2. Inventory - Draft

2.1 Introduction

To ensure the success of the 2020 Iowa Statewide Aviation System Plan Update (SASP 2020), it was important to begin with the most accurate and complete data set possible. The inventory effort for the SASP 2020 documents existing facilities and conditions for all airports included in the airport system. Data collected during the inventory process is used throughout the study to complete various evaluations and to formulate final study recommendations. Information gathered during the inventory is used to project future demand, determine the adequacy of current system performance, identify airport-specific facility and service improvements, and develop recommendations for the future system. Data summarized in this chapter includes current conditions as they relate to:

- **Aviation Activity**: based aircraft and annual general aviation operations for all study airports;
- **Airside Facilities**: runways and taxiways;
- **Navigational, Approach, and Landing Aids**: facilities that support airport usage during periods of reduced visibility or at night;
- **Landside Facilities**: fuel services, airfield security, as well as aircraft parking and automobile parking (spaces available to accommodate airport users);
- **Services**: fixed base operators (FBOs), terminal evaluation, ground transportation, snow removal, and airport user groups; and
- **Airport Support Features**: airport master and layout plans, local land use and zoning regulations, pavement management, and sustainability initiatives.

The data collection process to support the inventory effort started in early 2020; information reported in this chapter reflects conditions at study airports at the time data collection was completed in May 2020.

2.2 Data Collection Process

The inventory collected information from the 114 public-use commercial service and general aviation study airports using several sources. Data was collected using on-line survey/questionnaires, on-site visits at approximately 60 of the state's most active airports, phone interviews, and secondary sources. An on-line SASP 2020 inventory questionnaire was created, and survey links emailed to each airport sponsor to begin the process. This survey asked for information regarding taxiways, airport services, user groups, hangar storage, ground transportation, airfield security, and local planning measures. Data related to the physical features of the airport such as runways and available navigational aids was collected from Federal Aviation Administration (FAA) databases.

To the extent possible, data from the following sources was used to support the analysis:

- FAA Form 5010, Airport Master Record
- FAA Airport/Facilities Directory
- AirNav.com
- Airport Master Plans
- Airport Layout Plans
- Iowa DOT information
- Iowa 2010-2030 State Airport System Plan

A copy of the inventory questionnaire used to collect information for the SASP 2020 is contained in **Appendix A**. It should be noted that surveys were received from nearly all system airports. Once all data was collected and verified, a database was prepared and furnished to Iowa DOT.

2.3 Existing System

The SASP 2020 focuses on the Iowa's system of 114 public-use airports. **Figure 2-1** displays the airports by service type and ownership. **Table 2-1** lists the complete Iowa airport system. Eight of Iowa's airports provide commercial air service, while the remaining 106 are general aviation airports. Of those 106, eight are privately owned and open for public use.

Four commercial service airports operate with the assistance of an operating subsidy from the federally funded Essential Air Service (EAS) program.[1] The EAS program was put into place after passage of the Airline Deregulation Act in 1978 to guarantee that small communities that were served by certificated air carriers before airline deregulation maintain a minimal level of scheduled air service. The United States Department of Transportation is mandated to provide eligible EAS communities with access to the National Air Transportation System. This is generally accomplished by subsidizing two round trips a day with 30- to 50-seat aircraft, or additional frequencies with aircraft with nine seats or fewer, usually to a large- or medium-hub airport.[2]

Table 2-1: Iowa System Airports

FAA ID	Associated City	Airport Name
Commercial Service Airports		
BRL	Burlington	Southeast Iowa Regional (EAS)
CID	Cedar Rapids	Eastern Iowa
DSM	Des Moines	Des Moines International
DBQ	Dubuque	Dubuque Regional
FOD	Fort Dodge	Fort Dodge Regional (EAS)
MCW	Mason City	Mason City Municipal (EAS)
SUX	Sioux City	Sioux Gateway/Brig Gen Bud Day Field[1]
ALO	Waterloo	Waterloo Regional (EAS)
General Aviation Airports		
4C7	Ackley	Ackley Municipal
4C8	Albia	Albia Municipal
AXA	Algona	Algona Municipal
K98	Allison	Allison Municipal
C11	Amana	Amana
AMW	Ames	Ames Municipal
Y43	Anita	Anita Municipal-Kevin Burke Memorial Field
IKV	Ankeny	Ankeny Regional
AIO	Atlantic	Atlantic Municipal
ADU	Audubon	Audubon County
Y46	Bedford	Bedford Municipal
TZT	Belle Plaine	Belle Plaine Municipal - Mansfield Tippie
Y48	Belmond	Belmond Municipal
4K6	Bloomfield	Bloomfield Municipal
BNW	Boone	Boone Municipal

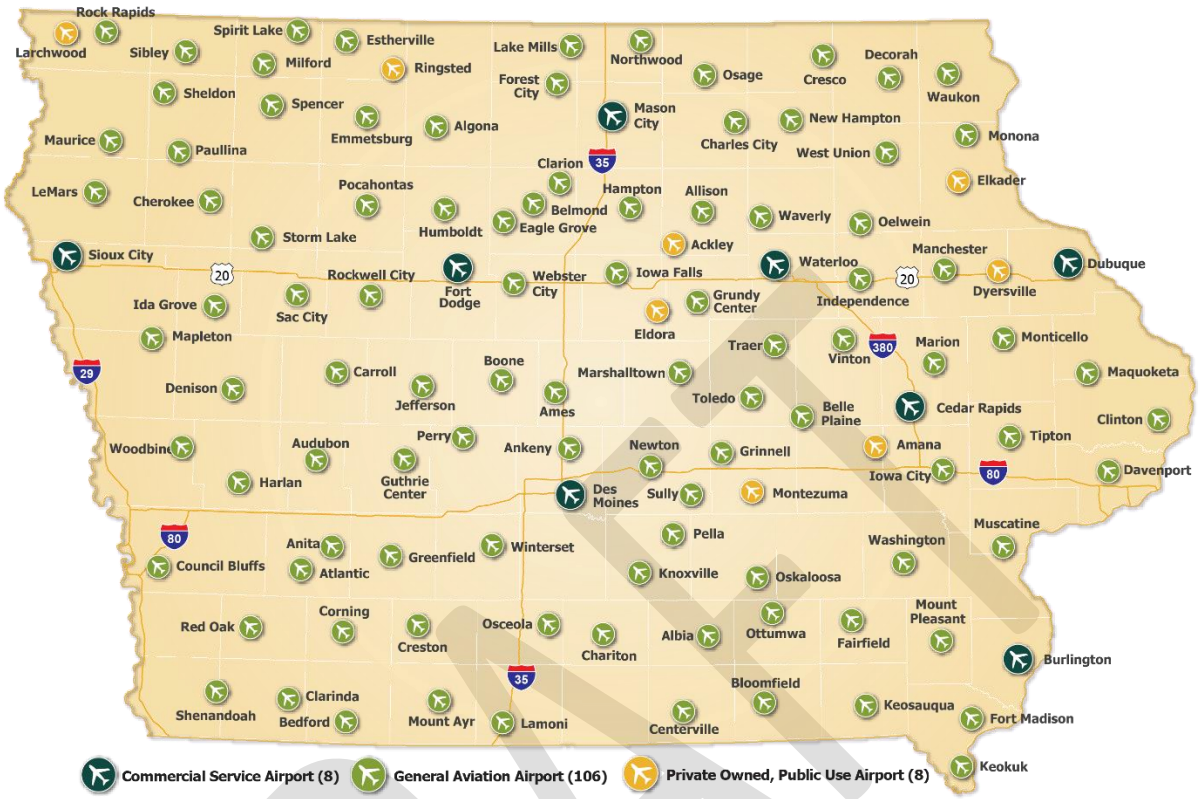
[1] Sioux City (SUX) is also an eligible EAS community, but not currently subsidized (as of February 2020)
[2] U.S. Department of Transportation

FAA ID	Associated City	Airport Name
CIN	Carroll	Carroll Municipal - Arthur N. Neu
TVK	Centerville	Centerville Municipal
CNC	Chariton	Chariton Municipal
CCY	Charles City	Northeast Iowa Regional
CKP	Cherokee	Cherokee County Regional
ICL	Clarinda	Clarinda Municipal - Schenck Field
CAV	Clarion	Clarion Municipal
CWI	Clinton	Clinton Municipal
CRZ	Corning	Corning Municipal
CBF	Council Bluffs	Council Bluffs Municipal
CJJ	Cresco	Cresco Municipal - Ellen Church Field
CSQ	Creston	Creston Municipal
DVN	Davenport	Davenport Municipal
DEH	Decorah	Decorah Municipal
DNS	Denison	Denison Municipal
IA8	Dyersville	Dyersville Area
EAG	Eagle Grove	Eagle Grove Municipal
27P	Eldora	Eldora
I27	Elkader	Elkader
EGQ	Emmetsburg	Emmetsburg Municipal
EST	Estherville	Estherville Municipal
FFL	Fairfield	Fairfield Municipal
FXY	Forest City	Forest City Municipal
FSW	Fort Madison	Fort Madison Municipal
GFZ	Greenfield	Greenfield Municipal
GGI	Grinnell	Grinnell Regional
6K7	Grundy Center	Grundy Center Municipal
GCT	Guthrie Center	Guthrie County Regional
HPT	Hampton	Hampton Municipal
HNR	Harlan	Harlan Municipal
0K7	Humboldt	Humboldt Municipal
IDG	Ida Grove	Ida Grove Municipal
IIB	Independence	Independence Municipal - James H Connell Field
IOW	Iowa City	Iowa City Municipal
IFA	Iowa Falls	Iowa Falls Municipal
EFW	Jefferson	Jefferson Municipal
EOK	Keokuk	Keokuk Municipal
6K9	Keosauqua	Keosauqua Municipal
OXV	Knoxville	Knoxville Municipal
0Y6	Lake Mills	Lake Mills Municipal
LWD	Lamoni	Lamoni Municipal
2VA	Larchwood	Larchwood - Zangger Vintage Airpark
LRJ	Le Mars	Le Mars Municipal
C27	Manchester	Manchester Municipal
MEY	Mapleton	Mapleton - James G Whiting Memorial Field
OQW	Maquoketa	Maquoketa Municipal

FAA ID	Associated City	Airport Name
C17	Marion	Marion
MIW	Marshalltown	Marshalltown Municipal
SXK	Maurice	Sioux County Regional
4D8	Milford	Milford Municipal - Fuller
7C3	Monona	Monona Municipal
7C5	Montezuma	Montezuma Sig Field
MXO	Monticello	Monticello Regional
1Y3	Mount Ayr	Mount Ayr Municipal - Judge Lewis Field
MPZ	Mount Pleasant	Mount Pleasant Municipal
MUT	Muscatine	Muscatine Municipal
1Y5	New Hampton	New Hampton Municipal
TNU	Newton	Newton Municipal-Earl Johnson Field
5D2	Northwood	Northwood Municipal
OLZ	Oelwein	Oelwein Municipal
D02	Osage	Osage Municipal
I75	Osceola	Osceola Municipal
OOA	Oskaloosa	Oskaloosa Municipal
OTM	Ottumwa	Ottumwa Regional
1Y9	Paullina	Paullina Municipal
PEA	Pella	Pella Municipal
PRO	Perry	Perry Municipal
POH	Pocahontas	Pocahontas Municipal
RDK	Red Oak	Red Oak Municipal
8Y8	Ringsted	Peltz Field
RRQ	Rock Rapids	Rock Rapids Municipal
2Y4	Rockwell City	Rockwell City Municipal
SKI	Sac City	Sac City Municipal
SHL	Sheldon	Sheldon Regional
SDA	Shenandoah	Shenandoah Municipal
ISB	Sibley	Sibley Municipal
SPW	Spencer	Spencer Municipal
0F3	Spirit Lake	Spirit Lake Municipal
SLB	Storm Lake	Storm Lake Municipal
8C2	Sully	Sully Municipal
8C4	Tipton	Tipton Municipal - Mathews Memorial
8C5	Toledo	Toledo Municipal
8C6	Traer	Traer Municipal
VTI	Vinton	Vinton Veterans Memorial Airpark
AWG	Washington	Washington Municipal
Y01	Waukon	Waukon Municipal
C25	Waverly	Waverly Municipal
EBS	Webster City	Webster City Municipal
3Y2	West Union	West Union Municipal - George L Scott
3Y3	Winterset	Winterset Municipal
3Y4	Woodbine	Woodbine Municipal

