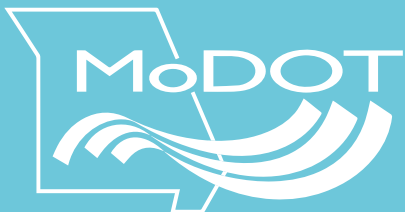


MISSOURI

STATE AIRPORT SYSTEM PLAN UPDATE



EXECUTIVE SUMMARY

FEBRUARY 2019



MISSOURI STATE AIRPORT SYSTEM PLAN UPDATE

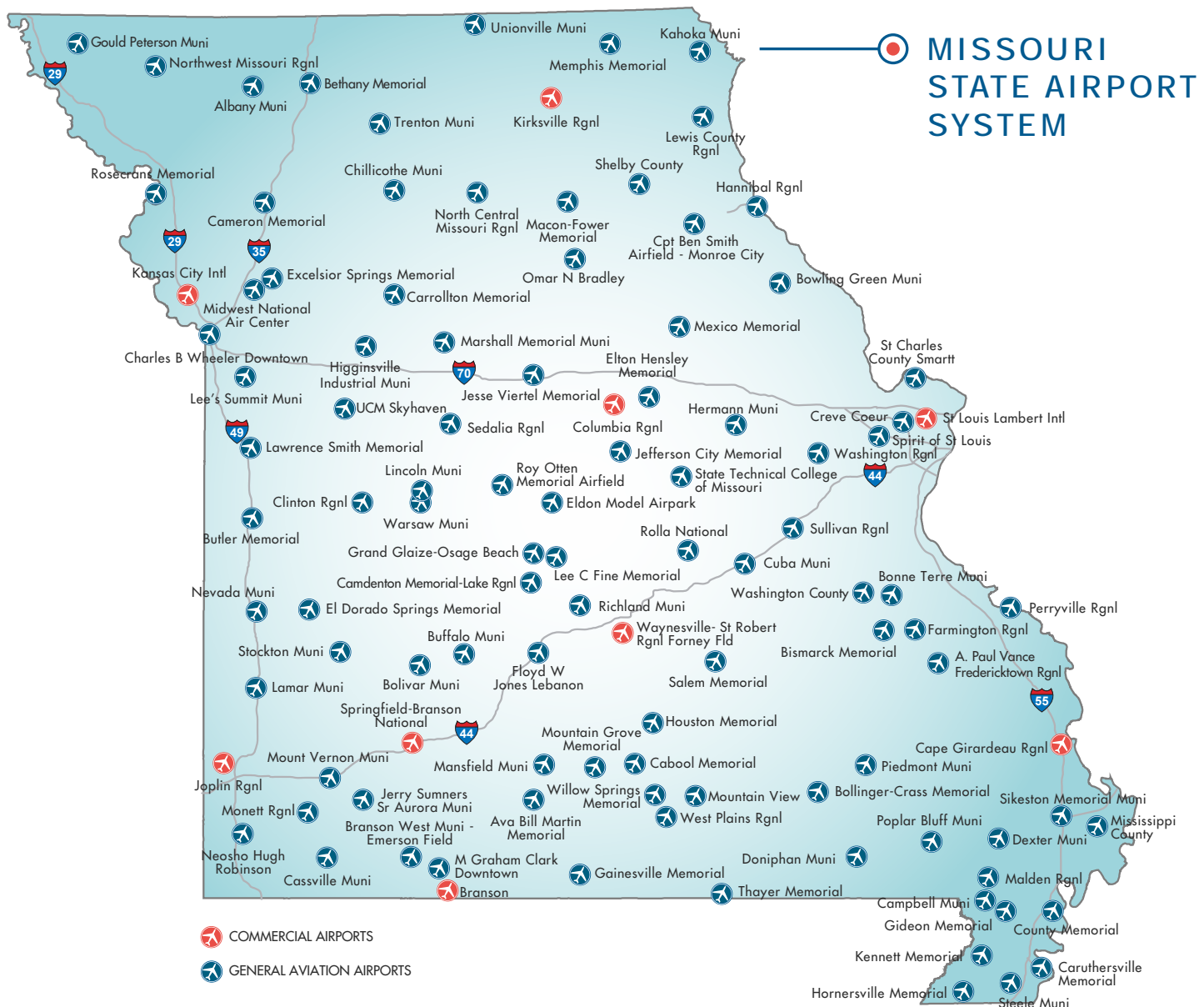
GLOSSARY OF TERMS

Airport Reference Code (ARC)	A coding system used to relate the airport design criteria to the operational and physical characteristics of the airplanes intended to use the airport or the critical aircraft. It is a two-character code consisting of the Aircraft Approach Category and the Airplane Design Group.
Automated Surface Observation System (ASOS)	Similar data reporting as an AWOS, but usually owned and maintained by the National Weather Service.
Automated Weather Observation System (AWOS)	An automated sensor suite which is voice synthesized to provide a weather report that can be transmitted via VHF radio, NDB, or VOR ensuring that pilots on approach have up-to-date airport weather for safe and efficient aviation operations. Most AWOS observe and record temperature and dew point in degrees Celsius, wind speed and direction in knots, visibility, cloud coverage and ceiling up to 12,000 feet, freezing rain, thunderstorm (lightning), and altimeter setting.
AVGAS	Aviation fuel (gasoline) used for aircraft with internal-combustion engines. The most common Avgas is currently 100LL (Low Lead).
Fixed Base Operation or Fixed Base Operator (FBO)	A business enterprise located on the airport property that provides services to pilots including aircraft rental, training, fueling, maintenance, parking, and the sale of pilot supplies.
General Aviation (GA)	The segment of aviation that encompasses all aspects of civil aviation except certified air carriers and other commercial operators, such as air freight carriers.
Instrument Landing System (ILS)	A precise ground-based navigation system for aircraft that provides precision guidance to an aircraft approaching a runway. It uses a combination of radio signals and, in many cases, high-intensity lighting arrays to enable a safe landing during instrument meteorological conditions.
Localizer Performance With Vertical Guidance (LPV)	An instrument approach procedure that uses wide area augmentation system (WAAS) and very precise GPS capabilities to attain an airplane's position. Although it does provide vertical guidance and can provide minimums consistent with an ILS, an LPV is considered to be a non-precision approach.
Medium Intensity Runway Lights (MIRL)	Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing: High Intensity, Medium Intensity, and Low Intensity. Medium Intensity Runway Lights represent the system typically utilized at most general aviation airports.
Medium Intensity Taxiway Lights (MITL)	Taxiway edge lights are used to outline the edges of taxiways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing: High Intensity, Medium Intensity, and Low Intensity. Medium Intensity Taxiway Lights represent the system typically utilized at most general aviation airports.
Precision Approach Path Indicator (PAPI)	A path indicator that uses a single row of lights arranged to provide precision descent guidance information during approach to a runway.
Runway End Identifier Lights (REIL)	Provides rapid and positive identification of the approach end of a particular runway. The system consists of a pair of synchronized flashing lights, one on each side of the runway threshold.
Visual Approach Slope Indicator (VASI)	A system of lights arranged to provide vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams.
Visual Glide Slope Indicator (VGSI)	A ground device that uses lights to assist a pilot in landing an airplane at an airport. The lights define a vertical approach path during the final approach to a runway and can help the pilot determine if the airplane is too high or too low for an optimum landing.

OVERVIEW

Missouri has a well-developed system of commercial and general aviation airports. Airports are essential to the state's transportation infrastructure and to many sectors of the economy. To help guide the future development of Missouri's airport system, the Missouri Department of Transportation's (MoDOT) Aviation Section undertook a comprehensive update to the Missouri State Airport System Plan.

Starting in late 2017, MoDOT, in partnership with the Federal Aviation Administration (FAA) and Missouri airports, took steps to identify how 107 airports in the Missouri airport system should be developed to meet state objectives. The state system includes nine public-use commercial and 98 general aviation airports. Details on the System Plan can be found on the Aviation Section's website: <https://www.modot.org/aviation-general-information>. In addition to the 107 public-use study airports, Missouri has many other private-use airports that are not part of the state airport system and, therefore, were not included in the System Plan. This summary documents how aviation demand in Missouri is expected to grow and how airports should be improved to best fulfill their recommended role in the state airport system.





PLANNING PROCESS FOR THE MISSOURI AIRPORT SYSTEM

Updating the State Airport System Plan helps to ensure that Missouri has a first-class airport system to support resident, business, and visitor needs. Results from the System Plan provide MoDOT, FAA, and each airport owner/sponsor with a blueprint for maintaining and expanding Missouri’s system, as needed, so that airports can continue to be key contributors to many facets of the state’s economy and its transportation infrastructure.

