	4,025	4,370	4,671	5,016	5,369	(5,369)

SOURCE: Atkins, 2022

## Baggage Handling Facilities

Baggage handling facilities include outbound baggage makeup areas, TSA checked baggage inspection systems, inbound baggage facilities, and baggage claim. Outbound baggage facility requirements are based on peak hour departing passengers that check-in bags and flights staging for departure. Inbound baggage facilities are based on peak hour deplaning passengers that retrieve baggage at the bag claim after their flight.

Outbound bag makeup devices can consist of piers or chutes that extend directly from the bag conveyance and sorting system, or they can be carousel units that allow bags to circulate continuously. The latter configuration provides higher bag storage capacity and more staging area for carts than the former. Carousels can be flat-plate or sloped plate units. Sloped plate units provide greater capacity than flat-plate carousels with the same footprint because they have more surface area. However, some airlines prefer flat plate units because they provide better ergonomics for workers.

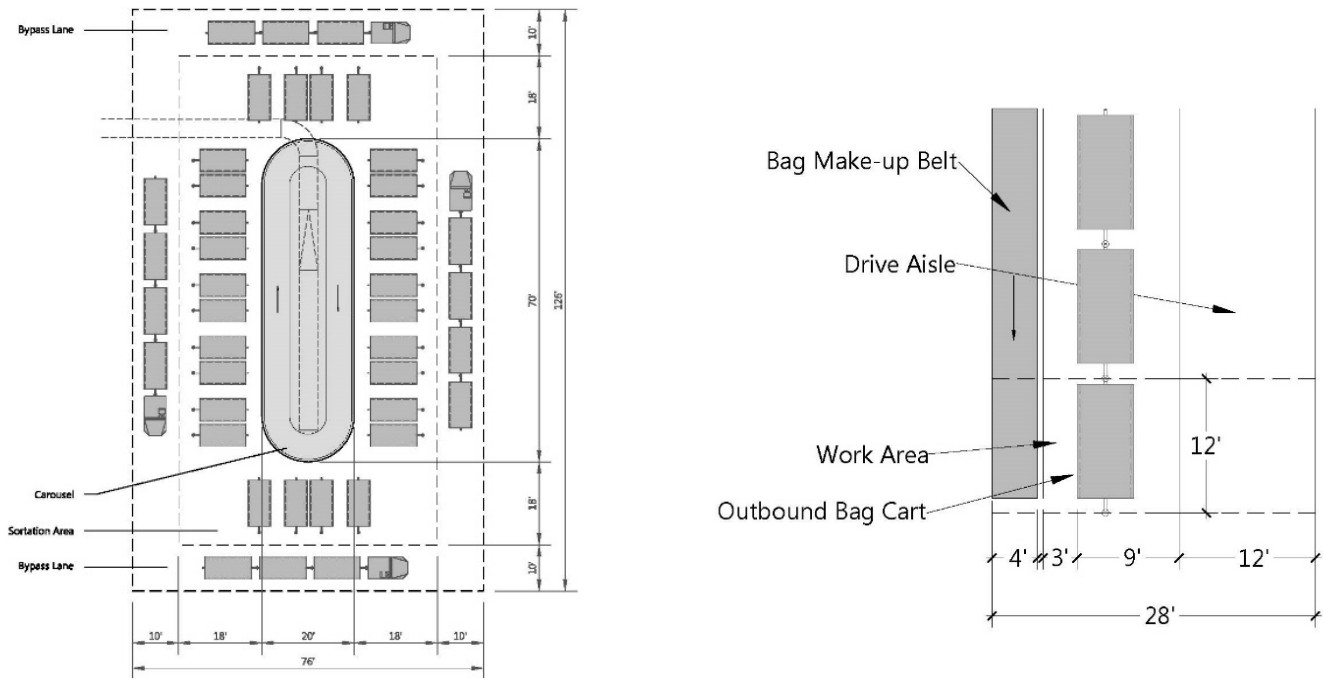
Bag carts can be staged either parallel or perpendicular to makeup devices if there is sufficient width between devices. An area of 40 feet by 12 feet per cart, or 480 square feet, is suggested for a functional outbound bag makeup area. Critical dimensional clearances for the components of outbound makeup devices include:

- **Bag Carts** – Bag carts have lengths of 11 feet and 15 feet (with tow bar down). The cart width ranges from approximately 5 feet, 7 inches to 5 feet, 9 inches.
- **Bag Containers/Dollies** – Containers/dollies are more commonly used for widebody aircraft. Containers are carried on dollies and are approximately 13 feet, 6 inches long (with tow bar down) and approximately 6 feet wide.

■ **Work Area** – The area between the carousel and the staged bag carts used by workers to load bags should provide the following clearances:

- Work aisle width: 3 feet
- Clear height: 7 feet

Figure 4-11 depicts typical outbound baggage makeup layouts for both perpendicular and parallel configurations. Bag carts and bag containers cover approximately the same areas, so these typical layouts are applicable for both bag cart and bag container staging.



SOURCES: International Air Transport Association, *Airport Development Reference Manual*, 11th Edition, March 2019 (LOS); Airport Cooperative Research Program, *Report 25: Air Passenger Terminal Planning and Design*, Volume 1: Guidebook, 2010 (critical dimensions).

**Figure 4-11 Outbound Bag Makeup – Perpendicular and Parallel Configurations**

Bag makeup facility requirements were based on the maximum number of carts staged for all flights during the peak 10-minute period of the DDFS and the minimum area required per cart, including the outbound bag device. **Table 4-16** lists the maximum bag carts recommended for each aircraft type. For each domestic departure, the maximum number of bag carts was assumed to stage in the make-up area between 90 and 30 minutes prior to the flight's scheduled departure. For each international departure, the maximum number of bag carts was assumed to stage in the make-up area between 90 and 40 minutes prior to the flight's scheduled departure. These assumptions are based on benchmarks from comparable airports.

**Table 4-16 Outbound Baggage Cart Staging per Aircraft Gauge**

Aircraft Design Group	Maximum Cart Positions
II	2
III	3
V	8

SOURCE: Atkins, 2021

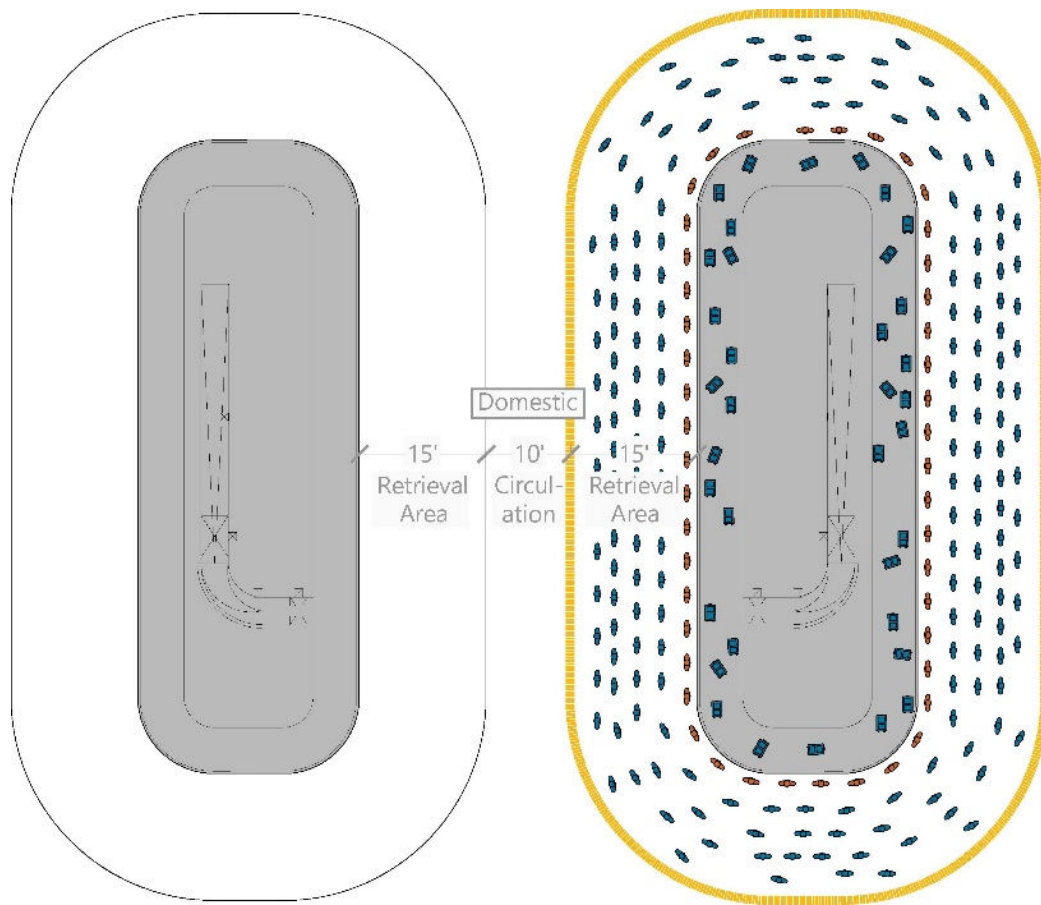
Outbound baggage screening demand is based on these passenger characteristics applied to the DDFS:

- 70% of passengers check bags
- 1.1 bags checked per passenger checking bags
- In accordance with TSA requirements, a CBIS with an Explosive Detection System (EDS) is required for all baggage screened throughout the facility. TSA will have an on-screen resolution (OSR) room contained within its support areas where all suspicious baggage images are reviewed. Bags that cannot be cleared via this process are sent to the Checked Baggage Reconciliation Area (CBRA). The CBIS and CBRA must have the following:
  - Dedicated room or locations for TSA's EDS servers and active network components (typically two or three racks).
  - TSA-provided workstations and other peripherals to receive EDS images,
  - Video Surveillance System (VSS) cameras installed on either side of each EDS screening machine and at fail safe locations connected to the existing VSS,
  - Workstation and associated monitors in OSR room for TSA to monitor the CBIS related cameras, and
  - Airport phones installed at each EDS machine and in the OSR and CBRA rooms.
- All necessary CBIS and CBRA equipment, staging, conveyor, and workspace is included in the area required by each EDS machine, totaling 6,500 square feet per device.
- The EDS requirements are based on the peak hour check-in baggage demand, EDS screening rates at 600 bags per hour processing rate per inline screening device. Requirements include a redundant EDS device, known as (n+1).

Inbound baggage:

- 48-foot input area length
- 18-foot input area width
- 1,760 square feet per baggage claim carousel
- Bag claim requirements include the number of claim units, linear feet (LF) of presentation frontage, retrieval areas, and circulation. Bag claim requirements are based on the peak accumulation of passengers in the active area during a 20-minute period. **Figure 4-12** depicts a typical bag claim device, including the following elements:
  - **Bag Claim Device and Retrieval Area** – Spatial area allocated for a single claim device including: the equipment area; the clearance between the equipment; and the adjoining devices, walls, or circulation corridors. Device size and equipment type is based on the configuration of the bag claim area and predominant aircraft size. A minimum of 15 feet of clearance from the face of the device for passengers to retrieve their bag is recommended for domestic units to maintain appropriate processing areas and meet LOS requirements.
  - **Circulation** – A circulation corridor of 10 feet for passengers and non-passengers moving between bag claim devices. The corridor must be free of any obstructions and active retrieval areas to accommodate cross-circulation for passengers and non-passengers.

The existing claim area uses flat-plate claim units with an average of 200 LF of claim frontage per unit. Each baggage claim device and adjacent retrieval area occupy approximately 3,600 square feet.



SOURCES: International Air Transport Association, *Airport Development Reference Manual*, 11th Edition, March 2019 (LOS); Airport Cooperative Research Program, *Report 25: Air Passenger Terminal Planning and Design*, Volume 1: Guidebook, 2010 (critical dimensions).

**Figure 4-12 Baggage Claim Space Template**

**Table 4-17** summarizes the bag claim operating assumptions for domestic flights. Facility requirements were based on a range of 70 to 90% accumulation of passengers with bags during the peak 20-minute period to reflect fluctuations in bag delivery times relative to the passenger arrival rate to the claim area. Baggage Service Offices are usually directly adjacent to the Baggage Claim Hall with a requirement of 150 square feet per claim unit.

Table 4-17 Domestic Baggage Claim Operating Assumptions	
Operating Assumptions	Maximum Cart Positions
Passengers with baggage	0.70
Passengers retrieving baggage	0.95
Area per passenger at the baggage claim	17.25 sf
Linear baggage claim frontage per passenger	1.38 lf
Circulation area per device	1,500 sf
Baggage office area per device	150 sf

SOURCE: Atkins, 2022  
 NOTES: lf: linear feet; sf: square feet

**Table 4-18** provides a summary of the baggage handling facility requirements. Based on the assumptions above and the current and forecast traffic demand, both the inbound and outbound baggage handling facilities are insufficient to handle the future PAL 1 to PAL 4 demand.

<b>Table 4-18 Baggage Facilities</b>							
	<b>Existing</b>	<b>Baseline</b>	<b>PAL 1</b>	<b>PAL 2</b>	<b>PAL 3</b>	<b>PAL 4</b>	<b>PAL 4 Surplus/ (Deficiency)</b>
Baggage Makeup Units (#)	11	11	12	12	15	16	(5)
Outbound Baggage Area (sf)	60,100	51,840	51,840	57,600	67,200	71,040	(10,940)
EDS Machine (#)	4	4	5	5	5	6	(2)
BHS (lf)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
TSA CBRA # Positions/sf	13	13	15 / 6,500 sf	15 / 6,500 sf	15 / 6,500 sf	15 / 6,500 sf	(2)
Baggage Claim Units (#)*	10	8	9	11	12	14	(4)
Inbound Baggage (sf)	26,790	14,080	15,840	19,360	21,120	24,640	2,150
Baggage Claim Public Circulation (sf)	36,030	28,880	32,490	39,470	43,320	50,540	(14,510)

SOURCE: Atkins, 2022

\* Baggage claim carousel requirements for PAL 1 through PAL 4 were determined based on a planning factor determined using the Baseline requirements.

## Airline Support Space

Airline operations and support facilities include spaces within the terminal building leased to airlines for various functions, including employee break and locker rooms, staff offices, and maintenance. Airline support area requirements were calculated based on industry benchmarks for planning purposes. In design and construction phases of the project, these areas will be refined based on the needs of the tenant airlines. The operating parameters used to size airline operations and support facilities were based on a factor of 1,000 square feet per gate. **Table 4-19** summarizes the airline operations and support operating requirements.

<b>Table 4-19 Airline Support Services</b>							
	<b>Existing</b>	<b>Baseline</b>	<b>PAL 1</b>	<b>PAL 2</b>	<b>PAL 3</b>	<b>PAL 4</b>	<b>PAL 4 Surplus/ (Deficiency)</b>
Airline BSO (sf)	2,600	2,600	2,860	3,120	3,640	3,900	(1,300)
Airline Airside Ops (sf)	9,321	9,320	11,046	12,081	14,151	15,531	(6,210)

SOURCE: Atkins, 2022

## TSA Passenger Screening

The Transportation Security Administration (TSA) is responsible for screening all ticketed passengers and their carry-on baggage at security screening checkpoints prior to passengers entering secure gate boarding areas. While the TSA has direct responsibility for determining the size and configuration of the passenger security screening checkpoints at the Airport, TSA typically collaborates with Airport management to plan checkpoint locations and programs. Checkpoint Requirements and Planning Guide (CRPG), September 30, 2021, provides guidelines for developing the requirements for checkpoints in the terminal.

Unit requirements for SSCPs were based on TSA targets for passenger processing rates. Although none are currently in use at the Airport, checkpoint property screening system (CPSS) lanes, which combine computed tomography (CT) scanner technology with automated screening lanes (automated bin return, remote screening, alternate viewing stations at secondary screening, and automatic divert for alarm bags), provide increased passenger throughput, improved screening capabilities, and greater system efficiency. CPSS lanes are included in the requirements analysis to reflect future adoption of this emerging technology.