Source: Airport Management, 2019-2023 NPIAS Report, Jviation

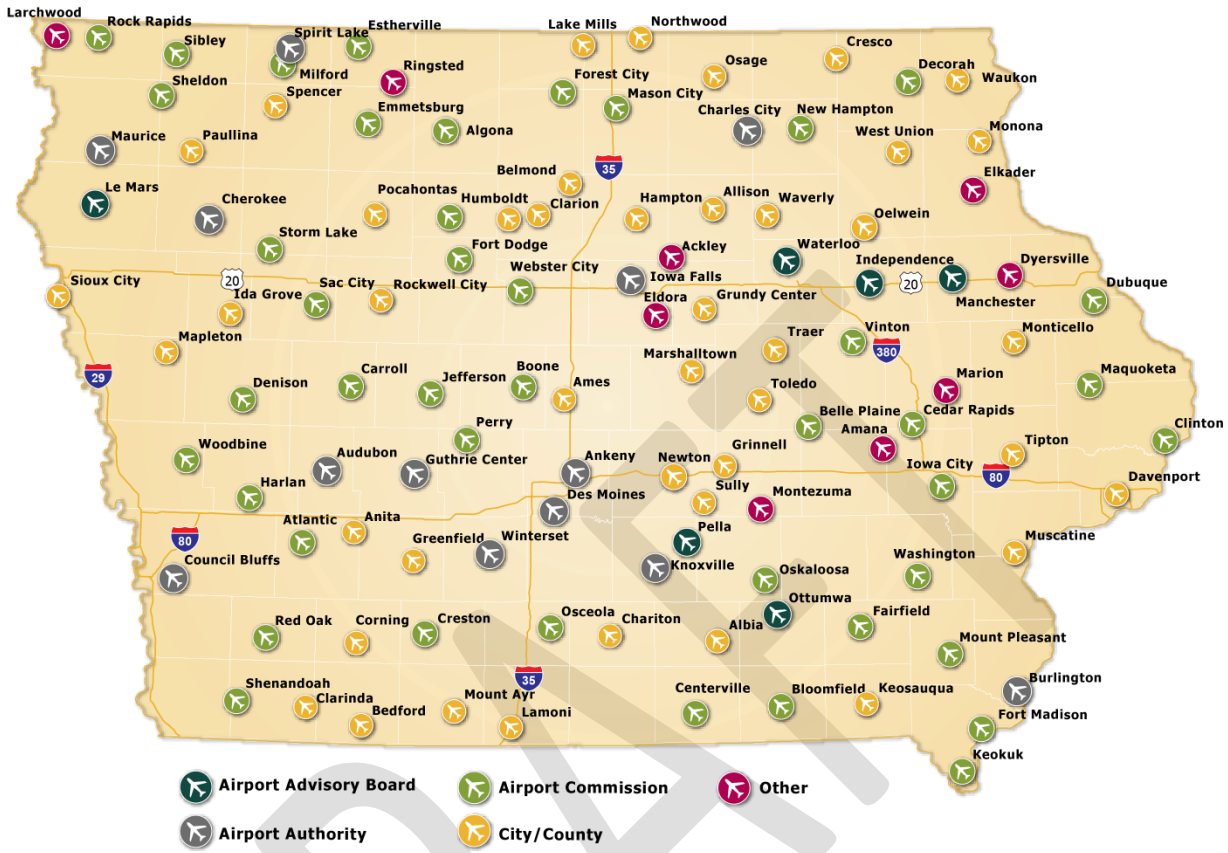
Figure 2-1: Iowa Airport System



Source: Jviation

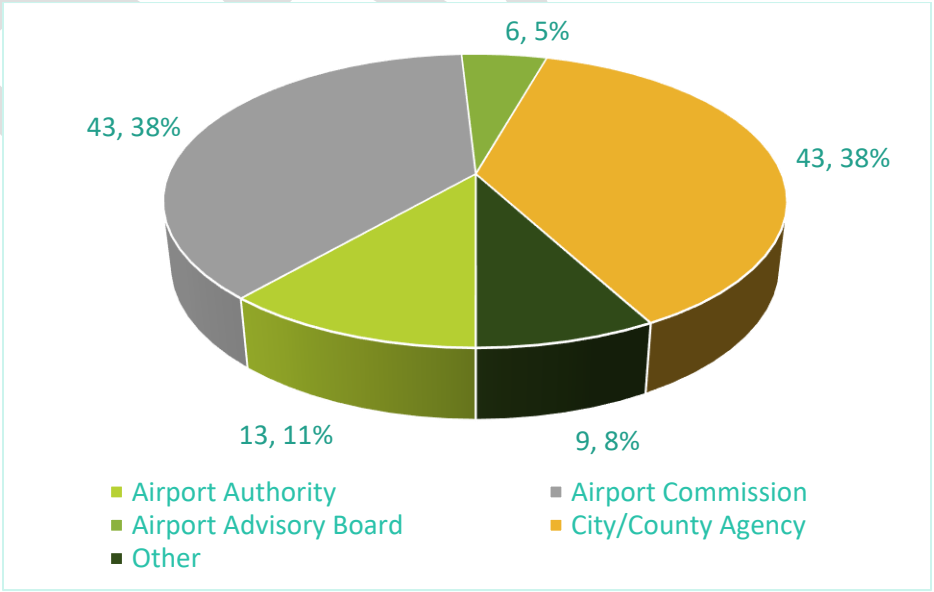
Within the Iowa system, airports are operated under different local configurations. Airports are typically operated by an Airport Authority, Airport Commission, Airport Advisory Board, or a City or County Agency. There are also a select number of privately-owned airports and others that operate under unique circumstances such as with a public-private partnership. **Figure 2-2** and **Figure 2-3** shows the distribution of Iowa airports by operational type.

Figure 2-2: Iowa DOT Airports by Operational Type



Source: Jviation

Figure 2-3: Iowa Airport Operational Type



Source: Jviation
Note: Other includes Privately Owned Airports and Public-Private Partnerships

2.4 Aviation Activity and Based Aircraft at Public Use Airports

Aircraft operations and based aircraft data were collected for each airport through the inventory process and from available FAA data sources. Airport activity data is discussed briefly in the following sections. Additional information on aviation activity and current demand at study airports is included in **Chapter 3, Forecasts of Aviation Demand**.

2.4.1 Airport Operations

Operational data (aircraft takeoffs and landings) are essential to determining future airport needs within a state system plan. Current and historical operational data for each airport can be found in **Chapter 3, Forecasts of Aviation Demand**.

Five study airports have air traffic control towers:

- Des Moines International
- Dubuque Regional
- Eastern Iowa
- Sioux Gateway
- Waterloo Regional

Air traffic control towers provide a more accurate count of takeoffs and landings. At non-controlled airports, operations are the "best estimates" of annual activity, based on airport representatives' experience and knowledge of their airport's activity. Baseline activity estimates for Iowa's airports were derived from the most current FAA documentation available including FAA 5010 forms.

2.4.2 Based Aircraft

Based aircraft represent aircraft that are stored at each airport. Storage for based aircraft is typically distributed between hangars and tie-down spaces. Beginning in 2007, FAA undertook a more stringent program for airports to report their individual counts of based aircraft at NPIAS airports. FAA implemented this program to record based aircraft by actual "N" number (the N number is specific to each aircraft and is displayed on the plane).

The program was needed because multiple airports were reporting the same aircraft as being based at their airports, leading to double counting of general aviation aircraft in the U.S. fleet. When this FAA program was implemented, the number of based aircraft reported at many airports within the U. S. showed a decrease. In reality, the number of aircraft did not decrease, it was a result of aircraft not being recorded at more than one

airport. It should be noted, that non-NPIAS public-use airports are not included in the FAA based aircraft report. These based aircraft are tallied when airports update their annual 5010 report. Even these two methods do not capture all aircraft. A significant number of aircraft including those at privately-owned, private use airports include numerous airplanes as well as gliders, balloons, rotor-copters and those aircraft that are "Invalid" in status.

Table 2-2 shows general aviation operations and based aircraft for each Iowa airport. In 2019, over one million general aviation aircraft operations took place in the state. In the same year, there were also over 2,600 based aircraft at airports around the state. The number of based aircraft and operations often correlate with the available facilities and services at airports within the system. These facilities and services will be outlined throughout the inventory chapter.

Table 2-2: Total Aircraft Operations and Based Aircraft

FAA ID	Associated City	Airport Name	Total Aircraft Operations	Based Aircraft
Commercial Service Airports				
BRL	Burlington	Southeast Iowa Regional	20,172	31
CID	Cedar Rapids	Eastern Iowa	44,607	128
DSM	Des Moines	Des Moines International	71,384	111
DBQ	Dubuque	Dubuque Regional	56,342	71
FOD	Fort Dodge	Fort Dodge Regional	21,216	24
MCW	Mason City	Mason City Municipal	33,600	48
SUX	Sioux City	Sioux Gateway/Brig Gen Bud Day Field	20,423	71
ALO	Waterloo	Waterloo Regional	18,959	79
General Aviation Airports				
4C7	Ackley	Ackley Municipal	450	4
4C8	Albia	Albia Municipal	2,000	5
AXA	Algona	Algona Municipal	8,750	32
K98	Allison	Allison Municipal	1,250	5
C11	Amana	Amana	1,580	5
AMW	Ames	Ames Municipal	33,751	76
Y43	Anita	Anita Municipal-Kevin Burke Memorial Field	1,000	4
IKV	Ankeny	Ankeny Regional	48,600	94
AIO	Atlantic	Atlantic Municipal	8,050	27
ADU	Audubon	Audubon County	1,152	1
Y46	Bedford	Bedford Municipal	2,000	4
TZT	Belle Plaine	Belle Plaine Municipal - Mansfield Tippie	2,000	12
Y48	Belmond	Belmond Municipal	250	1
4K6	Bloomfield	Bloomfield Municipal	2,500	9
BNW	Boone	Boone Municipal	20,700	40
CIN	Carroll	Carroll Municipal - Arthur N. Neu	7,700	15
TVK	Centerville	Centerville Municipal	5,750	15
CNC	Chariton	Chariton Municipal	3,250	11
CCY	Charles City	Northeast Iowa Regional	6,082	19
CKP	Cherokee	Cherokee County Regional	11,200	19
ICL	Clarinda	Clarinda Municipal - Schenck Field	5,500	24
CAV	Clarion	Clarion Municipal	3,750	14

FAA ID	Associated City	Airport Name	Total Aircraft Operations	Based Aircraft
CWI	Clinton	Clinton Municipal	15,400	37
CRZ	Corning	Corning Municipal	2,000	8
CBF	Council Bluffs	Council Bluffs Municipal	46,350	58
CJJ	Cresco	Cresco Municipal - Ellen Church Field	1,500	8
CSQ	Creston	Creston Municipal	4,500	23
DVN	Davenport	Davenport Municipal	28,251	112
DEH	Decorah	Decorah Municipal	9,100	31
DNS	Denison	Denison Municipal	8,167	10
IA8	Dyersville	Dyersville Area	750	4
EAG	Eagle Grove	Eagle Grove Municipal	2,000	8
27P	Eldora	Eldora	250	2
I27	Elkader	Elkader	600	4
EGQ	Emmetsburg	Emmetsburg Municipal	2,250	10
EST	Estherville	Estherville Municipal	9,450	19
FFL	Fairfield	Fairfield Municipal	7,700	21
FXY	Forest City	Forest City Municipal	5,950	17
FSW	Fort Madison	Fort Madison Municipal	2,250	10
GFZ	Greenfield	Greenfield Municipal	4,998	27
GGI	Grinnell	Grinnell Regional	5,950	16
6K7	Grundy Center	Grundy Center Municipal	250	1
GCT	Guthrie Center	Guthrie County Regional	2,750	12
HPT	Hampton	Hampton Municipal	4,500	20
HNR	Harlan	Harlan Municipal	7,700	24
0K7	Humboldt	Humboldt Municipal	4,000	12
IDG	Ida Grove	Ida Grove Municipal	1,250	5
IIB	Independence	Independence Municipal - James H Connell Field	9,100	29
IOW	Iowa City	Iowa City Municipal	19,287	76
IFA	Iowa Falls	Iowa Falls Municipal	5,700	15
EFW	Jefferson	Jefferson Municipal	5,750	21
EOK	Keokuk	Keokuk Municipal	8,050	24
6K9	Keosauqua	Keosauqua Municipal	400	4
OXV	Knoxville	Knoxville Municipal	9,700	43
0Y6	Lake Mills	Lake Mills Municipal	1,000	4
LWD	Lamoni	Lamoni Municipal	4,000	21
2VA	Larchwood	Larchwood - Zangger Vintage Airpark	800	21
LRJ	Le Mars	Le Mars Municipal	12,650	26
C27	Manchester	Manchester Municipal	1,100	15
MEY	Mapleton	Mapleton - James G Whiting Memorial Field	3,250	11
OQW	Maquoketa	Maquoketa Municipal	3,250	10
C17	Marion	Marion	17,560	49
MIW	Marshalltown	Marshalltown Municipal	13,650	43
SXK	Maurice	Sioux County Regional	13,050	32
4D8	Milford	Milford Municipal - Fuller	3,850	15

FAA ID	Associated City	Airport Name	Total Aircraft Operations	Based Aircraft
7C3	Monona	Monona Municipal	1,500	10
7C5	Montezuma	Montezuma Sig Field	500	3
MXO	Monticello	Monticello Regional	10,850	36
1Y3	Mount Ayr	Mount Ayr Municipal - Judge Lewis Field	1,000	4
MPZ	Mount Pleasant	Mount Pleasant Municipal	6,285	28
MUT	Muscatine	Muscatine Municipal	14,850	31
1Y5	New Hampton	New Hampton Municipal	500	4
TNU	Newton	Newton Municipal-Earl Johnson Field	9,000	23
5D2	Northwood	Northwood Municipal	1,750	5
OLZ	Oelwein	Oelwein Municipal	4,000	15
D02	Osage	Osage Municipal	1,500	10
I75	Osceola	Osceola Municipal	5,750	35
OOA	Oskaloosa	Oskaloosa Municipal	8,399	24
OTM	Ottumwa	Ottumwa Regional	16,450	28
1Y9	Paullina	Paullina Municipal	1,750	6
PEA	Pella	Pella Municipal	13,950	33
PRO	Perry	Perry Municipal	4,750	28
POH	Pocahontas	Pocahontas Municipal	4,500	14
RDK	Red Oak	Red Oak Municipal	11,550	38
8Y8	Ringsted	Peltz Field	250	1
RRQ	Rock Rapids	Rock Rapids Municipal	3,500	16
2Y4	Rockwell City	Rockwell City Municipal	3,000	11
SKI	Sac City	Sac City Municipal	2,500	10
SHL	Sheldon	Sheldon Regional	9,501	20
SDA	Shenandoah	Shenandoah Municipal	3,500	17
ISB	Sibley	Sibley Municipal	2,750	11
SPW	Spencer	Spencer Municipal	15,090	33
0F3	Spirit Lake	Spirit Lake Municipal	4,200	19
SLB	Storm Lake	Storm Lake Municipal	19,600	21
8C2	Sully	Sully Municipal	600	-
8C4	Tipton	Tipton Municipal - Mathews Memorial	2,000	12
8C5	Toledo	Toledo Municipal	990	4
8C6	Traer	Traer Municipal	2,250	8
VTI	Vinton	Vinton Veterans Memorial Airpark	5,000	24
AWG	Washington	Washington Municipal	13,124	22
Y01	Waukon	Waukon Municipal	1,000	5
C25	Waverly	Waverly Municipal	8,050	14
EBS	Webster City	Webster City Municipal	11,250	14
3Y2	West Union	West Union Municipal - George L Scott	2,250	8
3Y3	Winterset	Winterset Municipal	4,750	26
3Y4	Woodbine	Woodbine Municipal	500	3
All Iowa Airports			**1,008,425**	**2,631**

Source: FAA Advisory Circular 150/5300-13A, Airport Design
*Total operations include commercial, commuter, air taxi, general aviation, and military.

