



T E N N E S S E E

Aviation System Plan

EXECUTIVE SUMMARY



TDOT
Department of
Transportation

Kimley»Horn

with assistance from Garver, LLC and EBP

Overview

Tennessee's booming economy, unique recreational activities, bustling urban centers, and rich cultural institutions make it a desirable place to live and to visit. From east to west, Tennessee spans two time zones, a variety of natural landscapes, and touches eight other states, tied for the most of any other state in the nation. Tennessee's unique environment is supported by its equally unique aviation system, composed of 78 public-use airports that span from one of the newest large-hub commercial service airports in the nation, Nashville International Airport (BNA), to a variety of smaller general aviation airports. Tennessee's airports support a variety of uses and activities, from commercial aviation, to flight training and education, to air cargo.

Recognizing the vital role that aviation plays in supporting the state, the Tennessee Department of Transportation (TDOT) Aeronautics Division initiated the development of the Tennessee Aviation System Plan (TASP). The TASP establishes a systemwide inventory of needs and provides context and justification for the continued development of the state's aviation system. This Executive Summary brochure will present findings from the TASP, such as the development of Goals and Performance Measures (PMs), existing and future system performance, and cost estimates and recommendations for system needs.

Quick Facts

Home to the **world's busiest air cargo airport** (Memphis International Airport)



3.3M
enplanements

2M
operations

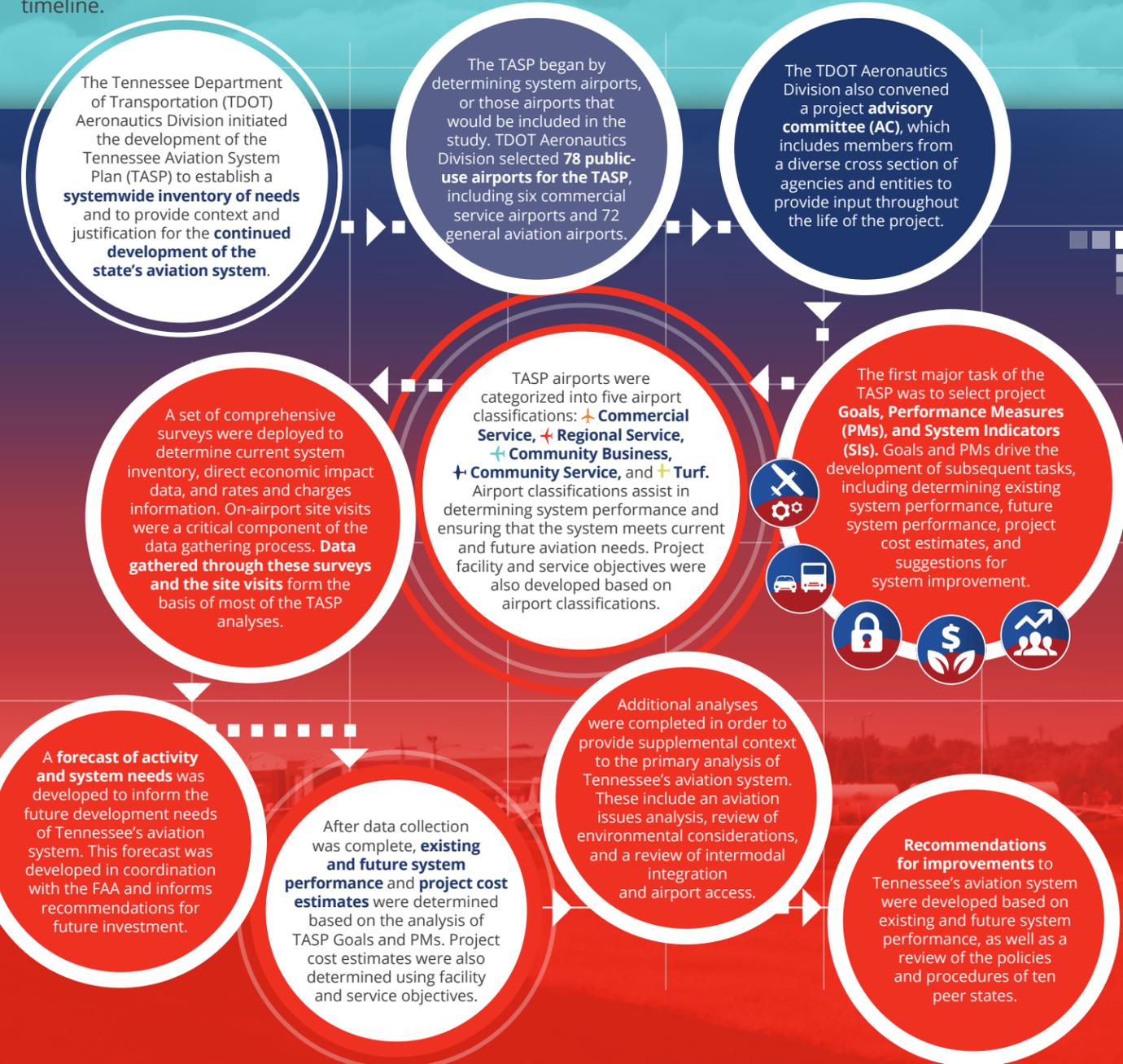
69 airports included in the **National Plan of Integrated Airport Systems (NPIAS)**