Screening technology and passenger eligibility for Trusted Traveler programs continue to evolve, and future processing rates and program participation are unknown. To simplify processing variables and to provide a realistic assessment of lane and area requirements over time, an average throughput rate was adopted to represent a blended rate for ASLs, TSA Pre-Check, families, passengers with oversized carry-on, and passengers requiring special assistance. This methodology allowed for the randomization of processing times for individual passengers that result in a blended average throughput rate of a collective checkpoint based on TSA goals and observed performance of each lane type. The assumptions used to generate SSCP requirements are shown below:

- Screening Channel
  - 67% passengers will be screened at standard lanes
  - 33% passengers will be screened at Pre-Check lanes
- Throughput
  - 185 passengers per hour per standard lanes
  - 210 passengers per hour per Pre-Check lanes
- Wait Time Goals
  - 10-minute wait time goal at standard lanes
  - 5-minute wait time goal at Pre-Check lanes

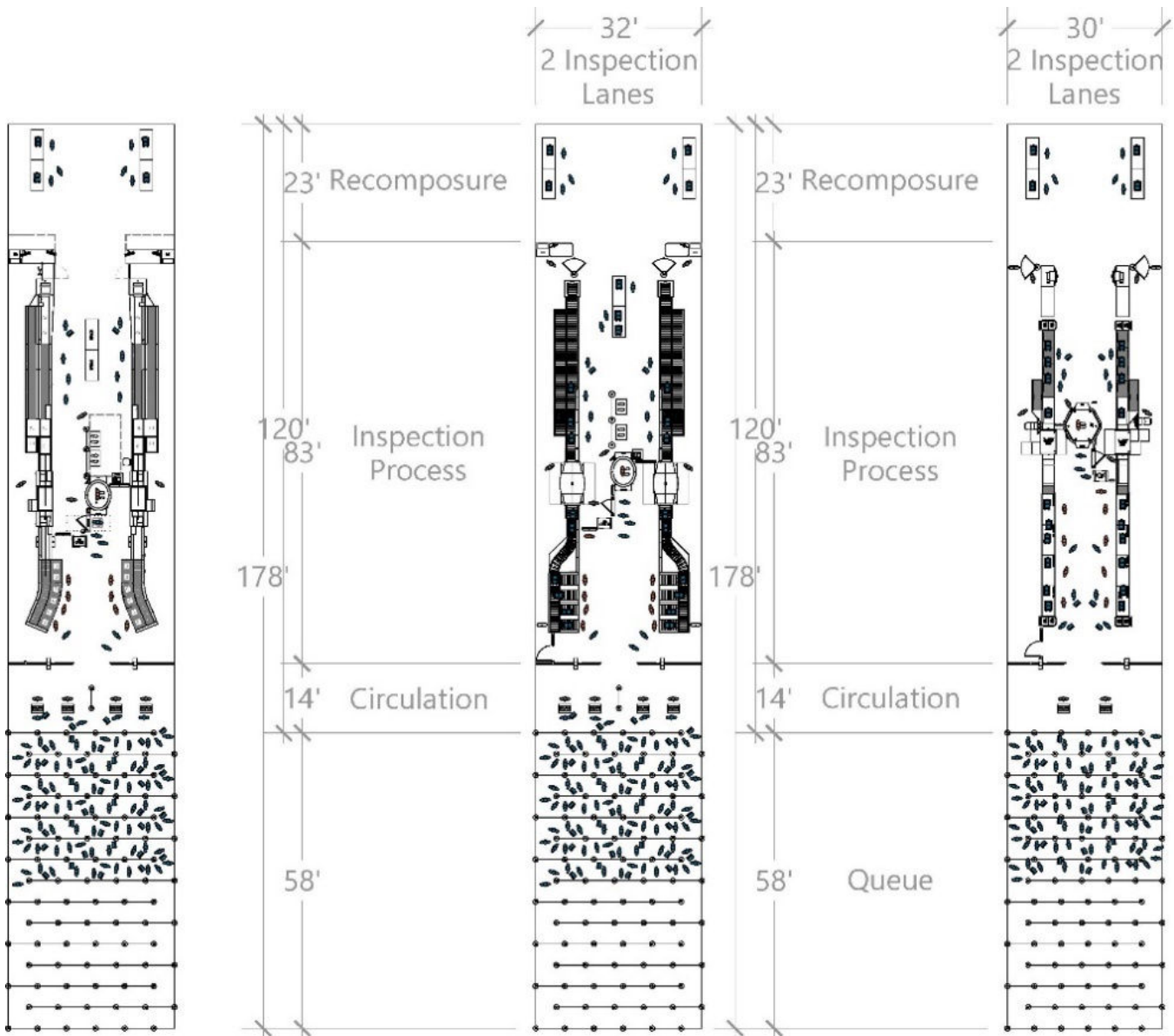
**Figure 4-13** depicts a typical layout for a two lane SSCP. Overall dimensions of the area as shown are approximately 178 feet by 32 feet.

Based on the stated assumptions, eleven (11) CPSS lanes are adequate for the baseline forecast; however, the lane requirement will need to increase to 18 lanes by PAL 4.

TSA guidelines recommend a minimum of 600 square feet of passenger queue per lane. However, many airports find an increase up to approximately 900 square feet per lane better absorbs passenger surges and irregular operations should lanes not open in a timely manner.

Over the past twenty years or so there has been a trend to consolidate TSA security checkpoints, at the same time, there has also been a focus by the TSA to increase the throughput of passengers at checkpoints to create greater ease in the process and eliminate long queue lines. This has led to the need for more IT infrastructure and an increase in space required at checkpoints for the new advanced equipment. It is expected this trend will continue with the goal of a very rapid and less onerous security screening process. Another added benefit to checkpoint consolidation has been TSA staffing. By staffing one checkpoint, instead of several, it allows for the highest utilization of TSA staff and avoids imbalance in staffing between understaffed and overstaffed checkpoints.

**RECOMMENDED CHECKPOINT LAYOUTS**  
**2,850 sf total per lane (includes 930 sf of queue)**



SOURCES: International Air Transport Association, *Airport Development Reference Manual*, 11th Edition, March 2019 (LOS); Airport Cooperative Research Program, *Report 25: Air Passenger Terminal Planning and Design*, Volume 1: Guidebook, 2010 (critical dimensions)

**Figure 4-13 Typical Two-Lane SSCP with AIT**

It should be noted that as airports grow with increased passenger demand, the distance between the consolidated security checkpoint and any new gates may increase. With the increased focus at US airports on customer service and higher levels of service, the passenger experience is very important to airport operators. If the distance between the consolidated security checkpoint and the passenger's aircraft boarding gate becomes too great, the use of satellite consolidated checkpoints could become essential to maintaining a positive passenger experience. The same can be noted for the location of baggage claims, ticketing check-in and from an airport operations perspective, the location of baggage make-up devices. Even as these trends continue to evolve, all the airport planning principles outlined here would still be employed.

## Federal Inspection Services Facility

The existing FIS facility is 35,660 square feet, including one international baggage carousel. The Primary immigration and international baggage claim are sized to accommodate 400 peak hour international arriving passengers. However, the overall facility area exceeds Custom and Border Protection program requirements for a 400 passenger per hour facility.

The DDFS indicate a maximum of one peak-hour international flight throughout the planning horizon with a 283 seat A330-300 flight carrying approximately 255 peak hour international arriving passengers. The FIS facility is adequately sized to accommodate peak hour passengers through PAL 4.

**Table 4-20** presents the recommended security checkpoint requirements and FIS for the future PALs.

<b>Table 4-20 Security Screening Checkpoint</b>							
	<b>Existing<sup>a</sup></b>	<b>Baseline</b>	<b>PAL 1</b>	<b>PAL 2</b>	<b>PAL 3</b>	<b>PAL 4</b>	<b>PAL 4 Surplus/ (Deficiency)</b>
Standard Lanes <sup>a</sup> (#)	11	7	8	9	11	11	-
PreCheck Lanes <sup>a</sup> (#)	5	3	4	5	5	6	(1)
Total Lanes <sup>a</sup> (#)	16	10	12	14	16	17	(1)
Queue Area <sup>b</sup> (SF)	14,800	6,000	7,200	8,400	9,600	10,200	4,600
Total SSCP <sup>c</sup> (SF)	47,500	28,500	34,200	39,900	45,600	48,450	(950)
Office/Admin Support (SF)	15,350	15,350	17,835	19,850	23,480	25,900	(10,550)
FIS <sup>d</sup>	35,660	21,150	21,150	21,150	21,150	21,150	14,510

SOURCE: Atkins, 2022

NOTES:

<sup>a</sup> Existing SSCP lane count based on 2019 Terminal Expansion Consolidated Checkpoint Project with 16 lanes and expansion capability to 18 lanes.

<sup>b</sup> Existing queue area based on 2019 Terminal Expansion Consolidated Checkpoint Project.

<sup>c</sup> Existing total SSCP area based on 2019 Terminal Expansion Consolidated Checkpoint Project.

<sup>d</sup> Includes international baggage claim hall.

## Concessions

Concessions are a critical component of any airport terminal as they provide revenue and necessary services to the travelling public. In terms of sales potential at U.S. domestic airports, airside locations are the strongest, followed by pre-departures landside locations, and finally, arrivals locations.

The RSW Terminal was planned and designed pre-9/11. At that time, the flow of passengers from a secure to non-secure side of the facility was less restrictive. There was no boarding-pass check or requirement that only ticketed passengers could go through security to the airside. As a result, most concession offerings in the original design were located landside as passengers and meeter/greeters could quickly flow between landside and airside with little difficulty. After 9/11, only passengers were permitted through security screening checkpoints, which eliminated the unobstructed flow between landside and airside. Psychologically, the addition of TSA Security Checkpoints created what is known as a 'pain point' introducing an unknown delay on the passenger's journey through an airport. Passengers typically want to transition through all pain points as quickly as possible and remain within easy access to their departure gate. Consequently, concession operators located pre-security on the landside experienced a significant decrease in revenue while demand for concessions post security surged.

Concessions are an important component for an airports' fiscal health and a passenger's satisfaction with the airport experience. As a result, airports across the US have trended toward consolidated security checkpoints and placing most concession offerings on the post-checkpoint (secure) airside of the airport where passengers can once again easily flow from concessions to the gates with no concern of a security delay in between. At airports which have made this shift, there has been a significant and notable increase in concession revenue. RSW's planned consolidation of the security checkpoints and significant increase in post security concessions will not only greatly improve concession revenue but contribute to a higher level of customer satisfaction and level of service. Post security concessions have also brought about further advantages in level of service at airports in that they tend to spread passengers waiting to board aircraft out inside the terminal and concourses eliminating overcrowding of hold rooms and crowding of circulation routes.

Since the move to place most concessions post security, airports have developed even more advanced concepts in concession layouts. The recent trend is moving concessions to the center of the main circulation path in a concourse as well as dispersing them more throughout the concourses. This has allowed passengers to enjoy concession offerings for longer dwell times closer to their gates. When a passenger can enjoy a concession venue with their 'eyes and ears' in the line of sight of their hold room, hold room crowding is reduced and secondary and tertiary spending at concessions by passengers is increased. In airports that have employed these more advanced planning opportunities, there has been a significant increase in concessions revenue and a higher level of service, thus increased passenger satisfaction.

The concessions analysis includes the space required to accommodate the three concession types: food and beverage concessions, retail, and specialty retail. These three concessions space areas and concession storage comprise the commercial requirements. Commercial space requirements are typically generated by assuming an area per million annual enplaned passengers (MAEP). The analysis assumes that arriving passengers do not patronize food and beverage concessions upon arrival. Concession requirements were delineated by concession type and pre- and post-secure area location. Unit requirements for each concession type are based on the 2019 RSW Concessions Master Plan assumptions.

**Table 4-21** shows the breakdown of requirement factors by type and location.

**Table 4-21 Concessions Operating Assumptions**

	Unit	Airside	Landside
Food and Beverage	SF/MAEP	7.90	0.50
Retail	SF/MAEP	1.60	0.10
Specialty Retail	SF/MAEP	1.00	0.10
<b>Total</b>	<b>SF/MAEP</b>	<b>10.60</b>	<b>0.70</b>

SOURCE: Atkins, 2022

Concession area requirements are based on the activity level that can support them. An assumption of 11.2 square feet per 1,000 MAEP is used to identify the total concession requirements. The results of this methodology are detailed in **Table 4-22**.

**Table 4-22 Concessions Requirement**

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
<b>Landside (sf)</b>	<b>3,000</b>	<b>2,700</b>	<b>3,000</b>	<b>3,400</b>	<b>3,800</b>	<b>4,300</b>	<b>(1,300)</b>
Food and Beverage (sf)	—	2,700	3,000	3,400	3,800	4,300	—
<b>Airside (sf)</b>	<b>63,424</b>	<b>56,700</b>	<b>65,057</b>	<b>73,301</b>	<b>82,795</b>	<b>91,100</b>	<b>(27,676)</b>
Food and Beverage (sf)	—	42,525	48,793	54,976	62,096	68,325	
Retail (sf)	—	11,340	13,011	14,660	16,559	18,220	
Specialty Retail (sf)	—	2,835	3,253	3,665	4,140	4,555	
<b>Total Concessions (sf)</b>	<b>66,424</b>	<b>59,400</b>	<b>68,057</b>	<b>76,701</b>	<b>86,595</b>	<b>95,400</b>	<b>(28,976)</b>
<b>Storage and Support (sf)</b>	<b>16,606</b>	<b>12,700</b>	<b>17,014</b>	<b>19,175</b>	<b>21,649</b>	<b>24,182</b>	<b>(7,576)</b>

SOURCE: Atkins, 2022

## Terminal Services

Terminal services include public restrooms, offices, meet/greeter areas, rental car counters, and areas for public information and storage of carts and wheelchairs.

## Restrooms

The restroom requirements include restrooms for both the airside and landside portion of the terminal. The area provided for restrooms is calculated based on the guidelines described in ACRP Report 226, Planning and Design of Airport Terminal Restrooms and Ancillary Spaces. The airside restrooms requirements are based on the quantity of narrow-body and widebody gates. Support, mothers' nursing rooms, companion/gender-neutral rooms, and family rooms are included, and are usually adjacent to each restroom module. Restrooms should be sized to avoid excessive queuing for use. The landside restroom requirements are based on passenger demand, both inbound and outbound. These assumptions for airside and landside include:

- Airside
  - 90% load factor
  - 50% passenger utilization rate
  - 20% peak 20-minute demand
  - 3:4 male/female fixture ratio
  - 95 square feet per fixture to account for ambulatory stalls, Americans with Disabilities Acts stalls, maintenance plumbing chases, etc.
  - 1 lactation room per concourse with an area of 100 square feet
  - 1 janitorial closet per restroom with an area of 100 square feet
- Landside
  - 1.1 visitors per each peak-hour deplaning passenger
  - 1.1 visitors per each peak-hour enplaning passenger
  - 1 male fixture per 70 peak hour deplaning passengers for first 400 passengers, and 1 male fixture per 200 peak hour deplaning passengers in excess of 400 passengers
  - 1.5 female fixtures per male fixture
  - 95 square feet per fixture to account for ambulatory stalls, Americans with Disabilities Acts stalls, maintenance plumbing chases, etc.
  - 1 lactation in the landside area with an area of 100 square feet
  - 1 janitorial closet in the landside area with an area of 100 square feet

**Table 4-23** provides the recommended requirements for airside and landside restrooms based on these assumptions.

**Table 4-23 Restroom Requirements**

Fixture	Existing	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
<b>AIRSIDE</b>						
Male Fixtures	116	52	57	66	72	44
Female Fixtures	92	70	75	87	95	(3)
Family Fixtures	12	11	14	14	14	(2)
<b>Total Fixtures</b>	<b>220</b>	<b>133</b>	<b>146</b>	<b>167</b>	<b>181</b>	<b>39</b>
<b>Total Area SF</b>	<b>14,585</b>	<b>13,735</b>	<b>14,970</b>	<b>17,195</b>	<b>18,525</b>	<b>3,705</b>
<b>LANDSIDE</b>						
Male Fixtures	46	25	27	32	34	12
Female Fixtures	41	34	37	43	46	(5)
Family Fixtures	5	5	7	7	7	(2)
<b>Total Fixtures</b>	<b>92</b>	<b>64</b>	<b>71</b>	<b>82</b>	<b>87</b>	<b>5</b>
<b>Total Area SF</b>	<b>8,420</b>	<b>12,360</b>	<b>13,690</b>	<b>15,780</b>	<b>16,730</b>	<b>950</b>

SOURCE: Atkins, 2021

## Meeter/Greeter Area

The meeter/greeter area requirements are based on arriving passengers and assumes 15% of arriving passengers have a meeter/greeter occupying 25 square feet per occupant in the waiting area in the two central atriums near to the airside passenger exit for domestic arrivals, and near the FIS exit for international arrivals. The results of this methodology are shown in **Table 4-24** and **Table 4-25**.

**Table 4-24 Domestic Meet and Greet Area Requirements**

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Peak Hour Domestic Arrivals	2,610	2,610	3,046	3,442	3,818	4,596	
Meeters/ Greeters	392	392	457	516	588	690	
SF Required	12,400	9,800	14,720	16,100	18,860	20,700	(8,300)

**Table 4-25 International Meet and Greet Area Requirements**

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Peak Hour International Arrivals	255	255	255	255	255	255	
Meeters/ Greeters	38	38	38	38	38	38	
SF Required	4,450	1,170	1,170	1,170	1,170	1,170	3,280

SOURCE: Atkins, 2022

## Airport Offices and Support Space

The office space includes space for the Airport operations and administration as well as tenant offices, such as TSA administrative offices and the LCPA Police Department. Airport offices include supporting space, such as non-public restrooms, locker and dressing rooms, maintenance rooms as well as storage space. Current office and support space accounts for about 12.7% of occupiable terminal areas, or 17 square feet per 1,000 annual enplaned passengers. Based on discussions with the Airport staff, the current office space is inadequate. Office space requirements are determined by a factor of 18 square feet per 1,000 annual enplanements, which allows for growth as the passenger demand increases over time. **Table 4-26** shows the requirements for airport office and support space throughout the planning period.

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Airport Admin	90,125	91,800	102,000	113,900	129,200	144,500	(54,375)
Ops	6,000	6,000	7,110	7,776	9,108	9,996	(3,996)
Maintenance	7,555	7,555	8,955	9,795	11,475	12,595	(5,040)
APD	13,551	13,551	16,051	17,551	20,551	22,551	(9,000)
AirCom	1,860	1,860	2,220	2,420	2,840	3,120	(1,260)
ID Office	1,941	1,941	2,301	2,571	2,949	3,237	(1,296)
<b>Terminal Services Total (sf)</b>	<b>121,032</b>	<b>128,285</b>	<b>133,427</b>	<b>140,903</b>	<b>155,708</b>	<b>165,624</b>	<b>(44,592)</b>

SOURCE: Atkins, 2022

## Airport Amenities Space

Airport amenities include services that provide attractions and services for passengers. These may include companion waiting areas, children's play areas, sensory rooms, art exhibition spaces, or meditation/worship areas, Service Animal Relief Areas, and information desks. The selection of such attractions is at the Airport's discretion; the spatial requirements do not indicate whether any of these attractions is preferable. The total area required for airport amenities was assumed to be 2% of the total space accessible by the public, based on guidelines in ACRP Report 25: Airport Passenger Terminal Planning and Design, Volume 1.