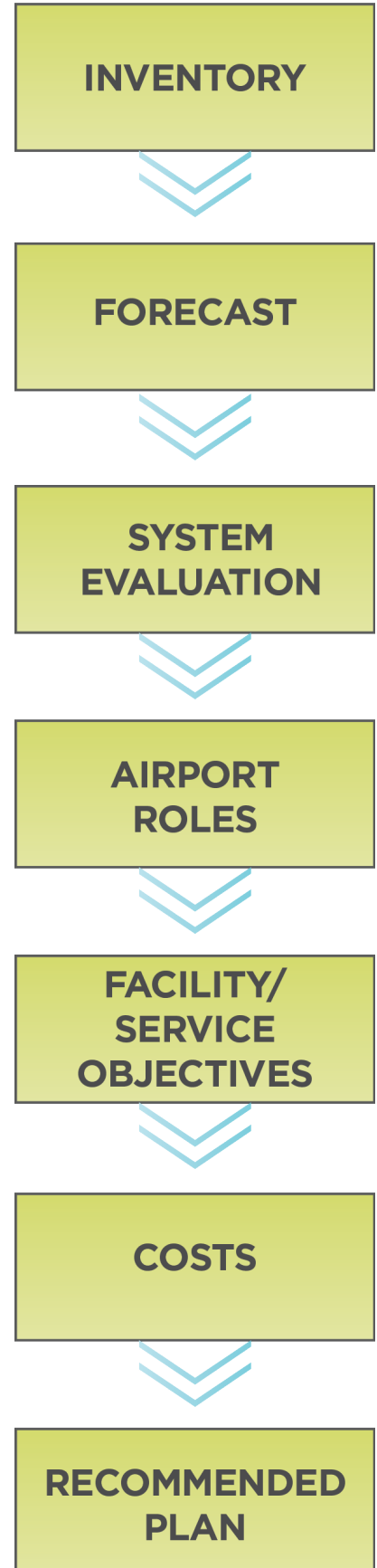
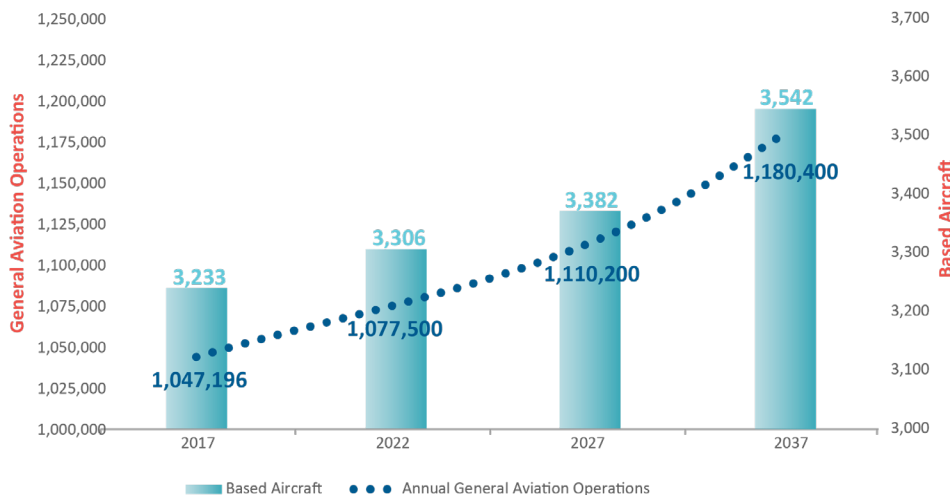
The study started with a comprehensive data collection effort, completed as part of the inventory task. Information obtained from each airport during the inventory effort was used to support all essential facets of the System Plan’s analyses. The approach to updating the System Plan followed FAA guidance.

GENERAL AVIATION OUTLOOK

General aviation refers to all segments of aviation that are not military or commercial. Demand forecasts for Missouri airports generally follow national trends for general aviation demand projected by the FAA. According to the FAA, business aviation is the fastest growing segment of the general aviation industry, and businesses based in Missouri, as well as those businesses that use general aviation to visit Missouri companies, are contributing to increased general aviation activity at some study airports.

As part of the System Plan, forecasts of both based aircraft and annual general aviation operations were prepared. Several methodologies were considered before a preferred forecast was selected to reflect statewide demand over the next 20 years. Statewide projections of based aircraft and annual general aviation operations are shown below. Based aircraft for all study airports are expected to increase from 3,233 to 3,542. Statewide general aviation operations are projected to grow from 1.05 million to 1.18 million. Forecasts of demand for each system airport were also developed and are presented in the study’s Technical Report and in the Individual Airport Reports.

STATEWIDE FORECAST OF GENERAL AVIATION DEMAND



AIRPORT ROLES

To help guide planning for Missouri airports, all airports are assigned to a role in the state system. Airport roles typically reflect the types of planes and customers the airport serves, as well as the characteristics of the area where the airport is located. A description of the role categories for Missouri airports follows.



COMMERCIAL	NATIONAL BUSINESS	REGIONAL BUSINESS	BUSINESS COMMUNITY	COMMUNITY LOCAL
Commercial airports accommodate scheduled commercial airline flights and a high level of general aviation activity. Airports in this role provide access to the national and global economies. Commercial airports should have a minimum runway length of 6,000 feet.	The National Business role is a new category for Missouri airports. National Business airports serve almost all business jets and connect Missouri with all domestic and some international markets. National Business airports should have a minimum runway length of 5,500 feet.	Regional Business airports focus on serving business activity, including many small jet and multi-engine general aviation aircraft. Regional Business airports should have a minimum runway length of 5,000 feet.	Business Community airports focus on providing aviation access for small business, recreational, and personal flying activities throughout Missouri and contribute to supporting community economies. Business Community airports should have a minimum runway length of 4,000 feet.	Community Local airports are important to the communities they serve. These airports primarily serve recreational and personal flying activities and support the local economy. The objective for airports in this role is to maintain the airport's existing runway length.

Source: Missouri State Airport System Plan

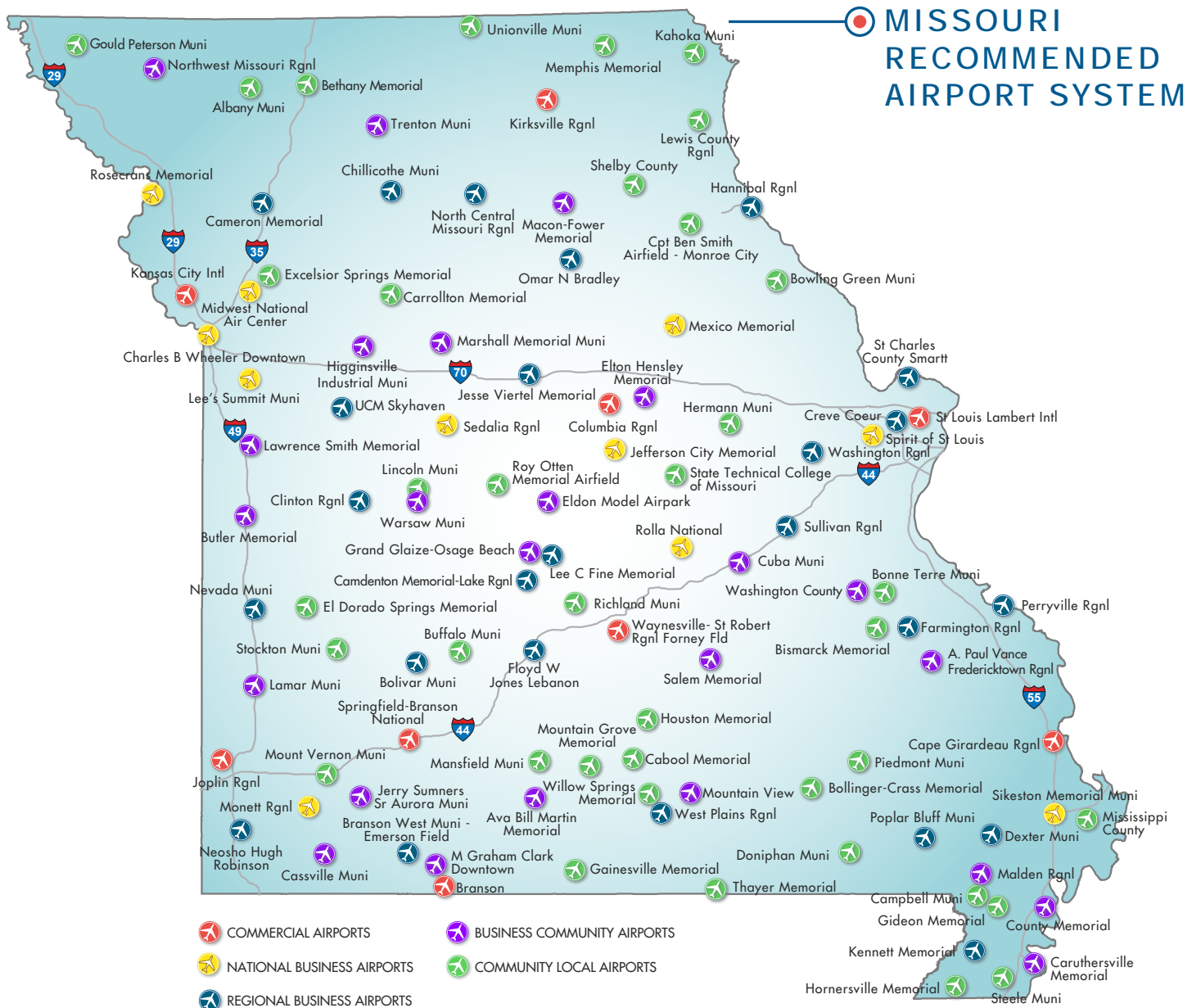




MISSOURI STATE AIRPORT SYSTEM PLAN UPDATE

AIRPORT ROLES

Airport roles are building blocks for the Missouri airport system. As part of the update to the State Airport System Plan, considerable focus was placed on identifying recommended roles for system airports. The Project Advisory Committee (PAC) for the System Plan guided the establishment of recommended roles for study airports. The PAC considered a wide number of factors when identifying recommended roles. Factors included: FAA airport roles, based aircraft, runway lengths, operational fleet mix, rates of population and employment growth, roles established in the 2002 System Plan, and current airport and community circumstances and conditions. Recommended roles for airports included in the state airport system are shown on the accompanying map.