Study Purpose and Process

Through a series of 14 tasks, the TASP explored the priorities of state aviation officials and stakeholders, established project Goals, examined the existing and future performance of the system, defined future needs, and developed targeted project recommendations. The project recommendations will ensure that Tennessee's aviation system continues to meet the needs of current users and will be able to evolve to meet the needs of the future.

The TASP was guided by an advisory committee (AC) consisting of 21 members. AC members included representatives from airports, planning organizations and development districts, the FAA Memphis Airports District Office (ADO), the Tennessee Aeronautics Commission, TDOT Long Range Planning Division, TDOT Multimodal Division, TDOT Strategic Transportation Investments Division, and TDOT Aeronautics Division. TASP AC members represented a diverse group of aviation stakeholders and provided input throughout the life of the project by reviewing draft TASP documents and meeting six times to provide feedback and guidance on the project. The graphic below details the overall TASP project timeline.



System Goals

Critical to the successful development of a system plan is the selection of project Goals that serve as the framework for the plan. Goals determine how TDOT Aeronautics Division measures and evaluates the performance of Tennessee's aviation system. TASP Goals were determined in coordination with the TASP AC.

Each Goal includes Performance Measures (PMs) and System Indicators (SIs), which are both important components of assessing aviation system performance. PMs quantitatively evaluate specific aspects of system performance that can be impacted by TDOT Aeronautics Division intervention. SIs evaluate specific aspects of system performance that cannot be impacted by TDOT Aeronautics Division intervention. Additional Supporting Data of importance to the TDOT Aeronautics Division are also components of certain Goals.

GOAL #1 Preserve Airport Infrastructure: Protect and preserve existing airport infrastructure by prioritizing airport system needs



PERFORMANCE MEASURES

- Percent of airports meeting the airport pavement management system (APMS) objective
- Percent of infrastructure within its useful life

SYSTEM INDICATORS

- Airport marking conditions
- Hangar space and condition
- Hangar waitlists
- Airport-owned fuel farm condition
- Fuel sales by airport classification
- Percent of airports with an airport layout plan (ALP) less than ten years old
- Percent of airports with an approved ALP with an Exhibit A
- Percent of airports with displaced thresholds and the length and cause of the displaced threshold
- Aircraft fleet mix
- Operations by airport classification

SUPPORTING DATA

- Percent of airport maintenance program funds expended (Fiscal Year 2015 to 2019)
- Percent of airports meeting Americans With Disabilities Act (ADA) compliance

GOAL #2 Transportation Options: Provide an airport system with available and cost-efficient transportation options for moving people and freight



PERFORMANCE MEASURES

- Percent of area and population within a 45-minute drive to any Tennessee commercial service airport
- Percent of area and population within a 30-minute drive to any Tennessee general aviation airport

SYSTEM INDICATORS

- Percent of airports with enough apron space to park transient aircraft on an average day
- Percent of airports with an instrument approach with minimums of at least 400 feet and 1 mile
- Percent of airports with FBO facilities
- Percent of airports with a dedicated courtesy car, rental car, or ride share available
- Percent of airports with intermodal options, including bus or other "on-demand" services
- Percent of airports with access to 24-hour aircraft fuel
- Percent of airports with 24-hour facilities
- Percent of airports supporting air cargo/freight activities
- Percent of airports supporting agricultural needs
- Percent of airports supporting fixed wing and/or rotor medical operations
- Percent of airports within a 15-minute drive time of emergency care facilities
- Geographic area and population that could benefit from improvements to existing facilities that would enable:
 - Business aircraft
 - Medical aircraft
 - Commercial service users

GOAL #3 Safety and Security: Improve the safety and security of airport system users



PERFORMANCE MEASURES

- Percent of airports that have adopted an emergency response and/or security plan
- Percent of airports meeting federal design and safety criteria based on existing operations and current airport reference code (ARC)
- Percent of airports with approaches meeting state obstruction criteria

SUPPORTING DATA

- Percent of airports with through-the-fence (TTF) operations
- Percent of airports that have standard operating procedures for TTF operations
- Percent of airports with access controls to the airport operating areas (AOAs)

