Airport Master Plan Update

Boca Raton Airport Authority Board Workshop #1

May 26, 2021

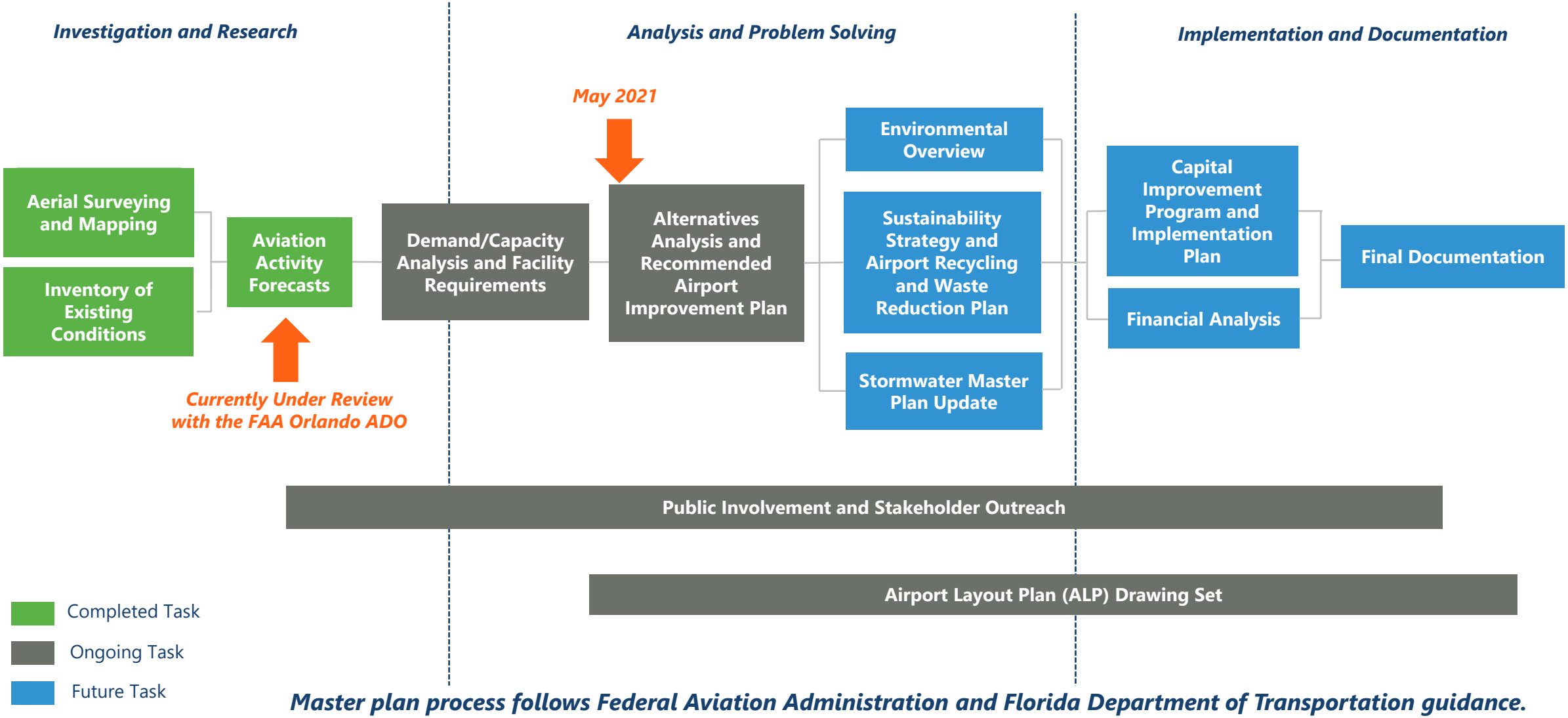
BOCA RATON AIRPORT

Meeting Agenda

- Master Plan Update Project Status
- Airport Baseline Conditions / Tenant Survey Feedback
- Review of Future Demand and Critical Aircraft
- Summary of Airfield Design Standards and Preliminary Scenarios
- Aeronautical Facility Requirements and Land Use Discussion
- Next Steps

Master Plan Update Project Status

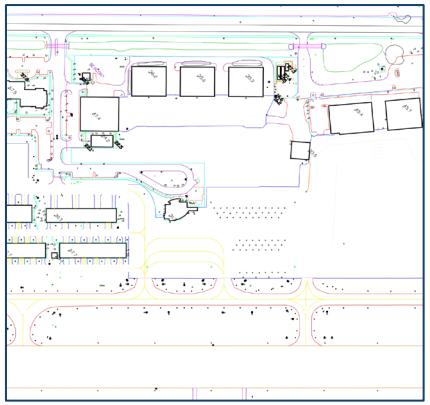
Master Plan Update Project Status



Master plan process follows Federal Aviation Administration and Florida Department of Transportation guidance.

Master Plan Update Key Dates

- **Inventory of Existing Conditions**
  - *Report Finalized* → *November 2020*
- **Aviation Activity Forecasts**
  - *Submitted to FAA* → *February 2021*
- **Aerial Surveying and Mapping**
  - *Aerial Photography* → *April 2021*
  - *Planimetric Mapping* → *April 2021*
- **Public Involvement and Stakeholder Outreach**
  - *Tenant Survey* → *December 2020*
  - *Air Traffic Control Tower Meeting* → *January 2021*
  - *Board Briefing #1* → *February 2021*
  - *Technical Advisory Committee #1* → *April 2021*
  - *Board Workshop #1* → *May 2021*



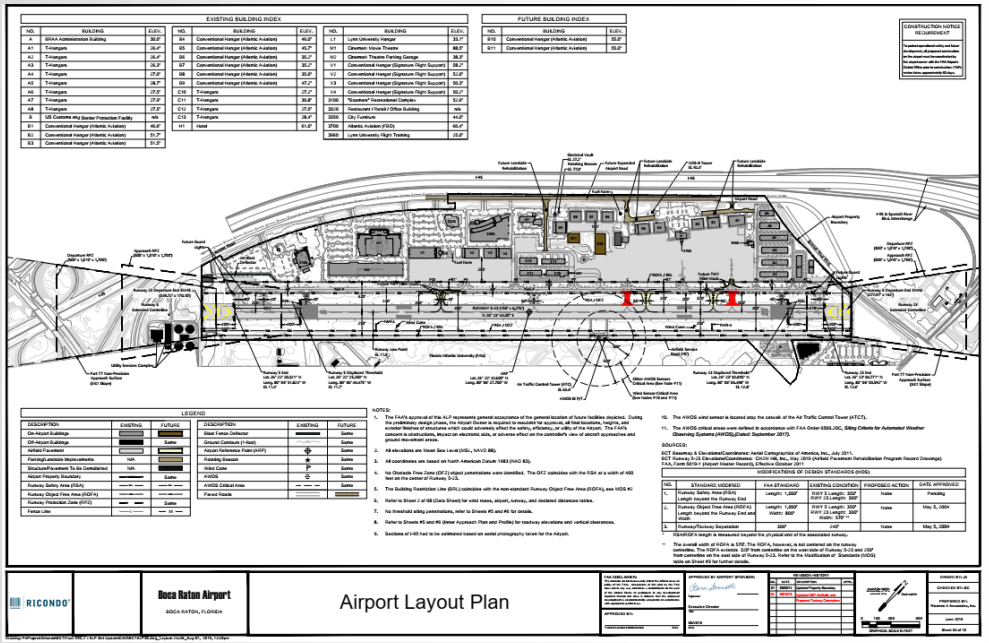
Master Plan Update Deliverables

Master Plan Study Document

- Compilation of technical documentation
- Includes FAA approved activity forecast
- Includes updated Capital Improvement Program (CIP)
- Accepted by FAA and conditionally approved by FDOT