EVALUATION OF SYSTEM PERFORMANCE

To help guide planning for Missouri airports, all airports are assigned to a role in the state system. To evaluate Missouri's airport system, a series of performance measures were also established. The performance measures, for the most part, are tied to accessibility to certain features of the airport system. The system evaluation task was conducted using drive-time mapping. The evaluation process considered accessibility to Missouri airports exhibiting each of the individual performance measures. The analysis also considered, according to applicable FAA guidelines, accessibility provided by nearby airports in neighboring states.

The system performance evaluation was completed in two steps. First, existing system performance was measured. Then, based on recommended airport roles, additional analysis was undertaken to show how accessibility could improve in the future if airports undertake projects to meet plan-related objectives. Results of the analysis show that most airports already meet characteristics measured as part of the system performance evaluation, but some accessibility increases could be realized if airports meet applicable study objectives. Accessibility ratings for most performance measures are high, indicating that the Missouri airport system is performing well.

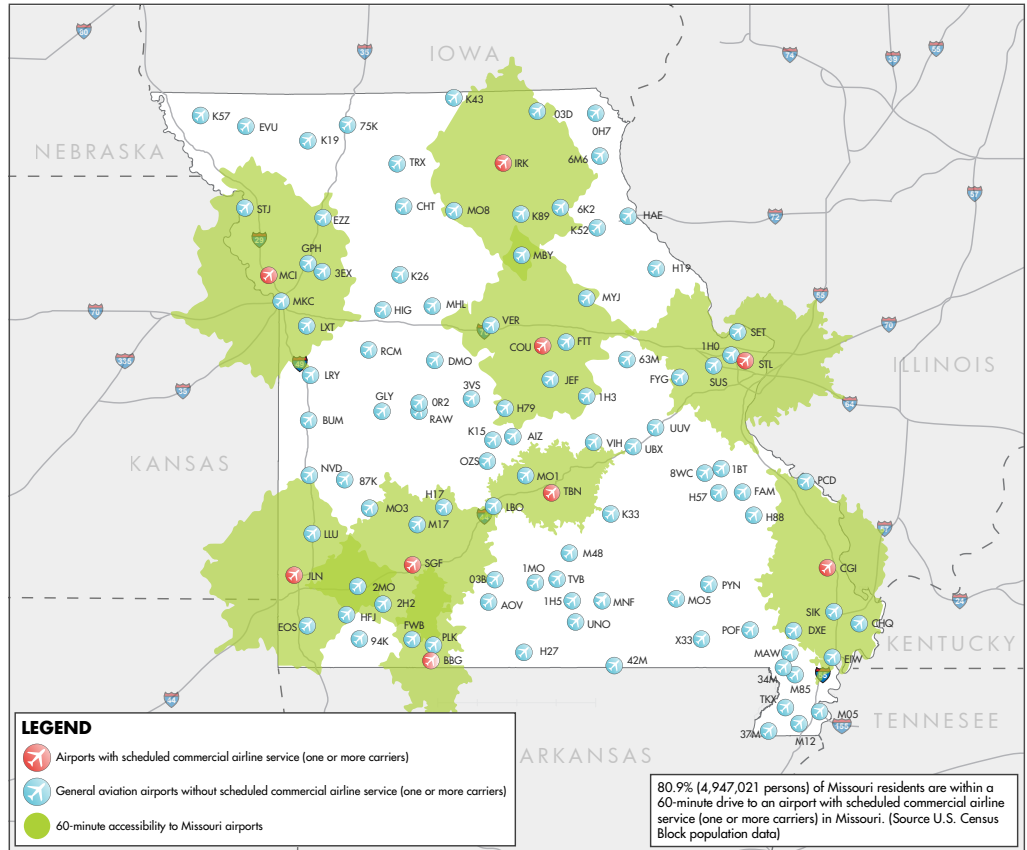
SYSTEM PERFORMANCE/ACCESSIBILITY EVALUATION

CURRENT SYSTEM PERFORMANCE BY MEASURE	
PERFORMANCE MEASURE	CURRENT ACCESSIBILITY RATING
60-Minute Accessibility to an Airport with Scheduled Commercial Airline Service (one or more carriers)	
60-Minute Current Accessibility to Missouri Commercial Airports (one or more carriers)	80.9%
60-Minute Current Accessibility to Missouri and Nearby Commercial Airports (one or more carriers)	82.1%
90-Minute Accessibility to an Airport with Scheduled Commercial Airline Service (more than one carrier)	
90-Minute Current Accessibility to Missouri Commercial Airports (more than one carrier)	85.6%
90-Minute Current Accessibility to Missouri and Nearby Commercial Airports (more than one carrier)	86.0%
30-Minute Accessibility to an Airport with a Published Approach	
30-Minute Current Accessibility to a Missouri Airport with a Published Approach	84.8%
30-Minute Current Accessibility to a Missouri or Nearby Airport with a Published Approach	86.8%
30-Minute Accessibility to an Airport with an Approach Supported by Vertical Guidance	
30-Minute Current Accessibility to a Missouri Airport with an Approach Supported by Vertical Guidance	79.8%
30-Minute Current Accessibility to a Missouri or Nearby Airport with an Approach Supported by Vertical Guidance	83.9%
30-Minute Accessibility to an Airport with Weather Advisory Reporting	
30-Minute Current Accessibility to a Missouri Airport with Weather Advisory Reporting	82.6%
30-Minute Current Accessibility to Missouri or Nearby Airport with Weather Advisory Reporting	88.0%
30 & 45-Minute Accessibility to Airports Exhibiting Selected NBAA Medium & Light Business Jet Airport Characteristics	
45-Minute Current Accessibility to Missouri Airports Meeting Acceptable NBAA Medium Business Jet Airport Characteristics	77.8%
45-Minute Current Accessibility to Missouri or Nearby Airports Meeting Acceptable NBAA Medium Business Jet Airport Characteristics	79.3%
30-Minute Current Accessibility to Missouri Airports Meeting Acceptable NBAA Light Business Jet Airport Characteristics	70.9%
30-Minute Current Accessibility to Missouri or Nearby Airports Meeting Acceptable NBAA Light Business Jet Airport Characteristics	73.1%
45 & 30-Minute Current Accessibility to Missouri Airports Meeting Acceptable NBAA Medium or Light Business Jet Airport Characteristics	84.6%
45 & 30-Minute Current Accessibility to Missouri or Nearby Airports Meeting Acceptable NBAA Medium or Light Business Jet Airport Characteristics	85.7%
System Performance for Primary Runway Pavement Condition Index (PCI)	
Percentage of System Airports with a PCI of 70 or greater	68.0%

