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Public Parking Requirements Analysis



Technical Memorandum # 2

Intermodal Center Advanced Planning – Parking Requirements Analysis

PREPARED FOR:

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February 2022

DRAFT

Technical Memorandum #2

Date: February 8, 2022

To: Michael P. Pacitto, PG, Director of Planning and Environmental
Broward County Aviation Department

From: Jason Garman

Subject: Intermodal Center Advanced Planning – Parking Requirements Analysis

This Technical Memorandum documents the parking demand analysis methodology and relocation of parking to help inform decision-making for the Intermodal Center (IMC) at Fort Lauderdale–Hollywood International Airport. It is intended that the work performed (and documented) through this advanced planning phase will provide a roadmap and blueprint to inform decisions necessary for any parking demand and capacity issues.

This memorandum is one in a series of several documents that will be developed as part of this advanced planning study to summarize planning and demand analyses, an updated concept of operations, implementation strategies, and stakeholder engagement efforts related to the IMC. This memorandum summarizes the following three key components of the advanced planning process to date relative to parking demand:

- Assumptions and Methodology
- Baseline Growth Scenario
- Future Scenarios with Changes in Mode Share

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1. Background

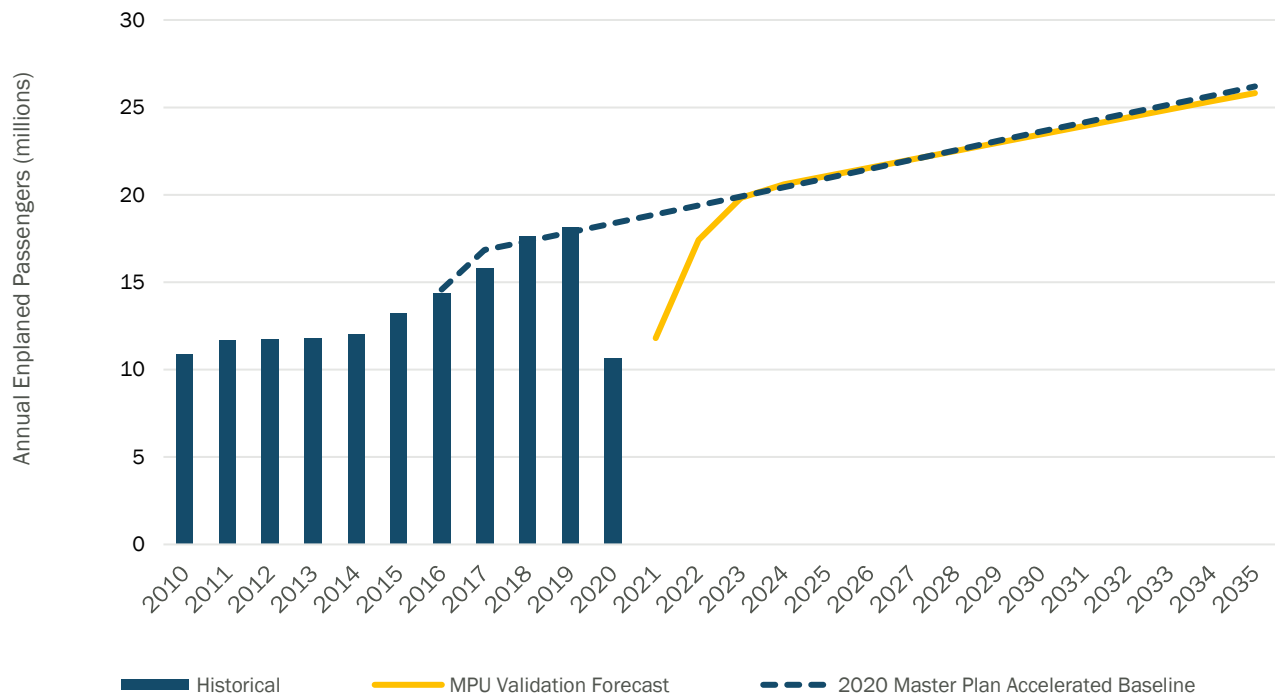
As landside facilities that were analyzed and recommended in the 2020 Master Plan Update (MPU) for Fort Lauderdale–Hollywood International Airport (FLL or the Airport) reach advanced planning, design, and implementation, it is important to understand how the parking demand for both the traveling public and employees of the Airport may have changed with the closure of economy parking, the relocation of employee parking, the effects of increased transportation network company (TNC) use, and the effects of the COVID-19 pandemic.

2. Historical Data Analysis

2.1 Passenger Forecast Comparison

The MPU Accelerated Baseline Forecast was used to determine the parking requirements for the Airport based on 2015/2016 parking data. In 2020, the COVID-19 pandemic significantly impacted aviation and transportation activity across the globe. In recognition of the potential impact the pandemic could have had on the master plan's recommended implementation plan, BCAD conducted a revalidation of the aviation activity forecast elements of the master plan in early 2021. The resulting MPU Validation Forecast was developed from March through May 2021. Beyond 2025, both forecasts track similarly. Both forecasts assume approximately 81 percent origin and destination (O&D) passengers beyond 2025. Thus, in the long term, the MPU Validation Forecast is similar to the MPU Accelerated Baseline Forecast. **Exhibit 1** depicts these forecasts.

Exhibit 1 Comparison of the Master Plan Update Accelerated Baseline Forecast to the Master Plan Update Validation Forecast



NOTES:

MPU – Master Plan Update

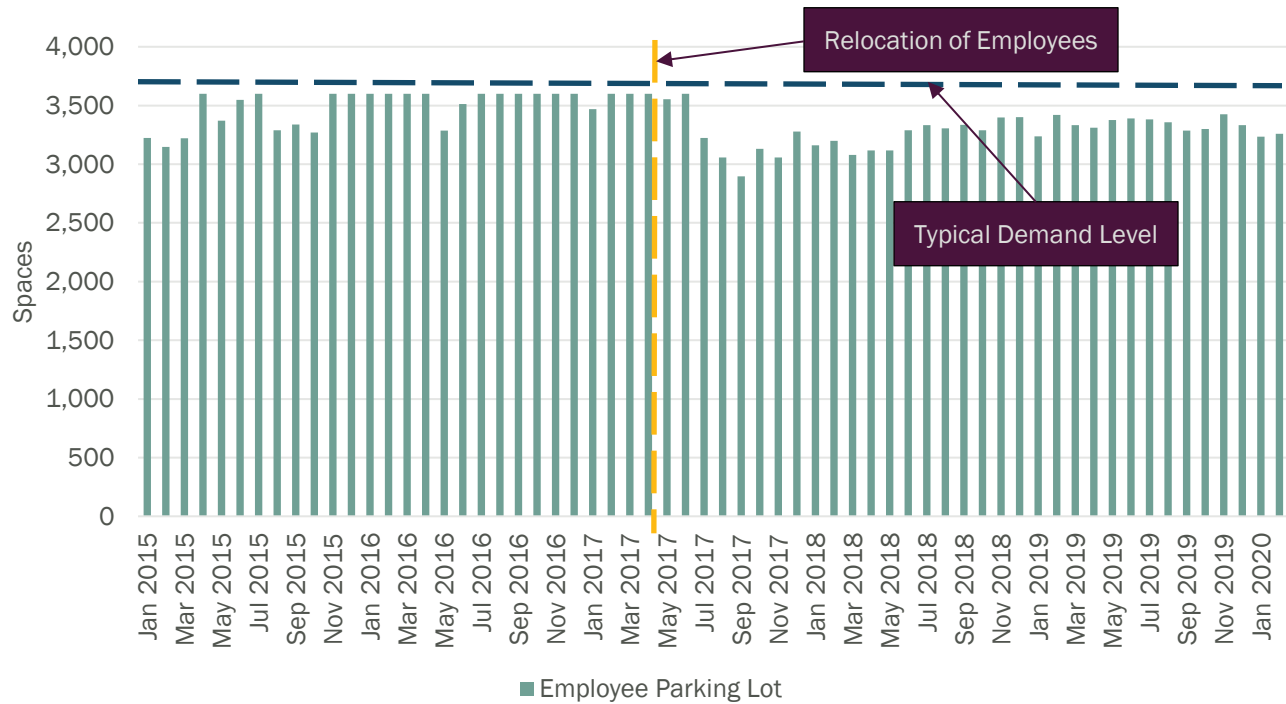
TAF – Terminal Area Forecast

SOURCES: Broward County Aviation Department, May 2021 (data); US Department of Transportation, Federal Aviation Administration, 2020 Terminal Area Forecast; Ricondo & Associates, Inc., May 2021 (analysis).

2.2 Employee Monthly Overnight Occupancy

To supplement the historical peak parking data, overnight occupancy data were obtained and examined to identify the employee parking trends and how they were affected by the relocation of employee parking from the top three levels of the Cypress Garage to the location of the former Economy Lot. This change occurred in Spring 2017 to open more public parking capacity in the Cypress Garage. The Economy Lot was closed to the public as a result of this change. After the relocation, employee demand levels decreased at the Employee Lot, as shown on **Exhibit 2**. **Exhibit 3** presents this trend as a rolling 12-month period, which removes any impacts of seasonal variation.

Exhibit 2 2015 to 2020 Employee Parking Trends – Monthly Overnight Occupancy



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 3 2015 to 2020 Employee Parking Trends – Rolling 12-Month Overnight Occupancy