Airport Layout Plan (ALP)

- Graphical representation of existing and future airport facilities (drawing set)
- Ensures development is consistent with design standards, safety requirements, and airport/community land use plans
- FAA/FDOT approved ALP is required for issuance of grants



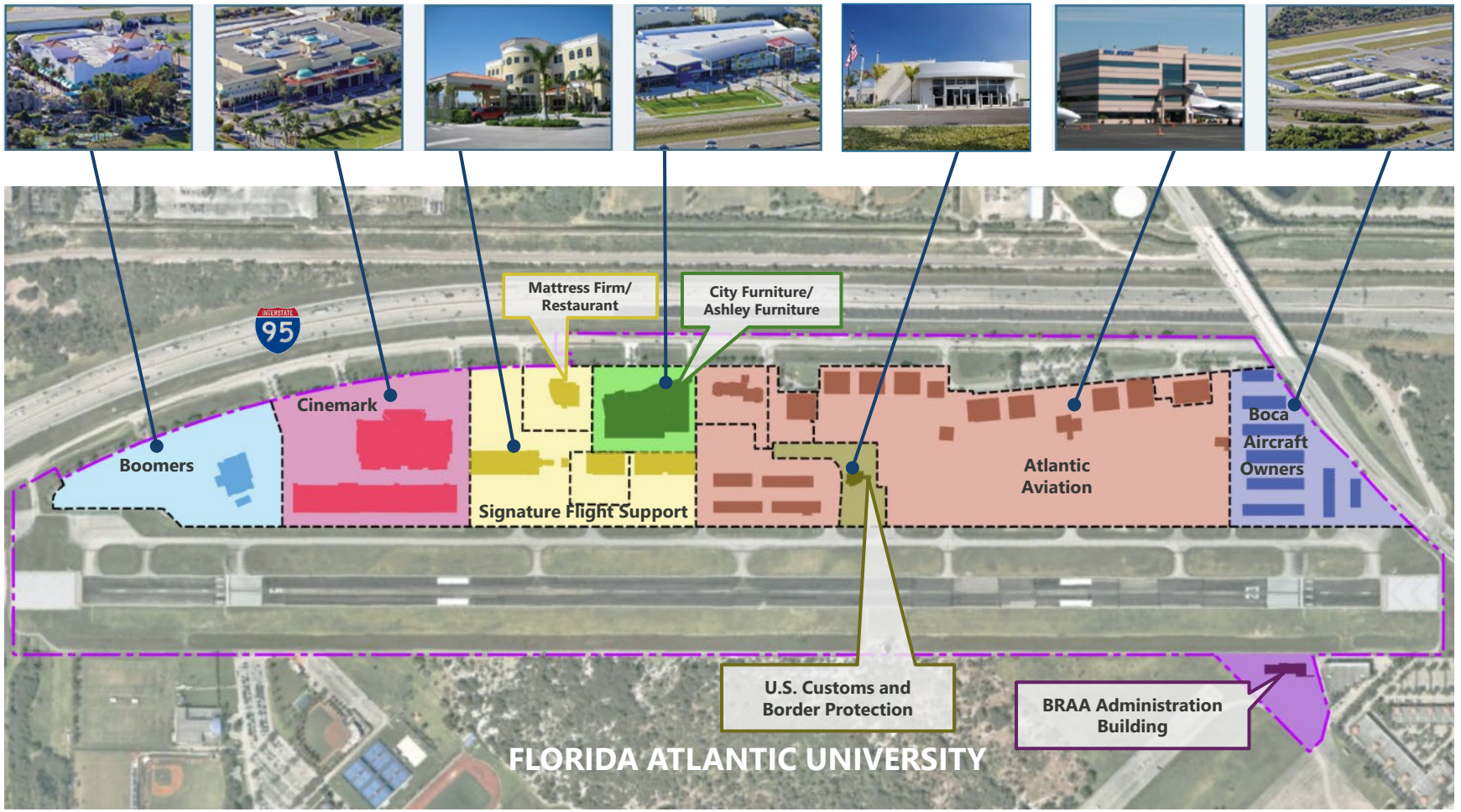
Airport Data Set

- Compliant with FAA's AGIS (Airport GIS) standards
- Allows FAA to protect airspace and instrument approach procedures

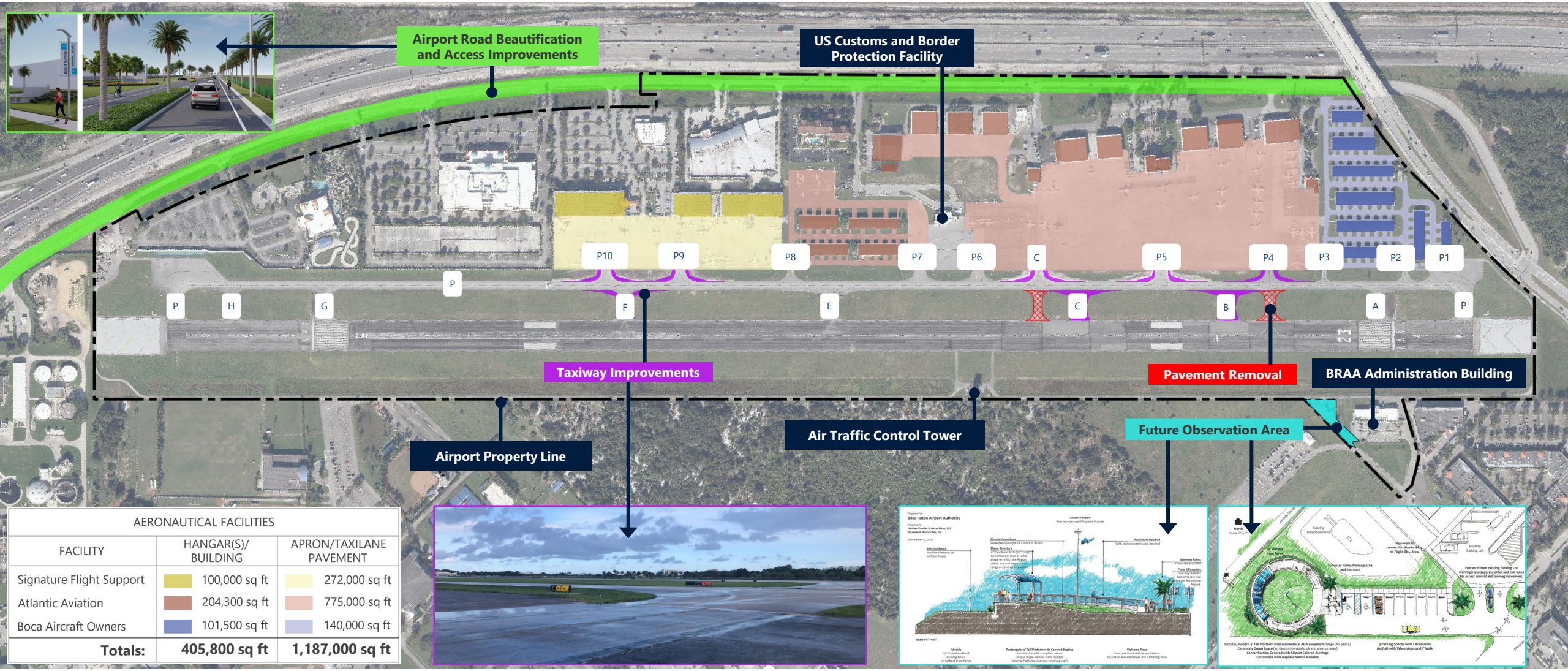
Airport Baseline Conditions/ Tenant Survey Feedback