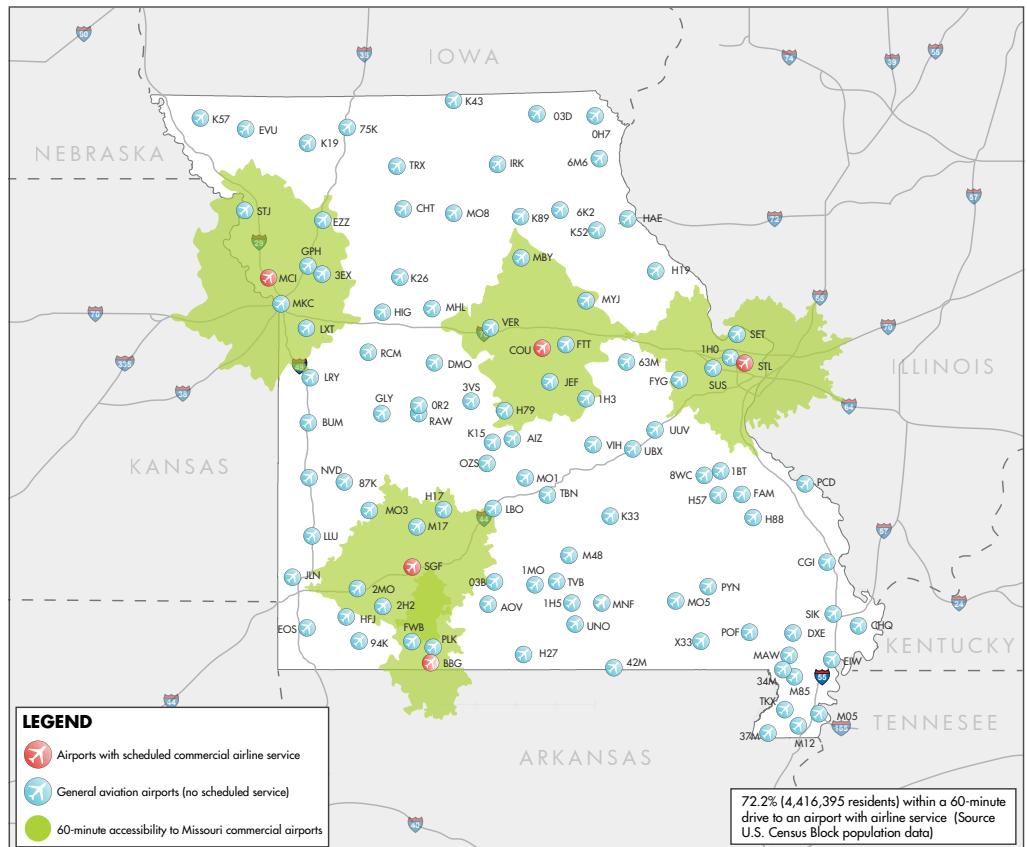


MISSOURI STATE AIRPORT SYSTEM PLAN UPDATE

THE ACCESSIBILITY RATING FOR ALL MISSOURI COMMERCIAL AIRPORTS CONSIDERING A 60-MINUTE DRIVE TIME IS 81%



THE ACCESSIBILITY RATING FOR COMMERCIAL AIRPORTS WOULD FALL TO 72% IF SINGLE CARRIER AIRPORTS LOST SERVICE



ACCESS TO AIRPORTS WITH SCHEDULED COMMERCIAL AIRLINE SERVICE

Having access to an airport with scheduled commercial airline service is important. Missouri is home to nine commercial airports. Service ranges from airports that have non-stop flights to international destinations to single carrier airports that may have only a handful of flights a day.

The system performance analysis shows that when 60-minute service areas for commercial airports in Missouri are considered, nearly 81 percent of Missouri's residents are within 60-minutes or less of a commercial airport. Nationally, few new commercial airports are anticipated; while not totally precluded, additional commercial airports in Missouri are not likely.

There is a national trend by commercial airlines to fly planes with higher seating capacities. Larger commercial planes have potential implications for small commercial airports. Larger planes with increased seating capacities can reduce service

frequency, often resulting in passengers leaving the local market area to depart from an alternative commercial airport with more flight options. Larger planes can also have facility implications, requiring runway projects, for instance, to meet the operating requirements of larger aircrafts.

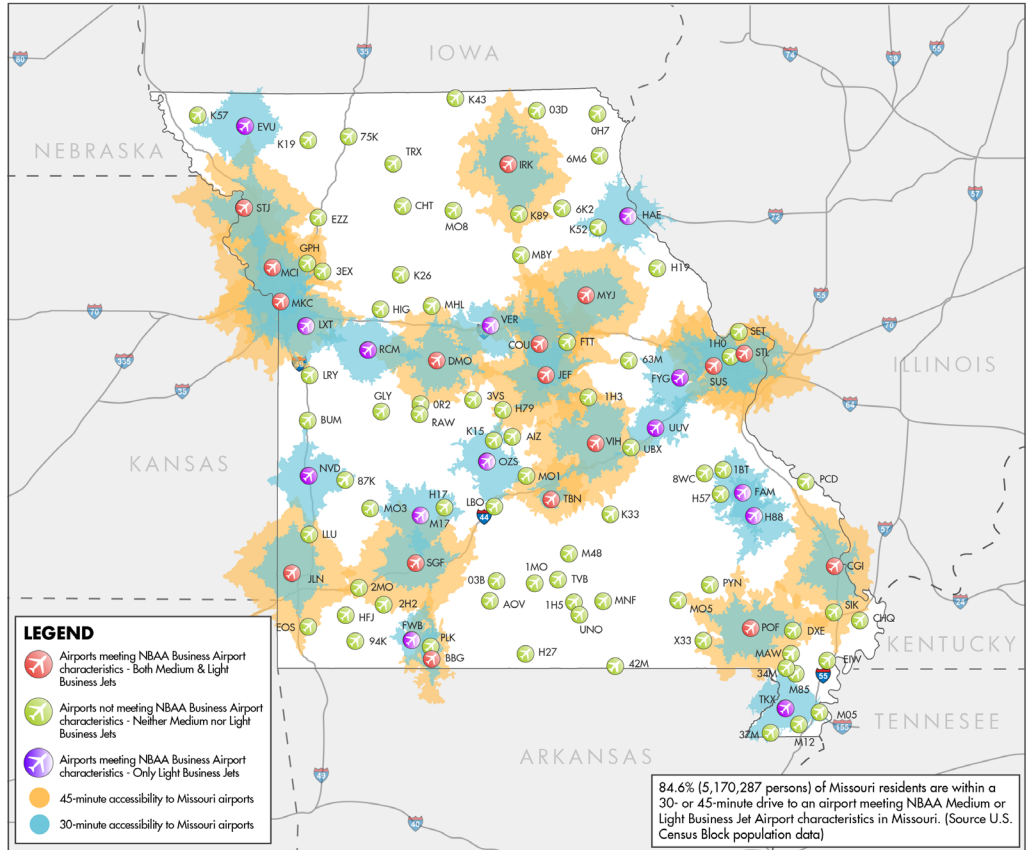
There is also a projected shortage of commercial airline pilots. In fact, some airlines are already deferring new service not because of a lack of planes, but because of a lack of pilots. Airlines are also seeking new ways to reduce their operating expenses. These trends may put smaller commercial airports with only one carrier at risk. The accompanying maps show what could happen to commercial airport accessibility if all commercial airports in Missouri with only one carrier lost scheduled service. The commercial airport accessibility rating would decrease from 81 percent to 72 percent. These maps help to demonstrate the priority that communities should place on efforts to retain airline service.



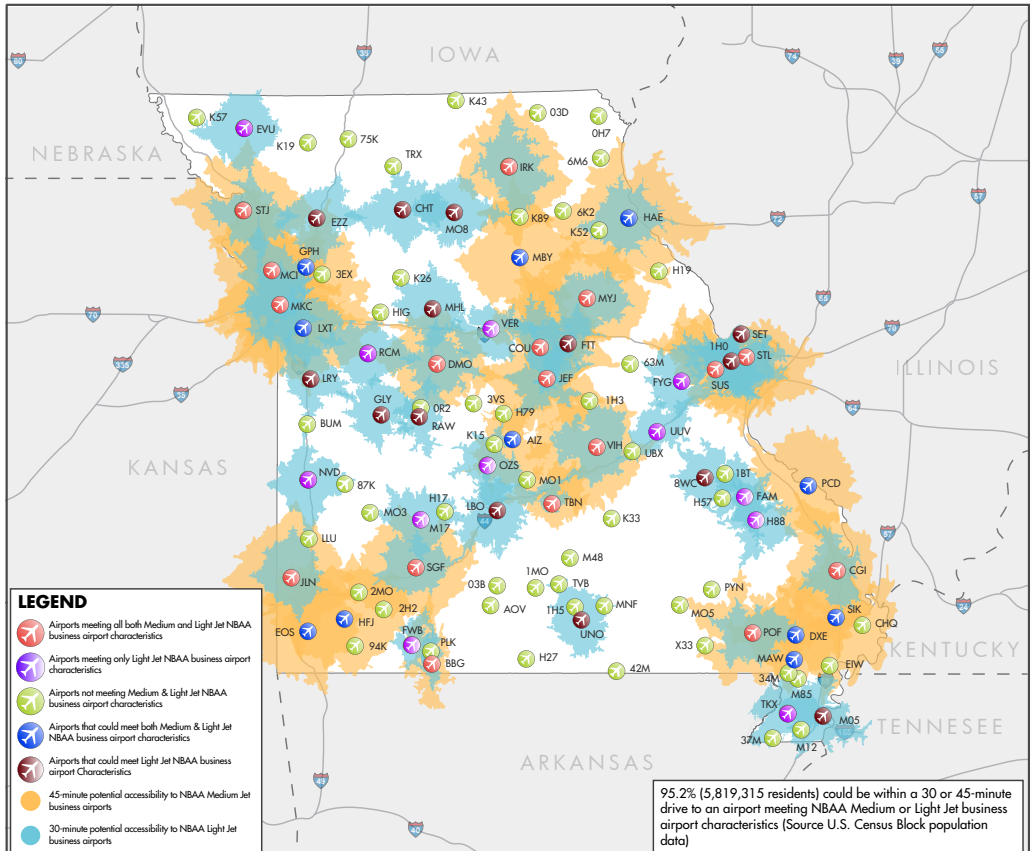


MISSOURI STATE AIRPORT SYSTEM PLAN UPDATE

CURRENT
ACCESSIBILITY TO
NBAA BUSINESS
READY AIRPORTS
85%



POTENTIAL
ACCESSIBILITY TO
NBAA BUSINESS
READY AIRPORTS
95%



According to the FAA, business aviation is the fastest growing segment of general aviation. Information from the National Business Aviation Association (NBAA) was used to identify Missouri airports that meet characteristics to serve medium and light business jets. The characteristics of business-ready airports were identified based on surveys of NBAA’s members and are shown below.