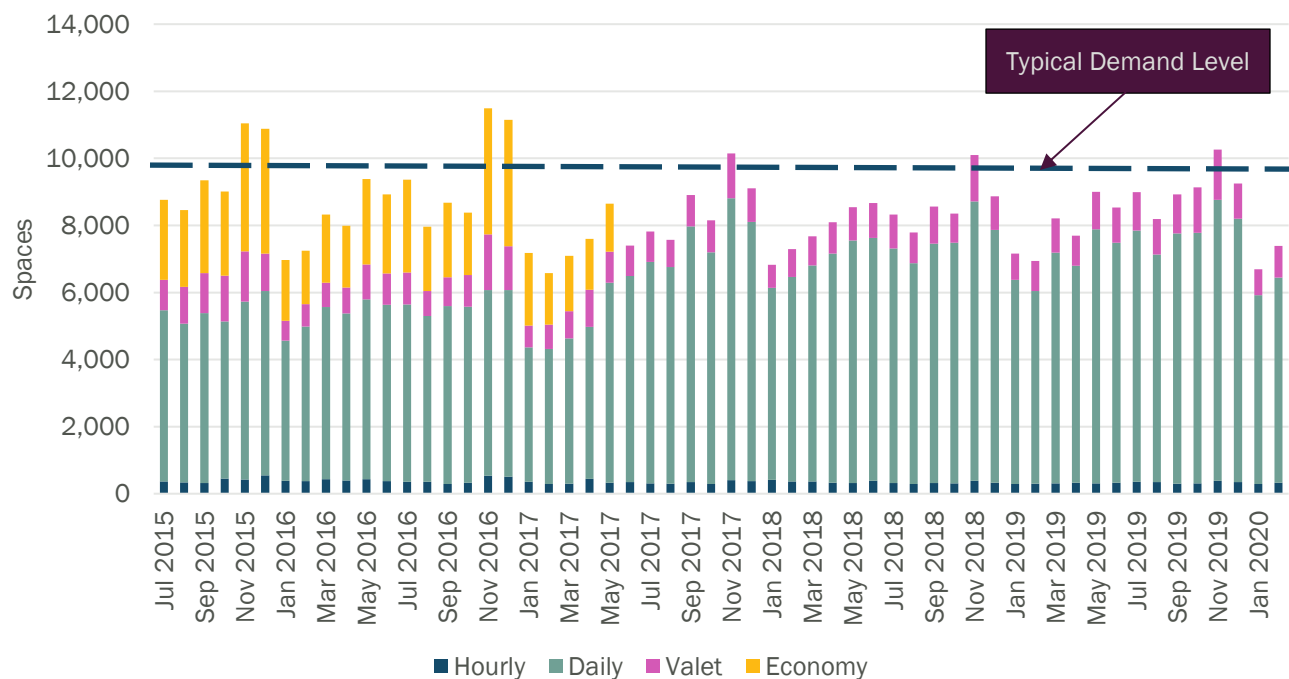


SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

2.3 Public Parking Monthly Overnight Occupancy

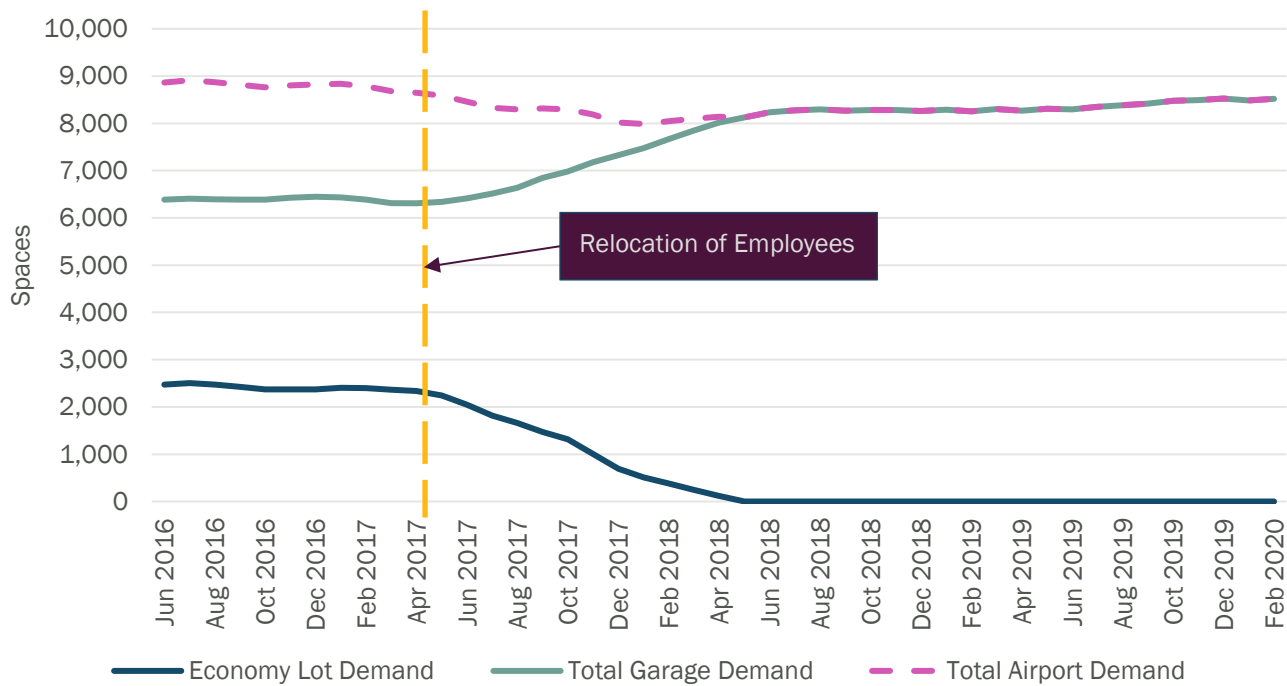
To supplement the historical peak parking data, overnight occupancy data were obtained and examined to identify the public parking trends and how they were affected by the relocation of the employee parking spaces from the Cypress Garage to the location of the former Economy Lot, as well as the subsequent closure of the Economy Lot spaces to public parkers. After the relocation, total public parking demand levels decreased, although garage occupancy increased, as shown on **Exhibit 4**. **Exhibit 5** presents this trend as a rolling 12-month period, which reflects seasonal changes. Since the closure of the Economy Lot, garage public parking demand has increased, but initially not by enough to offset the loss of the Economy Lot, leading to an initial decline in overall parking demand. That decline stabilized in 2018 and reversed in 2019 with slight overall parking demand growth.

Exhibit 4 2015 to 2020 Public Parking Trends – Monthly Overnight Occupancy



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 5 2015 to 2020 Public Parking Trends – Rolling 12-Month Overnight Occupancy



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

3. Effects of the COVID-19 Pandemic

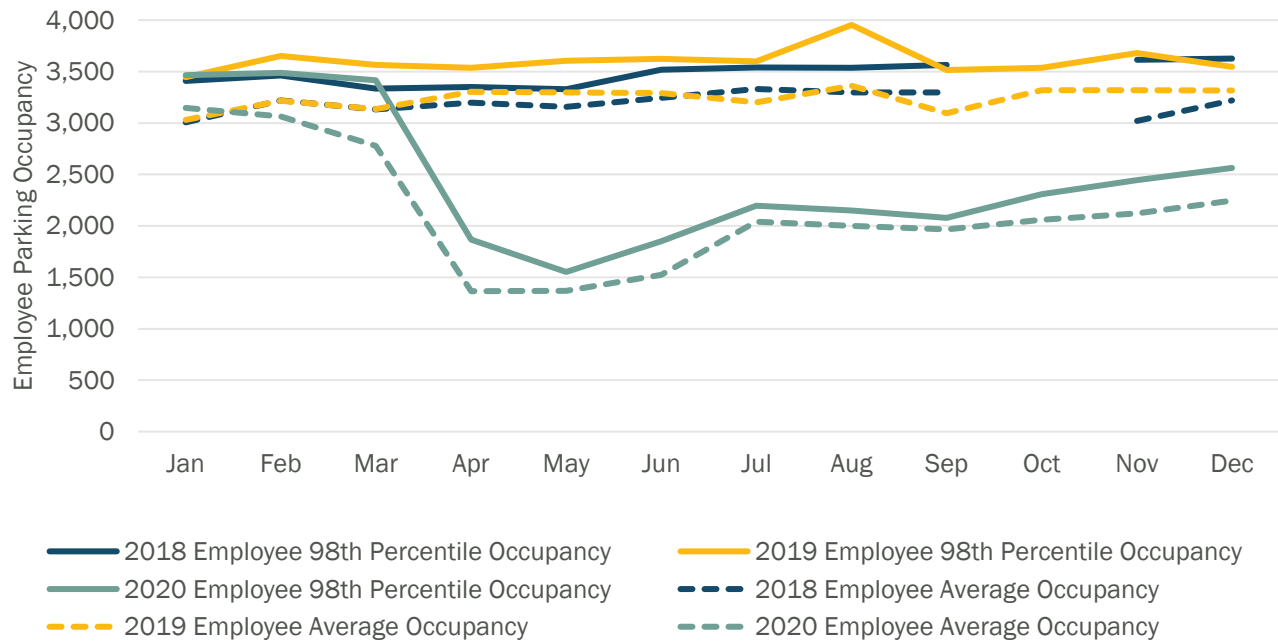
The COVID-19 pandemic greatly reduced air travel demand, and thus parking demand. At FLL, employee parking was affected; however, it was not affected as significantly as public parking, because a minimum number of employees must be present to maintain the critical operations at the Airport. Gradually, both employee and public parkers are returning to pre-pandemic values, although public parkers are returning at a quicker rate. To better understand the effects of the COVID-19 pandemic, Airport data from 2018 through 2020 were examined to observe the impacts and trends.

3.1 Effects on Employee Parking

Exhibit 6 illustrates the impact the pandemic has had on the employee parking demand (monthly average and 98th percentile) at the Airport. The 98th percentile day is used as the planning standard to represent a typical busy day of the year for employee parking, which does not vary as much as public parking throughout the year. Typical employee parkers are also more familiar with the facility and require less of a level of service buffer than public parker. As shown on **Exhibit 7**, employee parking demand was reduced to almost 40 percent of its pre-pandemic level in May 2020. However, in December 2020, employee parking demand was 70 percent of the pre-pandemic level. **Exhibit 8** shows the ratio of employee parkers to aircraft operations is returning to pre-pandemic levels after lagging the change in enplaned passengers at the start of the pandemic in Spring 2020. This indicates that staffing changes to adjust

to the pandemic lagged the decline in passenger activity and operations. There are also certain employee functions that are not dependent on passenger activity and operations that keep a higher minimum number of employees at the Airport than would be explained just by passenger aircraft operations.

Exhibit 6 Monthly Employee Parking Occupancy



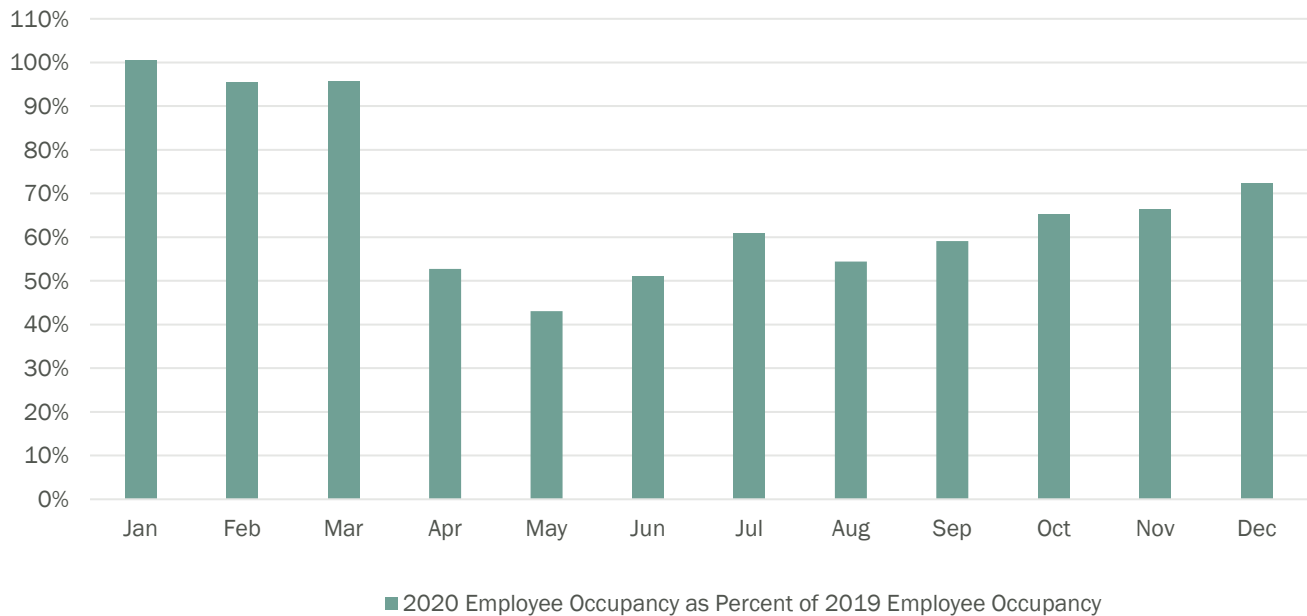
NOTES:

1/ The 98th percentile occupancy used for employees is higher than the 95th percentile occupancy used for public parking due to employees' familiarity and comfort with the facility and lesser need to provide a level of service buffer.

2/ October 2018 data were not available.

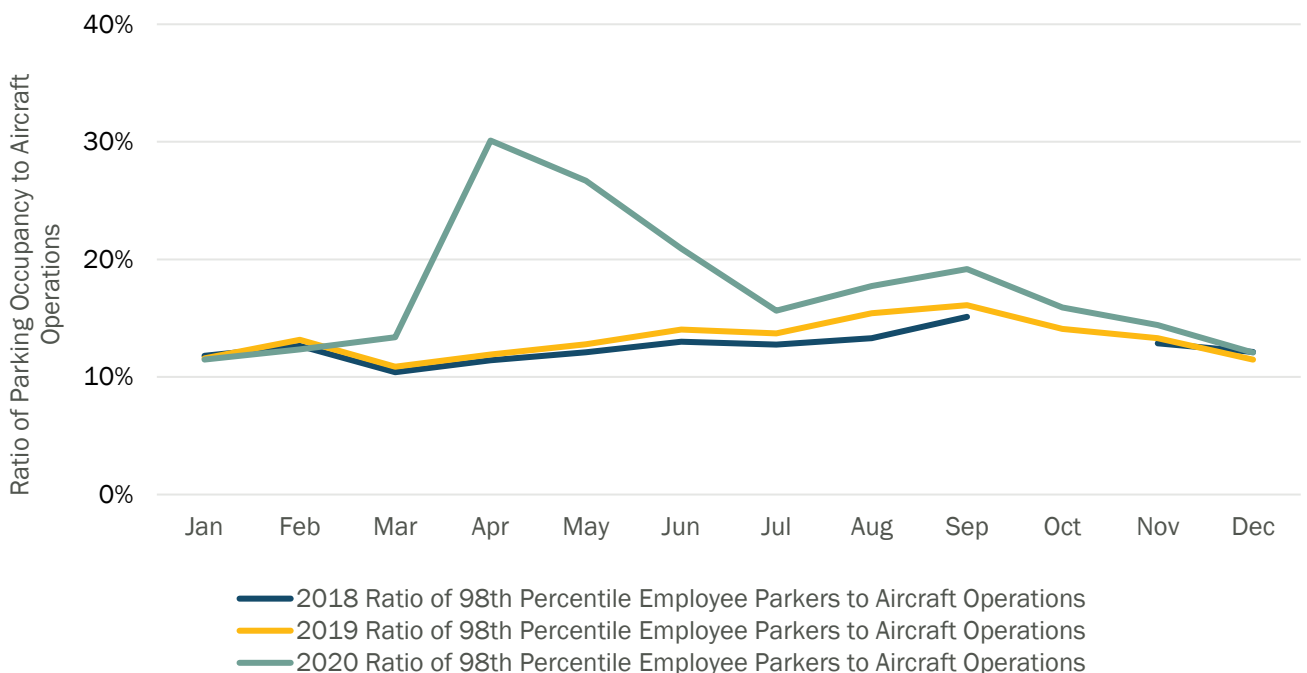
SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 7 2020 Employee Parking Occupancy as a Percentage of 2019 Occupancy