SYSTEM INDICATORS

- Percent of airports with a full parallel taxiway for the primary runway
- Percent of airports by existing ARC
- Percent of airports by future ARC
- Percent of airports with a visual approach to their primary runway
- Percent of airports with a non-precision approach to their primary runway
- Percent of airports with a precision approach to their primary runway
- Percent of airports with aircraft incidents/accidents related to approaches, runway safety area (RSA), etc.
- Coverage by airports with on-site weather reporting service/equipment
- Percent of airports with an airport manager or attendant on the airport
- Percent of airports that have procedures in place to conduct self-inspections on a regular basis
- Percent of airports with clear Part 77 approach surfaces
- Percent of airports that report having unmanned aircraft systems (UAS) operations on or near the airport
- Percent of airports that report having a system to track/monitor UAS activity on or near the airport

GOAL #4 Funding and Environment: Maximize federal, state, and local resources to meet airport system needs and minimize environmental impacts



PERFORMANCE MEASURES

- Percent of airports with airport included in local comprehensive and/or land use plan
- Execution of annual Airport Capital Improvement Plan (ACIP)
- Percent of federal funds allocated through sub-awards
- Percent of airports with a spill prevention control and countermeasure (SPCC) program

SYSTEM INDICATORS

- Percent of airports with alternative energy/renewable energy initiatives and programs
- Percent of airports included in local or other regional transportation capital improvement plans (CIPs)
- Percent of airports with a dedicated representative on planning/zoning boards
- Percent of airports with an adopted wildlife management plan
- Percent of airports with FAA Part 150 noise studies and/or noise contour maps
- Percent of airports that have storm water pollution prevention plans (SWPPPs)
- Number of based aircraft, by airport classification
- Available aircraft space for lease
 - Number of T-hangars
 - Number of shade hangars
 - Square footage of box hangars
- Annual revenue in relation to airport CIP
- Non-primary entitlement (NPE) utilization
- Percent of airports producing enough operating revenue to cover operating and maintenance costs

SUPPORTING DATA

- Tennessee's aviation funding in relation to other states
- Businesses with based aircraft and their average proximity to/from the airport

GOAL #5 Workforce and Economy: Invest in the airport system and aviation workforce to support economic growth and competitiveness



PERFORMANCE MEASURES

- Population and area within a 45-minute drive time of an airport meeting business aircraft needs

SYSTEM INDICATORS

- Percent of airports that have based flight training programs and schools
- Percent of population within a 30-minute drive time of an airport with flight training
- Percent of airports supporting airframe and powerplant (A&P) mechanic programs
- Percent of airports that have educational programs
- Number of STEM students presented to annually, by airport classification
- Percent of airports with on-site aerospace manufacturing lessees
- Percent of airports with business parks or landside real estate development
- Percent of airports with build-ready airside acreage
- Percent of airports with the ability to support business aircraft
- Percent of airports with active development partnerships
- Percent of airports that host annual air shows and fly-ins
- Economic impact of airports, by NPIAS category

SUPPORTING DATA

- Pilot certificates held in Tennessee
- Percent of registered pilots within a 30-minute drive time of an airport

Airport Classifications

Tennessee's aviation system is composed of 78 public-use airports that are owned by a political subdivision of the state or, in the case of four of the airports, privately-owned. While all airports serve their communities, regions, and the needs of their users, they differ in the types of facilities and services available. It is beneficial to have airports of all sizes that serve a variety of functions as it ensures an efficient use of resources. State aviation system plans typically define airport classifications that are tailored to the specific needs of the state, which may differ from federal classification systems like the NPIAS.

TDOT Aeronautics Division has classified all airports in the system according to the different functions and purposes they serve within the system. Airports that serve similar functions are grouped together into classifications for further analysis and, ultimately, policy decisions. TDOT Aeronautics Division considered several criteria for classifying airports, including based jets, commercial service status, reliever status, and total instrument flight rules (IFR) operations before determining the most appropriate criteria to be almost solely based on jet operations.



Existing and Future System Performance

TASP Goals were developed to shape the future of Tennessee's aviation system and assess performance in achieving that vision. To identify future needs, the TASP also established future performance targets for seven PMs. Future performance targets are defined as the total and percent of airports by classification that need to meet each PM in order to accomplish the overarching Goals of the TASP. The difference between existing system performance and future system performance is important for defining system investment needs and recommendations to ensure that the system continues to meet current demands and is poised to meet future demands.

Data to determine existing and future system performance was collected primarily via the TASP Inventory Data Survey. This Survey was disseminated as part of the overall TASP inventory effort and was completed by all airports in the system, except for one. Onsite and virtual site visits were completed to assist airports with survey completion. Current and future system performance (where applicable) are presented for each PM in the following pages.