NBAA CHARACTERISTICS USED IN THIS ANALYSIS



NBAA MEDIUM BUSINESS JET AIRPORTS

- Runway 5,000 feet by 100 feet
- Approach supported by vertical guidance
- Visual Glide Slope Indicator (VGSI) – both runway ends
- Medium Intensity Runway Lighting (MIRL)
- On-site weather advisory reporting equipment
- FBO services/aircraft maintenance
- Jet fuel



NBAA LIGHT BUSINESS JET AIRPORTS

- Runway 4,000 feet by 75 feet
- Approach supported by vertical guidance
- Visual Glide Slope Indicator (VGSI) – at least one runway end
- Medium Intensity Runway Lighting (MIRL)
- On-site weather advisory reporting equipment
- FBO services/aircraft maintenance
- Jet fuel

The current rating for the NBAA business-ready airport accessibility measure is 85 percent. This rating considers Missouri airports that meet NBAA characteristics for serving both medium and light business jets. Using 45-minute drive time service areas for airports meeting medium jet characteristics and 30-minute drive time service areas for airports meeting light jet characteristics results in the current accessibility rating of 85 percent.

For each of the five Missouri airport roles, facility and service objectives have been set. If Missouri airports are improved and meet all of their associated facility and service objectives, additional Missouri airports could meet all NBAA characteristics for either medium or light business jets. Assuming all facility and service objectives are met, the map on the previous page shows how accessibility to airports meeting NBAA characteristics for business-ready airports could increase. If Missouri airports meet all applicable facility and service objectives, this accessibility rating could increase to 95 percent.



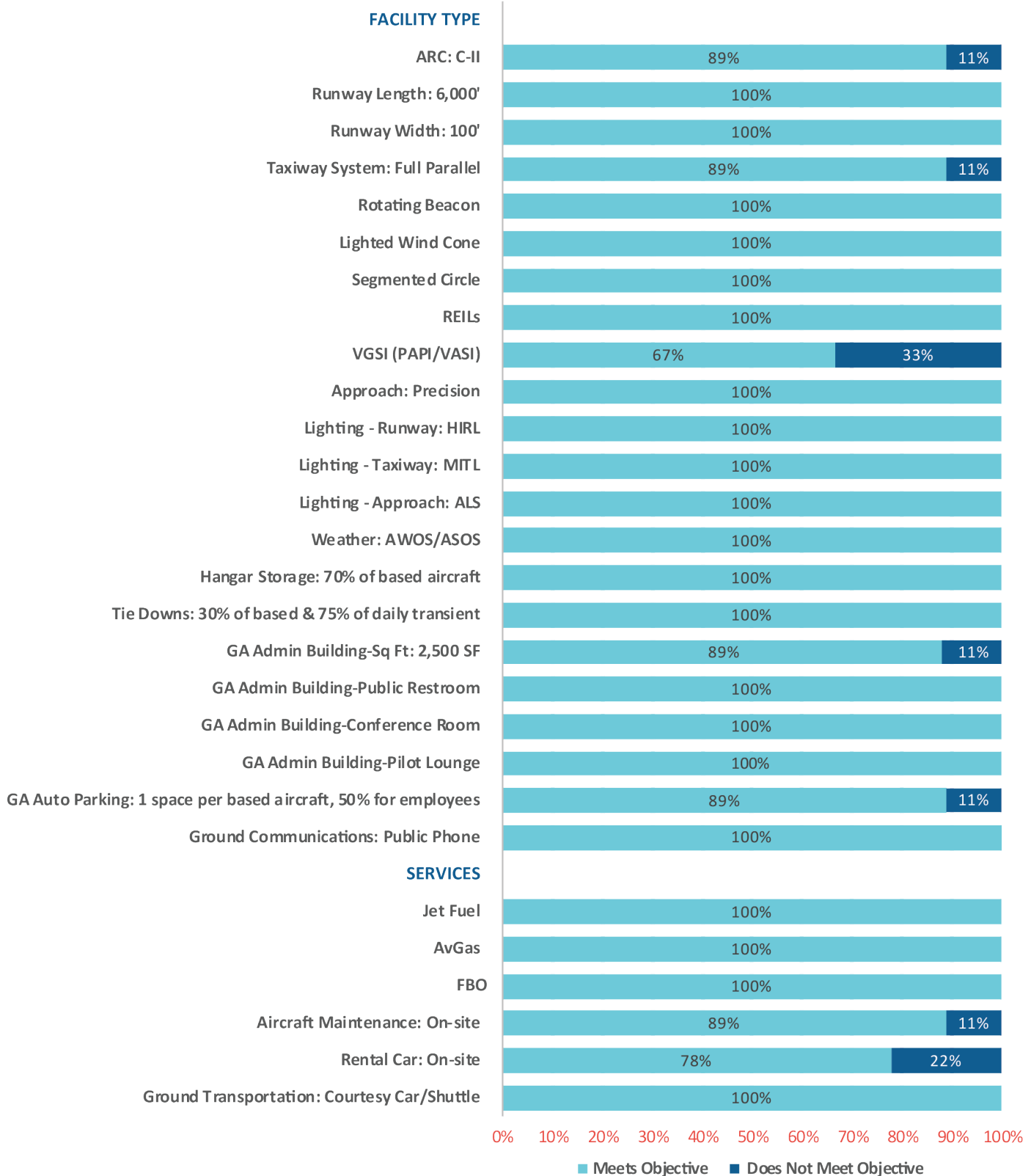
FUTURE AIRPORT PERFORMANCE

As part of the Missouri State Airport System Plan, the Aviation Section established facility and service objectives for airports assigned to each of the five airport roles. Once recommended roles were identified for all airports, analysis was undertaken to determine each airport’s ability to meet all objectives associated with the airport’s recommended role in the state airport system. The graphs that follow provide a summary of current performance by role. Reported performance relates to all airports recommended for each role and the ability of those airports to meet all established objectives for their applicable role. Projects needed to increase performance to 100 percent for each objective form the basis of the System Plan’s recommendations.