Current Conditions

- Designated as a General Aviation Reliever Airport
- Airport Size: 215 acres
- Existing Leaseholds: 95 acres
- One runway:
  - Runway 5-23 (non-precision)
- Contract Air Traffic Control Tower
- Based Aircraft: 241
- FY 2020 Operations: 71,756



Baseline Conditions



AERONAUTICAL FACILITIES		
FACILITY	HANGAR(S)/ BUILDING	APRON/TAXILANE PAVEMENT
Signature Flight Support	100,000 sq ft	272,000 sq ft
Atlantic Aviation	204,300 sq ft	775,000 sq ft
Boca Aircraft Owners	101,500 sq ft	140,000 sq ft
Totals:	**405,800 sq ft**	**1,187,000 sq ft**

Tenant Survey Feedback

Airfield Improvements:

- Widening and strengthening of taxiway exits onto FBO ramps
- LED airfield lighting
- Ramp resurfacing
- New fuel farm

Landside Improvements:

- Aircraft viewing area
- Four lane expansion of airport road
- Underground utilities
- Improved landscaping
- Security lighting along airport road
- Additional vehicular parking
- Self fueling station
- Larger corporate aircraft hangars
- Larger t-hangars
- Additional office space (e.g., classroom space)
- Hangar and FBO improvements

Other Comments:

- Limited space to expand
- Convert commercial areas to aeronautical uses

Tenant Survey Feedback

- Key Trends:
  - Larger aircraft (e.g., Global 7500)
  - Electric vertical takeoff and landing (EVTOL) Aircraft Operations
  - Sustainable Aviation Fuels (SAF)

Bombardier Global 7500[1]

Lilium[2]

SOURCES:
1/ AIN Online, Global 7500 to Drive Delivery Increase at Bombardier, https://www.ainonline.com/aviation-news/business-aviation/2020-02-13/global-7500-drive-delivery-increase-bombardier (accessed April 2021).
2/ Lilium, Daniel Bachmann, https://robbreport.com/tag/lilium/(accessed April 2021).

Review of Future Demand and Critical Aircraft

Primary Master Plan Goals

To evaluate the fleet of business jet aircraft that operate at the Airport

To define, evaluate, and recommend safety, capacity, and operational enhancements for BCT

To update the 10-year Capital Improvement Program (CIP) for the Airport

To establish a plan that optimizes the use of BCT's limited land assets

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Future Demand Summary (Pending FAA Approval)

CATEGORY	ACTUAL	PROJECTED		
	FY 2020	FY 2025	FY 2030	FY 2040
Total Aircraft Operations	**71,756**	**80,800**	**90,000**	**111,200**
Itinerant	45,683	50,600	55,800	67,200
Local	26,073	30,200	34,200	44,000
Total Based Aircraft	**241**	**253**	**267**	**298**
Single Engine	130	132	133	137
Multi Engine	27	28	29	31
Jet	81	90	101	125
Helicopter	3	3	4	5

Net Increase – 55%
- *Airfield Infrastructure*
- *Itinerant Aircraft Parking Apron*
- *Fuel Farm Requirements*
- *General Aviation/FBO Terminal*
- *Vehicular Parking*

Net Increase – 24%
- *Hangar Requirements*
- *Maintenance Requirements*
- *Based Aircraft Parking Apron*

NOTE: FBO – Fixed Base Operator; FY – Fiscal Year (October 1 – September 30)
SOURCE: Ricondo & Associates, Inc., March 2021.

Existing Airport Reference Code / Critical Aircraft

- Airport design standards are determined by the **Airport Reference Code (ARC)**
- **Critical aircraft** is the most demanding aircraft type, or grouping of aircraft with similar characteristics
- **ARC** and **critical aircraft** determined by **regular use (500 annual operations)**

AIRCRAFT APPROACH CATEGORY (AAC)	
AAC	**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

AIRPLANE DESIGN GROUP (ADG)		
ADG	**WINGSPAN (FEET)**	**TAIL HEIGHT (FEET)**
I	<49	<20
II	49 to <79	20 to <30
III	79 to <118	30 to <45
IV	118 to <171	45 to <60
V	171 to <214	60 to <66
VI	214 to <262	66 to <80

AAC + ADG = ARC

SOURCE: US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, February 26, 2014.

Representative Aircraft by Airport Reference Code

A-I Cessna 172[1]

B-I Hawker Beechjet 400[3]

C-I Learjet 45[5]

A-II Cessna 208[2]

B-II Embraer Phenom [4]

Airport Reference Code - Pre 2004
Aligns with existing runway to taxiway separation

C-II Bombardier Challenger 300[6]

Airport Reference Code - 2004 Airport Enhancement Plan
Reflected on current Airport Layout Plan

SOURCES: Reference next slide.

Representative Aircraft by Airport Reference Code

D-I Learjet 35[7]

C-III Global Express[9]

D-II Gulfstream 450[8]

D-III Gulfstream 550[10]

Airport Reference Code – 2020 Airport Master Plan
Consistent with existing operations

SOURCES:

1. BWI Aviation Insurance, November 16, 2019, https://bwifly.com/aircraft-insurance/cessna-172-insurance-cost/
2. Air Vectors, Dec 01, 2020, http://www.airvectors.net/avcvan.html
3. Nextant Aerospace, July 18, 2018, https://www.nextantaerospace.com/faa-awards-nextant-aerospace-true-blue-powertm-lithium-ion-battery-installation-stc-for-beechjet-400a-and-hawker-400xp/
4. Privatejet, https://privatejetcardcomparisons.com/embraer-phenom-300/
5. Business Jet Traveler, https://www.bjtonline.com/aircraft/bombardier-learjet-45
6. Magellan Jets, Bombardier Challenger 300, https://magellanjets.com/travel/bombardier-challenger-300-html/
7. Paramount Business Jets, Learjet 35, https://www.paramountbusinessjets.com/aircraft
8. Pro Aircraft Interiors, Gulfstream IV, https://proaircraftinteriors.com/portfolio_page/gulfstream-iv-sn-1337/
9. Controller, Bombardier Global Express XRS, https://www.controller.com/listings/for-sale/bombardier/global-express-xrs/aircraft
10. Paramount Business Jets, Gulfstream G550, https://www.paramountbusinessjets.com/aircraft/gulfstream-g550.html

