Chapter 2: Airport Categories

2.0 Introduction

The airport system envisioned by the Indiana General Assembly in 1945 (when it first created the Aeronautics Commission of Indiana) has been developed and fostered by close cooperation with airport sponsors, local agencies, and the Federal Government. Today, each ISASP airport is unique in terms of available facilities, services, and user base. However, just as Indiana's highway system serves a wide spectrum of customers ranging from commercial 18-wheel semitrailer trucks to private passenger vehicles, our airport system serves users ranging from small, single-engine aircraft to large commercial jets. In order to bring organization to an aviation system that includes 68 airports and one heliport, these facilities have been organized into general categories based on their characteristics. This Chapter reviews the categories established by the 2003 system plan, and establishes new categories for the 2012 system plan update that reflects the evolving roles of this diverse system.

2.1 2003 Categories

The previous system plan update established five groups of ISASP airports: Large, Corporate Class, Urban General Aviation, Regional General Aviation, and Local General Aviation. These groups were based largely upon six different characteristics:

- The presence of an Air Traffic Control Tower (ATCT) at the airport,
- The presence of commercial airline passenger service,
- The length of the primary runway,
- The type of instrument approach procedure,
- The location of the airport within a Metropolitan Statistical Area (MSA), and
- The airport's classification in the National Plan of Integrated Airport Systems (NPIAS).

Table 2-1 outlines the criteria for the 2003 ISASP airport categories.

Table 2-1: 2003 ISASP Categories and Criteria

	Large	Corporate Class	Urban General Aviation	Regional General Aviation	Local General Aviation
Air Traffic Control Tower	Yes	Some	No	No	No
Commercial Passenger Service	Yes/Recent	No	No	No	No
Runway Length (feet)	6,500+	5,000+	4,000 – 4,999*	4,000 – 4,999	<4,000
Approach	Precision	Precision/ Nonprecision	Nonprecision	Nonprecision	Nonprecision
Metropolitan Statistical Area(MSA)	Yes	Some	Yes	No	Some
NPIAS Class	Most Primary	Reliever/ General Aviation	Reliever/ General Aviation	General Aviation	General Aviation

**Indianapolis Metropolitan has a runway length of 3,860 feet, but is a reliever*
Source: Aerofinity, Inc., 2003

2.2 2012 Categories

While the ISASP has maintained uniquely defined categories for airports throughout its history, the federal government has also maintained its own classification systems. Historically, the Federal Aviation Administration (FAA) has used the NPIAS as the guiding document that has identified specific classification of airports. The most recent edition of that study is entitled *Report to Congress – National Plan of Integrated Airport Systems (NPIAS) 2013-2017*. In 2012, the FAA published a new document entitled *General Aviation Airports: A National Asset* that provides a new classification system for general aviation airports. The federal classification for an airport can sometimes overlap in these two documents. In order to provide an understanding of how Indiana's airports fit into the national airport system, the FAA airport categories are discussed below before a new ISASP category structure is presented.

2.2.1 FAA Airport Categories

2.2.1.i National Plan of Integrated Airport Systems (NPIAS)

Today, airports across the country function as an interrelated system. To coordinate and fund this system, the FAA developed and annually updates the NPIAS. Today, the NPIAS consists of a system of more than 3,300 existing and proposed airports that the FAA considers significant to the national air transportation network. When first established, one of the goals of the NPIAS was to provide convenient access to air transportation to as many people as possible, typically not more than 20 miles of travel or 30 minutes to the nearest NPIAS airport.

The goals of the NPIAS today are more defined and refined, including being permanent while also being flexible, expandable, and compatible with surrounding communities. The NPIAS generally categorizes Indiana's airports as either primary or non-primary in the following ways:

Primary:

Primary commercial service – airports that experience more than 10,000 annual airline passenger enplanements.

Non Primary:

Non-primary commercial service – airports that experience at least 2,500 annual airline passenger enplanements, but less than 10,000.

Reliever – airports that are labeled by the FAA as providing congestion relief for non-commercial traffic to a congested primary commercial service airport.

General aviation – airports that do not fall into any of the above categories.

2.2.1.ii General Aviation Airports: A National Asset (ASSET)

In May 2012, the FAA published *General Aviation Airports: A National Asset.* In this report, the FAA produced another categorization system for all non-primary airports and called them all General Aviation (GA) airports. The report states that a GA airport provides "a variety of functions, ranging from access for emergency medical services, disaster relief, aerial firefighting, law enforcement and border control to agricultural functions, flight training, charter passenger and time-sensitive air cargo services, among others."[1] The report also includes an in-depth analysis that highlights the pivotal role non-primary airports (or GA airports) play in our society, economy, and the aviation system. The report details four new categories for GA airports—national, regional, local, and basic—based on their existing activity levels:

- National – "Supports the national and state system by providing communities with access to national and international markets in multiple states and throughout the United States."[2]
- Regional – "Supports regional economies by connecting communities to statewide and interstate markets."[2]
- Local – "Supplements local communities by providing access primarily to intrastate and some interstate markets."[2]
- Basic – "Supports general aviation activities such as emergency service, charter or critical passenger service, cargo operations, flight training, and personal flying."[2]

Each classification has unique criteria that airports must meet to be included. **Table 2-2** outlines the criteria for each category, while **Table 2-3** lists each of the 69 facilities in Indiana's aviation system in their respective FAA airport categories.