2.5 Airside Facilities

The study inventoried each airport's airside facilities and collected data on current runways and taxiways at study airports. Specifically, dimensions and lighting information were collected. This information is used throughout the study to determine the ability of study airports to meet facility objectives associated with their role in the state airport system.

Each airport's primary runway information is reported in **Appendix B, Table B-1**. Runway information collected through the inventory process includes:

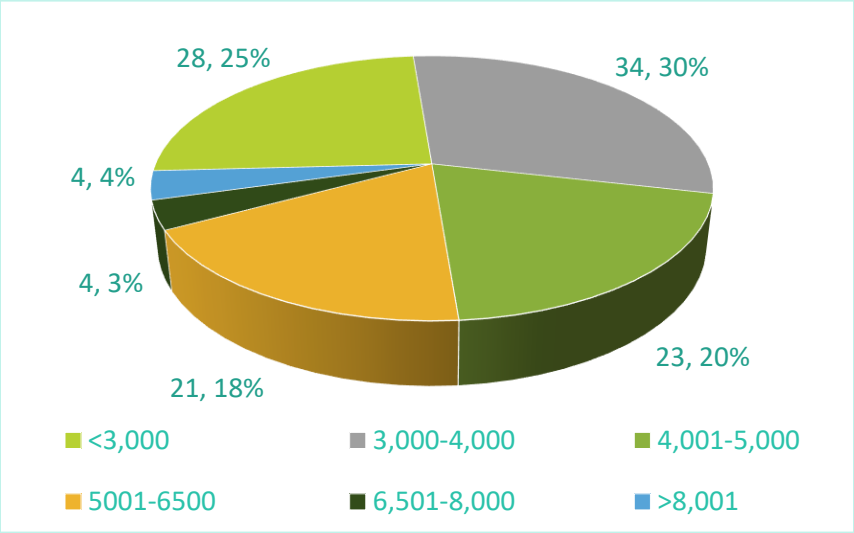
- Runway Dimensions
- Runway Lighting
- Runway Approach Lighting

2.5.1 Primary Runway Information

Runway lengths are generally related to the most demanding type of aircraft operating at each airport and the aircraft's operational characteristics. Runway widths also vary among the airports. Airports that are included in the National Plan of Integrated Airport Systems (NPIAS) are eligible to compete for FAA grants and hence must comply with FAA design standards. For Non-NPIAS airports, Iowa DOT makes efforts to follow FAA standards when feasible. According to FAA design standards, 60 feet is the minimum width for any runway. In subsequent portions of this study, the adequacy of current runway lengths and widths is considered based on the airport's role in the state system.

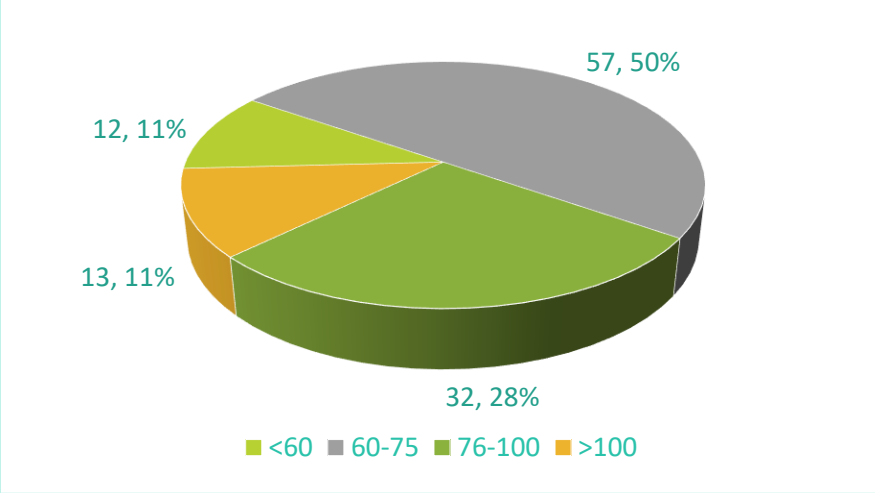
Eight airports in the Iowa system have runways longer than 6,500 feet and runways 100 feet or wider. Only 11 percent of primary runways in the system do not meet the FAA minimum standard for runway width. **Figure 2-4** and **Figure 2-5** show the breakdown of primary runway length and width in the Iowa system. It should be noted that many of the widest runways in Iowa are located at turf strips.

Figure 2-4: Summary of Runway Lengths (in Feet) for Iowa System Airports



Source: FAA 5010 Form

Figure 2-5: Summary of Runway Widths (in Feet) for Iowa System Airports



Source: FAA 5010 Form
Note: Data includes airports with turf runways

Runway length and width, as well as taxiway design, influence the Airport Reference Code (ARC) and Runway Design Code (RDC). The "design" or "critical aircraft" is defined as the largest aircraft or family of aircraft anticipated to utilize a given airport on a regular basis. The FAA defines "regular basis" as conducting at least 500 itinerant operations (defined as a takeoff or a landing). The selection of the design aircraft allows for the identification of the ARC for an airport, which itself is a coding system used to relate airport design criteria to the operational and physical characteristics of the types of aircraft intended to operate at that airport. Specifically, the ARC is an airport designation that signifies the airport's highest RDC, which consists of the following components:

- Aircraft Approach Category (AAC) depicted by a letter based on aircraft approach speed (**Table 2-3**)
- Airplane Design Group (ADG) depicted by a Roman numeral and based on aircraft wingspan and tail height (**Table 2-4**)
- The RDC includes the airport's ARC as well as the Runway Visual Range (RVR) based on runway visibility minimums (**Table 2-5**).

Table 2-3: Aircraft Approach Category

Approach Category	Approach Speed
A	< 91 knots
B	91 knots - < 121 knots
C	121 knots - < 141 knots
D	141 knots - < 166 knots
E	166 knots or more

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

Table 2-4: Airplane Design Group

Design Group	Wingspan	Tail Height
I	< 49 feet	< 20 feet
II	49 feet - < 79 feet	20 feet - < 30 feet
III	79 feet - < 118 feet	30 feet - < 45 feet
IV	118 feet - < 171 feet	45 feet - < 60 feet
V	171 feet - < 214 feet	60 feet - < 66 feet
VI	214 feet - < 262 feet	66 feet - < 80 feet

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

Table 2-5: Runway Visual Range

RVR (feet)	Instrument Flight Visibility Category (statute mile)
5,000	Not lower than 1 mile
4,000	Lower than 1 mile but not lower than ¾ mile
2,400	Lower than ¾ mile but not lower than ½ mile
1,600	Lower than ½ mile but not lower than ¼ mile
1,200	Lower than ¼ mile

Source: FAA

Generally speaking, aircraft in Approach Category A and Design Group I are small general aviation aircraft. Most general aviation aircraft seldom exceed Approach Category C. Aircraft above Approach Category C are typically commercial aircraft, but some smaller commercial planes are included in Approach Category C. The higher the letter designation for the Approach Category and the higher the Roman numeral for the Design Group, the larger the aircraft that the airport is designated to accommodate, as shown in **Figure 2-6**.

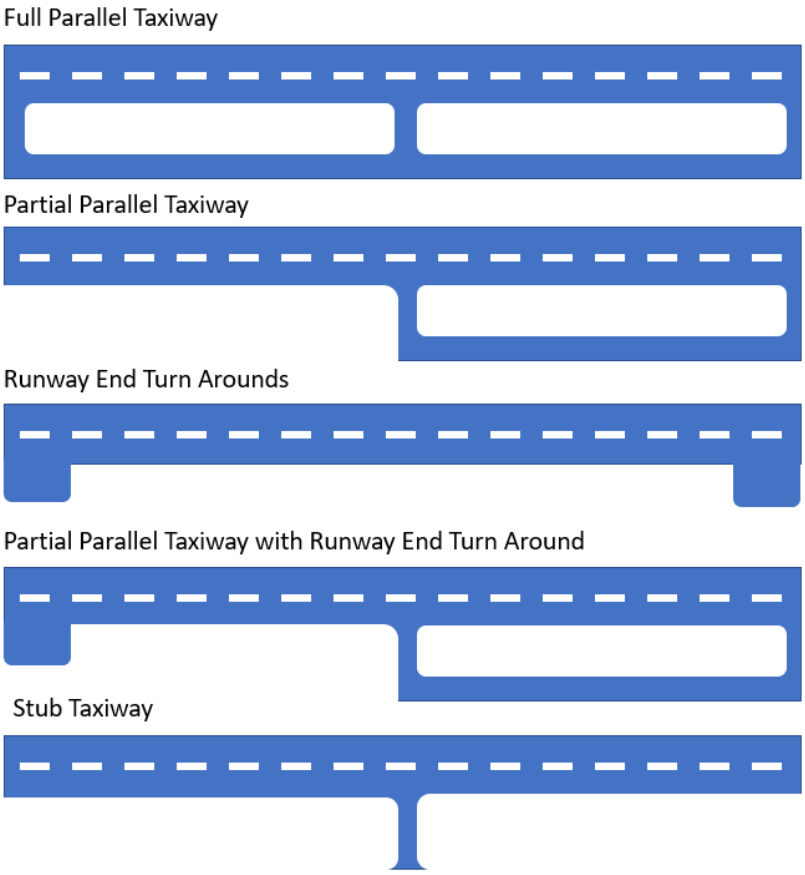
Figure 2-6: Runway Design Code Aircraft Types

Source: Jviation
Note: Category E is only assigned to military aircraft, so is not included in this graphic

2.5.2 Taxiway Information

According to FAA guidelines, full parallel taxiways are most often needed at the busiest of airports or at airports that have a precision approach. A full parallel taxiway improves both runway safety and operational capacity. Because many of the study airports have lower activity levels, they do not have nor do they need to have a full parallel taxiway; however, to support safety and operational needs, nearly all study airports have at least a taxiway turnaround. Turnarounds are located on runway ends and provide landing aircraft with the ability to turn around and back-taxi on the runway to reach hangar areas or other landside facilities. **Figure 2-7** depicts the types of taxiways present in the Iowa airport system.