Aircraft Operations by Airport Reference Code

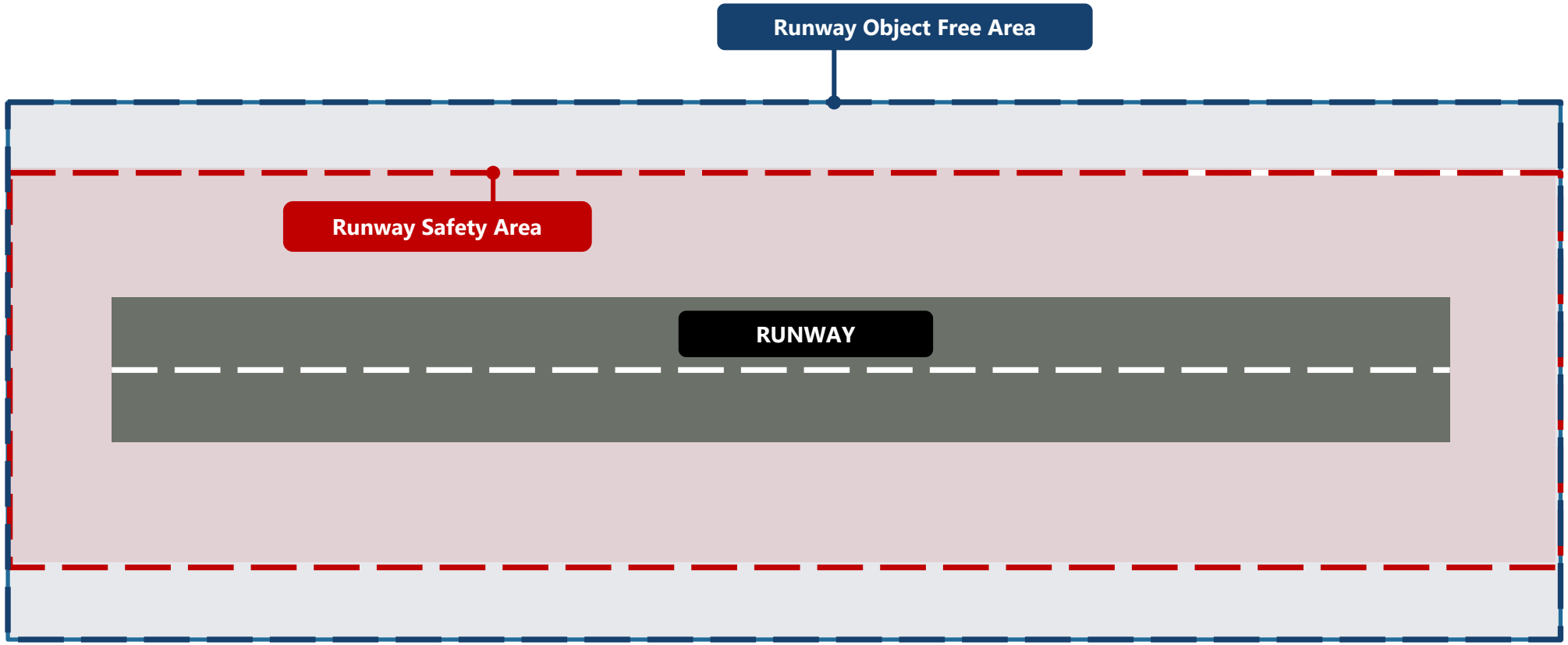
Airport Reference Code (ARC)	Representative Aircraft (Typical)	Existing Fleet Mix	Forecast Aircraft Operations Fleet Mix		
		FY 2020	**FY 2025**	**FY 2030**	**FY 2040**
A-I/B-I	Cessna 172, Cirrus SR22, Beechjet 400, Cessna 525	50,253	56,587	63,030	77,877
A-II/B-II	Pilatus PC-12, Cessna 208, Cessna 560X, Embraer Phenom 300	10,138	11,416	12,716	15,711
B-III	Dassault Falcon 7X	67	75	83	103
C-I/D-I	Raytheon Hawker 800, Learjet 60, Learjet 45, Learjet 35	3,415	3,845	4,283	5,292
C-II/D-II	Bombardier Challenger 300/350/600, Gulfstream IV	6,259	7,048	7,851	9,700
C-III/D-III	**Bombardier Global 5000, Global Express, Gulfstream V/500/550, Gulfstream 650**	**1,545**	**1,739**	**1,937**	**2,394**
N/A	Helicopter	80	90	100	124
	Total	71,756	80,800	90,000	111,200

NOTE:
N/A – Not Applicable

ARC / family of aircraft exceeding 500 annual operations

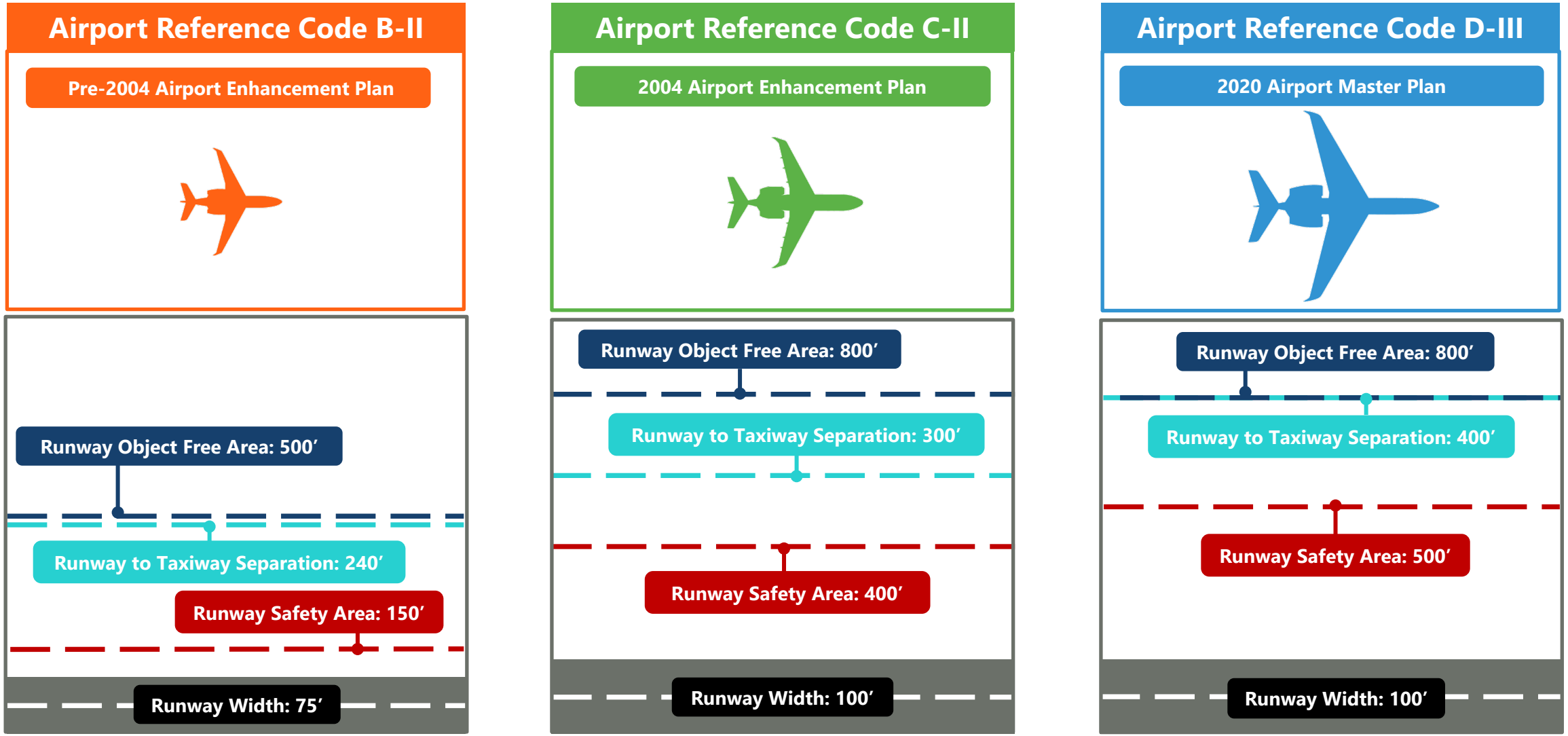
SOURCE: Boca Raton Airport Authority, CY 2015-2019 ANOMS Database, September 2020.

