



Classification White Paper

Minnesota Continuous State Aviation System Plan Phase I

April 10, 2019

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Minnesota Aviation System

The aviation system in Minnesota consists of over 380 public and private airports, seaplane bases and helipads throughout the state as depicted in Figure 1. These airports serve aviation needs of a wide array of users. While 135 of the over 380 airports receive state funding and comprise of the State Aviation System, the remaining airports and heliports are also an important part of the overall Minnesota aviation system.



Figure 1 – Minnesota Aviation System

Figure 2 depicts the various types of facilities that comprise of the aviation system.



Figure 2 – Publicly Funded Airports
 Source: MnDOT Office of Aeronautics

There are over fifty (50) seaplane bases in the aviation system. These seaplane bases do not include those that may be collocated with a state funded airport identified above (such as Baudette or Sky Harbor Airports). The seaplane bases include both privately and publicly owned seaplane bases. The seaplane bases in the system are shown in Figure 3.

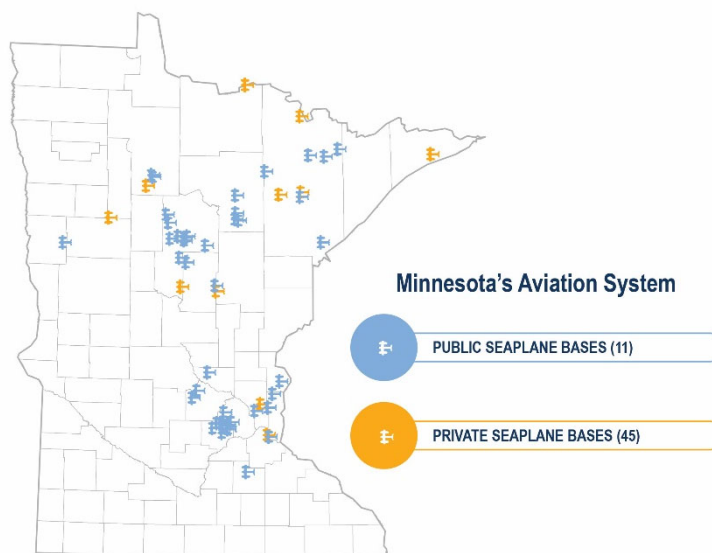


Figure 3 – Seaplane Bases
 Source: MnDOT Office of Aeronautics

Over 100 heliports are included in the aviation system. These heliports are frequently located at hospitals and provide aeromedical transportation. The system heliports are shown in Figure 4 and are separate from heliports that may exist on a state funded airport.

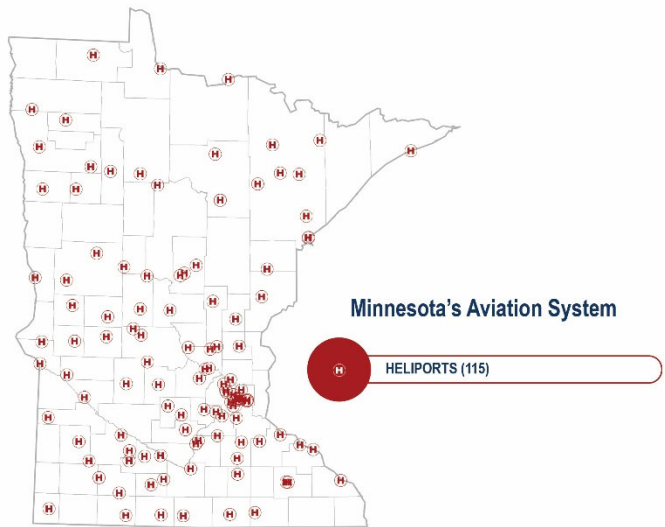


Figure 4 – Heliports

Source: MnDOT Office of Aeronautics

Additional paved and turf landing strip airports exist in the state system to serve aeronautical needs throughout the state. These airports are a mix of publicly and privately owned and use. Figure 5 depicts the airports that are a mix of public and private ownership and use.