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 8 Ratio of 98th Percentile Employee Parking Demand to Aircraft Operations



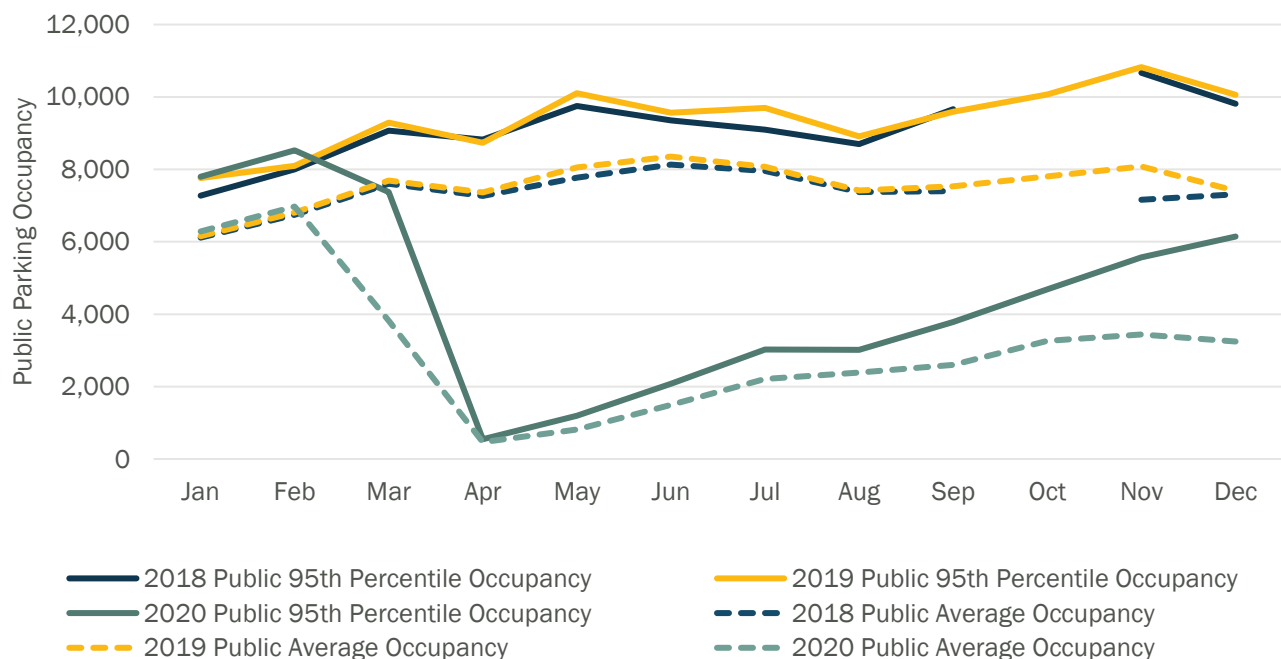
NOTE: 1/ October 2018 data were not available.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

3.2 Effects on Public Parking

The COVID-19 pandemic has affected public parkers at the Airport. **Exhibit 9** illustrates the effect on public parking demand (monthly average and 95th percentile). The use of the 95th percentile day demand as the planning standard generally excludes the extreme peaks on major holidays and other isolated peak parking events. As shown on **Exhibit 10**, public parking demand was reduced to almost 5 percent of the pre-pandemic level in April 2020. However, in December 2020, public parking demand was back to 60 percent of the pre-pandemic level. **Exhibit 11** shows the ratio of public parkers to O&D passengers is returning to pre-pandemic levels after an initial increase in parking demand per O&D passenger at the start of the pandemic. This indicates that of the few passengers who were still traveling at that time, they were more likely to park than use another mode of transportation. Given the social distancing directives, passengers preferred their own vehicles over sharing a vehicle with someone else. The ratio began to approach the pre-pandemic level in Summer 2020 after some pandemic restrictions began to be lifted and the public started to become more comfortable with traveling again.

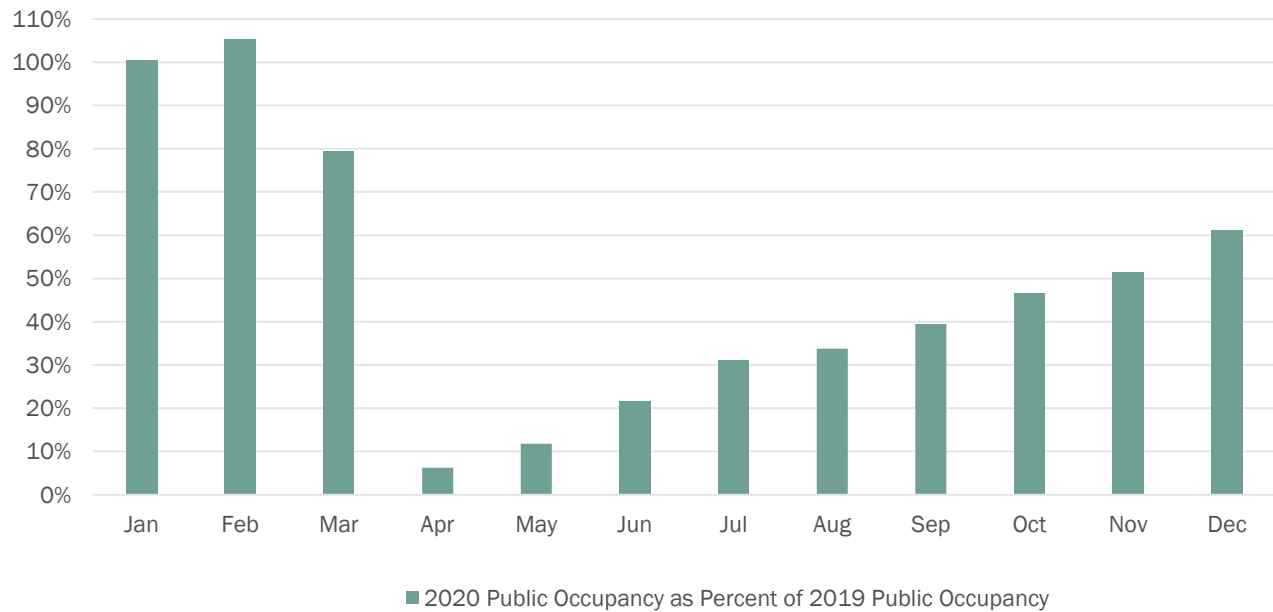
Exhibit 9 Monthly Public Parking Occupancy



NOTE: October 2018 data were not available.

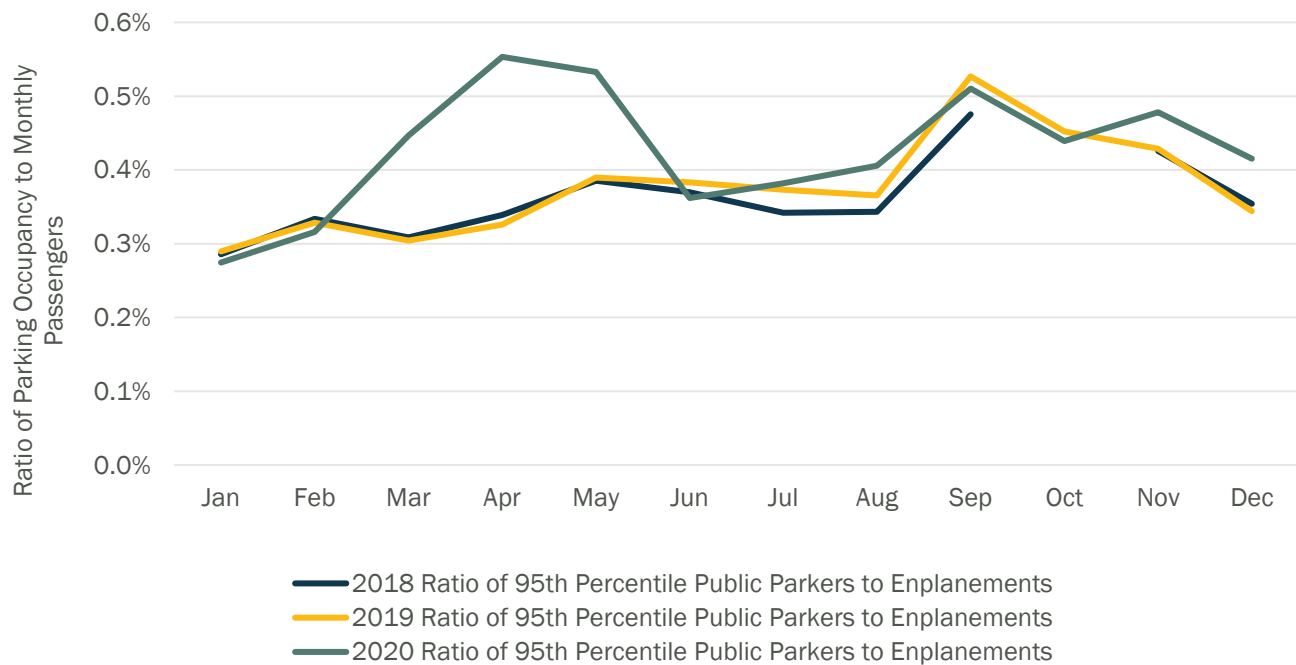
SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 10 2020 Public Parking Occupancy as a Percentage of 2019 Occupancy



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 11 Ratio of 95th Percentile Public Parking Demand to Origin and Destination Passengers



NOTE: October 2018 data were not available.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

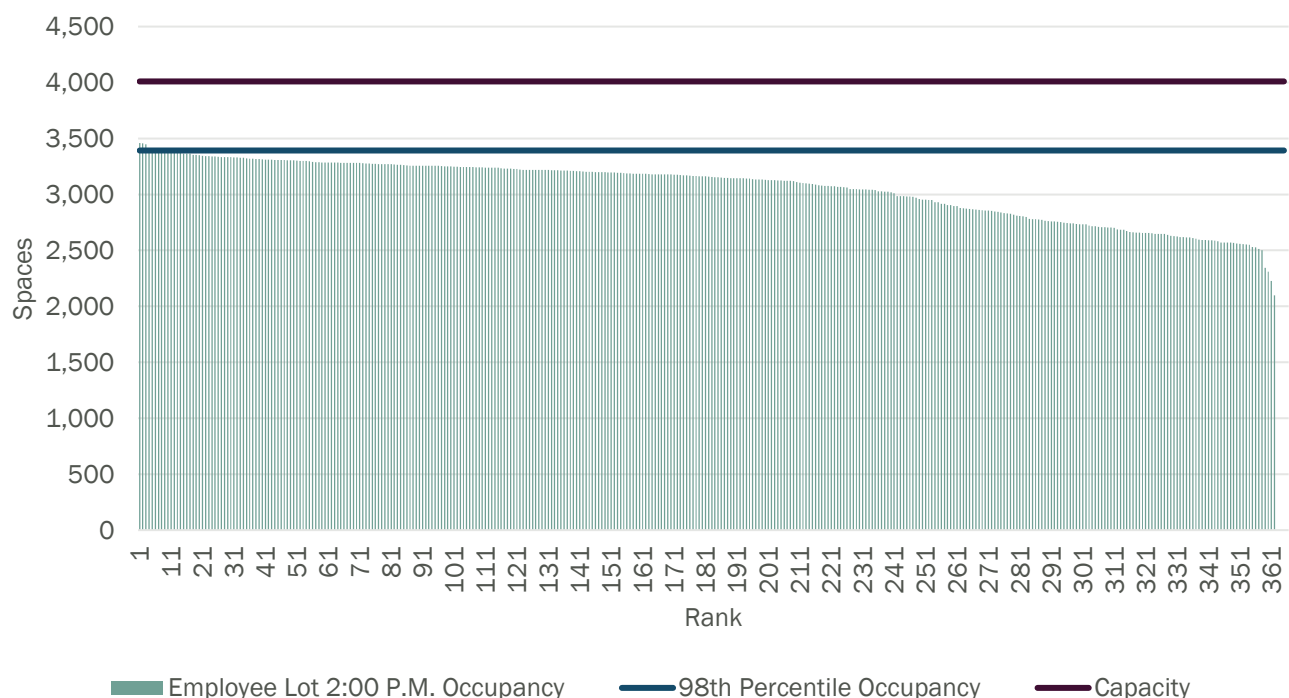
4. Parking Demand

4.1 Employee Parking Demand

Employee parking demand was examined to determine future requirements. Existing employee parking demand was determined using daily occupancy data from the Airport’s parking access and revenue control system (PARCS) for 12 consecutive months (calendar year [CY] 2019). The daily peak occupancy counts were then ranked from highest to lowest daily occupancies to provide an annual descending order profile for each parking facility. The “design day” represents the level of demand for which parking facilities should be designed to accommodate anticipated demand on a busy day. The design day is based on the goal of accommodating the 98th percentile day demand, which represents a typical busy day of the year for employee parking. As employee demand does not vary much throughout the year, the 98th percentile day is not substantially different from most other busy days.