Airport Design Standard Dimensions



SOURCES: U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo & Associates, Inc., May 2021.

Airport Design Standard Dimensions



SOURCES: U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo & Associates, Inc., May 2021.

Summary of Airfield Design Standards and Preliminary Scenarios

Primary Master Plan Goals

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To establish a plan that optimizes the use of BCT's limited land assets

Strategic Initiatives

Plan for financial resiliency in a dynamic and uncertain future environment

Develop land use policies and practices that enhance the value of the Airport to business and community stakeholders

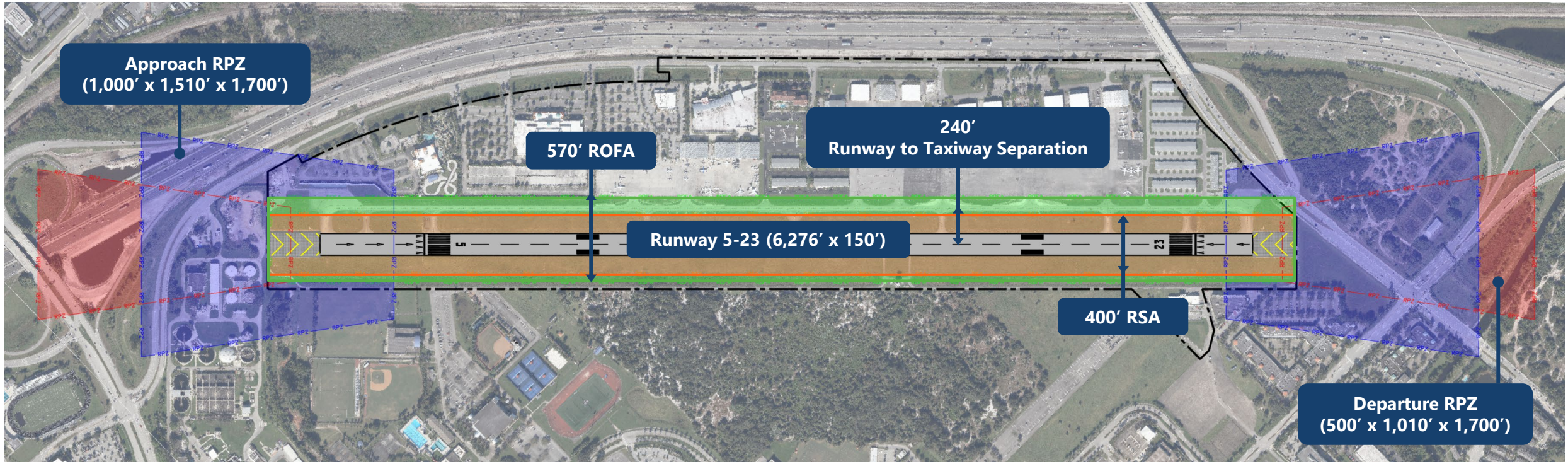
Promote the Airport's value to the community and contributions to the regional economy

Shape the organizational structure to continue responding to a dynamic operating environment and deliver excellence in all we do

Preserve and improve infrastructure assets and the operational integrity of the Airport

SOURCE: Ricondo & Associates, Inc., *Strategic Business Plan*, July 2020.

Existing Conditions – Airport Reference Code C-II



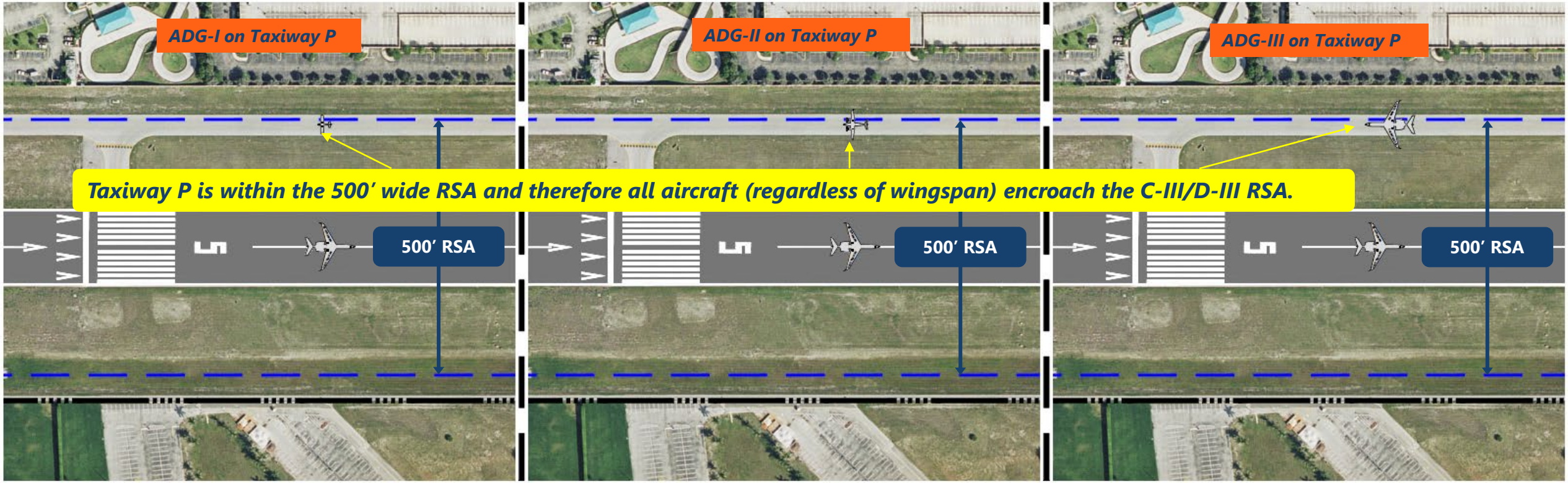
NOTES:
1. Existing conditions based upon approach visibility minimums of not lower than ¾ mile.
2. BCT has approved MOSs for ROFA length and width and runway centerline to taxiway centerline separation distance, EMAS on both ends, and ADG III operational restrictions.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

Runway Design Standards

DESIGN STANDARD	RUNWAY 5-23 DESIGN STANDARD		
	EXISTING CONDITIONS	C-III/D-III (FUTURE ARC)	DIFFERENCE
Runway Safety Area Width	400 ft	500 ft	100 ft
Runway Object Free Area Width	570 ft	800 ft	230 ft
Runway Safety and Object Free Area Length	Length beyond Runway 5: 300 ft Length beyond Runway 23: 350 ft *Mitigated with non-standard EMAS on both runway ends*	Length beyond Runway 5: 1,000 ft Length beyond Runway 23: 1,000 ft	To be Determined
Runway-Taxiway Centerline Separation	240 ft	400 ft	160 ft gap

Airport Reference Code C-III/D-III Runway Safety Area (500’ Wide)