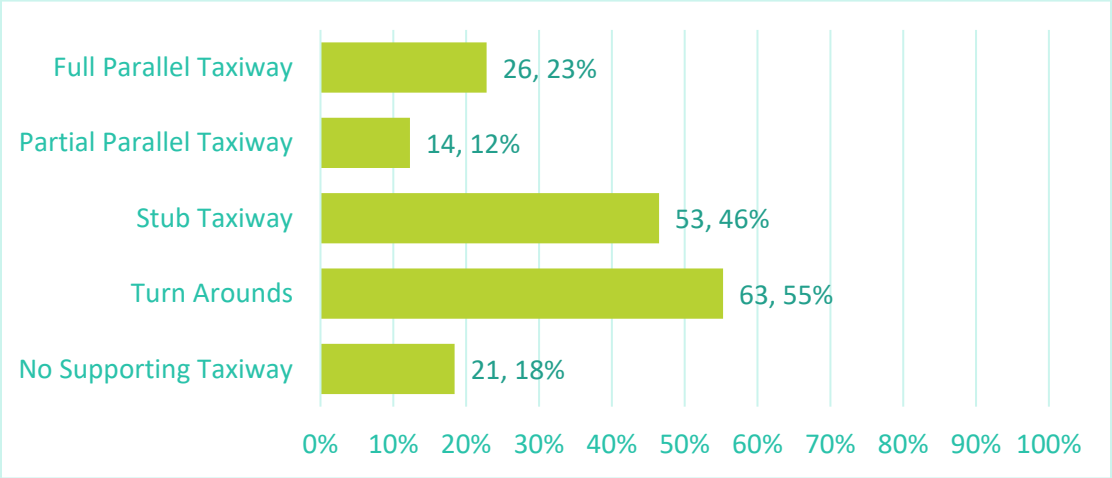
Figure 2-7: Examples of Taxiway Types Found at Iowa System Airports



Source: Jviation

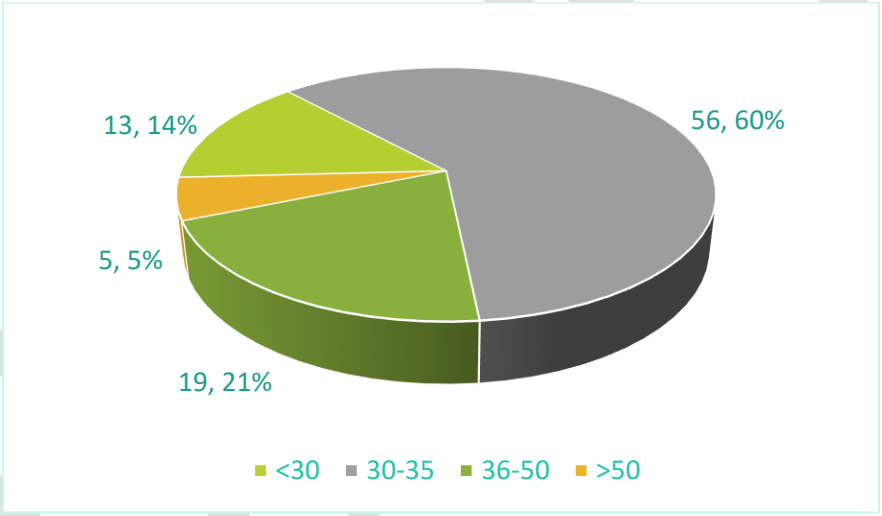
Taxiway information collected as part of this study includes the type of taxiway system and taxiway width. The types of taxiways vary from full parallel, partial parallel, to turnarounds. All taxiways contribute to an airport's safety and operating efficiency. Nearly a quarter of the airports (26 airports) in the Iowa system maintain a full parallel taxiway to support operations. Current taxiway information for each airport's primary runway is provided in **Appendix B, Table B-2**, and is summarized in **Figure 2-8** and **Figure 2-9**.

Figure 2-8: Summary of Taxiway Types



Source: FAA 5010 Form, Iowa Airport Management Survey
Note: Airports with no supporting taxiways include those with turf runways.

Figure 2-9: Summary of Taxiway Widths (in Feet)



Source: FAA 5010 Form, Iowa Airport Management Survey

2.5.3 Runway Lighting

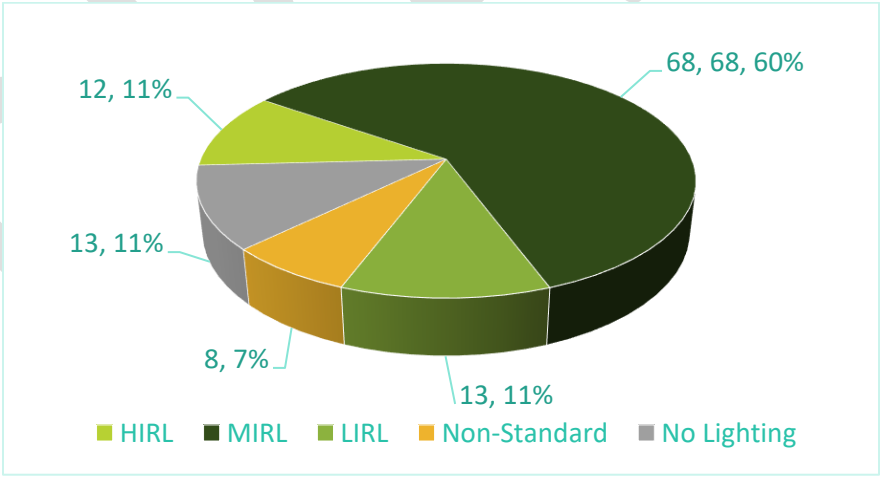
Runway lights help airports remain operational during periods of reduced visibility and throughout nighttime hours. Runway lighting comes in low (LIRL), medium (MIRL), and high (HIRL) forms. These lights are often controllable by the pilot in the aircraft if the pilot-controlled lighting (PCL) is installed at the airport. The majority of Iowa airports, 60 percent, maintain MIRL. Only 13 airports have no form of runway lighting.

The inventory also collected information on approach lighting systems at study airports. Approach lighting systems are needed only when an airport has a precision instrument approach, but even non-precision runways benefit from the various types of approach aids that were inventoried as part of the SASP 2020. Runway and approach lighting inventoried in this study includes:

- Runway End Identification Lights (REILs): REILs are a lighting system consisting of two flashing lights located on each corner of the runway-landing threshold. The light from this system enables pilots to quickly identify the runway threshold on approach.
- Visual Glide Slope Indicators (VGSI): VGSI are ground devices that use lights to assist a pilot in landing. The lights define a vertical approach path during the final approach to a runway and can help the pilot determine if the airplane is too high or low for an optimum landing. There are several types of VGSI:
    - Precision Approach Path Indicators (PAPIs): PAPIs are a lighting system consisting of two or four lights located to the side of the runway touchdown zone. The system uses red and white lights to provide visual glide path indication to the approaching aircraft.
    - Visual Approach Slope Indicators (VASIs): VASIs are a lighting system located to the side of the runway touchdown zone. The light from this system provides visual approach slope guidance that ensures clearance of all obstructions in the approach area.
    - Approach Path Alignment Panels (APAPs): APAPs are a system of panels used for alignment of an approach path, which may or may not be lighted.
- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR): MALSRs are a lighting system consisting of a combination of lights and light bars/flashers that provide visual information on runway alignment, height, roll guidance, and horizontal reference.
- Medium Intensity Approach Lighting System with Sequenced Flashers (MALSF): MALSFs are the same as MALSRs but three sequenced Flashers (F) in a MALSF are configured differently from the five Runway Alignment Indicator Lights (R) in a MALSR. MALSFs are typically found at locations where there may be approach identification challenges.

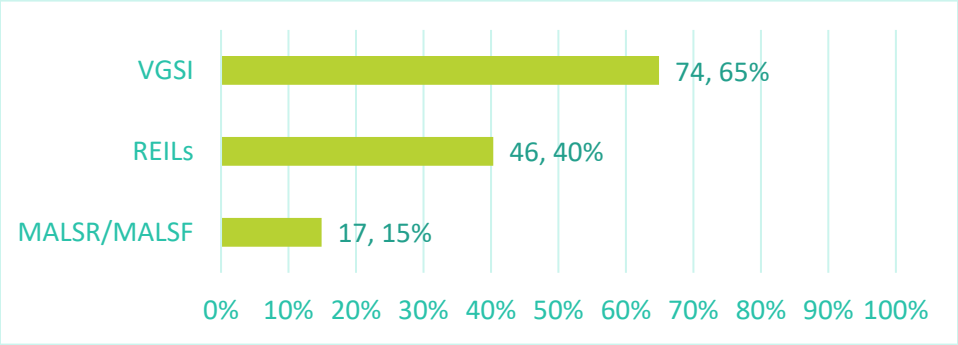
Figure 2-10 shows the percentage of Iowa airports by runway lighting, while **Figure 2-11** shows approach lighting. **Appendix B, Table B-3** provides information on runway lighting at each Iowa system airport.

Figure 2-10: Summary of Runway Lighting for Iowa System Airports



Source: FAA 5010 Form

Figure 2-11: Summary of Approach Lighting for Iowa System Airports



Source: FAA 5010 Form

2.6 Navigation, Approach, and Landing Aids

A variety of navigational aids (NAVAIDs) support operations at study airports. NAVAIDs provide information for enroute and ground-based pilots and include instrument approach aids, visual aids, and automated weather systems. NAVAIDs improve safety and help airports remain operational during periods of reduced visibility.

Instrument approach aids are categorized by precision and non-precision. Precision instrument approaches provide both lateral and horizontal guidance to aircraft, while non-precision approaches primarily provide only lateral guidance. The most common approach types include:

- Instrument Landing System (ILS): ILS is a precision approach that provides precise vertical and horizontal guidance information to approaching aircraft. The ILS provides guidance through the use of a localizer, a glide slope, and other ground-based facilities.
- Global Positioning System (GPS): GPS is a non-precision approach. It is a space-based radio navigation system that consists of a network of satellites and ground stations. GPS satellites are capable of providing aircraft with three-dimensional position (latitude, longitude, and altitude), velocity, and time of day, in all weather conditions.
- Area Navigation/Required Navigation Performance (RNAV/RNP): RNAV/RNP is a non-precision approach and a performance-based type of navigation that allows aircraft to fly on a desired path within the coverage of ground or space-based NAVAIDs. RNP-capable aircraft are equipped with onboard performance monitoring and alerting capabilities.
- Localizer Performance with Vertical Guidance (LPV): LPV is not an approach in and of itself; an LPV provides minimum approach heights for GPS/RNAV approaches through the use of wide area

augmentation system (WAAS) and precise GPS capabilities. In most cases, approaches with LPV have minimums comparable to if not better than an ILS approach. An LPV approach provides both lateral and vertical guidance.

- Very High Frequency Omni-Directional Range (VOR): VOR is a non-precision approach. It is a ground-based radio navigation aid that provides 360 degrees of continuous directional information and supplies aircraft with location relative to the VOR station.
- Localizer (LOC): The LOC is a non-precision approach using a radio transmitting antenna that supplies aircraft with lateral course guidance to the runway.
- Distance Measuring Equipment (DME): The DME is a non-precision approach, ground-based, ultra-high-frequency NAVAID that corresponds to aircraft DME avionics; it enables aircraft to determine the slant range between the aircraft and ground station.
- Non-Directional Beacon (NDB): The NDB is a non-precision approach, ground-based, low- or medium-frequency radio beacon that broadcasts non-directional signals on an assigned frequency signal. Pilots can use NDBs to determine their location in relation to the ground station.

In addition to the above-mentioned instrument approach aids, airports also have visual aids to assist approaching aircraft. Visual aids help pilots locate the airport and provide approach guidance. The most common visual aids include:

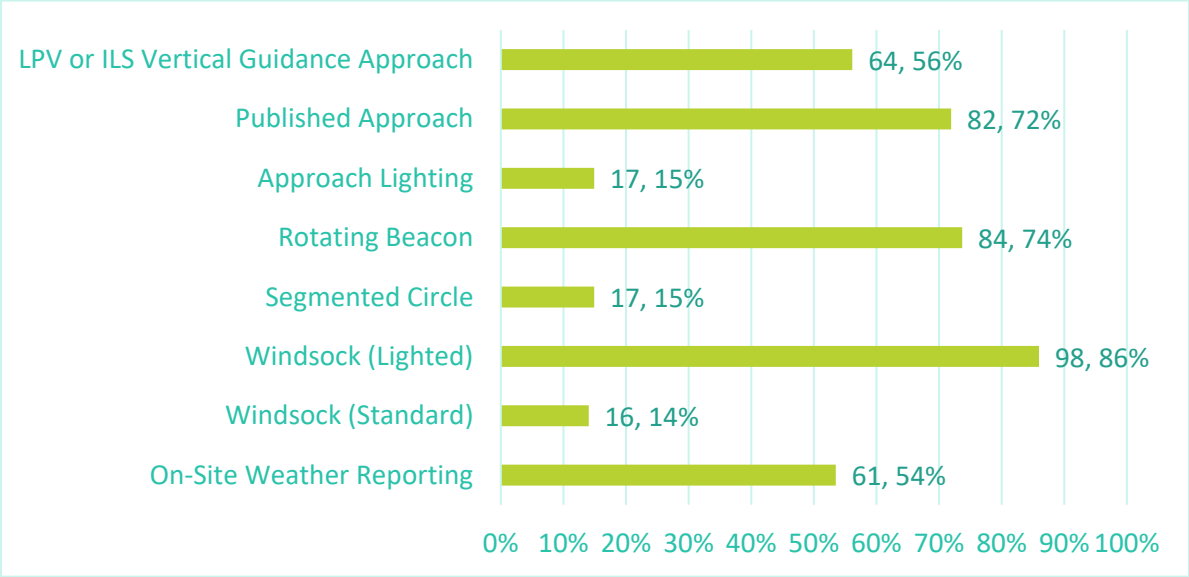
- Rotating Beacon: A rotating beacon helps pilots locate an airport at night. The beacon light color combinations indicate the type of airport. White and green, indicating a civilian land airport, is the most common combination.
- Segmented Circle: A segmented circle provides airport location and a centralized location for other indicators (typically a windsock).
- Wind Indicator: Indicates wind direction and relative wind speed.