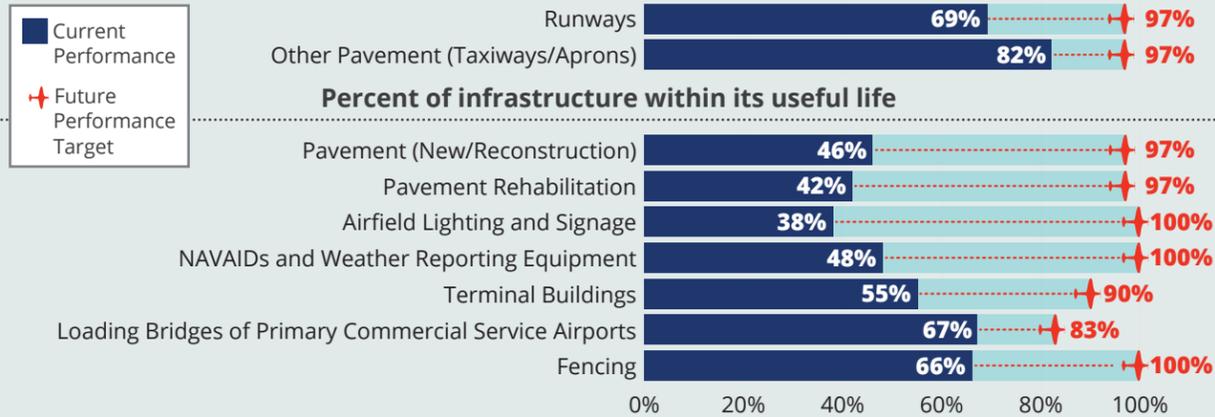
Data Collection and Performance Evaluation Timeline



Existing and Future System Performance

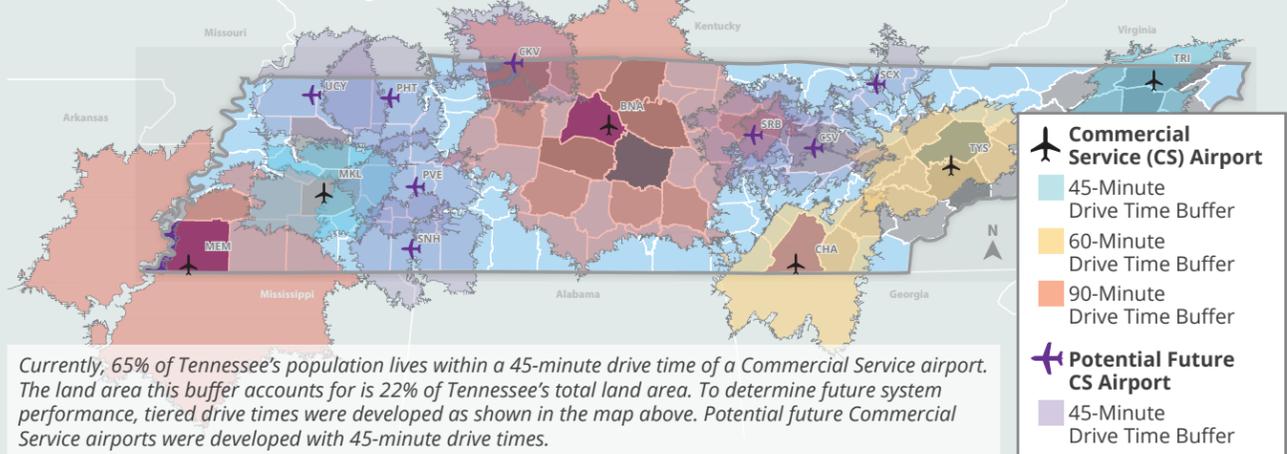
GOAL #1 Preserve Airport Infrastructure: Protect and preserve existing airport infrastructure by prioritizing airport system needs

Percent of airports meeting the airport pavement management system (APMS) objective