The base year (2019) employee parking demand was estimated by identifying the peak hour daily parking occupancy on the design day, or 98th percentile day of parking activity, as depicted on **Exhibit 12** for the Employee Parking Lot.

Exhibit 12 Employee Parking Lot – Descending Order Chart



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

4.1.1 METHODOLOGY

Future employee parking requirements were determined using a spreadsheet-based parking demand model prepared to project demand for each on-Airport parking facility for future year conditions. As employment may vary based on changes in passenger enplanements or aircraft operations, future employee parking demand estimates assume demand will increase in proportion with the average of the airline passenger enplanement growth rate and the aircraft operations growth rate from the MPU Validation Forecast. Employee parking demand was determined using the blended growth rate of aircraft operations and enplaned passengers described above. Employee parkers would experience a deficit of parking spaces by 2027. By 2035 (51.6 MAP), a 520-space deficit is anticipated for employee parkers. **Table 1** lists the requirements that resulted from the employee parking demand analysis.

4.1.2 COMPARISON OF REQUIREMENTS

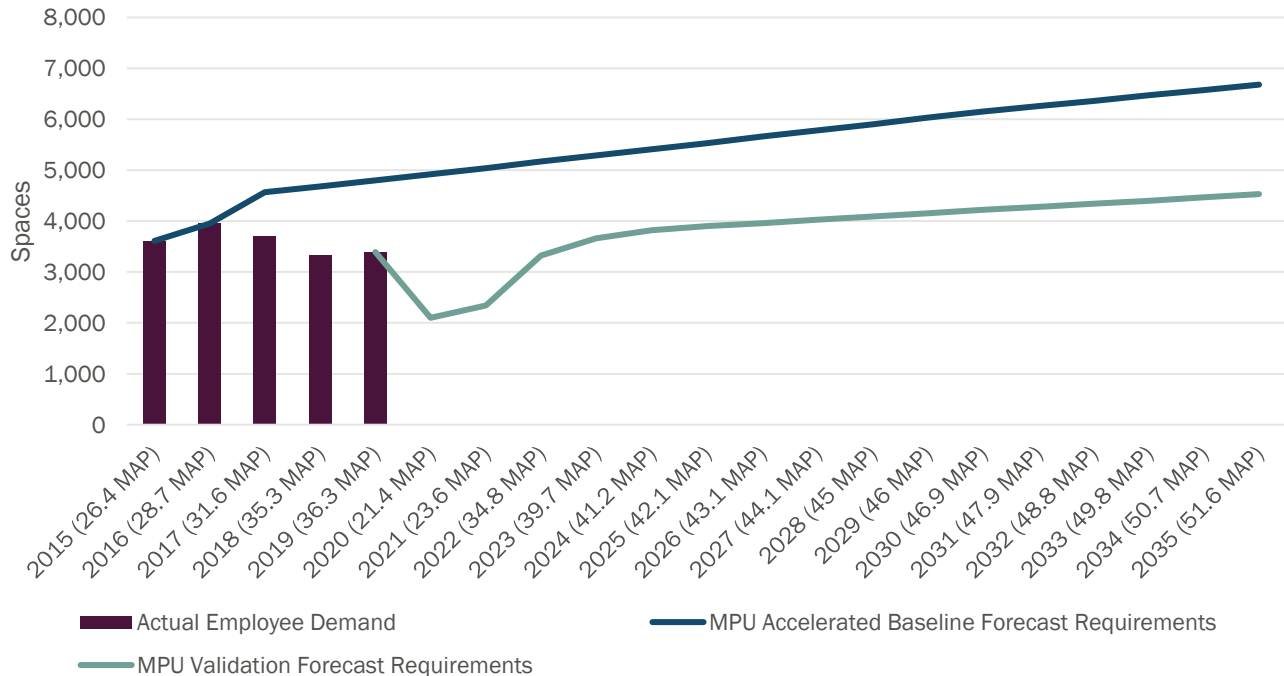
Exhibit 13 compares the MPU employee parking requirements (2015 base year) to the actual 2019 values, which the 2021 MPU Validation Forecast requirements were based on. As shown, there was a decrease from 2015 to 2019 in actual demand. The updated employee parking requirements based on the 2021 MPU Validation Forecast show a decrease in anticipated required parking. The actual employee parking demand not keeping pace with the MPU requirements beginning in 2017 is likely due to a shift in how employees accessed the Airport when employee parking was relocated from the Cypress Garage to the former Economy Lot. The increased travel time to get from the parking location to an employee's job location may have caused some to take a different mode of transportation to the Airport, such as a TNC or public transit. Some employees may also carpool to split the cost of continuing to park in the public garages at the public rates.

Table 1 Employee Parking Requirements (Spaces)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
MAP	36.3	21.4	23.6	34.8	39.7	41.2	42.1	43.1	44.1	45.0	46.0	46.9	47.9	48.8	49.8	50.7	51.6
Aircraft Operations (thousands)	279	181	203	278	298	312	317	321	324	327	330	334	337	339	342	345	348
Requirements	3,390	2,100	2,340	3,320	3,670	3,830	3,900	3,970	4,040	4,100	4,160	4,230	4,290	4,350	4,410	4,470	4,530
Employee Lot Capacity	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010	4,010
Surplus/(Deficit)	620	1,910	1,670	690	340	180	110	40	(30)	(90)	(150)	(220)	(280)	(340)	(400)	(460)	(520)

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 13 Comparison of Master Plan Update Employee Parking Requirements (2015 Base Year) to 2021 Master Plan Update Validation Forecast Requirements (2019 Base Year)



NOTES:

MAP – Million Annual Passengers

MPU – Master Plan Update

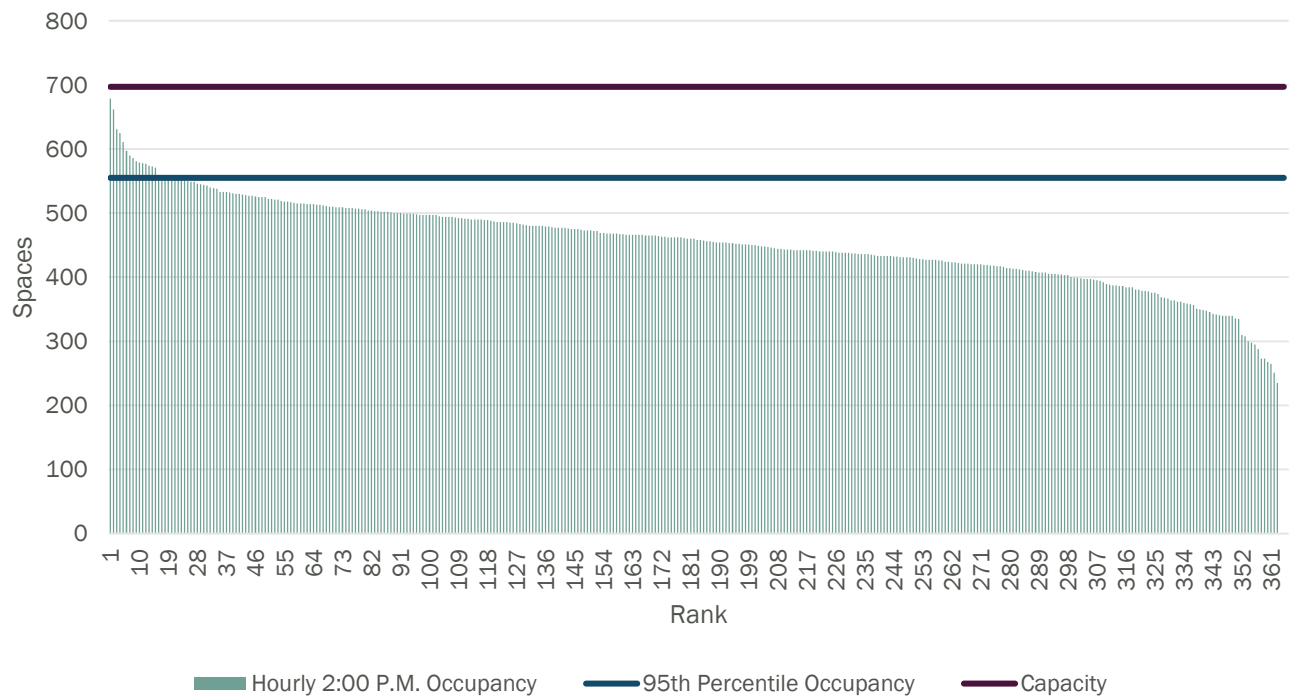
SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

4.2 Public Parking Demand

Existing public parking demand was determined using daily occupancy data from the Airport’s PARCS for 12 consecutive months (CY 2019). The daily peak occupancy counts were then ranked from highest to lowest daily occupancies to provide an annual descending order profile for each parking facility. The design day represents the level of demand for which parking facilities should be designed to accommodate anticipated demand on a busy day. The design day is based on the goal of accommodating the 95th percentile day demand, which is represented by the 18th-busiest day of the year. The use of the 95th percentile day demand as the design day generally excludes the extreme peaks on major holidays and other isolated peak parking events. These isolated demand surges are typically accommodated by peak-day management and/or the use of additional surface and overflow parking areas. Adequate overflow facilities should be provided to accommodate the absolute peak-day demand occurring during major holidays, as needed.

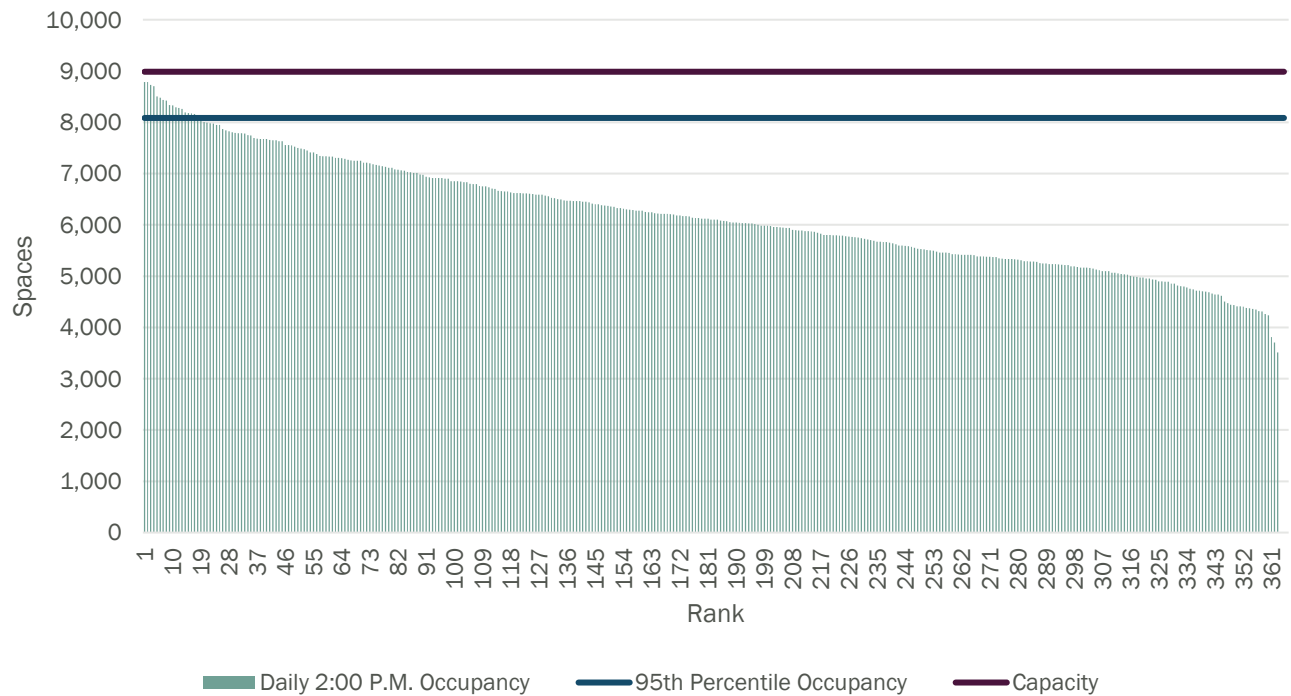
The base year (2019) public parking demand was estimated by identifying the peak hour daily parking occupancy on the parking design day, or 95th percentile day of parking activity, as depicted on **Exhibit 14** for Hourly Parking, **Exhibit 15** for Daily Parking, **Exhibit 16** for Valet Parking, and **Exhibit 17** for total public parking.