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[1] *FAA Launches Study of General Aviation Airports*, Federal Aviation Administration, http://www.faa.gov/news/updates/?newsId=63927&omniRss= news_updatesAoc&cid=101_N_U, 7, accessed 2-25-13.
[2] *General Aviation Airports: A National Asset,* Federal Aviation Administration, May 2012.

Table 2-2 – 2012 ISASP Categories and Criteria

National	Regional	Local	Basic
• 5,000+ instrument operations, 11+ based jets, 20+ international flights, or 500+ interstate departures; or • 10,000+ enplanements and at least 1 charter enplanement by a large certificated air carrier, or • 500+ million pounds of landed cargo weight	• Metropolitan Statistical Area (Metro or Micro) and 10+ domestic flights over 500 miles, 1,000+ instrument operations, 1+ based jet, or 100+ based aircraft; or • The airport is located in a metropolitan or micropolitan statistical area, and the airport meets the definition of commercial service	• 10+ instrument operations and 15+ based aircraft; or • 2,500+ passenger enplanements	• 10+ based aircraft; or • 4+ based helicopters; or • The airport is located 30+ miles from the nearest NPIAS airport; or • The airport is identified and used by the U.S. Forest Service, or U.S. Marshals, or U.S. Customs and Border Protection (designated, international, or landing rights), or U.S. Postal Service (air stops), or has Essential Air Service; or • The airport is a new or replacement facility activated after January 1, 2001; and • Publicly owned or privately owned and designated as a reliever with a minimum of 90 based aircraft

Source: *FAA General Aviation Airports: A National Asset, 2012.*

Table 2-3 – 2012 ISASP Airports by Category

Primary	National	Regional	Local	Basic
Ft. Wayne Intl. Indianapolis Intl. South Bend Rgnl. Evansville Rgnl.	Gary/Chicago Intl.	DeKalb Co. Monroe Co. Columbus Muni. Elkhart Muni. Goshen Muni. Huntingburg Eagle Creek Indianapolis Metro Indianapolis Rgnl. Indianapolis Exec. Clark Co. Purdue University Marion Muni. Delaware Co. Porter Co. Muni. Warsaw Muni.	Anderson Muni. Steuben Co-Tri State Virgil L. Grissom Brazil-Clay Co.* Crawfordsville Muni. Smith Field Putnam Co. Greensburg-Decatur Co. Griffith-Merrillville* Huntington Muni. Hendricks Co. Greenwood Muni. Kendallville Muni. Starke Co. Kokomo Muni. LaPorte Muni. Madison Muni. Michigan City Phillips White Co. New Castle-Henry Co. North Vernon Muni. Paoli Muni. Peru Muni. Plymouth Muni. Portland Muni. Jasper Co. Richmond Muni. Salem Muni. Freeman Muni. Shelbyville Muni. Sheridan* Sullivan Co. Terre Haute Intl. Wabash Muni. Daviess Co.	Clinton* Mettel Field Delphi Muni. Frankfort Muni. French Lick Muni. Ind. Downtown Heliport Kentland Muni. Boone Co* Logansport Muni. Perry Co. Muni. Arens Field Randolph Co. Fulton Co.

*These airports are not currently classified by the FAA's *General Aviation Airports: A National Asset* study as they are privately owned, public use airports, except for Brazil-Clay Co. which is publicly owned but new to the NPIAS. For the ISASP, these airports have been classified as if they were publicly owned or existing within the NPIAS already.