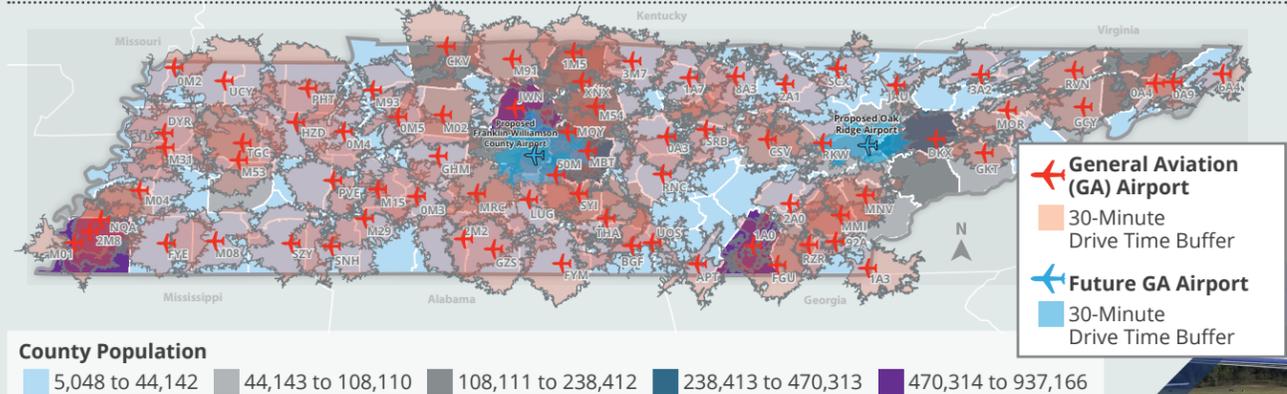


GOAL #2 Transportation Options: Provide an airport system with available and cost-efficient transportation options for moving people and freight

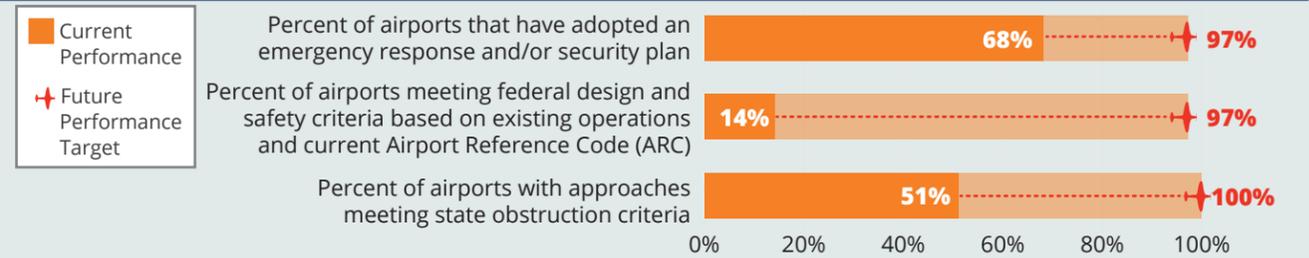
Percent of Population and Area within a 45-, 60-, or 90-minute Drive Time of a Commercial Service Airport



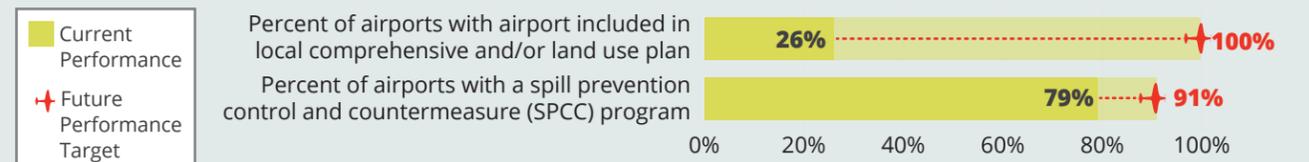
Additional Population and Land Coverage Provided by Two Potential General Aviation Airports



GOAL #3 Safety and Security: Improve the safety and security of airport system users

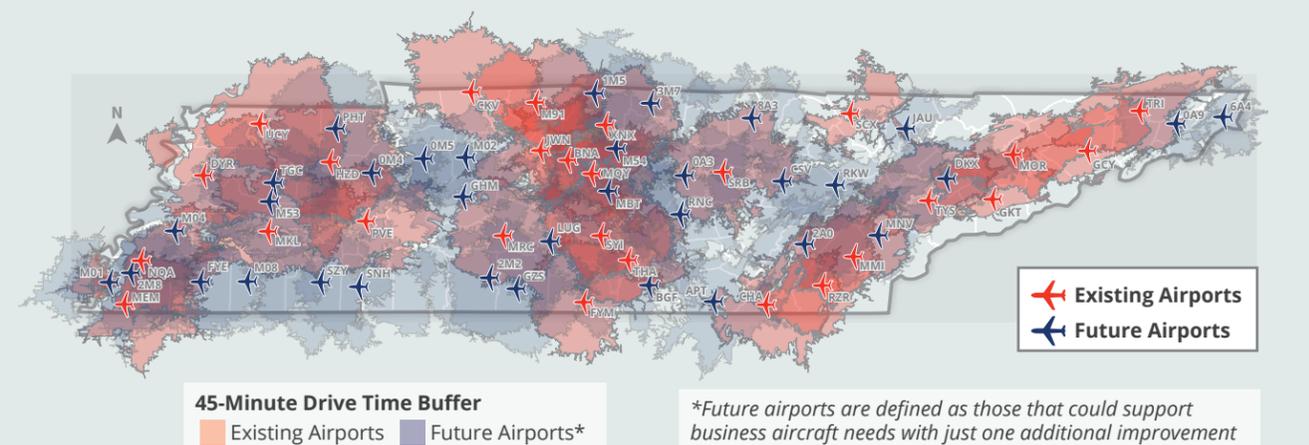


GOAL #4 Funding and Environment: Maximize federal, state, and local resources to meet airport system needs and minimize environmental impacts