There are two primary types of automated weather systems at study airports: the Automated Weather Observation System (AWOS) and the Automated Surface Observation System (ASOS). Typically, these systems provide basic weather data such as temperature, dew point, density altitude, altimeter setting, and wind speed and direction. Additionally, many airports are equipped with Hazardous Inflight Weather Advisory Service systems. The systems are defined as follows:

- Automated Weather Observation System (AWOS): The AWOS automatically collects weather data from various locations on and around the airport. The information is then transmitted to pilots via a computer-generated voice message on a specified frequency.
- Automated Surface Observation System (ASOS): The ASOS collects minute-by-minute weather observations, from which it generates aviation weather information. This information is disseminated to pilots by a computer-generated voice message via a specified radio frequency.

Figure 2-12 shows that study airports are currently served by a variety of approach aids. Study airports that do not have either a precision or a non-precision approach have a visual approach. For this study, airports with an ILS or LPV approach are considered to have an approach with vertical guidance or a precision type approach. Over half of study airports have an LPV or ILS approach with vertical guidance. **Appendix B, Table B-4** and **Table B-**5 provide information on approaches and navigational aids at each Iowa system airport.

Figure 2-12: Summary of Iowa System Airports with Navigational Approach Aids



Source: FAA 5010 Form

2.7 Landside Facilities/Services

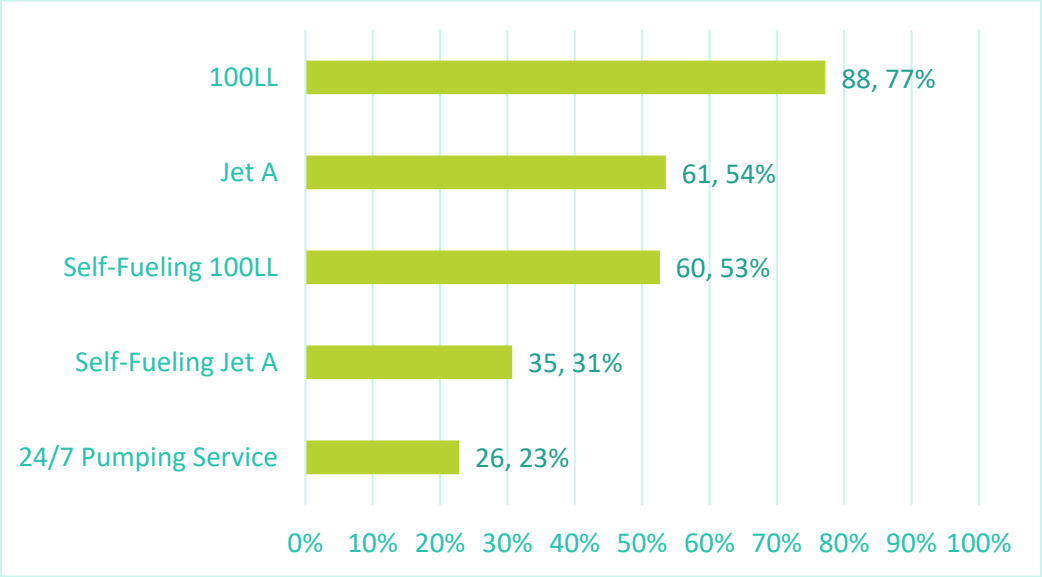
Landside facilities support aircraft and flight activities and airport customers. The landside facilities collected as part of the inventory effort include fuel, terminal and FBO facilities/services, ground transportation options, auto parking, hangars, and tie-downs.

2.7.1 Fuel Services

Nearly all study airports currently have some type of fuel available. The two most common types of fuel used for aviation activities are 100LL (AvGas) and Jet A. AvGas is used by most general aviation, piston-engine aircraft, while Jet A fuel is used by larger turboprop, twin-engine, and jet aircraft. MoGas, also called "motor gas" is often offered at airports for aircraft that are able to use automotive fuel. **Figure 2-13** indicates what fuel is currently offered at each study airport. Various system roles have different objectives for fuel.

Self-fueling capabilities for 100LL and Jet A provide users the opportunity to fill up without the assistance of an attendant and can reduce idle times at airports. These systems offer convenience but are also costly to install and require safety protocols and ongoing upkeep to ensure fuel quality is maintained. As depicted in **Figure 2-13**, over half of Iowa airports offer self-fueling for 100LL, and over 30 percent of airports offer self-fueling for Jet A. **Appendix B, Table B-6** provides information on fuel service at each Iowa system airport.

Figure 2-13: Fuel Availability at Iowa System Airports



Source: FAA 5010 Form, Iowa Airport Management Survey

Figure 2-14 and **Figure 2-15** depict the amount of available storage in terms of gallons and fuel tanks for both AvGas and Jet A. Larger aircraft typically use more fuel and require Jet A, which explains the lower number of tanks but larger storage capacity within the system.

Figure 2-14: Fuel Storage (Total Gallons) at Iowa System Airports

Source: Iowa Airport Management Survey

Figure 2-15: Fuel Storage (Tanks) at Iowa System Airports

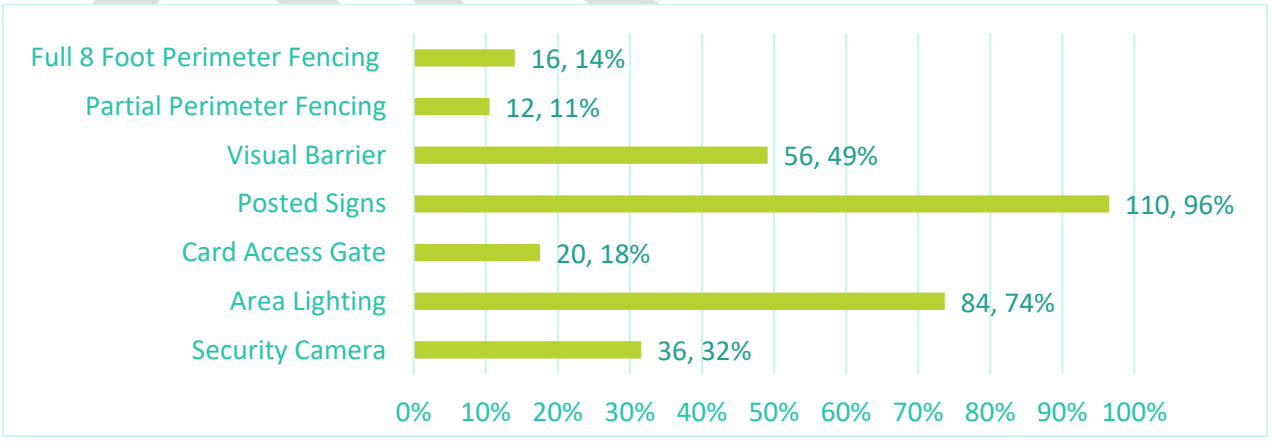
Source: Iowa Airport Management Survey

2.7.2 Airfield Security

Airfield security measures can vary depending on the type of airport and level of use. Operational levels, both in terms of aircraft type and number of operations, can dictate security requirements.

The inventory survey found that nearly 100 percent of airports have posted signs around the airport property. Other popular forms of security measures found at Iowa system airports include area lighting, visual barriers, and surveillance cameras. Fencing is also an important security element that can prevent unwanted trespassers, as well as block wildlife from accessing critical operational areas such as runways and taxiways. Twenty-eight Iowa airports responded that they have either full eight-foot perimeter fencing or partial perimeter fencing. **Appendix B, Table B-7** provides information on airfield security measures at each Iowa system airport.

Figure 2-16: Airfield Security at Iowa System Airports

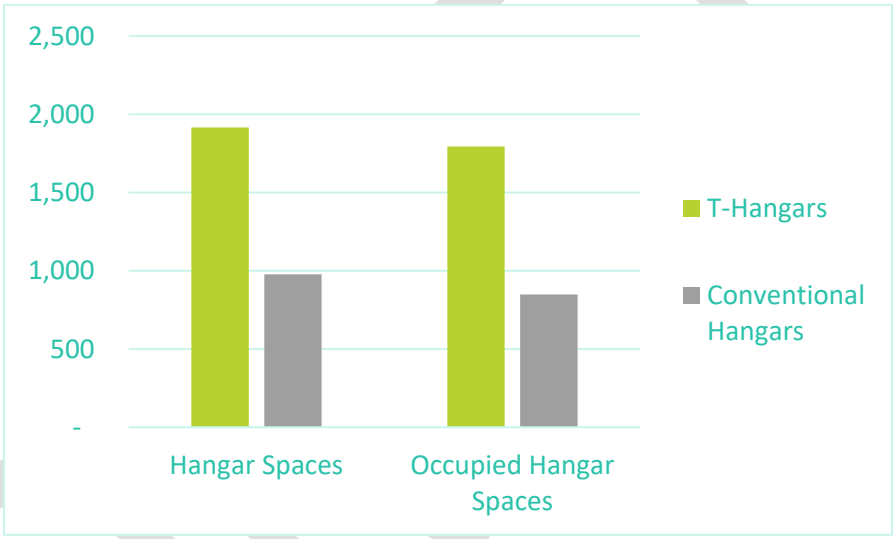


Source: Iowa Airport Management Survey

2.7.3 Hangars

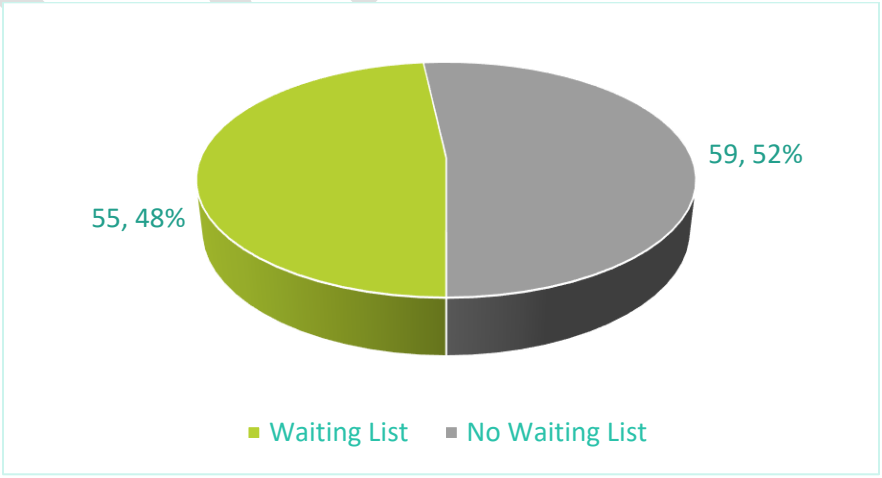
Demand for hangar space is directly related to local aircraft owner demand, climate conditions, and the type of based aircraft at each airport. Areas with a propensity for severe weather conditions or intense heat or cold may have a higher demand for hangar storage facilities. In addition, larger investments for jet and turboprop aircraft also increase the demand for hangar storage. Airport management was asked during the data collection efforts to describe hangar type, occupancy, overnight storage capabilities, and if there was a waiting list. **Figure 2-17** indicates the total number of hangars in the system by type, as well as the number of occupied hangars. Ninety-four percent of t-hangars in the system are occupied, while 87 percent of conventional hangar space is occupied. Almost half of the airports in the state responded that they have a waiting list; at the time of data collection, there were nearly 500 aircraft on waiting lists at Iowa airports. Finally, managers were asked about overnight storage capabilities, with 68 percent responding that they had the capacity to store an aircraft overnight if possible. **Appendix B, Table B-8** provides information on hangar storage at each Iowa system airport.

Figure 2-17: Aircraft Hangar Occupancy at Iowa System Airports



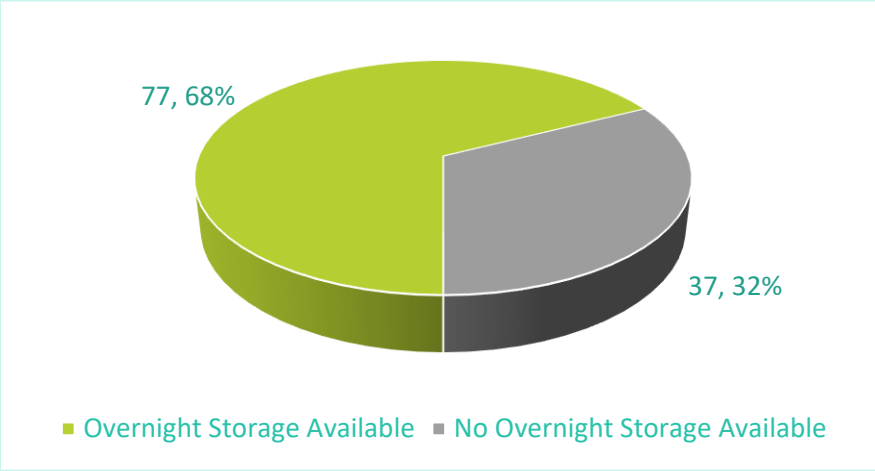
Source: Iowa Airport Management Survey

Figure 2-18: Hangar Waiting Lists at Iowa System Airports



Source: Iowa Airport Management Survey

Figure 2-19: Iowa Airports with Overnight Storage Capabilities

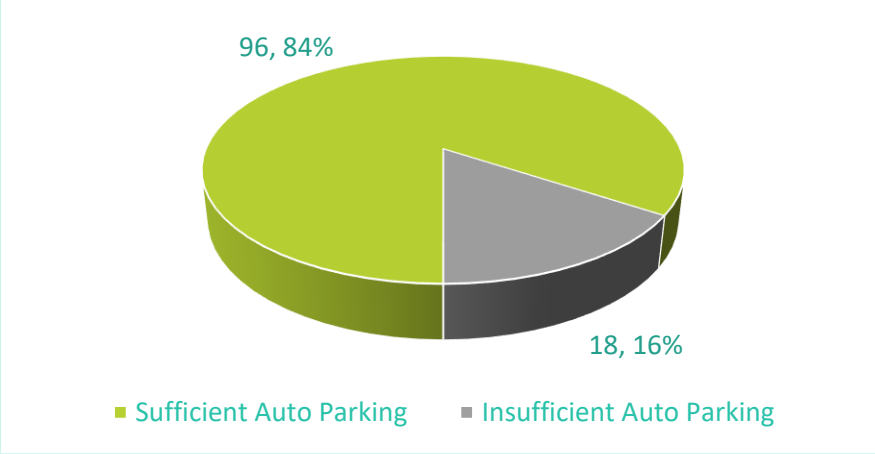


Source: Iowa Airport Management Survey

2.7.4 Automobile Parking

It is important to provide adequate auto parking for general aviation employees, airport employees and users, and visitors. The number of auto parking spaces at an airport varies based on demand and airport services. Airport management was asked during the data collection efforts whether their airport had sufficient automobile parking. **Figure 2-20** indicates 84 percent of airports (96 airports) have sufficient parking. **Appendix B, Table B-8** provides specific information on automobile parking sufficiency at Iowa system airports.