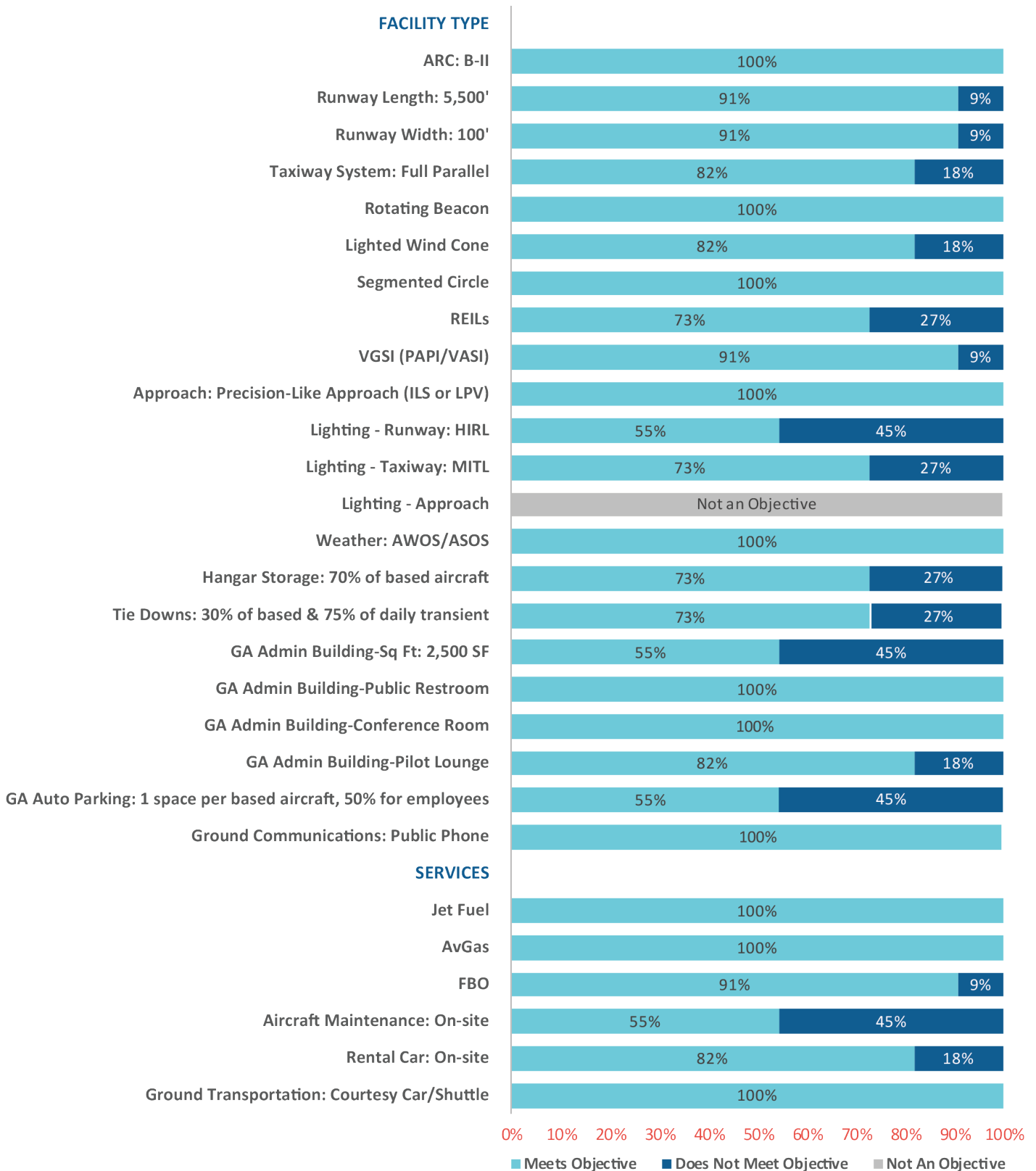
CURRENT FACILITY OBJECTIVE PERFORMANCE

COMMERCIAL



CURRENT FACILITY OBJECTIVE PERFORMANCE

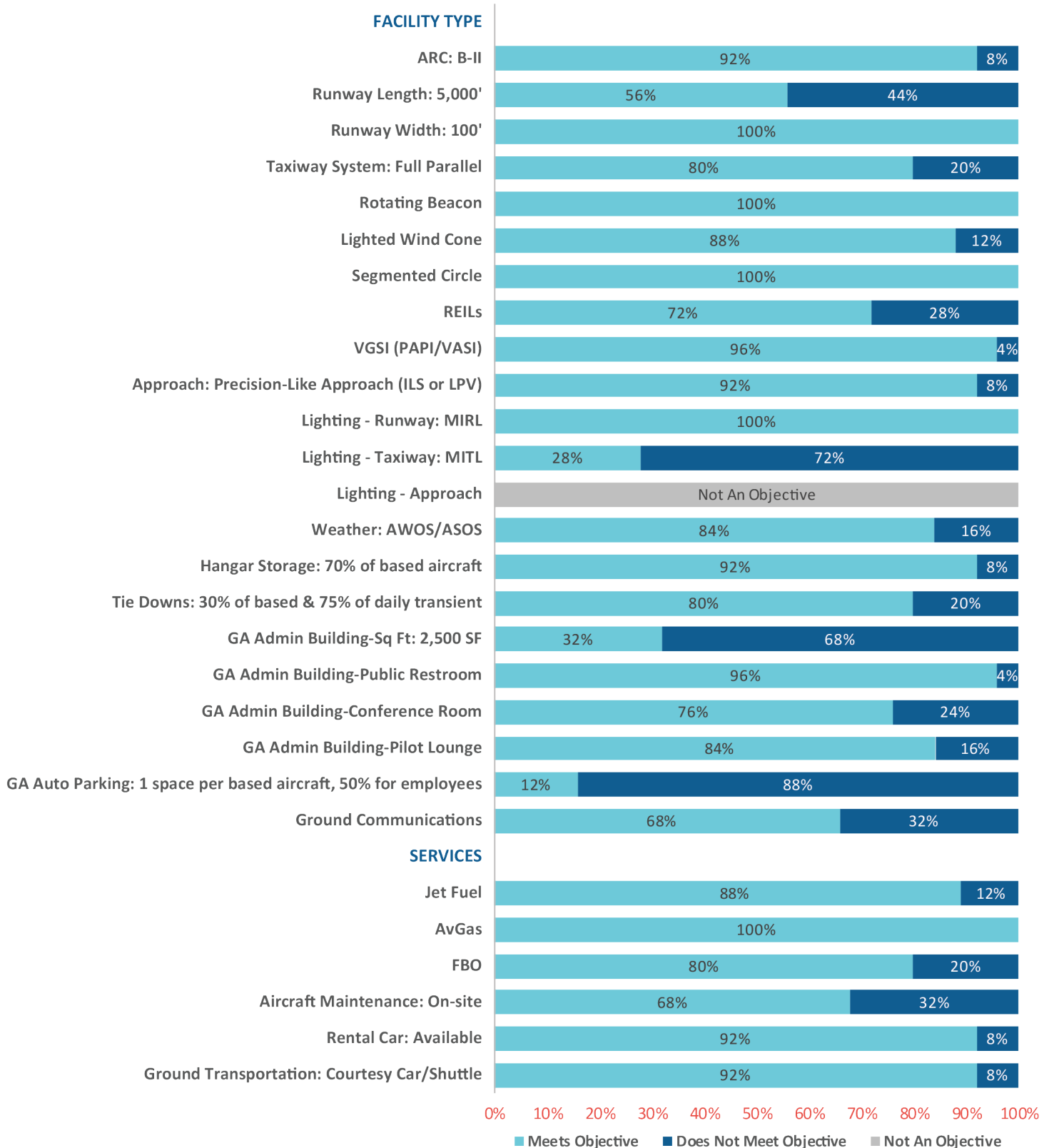
NATIONAL BUSINESS





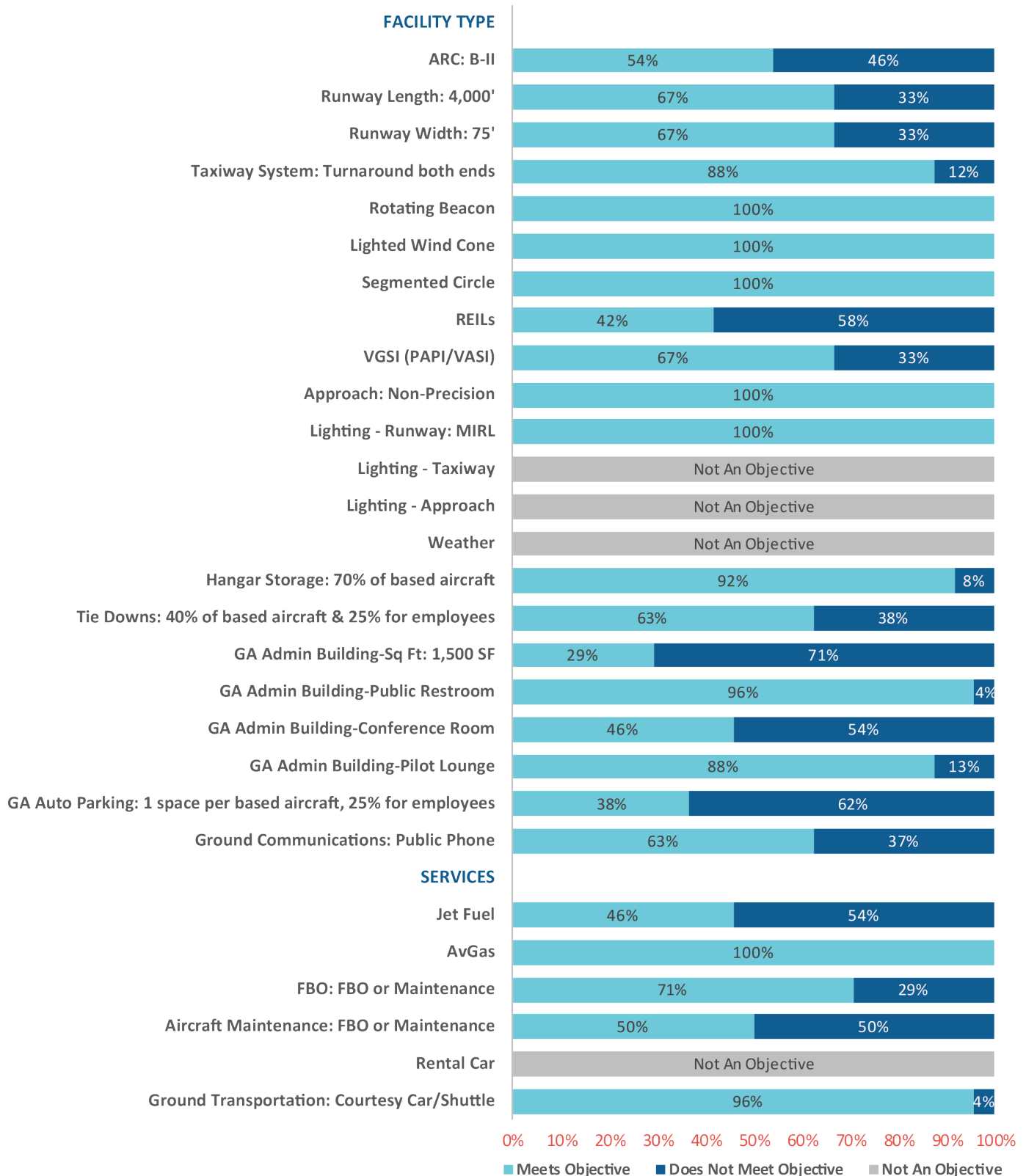
CURRENT FACILITY OBJECTIVE PERFORMANCE

REGIONAL BUSINESS



CURRENT FACILITY OBJECTIVE PERFORMANCE

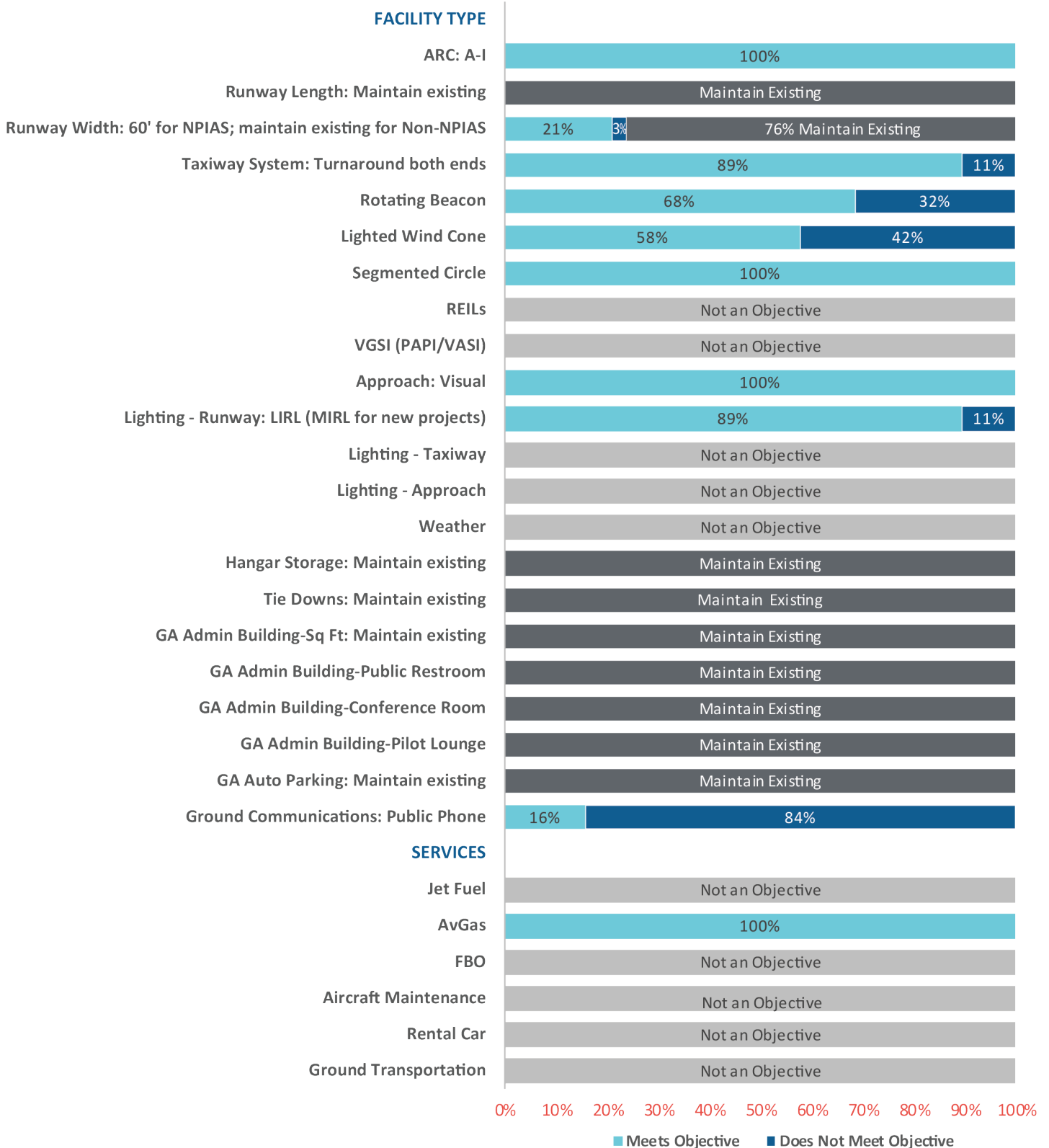
BUSINESS COMMUNITY





CURRENT FACILITY OBJECTIVE PERFORMANCE

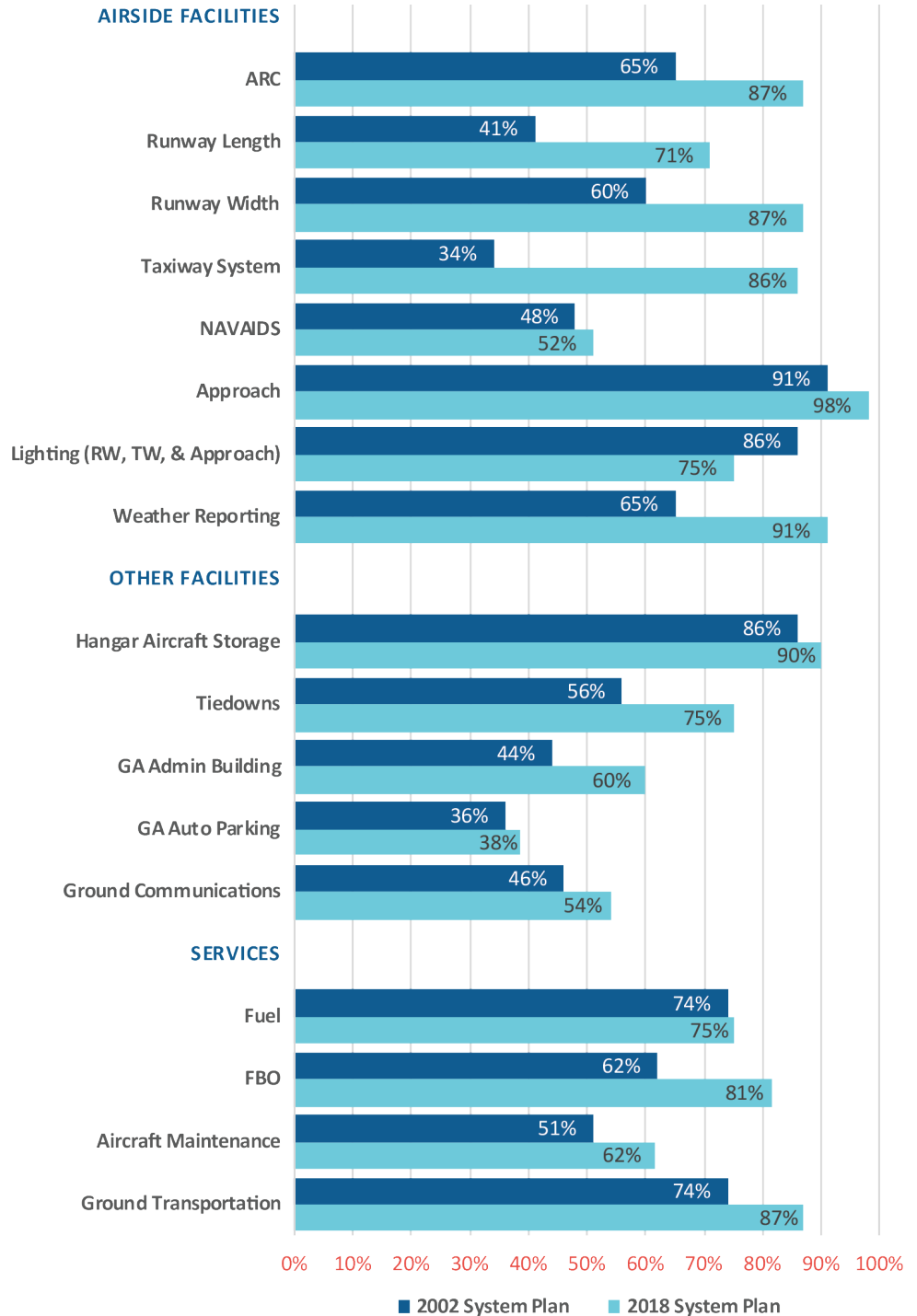
COMMUNITY LOCAL



PERFORMANCE COMPARISON

The accompanying graph shows how Missouri's state airport system has improved since airports were last evaluated in 2002. In a few instances, current performance is shown as being less than the performance in 2002. In those instances, this is a result of airports being assigned to a new role in this most current evaluation and/or more demanding objectives that were adopted for this update. Nevertheless, as shown on this graph, the airport system has made significant progress.

2002 VERSUS CURRENT SYSTEM PERFORMANCE



*The 2018 calculation includes the applicable roles only. For example, there is no objective established for the runway length at Local Community airports. Therefore, these airports are excluded from the 2018 calculation for meeting this objective.