Service Animal Relief Areas (SARAs) are also FAA mandated essential facilities. SARAs are designed for service animals, primarily service canines. An area of 15 feet by 15 feet, or 225 square feet, is suggested for each SARA. SARAs should have an accessible, artificial turf area with an automatic flushing system and floor drain below. A sink node should be provided with a mop sink, and a fold-down seat to rinse soiled paws is recommended. **Table 4-27** provides a summary of the terminal requirements for each PAL.

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Amenities (sf)	3,680	5,760	6,600	7,370	8,440	9,310	(5,630)
SARA (sf)	—	225	225	225	225	225	(225)

SOURCE: Atkins, 2022

## Circulation Space

Circulation includes area in the terminal that is provided to allow for the safe, comfortable, and efficient movement of passengers, staff, or vehicles. Area requirements were calculated for general circulation (public and non-public), a secure bus platform, and tug drive circulation.

Circulation interconnects the different terminal functions via pedestrian access, allowing passengers and non-passengers to move about the terminal. Minimum dimensions for main circulation corridors should conform to local building codes. Public circulation requirements are based on the total space accessible by all passengers, well-wishers, and meeter/greeters. The operating requirements for public space is 30% of all publicly accessible space.

Non-public circulation requirements are based on the total space only accessible by employees, crew, and airport support staff. The operating requirements for public space is 20% of all non-publicly accessible space. **Table 4-28** provides the requirements for public and non-public circulation.

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Public Circulation (sf)	204,100	83,680	95,320	106,480	121,240	134,170	69,930
Non-Public Circulation (sf)	24,310	28,271	36,070	40,830	45,920	51,120	(26,810)

SOURCE: Atkins, 2022

## Summary of Terminal Building Requirements

**Table 4-29** provides a summary of the terminal requirements for each PAL. The table includes area for mechanical elements of the building and circulation areas. These are based on the total building size. A factor of 15% was used to calculate the mechanical requirements and 20% was used to calculate the circulation area requirements.

	Existing**	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Number of Gates (#)	27	N/A	32	35	41	45	(18)
Ticketing/Check-In (BAP and ATO) (sf)	35,960	43,955	39,840	43,575	47,310	51,875	(15,915)
Airline Lounge (sf)	10,000	10,000	10,000	10,000	10,000	10,000	0
Common Use Lounge (sf)	0	4,025	4,370	4,671	5,016	5,369	(5,369)
TSA Passenger Screening (sf)	47,500	28,500	34,200	39,900	45,600	48,450	(950)
FIS*	35,660	21,150	21,150	21,150	21,150	21,150	14,510
Hold Rooms (sf)	70,800	86,400	89,100	99,000	118,800	132,000	(61,200)
Concessions	66,424	59,400	68,057	76,701	86,595	95,400	(28,776)
Outbound Baggage Facilities	60,100	51,840	51,840	57,600	67,200	71,040	(10,940)
Inbound Baggage Facilities	62,820	42,960	48,330	58,830	64,440	75,180	(12,360)
Terminal Services	121,032	128,285	133,427	140,903	155,708	165,624	(44,592)
Circulation	228,410	112,131	131,390	147,310	167,160	167,160	(61,250)

SOURCE: Atkins, 2022

\* Includes international baggage claim hall.

As shown in Table 4-29, the existing terminal building will not be adequate to accommodate the future PAL 4 demand. The development alternatives will evaluate opportunities to expand the terminal to meet the recommended space requirements. In addition, some of the functional spaces in the terminal exceed the requirements and may be reused for other functional needs.

## 4.6 Support Facilities Demand/Capacity and Requirements

### General Aviation and Fixed Base Operator Facility

The existing general aviation (GA) area at Southwest Florida International Airport is located north of Runway 6-24 and is approximately 34 acres. This area accommodates one FBO and includes a terminal building, aircraft parking apron, ground support activities, and vehicular parking. Between fiscal years (FYs) 2017 and 2021, RSW averaged approximately 9,000 annual GA operations<sup>1</sup>. According to the FAA Airport Master Record, as of December 2021, RSW was home to three based aircraft.

One of the components of this Master Plan Update (MPU) is to evaluate the developable space north of Runway 6-24 and create a future land-use plan that identifies areas suitable for a variety of demand-driven development, such as GA. In addition to developable space, RSW has several facilities, navigational aids (NAVAIDs), and physical characteristics, such as a runway with a length of 12,000 feet, that could be attractive to future corporate GA tenants.

In order to estimate and quantify areas needed to accommodate future GA activity, it is helpful to understand RSW's proximity to nearby airports and their physical and operational characteristics. **Table 4-30** provides a summary of airports within 40 NM of RSW, as well as their service level, runway length, NAVAIDs, and other key comparators. The location of the surrounding airports is illustrated on **Figure 4-14**.

There are seven public-use airports with at least one runway longer than 5,000 feet within 40 NM of RSW. Page Field (FMY) and Punta Gorda Airport (PGD), however, are the only two airports with an air traffic control tower (ATCT) and precision instrument approach capabilities. An ATCT and a precision instrument approach are two key items that would be considered by GA operators, corporate tenants, and/or FBOs when evaluating the merits of an airport for the development of a new hangar or facility. FMY, which is also owned and operated by the Lee County Port Authority (LCPA) is a designated reliever to RSW. FMY is approximately 588 acres and is constrained by nearby commercial development and residential development, as well as major roadways. As of December 2021, FMY has over 200 based aircraft and limited opportunities to construct additional GA facilities, including hangars and FBO facilities.

According to the 2035 Florida Aviation System Plan, based aircraft in the southwest region are projected to increase at an annual growth rate of 1.56% through 2035. This growth rate exceeds the projected statewide annual growth rate of 1.49% over this same time. Applying the average annual growth rate to FMY, based aircraft are projected to increase to 252 aircraft by 2035. Given FMY's existing constraints, a portion of that demand is likely to be accommodated at RSW if suitable facilities are available. There are limited GA airports/facilities in the region and RSW, with a 12,000-foot runway, offers prime facilities and developable space for the accommodation of additional GA activity. Therefore, for planning purposes, an additional 35 acres of property, north of Runway 6-24 will be reserved to meet future GA demand throughout the planning horizon.

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<sup>1</sup> Federal Aviation Administration, *2021 Terminal Area Forecast*, <https://taf.faa.gov/> (accessed December 16, 2021).

**Table 4-30 Nearby Airport Physical and Operational Characteristics (2021)**

	Southwest Florida International (RSW)	Page Field Airport (FMY)	Punta Gorda Airport (PGD)	Immokalee Regional Airport (IMM)	La Belle Municipal Airport (X14)	Naples Municipal Airport (APF)	Marco Island Executive (MKY)	Airglades Airport (2IS)
Distance to/from RSW		6.5 NM	26.2 NM	20.0 NM	21.4 NM	23.0 NM	32.8 NM	39.6 NM
Service Level	Primary	Reliever	Primary	General Aviation	General Aviation	General Aviation	General Aviation	General Aviation
Total Airport Acreage	6,431	588	1,934	1,330	160	732	140	2,560
Number of Paved Runways	1	2	3	2	1	2	1	1
Runway Length (feet)	12,000	6,406 4,910	7,193 6,286 2,636	5,000 4,550	5,254	6,600 5,001	5,000	5,902
Air Traffic Control Tower on Site	Yes	Yes	Yes	No	No	Yes	No	No
Approach Type	Precision	Precision	Precision	Non-Precision	Non-Precision	Non-Precision	Non-Precision	Non-Precision
Based Aircraft in 2021	3	203	384	56	71	368	33	33
Single Engine	0	152	312	46	59	215	29	27
Multi Engine	0	34	43	6	11	40	1	4
Business Jet	2	14	20	3	0	93	1	0
Helicopters	1	3	9	1	1	20	2	2
Total Operations	71,693	114,863	79,405	37,850	22,000	112,262	58,430	11,527

SOURCE: Federal Aviation Administration, AIRPORTIQ 5010, accessed December 1, 2021, <https://www.airportiq5010.com/5010Web/>

NOTE: This table includes public-use airports within 40 NM of RSW with at least one 5,000-foot paved runway.

To estimate land area requirements to accommodate future GA tenants and operators, a review of GA/FBO facilities at six commercial airports in the U.S. was conducted. The analysis focused on airports that experience or will experience enplaned passengers with activity levels of 8.5 million or more (consistent with RSW 2041 projected enplanement levels).

**Figure 4-15** provides a summary of the airports that were benchmarked, and their activity levels expressed in Million Enplaned Passengers (MEP), annual general aviation operations, and based aircraft. Figure 4-15 also includes CY 2018 population data associated with the Metropolitan Statistical Area (MSA) surrounding each airport.

The benchmarking analysis indicates that the GA/FBO areas at these airports range between 32 and 79 acres. For planning purposes, 50 acres north of Runway 6-24 should be reserved to meet future GA demand throughout the planning horizon, consistent with the six benchmarked airports average GA/FBO area. The analysis also indicates that the size of the hangars at these airports varies between 12,000 to 64,000 square feet.



SOURCE: FAA AIRPORTIQ 5010, December 2021

**Figure 4-14 Surrounding Airports**

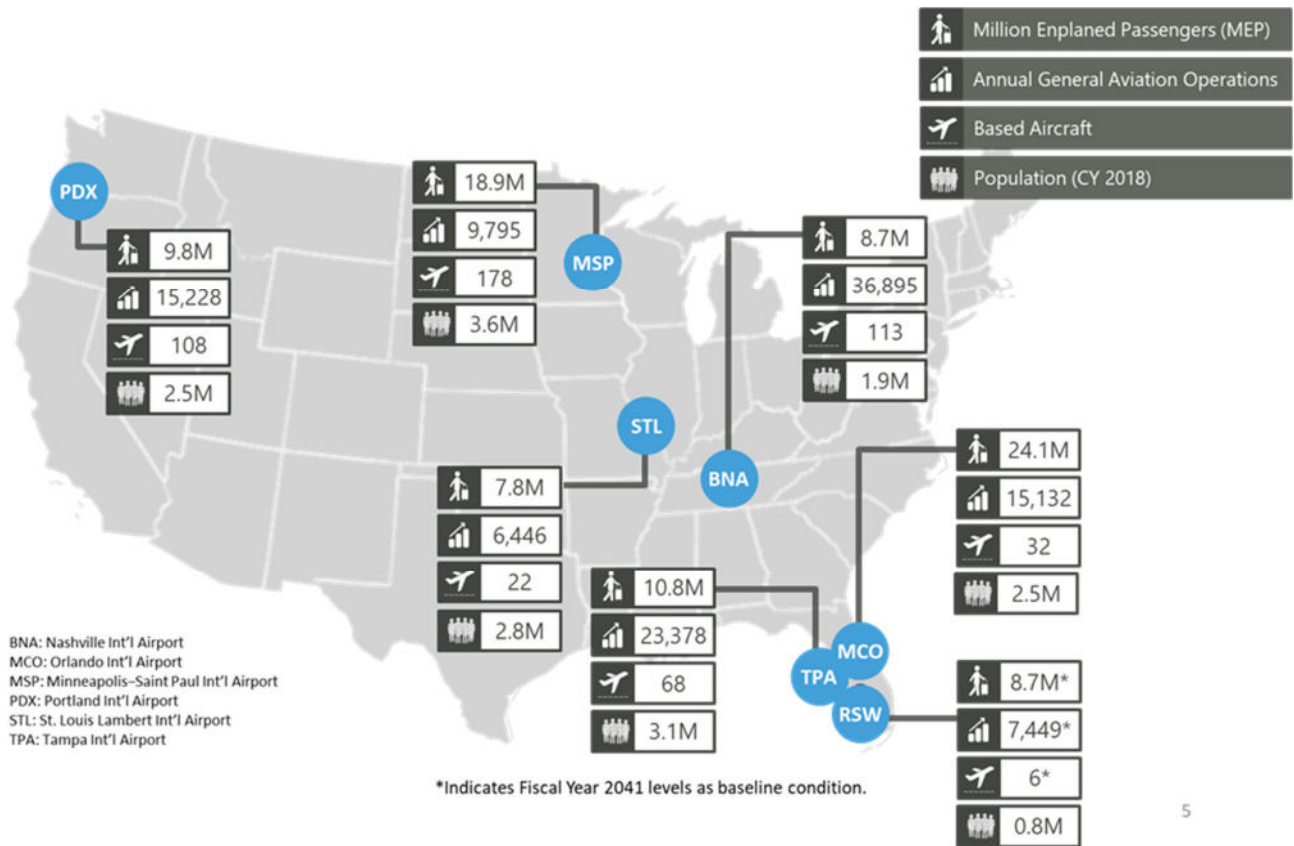


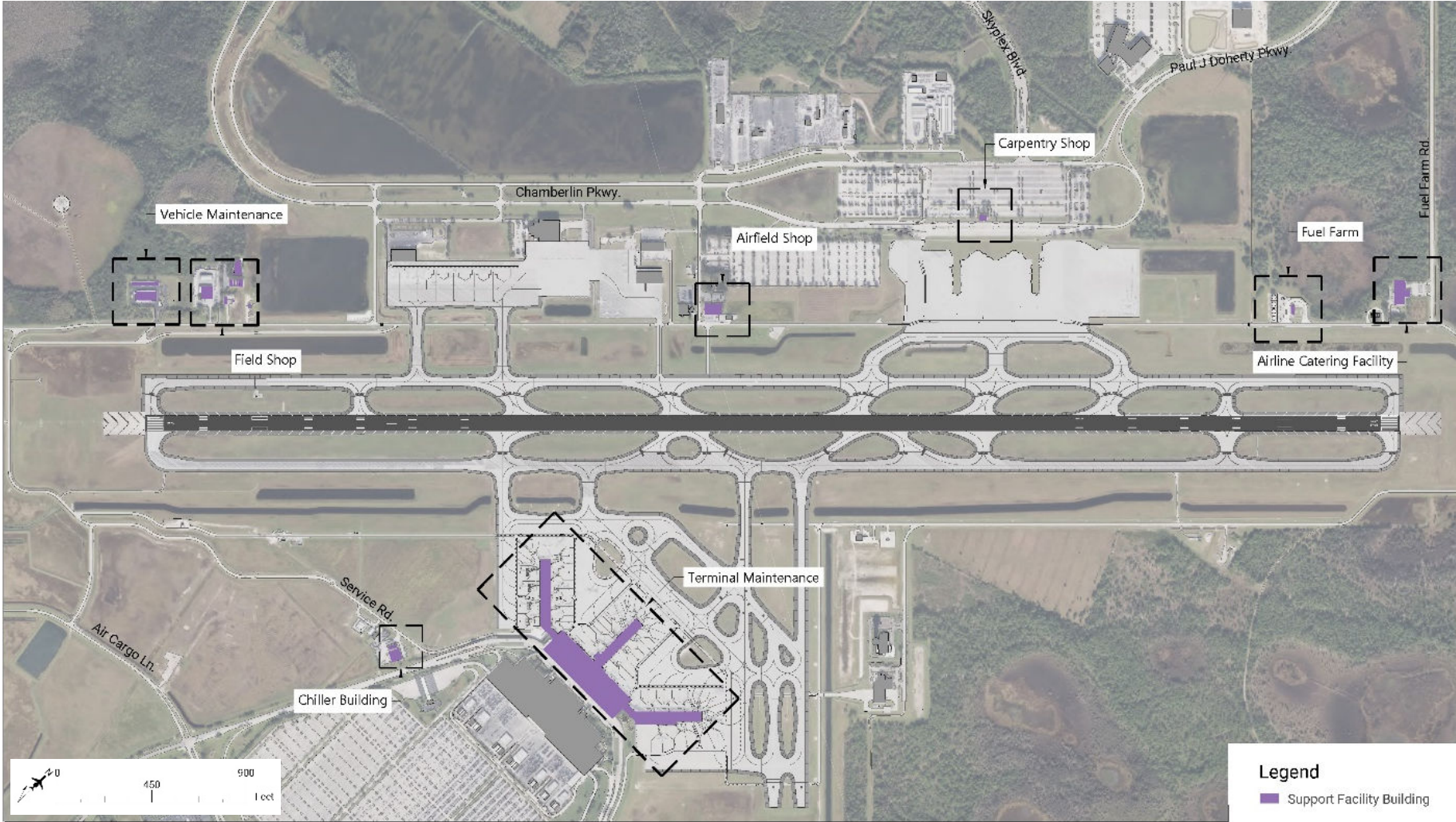
Figure 4-15 Benchmarked Airports

## Airline Catering Facility

The reduction in food service beyond snacks and beverages on most domestic flights has resulted in less demand for catering/flight kitchen facilities at airports. The catering facility operated by LSG/Sky Chefs is considered adequate through the planning horizon and no additional space requirements were identified as part of this Master Plan Update.

## Aircraft Maintenance, Repair, and Overhaul Facility

To estimate land area requirements to accommodate future aircraft maintenance tenants and operators, a review of MRO facilities at six commercial airports in the U.S. was conducted. These airports are the same as the ones that were benchmarked for the GA/FBO facilities and are noted in **Figure 4-16**. The benchmarking analysis indicates that the MRO areas at these airports range between 31 and 53 acres. For planning purposes, 40 acres north of Runway 6-24 should be reserved to meet future MRO demand throughout the planning horizon, consistent with the six benchmarked airports average MRO area. The analysis also indicates that the aircraft maintenance hangars at these airports vary in size from 24,000 to 110,000 square feet.