Figure 2-20: Sufficient Automobile Parking



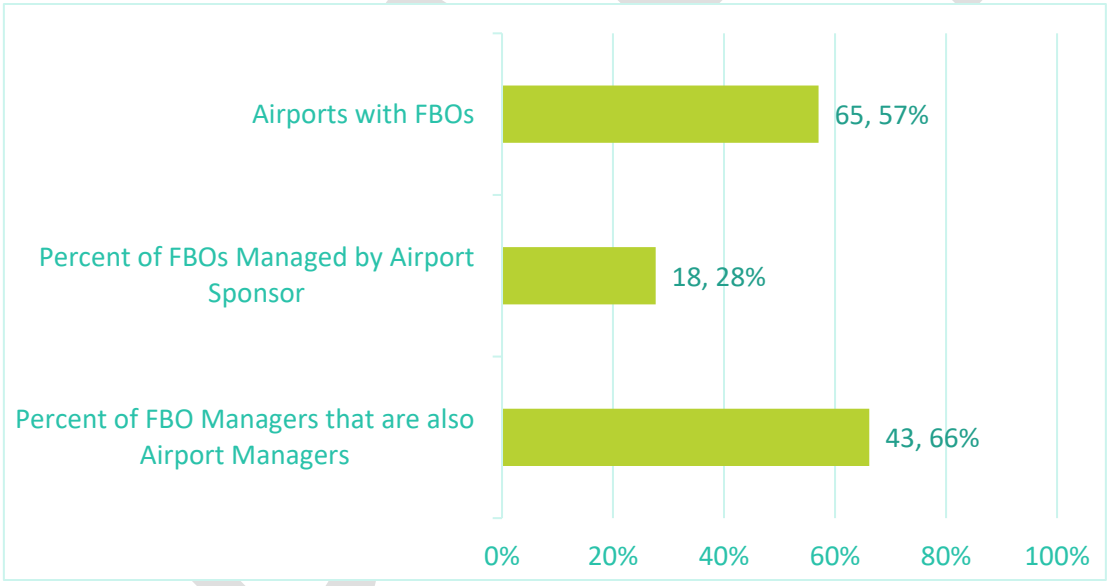
Source: Iowa Airport Management Survey

2.8 Services

2.8.1 Fixed Based Operator

Fixed base operators (FBOs) provide a variety of aviation services to both based and transient users. There are various types of FBOs, with some providing full-service and others providing more basic/limited services. Services provided by FBOs typically vary based on the volume of activity that the airport accommodates. Services can include fuel, tie-down or hangar storage, flight instruction, aircraft maintenance, charter service, ground transportation, aircraft towing, pilot's lounge, or conference rooms. **Figure 2-21** indicates 57 percent of airports (65 airports) in the Iowa system have FBO services. **Appendix B, Table B-9** indicates if FBO services are currently offered at each study airport.

Figure 2-21: FBO Presence at Iowa System Airports

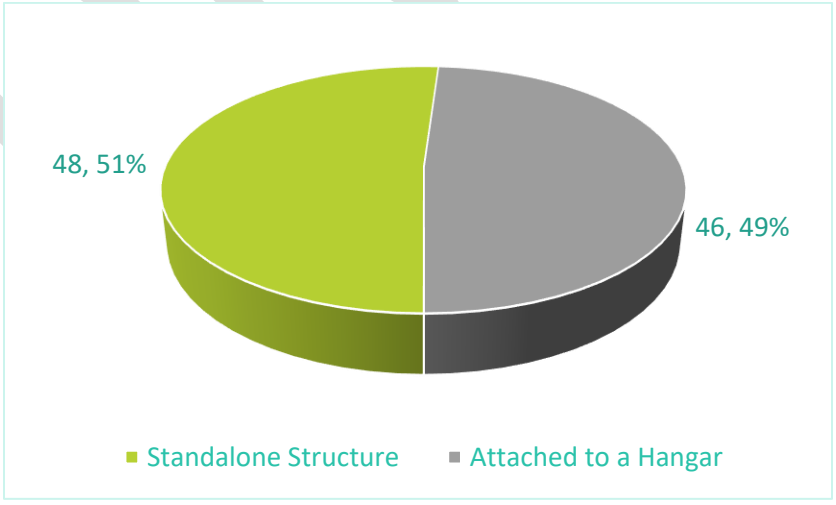


Source: Jviation

2.8.2 Terminal

Terminal buildings provide essential services for passengers and pilots, as well as a facility for the transfer of passengers and flight crews to and from the aircraft. Terminal facilities can range in size based upon several factors, the most important being the type of users. Buildings can range from a small pilot room for flight planning and resting, to a large multi-room building that provides services for multiple uses. **Figure 2-22** details the number of airports with a general aviation terminal building, 94 in all, and what percent of those are standalone structures or attached to a hangar. **Appendix B, Table B-10 and Table B-11** provide information on terminal buildings at Iowa system airports.

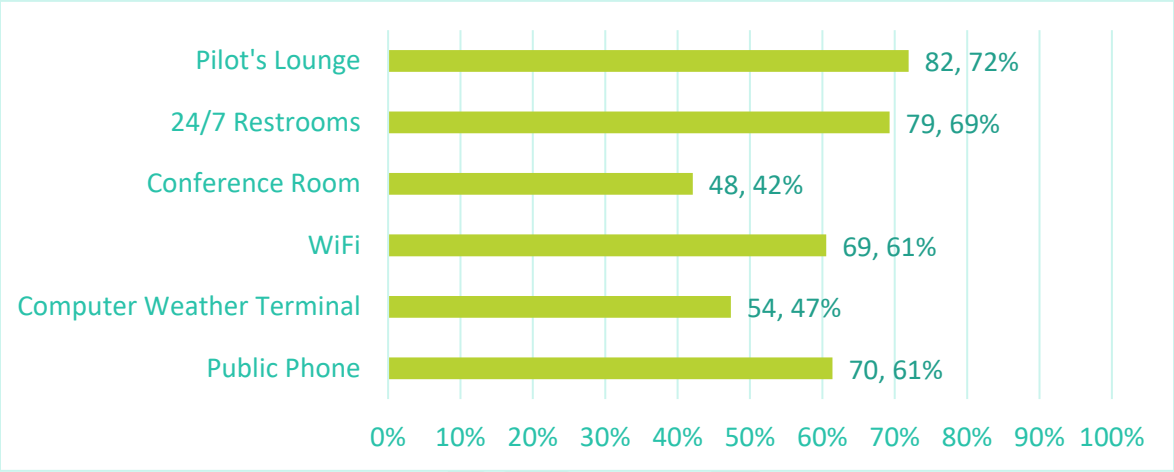
Figure 2-22: General Aviation Terminal Building Information



Source: Jviation

A terminal building provides the first impression of a community to visitors, so it is important for a terminal building to be welcoming and provide a positive experience for the visitor. Specific areas or uses in a terminal building can include waiting areas, restrooms, pilots lounge, flight planning area, conference rooms or public meeting rooms, vending, and airport manager offices. **Figure 2-23** presents general aviation terminal building amenities found in the Iowa airport system. Eighty-two percent of system airports have general aviation terminal buildings.

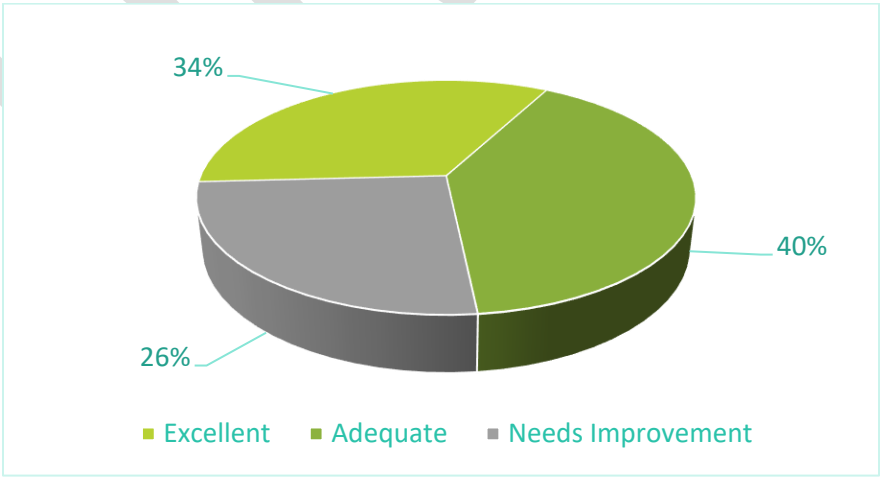
Figure 2-23: General Aviation Terminal Building Amenities



Source: Jviation

Figure 2-24 outlines airport manager responses when asked about the condition of the general aviation terminal at their airport. Responses were limited to excellent, adequate, and needs improvement, with 76 percent responding that their terminal is excellent or adequate. Since the last system plan, 11 new terminal buildings have been constructed to enhance general aviation operations at airports around the state. The survey process also identified that 36 general aviation terminal buildings are more than 35 years old. Continued investment in this area will help keep facilities modern and useable.

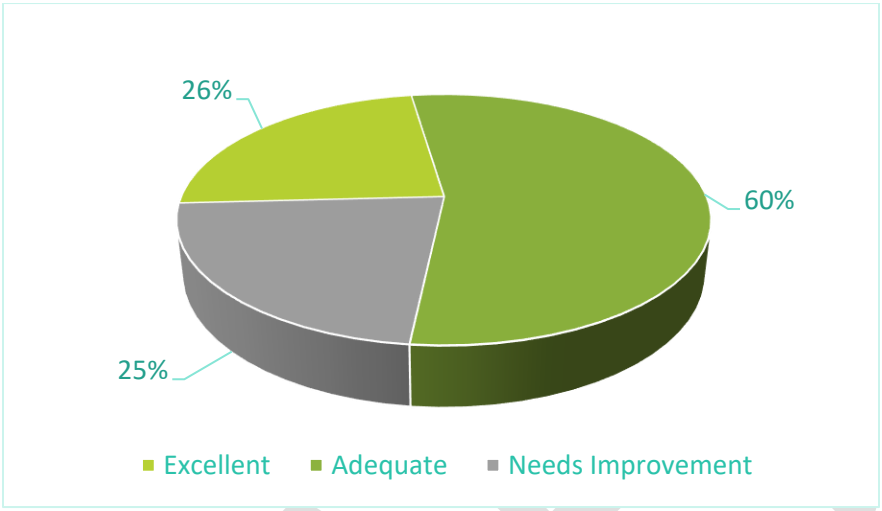
Figure 2-24: General Aviation Terminal Building Adequacy



Source: Jviation

Aside from the terminal building quality, Iowa airport managers were also asked about adequacy of the parking and entrance road. **Figure 2-25** illustrates that 78 percent of managers believe the entrance and parking facilities at the terminal are either excellent or adequate.