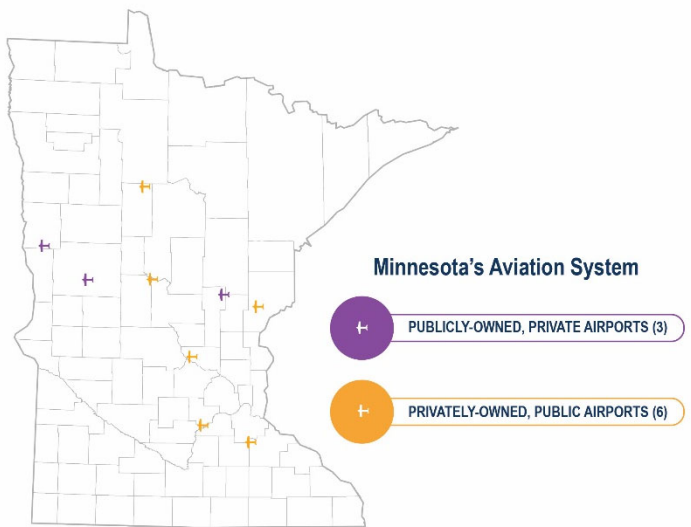


Figure 5 – Public and Private Mixed Ownership and Use Airports

Source: MnDOT Office of Aeronautics

Over sixty privately owned private use airports are included in the aviation system. These airports are depicted in Figure 6.



Figure 6 – Privately Owned and Private Use Airports
Source: MnDOT Office of Aeronautics

State Aviation System

MnDOT recognizes 135 airports in the State Aviation System. These airports are the publicly funded, public use airports as displayed in Figure 7 and are classified by into Key, Intermediate and Landing Strip Airports. This classification system is further discussed in Section 3.

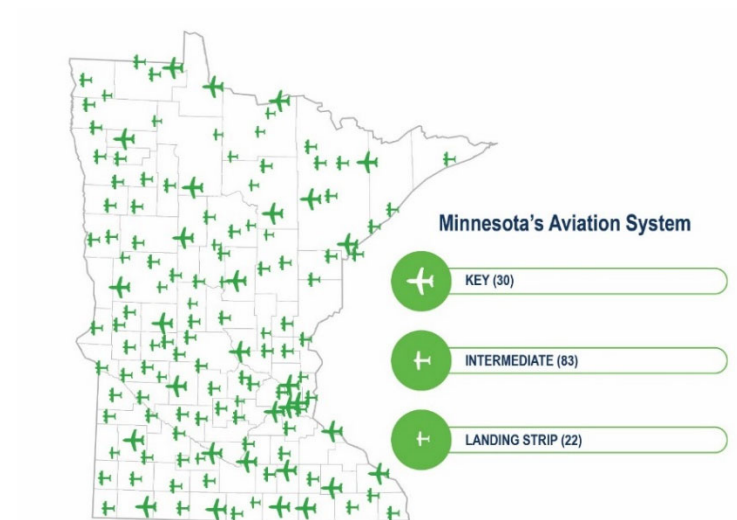


Figure 7 – Publicly Funded Airports
Source: MnDOT Office of Aeronautics

Existing Classification Systems

Airports are classified in various ways at both the federal and state levels. The existing classification systems are described below.

Federal Classification System

There are over 19,000 existing public and private airports (including airports, heliports, seaplane bases, ultralight, glideport, and balloonports) in the United States¹. The National Plan of Integrated Airport Systems (NPIAS) includes nearly 3,330 of the existing and proposed airports throughout the country. The plan includes all commercial service airports and select general aviation airports in the national system. The NPIAS documents the airports in the system, the role they serve and the federal investment needed for infrastructure improvements over the next five years. An airport must be included in the NPAIS in order to be eligible to receive a grant from the federal Airport Improvement Program. There are 96 NPIAS airports in Minnesota.

Airports in the NPIAS are grouped, by the FAA's authorizing statute, into two main categories: primary and non-primary.