MISSOURI STATE AIRPORT SYSTEM PLAN UPDATE

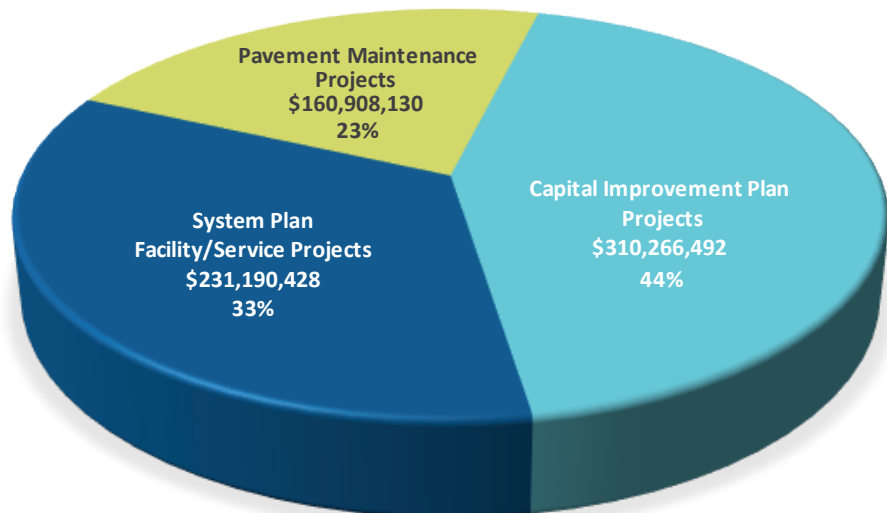
The Missouri State Airport System Plan identified needed projects to help airports meet their specific facility and service objectives; costs related to meeting all objectives were estimated as part of the system planning process. Missouri airports also have individual Capital Improvement Plans (CIPs) that identify development projects, equipment purchases, and other actions that would require funding if they are implemented. It is important to note that the CIP projects identified for Missouri airports are not approved by MoDOT or the FAA by their inclusion in this report. They are shown to provide a more holistic view of potential financial needs for the system. Through another statewide effort, MoDOT has identified pavement maintenance and rehabilitation projects that should be considered in the next few years to address the needs of the state's existing pavement infrastructure. Pavement maintenance and rehabilitation needs at Missouri airports change annually. The System Plan includes pavement-related projects for system airports, as they are known at this time.