Figure 2-25: General Aviation Terminal Building Entrance Road and Parking Adequacy

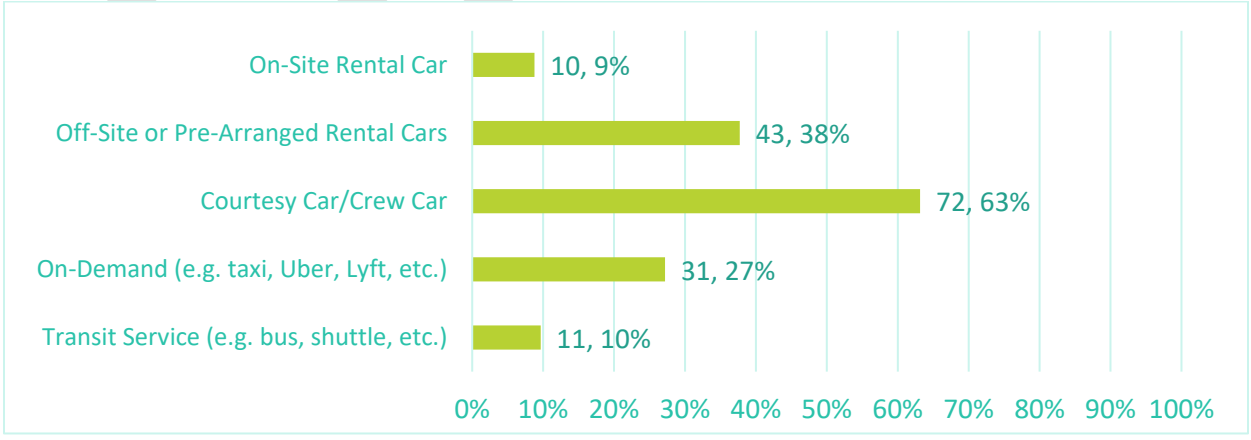


Source: Jviation

2.8.3 Ground Transportation

Ground transportation provides access to the community after visitors arrive at an airport. Inventory data was collected from airport management on the types of ground transportation services available at their airport. **Figure 2-26** summarizes the types of ground transportation services available at Iowa airports. Forty-nine percent of airports (56 airports) offer some form of courtesy car transportation to and from off-airport locations. **Appendix B, Table B-12** details which ground transportation services are currently offered at each study airport. Four airports do not provide any ground transportation services.

Figure 2-26: Ground Transportation Services at Iowa System Airports

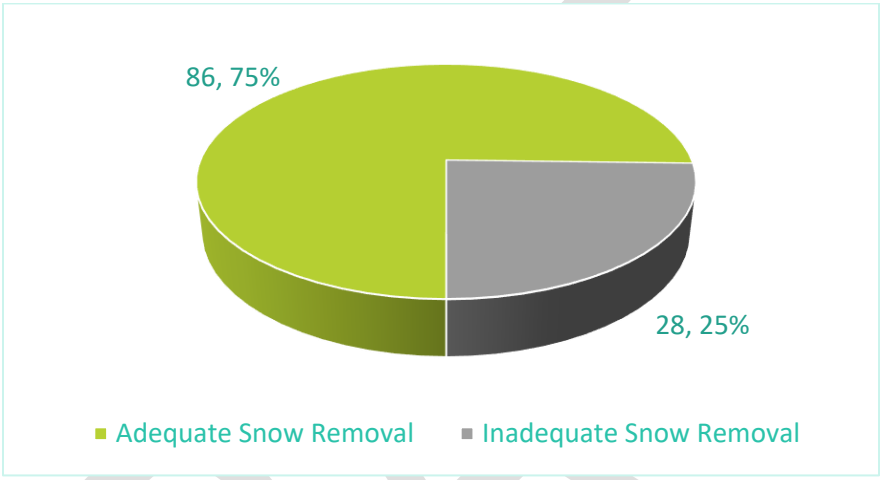


Source: Jviation

2.8.4 Snow Removal

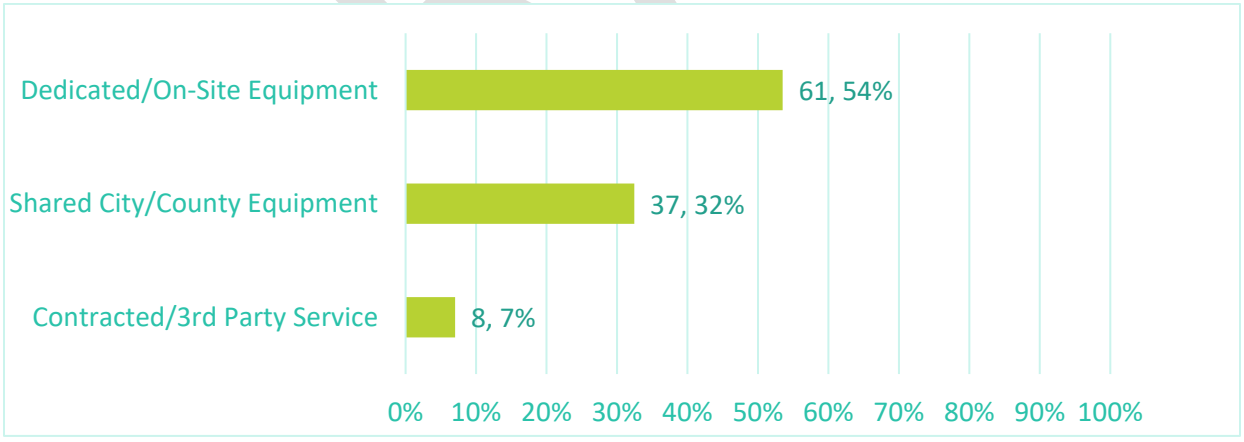
Snow can pose operational issues if not properly taken care of in a timely manner. Iowa airport managers were asked about the adequacy of their snow removal processes, as well as the provider of snow removal services. **Figure 2-27** summarizes the adequacy of snow removal services available at Iowa airports. Seventy-five percent of airports (86 airports) indicated that current snow removal processes were adequate for operations at their airport. **Figure 2-28** indicates whether snow removal services are provided with on-site equipment, by shared city or county equipment, or by a third-party provider. Over half of study airports responded that they own snow removal equipment, with only eight airports indicating a reliance on contracted snow removal. **Appendix B, Table B-13** details snow removal equipment used at each study airport.

Figure 2-27: Adequacy of Snow Removal at Iowa System Airports



Source: Jviation

Figure 2-28: Snow Removal Equipment at Iowa System Airports



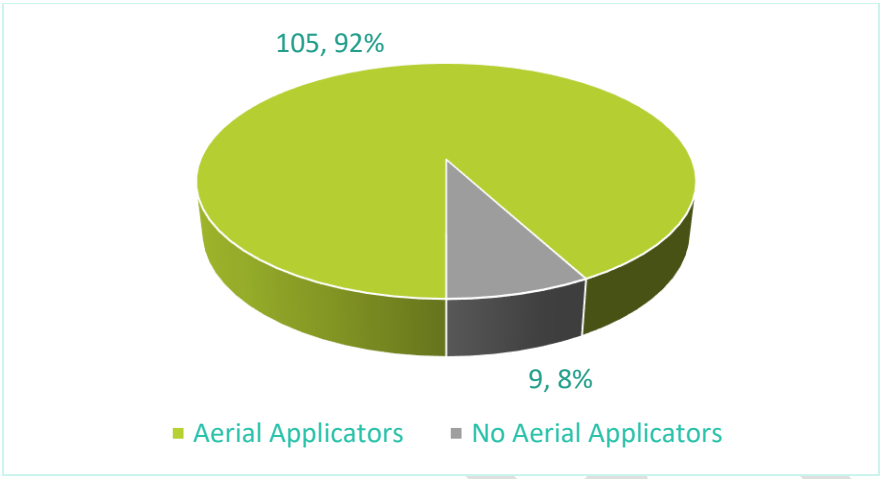
Source: Jviation

2.8.5 Airport Users

Aerial application of crop fertilizers and pesticides is of huge importance to Iowa where agriculture is a large driver of the economy. **Figure 2-29** summarizes the percent of Iowa airports where aerial application activity takes place. Ninety-two percent of airports (105 airports) responded that they have some form of aerial

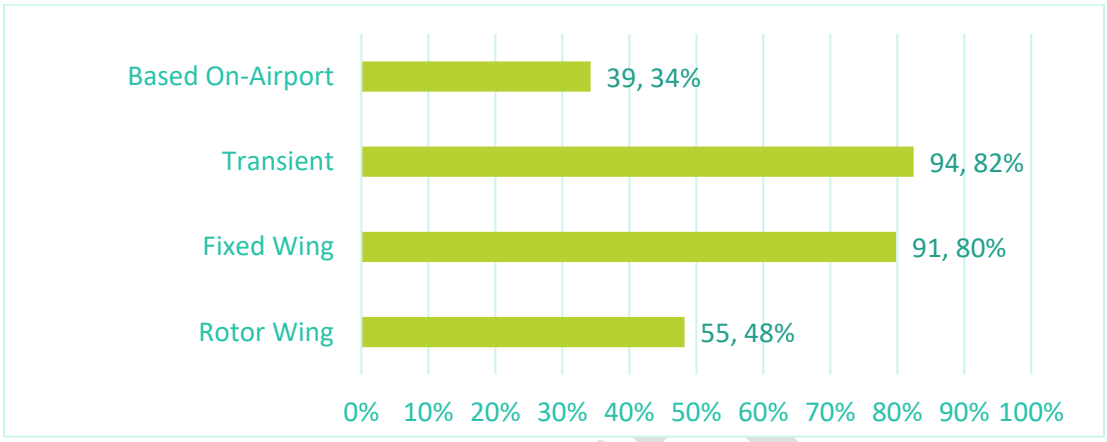
application use at their airport**. Figure 2-30** illustrates the breakdown of based and transient applicators, as well as the type of aircraft used. **Appendix B, Table B-14** provides more detail on aerial applicator use at each study airport.

Figure 2-29: Aerial Applicator Use at Iowa System Airports



Source: Jviation

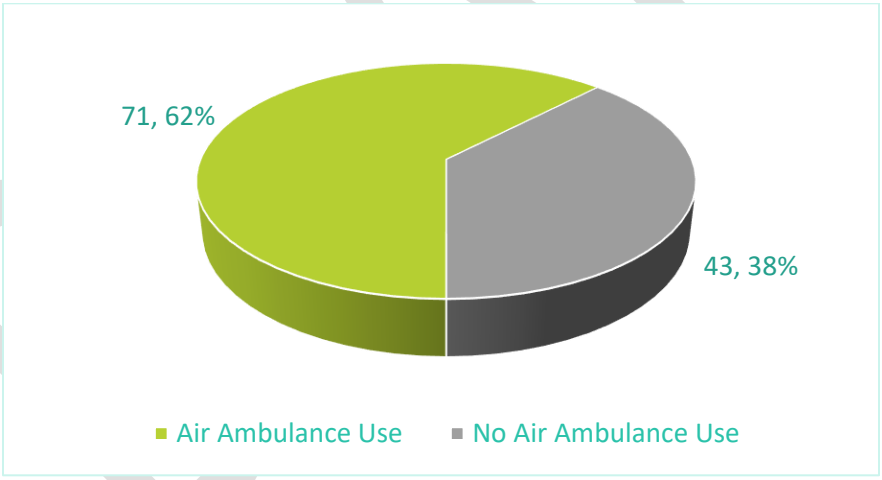
Figure 2-30: Types of Aerial Applicator Users at Iowa System Airports



Source: Jviation

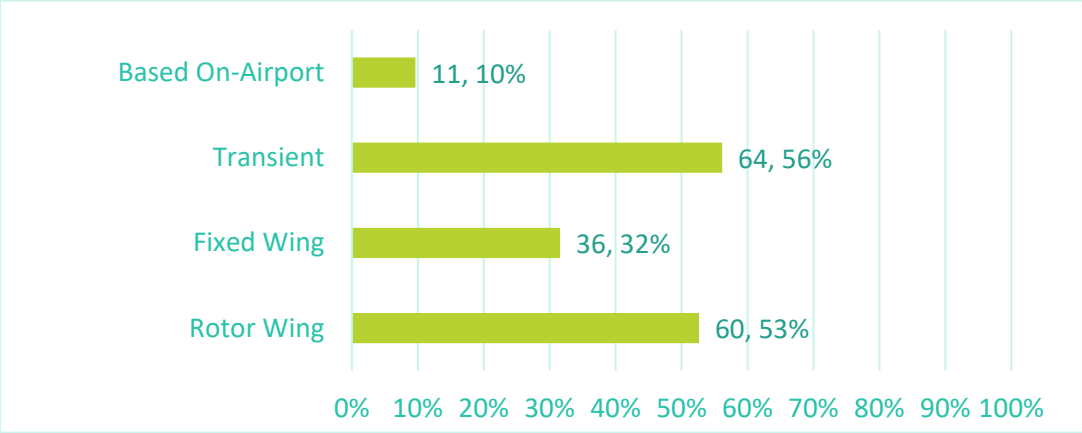
Iowa's rural population relies on air ambulance for expedient transportation to major trauma centers in more densely populated areas. **Figure 2-31** summarizes the percent of Iowa airports that indicated air ambulance use at their airport. Sixty-two percent of airports (71 airports) responded that they have some form of air ambulance activity at their airport. **Figure 2-32** illustrates the breakdown of based and transient air ambulance providers, as well as the type of aircraft used. **Appendix B, Table B-15** provides more detail on air ambulance activity at each study airport.