GOAL #5 Workforce and Economy: Invest in the airport system and aviation workforce to support economic growth and competitiveness

Percent of Population and Land Area Within a 45-minute Drive Time of an Airport Meeting Business Aircraft Needs



Facility and Service Objectives

The TASP has developed a series of recommended facility and service objectives for airports and their users. Established in close coordination with TDOT Aeronautics Division, these objectives outline the airside and landside facilities an airport should provide to fulfill its functions within the aviation system. Airport planning objectives are also provided. These recommendations help airports maintain safe and secure conditions for aircraft and their passengers, compliance with aviation regulations, and up-to-date master plans and/or airport layout plans (ALPs) that align with current conditions.

Each airport was evaluated against its classification's facility and service objectives. This analysis serves as the basis for the identification of airport-specific project needs and costs.

Policy

Existing TDOT Aeronautics Division rules and regulations were evaluated and compared with ten peer states: Arizona, Arkansas, Colorado, Georgia, Indiana, Kentucky, Montana, Nebraska, North Carolina, and Pennsylvania. Based on an evaluation of rules and regulations from other states, a set of policy recommendations were developed for TDOT Aeronautics Division. Recommendations were developed based on seven focus areas, including: Funding Programs, Land Use and Zoning, Minimum Airport Standards, Project Priority Process, Safety Through Airport Inspections, State Aviation Programs, and UAS. Recommendations included the following:



Funding Programs

Implement an interest-bearing loan program for airport-related construction projects at publicly-owned airports



Project Priority Process

Evaluate the feasibility of implementing a point ranking system for project prioritization based on existing state priorities or a reevaluation of priorities based on system needs



State Aviation Programs

Implement an aircraft counting program to forecast and support future TASP facilities and projects

In total, 14 recommendations were made across five focus areas. It should be noted that no specific recommendations are made for the Land Use and Zoning and Minimum Airport Standards focus areas due to governance by state legislature. Enacting further policies and programs will not only ensure Tennessee continues to develop its aviation system, but also remain competitive with its peer states.

Facility and Service Objectives

Category	CLASSIFICATIONS				
	Commercial Service	Regional Service	Community Business	Community Service	Turf
Primary Runway Length	>6,000'	5,000' – 6,000'	4,500' – 5,500'	1,800' < 4,500'	1,800' or greater
Primary Runway Width	100' - 150'	100' - 150'	75' - 100'	60' - 75'	40' - 60'
Primary Runway Surface	Paved	Paved	Paved	Paved	Turf (mowed)
Primary Runway Strength	Per ALP	> 60,000 lbs. SW or DW OR Based on ALP if Part 139	> 30,000 lbs. SW or DW AND <60,000 lbs. SW or DW	<30,000 lbs. SW or DW AND > 12,500 lbs. SW or DW	N/A
Minimum Runway PCI	>70	>70	>70	>70	N/A
Full Parallel Taxiway	Yes	Yes	Yes	No	N/A
Minimum Airfield Pavement PCI (not including runway)	>65	>65	>65	>65	N/A
Type of Runway Approach and Minima	Precision - 200 & 1/2 Minima (both ends)	Non-Precision - 300 & 3/4 Minima (one end)	Non-Precision - 400 & 1 Minima (one end)	Visual	Visual
Unobstructed Approaches	Clear Approaches in accordance with type of approach and State obstruction standards/criteria				
Runway Lighting	MIRL	MIRL	MIRL	Not a Target	N/A
Taxiway Lighting	MITL	MITL	MITL	Reflectors	N/A
Runway Visual Aids	PAPI/REIL or ALS (both ends)			PAPI/REIL (both ends)	Cones
Airport Visual Aids	Beacon and Lighted Windcone			Windcone (daytime operations only) Lighted Windcone (day-time & night-time operations) Beacon (day-time & night-time operations)	Windcone
Aircraft Apron	Accommodate regular transient activity and local parking				N/A
24-Hour Fuel	Yes	Yes	Yes	Not a Target	Not a Target
Weather Reporting	Yes	Yes	Yes	Not a Target	Not a Target
Terminal/Administration Building/Facility	Yes	Yes	Yes	Yes	Not a Target
Ground Transportation Services	At least one available courtesy car/rental car/TNC			Not a Target	Not a Target
After-Hours Food and Beverage	Vending	Vending	Vending	Not a Target	Not a Target
Posted Contact Information	Yes	Yes	Yes	Yes	Not a Target
Internet Access	Yes	Yes	Yes	Yes	Not a Target
24-Hour Restrooms	Yes	Yes	Yes	Not a Target	Not a Target
Pilot Area	Yes	Yes	Yes	Yes	Not a Target
Conference Room/Classroom	Yes	Yes	Yes	Not a Target	Not a Target
Height Zoning	Yes	Yes	Yes	Yes	Yes
Compatible Land Use Plan	Yes	Yes	Yes	Yes	Yes
Emergency Plan	Yes	Yes	Yes	Yes	Yes
Security Plan	Yes	Yes	Yes	Yes	Yes
Airport Master Plan/ALP with Exhibit A	ALP Update within last 8 years	ALP Update within last 10 years			Not a Target
RPZ Ownership	Yes	Yes	Yes	Yes	Yes
Minimum Standards	Yes	Yes	Yes	Yes	Yes