Primary Airports

Primary airports are commercial service airports with over 10,000 annual passenger enplanements. Primary commercial service airports are further classified into large hub, medium hub, small hub and nonhub airports. The criteria for each classification is listed below:

- Large Hub – Receives 1.0 percent or more of the annual U.S. commercial enplanements
- Medium Hub – Receives 0.25 to 1.0 percent of the annual U.S. commercial enplanements
- Small Hub – Receives 0.05 to 0.25 percent of the annual U.S. commercial enplanements
- Nonhub – Receives less than 0.05 percent of the annual U.S. commercial enplanements but more than 10,000 annual enplanements.

In Minnesota, Minneapolis St. Paul International Airport (MSP) is considered a large hub airport. All other commercial service airports in the state are considered nonhub airports.

Non-Primary Airports

Non-primary airports primarily include general aviation airports but also include reliever airports and air carrier airports with 2,500 to 9,999 annual passenger enplanements (non-primary commercial service nonhub airports).

¹ As of May 2018, National Plan of Integrated Airport Systems (2019-2023)

Non-primary airports are grouped into five categories based on activity, geographic factors, and public interest functions. These categories include:

- **National** – These airports are located in metropolitan areas near major business centers and support flying both nationally and internationally.
- **Regional** – These airports are also located in metropolitan areas and serve relatively large populations and support regional economies. Travel to and from these airports tends to be interstate and also includes some long-distance flying and high activity levels.
- **Local** – These airports serve large population centers but may not be located in metropolitan areas.
- **Basic** – These airports link communities with the national airspace system and serve primarily private general aviation flying.
- **Unclassified** – These airports are those included in the NPIAS that have limited activity levels. Unclassified airports include those in the NPIAS with zero (0) to eight (8) based aircraft.

Existing State Aviation System Classification

Airports are also classified at the state level to better define the type of funding, eligible projects and service area needs for each airport within the state. Minnesota Statute (630.305 Subdivision 2) requires airports have a classification designation before any state expenditure of money can be used to assist the airport sponsor with airport projects.

Use of classifications for state airports is also recommended in FAA Advisory Circular (AC) 150/5070-7, *The Airport System Planning Process*. The Advisory Circular does not require use of the federal classification, however, each state should develop a system to measure each airport's role within the state.

The 2012 Minnesota State Aviation System Plan (SASP) divided the state's public airports into classifications, as directed by Minnesota Statute (360.305 Subdivision 3). The three classifications included in the 2012 SASP are: Key, Intermediate and Landing Strip Airports. The classifications are based on existing infrastructure at each airport. Airports change classifications when the length and type of runway changes.

Key Airports: Key Airports have a paved and lighted primary runway 5,000 feet or greater in length. Key Airports serve as the primary landing facilities for business jets, and are the only airport classification capable of supporting regularly scheduled airfreight and airline service. They are capable of accommodating most business jets, all single-engine aircraft and larger multi-engine aircraft. These airports tend to be located near larger population and economic centers. Key Airports often house corporate flight and maintenance divisions for major employers, allowing businesses to connect to national and some global markets directly. Some Key Airports also may have a collocated seaplane base. There are currently 30 Key Airports in the state's system.

Intermediate Airports: Intermediate Airports have a paved and lighted primary runway that is less than 5,000 feet in length and are capable of accommodating all single-engine aircraft, some multi-engine aircraft, and some small business jets. These airports serve as landing facilities for flight training, aircraft maintenance, and general aviation aircraft. Intermediate Airports serve many roles in communities ranging from emergency medical transports to manufactured parts distribution and enable direct connections across Minnesota and the Central

US region. Similar to Key Airports, some Intermediate Airports also may have a collocated seaplane base. There are currently 83 Intermediate Airports in the state's system.

Landing Strips: Landing Strips have one or more turf runways and can accommodate most single-engine aircraft and some twin-engine aircraft. This type of airport may be unusable during certain conditions such as wet weather, winter months, and during the spring. A key function of these airports is supporting the agricultural industry with crop seeding and spraying services. Landing Strips may also have a collocated seaplane base. There are currently 22 Landing Strip Airports in the state's system.