Exhibit 14 Hourly Parking – Descending Order Chart



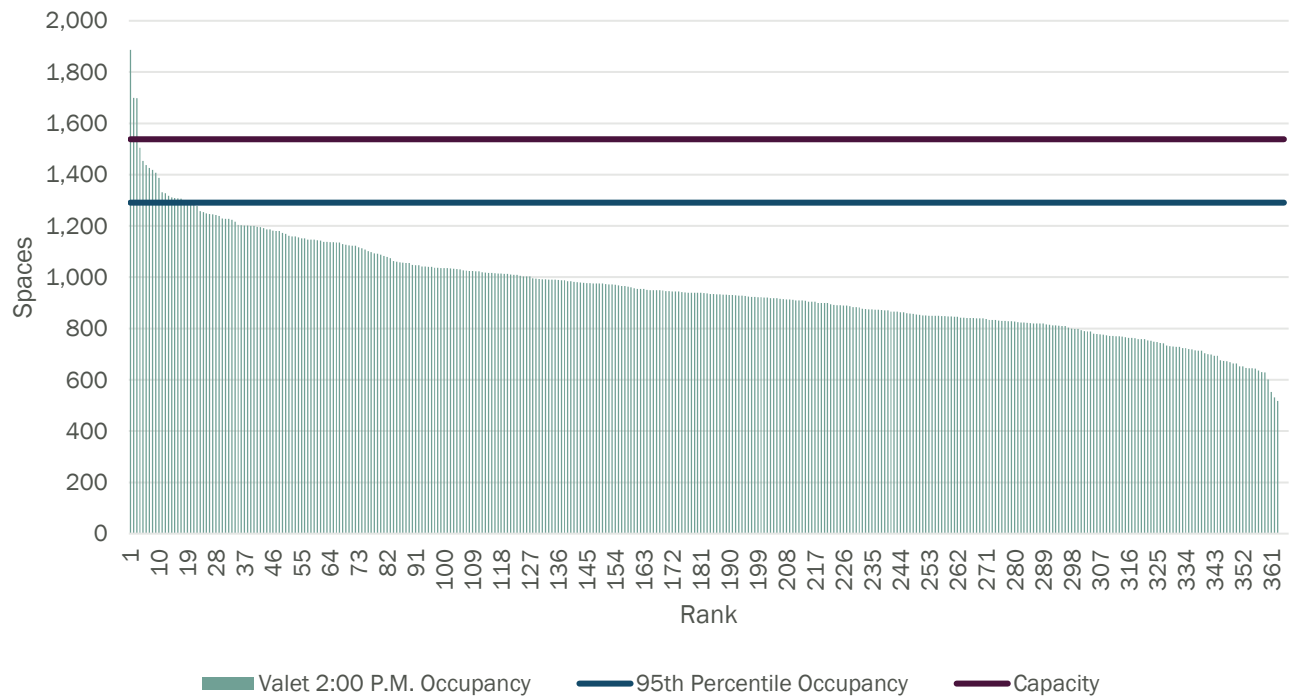
SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 15 Daily Parking – Descending Order Chart



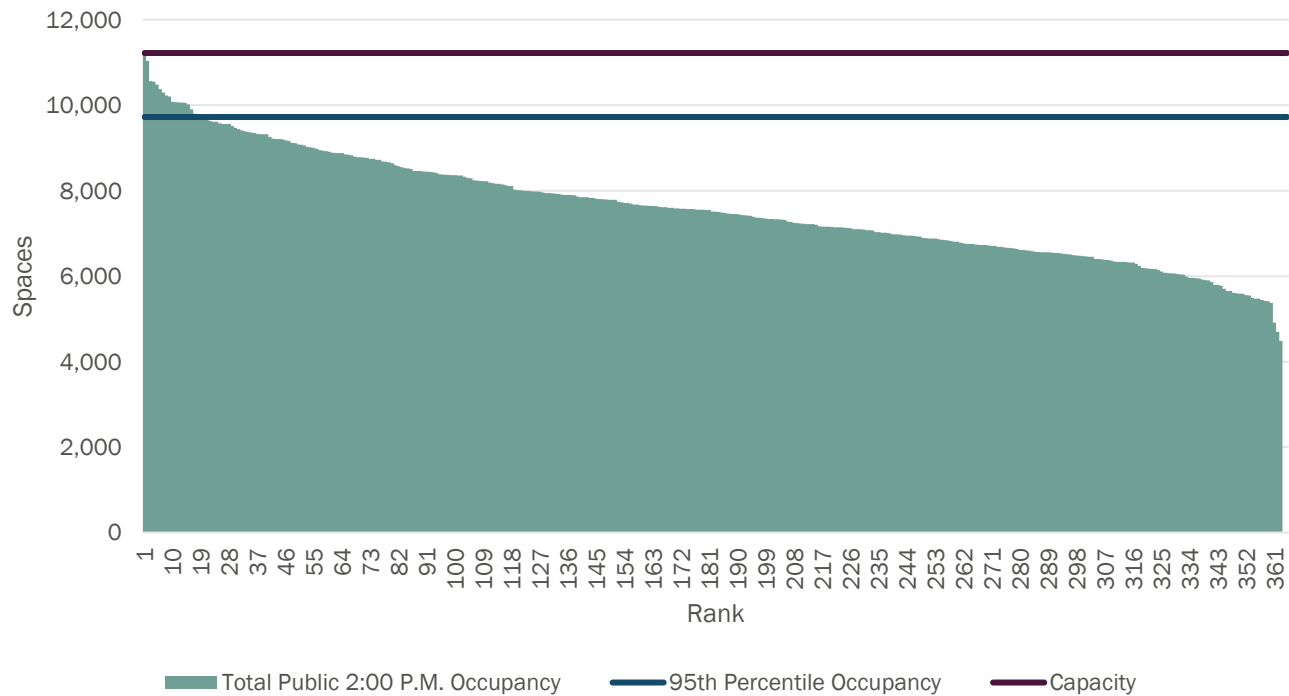
SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 16 Valet Parking – Descending Order Chart



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 17 Total Public Parking – Descending Order Chart



SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., October 2021 (analysis).

4.2.1 METHODOLOGY

Future public parking requirements were determined using a spreadsheet-based parking demand model prepared to predict demand for each on-Airport parking facility for future year conditions. Future parking demand estimates assume that parking demand will increase in proportion to the growth in O&D passenger demand from the MPU Validation Forecast. The public parking requirements as shown in **Table 2** are called the Baseline Scenario, which assumes no change in the parking mode share relative to 2019. The public parking requirements include a 10% service factor to account for the difficulty of finding a space when parking facilities approach full utilization. All public parking products would have a deficit in both 2025 (17.1 million O&D passengers) and 2035 (20.9 million O&D passengers) with the exception of Hourly, which has a slight surplus in 2025 (17.1 million O&D passengers). In 2035 (20.9 million O&D passengers), Hourly parking would have a 140-space deficit, Daily parking would have a 3,320-space deficit, and Valet parking would have a 430-space deficit. The Airport would have an overall 3,570-space deficit.

4.2.2 COMPARISON OF REQUIREMENTS

Exhibit 18 compares the MPU public parking requirements (2015/16 base year) to the actual 2019 values, which the 2021 MPU Validation Forecast requirements were based on. As shown, there was a decrease from 2016 to 2019 in actual demand. The updated public parking requirements based on the 2021 MPU Validation Forecast show a decrease in anticipated required parking. The actual public parking demand not keeping pace with the MPU requirements beginning in 2017 is likely due to the closure of the low-price Economy Lot from the public parking supply. While some parkers who would have parked in the Economy Lot may have moved to Daily Parking in the Garages, some may have also shifted to another mode to access the Airport, such as family/friend drop-off, TNCs or public transit. Off-airport parking competitors that competed most closely with the Economy Lot may have also attracted some parkers. With the parking product offerings assumed to remain constant from 2019, the parking demand is assumed to resume growth in proportion to O&D passenger growth.

These results were also compared to the MPU Scenarios 1 and 2 and the Palm Garage Advanced Planning currently being conducted by Kimley-Horn and Associates, Inc. The future parking demand requirements of the Palm Garage Advanced Planning and 2021 updated requirements with the MPU Validation forecast resulted in parking space requirements for 2035 (20.9 million O&D passengers) that were within 380 spaces of each other (a difference of approximately 2.6 percent). Both the Palm Garage Advanced Planning and the 2021 MPU Validation Requirements track between MPU Scenarios 1 and 2. **Table 3** compares the public parking requirements.

Table 2 Public Parking Requirements (Spaces), Baseline Scenario

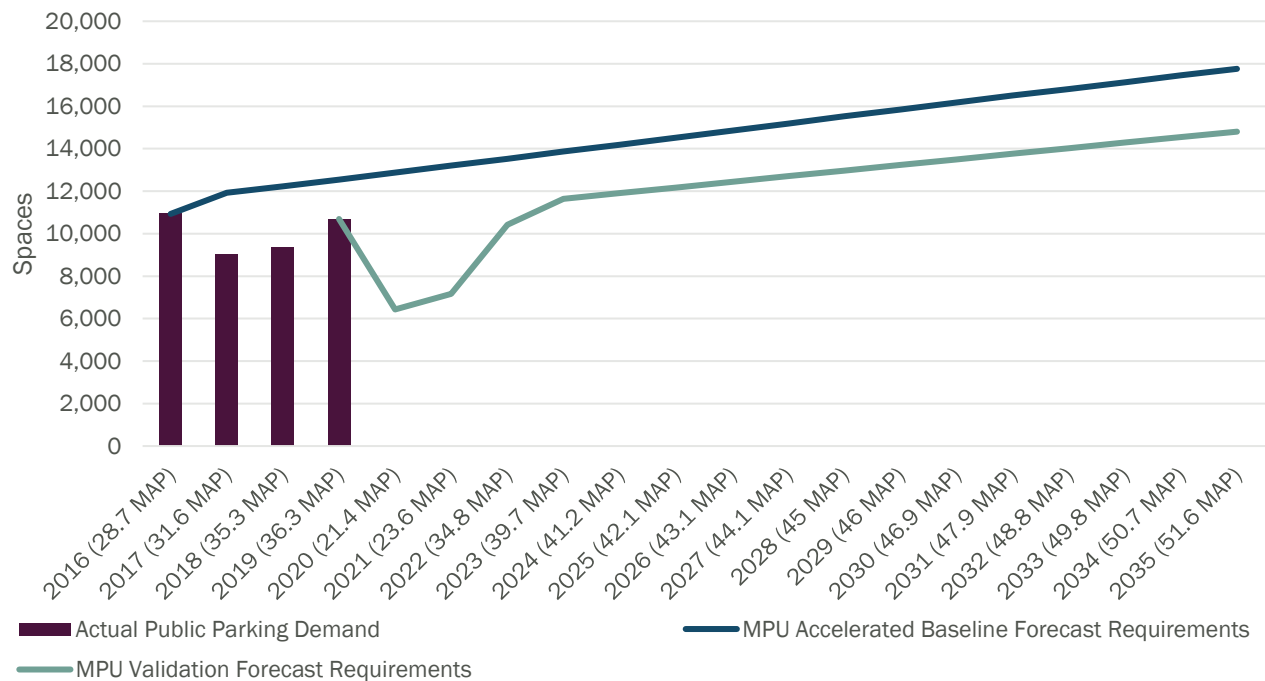
		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	O&D Passengers (millions)	15.1	9.1	10.1	14.7	16.4	16.8	17.1	17.5	17.9	18.3	18.6	19.0	19.4	19.8	20.1	20.5	20.9
Hourly Parking	Requirements	610	370	410	590	660	680	690	710	730	740	760	770	790	800	820	830	840
	Capacity	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
	Surplus/(Deficit)	90	330	290	110	40	20	10	(10)	(30)	(40)	(60)	(70)	(90)	(100)	(120)	(130)	(140)
Daily Parking	Requirements	8,890	5,350	5,960	8,660	9,670	9,900	10,120	10,340	10,560	10,780	11,000	11,220	11,440	11,660	11,880	12,100	12,310
	Capacity	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990
	Surplus/(Deficit)	100	3,640	3,030	330	(680)	(910)	(1,130)	(1,350)	(1,570)	(1,790)	(2,010)	(2,230)	(2,450)	(2,670)	(2,890)	(3,110)	(3,320)
Valet Parking	Requirements	1,420	850	950	1,380	1,540	1,580	1,620	1,650	1,690	1,720	1,760	1,790	1,830	1,860	1,900	1,930	1,970
	Capacity	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540
	Surplus/(Deficit)	120	690	590	160	0	(40)	(80)	(110)	(150)	(180)	(220)	(250)	(290)	(320)	(360)	(390)	(430)
Total Parking	Requirements	10,700	6,430	7,170	10,410	11,630	11,900	12,170	12,440	12,700	12,970	13,230	13,500	13,760	14,020	14,290	14,550	14,800
	Capacity	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230
	Surplus/(Deficit)	530	4,800	4,060	820	(400)	(670)	(940)	(1,210)	(1,470)	(1,740)	(2,000)	(2,270)	(2,530)	(2,790)	(3,060)	(3,320)	(3,570)