Forecast

Projections of general aviation activity for the state of Tennessee were prepared for the five-year (2025), 10-year (2030), and 20-year (2040) periods. Such forecasts help TDOT Aeronautics Division understand where future growth for its system will likely occur and what future growth is realistic at airports in the state. Based on TDOT Aeronautics Division and FAA-reviewed methodologies, the following projections are anticipated:



Case Studies

Aviation activity extends far beyond the airfield. Airports support their communities in a myriad of ways, from welcoming out-of-state visitors for a once in a lifetime event, to supporting life-saving medical flights, to supporting local agricultural businesses. The TASP and Aviation Economic Impact Study identified over 20 examples of how Tennessee's airports support communities across the state and beyond.

Bonnaroo - Bringing Thousands of Music Fans to Southern Tennessee

Bonnaroo, an annual four-day music and arts festival, draws tens of thousands of visitors to Manchester every June. In 2019, the event sold out with over 80,000 attendees traveling from across the country and globe. Approximately 75 percent of attendees travel from out of state to attend the event. Airports serving the Manchester area include Nashville International Airport (BNA), McGhee Tyson Airport (TYS), and Tullahoma Regional Airport/William Northern Field (THA). Every June during Bonnaroo, the traffic at Tullahoma Regional Airport/William Northern Field doubles, including a reported 136 percent increase in jet traffic in 2019. In the same year, jet traffic also increased at Lovell Field (CHA) by over 22 percent and at McGhee Tyson Airport by over 20 percent during Bonnaroo. It is estimated that nearly one in four Bonnaroo attendees earns in excess of \$75,000 per year, and attendees spend an average of \$35 per day outside of the festival. On average, on-site spending coupled with ticket sales contribute about \$1 million annually to Coffee County's economy. On a larger scale, Bonnaroo is estimated to have a \$52 million impact on the state and \$26 million impact on Coffee County. The impacts of Bonnaroo extend beyond airport operations and local economies. Nashville International Airport supports Bonnaroo charitable efforts by hosting an annual Bonnaroo-themed skylight exhibition in conjunction with the Bonnaroo Works Fund and Arts at the Airport organizations.



Photo: Shannon McGee, Huntsville, USA - Clean Vibes, Bonnaroo 2015

Cost Estimates

Systemwide cost estimates are based on future system performance and facility and service objectives. Airports that do not meet future performance targets or facility and service objectives are recommended projects to meet targets. Systemwide, the cost of these projects is \$1.5 billion, including \$1.1 billion (76 percent of total costs) in maintenance projects and \$347 million (24 percent of total costs) in expansion projects. Maintenance cost estimates are generally categorized as projects needed to maintain the existing system, while expansion projects are generally defined as new infrastructure or new programs. Total cost estimates shown are for projects resulting from TASP Goals and facility and service objectives only. Statewide and commercial service airports' CIPs are not included. Commercial service airports' CIPs alone total over \$2.5 billion*

*Excludes McGhee Tyson Airport (TYS)



Aerial Application - Maintaining Tennessee's Farmland from the Air

Aerial application involves applying agricultural products from an agricultural aircraft and is a key supporting component of Tennessee's agriculture sector. Aerial application of pesticides and fertilizers is the most economical and, even sometimes, the only way to distribute these substances onto crops, especially over large or remote areas. Aerial application is three to four times faster per unit area than other application methods and may boost crop yields by up to five percent.

Tennessee's airports support positive agricultural economic impacts by hosting aerial applicators. Five of Tennessee's airports have based aerial applicators, including Covington Municipal Airport (M04), Greeneville Municipal Airport (GCY), Arnold Field (M31), Humboldt Municipal Airport (M53), and Everett-Stewart Regional Airport (UCY). Together, these businesses contribute 50 jobs and over \$1.4 million in economic impact to the state's economy. The largest based aerial applicator, Vertical Flight Technologies, located at Greeneville Municipal Airport, employs 30 people and contributes over \$800,000 to Tennessee's economy. Though not as large, many of the smaller based aerial applicators also offer a noteworthy contribution to the economy. For example, Russell Flying Services, located at Everett-Stewart Regional Airport, employs five people and contributes \$191,000 to Tennessee's economy.