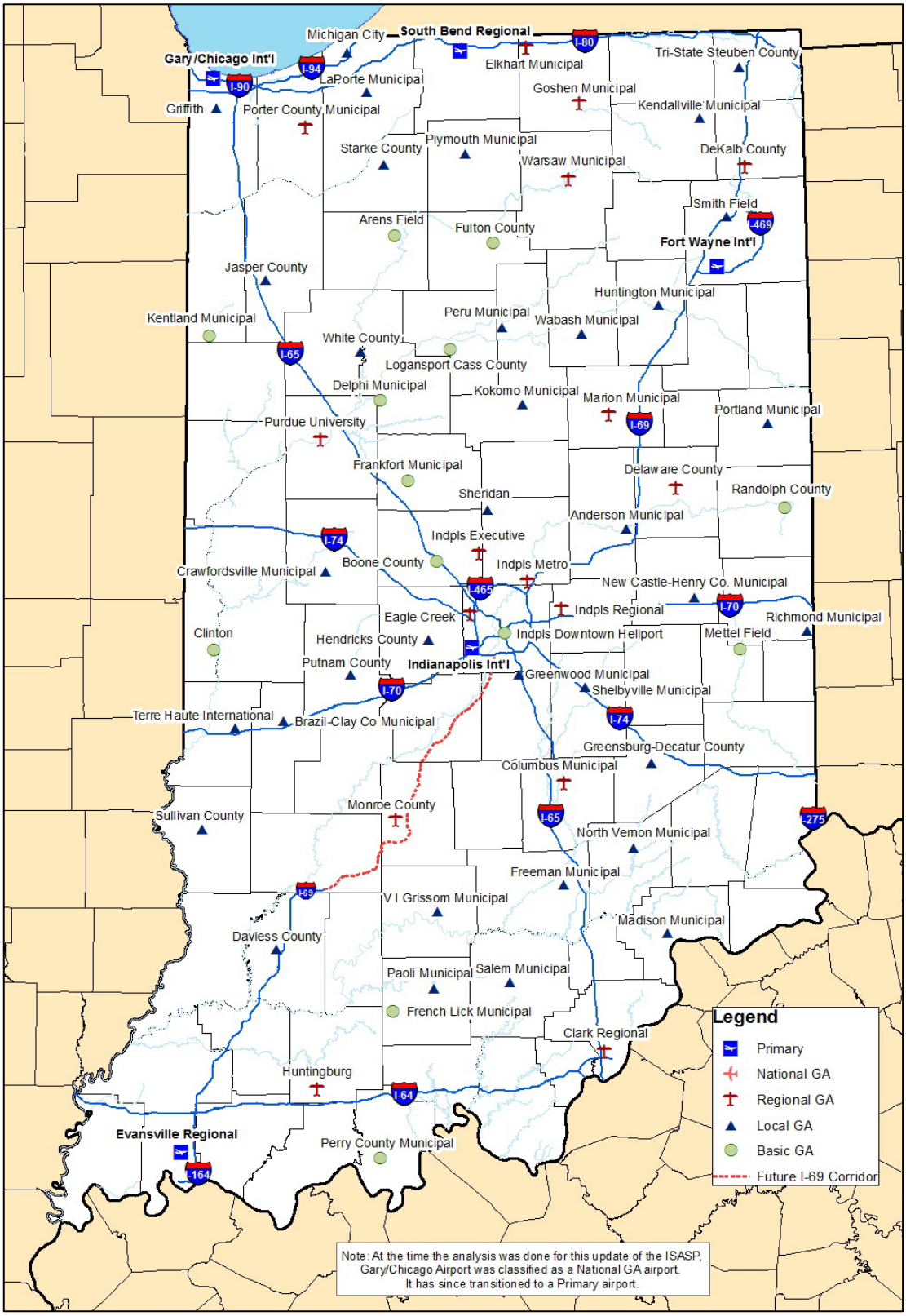
2.2.2 INDOT Airport Categories

In order for this update of the ISASP to coincide with the FAA airport categories at the national level, the classification system established by the FAA was adopted at the state level. Utilizing the same categories simplifies planning tasks and minimizes confusion that is often caused by multiple classification systems.

Figure 2-1 shows the location of each of the 69 facilities in Indiana's aviation system, and the category under which each is classified. This figure and the preceding tables represent the airports as they exist

in a particular point in time. Because the aviation system is always changing and adapting to users' needs and technological advances, the ISASP is intended to be a fluid document and will be maintained digitally with continuous updates to reflect these changes. The information provided here is up-to-date based upon the time that each analysis was performed. The airport categorization figures and tables are current as of the first publication of ASSET in 2012.

Figure 2-1 – Classifications of Indiana's Aviation System Facilities



2.3 Level 1 Service Requirements by Airport Category

Indiana's system of airports is actually more diverse than the categories developed by the FAA. To better evaluate the airports in the context of the services they provide, INDOT developed two levels of service within each of the five FAA categories and established criteria for each.

The services that an airport provides are fundamental to maintaining existing and attracting new customers. Therefore, the services that impact an airport's level within a category were established with input from an Aviation Industry Advisory Committee assembled for this update of the ISASP (see **Appendix A**). The criteria eventually chosen included items considered by INDOT to be essential for a superior aviation system. **Table 2-4** outlines the items chosen for level one classification for each airport category. If an airport does not meet the Level 1 requirements, it automatically becomes a Level 2 airport.

Table 2-4: Level 1 Requirements by Airport Category

LEVEL 1 REQUIREMENTS	PRIMARY	NATIONAL	REGIONAL	LOCAL	BASIC
Minimum Standards	√	√	√	√	√
Pavement Maintenance Management Program	√	√	√	√	√
Weather Reporting	√	√	√	√	√
Runway Lights	High Intensity Rwy Lights	Medium Intensity Rwy Lights	Medium Intensity Rwy Lights	Medium Intensity Rwy Lights	Low Intensity Rwy Lights
Full Parallel Taxiway	√	√	√	√	
24 Hr. Fuel Availability	√	√	√	√	
Taxiway Lights	√	√	√	√	
OTHERWISE LEVEL 2					

2.3.1 Minimum Standards for Commercial Aeronautical Activities

Establishing and maintaining minimum standards that promote safety in all airport activities is an important element to a safe and efficient aviation system. Minimum standards help protect airport users from unlicensed and unauthorized products and services, maintain and enhance the availability of adequate services for all airport users, promote the orderly development of airport land, and ensure

efficiency of operations. [3] Because minimum standards for commercial aeronautical activities promote safety for airport users, they were included as a criterion for all airport categories.