NOTE:

Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 18 Comparison of Master Plan Update Public Parking Requirements (2015/16 Base Year) to 2021 Master Plan Update Validation Forecast Requirements (2019 Base Year)



NOTES:

MAP – Million Annual Passengers

MPU – Master Plan Update

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Table 3 Comparison of Public Parking Requirements (Spaces)

	BASE YEAR	FORECAST	2025	2035
MPU Baseline Requirement¹	2015/16	MPU Accel. Baseline	14,510	17,760
MPU Scenario 1 Requirement¹	2015/16	MPU Accel. Baseline	13,250	16,230
MPU Scenario 2 Requirement¹	2015/16	MPU Accel. Baseline	11,890	12,800
Palm Garage Advanced Planning Requirement²	2019	MPU Accel. Baseline	11,790	14,420
2021 MPU Validation Requirement³	2019	MPU Validation	12,170	14,800

NOTES:

MPU – Master Plan Update

¹ Data were obtained from the 2020 Master Plan Update for Fort Lauderdale-Hollywood International Airport (Table 4.7-1 through Table 4.7-3).

² The public parking requirements forecast was developed by Kimley-Horn and Associates, Inc., for the Palm Garage Advanced Planning.

³ This represents the baseline public parking demand forecast of the 2021 updated requirements.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Kimley-Horn & Associates, Inc., July 2021 (Palm Garage Advanced Planning) Ricondo & Associates, Inc., October 2021 (analysis).

5. Alternative Demand Scenarios and Future Parking Facility Development

5.1 Alternative Parking Demand Scenarios

Two alternative parking demand scenarios, Scenario 1, and Scenario 2 were developed as sensitivity analyses to reflect variations in demand from the Baseline Scenario requirements resulting from the impacts of COVID-19, parking mode share changes in the overall airport ground transportation (GT) access market, and other macroeconomic trends. The public parking share of GT transactions at the Airport declined slightly from 30.3 percent in CY 2016 to 29.6 percent in CY 2019.¹

Scenario 1 assumes that after the GT market stabilizes and reaches equilibrium through the pandemic recovery, the public parking share of GT transactions continues the pre-pandemic slight decline on an annual basis, reaching 26.5 percent in 2035 (20.9 million O&D passengers). Other modes, such as TNCs, gain market share as the parking share declines. **Table 4** shows the Scenario 1 public parking requirements. All public parking products would have a deficit in both 2025 (17.1 million O&D passengers) and 2035 (20.9 million O&D passengers), albeit lower than the Baseline Scenario, with the exception of Hourly, which has a slight surplus in 2025 (17.1 million O&D passengers). In 2035 (20.9 million O&D passengers), Hourly parking would have a 70-space deficit, Daily parking would have a 2,170-space deficit, and Valet parking would have a 240-space deficit. The Airport would have an overall 2,190-space deficit.

Scenario 2 assumes that the public parking share of the GT market declines slightly faster than Scenario 1 due to continued pressure from other modes as well as the introduction of rail transit to the Airport. In addition, trends towards a “sharing economy” by younger generations of travelers and lower propensity to own a personal vehicle are also assumed, leading to a public parking GT transaction share of 23.3 percent in 2035 (20.9 million O&D passengers). **Table 5** shows the Scenario 2 public parking requirements. All public parking products except for Daily would be below capacity in 2025 (17.1 million O&D passengers). In 2035 (20.9 million O&D passengers), all except Hourly have a deficit, albeit lower than Scenario 1. In 2035 (20.9 million O&D passengers), Hourly parking would have a 30-space surplus, Daily parking would have an 840-space deficit, and Valet parking would have a 30-space deficit. The Airport would have an overall 590-space deficit.

¹ Palm Garage Advanced Planning, Kimley-Horn & Associates, Inc., June 2021.

Table 4 Public Parking Requirements (Spaces), Scenario 1

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	O&D Passengers (millions)	15.1	9.1	10.1	14.7	16.4	16.8	17.1	17.5	17.9	18.3	18.6	19.0	19.4	19.8	20.1	20.5	20.9
Hourly Parking	Requirements	610	370	410	590	650	660	670	680	690	700	710	720	730	740	750	760	770
	Capacity	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
	Surplus/(Deficit)	90	330	290	110	50	40	30	20	10	0	(10)	(20)	(30)	(40)	(50)	(60)	(70)
Daily Parking	Requirements	8,890	5,370	5,930	8,530	9,450	9,590	9,730	9,870	10,010	10,160	10,310	10,450	10,590	10,740	10,880	11,020	11,160
	Capacity	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990
	Surplus/(Deficit)	100	3,620	3,060	460	(460)	(600)	(740)	(880)	(1,020)	(1,170)	(1,320)	(1,460)	(1,600)	(1,750)	(1,890)	(2,030)	(2,170)
Valet Parking	Requirements	1,420	860	950	1,360	1,510	1,530	1,550	1,580	1,600	1,620	1,650	1,670	1,690	1,710	1,740	1,760	1,780
	Capacity	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540
	Surplus/(Deficit)	120	680	590	180	30	10	(10)	(40)	(60)	(80)	(110)	(130)	(150)	(170)	(200)	(220)	(240)
Total Parking	Requirements	10,700	6,450	7,130	10,260	11,370	11,530	11,700	11,870	12,040	12,220	12,400	12,560	12,740	12,910	13,080	13,260	13,420
	Capacity	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230
	Surplus/(Deficit)	530	4,780	4,100	970	(140)	(300)	(470)	(640)	(810)	(990)	(1,170)	(1,330)	(1,510)	(1,680)	(1,850)	(2,030)	(2,190)

NOTE:

Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Table 5 Public Parking Requirements (Spaces), Scenario 2

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	O&D Passengers (millions)	15.1	9.1	10.1	14.7	16.4	16.8	17.1	17.5	17.9	18.3	18.6	19.0	19.4	19.8	20.1	20.5	20.9
Hourly Parking	Requirements	610	360	400	570	620	630	630	630	640	640	650	650	660	660	670	670	670
	Capacity	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
	Surplus/(Deficit)	90	340	300	130	80	70	70	70	60	60	50	50	40	40	30	30	30
Daily Parking	Requirements	8,890	5,310	5,800	8,270	9,080	9,130	9,180	9,240	9,310	9,370	9,440	9,500	9,570	9,630	9,700	9,760	9,830
	Capacity	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990	8,990
	Surplus/(Deficit)	100	3,680	3,190	720	(90)	(140)	(190)	(250)	(320)	(380)	(450)	(510)	(580)	(640)	(710)	(770)	(840)
Valet Parking	Requirements	1,420	850	930	1,320	1,450	1,460	1,470	1,480	1,490	1,500	1,510	1,520	1,530	1,540	1,550	1,560	1,570
	Capacity	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540
	Surplus/(Deficit)	120	690	610	220	90	80	70	60	50	40	30	20	10	0	(10)	(20)	(30)
Total Parking	Requirements	10,700	6,380	6,980	9,950	10,920	10,980	11,040	11,110	11,190	11,270	11,350	11,430	11,500	11,580	11,660	11,740	11,820
	Capacity	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230	11,230
	Surplus/(Deficit)	530	4,850	4,250	1,280	310	250	190	120	40	(40)	(120)	(200)	(270)	(350)	(430)	(510)	(590)

NOTE:

 Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis)

5.2 Future Parking Facility Development Sequencing

The parking facility development sequencing applies the Baseline Scenario, Scenario 1, and Scenario 2 parking demand to the facility implementation schedule to identify parking surpluses and deficits throughout the implementation period to 2035. Public parking demand and employee parking demand were combined to holistically view total parking demand against total developed parking capacity. Which type of parking is accommodated in each parking facility in each year is not decided by this analysis.

At this time, it is assumed that the IMC could be constructed in one phase (full build) or two phases, which would affect the timing of available parking capacity and, therefore, when employees are able relocate from their existing location back to being closer to the terminals. In addition to the construction of the IMC, the Palm Garage Redevelopment Project may also affect parking capacity during this period.

The Employee Parking Lot demand is added to the public parking demand in each scenario chart in 2029, which is assumed to be the first full year of operation of the automated people mover (APM). This assumption is made as a reasonable estimate of when employees could be relocated into a facility on the APM loop to eliminate the need for employee busing. However, depending on the public parking demand in each scenario and the timing of new parking development, there may not be enough capacity for all employee parking in 2029. That is discussed with each Scenario as needed.

5.2.1 INTERMODAL CENTER (FULL-BUILD)

In the full-build option, the IMC is expected to open in 2027 after one construction phase and provide between 6,700 and 6,900 parking spaces.

5.2.2 INTERMODAL CENTER (TWO-PHASE)

In the two-phase option, the IMC is expected to open after two construction phases. The first phase is anticipated to open in 2027 with 4,500 spaces and the second phase completed in 2035 to bring the total to 6,700 to 6,900 spaces.

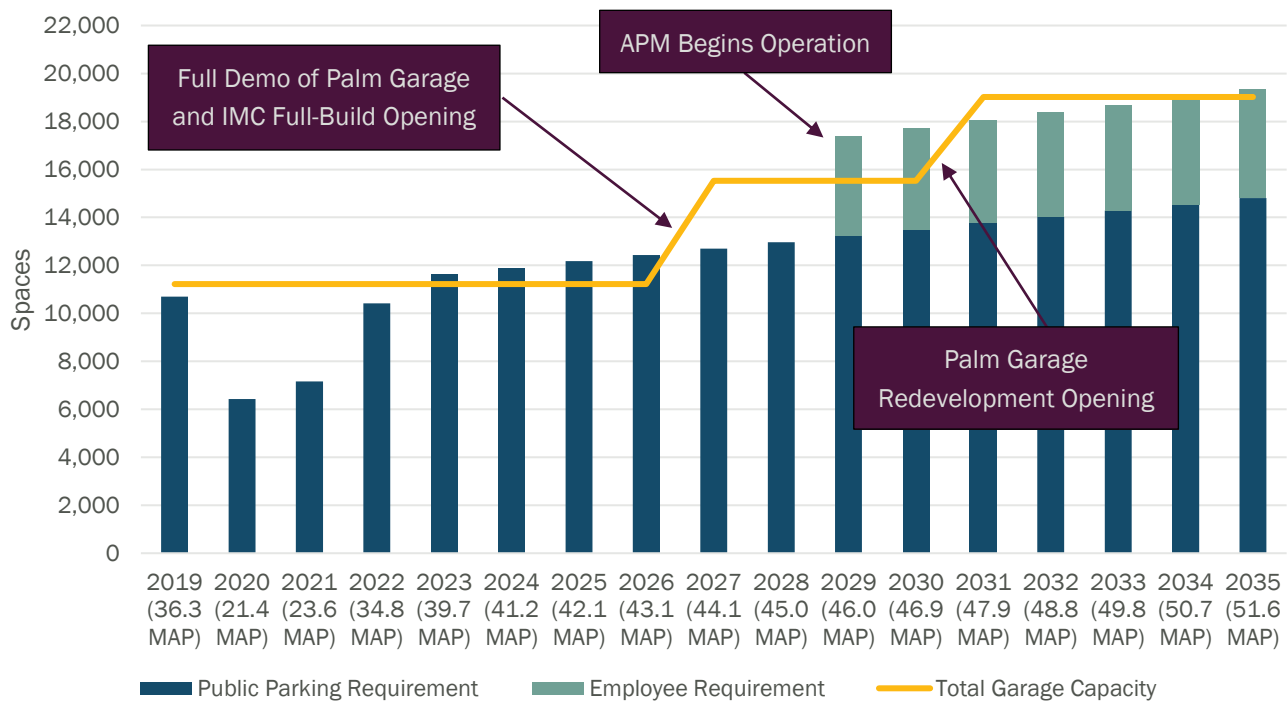
5.2.3 PALM GARAGE DEMOLITION AND REDEVELOPMENT

BCAD is currently proceeding with advanced planning for the demolition of the existing Palm Garage and a reconstruction of new 3,500-space garage to replace it, which would also accommodate the space needed for an APM station and guideway alignment. The existing Palm Garage is anticipated to be demolished in 2027 and the new garage is anticipated to open in 2031.