Assessment of Existing Classification System

The existing classification system has been in effect since 1974. As part of the Phase I 2020 SASP effort, multiple stakeholder groups were consulted through outreach meetings and events held throughout the process to evaluate the existing classification system and make recommendations for possible changes. The following groups were consulted and a series of outreach meetings were held to gather input on the classification system:

- MnDOT Aeronautics Staff
- SASP Advisory Committee (SAC)
- Technical Advisory Committee (TAC)
- Aviation Consultant Community Workshop

The following summarizes feedback received from stakeholders during the assessment of the existing classification system:

- Key Airports may benefit from being split into two categories in order to separate general aviation from commercial service roles.
- The Intermediate classification includes a wide variety of airport sizes, roles, and uses. This classification may benefit from being divided further.
- Publicly-owned public-use seaplane bases are not adequately addressed in the existing classification system. Although none exist today, they may in the future and inclusion may be beneficial.
- The classification system should include reference to the airport's role in the aviation system.
- There may be other beneficial ways MnDOT could utilize classification in the future. Examples identified included how classification could influence project funding eligibility, funding rates or priorities.
- The FAA ASSET categorization system (the categories of nonprimary airports) classifies airports differently, but may not be applicable to the SASP classification system.
- The classification names should invoke a clear hierarchy. For example, it is hard to conceptualize the difference between the categorization names of 'Basic' and 'Local' in the NPIAS nonprimary categories.
- There may be benefits in classifying airports based on more than just runway length.

Alternatives Considered

Several alternatives to the classification of the State Aviation System Airports were considered in the Phase I 2020 SASP process. These alternatives were developed based on stakeholder feedback but were not chosen for implementation:

- **No Change:** MnDOT considered continued use of the existing classification system (Key, Intermediate, and Landing Strip). This alternative would reduce the need to adopt a new classification system; however, it did not adequately address stakeholder feedback regarding the wide range of roles in the Key and Intermediate Airport classifications. In addition, adoption of the existing classification system did not easily allow for inclusion of seaplane bases other than including them in an existing classification.
- **Adoption of the NPIAS Classifications:** Adoption of the NPIAS classification of airports was considered. The role descriptions and activity criteria for each category could be applied to each airport in the system. Stakeholder feedback indicated that there are many different roles and uses within the large number of Local and Basic airports that would result. Outside of the Twin Cities Metropolitan airport, most general aviation airports would be classified as Local or Basic. Using only two categories for the wide range of roles and uses of these airports would not adequately classify the airports. In addition, stakeholders felt the names of the categories did not invoke a clear hierarchy and may be confusing.

Proposed Classification Changes

The following are the proposed changes to the airport classification system. The typical role for each classification is also described. It is important to note that in addition to serving the specified role, each classification typically also serves the roles of the lower classifications. For example, an Intermediate Airport often may concurrently serve the role of a Landing Strip Airport.

Key Airports

The 2012 SASP defines Key Airports as airports with a paved and lighted primary runway at least 5,000 feet in length. Minnesota Administrative Rules Chapter 8800 currently requires runways 4,900 feet or longer to be considered an “Other Than Utility Runway” (requiring a 34:1 approach slope). MnDOT proposes to revise the bottom limit of the Key Airport classification to 4,900 feet to correspond with the Minnesota Rules requirement for runways to be Other Than Utility once they reach a length of 4,900 feet. Currently, the longest non-Key Airport’s primary runway is 4,794 feet long so this change is not expected to impact any airport’s existing classification. However, there are several airports who are currently planning for a 4,900-foot long runway on their Airport Layout Plan. This change may impact the long-term plans for those airports.

MnDOT proposes subdividing the Key classification into two groupings – those with commercial air service and those without – through development of a Key Commercial Service classification and a Key General Aviation classification. Key Commercial Service Airports would be defined as airports with a Part 139 certificate and a paved runway of at least 4,900 feet. Key General Aviation Airports would be defined as general aviation airports with a paved runway of at least 4,900 feet.