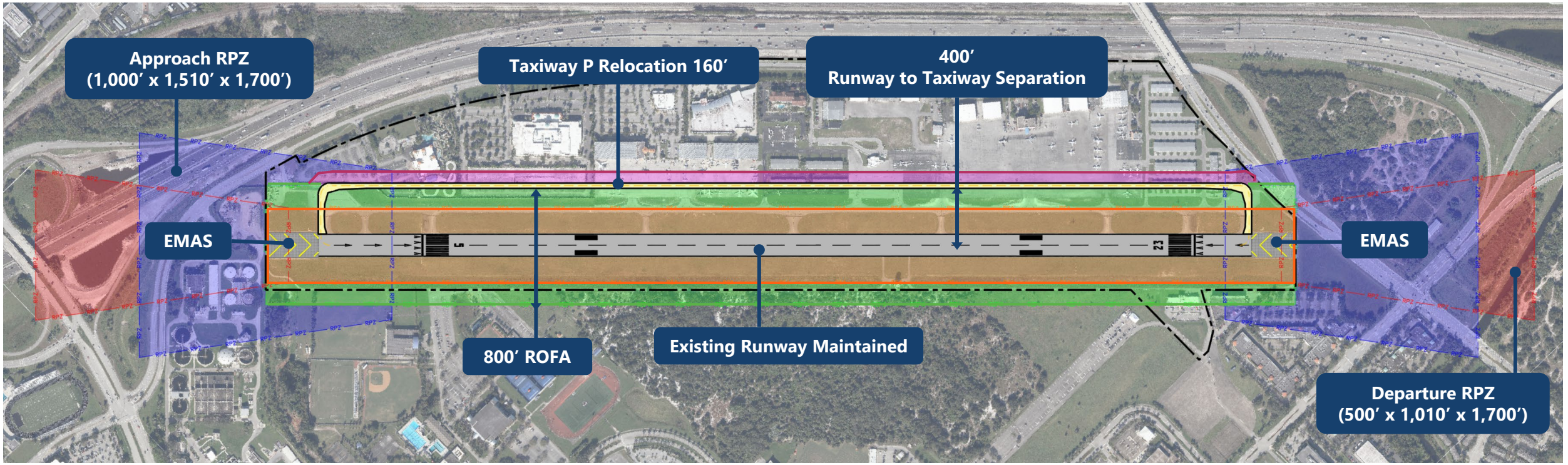
C-III/D-III Runway Safety Area (RSA)

Airport Property Boundary

AIRPLANE DESIGN GROUP (ADG)	
ADG	WINGSPAN (FEET)
I	<49
II	49 to <79
III	79 to <118

SOURCES: Aerial Photography and Basemap: Boca Raton Airport Authority, May 2011; US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, *Airport Design*, February 26, 2014.

FAA Design Compliance Scenarios
ARC C-III/D-III - Relocate Taxiway

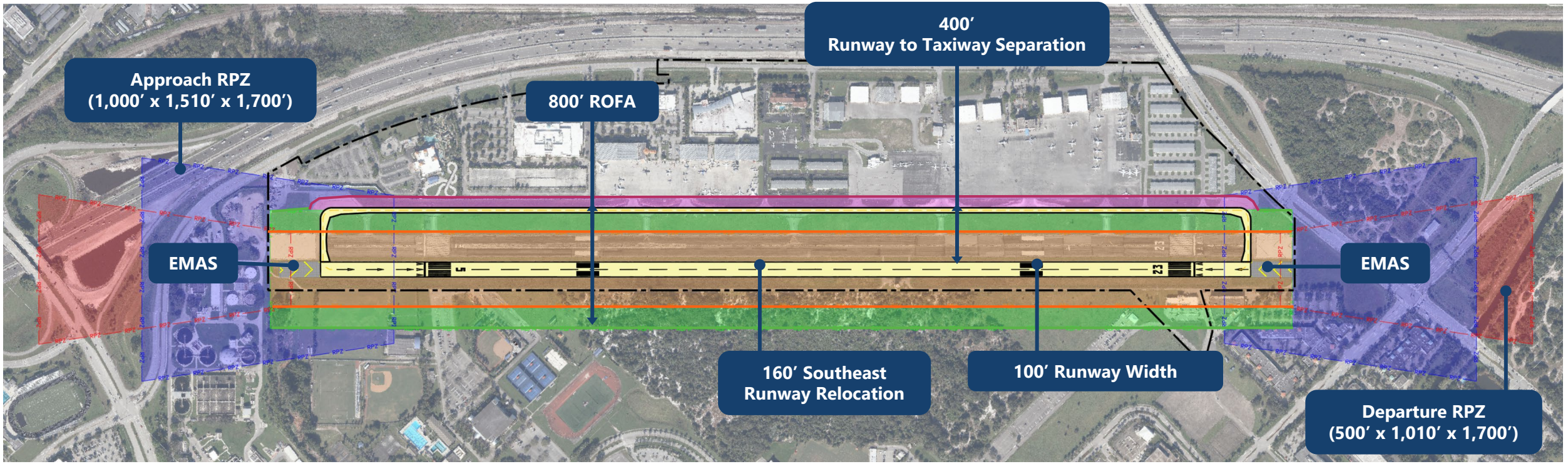


Runway Object Free Area
Runway Safety Area
Approach Runway Protection Zone
Taxiway Object Free Area
Departure Runway Protection Zone

NOTES:
1. Preliminary FAA design compliance scenairo includes relocating Taxiway P 160′ northwest.
2. Design standards based upon an approach visibility minimums not less than ¾ mile.

SOURCES: Federal Aviation Administration Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

FAA Design Compliance Scenarios
ARC C-III/D-III - Relocate Runway



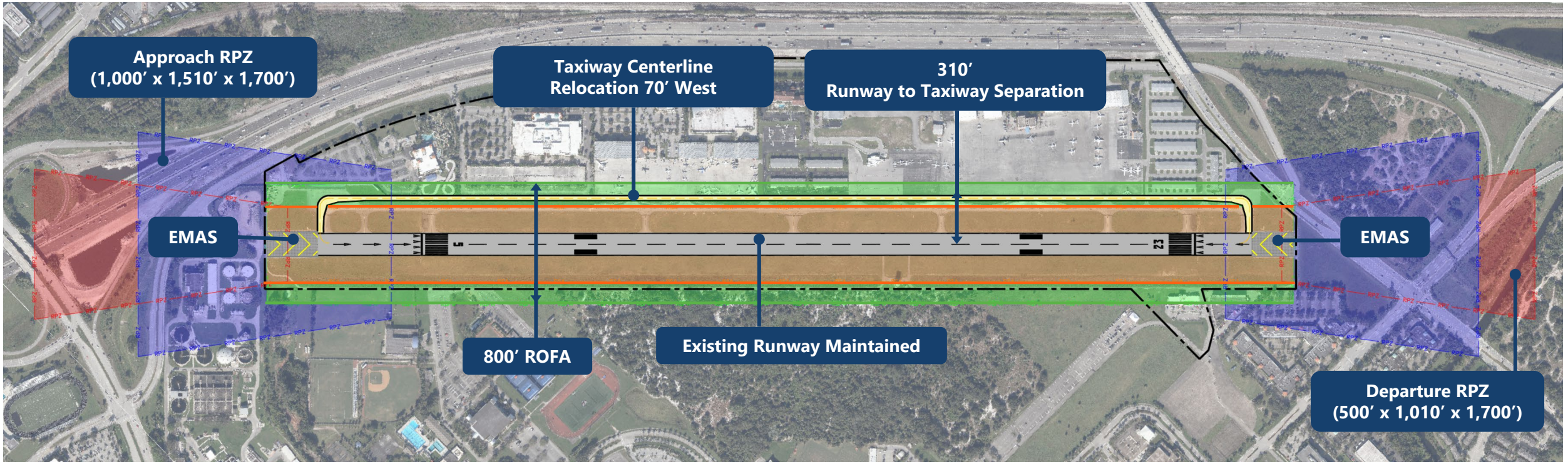
NOTES:
1. Preliminary FAA design compliance scenario includes relocating Runway 5-23 160′ southeast.
2. Design standards based upon an approach visibility minimums not less than ¾ mile.