2.3.2 Pavement Maintenance Management Programs

Since the state has such a significant resource in the physical pavements found at the airports throughout the system, taking an active role in maintaining them was determined to be critical to the Level 1 criteria. Pavement maintenance is a safety issue in addition to being a significant expense. Pavement maintenance management programs help protect Indiana's airport investments by preserving our runways, taxiways, and aprons for safe and efficient use by aircraft. Deferring pavement maintenance (e.g., crack sealing) adds to the rising backlog of airport development needs presented to INDOT each year in the form of capital improvement program grant requests (see Chapter 5: Funding). While maintaining a safe operating environment is the primary objective for implementing a preventative maintenance program on airports, overall funding needs can also be reduced by extending pavement life. FAA Advisory Circular (AC) 150/5380-7A *Airport Pavement Management Program* provides guidance to airport sponsors on how to develop and implement a pavement management program. These programs can provide procedures for establishing facility policies, setting priorities and schedules, allocating resources, and budgeting for pavement maintenance and rehabilitation. They can quantify information and provide specific recommendations for actions required to maintain an airport's pavement network at an acceptable level of service, while minimizing the cost of maintenance and rehabilitation. Because implementation of a pavement maintenance management program increases airport safety and pavement longevity, it was included as a criterion for all airport categories.

2.3.3 Weather Reporting

The introduction of the Global Positioning System (GPS) into airport instrument approach procedures has made all of the ISASP airports more accessible during inclement weather by providing lower minimum visibility and cloud ceiling heights than ever before. As a result, the availability of local airport weather at all ISASP airports is necessary to receive the full benefit of our airport system. Weather reporting equipment such as Automated Surface Observing Systems (ASOS) and Automated Weather Observing Systems (AWOS) provide accurate, on-site airfield conditions such as visibility, ceiling height, atmospheric conditions, wind speed, wind direction, and barometric pressure that are essential to pilots

[3] Federal Aviation Administration Advisory Circular 150/5190-7, *Minimum Standards for Commercial Aeronautical Activities*, page 3.

in planning a flight. Because advances in technology have made ISASP airports more accessible during inclement weather, weather reporting was chosen as a criterion for all airport categories.

2.3.4 Runway Lights

Landing at night is essential in today's aviation environment. Runway lighting is used to define the edges of a runway during nighttime and low visibility conditions. Runway lighting is classified into three types of systems based upon illumination intensity and level of control: High Intensity Runway Lighting (HIRL), Medium Intensity Runway Lighting (MIRL), and Low Intensity Runway Lighting (LIRL). HIRL systems offer pilots the greatest lighting intensity and control, while LIRL systems have a single illumination setting. Because runway lighting is essential for nighttime landing, it was chosen as a criterion for all airport categories; however, the level of lighting required for Level 1 standards varies with each category. High intensity is required for Level 1 status for Primary airports, medium intensity for National, Regional, and Local airports, and low intensity for Basic airports.

2.3.5 Full Parallel Taxiway

Parallel taxiways increase the safety and capacity of an airport by allowing aircraft to exit the runway after landing as opposed to back taxiing on the runway to get to the terminal area. Parallel taxiways are generally aligned parallel to a runway and are designed to minimize the time an aircraft occupies the runway when maneuvering before takeoff or after landing. A full parallel taxiway system (or equivalent) was chosen as a criterion for Primary, National, Regional, and Local airports because these airports generally have enough aircraft and instrument operations to make the absence of a parallel taxiway a concern for both efficiency and safety.

2.3.6 24-Hour Fuel Availability

An essential service for aircraft operations is the availability of aircraft fueling facilities. It is important that fuel is available for pilots 24/7 as many flights occur outside of what may be considered standard operating or staffing hours. The ability to obtain fuel round-the-clock was chosen as a criterion for Primary, National, Regional, and Local airports. Availability could be in the form of a self-service credit card system or an on-call employee who could be available within one hour.

2.3.7 Taxiway Lights

Taxiway lighting is utilized to illuminate the edge of taxiways in nighttime and low-visibility conditions. Taxiway lighting systems offer varying ranges of illumination intensity and level of control, similar to

runway lighting systems. Three types of standard taxiway lighting systems are found throughout the aviation system: High Intensity Taxiway Lighting (HITL), Medium Intensity Taxiway Lighting (MITL), and Low Intensity Taxiway Lighting (LITL). HITL systems offer the greatest range of illumination intensity and control, while LITL systems are equipped with a single illumination setting. A taxiway lighting system was chosen as a criterion for Primary, National, Regional, and Local airports because they add an increased level of safety and situational awareness for these busier airports. For the purposes of this ISASP update, an airport is considered to meet this criterion if it has any type (LITL, MITL, or HITL) of taxiway lighting.

2.4 Recommendations by Airport Category

While it is desirable for each airport to strive for the best infrastructure and service level feasible, there are minimum recommendations that are logical for each category of airport. Because the roles vary for each of the airport categories, so too should the development recommendations. This section of the ISASP identifies infrastructure that should ideally be available at airports in the five role categories. It is important to note that the infrastructure identified are recommendations and not requirements. It is possible that an airport may, for a variety of reasons, be unable to meet the infrastructure recommended. An airport's inability to meet the recommendations for its category does not necessarily prevent it from performing the role of that category within the system. It is also important to note that the recommendations presented are minimums, and achieving a higher level of service may be justified at an airport within a particular category depending on its unique needs and opportunities.