Figure 8 summarizes the proposed changes to the Key Airport classification.

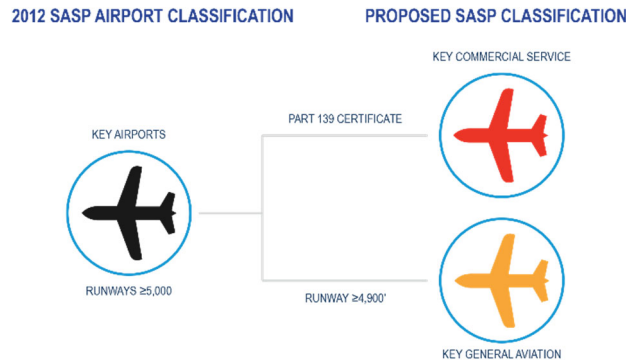


Figure 8 – Proposed Key Airport sub-Classifications

Proposed Role

Key Commercial Service

Key Commercial Service Airports serve the same role as Key General Aviation and also support regular airline service and the movement of commercial passengers.

Key General Aviation

Key General Aviation Airports serve as the primary landing facilities for general aviation jets. They are capable of accommodating most business jets, all single-engine aircraft, and larger multi-engine aircraft.

These airports tend to be located near larger population and economic centers, and are often used for business and air freight activities. Key Airports enable direct connections to national and some global markets.

Intermediate Airports

The 2012 SASP defines Intermediate Airports as airports with paved and lighted runways less than 5,000 feet. Existing primary runway lengths for this classification range from 2,522 feet to 4,794 feet. This classification includes a wide range of airport sizes, roles, and activity levels. It was determined that subdividing this classification would better group similar airports within the Intermediate classification.

Many factors determine the appropriate runway length needed to accommodate a family of aircraft at each airport. These factors include airport elevation (above mean sea level), temperature, wind velocity, aircraft weight, runway surface condition, effective runway gradient, and aircraft flap settings. Some factors can be mitigated based on the conditions surrounding the airport. The need at each airport should be reviewed on an individual basis during a master plan update.

The FAA runway length guidance is contained in AC 150/5325-4B, Runway Length Requirements for Airport Design. Not all factors can be accounted for when looking at a runway length in general, however, the AC takes

into consideration the mean maximum temperature and airport elevation when evaluating recommended runway lengths at an airport.

In order to better understand potential groupings of airports within the Intermediate Airports classification, MnDOT consulted the FAA runway length guidance contained in the AC. The length recommendations in Table 1 were developed using the average mean maximum temperature for Minnesota, as well as the average airport elevation for the State.

Aircraft Type	Runway Length
Small Airplanes with Approach Speeds <50 knots	893'
Small Airplanes with Approach Speeds >50 knots	
Small Airplanes with <10 Passenger Seats	
95% of these Small Airplanes	3,300'
100% of these Small Airplanes	3,900'
Small Airplanes with ≥10 Passenger Seats	4,250'
Elevation: 1,168' MSL Temperature: 81.18°F (Average of MN System Airports)	

Table 1 – FAA Recommended Runway Lengths - Minnesota Average Conditions

Source: AC 150/5325-4B, Runway Length Requirement for Airport Design

Intermediate Airports serve primarily small aircraft with approach speeds of greater than 50 knots as their primary critical aircraft. Therefore, MnDOT focused on these lengths in determining potential break points within the Intermediate classification.

Typically, general aviation airports serving small aircraft in Minnesota are able to use the 95 percent of small aircraft recommended runway length. FAA AC 150/5325-4B indicates that this recommendation is relevant to use for airports serving medium sized population communities with diverse usage. This length recommendation also includes airports primarily intended to serve low-activity locations, small population communities and remote recreational areas.