SOURCES: Federal Aviation Administration Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

Runway Relocation Issues

- Incompatible land uses within the Runway Protection Zones (RPZ)
- Off-airport land area requirements
- Engineered Materials Arresting System (EMAS) reconstruction
- Aircraft noise impacts
- Environmental impacts (e.g., Florida Atlantic University conservation area)
- Reduced runway width (150’ vs. 100’)
- Operational impacts during construction
- Construction costs

FAA Design Compliance Scenarios
ARC C-III/D-III - Relocate Taxiway (Non-Standard Separation)



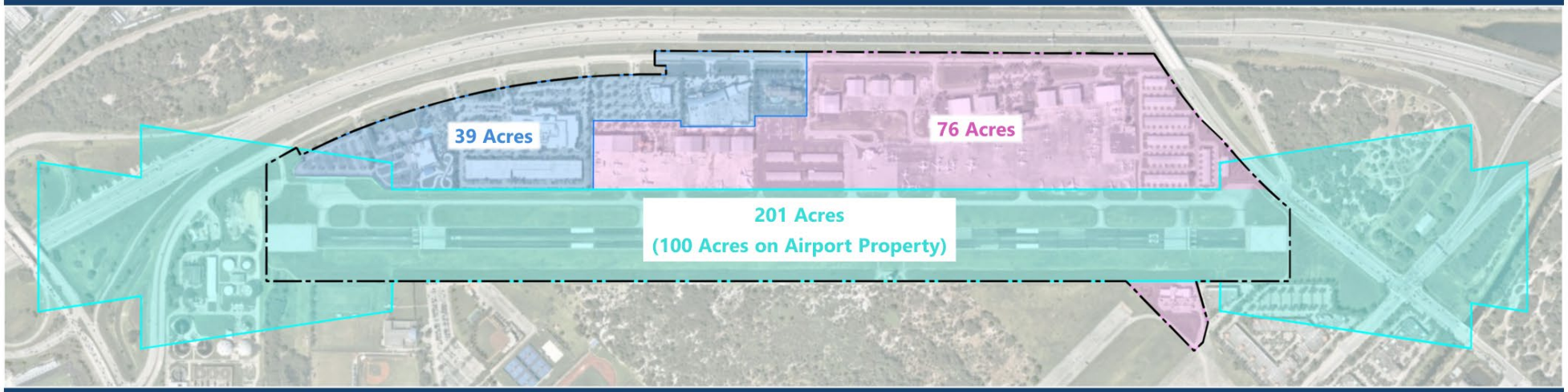
NOTES:
1. Preliminary FAA design compliance scenario includes maintaining the existing runway and increasing the runway to taxiway separation from 240′ to 310′ by relocating the Taxiway P centerline 70′ west.
2. Design standards based upon an approach visibility minimums not less than ¾ mile.

SOURCES: Federal Aviation Administration Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

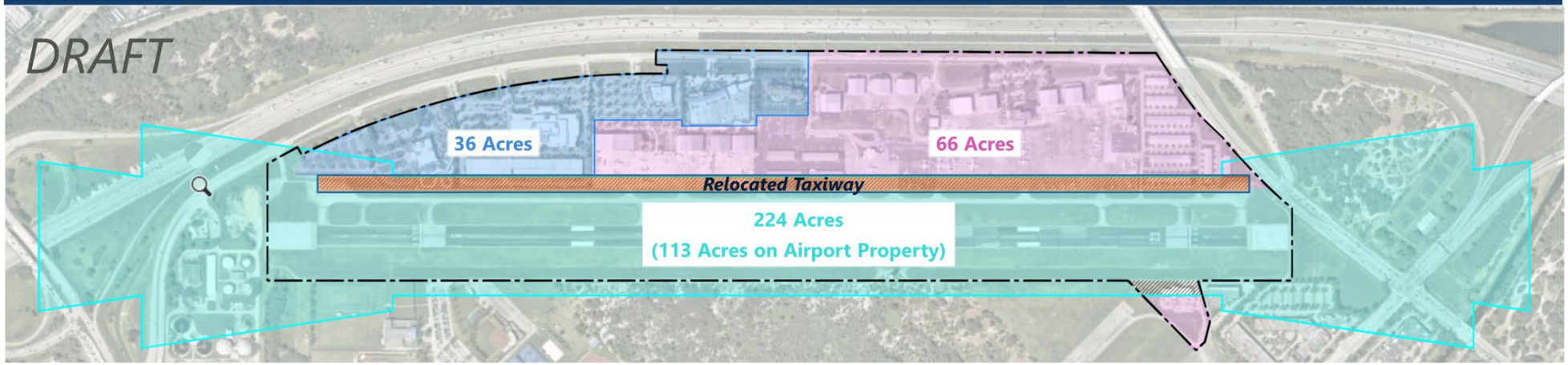
- Runway Object Free Area
- Approach Runway Protection Zone
- Departure Runway Protection Zone
- Runway Safety Area

Taxiway Relocation Impacts Existing Facilities (Non-Standard Separation)

Existing Land Area Allocation (Airport Reference Code C-II (Non-Standard))



Future Land Area Allocation (Airport Reference Code D-III (Non-Standard))



Airfield / Airspace

Thirteen (13) acres of existing airport property be converted to **Airfield** to accommodate taxiway relocation.

