MUSCATINE

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COMMUNITY DEVELOPMENT

Planning,
Zoning,
Building Safety,
Construction Inspection Services,
Public Health,
Housing Inspections,
Code Enforcement

Date: November 29, 2018
To: Mayor and City Council
From: Dave Gobin, Community Development Director
Cc: Gregg Mandsager, City Administrator

Re: APPROVAL OF AIRPORT LAYOUT PLAN

Introduction and Background: The FAA has funded the Airport Layout Plan (ALP). This project took about 3 years to complete. I have attached a copy of the final ALP report that was approved by the FAA.

Highlights of the study include items that allow for improvements over the next 10 years. One of the allowances in the report is the ability of the Muscatine Airport to conduct cargo operations. This may be a valuable provision as it would extend one of the runways and develop a airport industrial park that could support economic growth from the river port, any warehouse operations and potential re-packaging plants that might be built.

Recommendation: Staff hereby requests of the Council to approve the ALP.

Documentation:

1. The ALP Final Report
2. A Resolution for approval of the ALP

RESOLUTION NO. _____

RESOLUTION APPROVING THE AIRPORT LAYOUT PLAN

WHEREAS, the City Council of Muscatine, Iowa, does hereby deem the Airport Layout Plan (ALP) as complete and acceptable, and;

WHEREAS, the City Administrator is hereby authorized and directed to take the necessary steps to execute any ministerial conditions of the approval of the ALP, and;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MUSCATINE, IOWA, that the resolution accepting and the ALP by the City is hereby approved.

CITY COUNCIL OF THE CITY OF MUSCATINE, IOWA

ATTEST:

_____
Diana Broderson, Mayor

_____
Gregg Mandsager, City Clerk

1. EXISTING CONDITIONS

1.1 GENERAL

The City of Muscatine retained Anderson Bogert to update the Muscatine Municipal Airport (MUT) Master Plan. The City received Federal Airport Improvement Program (AIP) funding to complete this project. The notice to proceed was issued on September 14, 2016.

On December 12, 2016, a Master Plan Development Stakeholders Meeting was held at the airport. The minutes from this meeting have been included in Appendix A, along with the attendee list.

The scope of this project includes updating the existing Airport Layout Plan (ALP) drawing set to meet current FAA standards, along with the accompanying Narrative Report. The ALP is a graphic representation of existing and future facilities at the airport. The Narrative Report provides supporting documentation and justification for future facilities shown on the ALP.

The importance of updating the ALP is demonstrated by the following requirement from the AIP Sponsor Guide:

> In order for a development project to be considered eligible for AIP participation, the improvement must be identified on an approved ALP.

This document is the Narrative Report for the Muscatine, Iowa, Municipal Airport. It features information on current and projected activity levels at the airport, facility requirements, alternatives and recommendations, and an implementation plan.

The following is the general procedure that will be utilized in developing the Narrative Report and Airport Layout Plan for Muscatine Municipal Airport.

> **Current and Projected Activity Levels –** Aeronautical demand is forecasted using historical and current information to project levels for short (1-5 years), intermediate (6-10 years), and long-range (11-25 years) timeframes.

Facility Requirements – The capability of the existing airport to support the forecast demand is determined. Facilities required to meet the airport's ultimate needs are determined.

Implementation Plan – A proposed plan for development is presented, which includes concepts and schedules for proposed development.

This Narrative Report will provide an assessment of the general aviation needs of the Muscatine and Muscatine County area. The goal of this Narrative Report is to determine how to best accommodate these needs in a responsible and economical manner. The Narrative Report will provide analysis and recommendations from which local authorities may take action to continue improvement to the operation of the airport.

1.2 Iowa Aviation System Plan

The state has 109 publicly owned airports and seven privately owned airports, which are divided into a five-level system in the 2010-2030 Iowa Aviation System Plan, which can be viewed at http://www.iowadot.gov/aviation/studiesreports/systemplanreports.html.

These levels include commercial service airports (8), enhanced service airports (15), general service airports (30), basic service airports (19), and local service airports (44). The Muscatine Municipal Airport Aviation System Plan Individual Airport Report has been included in Appendix B.