The 100 percent of fleet curve is typically reserved for use in communities located on the fringe of a metropolitan area or relatively large population areas remote from a metropolitan area. Typically, this runway length curve is not applicable for general aviation airports serving small aircraft outside of the Twin Cities Metropolitan area.

The runway length recommendations for small aircraft with 10 or more passenger seats, such as a King Air 200, would be applicable for Intermediate Airports serving these larger small aircraft.

Figure 9 compares the FAA recommended runway lengths in FAA AC 150/5325-4B for the average Intermediate Airports in Minnesota (based on average elevation and mean maximum temperature of Minnesota airports). The lengths depicted represent both the length recommended to accommodate 95 percent of small aircraft (aircraft of 12,000 pounds or less maximum takeoff weight) and the length recommended to accommodate small aircraft with more than 10 passenger seats. The chart also depicts the midpoint between these two lengths, which is 3,800 feet.

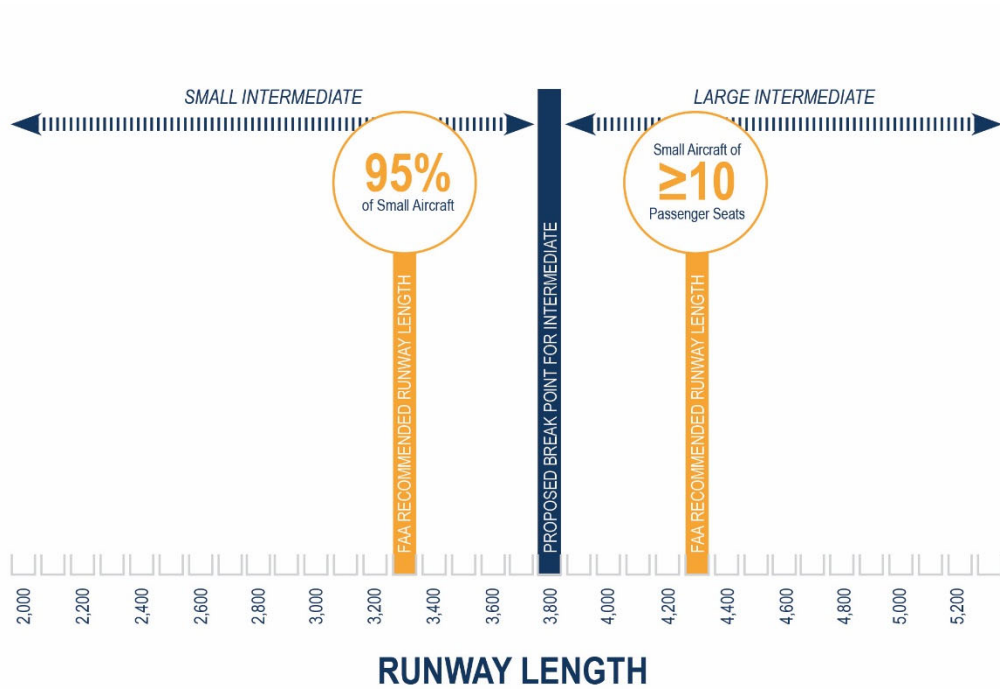


Figure 9 – FAA Recommended Runway Lengths for Existing Intermediate Airports

Figure 10 was developed to compare the FAA recommended runway lengths to the actual Intermediate Airport runway lengths across Minnesota. The total number of airports having the indicated runway length are shown on the right Y axis and the normal distribution of runway lengths is shown in the blue bell curves and the left Y axis.

The existing runway lengths of Intermediate Airports cluster around the recommended lengths for 95 percent of small aircraft and small aircraft with 10 or more passenger seats (3,300 feet and 4,250 feet respectively).