5.3 Baseline Scenario

Exhibit 19 shows the Baseline Scenario parking demand with the full-build IMC construction schedule, and **Exhibit 20** shows the two-phase-build IMC construction schedule. **Table 6** lists the requirements for the Baseline Scenario forecast. The employee parking demand is not able to be fully accommodated until both the full-build IMC and the Palm Garage Redevelopment are completed. In 2035, the anticipated parking deficit is 310 spaces.

Exhibit 19 Baseline Scenario Full-Build Intermodal Center Construction Schedule

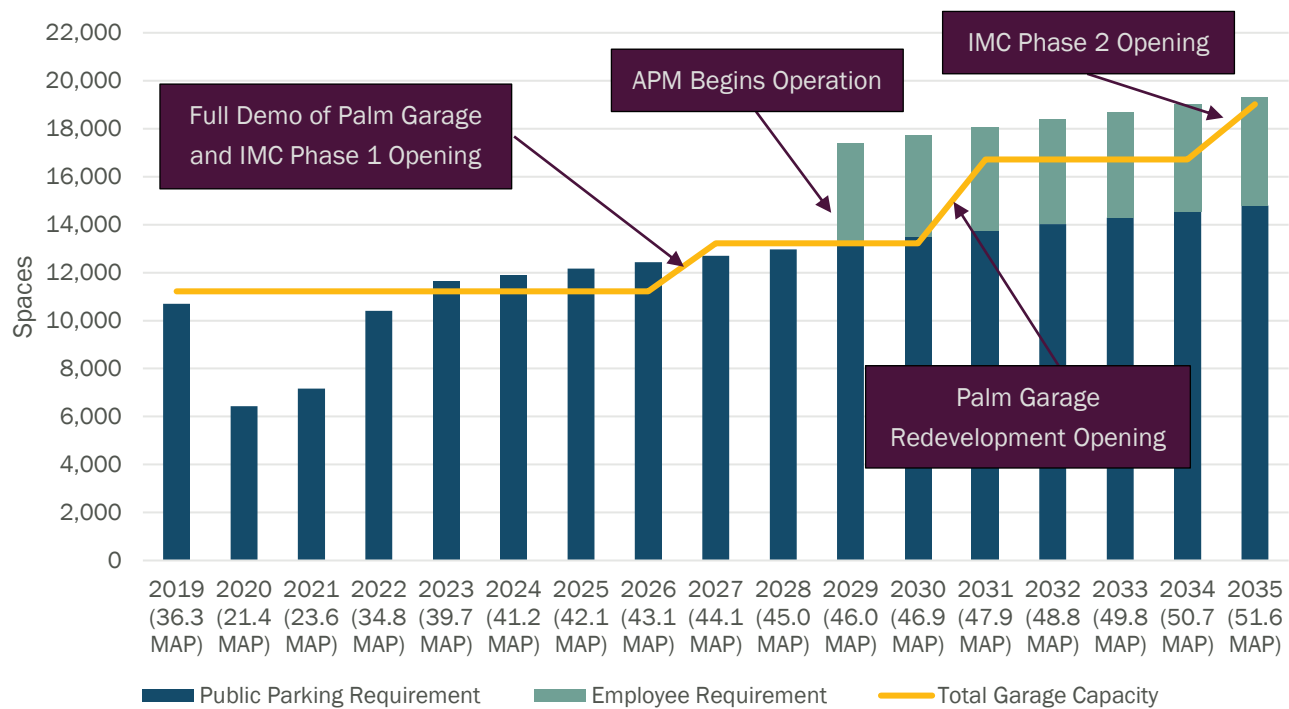


NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 20 Baseline Scenario Two-Phase-Build Intermodal Center Construction Schedule



NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Table 6 Baseline Scenario Forecast

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	MAP	36.3	21.4	23.6	34.8	39.7	41.2	42.1	43.1	44.1	45.0	46.0	46.9	47.9	48.8	49.8	50.7	51.6
Full-Build Schedule	Requirements	10,700	6,430	7,170	10,410	11,630	11,900	12,170	12,440	12,700	12,970	13,230	13,500	13,760	14,020	14,290	14,550	14,800
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	15,520	15,520	15,520	15,520	19,020	19,020	19,020	19,020	19,020
	Surplus/(Deficit)	520	4,790	4,050	810	(410)	(680)	(950)	(1,220)	2,820	2,550	2,290	2,020	5,260	5,000	4,730	4,470	4,220
	Employee	-	-	-	-	-	-	-	-	-	-	4,160	4,230	4,290	4,350	4,410	4,470	4,530
	Surplus/(Deficit)	520	4,790	4,050	810	(410)	(680)	(950)	(1,220)	2,820	2,550	(1,870)	(2,210)	970	650	320	0	(310)
Two-Phase-Build Schedule	Requirements	10,700	6,430	7,170	10,410	11,630	11,900	12,170	12,440	12,700	12,970	13,230	13,500	13,760	14,020	14,290	14,550	14,800
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	13,220	13,220	13,220	13,220	16,720	16,720	16,720	16,720	19,020
	Surplus/(Deficit)	520	4,790	4,050	810	(410)	(680)	(950)	(1,220)	520	250	(10)	(280)	2,960	2,700	2,430	2,170	4,220
	Employee	-	-	-	-	-	-	-	-	-	-	4,160	4,230	4,290	4,350	4,410	4,470	4,530
	Surplus/(Deficit)	520	4,790	4,050	810	(410)	(680)	(950)	(1,220)	520	250	(4,170)	(4,510)	(1,330)	(1,650)	(1,980)	(2,300)	(310)

NOTE:

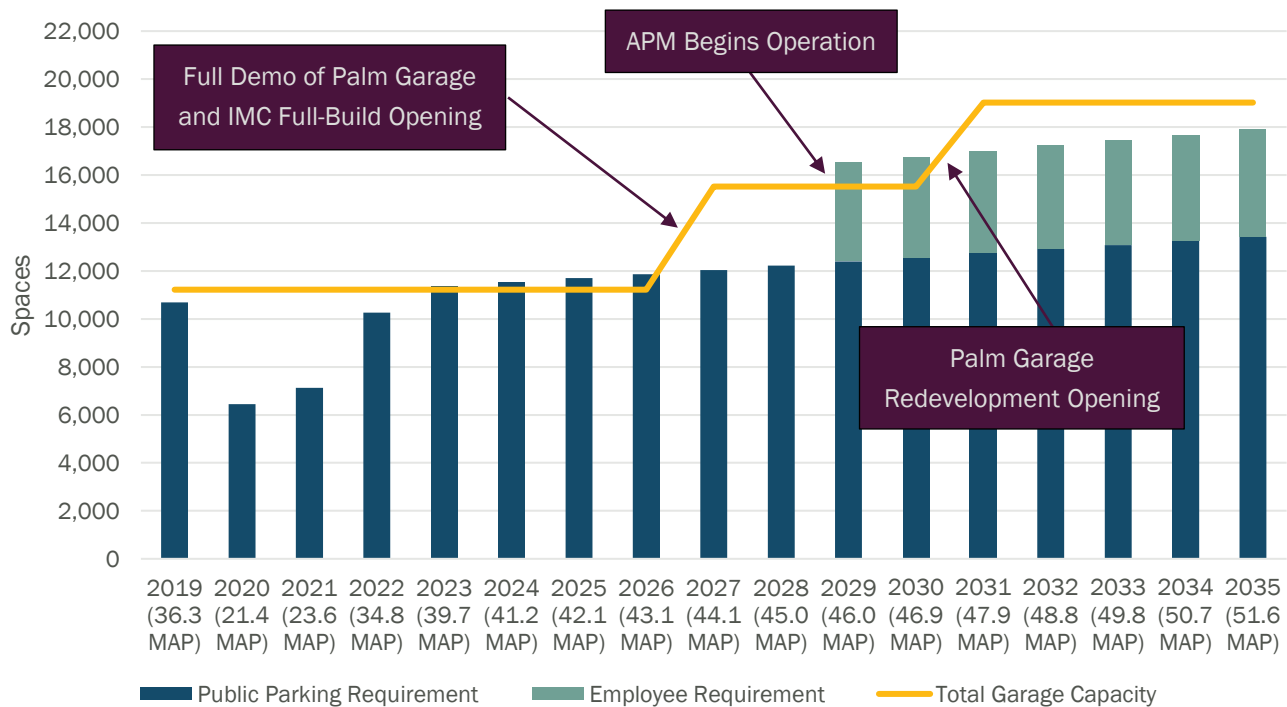
Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

5.4 Scenario 1

Exhibit 21 shows the Scenario 1 parking demand with the full-build IMC construction schedule, and **Exhibit 22** shows the two-phase-build IMC construction schedule. **Table 7** lists the requirements for the Scenario 1 forecast. The employee parking demand is able to be partially but not fully accommodated until both the full-build IMC and the Palm Garage Redevelopment are completed. In the two-phase IMC option, public parking may continue to be fully accommodated with only the first IMC phase completed. Most, but not all employees may then be accommodated when the Palm Garage Redevelopment is completed. In 2035, the anticipated parking surplus is estimated at approximately 1,130 spaces.

Exhibit 21 Scenario 1 Full-Build Intermodal Center Construction Schedule

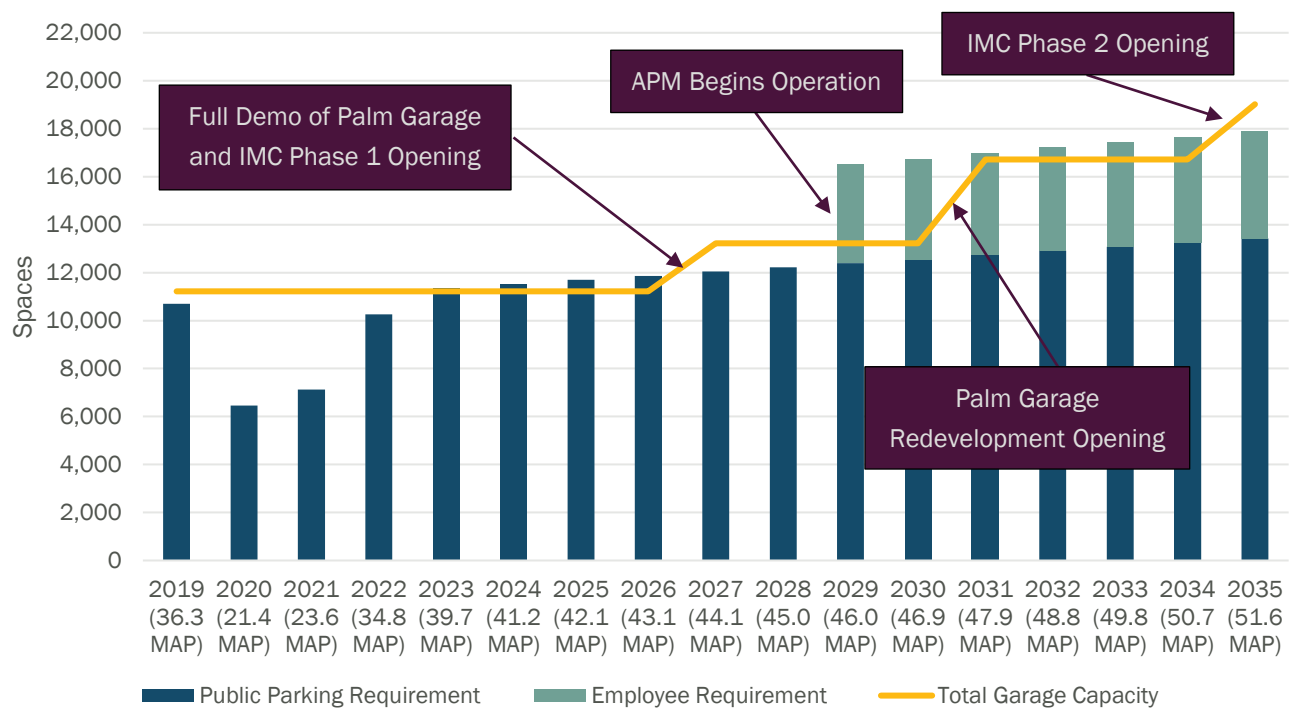


NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 22 Scenario 1 Two-Phase-Build Intermodal Center Construction Schedule



NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Table 7 Scenario 1 Forecast

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	MAP	36.3	21.4	23.6	34.8	39.7	41.2	42.1	43.1	44.1	45.0	46.0	46.9	47.9	48.8	49.8	50.7	51.6
Full-Build Schedule	Requirements	10,700	6,450	7,130	10,260	11,370	11,530	11,700	11,870	12,040	12,220	12,400	12,560	12,740	12,910	13,080	13,260	13,420
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	15,520	15,520	15,520	15,520	19,020	19,020	19,020	19,020	19,020
	Surplus/(Deficit)	520	4,770	4,090	960	(150)	(310)	(480)	(650)	3,480	3,300	3,120	2,960	6,280	6,110	5,940	5,760	5,600
	Employee	-	-	-	-	-	-	-	-	-	-	4,130	4,190	4,250	4,300	4,360	4,410	4,470
	Surplus/(Deficit)	520	4,770	4,090	960	(150)	(310)	(480)	(650)	3,480	3,300	(1,010)	(1,230)	2,030	1,810	1,580	1,350	1,130
Two-Phase-Build Schedule	Requirements	10,700	6,450	7,130	10,260	11,370	11,530	11,700	11,870	12,040	12,220	12,400	12,560	12,740	12,910	13,080	13,260	13,420
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	13,220	13,220	13,220	13,220	16,720	16,720	16,720	16,720	19,020
	Surplus/(Deficit)	520	4,770	4,090	960	(150)	(310)	(480)	(650)	1,180	1,000	820	660	3,980	3,810	3,640	3,460	5,600
	Employee	-	-	-	-	-	-	-	-	-	-	4,130	4,190	4,250	4,300	4,360	4,410	4,470
	Surplus/(Deficit)	520	4,770	4,090	960	(150)	(310)	(480)	(650)	1,180	1,000	(3,310)	(3,530)	(270)	(490)	(720)	(950)	1,130

NOTE:

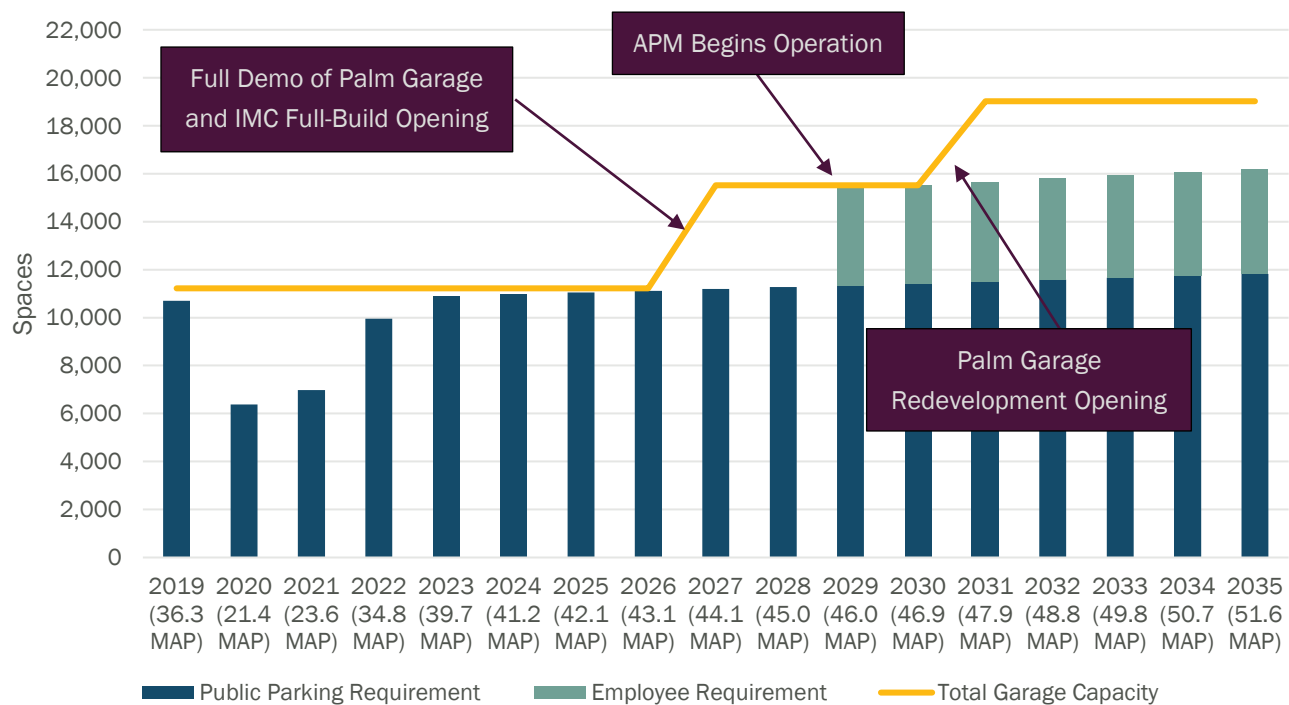
Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

5.5 Scenario 2

Exhibit 23 shows the Scenario 2 parking demand with the full-build IMC construction schedule, and **Exhibit 24** shows the two-phase-build IMC construction schedule. **Table 8** lists the requirements for the Scenario 2 forecast. The employee parking demand is able to be accommodated when the full-build IMC is completed. The opening of the Palm Garage Redevelopment then creates a surplus. In the two-phase IMC option, public parking may continue to be fully accommodated with only the first IMC phase completed. Only approximately half of all employees may be accommodated until the Palm Garage Redevelopment is completed. IMC Phase 2 is not anticipated to be required until beyond 2035 but is still shown in 2035 for comparative purposes. In 2035, the anticipated parking surplus is estimated at approximately 2,850 spaces.

Exhibit 23 Scenario 2 Full-Build Intermodal Center Construction Schedule

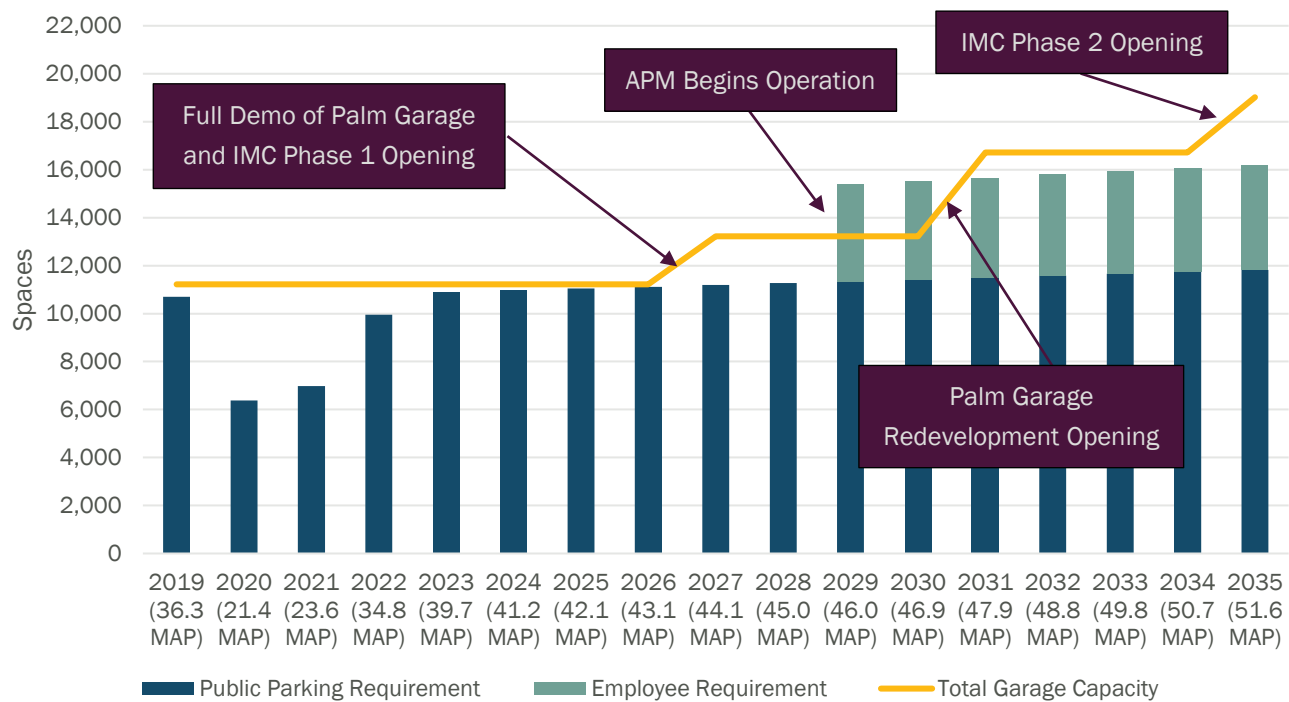


NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Exhibit 24 Scenario 2 Two-Phase-Build Intermodal Center Construction Schedule



NOTE: MAP levels reflect total passengers, inclusive of origin/destination (O&D)

MAP – Million Annual Passengers

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

Table 8 Scenario 2 Forecast

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	MAP	36.3	21.4	23.6	34.8	39.7	41.2	42.1	43.1	44.1	45.0	46.0	46.9	47.9	48.8	49.8	50.7	51.6
Full-Build Schedule	Requirements	10,700	6,380	6,980	9,950	10,920	10,980	11,040	11,110	11,190	11,270	11,350	11,430	11,500	11,580	11,660	11,740	11,820
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	15,520	15,520	15,520	15,520	19,020	19,020	19,020	19,020	19,020
	Surplus/(Deficit)	520	4,840	4,240	1,270	300	240	180	110	4,330	4,250	4,170	4,090	7,520	7,440	7,360	7,280	7,200
	Employee	-	-	-	-	-	-	-	-	-	-	4,060	4,110	4,160	4,210	4,260	4,300	4,350
	Surplus/(Deficit)	520	4,840	4,240	1,270	300	240	180	110	4,330	4,250	110	(20)	3,360	3,230	3,100	2,980	2,850
Two-Phase-Build Schedule	Requirements	10,700	6,380	6,980	9,950	10,920	10,980	11,040	11,110	11,190	11,270	11,350	11,430	11,500	11,580	11,660	11,740	11,820
	Capacity	11,220	11,220	11,220	11,220	11,220	11,220	11,220	11,220	13,220	13,220	13,220	13,220	16,720	16,720	16,720	16,720	19,020
	Surplus/(Deficit)	520	4,840	4,240	1,270	300	240	180	110	2,030	1,950	1,870	1,790	5,220	5,140	5,060	4,980	7,200
	Employee	-	-	-	-	-	-	-	-	-	-	4,060	4,110	4,160	4,210	4,260	4,300	4,350
	Surplus/(Deficit)	520	4,840	4,240	1,270	300	240	180	110	2,030	1,950	(2,190)	(2,320)	1,060	930	800	680	2,850

NOTE:

Total parking may not equal the sums of the products as the 95th percentile day for each product occurs on different days. All values are rounded to the nearest ten.

SOURCES: Broward County Aviation Department, May 2021 (data); Ricondo & Associates, Inc., May 2021 (Master Plan Update Validation Forecast); Ricondo & Associates, Inc., October 2021 (analysis).

6. Summary

The alternative parking demand scenarios are intended to encompass a range of possible outcomes based on:

- historical parking demand since the MPU analysis was conducted
- facility changes and other factors that have influenced parking behavior since then (such as the closure of the public Economy Lot and the relocation of Employee Parking to that location)
- potential future impacts to parking demand driven by factors such as the increase in share of other travel modes or a change in vehicle ownership rates, among others

Overlaying these alternatives onto the facility implementation schedule helps to identify when throughout the implementation process there may be parking surpluses or deficits. Given the potential range of outcomes for future parking demand, continual tracking of public and employee parking demand can assist in decision-making for operational actions, such as the timing of relocating some or all employee parkers into the garages and/or IMC.