SOURCE: Martinez Geospatial Inc., Base Mapping and Aerial Photography, April 2021; Ricondo & Associates, June 2022

**Figure 4-16 Maintenance Facilities**

The new commercial service MRO facility that is planned for development on the eastern portion of the north ramp area encompasses approximately 40 acres. The proposed facility would be equipped with the necessary infrastructure to provide services such as heavy aircraft maintenance, airframe modifications, avionics repairs, testing, and painting. The 340,000-square-foot proposed facility would include the following:

- 175,000-square-foot heavy maintenance MRO aircraft hangar
- 72,000-square-foot paint booth hangar
- 27,000-square-foot materials receiving and storage space
- Three-story 66,000-square-foot main operation building (22,000 square feet per floor)

The facility and associated apron is proposed to accommodate up to 11 narrowbody aircraft or four to six widebody aircraft at a given time. The paint booth hangar is planned to accommodate up to one widebody aircraft at a time. The proposed facility is anticipated to meet the long-term demand for MRO services. No additional facilities are recommended throughout the planning period.

## Fuel Storage Facilities

As noted in the Inventory Chapter, there are three fuel storage facilities at the Airport. The commercial service and GA fuel storage facilities are located east of the north ramp area and north of the Runway 24 end. The GSE fuel storage facility is located south of the Runway 6 end.

### Commercial Aviation Fuel Storage Facility

With a forecasted strong increase in commercial flight activity through the planning horizon, the need for additional fuel farm facilities was analyzed to determine the need (if any) for expansion.

Every fuel farm requires a minimum number of days of storage capacity each location strives to have and maintain. Most often this is driven by a number of variables which are site specific. Examples of these variables can include the method of fuel delivery, how reliable the fuel supply chain is, weather conditions, historical data, etc.

For RSW's peak month, the usage by day was reviewed to determine the peak average use observed in that month over several days. That usage was then spread over the number of current gates to find the average usage at each gate. This gate usage average combined with the projected aircraft mix is applied to the highest potential number of new gates (19), in order to best project what the future fuel usage may look like.

Other factors that went into the projections include operational limitations of the tanks such as safe fill levels, tank bottoms, out of service inspections that are required, current peak demand (how much fuel the ramp requires at one time), maximum fuel offloading capability, lag time when placing fuel orders vs when they arrive, and more.

Based on the assumptions and calculations in **Table 4-31**, it is recommended to build a total of three 25,000 Barrel of crude oil (BBL) tanks (1,050 gallons per tank) based on the schedule in **Table 4-32**.

**Table 4-31 Fuel Farm Requirements Assumptions**

Facility Name	Requirement	Units
Peak Monthly Usage	11,760,000	gallons (per Historical Data)
Calculated Daily Usage	379,355	gallons (per Historical Data)
Peak Daily Usage	450,000	gallons (per Historical Data)
Peak Daily Usage per Gate	10,714	gallons (Estimated Average)
Peak Daily Usage plus (19) Gates (2027)	653,571	gallons
Total Recommended Usable Storage (2027)	—	gallons
Peak Daily Usage plus (19) Gates (2042)	857,143	gallons
Total Recommended Usable Storage (2042)	—	gallons

SOURCE: FSM Group Analysis, 2022

**Table 4-32 Fuel Farm Concept**

Tank	Nominal (BBL)	Usable (gal.)	Percentage (%) Usable
Tank 1 (existing)	10000	355,110	85%
Tank 2 (existing)	10000	354,522	84%
Tank 3 (existing)	10000	355,236	85%
Tank 4 (existing)	10000	356,790	85%
Tank 5 (2027)	25000	881,143	84%
Tank 6 (2027)	25000	881,143	84%
Tank 7 (2042)	25000	881,143	84%
Recommended Volumes		Usable (gal.)	Percentage (%) of Forecasted Use
2027 Usable Volume		2,565,818	98%
2042 Usable Volume		3,446,961	101%

SOURCE: FSM Group Analysis, 2022

## General Aviation Fuel Storage Facility

In addition to the existing GA fuel farm with storage for 60,000 gallons of Jet A fuel and 12,000 gallons of aviation gas (AvGas), an area should be preserved for a secondary fuel farm to be located close to the existing and future general aviation facilities to reduce the number of fuel truck operations. The reduction in fuel truck movements on the airfield would increase safety, reduce air emissions, and reduce environmental risks, including surface fuel spills.

## Air Cargo Facilities

As noted in Existing Conditions Chapter, the air cargo facilities at the Airport include two primary buildings. The main cargo building consists of approximately 24,000 square feet of floor space and is occupied by Federal Express (FedEx) and United Postal Service (UPS). The airline freight forwarding facility, which encompasses 13,600 square feet, is used primarily for the airlines' belly-haul cargo processing. These buildings will continue to serve the short and midterm demand for air cargo. As such, future development plans for the north ramp area should assume these buildings will remain in place in the future.

To estimate land area requirements to accommodate future air cargo tenants and operators, a review of cargo facilities at six commercial airports in the U.S. was conducted. These airports are the same as the ones that were benchmarked for the GA/FBO facilities. The benchmarking analysis indicates that the cargo areas at these airports range between 37 and 116 acres. On average, the cargo areas at these airports encompass 70 acres. Therefore, for planning purposes, approximately 70 acres north of Runway 6-24 should be reserved to meet future cargo demand throughout the planning horizon.

Future cargo facilities are likely to include:

- Cargo buildings
- Truck loading docks and apron
- Truck staging/storage area
- Automobile parking
- Aircraft apron
- Ground support equipment (GSE) storage areas

## Electronic Commerce Logistics Facilities

The anticipated growth of electronic commerce (e-commerce), driven by increasing concentration of population in urban areas and technological advancements to enable globalized commerce, presents significant opportunities for airport owners to contribute to regional economic development. The U.S. is the second largest online market in the world (following China)<sup>2</sup> and many U.S. retailers are investing in e-commerce. According to the US Department of Commerce Retail Indicator Division, e-commerce represented 14.3% of all retail sales in the first quarter of 2022 (compared to 5.2% in the first quarter of 2012).

To estimate land area requirements to accommodate future e-commerce tenants and operators for their logistics facilities, a review of existing e-commerce logistics facilities at Lakeland Linder International Airport (LAL) and Chicago Rockford International Airport (RFD) was conducted. The e-commerce/sort logistics facilities at LAL encompass approximately 40 acres and include a 223,000-square-foot distribution/sort and office building, aircraft parking areas, truck loading docks and apron, GSE support buildings, and parking and operational support areas. A plan to expand Amazon Air's e-commerce hub at LAL was approved in 2021 and will include a 464,600-square-foot expansion of the existing distribution/sort and office building, approximately 69,000 square yards of paved truck court to accommodate 370 additional truck bays, additional automobile parking spaces, and a concrete apron capable of accommodating three additional Boeing 767-300 aircraft parking positions. The e-commerce logistics facilities at RFD encompass approximately 33 acres and include a 200,000-square-foot distribution/sort and office building, aircraft parking areas, truck loading docks and apron, GSE support buildings, and parking and operational support areas. Based the layout of the logistics facilities at both LAL and RFD and for planning purposes, it is recommended that approximately 40 acres be reserved for future e-commerce logistics facilities at RSW.

## Airfield Electrical Vault

As documented in the Existing Conditions Chapter, a new airfield electrical vault was constructed in June 2021. The new vault was designed to accommodate the airfield long-term needs including the new runway and no changes to this equipment are anticipated throughout the Master Plan horizon.

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<sup>2</sup> E-commerce Market Analysis, <https://ecommercedb.com/en/markets/us/all>, accessed June 20, 2022

## Air Traffic Control Tower

As discussed in Section 2, a new ATCT and terminal radar approach control (TRACON) are being constructed between Runway 6-24 and future Runway 6R-24L, north of the aircraft rescue and firefighting (ARFF) facility. The tower is anticipated to become operational in September 2022. The location of the ATCT was sited in accordance with FAA guidance and considered line-of-sight and other criteria necessary to accommodate the future airfield geometry, including the Runway 6R-24L. Given the facility will be in excellent condition, there are no additional ATCT improvements recommended throughout the planning period.

## Aircraft Rescue and Firefighting Facility

The existing ARFF station was constructed in 2012 and is approximately 31,000 square feet. The facility is located between Runway 6-24 and future Runway 6R-24L, east of the existing passenger terminal building. This location is consistent with the FAA ARFF siting criteria that include providing immediate access to the airfield, ensuring non-interference with the ATCT's line of sight, adhering to the building restriction line (BRL), and meeting requirements for emergency response time. As detailed in Title 14 CFR Part 139 (Part 139), the first ARFF response vehicle must be able to maneuver to the midpoint of any runway within 3 minutes. The location of the ARFF facility provides optimal access to the existing runway and future parallel runway.

The ARFF facility provides five drive-through apparatus bays capable of housing ten ARFF vehicles. The facility and equipment meet the requirements of Part 139 for Index D operations. Index D represents an aircraft length of 159 feet or greater but less than 200 feet. The index determination is based on the length of the longest air carrier aircraft performing five average daily departures at the Airport. In March 2020, there was an average of four daily departures of aircraft classified as Index D. These aircraft included the Boeing 757-300 and Boeing 767-300. According to a design day flight schedule developed in support of the May 2020 *Passenger and Operations Forecast*, the number of average Index D departures is forecast to increase to 23 by 2040. The increase in departures of Index D aircraft is due to evolving airline business models, such as upgauging and phasing out of older aircraft, as well as an overall increase in operations.

The basic equipment and extinguishing agent requirements of an Index D ARFF facility are three crash response trucks with:

- One vehicle carrying extinguishing agents of either 500 pounds of sodium-based dry chemical, halon 1211, or cleaning agent or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of aqueous film forming foam (AFFF) to total 100 gallons for simultaneous dry chemical and AFFF application
- Two vehicles carrying an amount of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by all three vehicles is at least 4,000 gallons.

The ARFF facility at RSW is adequately sized to accommodate to the equipment, agents, and personnel to meet Index D requirements. RSW's Part 139 classification of Index D is expected to remain constant throughout the planning horizon. Aircraft more than 200 feet long are not anticipated to account for the minimum of five daily departures within the MPU 20-year horizon; therefore, according to current regulations, ARFF Index D is adequate.

## Secondary Fire Station

Fire and rescue operations currently originate from the ARFF station, which is located between (existing) Runway 6-24 and future Runway 6R-24L, east of the existing passenger terminal building. While this location provides efficient access to airside emergencies, access to terminal facilities and other landside areas on the airport campus including 1 million

square feet of industrial, office, commercial, and hotel development potential in Skyplex is limited by security egress/ingress checkpoints and runway crossings. The constraints of the existing location and the projected growth of vehicle trips on primary and secondary access routes in the Skyplex development area is likely to result in unacceptable emergency response times for service delivery objectives based on the National Fire Protection Association (NFPA) time standards for the deployment of fire suppression, and rescue and emergency medical resources/services.

Specifically, NFPA Standard 1710 titled Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2020 Edition includes the following fire department time objectives:

- Turnout time (The time that begins when units acknowledge notification of the emergency to the beginning point of response time): 80 seconds turnout time for fire and special operations response and 60 seconds turnout time for EMS response
- Fire response time (The time that begins when units are en-route to the emergency incident and ends when units arrive at the scene):
  - 240 seconds (4 minutes) or less for the arrival of the first engine company at a fire suppression incident
  - 360 seconds (6 minutes) or less for the arrival of the second engine company at a fire suppression incident
  - 480 seconds (8 minutes) or less for the deployment of an initial full alarm assignment at a fire suppression incident for facilities other than high-rise
  - 610 seconds (10+ minutes) or less for the deployment of an initial full alarm assignment at a fire suppression incident for high-rise

First responder or higher emergency medical response time: 240 seconds (4 minutes) or less for the arrival of an advanced life support (ALS) unit at an emergency medical incident, where this service is provided by the fire department provided a first responder with an AED or basic life support (BLS) unit arrived in 240 seconds or less travel time.

The standard states that the fire department shall establish a performance objective of not less than 90% for the achievement of each response time objective.

Preliminary analyses by LCPA fire station staff indicate that response times from the ARFF station to facilities along Daniels Parkway will not meet NFPA standards. Thus, to improve response times on the airport campus and the Skyplex development area, LCPA should protect for the construction of a secondary fire station on the north side of the Airport.

## Public Safety Building

The Terminal complex is the facility that experiences by far the most public use of any facility at the Airport. Accordingly, if a security or safety incident were to occur, there is higher probability that it would occur in this facility. Based on discussions with law-enforcement personnel, co-locating police headquarters in the terminal facility presents potential response challenges should a situation emerge requiring law-enforcement personnel. A situation severe enough could render onsite personnel incapable or incapacitated to respond to a situation, similarly police resources could be unavailable if police headquarters are impacted by an incident. Locating the bulk of law-enforcement resources nearby, while retaining a smaller terminal police office allows the police to have a hardened and timely response to most security or safety scenarios.

In addition, with continuing rapid passenger growth at RSW, the already limited terminal space commands a high premium. Coupled with increased security requirements and police staffing to match passenger growth, the need for more Lee County Port Authority Police Department (APD) space competes with the need for more terminal space to accommodate the growing passenger demand.

In order to leverage terminal resources to the best and highest use for airline and airport operations; and to allow for the APD to continue to grow, a new Public Safety Building hosting the APD, a multi-use Airport Emergency Operations Center, and redundancy locations for limited Airport Badging and Communications functions is planned independent of the terminal.

## LCPA Police training gun ranges

The LCPA has an indoor (enclosed but open roof) and outdoor gun range. These gun ranges are a benefit to APD training as they do not have to book time and travel to other shared facilities. These facilities are recommended to be maintained in their current locations with periodic upgrades.

## Lee County Port Authority Airport Maintenance Department Facility

The existing airport maintenance facilities supporting RSW are spread throughout the Airport campus, with facilities located north and south of Runway 6-24, as well as within the Terminal Building. Figure 4-16 illustrates the location of the maintenance facilities. The primary use associated with each facility, the year constructed, and the approximate size is listed in **Table 4-33**.

<b>Facility Name</b>	<b>Year Constructed/ Renovated</b>	<b>Approximate Size of Facility<sup>a</sup></b>	<b>Primary Use</b>
Vehicle Maintenance Facility	1998/2020	30,100 sf	Vehicle Maintenance, Administrative Space, Sign Shop, Welding and Fabrication Shop, and Storage
Airfield Shop	1981	13,100 sf	Airfield Equipment Storage, Photometric Testing Lab, Exercise Facilities, and Auditorium
Field Shop	1981	16,800 sf	Warehouse Space, Large Equipment Storage, Fuel Facilities, and Chemical Storage
Carpentry Shop	1981	3,400 sf	Carpentry Related Functions and Storage Space
Chiller Building	2005	10,359 sf	Powder Coating Operations, Parts Cleaning and Preparation, and Bulk Storage
Terminal Building	2005	9,632 sf	Locksmith Shop, Carpentry Shop, Paint Storage, Terminal Maintenance Storage, Administrative Office Space, Locker Rooms, Breakrooms

SOURCES: Lee County Port Authority, December 2021; Ricondo & Associates, Inc., December 2021

<sup>a</sup> Approximate facility size includes covered storage for vehicles, equipment, and materials.

As of December 2021, the Maintenance Department has 105 approved positions. From a historical staffing perspective, the number of employees in the Maintenance Department has doubled since moving to the Midfield Terminal Complex in 2005 and is projected to grow by approximately 10 staff by PAL 1, 2026.

The size of the maintenance facility space within the Terminal Building has decreased since 2005 to accommodate the needs of airlines, concessionaires, and other tenants. According to Airport staff, there is an immediate need for additional

breakroom, locker room, storage, and administrative office space in the terminal. The Airport has a short-term plan to utilize additional space within the Terminal Building at the ends of Concourses B and D.

To accommodate maintenance needs in the mid-and long-term planning horizons, as well as future staffing projections, additional space is needed for a variety of maintenance functions. Due to the age and condition of the existing facilities, particularly the Airfield Shop, Field Shop, and Carpentry Shop, opportunities for the expansion of these facilities are limited.

Representatives from the Maintenance Department have indicated a preference to develop a consolidated maintenance facility to accommodate the majority of the maintenance staff and functions of the department. In addition to increasing the overall efficiency of the department, the construction of a consolidated maintenance facility would allow several existing functions and staff currently located within the terminal building to be relocated. The maintenance facilities within the terminal building would be limited to staff, equipment, and functions specifically related to the terminal core.

The proposed consolidated maintenance facility would include the following:

- Administrative office space and conference/training rooms
- Kitchen, breakrooms, locker rooms, showers, and exercise facilities
- Warehouse, paint and chemical storage, equipment storage, bulk storage
- Tool room, sign shop, lock shop, systems shop, system testing lab, carpentry shop, powder coat shop, photometric testing lab
- Employee parking
- Electric charging stations for airport maintenance, employee, and visitor vehicles

Maintenance personnel have also indicated the need for two additional fuel storage tanks (one 6,000-gallon unleaded gasoline tank, one 1,000-gallon ethanol-free gasoline tank) to support the small equipment, mowers, and carts used throughout the campus.

The existing maintenance facilities, including employee parking, currently occupy approximately 5.8 acres. The estimated future space requirements for all maintenance functions at RSW, including a consolidated maintenance facility, are approximately 6.6 acres.