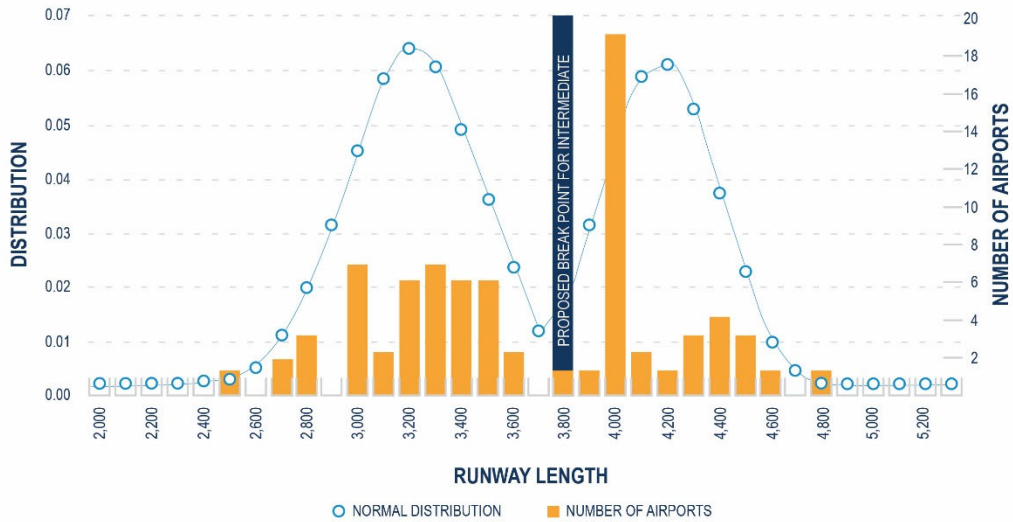


Figure 10 – Intermediate Airports Runway Lengths

Figure 10 notes a natural division between groupings of Intermediate runway lengths across Minnesota. MnDOT proposes 3,800 feet as the dividing line for the Intermediate classification into Intermediate Small and Intermediate Large. Runway lengths less than 3,800 feet typically cluster around the FAA recommended lengths for 95 percent of small aircraft, and runways more than 3,800 feet in length cluster around the FAA recommended length for small aircraft with ten or more passenger seats.

MnDOT proposes that Intermediate Small Airports be defined as airports with a paved runway less than 3,800 feet and Intermediate Large Airports be defines as airports with paved runways of at least 3,800 feet up to but not including 4,900 feet.

Figure 11 summarizes the proposed changes to the Intermediate classification.

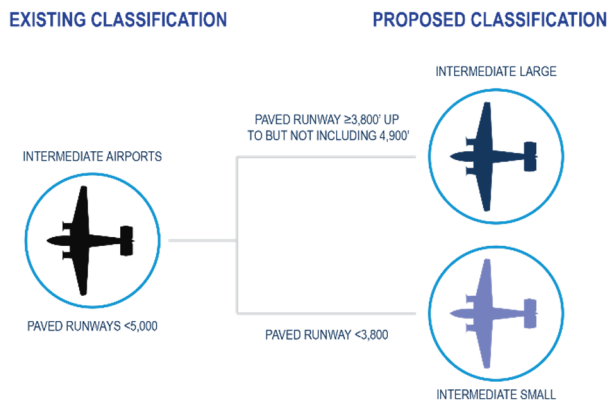


Figure 11 – Proposed Intermediate Sub-Classifications

Proposed Role

Intermediate Small

Intermediate Small Airports primarily accommodate small single- and multi-engine aircraft with less than 10 passenger seats. Airports in this classification may occasionally be used by aircraft with more than 10 passenger seats.

Intermediate Small Airports often serve as landing facilities for recreational flights, flight training, emergency medical transports, business flights, agricultural flights, and other general aviation uses.

Intermediate Small Airports enable direct connections across Minnesota and the Central US region.

Intermediate Large

Intermediate Large Airports primarily accommodate small single and multi-engine aircraft including small aircraft with more than 10 passenger seats. Airports in this classification may occasionally be used by small jets.

Intermediate Large Airports serve as landing facilities for recreational flights, flight training, emergency medical transports, business flights, agricultural flights, cargo distribution, and other general aviation uses.

Intermediate Large Airports enable direct connections across Minnesota and national markets.