2.4.1 INDOT Minimum Service Level Recommendations

The minimum service level recommendations for each airport category are shown in **Table 2-5** and detailed in the following paragraphs. Some of these recommendations are applicable to specific runways and not the airport as a whole; consequently, some are targeted as a minimum for one end of the airport's primary runway. As stated earlier, attaining greater than the minimum recommendation may be justified based on local conditions. Some of the other recommendations are focused on the airport as a whole. For example, perimeter fencing is recommended for all airport categories in order to separate the airport environment from inadvertent access by the general public and to reduce wildlife encounters between aircraft and animals. Airport overlay zoning or coordination between the airport and the local zoning board is also recommended for all airport categories. Tall structure zoning, compatible land use zoning, and/or zoning board coordination (e.g., memorandums of understanding) all help protect the significant public investments made in these facilities by controlling encroaching development and incompatible land uses around airports. The inclusion of the airport in a comprehensive plan (or other local/community land use planning document) also helps protect an airport from development

encroachment and incompatible land uses. The establishment of zoning and land use coordination offers airports protection from activities that could impact the operation and full utility of the facility. These efforts also assist in guiding public policy and community development that prevents land uses with high concentrations of people, wildlife attractants, and visual obstructions (such as smoke or steam), to be located in close proximity of an airport.

Table 2-5 – INDOT Minimum Service Level Recommendations

INDOT MINIMUM SERVICE LEVEL RECOMMENDATIONS[1]	PRIMARY	NATIONAL	REGIONAL	LOCAL	BASIC
Primary Runway Length (ft.)	7,000	7,000	5,000 - 7,000	3,400 - 5,000	3,400
Primary Runway Strength (SW[2] or DW[3])	100,000 SW 175,000 DW	100,000	60,000	30,000	12,500
Primary Runway Grooving[4]	Grooving	Grooving	Grooving	Grooving	
Primary Runway End Identifier Lights[5]*	REILs (If no AL)	REILs (If no AL)	REILs (If no AL)	REILs	
Primary Runway Visual Slope Indicators[6] * or Approach Lights[7] *	AL	AL	VSI or AL (Recommended)	VSI	
Perimeter Fencing	Fencing	Fencing	Fencing	Fencing	Fencing
Zoning or Land Use Coordination	Zoning/Coord.	Zoning/Coord.	Zoning/Coord.	Zoning/Coord.	Zoning/Coord.

NOTES, ACRONYMS, AND GLOSSARY

1 The following recommendations represent the minimum goal for at least one end of the primary runway. Attaining greater may be justified.
2 SW – Single wheel gear.
3 DW – Dual wheel gear.
4 Grooving – Runway grooves are small linear cuts on a runway pavement surface that provide a way for water to escape under aircraft tires traveling at high speed, reducing the hydroplaning effect when water is present on a runway. These grooves allow aircraft to maintain a higher degree of contact with the pavement surface when standing water is present to provide sufficient directional and braking control.
5 REILs – Runway end identifier lights generally provide rapid and positive identification of the end of the runway to the pilot.
6 VSI – Visual slope indicators – generally provide visual glide slope guidance to pilots in non-precision approaches environment.
7 AL – approach lights generally provide the basic means for the pilot to transition from instrument flight to visual flight for landing. They can provide the pilot with visual information on runway alignment, height perception, role guidance, and horizontal references during these times.
* Recommendation for minimum of one (1) runway end.

2.4.1.i Primary Airports

The length of a runway at an airport is based upon the performance characteristics of the most demanding aircraft type intended to use the facility (with 500 or more operations per year). Primary airports provide regularly scheduled passenger service, and, therefore, are accommodating aircraft operated by airlines, which are generally more demanding than private aircraft used for general aviation purposes. As a result, these airports will benefit from longer runways with greater strength, so a runway length of 7,000 feet or more is recommended for them. This length will accommodate a typical Boeing 737 over medium ranges.[4]

Additionally, a runway strength of 100,000 pounds single wheel/175,000 pounds dual wheel or more is recommended for these facilities. (The strength of a runway is calculated for two scenarios – single wheel [SW] strength and double wheel [DW] strength, since an aircraft can have either SW or DW landing gear.) Grooving is also recommended for this category because airports within this group are serving turbojet aircraft that are traveling at high speeds after touchdown.[5]

Runway approach lighting (AL) systems offer the greatest visual aid for assisting the pilot in transitioning from instrument flight to visual flight for landing. The can be in the form of MALSR (medium intensity approach lighting system with runway alignment indicator lights), SSALR (short simplified approach light system with runway alignment indicator lights), or the ALSF (approach lighting system with sequenced flashers). Therefore, to provide for the greatest utility and availability in various weather conditions, AL is also recommended for Primary airports serving airliners.

2.4.1.ii National Airports

National airports will also generally benefit from runways at least 7,000 feet in length as these facilities provide access to national and international markets, which require larger payloads. Additionally, runway strength of 100,000 pounds (single or dual wheel) at airports in this category will accommodate the vast majority of business jets across the country within the

[4] "The 737 is a twin-engine airplane designed to operate over short to medium ranges from sea level runways of less than 6,000 ft (1,830 m) in length." *Boeing 737 Airplane Characteristics for Airport Planning*, Boeing Commercial Airplanes, Seattle, Washington.
[5] FAA AC 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*.

general aviation aircraft fleet. Grooving is also recommended for this category because airports within this group are serving turbojet aircraft.[6]

ALs are also recommended for at least one runway end at these facilities because they tend to have relatively significant activity during inclement weather and ALs can provide the pilot with a safe transition from instrument to visual approach and landing. As describe in the previous section, this can be in the form of a MALSR, SSALR, or an ALSF. If the airport does not have an approach lighting system, runway end identifier lights (REILs) are recommended as a means to provide rapid and positive identification of the end of the runway to the pilot.