## Remote Loading Dock

Currently the Terminal building receives commercial goods through a loading dock accessible to unsecured delivery vehicles. The location of the loading dock within the Terminal presents a security issue as it allows a large-size commercial vehicle to approach and dock within the Terminal with no safety area in between the building and the vehicle. A new facility is being designed and will be located away from the Terminal area to allow for commercial deliveries to occur without contact with the Terminal. Goods will be off-loaded at the new facility, inspected for safety and then transferred to secure airside vehicles that will deliver the goods to the Terminal via the secure airside. This will allow for the removal of the landside loading dock and improve the hardening of the Terminal. This facility will be sized to match the current and future needs of the Terminal facility. A similar facility was built at San Diego International Airport with the addition of belly cargo facilities for airlines. **Table 4-34** shows the remote loading dock requirements over the planning horizon.

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/ (Deficiency)
SF	15,185	13,010	14,887	16,771	18,934	21,149	(5,964)

SOURCE: Atkins, 2022

## 4.7 Landside: Roadways, Curbside, Parking, and Rental Cars

The following section summarizes the forecasted demand and capacity for the internal RSW roadway network and commercial areas that serve the Airport, such as on-airport access roads, parking, and curbsides. Data from previously completed forecasts of RSW aviation activity were reviewed as part of this Master Plan Update. The May 2020 *Passenger and Operations Forecast Study* by C&S Companies and TransSolutions was compared against activity growth projections used in previous studies, which showed that previous projections are still valid with the 2020 forecast update. Findings from the previous studies were referenced to determine the extent to which each facility type (roadways, curbsides, parking, etc.) is expected to meet the projected demand. If future non-aeronautical development is expected in any of the internal RSW and commercial areas that serve the airport, then a future traffic impact study would be necessary to determine the level of service of the roadways affected by the developments.

### Landside Roadways

Based on available past studies there are no requirements identified to address capacity deficiencies through the planning horizon. The following subsections summarize the findings from these studies.

#### Chamberlin Parkway and Paul J. Doherty Parkway (North Access)

The development of non-aviation uses on airport property is subject to local government review of traffic impacts. The trip generation associated with roughly 1 million square feet of industrial, office, commercial and hotel development potential in Skyplex (non-aviation support lands north of Runway 6-24) and in the midfield area along Terminal Access Road have been preliminarily assessed. Through the Lee County review process, approval has been issued and the landside roadways are expected to have capacity to accommodate an anticipated 1,741 new PM peak hour trips in Skyplex area and 392 new PM peak hour trips in the midfield area, subject to final review on a site-by-site basis at time of development. If future additional non-aviation development is proposed, then a future traffic impact study would be necessary to assess impact to the levels of service of the roadways affected by the developments.

The 2017 Chamberlin Parkway Alignment Study (Appendix M) developed by Johnson Engineering, Inc. summarized the existing vehicular demand of Chamberlin Parkway and Paul J. Doherty Parkway based on data collected at three roadway segments in November-December 2016. The traffic counts indicated average daily traffic was 578 vehicles for Chamberlin Parkway and 2,115 vehicles for Paul J. Doherty Parkway.

The Chamberlin Parkway Alignment Study did not quantitatively determine deficiencies in terms of roadway capacity. If updated existing and future LOS is desired, then a new demand/capacity analysis would be required for these roadways. However, the study does outline improvements to be made in terms of safety and other benefits to the overall area in concern. Based on this study, the proposed alignment changes were identified to address safety and operational efficiency for the corridor. A total of three roadway realignments were proposed as part of the study and will be discussed in Chapter 5, Alternatives Development and Evaluation.

The 2019 Daniels Parkway and Paul J. Doherty Parkway Assessment (Appendix N) developed by Kimley-Horn summarized an intersection capacity analysis at four intersections based on data collected during the AM and PM peak periods on Thursday, February 21, 2019.

The four study intersections are identified in Error! Reference source not found.4-17. The study determined that Daniels Parkway/CR 876 at Paul J. Doherty Parkway required intersection improvements to accommodate then-current existing traffic conditions. The recommended improvements, from the Option 1 scenario, have since been implemented. No future LOS or queue conditions were determined as part of the study; therefore, additional demand/capacity analysis would be needed to determine future LOS conditions for these roadways and intersections. The LOS results for the study intersections with Option 1 Improvements existing are included in Appendix N.



SOURCE: Kimley-Horn, *Daniels Parkway and Paul J. Doherty Parkway Assessment*, 2019 (Appendix N)

**Figure 4-17 Location Map**

While no capacity deficiencies were identified for Fuel Farm Road, pavement conditions and geometrics for maneuverability should be assessed and accounted for to support any future expansions to the fuel farm or non-aviation development along this corridor.

## Terminal Access Road

The RSW Terminal Access Road Traffic Study developed by Johnson Engineering Inc. in August 2011 summarized the traffic analysis for Terminal Access Road and its intersections. Florida Department of Transportation (FDOT) historical data for Terminal Access Road shows an Annual Average Daily Traffic (AADT) of 27,500 vehicles during the year of 2019, which is approximately 23% lower than the 35,580 vehicles that were projected in the referenced study for 2019. This may indicate that, based on the average annual growth rate obtained from the RSW Passenger and Operations Forecast dated May 2020, conditions for this roadway may take longer to reach the operational level of service deterioration projected by the 2011 study since activity is growing slower than previously projected. As a result, the Terminal Access

Road and its intersections are experiencing conditions that are better than originally anticipated in the 2011 RSW Terminal Access Road Traffic Study from Johnson Engineering, Inc. As of the 2011 study, no recommended or required improvements were identified. Therefore, no geometric/capacity changes appear to be required based on the 2011 study or current conditions.

### ***Terminal Access Road at Treeline Avenue***

As a result of the of the I-75 interchange constructed after the August 2011 study was performed, the analysis included in the referenced study is no longer applicable to current conditions. Therefore, it is recommended that a new demand/capacity analysis be performed for the Terminal Access Road and Treeline Avenue intersection.

### ***Terminal Access Road at Air Cargo Lane (Inbound)***

No geometric or lane configuration changes appear to be required based on the August 2011 study or current conditions.

### ***Terminal Access Road at Air Cargo Lane (Inbound) Demand/Capacity Validation***

When then-proposed development traffic is accounted for, this intersection is projected to experience degradation only for the north-eastbound left turn movement. This movement would exceed the projected demands shown in the 2011 RSW Terminal Access Road Traffic Study prepared by Johnson Engineering. All other movements would remain similar or less than the traffic volumes projected during the 2011 study. For more details, see Appendix O.

### ***Terminal Access Road at Air Cargo Lane (Outbound)***

No geometric or lane configuration changes appear to be required based on both the August 2011 study and current conditions.

### ***Terminal Access Road at Air Cargo Lane (Outbound) Demand/Capacity Validation***

When then-proposed development traffic is accounted for, this intersection is projected to experience degradation only for the eastbound right turn and westbound through movements. These movements would exceed the projected demands shown in the 2011 RSW Terminal Access Road Traffic Study. All other movements would remain similar or less than the traffic volumes projected during the 2011 study. For more details, please see Appendix O.

## **Multi Modal Considerations**

Any future new roadways or updates to existing roadway configurations should consider a wide variety of travel modes such as walking, bicycling and public transit. The prior RSW master plan update identified an Ultimate Passenger Multi-Modal area along Treeline Avenue. It was uncertain at that time what, if any, multi-modal facility should be planned at the airport, so a place was merely reserved on the Airport Layout Plan for ultimate (beyond 2025) development. RSW itself is a multimodal facility serving to transition people and goods from air to land transportation. Passengers land via aircraft, walk to the front terminal curb, and board a surface vehicle to reach their final destination, whether personal vehicle, hired vehicle or public bus transportation. The entire RSW terminal is a multi-modal facility. This is also the case for the RSW Airline Freight and Air Cargo facilities, transitioning goods from air to land transportation. Sea and rail access is currently limited due to geographic constraints.

The Lee County Port Authority engages in ongoing coordination with the Lee County Metropolitan Planning Organization (MPO) and with the local public transit agency, LeeTran, to identify and address public transportation demands. The terminal is served by a LeeTran bus stop (Route 50 of the Lee Tran connects RSW to Lee County). Pedestrian paths and future potential bus stops are identified on the Airport Operations Planned Development (AOPD) master concept plan to

serve the northern non-aviation development area (Skyplex) along Daniels Parkway. The emerging technology of electric vertical take-off and landing (eVTOL) is considered with potential eVTOL development siting incorporated in the North Area Vision Plan (see Figure 5-11). Even though further multi-modal opportunities may exist in the future for RSW, and the airport should continue to be open to their investigation, this Master Plan Update does not recommend identifying a specific location on the Airport Layout Plan for additional multimodal facilities at this time.

## Terminal Curbside Requirements

### Methodology

The curbside portion of the terminal roadways, where the primary pickup and drop-off functions are accommodated, is often a constraining component of a terminal access road system. For this analysis, the curbside roadways are divided into separate facilities according to:

- Whether users are predominantly dropping off, picking up, or a mix of both operations.
- Whether users are private vehicles, commercial vehicles, airport shuttles, or a mix of multiple user types.

To accommodate these operations and mix of vehicles, RSW has three curbside locations: the upper level (departures), the lower level (arrivals), and the Ground Transportation Area (GTA) that is located adjacent to the arrivals curbside on the lower level.

Future peak-hour vehicle volumes were estimated based on the forecast of total annual enplaning and deplaning passenger activity and based on airport ground access market shares observed from the base year curbside traffic counts.

Curbside length requirements are generally determined based on the peak hour volumes of vehicles, the dwell time or amount of time the vehicle occupies the curb, and the length of curb the vehicle occupies. The Quick Analysis Tool for Airport Roadways (QATAR), as outlined in Airport Cooperative Research Program's (ACRP) *Report 40: Airport Curbside and Terminal Area Roadway Operations*, was used to assess the curbside LOS for the base year and for future scenarios. The curbside inventory and data collection information compiled for RSW was used as inputs to calibrate the QATAR spreadsheet analysis tool. Using this tool, a capacity, demand, and LOS assessment was completed for the base year and future scenarios to determine terminal curbside requirements.

### Base Year Traffic Conditions

Curbside operational observations were completed on Thursday, March 17, 2016, as part of the *RSW Terminal Curb Front Roadway Assessment* (Appendix P) completed by Kimley-Horn in December 2016. Based on historical RSW passenger data, March was determined to be the peak month of the year and Thursday was determined to be the peak day of the week. The landside data is summarized under two categories: roadway traffic counts and terminal curbside observations. Twenty-four-hour vehicle classification counts were collected and are summarized below. Curbside operational observations were completed during a two-hour period (11 a.m. to 1 p.m.) associated with peak arrival and peak departure times. All curbside observations were conducted on both the upper and lower levels. The terminal curbside observations included:

- Vehicle classification counts
- Loading/Unloading dwell times for a variety of vehicle types, including but not limited to, private autos, taxis, service vehicles, shuttles, and buses

- General observations included observed congestion/conflict areas and amount of enforcement
- The traffic data collected, such as traffic counts, vehicle occupancy, and dwell times, were used as model inputs for the QATAR tool.

Curbside roadways provide access for a variety of travel modes that include both commercial and private vehicles. This section summarizes the travel modes that currently utilize the curbside and the characteristics of the curbside roadways. In an airport environment, vehicle mix (or vehicle classification) refers to the breakdown of the traffic volume by individual travel modes, as defined by both the type of service each mode provides (e.g., taxicab, courtesy vehicle, charter bus) and the type of vehicle used (e.g., sedan, passenger van, minibus, full-size bus). A number of different types of vehicles were identified as utilizing the curbside roadways at RSW. The vehicle classification and dwell times take into consideration various vehicle types that frequented the Airport during the peak period. **Table 4-35** summarizes the documented vehicle types at RSW. It should be noted that due to the difficulty of identifying TNC vehicles apart from private vehicles, TNC vehicles were included in the private vehicle count.

Table 4-35 Base Year Vehicle Classification		
Vehicle Type	Vehicle Examples	Airport Utilization
Private Vehicles	Automobile, pick-up truck, SUV	Upper level and lower level
Taxis	Taxi	GTA and upper level
Luxury Limo	Lincoln town cars and Expeditions	Upper level and lower level
Buses	Public bus, charter and tour busses	Public transit, Route 50 of the Lee Tran service from RSW GTA to Lee County
Shuttles	Hotel and motel shuttles, super shuttles, surface parking lot shuttle, employee shuttle	On-airport shuttles circulate between the GTA or Upper level and either the long-term (surface) parking or the employee lot. Hotel/Motel shuttles have pick up stations at the GTA
Private Transportation Vehicles	Apple Airport Transportation, Superior Airport Shuttle	Upper level and lower level
LCPA Vehicles	Lee County trucks and cars	Upper level and lower level
Law Enforcement	Police ambulance, airport security	Recirculating (orbiting) trips on upper level, lower level and GTA

SOURCE: Kimley-Horn, *RSW Terminal Curb Front Roadway Assessment*, 2016 (Appendix P)

Vehicle classification counts were collected at three locations during the identified two-hour period (11 a.m. to 1 p.m.) for the traffic data collection effort on March 17, 2016. The vehicle counts were collected at the following key airport entries:

- Upper level (departures) curbside entry
- Lower level (arrivals) curbside entry
- GTA curbside entry

**Table 4-36** summarizes the total vehicle count (characterized by vehicle type) at each of the three locations listed above. "Percent Total Traffic" summarizes the traffic composition (in percent) by vehicle type during the two-hour period. The specific peak hour traffic within the two-hour period for the upper level and for the lower level was identified and used for the QATAR LOS analysis.

**Table 4-36 Base Year Curbside Two-Hour Peak Period Vehicle Classification Counts**

Type of Vehicle	Upper Level		Lower Level		GTA		All	
	Total	Percent Total Traffic	Total	Percent Total Traffic	Total	Percent Total Traffic	Total	Percent Total Traffic
Automobile, Pick-up, SUV	1,038	90.1%	1,059	97.5%	3	1.8%	2,100	87.2%
Taxi	30	2.6%	9	0.8%	96	56.1%	135	5.6%
Luxury Limousine	0	0.0%	3	0.3%	0	0.0%	3	0.1%
Public Bus	0	0.0%	0	0.0%	1	0.6%	1	0.0%
Hotel/Motel Shuttle	9	0.8%	0	0.0%	13	7.6%	22	0.9%
Supershuttle	3	0.3%	0	0.0%	0	0.0%	3	0.1%
Surface Parking Lot Shuttle	29	2.5%	1	0.1%	28	16.4%	58	2.4%
Employee Shuttle	0	0.0%	1	0.1%	24	14.0%	25	1.0%
Private Transportation Vans	35	3.0%	2	0.2%	0	0.0%	37	1.5%
Delivery Trucks	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Law Enforcement Vehicle	7	0.6%	4	0.4%	0	0.0%	11	0.5%
LCPA Trucks/Cars	0	0.0%	3	0.3%	2	1.2%	5	0.2%
Charter & Tour Busses	0	0.0%	2	0.2%	0	0.0%	2	0.1%
Other	1	0.1%	2	0.2%	4	2.3%	7	0.3%
<b>Total</b>	<b>1,152</b>	<b>100.0%</b>	<b>1,086</b>	<b>100.0%</b>	<b>171</b>	<b>100.0%</b>	<b>2,409</b>	<b>100.0%</b>

SOURCE: Kimley-Horn. *RSW Terminal Curb Front Roadway Assessment*, 2016 (Appendix P)

NOTE: Totals may not add up to 100% due to rounding.

Dwell time is the amount of time a vehicle spends parked at a curbside lane (or other passenger loading or unloading area). Typically, the dwell time is the length of time between when the driver parks (i.e., the vehicle comes to a complete stop) and when the driver first attempts to re-join the traffic stream (it does not include any time during which the driver may be ready to depart but is prevented from doing so by other vehicles). "Active" dwell times, the length of time a vehicle remains at a curbside while actively loading/unloading passengers and their baggage were also collected. The "total" dwell time reflects the time difference between when a vehicle first stops at a curbside until it leaves the curbside. Dwell time data is required to analyze curbside roadway operations. The dwell times were collected at two locations at each of the three curbside roadways. The first location collected data for the first half of the terminal curbside (Zones 1 to 3) and the second location collected data at the second half of the terminal curbside (Zones 4 to 6). The average dwell times by vehicle type, per location (Zones 1 to 3 and Zones 4 to 6), as well as the total average dwell time per curbside, are summarized in Appendix P (Table 4-32).

The capacity of the three curbsides at RSW were evaluated using the ACRP methodology and applying the corresponding QATAR spreadsheet modeling tool. This tool calculated the LOS for each curbside, per zone, taking into account the various curbside characteristics and factors discussed previously in this section. The QATAR analysis provides both quantitative and qualitative results and displays the results as a curbing LOS output and as a roadway (travel lanes) LOS output. The curbing LOS considers factors such as peak hour volume, vehicle length, dwell time, number of curbing lanes, and curbside length. The roadway LOS considers number of through lanes and the friction between the curbing vehicles and the vehicles on the travel lanes. The resulting curbside LOS is reported as the lesser (worse) LOS between the curbing and roadway LOS outputs. For this RSW curbside analysis, the curbing LOS is worse than the roadway LOS for each given zone in all scenarios; thus, curbing operations is generally a greater constraint than roadway through capacity at the existing RSW curbsides. A LOS of C or better (i.e., yellow or green in the appendix

figures) is used as the benchmark for acceptable LOS for the planning of proposed improvement for the RSW curbside. Appendix P (Figure 4-20) shows the graphical LOS results of the QATAR analysis for the upper level (departures) curbside for the peak hour in the base year 2016. The QATAR analysis shows that over half of the departure's curbside operates at LOS D during the peak hour in the year 2016.