Landing Strips

As defined in the 2012 SASP, Landing Strips have one or more turf runways. The outcome of the review of the existing classifications determined seaplane bases should be added and specifically identified within the updated system plan. MnDOT recommends revising the landing strip classification to be defined as airports with an unpaved primary runway or seaplane bases.

Seaplane bases that are not part of an airport with a paved runway would be in this classification. Airports with a seaplane base and a paved runway would continue being classified based on the paved runway at the airport. Although there are no publicly-owned public-use seaplane bases (without a corresponding paved landing area) currently in the State, this revision will provide for classification of these facilities should they develop.

MnDOT proposes to divide the Landing Strip classification into two sub-classifications. Landing Strip Turf Airports would be those with a turf primary runway while Landing Strip Seaplane Base would be seaplane bases that do not have a co-located hard surface landing area.

Figure 12 summarizes the proposed changes to the Landing Strip classification.

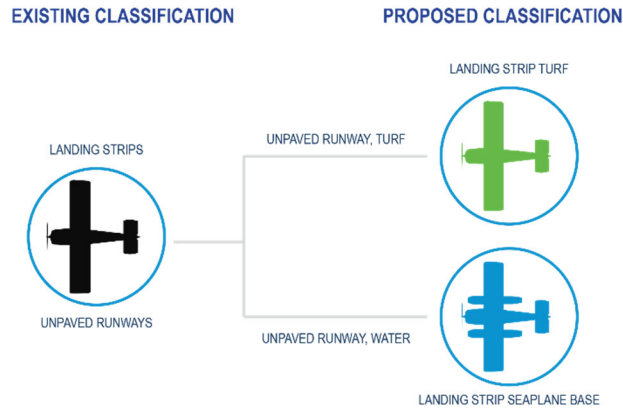


Figure 12 – Proposed Landing Strip Sub-Classifications

Proposed Role

Landing Strip Turf

Airports with unpaved primary runways accommodate single-engine aircraft and some multi-engine aircraft. This type of airport may be unusable during certain conditions such as wet weather, winter months, and during the spring melt. A key function of these airports is supporting the agricultural industry with crop seeding and spraying services, as well as recreational aviation uses.

Landing Strip Seaplane Base

Seaplane bases accommodate both single-engine and multi-engine seaplane users. Key functions of seaplane bases include recreational use and providing access points to remote areas only accessible by seaplane.

Documentation of Classification and Airport Role

Through the outreach completed while assessing prior system planning efforts, it was determined the SASP could better describe a classification's, as well as an individual airport's, role in the system. The following roles are examples of those that can be used in subsequent phases of the SASP to describe an airport or a classification's typical role. Additional roles can be developed and incorporated into the plan and the continuous planning model. Icons will be developed in Phase 2 to correspond to each role.

- Agricultural – Agricultural flying includes aerial spraying and surveillance by aircraft, helicopters and drones. This agricultural spray industry also provides public health application services for mosquito reduction.
- Medical – Aircraft transport patients and medical personnel throughout the state on both aircraft and helicopters.
- Recreational – Many pilots throughout the state fly general aviation aircraft for recreational, or personal, purposes.

- Business – Business aviation includes the use of general aviation aircraft for business purposes. Business aircraft include aircraft, seaplanes and helicopters. Drones are also a growing type of business aircraft use.
- Airline Service – Airline service includes scheduled commercial passenger service.
- Military – Military aviation includes the use of aircraft for military uses.
- Firefighting – Aviation plays a critical role in firefighting through use of airplanes and helicopters. These aircraft assist in fire surveillance and aerial application during fire conditions.
- Law Enforcement – Law enforcement use of aviation includes surveillance, drug enforcement, disaster relief, and other uses.
- Search and Rescue – Aviation aids in search and rescue efforts through the use of airplanes, helicopters and drones.
- Flight Training – Flight training includes the training of commercial and recreational aircraft and remote pilots.
- Cargo – Cargo aviation transports freight, parts and packages to communities throughout the state on general aviation and commercial airline aircraft.