2.4.1.iii Regional Airports

Most of Indiana's airports in the Regional category fall into this classification because they tend to serve interstate markets due to the demands of their associated city's business class. The recommended runway length for Regional airports that support regional economies is from 5,000 feet to 7,000 feet, again depending on local needs. As the runway length of the airport increases, the utility will follow. While actual runway length varies depending upon the type of aircraft, their stage length, and their payload, a 7,000 foot runway in Indiana will generally accommodate 75% of the U.S. aircraft fleet that are less than 60,001 pounds at 90% useful loads in wet conditions[7]. Grooving is also recommended for this category because airports within this group are serving turbojet aircraft.[8] Additionally, a runway pavement strength of 60,000 pounds (SW or DW) at airports in this category will accommodate the vast majority of business jets across the country within the general aviation aircraft fleet.

An AL system is recommended for at least one runway end at Regional airports because these facilities tend to have relatively significant activity during inclement weather, and approach lights can provide the pilot with a safe transition from instrument to visual approach to landing. However, an AL system is expensive, and there are often no identified benefits or safety enhancements[9] when the cloud ceiling and visibility for the runway's instrument approach procedure are relatively high. Therefore, if a cost-benefit ratio indicates that ALs are not a reasonable investment for the FAA to assist in funding, then a VSI is recommended. A precision approach path indicator (PAPI) is the most common VSI. If the airport does not have an

[6] FAA AC 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*.
[7] FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design.*
[8] 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*.
[9] FAA AC 150/5300-13 Change 18, *Airport Design*.

approach lighting system, runway end identifier lights (REILs) are also recommended as an additional means to transition the pilot to landing by providing rapid and positive identification of the end of the runway to the pilot.

2.4.1.iv Local Airports

A primary runway length ranging from 3,400 feet to 5,000 feet is recommended for Local airports in Indiana that serve local communities by providing access to intrastate and some interstate markets. As aircraft increase in size and weight, they generally need a longer runway (actual runway length varies depending upon the type of aircraft, their stage length, and their payload). While 3,400 feet will accommodate most small aircraft under 12,500 pounds with less than 10 passengers, a length of 4,300 feet should accommodate small aircraft in Indiana without a passenger limitation.[10] Increasing the length to 5,000 feet will provide for even greater utility of the airport. This length will generally accommodate about 75% of U.S. aircraft fleet weighing more than 12,500 pounds but less than 60,001 pounds at 60% useful loads on a dry day at a ground elevation of 1,000 feet and a temperature as hot as 86°F.[10]

Grooving is also recommended for this category because airports within this group have the potential to serve turbojet aircraft.[11] Additionally, a runway pavement strength of 30,000 pounds (single or dual wheel) at airports in this category will accommodate many of the most popular business aircraft models operating in the intrastate and interstate markets.

REILs and a VSI (e.g., precision approach path indicator) are recommended in lieu of AL for Local airports as a low-cost visual aid to enhance the safety of instrument approaches at these less busy airports.

2.4.1.v Basic Airports

A 3,400 foot primary runway is recommended for Basic airports in Indiana that serve general aviation activities. While actual runway length varies depending upon the type of aircraft, their stage length, and their payload, 3,400 feet in Indiana will generally accommodate 95% of the fleet of aircraft in the U.S. weighing 12,500 pounds or less with fewer than 10 passengers on a typical Indiana day.[12] Additionally, a runway pavement strength of 12,500 pounds (single or dual

[10] FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design.*
[11] FAA AC 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*.
[12] FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design.*

wheel) at these airports will accommodate the majority of single- and multi-engine piston aircraft.

2.4.2 Vertically Guided Instrument Approach Procedure (IAP) Recommendations

Instrument Approach Procedures (IAP) enable landings to be conducted at night, in low visibility, and during inclement weather conditions. Different types of runway approaches help guide aircraft on the correct glide paths toward safely landing on a runway. There are several types of runway approaches that provide pilots with varying levels of navigational guidance. Two are discussed in the recommendations of this ISASP:

- Precision instrument approaches, typically achieved with an Instrument Landing System (ILS), provide vertical and horizontal guidance to aircraft. This permits approaches to be generally conducted as low as a ½-mile visibility and a 200-foot cloud ceiling height.

- Localizer Performance with Vertical Guidance (LPV) approaches use GPS to provide vertical and horizontal guidance. Approach minimums may be as low as a ½-mile visibility and cloud ceiling heights of 200 feet, however many provide much larger/higher visibility minimums and cloud ceiling heights.

The goals of the ISASP and the FAA's Next Generation Air Transportation System (NextGen)[13] for Instrument Approach Procedure (IAPs) are to increase the general utility of all Indiana airports with the use of new technology and equipment and lower operational and maintenance costs than found with typical ground-based navigational equipment. IAP recommendations were established for each airport classification based on the recommendations and requirements found in the FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures", which was the current airport design criteria at the time of this analysis. Each visibility and ceiling minimum comes with associated airport design and infrastructure requirements outlined in FAA AC 150/5300-13[14]. Select critical requirements from this FAA AC have been included in the IAP recommendations because without them, an airport is not likely to attain any new IAPs with the minimums outlined for their respective category.