Appendix P (Figure 4-21) shows the graphical LOS results of the QATAR analysis for the lower level (arrivals) curbside for the peak hour in the base year 2016. The QATAR analysis shows that a portion of the arrival's curbside operates at LOS D during the peak hour in the year 2016.

Appendix P (Figure 4-22) shows the graphical LOS results of the QATAR analysis for the GTA curbside for the peak hour in the base year 2016. The QATAR analysis shows that all areas of the GTA curbside will operate at LOS A in the year 2016 except for one area which is used for the taxi staging curbside. Taxis are called to arrive to the curbside on demand resulting in no observed congestion at the time data was collected. Because the QATAR model does not allow an option for documenting staging areas for vehicles, the resulting LOS is F when the model is run.

## Curbside Requirements

In an effort to determine the planning of improvements, QATAR was also utilized in the *RSW Terminal Curb Front Roadway Assessment* completed by Kimley-Horn in December 2016, with the same input factors and assumptions used for the base year 2016 curbside analysis (except for the traffic volumes). This was performed to determine the operations of the curbside roadways in the future if no improvements were implemented. Based on historical RSW passenger trends, a 4% growth rate in total passengers was applied to the ten-year forecast period. In order to relate the number of passengers with the total traffic volume entering the curbside roadways, the same methodology used to grow the passenger counts was used to grow the vehicle counts. Projected vehicle counts through year 2025 were obtained by multiplying the existing vehicle count by the same growth factor (i.e., based on 4% growth per year) corresponding to the forecasted year. This process provided the growth number of vehicles using each curbside for the forecasted years.

Appendix P (Figure 4-23) shows the graphical LOS results of the QATAR analysis for the upper level (departures) curbside for the peak hour for the years 2017 through 2025 without any improvements. The QATAR analysis shows that by 2019 a portion of the departure's curbside operates at LOS E during the peak hour if no improvements are implemented, and by 2025 all of the departure's curbside will operate at LOS D, E, or F during the peak hour, if no improvements are implemented.

Appendix P (Figure 4-24) shows the graphical LOS results of the QATAR analysis for the lower level (arrivals) curbside for the peak hour for the years 2017 through 2025 without any improvements. The QATAR analysis shows that by 2020 over half of the arrival's curbside operates at LOS D during the peak hour if no improvements are implemented, and by 2025, all of the departure's curbside will operate at LOS D or E during the peak hour if no improvements are implemented.

The GTA displays LOS A throughout the entire curbside during the base year in 2016. The number of buses and shuttles at the GTA curbside are not forecasted to grow in the foreseeable future since the average occupancy for each of these vehicle modes did not go above half of the capacity according to the data collection performed. The taxi demand will increase, but congestion will be mitigated by operations of calling taxis to enter the GTA based on demand allows for sufficient vehicles to be staged at the taxi curbside. Therefore, the GTA curbside is expected to remain at acceptable levels of service (i.e., LOS C or better) during the forecasted 2016-2025 period and as well as through PAL 4.

Next, the peak hour traffic counts were forecasted out to PAL 3 and PAL 4 based on the same growth rates forecasted for annual passengers at RSW for PAL 3 and PAL 4. The QATAR analysis tool was used to determine the LOS with the PAL 3 and PAL 4 peak hour traffic if no improvements were implemented.

Appendix P (Figure 4-25) shows the graphical LOS results of the QATAR analysis for the upper level (departures) curbside for the peak hour for PAL 3 and PAL 4 without any improvements. The QATAR analysis shows that in PAL 3 approximately half of the departure's curbside will operate at LOS F during the peak hour if no improvements are implemented, and by PAL 4 almost all of the departure's curbside will operate at LOS E or F during the peak hour if no improvements are implemented.

Appendix P (Figure 4-26) shows the graphical LOS results of the QATAR analysis for the lower level (arrivals) curbside for the peak hour for PAL 3 and PAL 4 without any improvements. The QATAR analysis shows that in PAL 3 over half of the arrival's curbside will operate at LOS E during the peak hour if no improvements are implemented, and by PAL 4 all of the departure's curbside will operate at LOS E or F during the peak hour if no improvements are implemented.

Based on QATAR analysis for PAL 3 and PAL 4 without improvements, the QATAR analysis tool was then used to determine the length of curbside required for the departures and arrivals curbsides to operate at LOS C for PAL 3 and PAL 4. For the departures curbside, a total of 1,566 feet is required to operate at LOS C for PAL 3 and a total of 1,810 feet is required to operate at LOS C for PAL 4. For the arrivals curbside, a total of 1,244 feet is required to operate at LOS C for PAL 3 and a total of 1,505 feet is required to operate at LOS C for PAL 4. All of these curbside requirements are given as end-to-end lengths and assume a minimum of two curbing lanes and two through lanes. Table 4-33 shows the scenarios that were evaluated to achieve the required length for the departure's curbside. It should be noted that all the total lengths presented in the table for each scenario are also curbside end-to-end lengths, not total linear feet of curbing space; therefore, the number of curbing lanes is accounted for accordingly in the analysis.

As seen in **Table 4-37**, the existing curbside plus the new Concourse E departure's curbside will not provide the required curbside length for either PAL 3 or PAL 4 during the peak hour. However, adding an additional two-lane or three-lane outer curbside to the existing Concourse B/C/D curbside will provide the required curbside length for both PAL 3 and PAL 4. It should be noted that the proposed outer curbside capacity is discounted by 25% because it is assumed that it will not be used as much as the inner curbside. Also, the two-lane and three-lane outer curbside capacities are discounted by another 25% to account for having only one curbing lane instead of two (half the space) while also considering differences in utilization/efficiency between a single-lane and dual-lane curbing environment. Also, it should be noted that the QATAR analysis shows that the LOS for the inner curbside for the existing Concourse B/C/D is the same whether it is four lanes or five lanes. However, it is recommended that if the inner curbside is reduced from five lanes to four lanes, the proposed outer curbside should be implemented as a three-lane outer curbside to accommodate through traffic that may choose to pass through the outer curbside rather than the inner curbside. In summary, both the two-lane and three-lane outer curbsides will have the same effective curbing capacity since they both assume only one curbing lane. Therefore, the only difference between the two-lane and three-lane outer curbsides is that the three-lane outer curbside proposes a designated through-lane in order to accommodate through traffic if the inner curbside is reduced from five lanes to four lanes. The scenario with a modified four-lane inner curbside and new three-lane curbside is recommended because it provides greater flexibility for through traffic. Note: this geometric recommendation is preliminary and schematic in nature for the purposes of clarifying curbside requirements; roadway/curbside recommendations will be further assessed in the alternatives analysis.

Table 4-33 shows the scenarios that were evaluated in order to achieve the required length for the arrival's curbside. As seen in **Table 4-38**, the existing curbside plus the new Concourse E curbside will provide the required curbside length for PAL 3 but not for PAL 4 during the peak hour. However, adding an additional two-lane outer curbside to the existing Concourse B/C/D curbside will provide the required curbside length for both PAL 3 and PAL 4.

**Table 4-39** shows the terminal curbside lane requirements for both the upper-level departures and the lower-level arrivals through PAL 4.

**Table 4-37 Departures Curbside Requirements for PAL 3 and PAL 4**

Geometric Scenario	Existing or Assumed Active Curbside End-to-End Length, Assuming Dual-Lane Curbing, for Each Concourse (feet)					PAL 3, 15.2 M PAX		PAL 4, 17 M PAX	
	Existing Concourses B/C/D	New Concourse E	New Outer Curbside Available	50% Discount of Outer Curbside <sup>a</sup>	Total	Needed for LOS C or Better Active Curbside End-to-End Length Assuming Dual-Lane Curbing (feet) <sup>b</sup>	Deficit or Surplus (feet)	Needed for LOS C or Better Active Curbside End-to-End Length Assuming Dual-Lane Curbing (feet) <sup>b</sup>	Deficit or Surplus (feet)
Existing	910	—	—	—	910	1,566	(656)	1,810	(900)
With New Concourse E	910	515	—	—	1,425	1,566	(141)	1,810	(385)
With New Concourse E and with New 2-Lane Outer Curbside (1 Curbing Lane + 1 Maneuver Lane) Assuming Existing Lane Inner Curbside	910	515	1,225	613	2,038	1,566	472	1,810	228
With New Concourse E and with New 3-Lane Outer Curbside (1 Curbing Lane + 1 Maneuver Lane + 1 Through Lane) Assuming Reduced 4-Lane Inner Curbside	910	515	1,225	613	2,038	1,566	472	1,810	228

SOURCE: Atkins, 2021

- <sup>a</sup> The proposed outer curbside capacity is discounted by 25% because it is assumed that it will not be used as much as the inner curbside. Also, the two-lane and three-lane outer curbside capacities are discounted by another 25%, for a total discount of 50%, to account for having only one curbing lane instead of two (half the space) while also considering differences in utilization/efficiency between a single-lane and dual-lane curbing environment.
- <sup>b</sup> The curbside requirement for all geometric scenarios is based on future passenger demand and is independent of the concourses that are provided.

**Table 4-38 Arrivals Curbside Requirements for PAL 3 and PAL 4**

Geometric Scenario	Existing or Assumed Active Curbside End-to-End Length (feet)					PAL 3, 15.2 M PAX		PAL 4, 17 M PAX	
	Existing Concourses B/C/D	New Concourse E	New Outer Curbside Available	50% Discount of Outer Curbside <sup>a</sup>	Total	Needed for LOS C or Better Active Curbside End-to-End Length Assuming Dual-Lane Curbing (feet) <sup>b</sup>	Deficit or Surplus (feet)	Needed for LOS C or Better Active Curbside End-to-End Length Assuming Dual-Lane Curbing (feet) <sup>b</sup>	Deficit or Surplus (feet)
Existing	835	—	—	—	835	1,244	(409)	1,505	(670)
With New Concourse E	835	515	—	—	1,350	1,244	106	1,505	(155)
With New Concourse E and with New 2-Lane Outer Curbside (1 Curbing Lane + 1 Maneuver Lane)	835	515	1,065	533	1,883	1,244	639	1,505	378

SOURCE: Atkins, 2021

- <sup>a</sup> The proposed outer curbside capacity is discounted by 25% because it is assumed that it will not be used as much as the inner curbside. Also, the two-lane and three-lane outer curbside capacities are discounted by another 25%, for a total discount of 50%, to account for having only one curbing lane instead of two (half the space) while also considering differences in utilization/efficiency between a single-lane and dual-lane curbing environment.
- <sup>b</sup> The curbside requirement for all geometric scenarios is based on future passenger demand and is independent of the concourses that are provided.

**Table 4-39 Terminal Curbside Lane Requirements**

	Existing	Baseline	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Departures Upper-Level	5	5	5	5	7	7	(2)
Arrivals Lower-Level	7/8 <sup>a</sup>	7/8 <sup>a</sup>	7/8 <sup>a</sup>	7/8 <sup>a</sup>	7/8 <sup>a</sup>	8	(1)

SOURCE: Atkins, 2022

<sup>a</sup> Lane count varies depending on location relative to terminal curbside.

## Parking and Rental Cars

### Cell Phone Lot

Like many other RSW facilities, the Cell Phone Lot exceeds its capacity during (84 spaces) the peak season and has excess capacity in the Off-season. In the peak season, the commercial vehicle lot (81 spaces) is also used as an overflow cell phone lot as a contingency to handle the peak season demands. In comparison to other US airports, the RSW Cell Phone Lot is much closer to the terminal building and offers great convenience for RSW patrons. The 2011 *RSW Cell Phone Lot Activity Analysis* conducted by Johnson Engineering determined that if all Cell Phone Lot parkers were to park in the Short-Term garage, the airport would gain approximately \$396,000 in airport revenue. Even though this would be an extreme case as many Cell Phone Lot parkers would never use the Short-Term garage even if the Cell Phone Lot parking was not available at the airport, it demonstrates that there is a loss of airport revenue by providing airport cell phone lot parking. However, the offsetting benefit of the Cell Phone Lot is observed by a reduction in recirculating vehicle traffic and reduces the numbers of illegally parked vehicles along this side of active roadways. So, while the Cell Phone Lot impacts parking revenues, it provides a beneficial amenity to the airport and the public.

The 2011 *RSW Cell Phone Lot Activity Analysis* summarizes the recorded occupancy of the lot and the vehicle activity on the nearby roadways. Since the study was conducted in 2011, the lot has since been moved from the southeast quadrant of the Terminal Access Road and Air Cargo Lane intersection to the area adjacent to the 7-Eleven/Mobil gas station, southwest of the employee lot.

Due to certain aspects of the study, such as the age of the data, the relocation of the cell phone lot, the occupancy data being restricted to just the marked spaces, and the rise in TNC usage in the past ten (10) years, it was determined that the study reference data has too many limitations to use for the sizing of the cell phone lot. Therefore, the best approach to sizing the cell phone lot was to leverage the *ACRP Synthesis 62, Cell Phone Lots at Airports* in combination with a benchmark comparison of various airports in Florida.

The ACRP 62 looked at various airports across America to determine if there was any correlation between the size of a cell phone lot and other variables such as the number of arriving passengers. The only relationship found was that the ratio of cell phone lot spaces to total airport spaces across the various airports ranged from just under 0.5% to 2.5% which is shown in **Table 4-40**. This relationship indicates that airports generally increase their cell phone lot size as they increase total parking capacity to accommodate growing passenger demand.

<b>Table 4-40 Ratio of Cell Phone Lot Spaces to Total Airport Parking Spaces</b>			
<b>Airport</b>	<b>Cell Phone Lot Spaces</b>	<b>Estimated Total Airport Controlled Parking Spaces</b>	<b>Percent of Cell Phone Lot Spaces</b>
Austin-Bergstrom International	65	11,500	0.57%
Boston Logan International	61	16,072	0.38%
Denver International	203	41,683	0.49%
Indianapolis International	231	23,000	1.00%
John F. Kennedy International	373	15,000	2.49%
Lambert-St. Louis International	180	8,800	2.05%
Louis Armstrong New Orleans Int'l	25	6,325	0.40%
Metropolitan Oakland International	30	6,563	0.46%
Newark Liberty International	150	18,400	0.82%
Phoenix Sky Harbor International	262	22,168	1.18%
Pittsburg International	150	13,200	1.14%
Portland International	30	14,230	0.21%
Ronald Reagan Washington National	35	9,180	0.38%
Salt Lake City International	82	11,824	0.69%
San Antonio International	83	8,582	0.97%
San Francisco International	70	8,648	0.81%
Seattle-Tacoma International	330	13,330	2.48%
Tampa International	350	23,300	1.50%
Toronto Pearson International	115	23,000	0.50%

SOURCE: ACRP, *Synthesis 62 Cell Phone Lots at Airports*, 2015

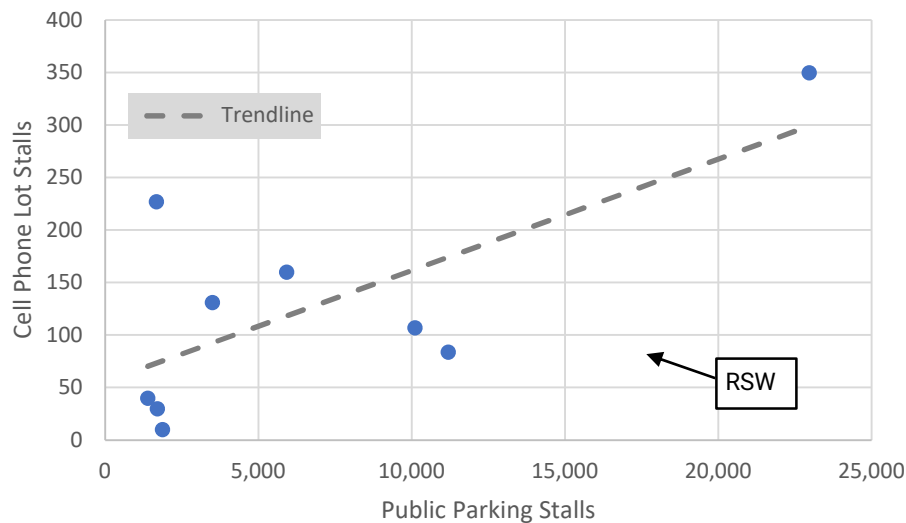
- a Denver and Indianapolis cell phone spaces include spaces associated with third party concessions associated with cell phone lots.
- b Total airport-controlled parking spaces obtained from individual airport websites.
- c Cell phone lot spaces obtained from Online Survey by KRAMER aerotek inc. (2014).

A similar approach was taken when looking at RSW and other airports within Florida. The findings are presented in **Table 4-41**. The findings are also shown graphically in **Figure 4-18**. These results indicate a finding similar to that of the analysis in the ACRP 62 insofar as the ratio of cell phone lot spaces to total airport spaces is generally in a range between 0.5% to just over 2.5%. RSW has a ratio of 0.8%. Of the airports in Florida that were reviewed, only Northwest Florida Beaches International Airport (ECP) had a lower ratio of cell phone lot spaces to public parking spaces. Based on this and operational observations, it has been determined that the cell phone lot's current size is not sufficient to handle the current demand and the amount of space should be increased from 84 cell lot spaces plus 81 overflow spaces to 140-200. This brings the ratio of cell phone lot spaces to total spaces to 1.1%–1.6%. This increase will not only bring the airport more in line with other Florida airports but accommodate anticipated growth in public parking demand and the associated development of facilities to handle that demand.