Photo: Louren Colf, shutterstock.com



Environmental

In its latest Advisory Circular (AC) on system planning, the FAA identified the need to consider environmental conditions as part of system plans. As discussed in the AC, the purpose of this is to ensure “the early evaluation of potential problems, with the objective of identifying alternatives, and may identify the need for additional environmental analysis for projects at a particular airport.”

The TASP examined known environmental issues located on and around system airports that may impact project development and implementation, including: incompatible land uses, approach obstructions, and environmental features (hazards, historic buildings, wetlands, etc.).



Incompatible Land Uses

This evaluation focused on identifying land uses that are generally considered to be incompatible in close proximity to airports, including buildings and structures whose height exceeds FAA standards, known as Part 77 surfaces, as well as other types of development that may attract wildlife or large concentrations of people, are noise-sensitive, or cause visual obstructions.



Approach Obstructions

A statewide analysis was conducted to determine the number and type of manmade obstructions within airport approaches. At the most basic level, an obstruction is any manmade or naturally occurring object that poses a hazard to flight safety in and around airports.



Environmental Features (hazards, historic buildings, wetlands, etc.)

A key part of the airport planning process is analyzing the impact that the project will have on the natural environment, as well as the impact the natural environment may have on the project itself. Environmental features near runways may be hazardous if they attract wildlife or are tall and create an obstruction. Further, certain environmental features such as water bodies or wetlands may pose planning, engineering, and construction issues for airport projects. Of the 16 environmental categories analyzed per FAA Standard Operating Procedure (SOP) 5.1, only four environmental features currently exist on or very near system airports, which are streams, critical habitats for land animals, historic districts, and wetlands.

Aviation Issues

Understanding the issues facing Tennessee’s aviation industry and how it may impact users, airports, and airport sponsors is important in order to assess the system’s historical, current, and future performance. To help identify and provide context on some of the most important issues impacting the aviation industry in Tennessee, the graphic below provides an overview of the issues that airports, airport sponsors, and the advisory committee identified as most significant—affecting airports’ abilities to optimally support Tennessee aviation system users.

- 
Change to State Fuel Tax: An aviation fuel tax cap was passed under the 2015 Tennessee Laws Public Chapter 462. This cap meant that state funding for aviation projects decreased to its current level of approximately \$20 million.

- 
Competition: Tennessee has 78 airports in the state system, many of which are competing for the same finite amount of federal and state resources.

- 
Consumer Expectations: The modern airport user expects a seamless travel experience, including check-in and boarding conveniences and modern amenities.

- 
Funding: Tennessee’s airports must share a finite pool of state and federal funding. Additionally, while many of Tennessee’s airports are in the National Plan of Integrated Airport Systems (NPIAS), those that are not are ineligible for federal funding.

- 
Future Aircraft and Fuel Sources: Aircraft technology and fuel sources continue to change and adapt, meaning that airports and aviation professionals must change and adapt with them.

- 
Hangar Availability: Many of the state’s airports reported having a hangar shortage and stated that one of their top issues was the lack of funding to build additional hangars. Adequate hangar storage is important for service provision and growth at Tennessee’s airports.

- 
Industry Concentration: Airports are frequently supported by clusters of “aviation-reliant businesses,” or businesses that need to be located near an airport in order to conduct the essential functions of their business.

- 
Infrastructure Needs: Many of the state’s airports stated that one of their top issues was some type of infrastructure need. Functional infrastructure that meets the current and projected needs of an airport is important for an efficient aviation system.

- 
Natural Disasters: Preparing for, withstanding, and recovering from natural disasters such as tornadoes is critical to the overall wellbeing of Tennessee’s aviation system.

- 
Pandemics: COVID-19 has severely impacted air travel, and outcomes will likely continue to be felt in the ensuing months and years.

- 
Population Growth: Tennessee is experiencing rapid growth. With population growth comes the need to accommodate the needs of a greater number of travelers.

- 
Promotion and Marketing: Airports who do not engage in promotion and marketing may miss out on or lose existing users.

- 
Technology: Aviation technology is always changing. Changes needed to continue adapting and accommodating new technology are a concern.

- 
Urban Growth: Airports within Tennessee’s fast-growing cities need to accommodate increased growth and aviation demand, while airports on the outskirts need to prepare for “spillover” growth.

- 
Workforce: The number of licensed pilots and other individuals in the aviation workforce, such as mechanics and airport personnel, is falling.

TASP



T E N N E S S E E

Aviation System Plan