In making IAP recommendations, consideration was given to each airport category based on the typical operators more commonly utilizing the facilities within the category. While no airport or group of

[13] NextGen is the transformation of the radar-based air traffic control system to a satellite-based system. See http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=10261 for more information.
[14] FAA AC 150/5300-13 Change 18, *Airport Design* was the current FAA AC at the time this ISASP update was prepared.

airports can be universally labeled, assumptions were made. These assumptions and the IAP recommendations are presented in **Table 2-6** and detailed in the following paragraphs.

Table 2-6 – INDOT Minimum Vertically Guided AIP Recommendations

INDOT MINIMUM VERTICALLY GUIDED IAP RECOMMENDATIONS[3]	PRIMARY	NATIONAL	REGIONAL	LOCAL	BASIC
Visibility Minimums (One End Minimum)	1/2 mile	< 3/4 mile	< 1 mile	1 mile	> 1 mile
Ceiling Minimums[1] (One End Minimum)	200'	250'	300'	350'	400'
Obstruction Survey (VG or ANA)[4]	VG	VG or ANA	VG or ANA	VG or ANA	VG or ANA
Basic Requirements by AC FAA 150/5300-13[2]					
Approved ALP on File	ALP w/ LPV or ILS	ALP w/ LPV or ILS	ALP w/ LPV or ILS	ALP w/ LPV	ALP w/ LPV
Minimum Runway Length	4,200 ft. (Paved)	4,200 ft. (Paved)	3,200 ft. (Paved)	3,200 ft.	3,200 ft.
Runway Markings & Signage	Precision	Precision	Nonprecision *(precision recommended)*	Nonprecision	Nonprecision
	Hold Position Setback 250'	Hold Position Setback 250'	Hold Position Setback 250' (200' <=A/B-II)	Hold Position Setback 250' (200' <=A/B-II; 125' <=A/B-I Sm)	Hold Position Setback 200' (125' <=A/B-I Sm)
Full Parallel Taxiway or Comparable	Required	Required	Required	Recommended	Recommended
Runway Edge Lights	HIRL/MIRL	HIRL/MIRL	HIRL/MIRL	MIRL/LIRL	MIRL/LIRL
Approach Lights (One End Minimum)	MALSR, SSALR, ALSF	MALSR, SSALR, ALSF	Recommended	Recommended	Recommended
POFZ	Required	Required	Recommended	Recommended	Recommended

[1] For LPV with ILS, lowest ceiling minimums are 200'.

[2] The requirements under this heading are found within FAA AC 150/5300-13, Airport Design, Change 18. Meeting basic required elements of class does not guarantee minimums. A detailed airspace analysis will need to be performed to determine best potential minimums.

[3] Represents minimum goal for Primary runway. Attaining greater may be justified.

[4] Vertically Guided or Area Navigation Approach Survey

ACRONYMS AND GLOSSARY

LPV: Localizer performance with vertical guidance

VG: Vertical guidance

ILS: Instrument Landing System

ANA: Area Navigation Approach

ALP: FAA-approved airport layout plan

POFZ: Precision object free area - rectangular safety area at the runway threshold, centered on the extended runway centerline and is 200 feet long by 800 feet wide.

Runway Edge Lights:

HIRL: High intensity runway lighting

LIRL: Low intensity runway lighting

Approach Lights (AL):

MALSR: Medium intensity approach lighting system with runway alignment indicator lights

SSALR: Short simplified approach light system with runway alignment indicator lights

ALSF: Approach lighting system with sequenced flashers

Runway Markings and Signage: A runway is painted with various markings that coincide with the type of approach it has. This recommended target, as part of the FAA AC 150/5300-13 criteria, has two components for each airport classification. The first

component is the type of markings on an airport's runway: precision or non-precision. The second component is the hold position setback, which is the line on a taxiway where a pilot is to stop when not cleared to proceed onto the runway. The appropriate setback distance is determined by the design aircraft (the most demanding aircraft making at least 500 annual operations on a runway [see following page]) and the type of approach to the runway.

Airport Reference Code (e.g., A/B-II): The FAA has developed a system to relate airport planning and design criteria to the operational and physical characteristics of the aircraft intended to use the airport. This system is known as the Airport Reference Code (ARC), and is detailed in *FAA Advisory Circular 150/5300-13, Airport Design.* A combination of two codes is used to develop the ARC. The first code, Aircraft Approach Category, relates to the approach speed (landing speed) of an aircraft. The second code, Airplane Design Group, pertains to the design group determined by the wingspan or tail height of an aircraft. The ARC is based upon the aircraft or combination of aircraft with the highest approach speed code and greatest wingspan that use, or are expected to make substantial use, of the airport. Per FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems, substantial use means 500 or more annual itinerant operations. An operation is a takeoff or landing by an aircraft.

Aircraft Approach Category	**Speed (knots)**	**Airplane Design Group**	**Wingspan (feet) or Tail Height (feet)**
A	Less than 91	I	Wingspan less than 49 **or** Tail Height up to but not including 20
B	91 to less than 121	II	Wingspan 49 up to but not including 79 **or** Tail Height from 20 up to but not including 30
C	121 to less than 141	III	Wingspan 79 up to but not including 118 **or** Tail Height from 30 up to but not including 45
D	141 to less than 166	IV	Wingspan 118 up to but not including 171 **or** Tail Height from 45 up to but not including 60
E	166 or more	V	Wingspan 171 up to but not including 214 **or** Tail Height from 60 up to but not including 66
		VI	Wingspan 214 up to but not including 262 **or** Tail Height from 66 up to but not including 80

Source: FAA Advisory Circular 150/5300-13, Airport Design.