Figure 2-31: Air Ambulance Use at Iowa System Airports



Source: Jviation

Figure 2-32: Types of Air Ambulance Users at Iowa System Airports



Source: Jviation

2.9 Additional Airport Support Features

2.9.1 Airport Planning Documents

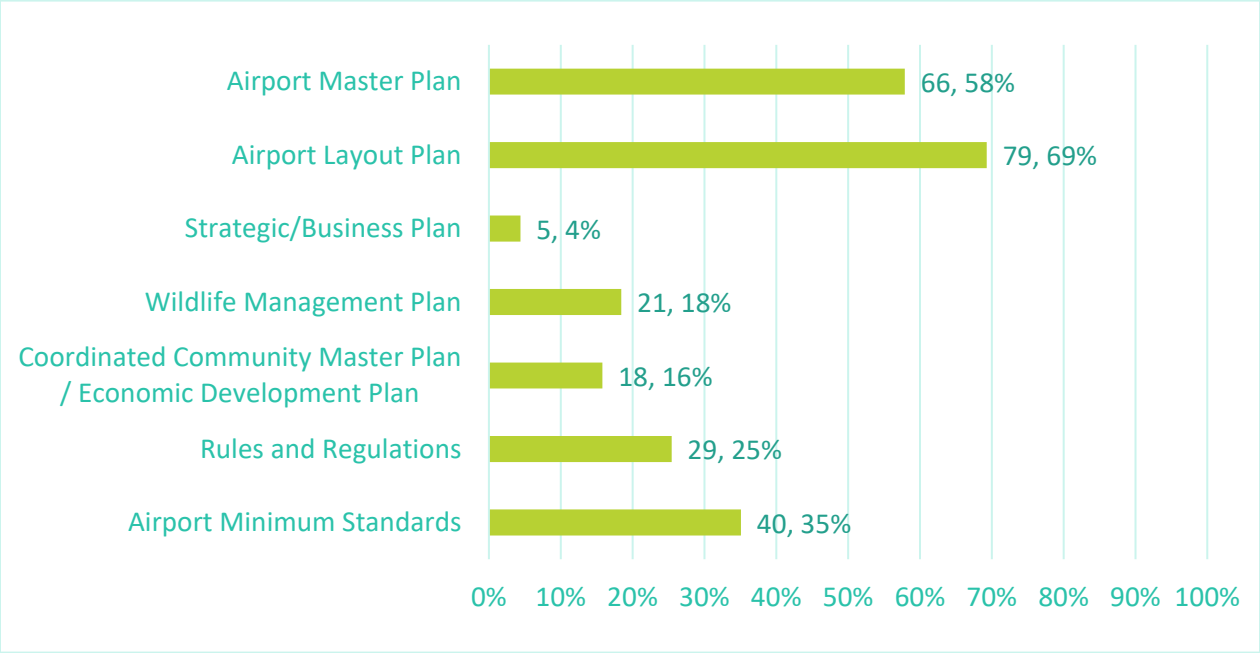
Airports were asked whether or not there is an approved airport master plan or airport layout plan (ALP) and the date of the plan's completion. The airport master plan is a report that documents the airport's long-range planning process, while the ALP is a set of drawings that depicts recommendations that are a result of the planning process.

Wildlife on airports can be a hazard for both aircraft and animals. A Wildlife Hazard Management Plan helps airports identify the most common wildlife in their area and determine how best to mitigate any potential hazard. Under various conditions, as presented in the AIP Handbook Order 5100-38D, some airports are eligible to receive grants to develop a Wildlife Hazard Management Plan.

Additionally, airports were asked about strategic plans, economic development plans, rules and regulations, and airport minimum standards.

Figure 2-33 presents the percent of airports in Iowa that have a specific type of approved planning document. **Appendix B, Table B-16** provides information on plan types at specific airports.

Figure 2-33: Planning Documents Adopted by Iowa System Airports

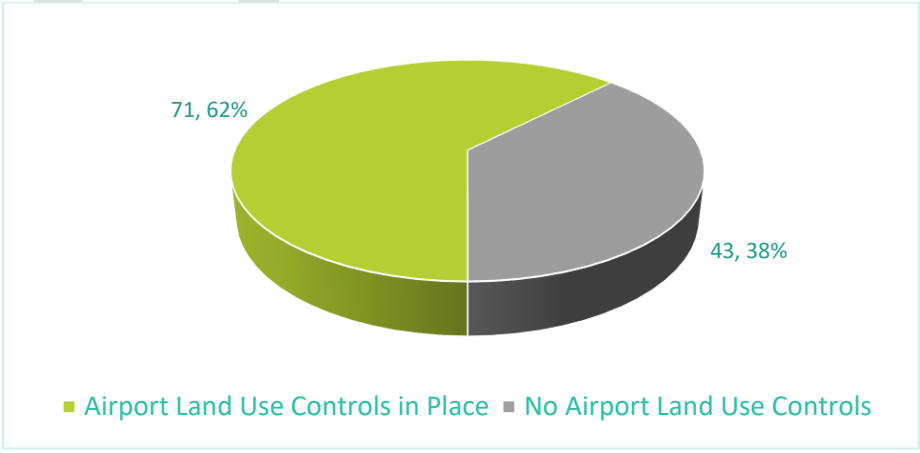


Source: Jviation

2.9.2 Land Use and Zoning Regulations

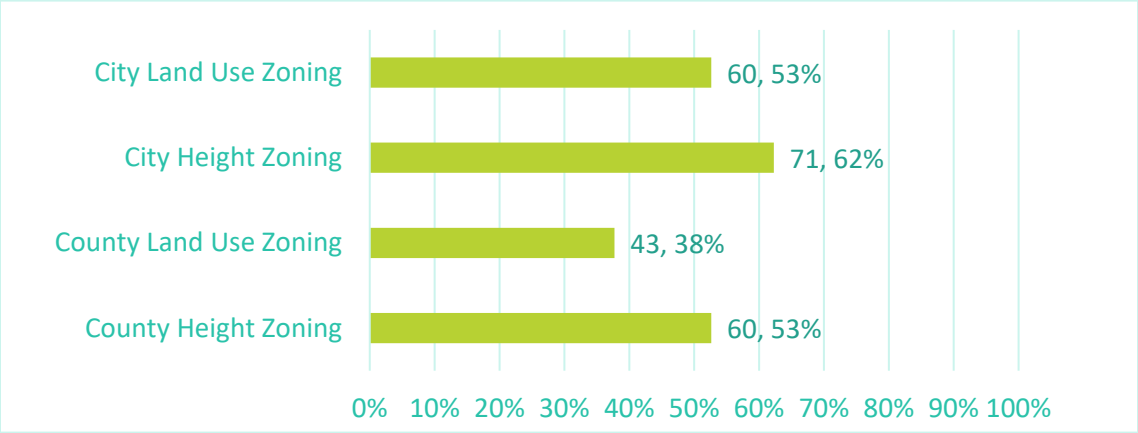
The Iowa Code, Chapter 329 specifies legislation related to airport zoning that outlines zoning powers, procedures for adopting zoning regulations, and airport zoning requirements. The state Code sets the groundwork for implementation of ordinances at the local level where they can help improve the safety of airport operations and quality of life in surrounding communities. As part of the inventory survey effort, airport managers were asked about the presence of local land use controls related to the airport, as well as if zoning measures related to property near the airport were in place. **Figure 2-34** illustrates the percent of airports that indicated if there were local land use controls related to the airport while **Figure 2-35** details airports with city or county zoning regulations related to land use and building height. **Appendix B, Table B-17** provides information on local zoning ordinances supporting Iowa system airports.

Figure 2-34: Iowa System Airports with Airport Land Use Controls



Source: Jviation

Figure 2-35: Iowa System Airports with City or County Zoning Controls

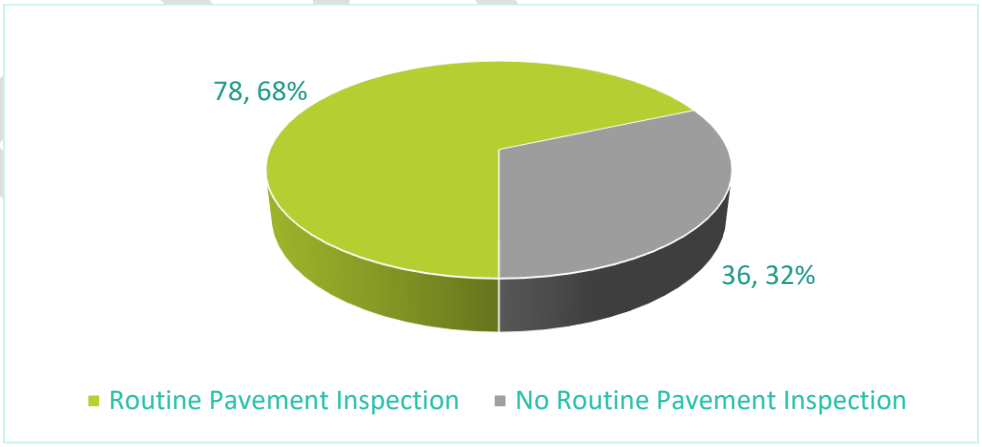


Source: Jviation

2.9.3 Pavement Management

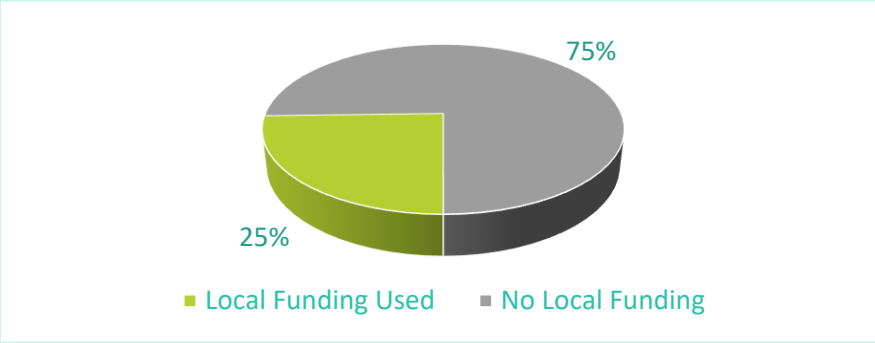
Pavement management at Iowa system airports requires inspections related to quality as well as continued investment to ensure surfaces are adequate for airport operations. Airport managers were asked if routine inspection measures at the local level were in place, with 68 percent (78 airports) replying that pavement inspections were a part of local responsibilities related to ongoing operations. **Figure 2-37** shows that only 25 percent of airports contribute local funds to ongoing pavement maintenance. By aggregating airport responses, nearly $5.5 million has been spent on pavement management from local funds in the past five years. **Appendix B, Table B-18** provides information local pavement management routines at Iowa system airports.

Figure 2-36: Local Pavement Inspection at Iowa System Airports



Source: Jviation

Figure 2-37: Local Funding Support for Pavement Management at Iowa System Airports

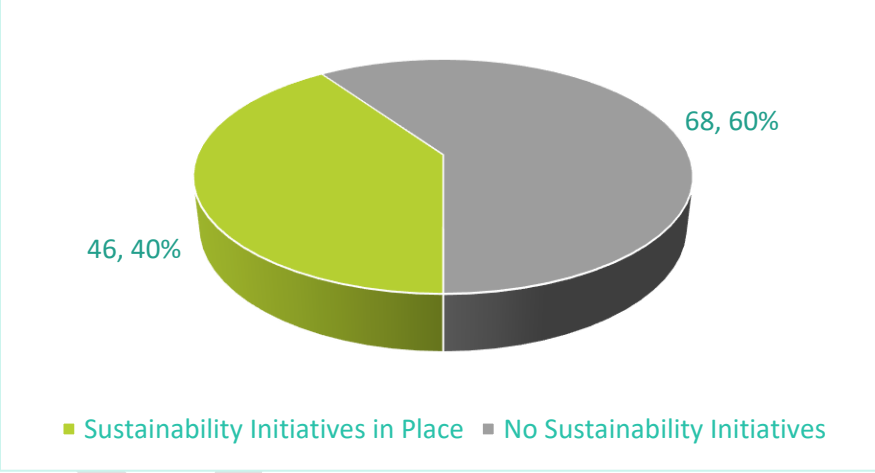


Source: Jviation

2.9.4 Sustainability Initiatives

As sustainable initiatives such as recycling, solar power, and alternative fuel sources become more of a presence throughout the U.S., Iowa airports were asked if any initiatives have been implemented. Forty percent indicated that some form of sustainability initiative has been put in place at their specific airport. Airports that have implemented initiatives listed examples such as LED runway lighting, solar panels on available surfaces, and recycling programs in terminal buildings. **Appendix B, Table B-18** provides information on if specific Iowa system airports have adopted sustainability initiatives.

Figure 2-38: Implementation of Sustainability Initiatives at Iowa System Airports



Source: Jviation

2.10 Summary

The inventory effort catalogued a robust and well-developed airport system. Still, it is likely that airport improvements will be identified. Information presented in this chapter is essential to subsequent steps in the system planning process. In subsequent chapters of this document, various system performance measures, benchmarks, and facility and service objectives are used to evaluate the current performance for Iowa's airport system and individual study airports. Information gathered as part of the inventory effort helps Iowa DOT better understand how current airport system performance and airport performance may need to be enhanced in the future.

- Twenty-nine airports (25 percent) have primary runways 5,000 feet or greater in length
- Five study airports have air traffic control towers
- Twenty-six airports (23 percent) are equipped with full length parallel taxiways
- Sixty-four airports (56 percent) have ILS or LPV vertical guidance approaches
- Eighty-eight airports (77 percent) offer 100LL and 61 (54 percent) offer Jet A fuel
- Ninety-four percent of t-hangars and 87 percent of conventional hangar space is occupied
- Ninety-four airports have terminal building, of which 48 are stand-alone building while the other 46 are attached to a hangar.
- Iowa's airports serve the state by offering service to a variety of aviation activities, including agricultural sprayers and air ambulance operators. More than one hundred airports reported having annual ag sprayer operations while 71 airports reported air ambulance activity.

Appendix B, Inventory Tables, provides summary tables of airport inventory data collected as part of the SASP 2020.