Aeronautical Development

Ten (10) acres of Aeronautical Development to be converted to **Airfield.**

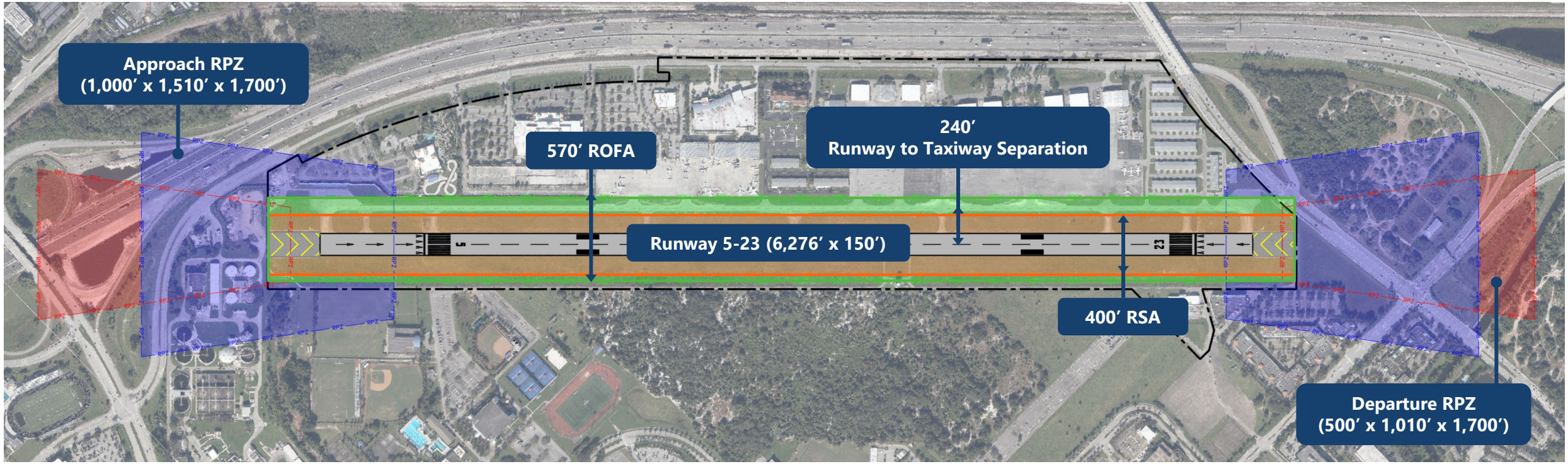
Non-Aeronautical Development

Three (3) acres of Non-Aeronautical Development to be converted to **Airfield.**

Non-Standard Conditions

- Would require approval of Modification of Standards (MOS) by FAA
- Could lead to operational restrictions
- Per FAA Order 5300.1G, a MOS is not applicable for:
  - Non-standard RSA dimensions
  - Non-standard Obstacle Free Zone (OFZ) surfaces
  - Non-standard approach / departure surfaces
  - To match existing equipment owned by the airport
  - Impermissible land use within Runway Protection Zone (RPZ) limits
- All MOS associated with design standards expire no later than 5 years from the approved date. The airport must re-submit the MOS for review and approval if an extension is requested.

FAA Design Compliance Scenarios
ARC C-II - Maintain Existing Conditions



NOTES:
1. Existing conditions based upon approach visibility minimums of not lower than ¾ mile.
2. BCT has approved Modification of Standards (MOS) for the Runway Object Free Area length and width and runway centerline to taxiway centerline separation distance, Engineered Materials Arresting System (EMAS) on both ends, and an Airplane Design Group (ADG) III operational restriction.
3. Maintaining existing conditions would be subject to FAA approval and renewal of MOSs.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, February 2014; Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

- Runway Object Free Area
- Approach Runway Protection Zone
- Departure Runway Protection Zone
- Runway Safety Area

Aeronautical Facility Requirements and Land Use Discussion

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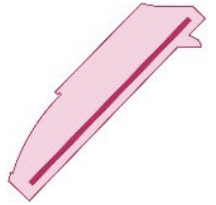
SOURCE: Ricondo & Associates, Inc., *Strategic Business Plan*, July 2020.

Additional General Aviation Facility Requirements



General Aviation Facility Description[1/2/]	FY 2025	FY 2030	FY 2040
Hangars			
T-Hangars	30,500	32,500	40,500
Conventional Hangars	99,000	130,000	197,000
Maintenance Hangars	23,000	31,000	47,000
Subtotal Hangars	**152,500**	**193,500**	**284,500**
Apron			
Hangar Access	152,500	193,500	284,500
Based Aircraft	0	3,000	61,000
Itinerant Aircraft	10,000	78,000	246,000
Subtotal Apron	**162,500**	**274,500**	**591,500**
General Aviation / FBO Terminal	0	0	6,000
Vehicle Parking	3,000	14,000	36,000
Landscaping/Drainage	72,000	120,000	229,000
Grand Total	**390,000**	**602,000**	**1,147,000**
Grand Total in Acres	**9.0**	**13.8**	**26.3**

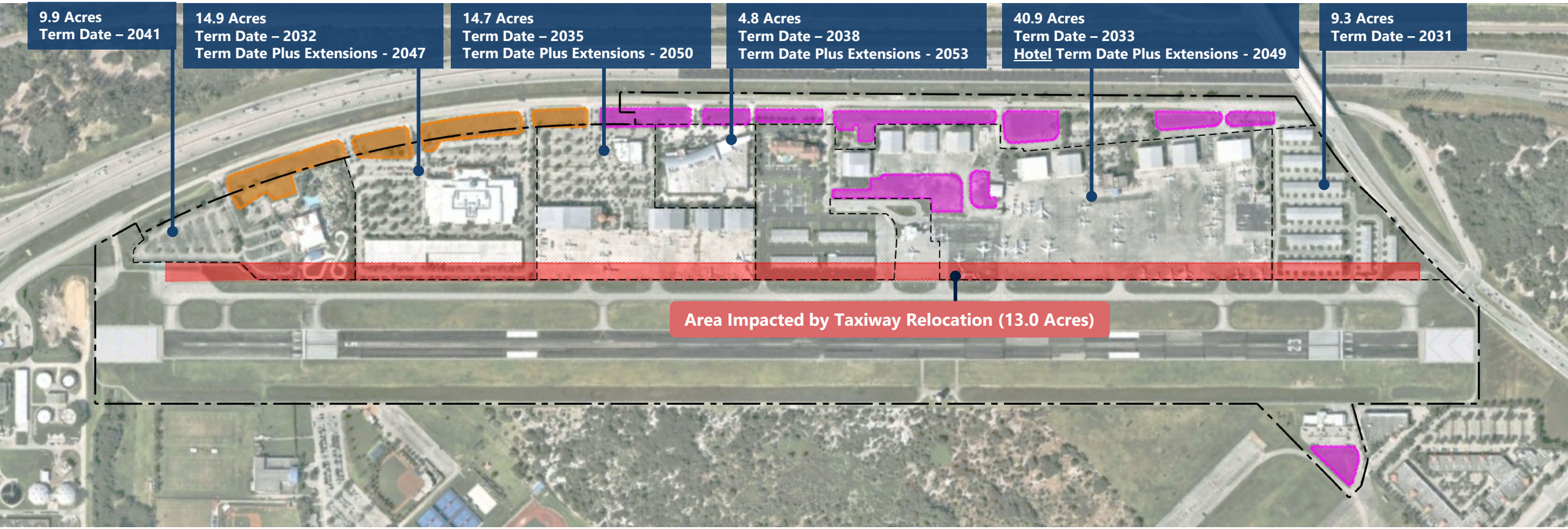
NOTES:

FBO – Fixed Base Operator
FY – Fiscal Year (October 1 – September 30)

1/ Values are presented in square feet unless otherwise noted.
2/ Additional general aviation facilities are needed to accommodate future demand identified in the preliminary aviation activity forecasts. These values are in excess of the current general aviation facilities at BCT.

SOURCE: Ricondo & Associates, Inc., March 2021

Future Development Strategy Discussion



- Maintain financial resiliency (aeronautical vs. non-aeronautical)
- Mitigate development impacted by taxiway relocation (13.0 acres)
- Identify future land areas to meet projected demand (26.3 acres)

Tier 1 Areas (7.6 Acres)

Tier 2 Areas (4.3 Acres)

SOURCES: Boca Raton Airport Authority, January 2020 (leasehold details); Ricondo and Associates, *Airport Layout Plan*, June 2018; Martinez Geospatial, Inc., November 2019 (aerial photo).

Next Steps

Next Steps

- Address FAA comments on the Aviation Activity Forecasts
- Finalize the analysis of future facility requirements
- Refine airport development alternatives and design compliance scenarios
- Continue to collaborate with stakeholders
  - BCT staff
  - FAA and FDOT
  - Board Workshop
  - Technical Advisory Committee meeting

THANK YOU

BOCA RATON AIRPORT