Table 4-41 Cell Phone Lot Size at Other Florida Airports					
Airport	Approx. No. of Cell Phone Lot Stalls	Estimated Total Airport-Controlled Parking Spaces <sup>a</sup>	Percent of Cell Phone Lot Spaces	2019 Enplanements	Cell Phone Lot Stalls per 1,000 Enplanements
Daytona Beach International (DAB)	40	1,390	2.9%	340,815	0.18
Tallahassee International (TLH)	30	1,710	1.8%	415,272	0.07
Northwest Florida Beaches International (ECP)	10	1,870	0.5%	621,406	0.02
Sarasota Bradenton International (SRQ)	230	1,680	13.5%	979,810	0.23
St. Pete-Clearwater International (PIE)	130	3,500	3.7%	1,143,483	0.12
Palm Beach International (PBI)	110	10,110	1.1%	3,449,515	0.03
Jacksonville International (JAX)	130	5,920	2.7%	3,479,923	0.05
<b>Southwest Florida International (RSW)</b>	<b>84</b>	<b>11,914</b>	<b>0.8%</b>	<b>5,144,467</b>	<b>0.02</b>
Tampa International (TPA)	350	22,970	1.5%	10,978,756	0.03

SOURCES ACAIS, *Commercial Service Airports (Rank Order) based on Calendar Year 2019*, September 25, 2020, [https://www.faa.gov/sites/faa.gov/files/airports/planning\\_capacity/passenger\\_allcargo\\_stats/passenger/cy19-commercial-service-enplanements.pdf](https://www.faa.gov/sites/faa.gov/files/airports/planning_capacity/passenger_allcargo_stats/passenger/cy19-commercial-service-enplanements.pdf); ACAIS, *Final Calendar Year 2020 Enplanements at Commercial Service Airports, Rank Order*, November 8, 2021, [https://www.faa.gov/sites/faa.gov/files/airports/planning\\_capacity/passenger\\_allcargo\\_stats/passenger/cy20-commercial-service-enplanements.pdf](https://www.faa.gov/sites/faa.gov/files/airports/planning_capacity/passenger_allcargo_stats/passenger/cy20-commercial-service-enplanements.pdf)

<sup>a</sup> Total airport-controlled parking spaces obtained from aerials



SOURCE: Kimley-Horn

NOTE: Total airport-controlled public parking stalls and cell phone lot stalls obtained from aerials.

**Figure 4-18 Cell Phone Lot Stalls vs. Public Parking Stalls at Other Florida Airports**

In order to project the required cell phone lot stalls for future PALs, the relationship between enplanements and cell phone lot stalls was analyzed for RSW and other airports within Florida. This information is presented in Table 4-35 and shown graphically in Figure 4-18. The results indicate that as enplanements increase, airports generally provide additional cell phone lot stalls. The trendline used for this data set was used to project the required cell phone lot stalls at the projected PALs and shown in Table 4-42.

**Table 4-42 Cell Phone Lot Size Requirements at RSW**

	Existing	PAL 1	PAL 2	PAL 3	PAL 4	PAL 4 Surplus/(Deficiency)
Required Cell Phone Lot Stalls	84	200	220	250	280	(196)

SOURCE: Kimley Horn Analysis

The ACRP 62 describes issues with cell phone lots that various airports experience. These issues include congestion at the entrance and exit of the cell phone lot if striping is not clearly marked, the potential for a loss of revenue due to would be hourly parking users using the free cell phone lot instead, inadequate signing to the cell phone lot resulting in driver confusion, and commercial vehicles using the cell phone lot. The benefits include improving customer experience for greeters who would not likely wait in a parking lot or garage, reducing curb congestion and parking on access roads, improving safety, lessening vehicle emissions, addressing parking space shortages by directing ultra-short-term customers to the cell phone lots, and meeting TSA and FAA security requirements. Effective locations for cell phone lots are next to a road with direct access to arrivals drive lanes, located before the main terminal, located so as not to take away from the generation of revenue, and are within a 2-minute driving time of the terminal.

## Employee Lot

The 2017 RSW Employee Parking Facility Capacity Assessment (Appendix Q) evaluated the parking demand and capacity of the employee parking lot. This study evaluated the employee entry and exit data from August 23, 2016, to March 8, 2017, to determine the parking facility's existing usage. During the peak months, January 2017 to March 2017, there were an average of 3,767 registered employees at the Airport. During non-peak months, the total number of registered employees averaged 3,400, 10% less than during the peak. Figure 2 in Appendix Q summarizes the total number of known registered employees per month between April 2016 and March 2017. January 2017 had the highest number of registered badged employees totaling 3,798, this total includes temporary employees.

January 2017 entry and exit data for the employee parking was evaluated as it correlated with the highest number of registered employees for the month. It was observed that weekday employee occupancy percentages within the employee parking lot were higher than weekend activity. Thursday, January 12, 2017, had the highest peak demand for the month at 11 a.m., with 1,034 total vehicles parked, representing 79.7% of total supply (263 spaces available). Figure 4 from Appendix Q provides the estimated number of vehicles parked, by hour in the employee parking lot for the peak day in January, Thursday, January 12, 2017.

Table 1 in Appendix Q provides the projected increase in total number of employees during the peak season over a 10-year planning horizon starting in 2017, applying a compounded 2.0% annual growth rate. An average peak season total of 3,767 registered employees was used as the base year estimate for 2017.

The employee parking facility is estimated to be operating at approximately 79.7% capacity with current staffing levels during the highest employment month (January) at the peak midday period. If staff levels increase annually by 2%, the employee parking lot is projected to be operating below 86% capacity in the short term and below 90% capacity within a five-year (2027) planning horizon. Expansion of the existing employee parking lot was not proposed within the planning horizon of the study in Appendix Q. With increased growth in operations and expansion of terminal facilities, it is anticipated that the current employee lot will exceed its capacity by PAL 2.

**Table 4-43** shows the existing employee lot supply and peak occupancies for the projected PALs.

**Table 4-43 Existing Employee Parking Lot Supply & Peak Occupancies**

	2018	PAL 1	PAL 2	PAL 3	PAL 4
Peak Season Estimated Employees	3,767	4,414	4,873	5,380	5,940
Peak Occupancy	1,034	1,275	1,408	1,555	1,717
Total Parking Supply	1,297	1,297	1,297	1,297	1,297
Effective Parking Supply (95%)	1,232	1,232	1,232	1,232	1,232

SOURCE: Kimley Horn Analysis

## Public Parking, Short-Term (Garage) and Long-Term (Surface Lot)

### Overnight Vehicle Occupancy

Figure 2 of the 2018 RSW Existing Parking Facility Capacity Evaluation from Kimley-Horn (Appendix R) summarizes the total overnight vehicle occupancy totals for the short-term parking garage from October 2016 to July 2017. Figure 3 in Appendix R summarizes the total overnight vehicle occupancy totals for the long-term parking garage from October 2016 to July 2017.

### Design Day Parking Demand

March 7, 2017, had the highest non holiday midday accumulation total and was used to calculate the parking facilities design day parking demand. The design day represents a typical day of the year the full range of parking options should be available to parking patrons. Design days are used to size parking structures to satisfy parking demand 90% of the days of the year and provide less expensive surface parking for the remaining 10% of the days.

In March, the parking occupancy increased between 2 a.m. (overnight inventory) and 1 p.m. (midday peak) by 43% in the short-term parking garage and by 15% in the long-term surface parking lot. Figure 4 in Appendix R illustrates the parking accumulation on March 7, 2017, by hour, generated by evaluating the processed short and long-term occupancies during that day.

### Short-Term Design Day Peak

The calculated design day parking demand for the short-term parking garage is 1,592 vehicles, 65% parking occupancy at midday peak. From onsite observations and discussions with staff the second level of the garage is the preferred parking level by customers and stays full throughout the day. The second level is mostly covered and is the first level customers typically enter of the garage. The third level/roof top is uncovered and is underutilized by customers as most of the unoccupied spaces are located on the third level of the garage.

The parking supply within the garage (2,432 spaces) meets the current design day parking demands but may not meet the needs of the customers wanting to park in a covered parking space. Due to high volumes of daily/overnight parkers occupying the high demand parking spaces on the second level, hourly parkers may find it difficult to locate a covered space close to the elevators.

### Long-Term Design Day Peak

The calculated design day parking demand for the long-term surface parking lot is 2,792 vehicles, 32% parking occupancy at midday peak. Customers entering the long-term parking lot are directed to park by the parking

management company, SP+. The management of customer parking within the long-term lot enhances efficiency of customer parking shuttling operations between the parking lot and the terminal.

Parking supply for the long-term surface parking lot (8,762 spaces) meets the current design day parking demands during peak season and off-peak season, at the time of the study.

## Absolute Peak Day Assessment

On December 25, 2016, the short-term parking garage midday peak was 58% occupancy (1,024 available parking spaces in the garage) and the long-term parking lot midday peak was 84% occupancy (1,369 available spaces in the surface lot). The combined parking occupancy at the midday peak was 79% (2,393 available parking spaces on site).

The current parking supply for the short and long-term parking facilities supports the current parking demands for each facility type as well as for the overall parking demand for the Airport during off-season and peak season trends.

## Projected Demand – Non-Holiday Peak Parking Demand

The calculated design day parking demand on March 7, 2017, was 4,384 parked vehicles, 1,592 vehicles in the garage and 2,792 vehicles in the surface parking lot. A 4% annual growth factor was applied to project the parking demand for the Airport for a minimum 5-year and 10-year planning horizon, between years 2017-2018. Table 3 in Appendix R summarizes the projected effective parking supply needs (95% of total supply) associated with the estimated non-holiday (design day) parking demand onsite and for each parking facility between years 2017 and 2028.

**Figure 4-19** summarizes the projected effective parking supply needs (95% of total supply) associated with the estimated non-holiday (design day) parking demand onsite and for each parking facility between for each PAL.

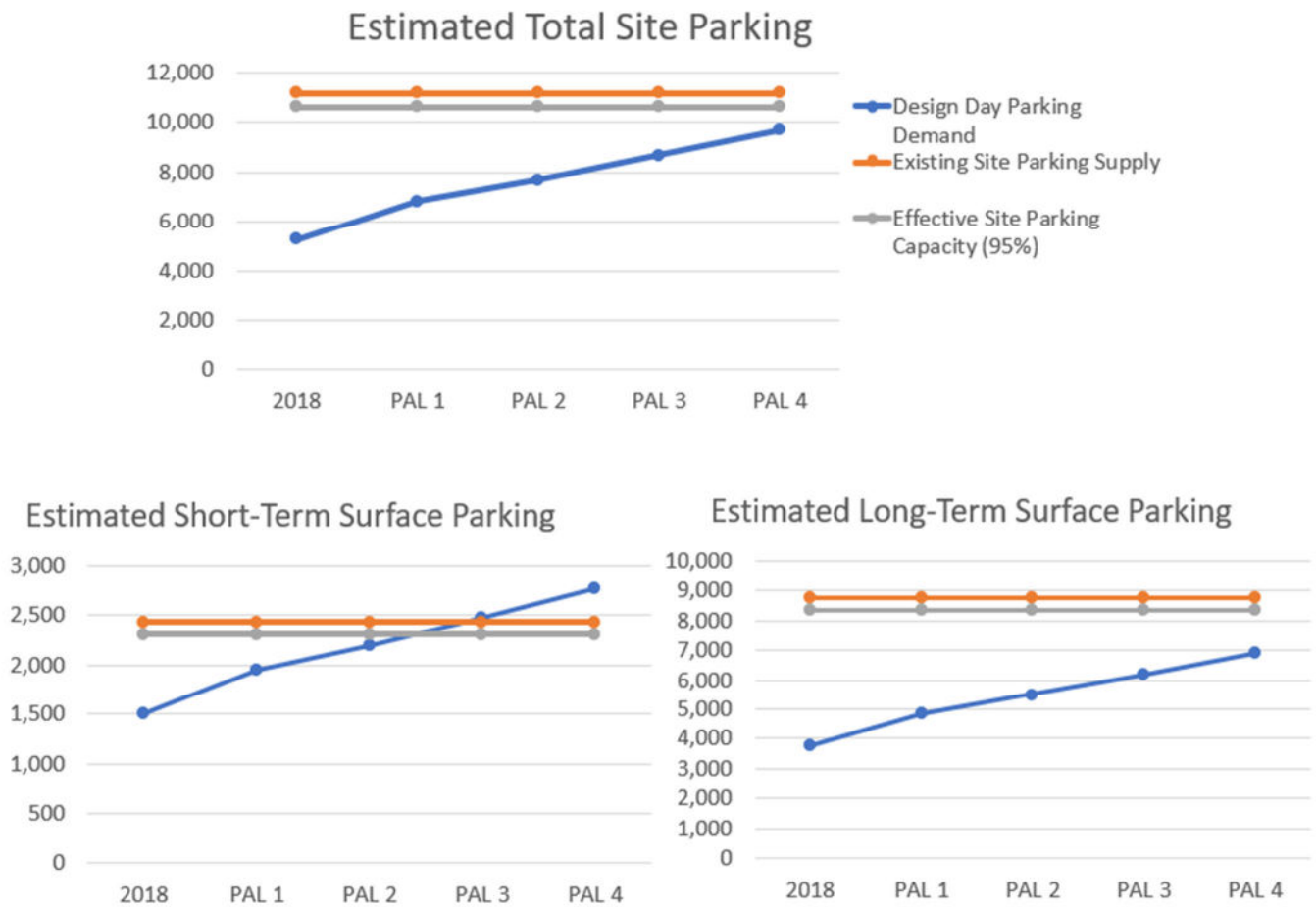
It is projected that the long-term parking facility and combined current parking supply will support the non-holiday peak parking demand through PAL 4 if current parking demand stays consistent. The short-term parking garage is estimated to exceed the existing parking supply by PAL 3.

## Projected Demand – Absolute Peak Demand (Holiday Demand)

On the identified absolute peak parking demand day, December 25, 2016, there were an estimated 8,801 parked vehicles, 1,408 spaces in the garage and 7,393 spaces in the surface lot. A 3.5% annual growth factor was applied to project the parking demand for the Airport for a minimum 5-year and 10-year planning horizon, between years 2016-2028. Projections to determine the estimated year parking demand was expected to exceed the existing parking supply for each parking facility independently was also calculated. Parking demand calculations assume no changes are made to the existing parking supply.

Table 4 in Appendix R summarizes the projected effective parking supply needs (95% of total supply) associated with the estimated absolute peak parking demand onsite and for each parking facility between years 2016 and 2033.

**Figure 4-20** summarizes the projected effective parking supply needs (95% of total supply) associated with the estimated absolute peak parking demand onsite and for each parking facility for each PAL. The absolute peak parking demand (12,689 vehicles) is expected to exceed supply (11,194 spaces) by 2026 (PAL 1).



SOURCE: Kimley-Horn, RSW Existing Parking Facility Capacity Evaluation, 2018 (Appendix R)

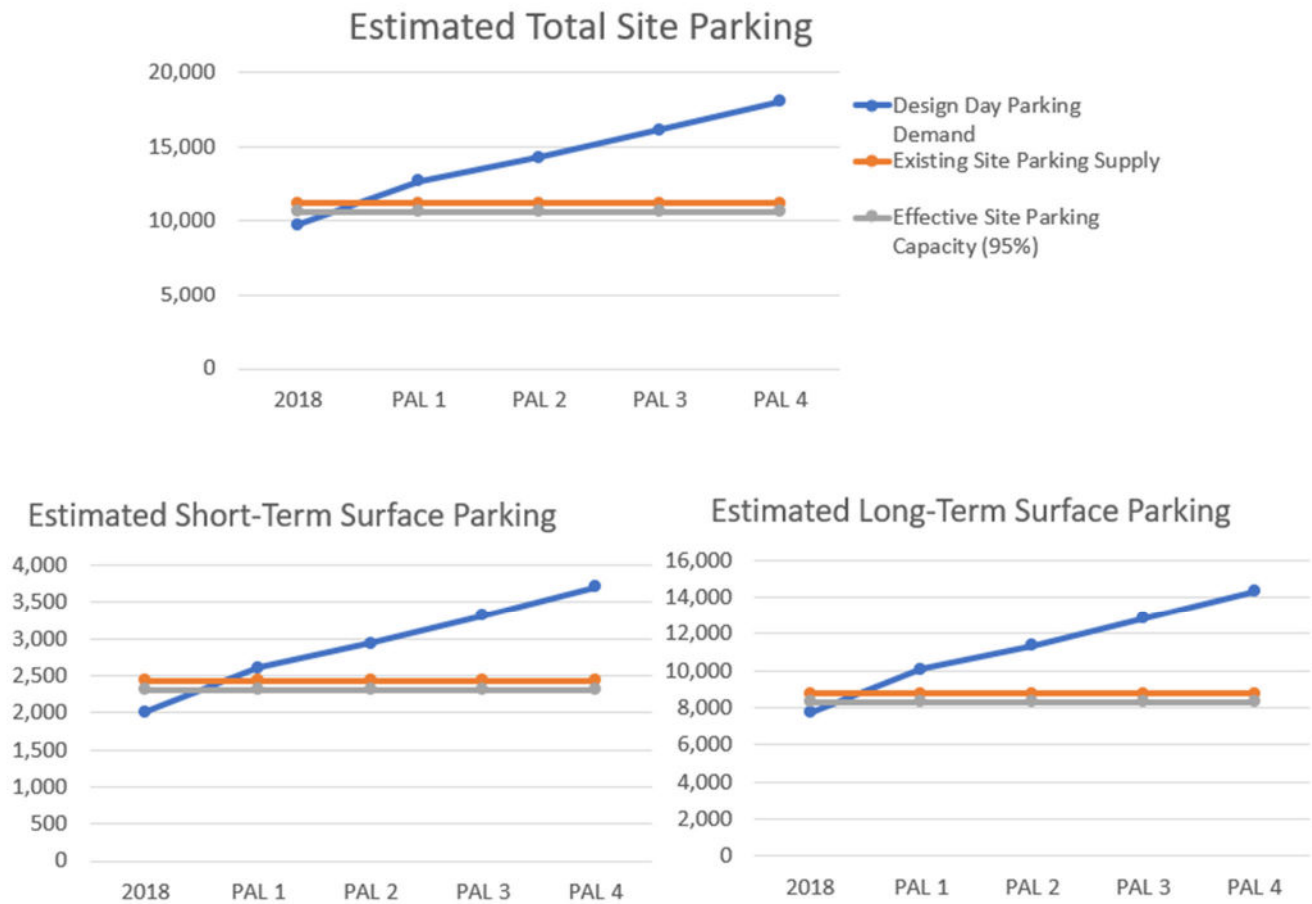
**Figure 4-19 Projected Future Design Day Parking Demand (Non-Holiday)**

### Parking Conclusion

The total public parking supply at the Airport is 11,194 parking spaces. On the absolute peak parking day (December 25), 8,801 (79%) of the spaces were occupied in 2016. At the current rate of growth (3.5%), total parking supply is adequate through PAL 4 during non-holiday peak periods (estimated to be 90% of the year), however the parking demand is projected to exceed the total parking supply by 2026 (PAL 1) on the absolute peak parking day (December 25).