2.4.2.i Primary Airports

Generally, Primary airports serve commercial airline operators with regularly scheduled passenger service. These commercial airline operators (e.g., airline passenger aircraft) typically require specific flight standard minimums including specialized IAPs that eliminate or reduce the need for diversions to alternate facilities during inclement weather. Often, these operators maintain specialized avionics equipment in their aircraft to fly the lowest minimum approaches. Because Primary airports are served by commercial airlines, these airports are recommended to have an IAP with visibility and ceiling minimums of at least ½-mile visibility and 200-foot ceiling. The runway protection zones (RPZ) associated with these IAPs, which serve these larger passenger jet aircraft, include almost 79 acres of land, so these types of approaches require a significant investment by the airport sponsor in land acquisition and obstruction removal and are most justified for the largest, busiest airports. As described in Table 2-6 above, other items needed for new IAPs to these minimums include: VG obstruction survey, an ALP with an ILS or LPV, 4,200 feet paved runway length minimum, precision runway markings and signage, a full parallel taxiway (or compatible), MIRL or HIRL, and AL system, and a POFZ.[15]

2.4.2.ii National Airports

While National airports may not serve airlines, they do have a significant amount of commercial and corporate jet traffic. Since these airports serve corporate and commercial aircraft, but generally not airlines, they still benefit from relatively low IAP minimums to allow businesses to operate efficiently. Visibility and ceiling minimums of at least < ¾ mile and 250 feet, respectively, will provide the required utility that most business aircraft users desire. Again, the RPZs associated with these IAPs include almost 79 acres of land, so IAPs with weather minimums this low require a significant investment by the airport sponsor in land acquisition and obstruction removal and are most justified where higher utility is warranted. As described in Table 2-6 above, other items needed for new IAPs to these minimums include: VG or ANA obstruction survey, an ALP with an ILS or LPV, 4,200 feet paved runway length minimum, precision runway markings and signage, appropriate hold position lines, a full parallel taxiway (or compatible), MIRL or HIRL, and AL system, and a POFZ.[16]

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[15] FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures"
[16] FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures"

2.4.2.iii Regional Airports

Regional airports typically will serve corporate operators with jets. Visibility and ceiling minimums of at least < 1 mile and 300-foot respectively will provide the required utility that most business aircraft users desire. These IAPs do not provide as great utility as those with lower visibility and ceilings, but they will allow most aircraft to land in most conditions. With a smaller RPZ—49 acres—they have good utility at a lower investment to the airport. As described in Table 2-6 above, other items needed for new IAPs to these minimums include: VG or ANA obstruction survey, an ALP with an ILS or LPV, 3,200-foot paved runway length minimum, non-precision runway markings and signage, appropriate hold position lines, a full parallel taxiway (or comparable), and MIRL or HIRL.[17]

2.4.2.iv Local Airports

While Local airports may serve jet traffic, they are more prominently used by piston aircraft. IAPs with visibility and ceiling minimums of at least 1 mile and 300 feet respectively, can typically accommodate these users. With Runway Protection Zones (RPZs) ranging from eight to 30 acres in area, depending on the airport's ARC, they offer sufficient access to these airports at an affordable investment in land and obstruction removal. As described in Table 2-6 above, other items needed for new IAPs to these minimums include: VG or ANA obstruction survey, an ALP with LPV, 3,200-foot runway length minimum, non-precision runway markings and signage, appropriate hold position lines, and MIRL or HIRL.[18] A full parallel taxiway (or comparable), ALs, and a POFZ are recommended by the FAA, but not required.

2.4.2.v Basic Airports

Basic airports are primarily used by piston aircraft. Many of these aircraft are flown for personal and business use or for flight training. IAPs with visibility and ceiling minimums of more than 1 mile and 400 feet respectively, can generally accommodate most of these users' needs at the lowest investment in land acquisition and obstruction removal. As described in Table 2-6 above, other items needed for new IAPs to these minimums include: VG or ANA obstruction survey, an ALP with LPV, 3,200-foot runway length minimum, non-precision runway markings and signage,

[17] FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures"
[18] FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures"

appropriate hold position lines, and MIRL or HIRL.[19] A full parallel taxiway (or comparable), ALs, and a POFZ are recommended by the FAA, but not required.

2.5 Summary

The new classification system used as a part of this 2012 Indiana State Aviation System Plan update provides a greater level of cohesiveness between the state and national plan. Utilizing the categories developed for GA airports as a part of the FAA ASSET Study simplifies planning tasks and minimizes confusion that is often caused by multiple classification systems. However, to customize the plan to Indiana's needs, INDOT developed additional criteria for Level 1 and Level 2 service. Additionally, INDOT provided recommendations for each category for minimum service level infrastructure and for vertically guided instrument approach procedures. These recommendations will assist INDOT in prioritizing the limited state and federal funding available for improving this critical segment of Indiana's transportation network.

[19] FAA AC 150/5300-13: *Airport Design*, Change 18, Appendix 16, "New Instrument Approach Procedures"