Estimated costs from each of the three sources - the System Plan, CIPs, and Pavement Plan - are shown, as are the distribution of these costs by airport role. Costs generally do not reflect the needs of St. Louis Lambert or Kansas City International airports; for the other commercial airports, only CIP projects that could be funded from the state's Aviation Trust Fund are considered in the cost estimates. Proportionally, costs for the commercial airports are lower because these airports generally meet plan objectives, and the full CIP for each Commercial airport is not considered in the cost analysis.

ESTIMATED FIVE-YEAR DEVELOPMENT COSTS

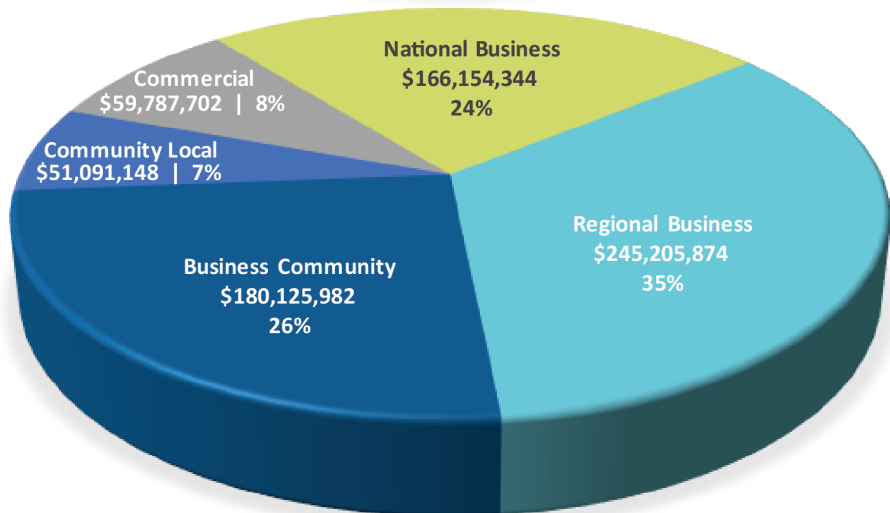
TOTAL ESTIMATED DEVELOPMENT COSTS: \$702 MILLION

COMBINED DEVELOPMENT COSTS (BY PLAN)



TOTAL ESTIMATED DEVELOPMENT COSTS: \$702 MILLION

COMBINED DEVELOPMENT COSTS (BY ROLE)

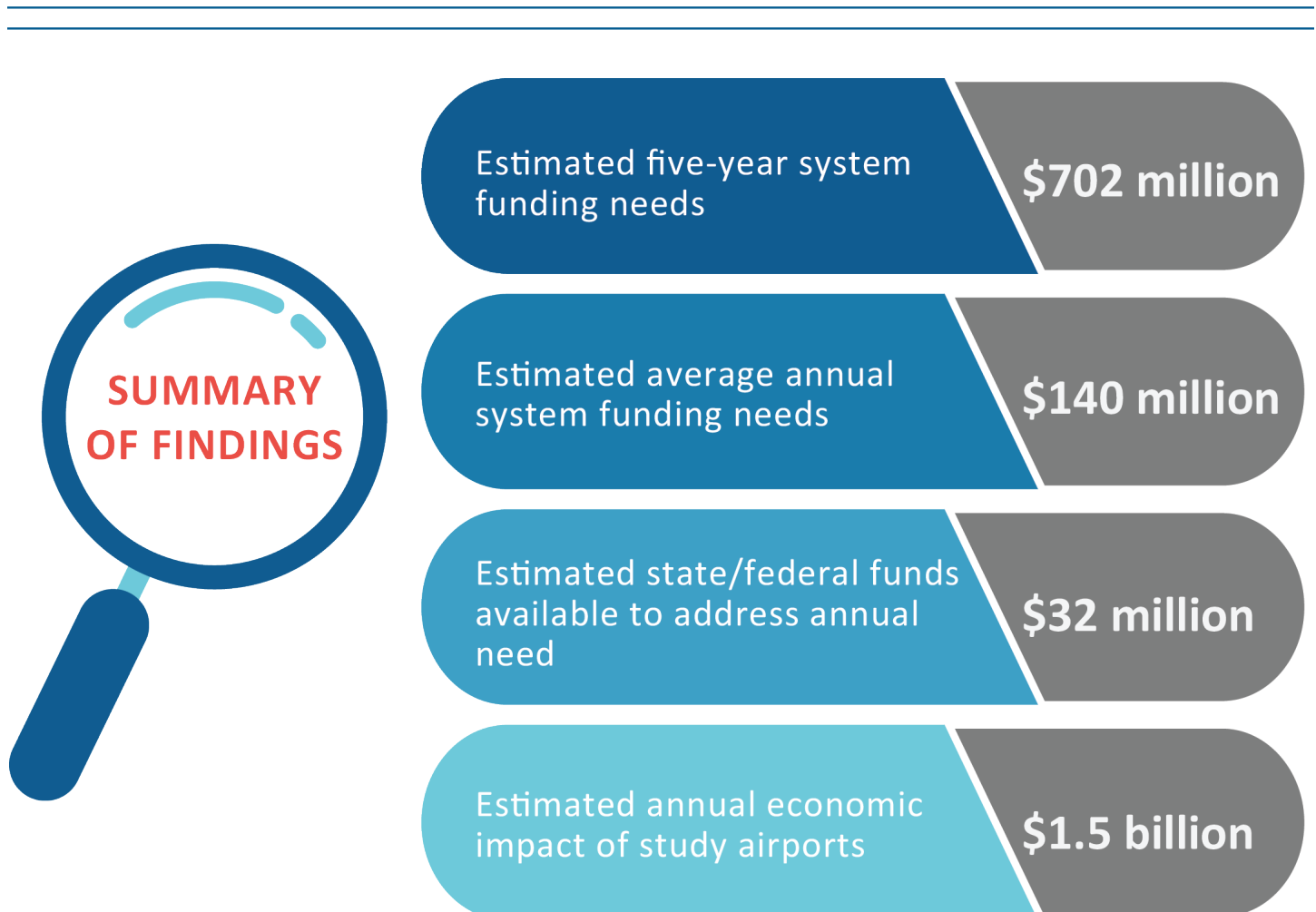


SYSTEM NEEDS VERSUS SYSTEM BENEFITS

Annually, funds from MoDOT, the FAA, and study airports are used to help implement various improvement and maintenance projects for airports in Missouri. Historically, about \$32 million in funds has been available to meet the average annual investment needs that have been identified in this plan, which are estimated at \$140 million per year. This indicates that a large funding gap can be expected. This information helps to demonstrate how important it is to use the System Plan to make informed investment decisions that will help support a system of airports that meet Missouri’s transportation needs and economic objectives.

Funding needs shown here are not all-inclusive, as there will undoubtedly be additional projects that are not known at this time. Estimated costs indicate that to fully fund all known projects, maintenance, and equipment needs, an average of approximately \$140 million in each of the next five years is needed. An estimated \$702 million is needed for the entire five-year planning period.

MoDOT conducted an airport economic impact study in 2012. This study showed the state’s general aviation and commercial airports contribute an estimated \$1.5 billion in economic benefit annually to state and local economies throughout Missouri. This annual economic impact excludes the impacts of St. Louis Lambert and Kansas City International airports. The annual benefit of \$1.5 billion is significantly greater than the annual financial need for the system, estimated on a conservative basis to be approximately \$140 million. As shown, Missouri airports are providing an economic benefit that far exceeds the anticipated financial need to maintain and develop the state airport system. Missouri airports are clearly worth the investment!



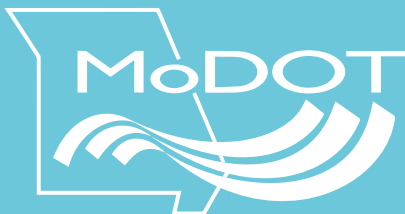
Note: The economic impacts shown in this summary do not reflect those associated with St. Louis Lambert International and Kansas City International airports. When these two major airports are considered, the estimated annual economic impact of airports in Missouri is \$11.1 billion.

MoDOT

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EXECUTIVE SUMMARY