The short-term parking garage has 2,432 parking spaces. On the absolute peak parking day (December 25), 1,408 (58%) of the spaces were occupied in 2016. At the current rate of growth (3.5%), parking supply in the short-term parking garage is adequate through PAL 2 during non-holiday peak periods (estimated to be 90% of the year), however the parking demand is projected to exceed the short-term parking supply by 2026 (PAL 1) on the absolute peak parking day (December 25).

The long-term surface lot has 8,762 spaces. On the absolute peak parking day (December 25), 7,393 (84%) of the spaces were occupied in 2016. At the current rate of growth (3.5%), parking supply in the long-term parking lot is adequate to meet demand through PAL 4 during non-holiday peak periods (estimated to be 90% of the year), however the parking demand is projected to exceed the long-term surface parking lot supply by 2026 (PAL 1) on the absolute peak parking day (December 25).



SOURCE: Kimley-Horn

**Figure 4-20 Projected Future Absolute Peak Parking Demand (Holiday)**

### Garage Ground-Level Curb Front

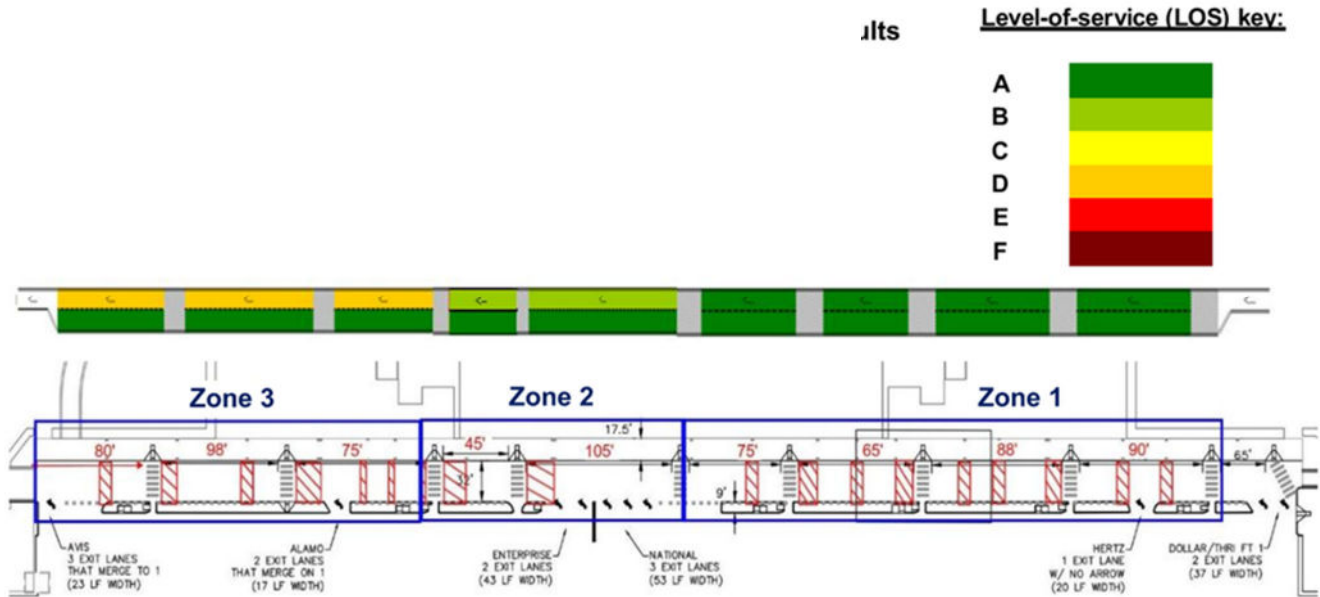
Data of 72-hour traffic volumes were collected along the proposed curb front starting at 12 a.m. on Thursday, February 1, 2018, through 12 a.m. on Sunday, February 4, 2018. The proposed curb front was divided into three analysis zones with one count location placed within each zone. The analysis zones and traffic count locations are numbered from east to west starting with Zone 1 at the east end of the garage, Zone 2 in the middle, and Zone 4 at the far west end. The results of the traffic count show 12 p.m. as the peak period with an average total vehicle count of 523 vehicles exiting during the peak period. The results show that during the analysis window, the peak hour volume was at 12 p.m. on February 1. Figure 3 in RSW Garage Ground Level Curb Front Assessment, 2018, by Kimley Horn (Appendix S) provides a summary of the traffic volume data collected by zone for Thursday, February 1, 2018.

A QATAR analysis was performed using the average peak hour traffic volume and a total of 57 vehicles to represent vehicle-for-hire/TNC activity, the volumes of which are shown in **Table 4-44**.

Table 4-44 Scenario 1: Vehicle Classification Utilized					
Vehicle Classes	Length (feet)	Dwell Time (minutes)	Vehicles per Hour (vph)		
			Zone 1	Zone 2	Zone 3
<b>SCENARIO 1: ZONES 1, 2, AND 3 WITH FOR-HIRE AND TNC</b>					
Rental Vehicle	25	2	118	214	523
For-Hire/TNC	25	1	57	57	57

SOURCE: Kimley-Horn, RSW Garage Ground Level Curb Front Assessment, 2018 (Appendix S)

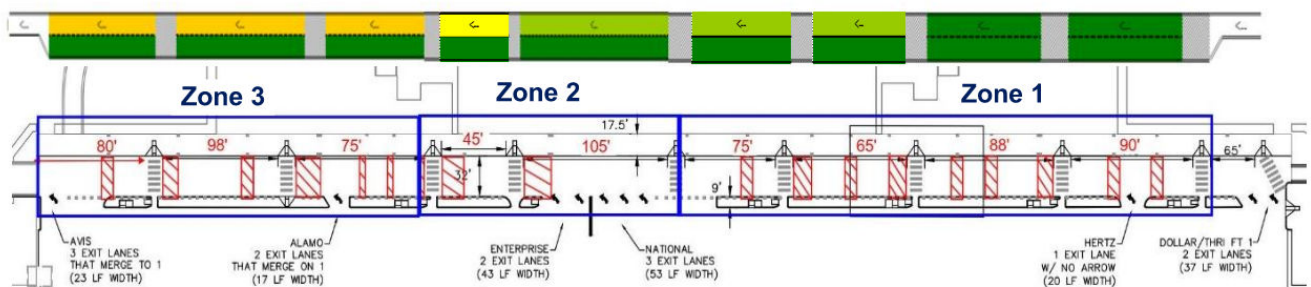
The QATAR analysis projects over half of the proposed curb front operating above LOS C. Due to all vehicles exiting at the west end of the corridor (compounded volume) and the limitations to available curbing length due to columns and existing crosswalk locations, level of service degrades to LOS D within Zone 3. The results of the QATAR model are presented in **Figure 4-21**.



SOURCE: Kimley-Horn, *RSW Garage Ground Level Curb Front Assessment*, 2018 (Appendix S)

**Figure 4-21 Scenario 1 – QATAR Results**

A variation of the above analysis was modeled assuming the estimated total number of vehicle-for-hire/TNC vehicle activity during the peak hour was doubled. With the increase in vehicle activity LOS is projected to be impacted within Zones 1 and 2. Zone 3 LOS remains at a projected LOS D. The results of the QATAR model for the modified variation of Scenario 1 are presented in **Figure 4-22**.



SOURCE: Kimley-Horn, *RSW Garage Ground Level Curb Front Assessment*, 2018 (Appendix S)

**Figure 4-22 Scenario 1, Increased TNC Activity – QATAR Results**

## Rental Car Facilities and Parking

### Ready/Return (R/R)

The results of the industry survey indicate a current demand of 1,700 stalls, over the current capacity of 1,200 stalls. On-site observations have indicated that several of the brand families have begun to utilize portions of their QTA stacking space for ready/return operations when the ready/return stall utilization is at capacity. The need for additional stalls has also been confirmed by analysis, shown in Appendix R.

### Quick Turn-around Facility (QTA)

The existing QTA facility is operating at or near capacity. The stacking and wash bays are adequate with slight deficiency in fueling positions. This slight deficiency can be mitigated by operating the facility for additional hours during the peaks or sending vehicles to the off-site maintenance facilities for processing.

### Customer Service Building (CSB)

The existing customer service building is adequate when based purely on counter length. The impact of the divided counters with two distinct areas and allocated by brand versus brand family creates some inefficiencies. Based on conversations with the employees at the counters, one challenge they identified was the amount of waiting area. During peak transaction times, customers dwelling in the CSB can cause dense pedestrian traffic that causes some customers to wait outside the building.

### Maintenance Facilities

The current maintenance facilities are planned to be relocated as part of a near-term project, as the most significant deficiency identified was the amount of available storage space located within the current maintenance facilities themselves. The concept development phase will evaluate sites that will meet the demands of today and reserve space for future expansions to continue to accommodate growth.

Table 4-45 shows the current rental car facility supply and projected demand

Table 4-45 Rental Car Facility Supply and Projected Demand							
Rental Car Facility	Existing Supply	Current Demand	Projected (PAL 1)	Projected (PAL 2)	Projected (PAL 3)	Projected (PAL 4)	PAL 4 Surplus/ (Deficiency)
Service Counters	66	53	59	67	75	84	(18)
Office Space	6,800 sf	5,460 sf	6,100 sf	6,880 sf	7,770 sf	8,680 sf	(1,880) sf
Ready/Return Spaces	1,200	1,700	1,890	2,130	2,400	2,690	(1,490)
Fueling Positions	68	73	81	91	103	115	(47)
Wash Bays	17	13	13	15	17	19	(2)
QTA Vehicle Stacking Spaces	1,300	1,395	1,540	1,740	1,960	2,190	(890)
Maintenance Bays	22	32	37	41	47	52	(30)
Remote Idle Vehicle Storage	10,500	5,700	6,440	7,250	8,190	9,150	1,350

SOURCE: Kimley-Horn, *Rental Car & Public Parking Sizing Analysis*, 2019 (Appendix T)

NOTES: Figure 7 (of Appendix T) provides the annual historic rental car transactions per year.  
Figure 8 (of Appendix T) provides the annual historic rental car transactions per 1,000 enplanements.

## 4.8 Utilities

### Electric

Electrical power infrastructure is provided by Florida Power and Light (FPL). FAA electrical infrastructure is minimal, mostly around the southerly portion of the runway. In terms of power, FPL will provide whatever additional power is necessary as new services are added to their system.

### Fiber

Communications infrastructure is primarily provided by T-Mobile and to a much lesser extent, CenturyLink, entirely located between north of the runway and Daniels Parkway in the aviation support and non-aviation support area known as Skyplex. Fiber optic infrastructure is limited to most of the perimeter of the runway. For future development and expansion areas, additional fiber can be added to the network as new locations come online.

### Water

Potable water is provided through the Lee County Utilities system. All five of Lee County Utilities Water Treatment Plants are interconnected and feed the Airport from the south and west. An existing 30-inch water transmission main that crosses Airport property from south to north connects Daniels Parkway to Airport Haul Road. Per the 2020 Lee County Concurrency Report there is sufficient capacity to meet the present demand and foreseeable future demand. North Lee County Water Treatment Plant has a planned expansion to add 5 million gallons of water to the system to account for future buildout of areas including RSW.

It appears the spine water main system is large enough to handle development planned through 2041 in the North Ramp Area and Skyplex. Water main extensions off of the 12-inch, 16-inch, and/or 30-inch lines will need to be looped within each expansion area to maximize the available fire flow.

A second water service line and fire line have been added on the east end of the terminal as part of the 2021-22 terminal expansion project. According to the plumbing designer these two connections on the west and east ends of the terminal will be adequate to serve future expansions for Concourses A and E as well. The existing 8" ductile iron fire line that loops around the existing concourses on the airside will need to be extended to loop around the future concourses.

### Sanitary Sewer

Sanitary sewer service is provided by Lee County Utilities using traditional gravity sewer, force main and pump stations at the Airport. There is one Master Lift Station (3307) that takes in all the wastewater south and west of Skyplex Boulevard and discharges due north. Wastewater flow is then directed east along Daniels Parkway within a 24-inch force main which discharges into Gateway Wastewater Treatment Plant (WWTP). The Gateway WWTP has a planned expansion from 3 million to 6 million gallons per day to assist in treating future flows.

As future non-aviation and aviation support development is brought online, gravity sewer, lift stations and force mains will need to be built to connect to the existing wastewater infrastructure.

The existing 10" gravity line that runs along Terminal Access Road in front of the terminal building has adequate capacity to serve the existing facility and the future expansions of Concourses A and E. The existing airport master lift station 3307 (MLS 3307) will likely need to be upgraded prior to the additional 14 gates planned for Concourse E. The downstream force main appears to be sufficiently sized to handle the non-aviation flows and future concourse expansion.

The existing terminal lift station (LS3308) has adequate capacity for existing conditions and appears to have adequate capacity for the addition of Concourse E but will likely need to be upgraded prior to expansion of a future Concourse A.

All wastewater flow will be directed to the Gateway Wastewater Treatment Plant owned by Lee County. This Plant has space to expand, and Lee County will keep up with demands of the County and expand as needed.

## Information Technology

As the airport grows and becomes more reliant on its staff and services to deliver operational excellence to guest, airlines and tenants, technology systems will assist with automation and compliance benefits.

Traveling customers experience can be enhanced through development of wayfinding kiosks and virtual queueing to enhance opportunities to explore the terminal amenities. Development of remote and self-bag drop services to relieve passenger loads at ticket hall and counters. Explore assistive listening technologies to discretely assist hearing challenged guests.

Parking customers experience can be improved by automation of fee collection, guidance to open garage spaces and blue light phone system upgrades to improve customer efficiency and operational support.

Tenant services can be developed to support expansion of airline, cargo, and development areas to include extending infrastructure and Information Technology (IT) services to these areas to support development and security of the area.

Several major systems will require maintenance and upgrades during the timeframe. The security systems upgrades will include AACS, CCTV, and PIDS. The development of integration platforms for these systems to manage alarms (PSIM) and credentials (PIAM) is recommended to improve security monitoring and compliance.

Several space needs will also be evaluated including IT staff, storage and AirCom space.

Several infrastructure upgrades are planned to improve sustainability of services including IT server room expansion, perimeter fiber optic cable replacement, redundant service entry points, expanded Wi-Fi and private LTE.

## 4.9 Non-Aviation/Non-Commercial Development

The new parallel runway, when implemented, will require the relocation of a Florida high-voltage power line (FPL). In order to accommodate the preferred runway configuration, the existing FPL will need to be relocated further to the south and east of its current location.

The proposed route of the relocated FPL will impact two property owners: the Jared F. Holes Trust and Lee County 20/20 Wild Turkey Strand Preserve (WTS).

A successful negotiation of the relocation easement through the Jared Holes Trust parcel was completed by June 2017.

Approximately two-thirds of the new transmission line will be located within the WTS preserve. These lands were acquired by Lee County as part of the Conservation 20/20 program, an environmentally sensitive land acquisition and stewardship program in Lee County. The LCPA environmental team worked with the Lee County 20/20 program staff to evaluate routes that would minimize the impact of the relocation. An ultimate alignment was proposed and approved by the Conservation Land Acquisition and Stewardship Advisory Committee (CLASAC) at their August 26, 2015, meeting.

Further coordination with the Florida Communities Trust (FCT) was required due to funding from the FCT to acquire the WTS lands. Additional information was requested by the FCT and provided by LCPA and the Lee County 20/20 staff to obtain approval for the proposed right-of-way. However, the FCT requested additional coordination and approvals which delayed a potential approval past a June 2017 funding deadline. It was decided that the WTS easement would be re-evaluated and coordinated upon restarting of the new parallel runway planning and design program. More information can be found in the Parallel Runway Close-Out Report, 2017 by AECOM (Appendix H).

The three areas designated for non-aviation support development are Skyplex north of Runway 6-24, approximately 51.6 acres in the Midfield Area, and a 487-acre area in the southeast quadrant of the airport property. Through a comprehensive commercial market analysis and land planning effort initiated in 2022, the LCPA is actively determining how to position Skyplex to accommodate future market-driven demands for commercial, office, hotel, and entertainment development. Through additional studies in the future, LCPA will determine optimal utilization of the Midfield non-aviation support property, which is well positioned to provide commercial, convenience, and hospitality services on-airport. Given its location, the future potential development area in the southeast quadrant will require additional analysis and infrastructure evaluation to determine strategies for access and utilization of that area in the long term.

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