The Muscatine Municipal Airport is considered an enhanced service airport. Enhanced Service airports have runways 5,000 feet or greater in length, with facilities and services that can accommodate a full range of general aviation activity, including most business jets. These airports serve business aviation and are regional transportation centers and economic catalysts. Specific criteria for this role include:

- 5,000 foot or greater paved runway
- Airport Reference Code (ARC) of C-II or greater
- Full-time staffing during regular weekday and weekend business hours
- Airport or Fixed Base Operator (FBO) staffing 24 hours a day
- Availability of jet fuel
- Weather observing system located on airport (ASOS or AWOS)

* Availability of the following based services:
  - Aircraft maintenance and repair
  - Flight training
  - Rental aircraft
  - Aircraft charter

The primary goal of the system plan is to provide a framework that supports informed decisions related to planning and developing the Iowa aviation system. This framework consists of the following six goals: safety and security, infrastructure and user support, accessibility, economic support, planning, and education and outreach.

In comparing the existing Muscatine Municipal Airport facilities to the system plan objectives, the plan recommends the following six actions to meet the objectives and service targets:

- Create an airport emergency plan and update annually
- Create additional hangars to provide covered storage for all based aircraft
- Establish a regular communication program to inform interested parties on airport news and events through newsletters, press releases, web sites, and social media
- Coordinate with the FAA, industry associations, and other aviation organizations to host pilot safety programs
- Increase efforts to host annual aviation events such as fly-ins and air shows, public open houses, tours, conferences, meetings, and organized youth educational activities
- Provide based rental aircraft
- Provide based aircraft maintenance and repair

1.3 National Plan of Integrated Airport Systems (NPIAS)

The Muscatine Municipal Airport is a General Aviation Airport in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS is a Federal Aviation Administration (FAA) report to the United States Congress which reviews and

considers recommendations on the status of the national airport system. It identifies the needs of the system to meet future demands and also identifies the role of each airport. The NPIAS also provides an estimated cost of maintenance to assure the airports will continue their role in the success of the national system.

The NPIAS plan identifies more than 3,400 existing and proposed airports that are significant to the national air transportation system. The NPIAS includes a section on the condition and performance of the airport system, highlighting six topics: safety, capacity, environmental, runway pavement condition, surface accessibility, and financial performance. The findings are generally favorable, indicating that the system is safe, convenient, well maintained, and largely supported by rents, fees, and taxes paid by users.

The Muscatine Municipal Airport is identified in the NPIAS as a nonprimary regional general aviation airport. Regional airports are typically near metropolitan areas and serve relatively large populations. The metropolitan areas in which regional airports are located can be metropolitan statistical areas with an urban core population of at least 50,000 or micropolitan statistical areas with a core urban population between 10,000 and 50,000. These airports support regional economies with interstate and some long-distance flying and have high levels of activity, including some jets and multiengine propeller aircraft.

The entire NPIAS report can be viewed online at https://www.faa.gov/airports/planning_capacity/npias/reports/

1.4 Regional Airport Significance

The function of the Muscatine Municipal Airport is to serve the general aviation needs of the Muscatine and Muscatine County area. General aviation includes every type of civil flying activity, but excludes certified air carriers. It is the largest and possibly the most significant element of the air transportation system in the United States today. General aviation aircraft constitute 97 percent of all civil aircraft in use, and general aviation airports comprise approximately 90 percent of all public-use airports nationwide. General aviation is a major contributor to the national air transportation system, the aviation industry, and our national economy.

General aviation activity provides a variety of aviation services that commercial aviation is unable to accommodate. This is a possible reason why industries in the United States have relocated to smaller communities away from larger

metropolitan areas. It is not the only factor, but a community's airport can be a principle consideration when potential industries evaluate a possible site location. Larger and more sophisticated aircraft are becoming popular with businesses and corporations. Smaller communities, such as Muscatine, need to provide the airport facilities to accommodate these aircraft to increase the economic attractiveness of their community.

1.5 AIRPORT BACKGROUND

The Muscatine Municipal Airport is a city-owned, public-use airport located six (6) miles southwest of the central business district of Muscatine, the County Seat of Muscatine County, Iowa. The airport covers an area of 692 acres and has two runways: 6/24 and 12/30.

1.6 Inventory and Description of Existing Facilities

1.6.1 Based Aircraft

Table 1-1

EXISTING BASED AIRCRAFT FROM VARIOUS SOURCES						
SOURCE	**SINGLE ENGINE**	**MULTI ENGINE**	**JETS**	**HELICOPTERS**	**GLIDERS**	**TOTAL**
FBO (2/22/2017)	24	4	1	1	4	34
FAA AIRPORT MASTER RECORD - 5010 (2/21/2017)	25	2	1	1	2	31
FAA TAF (YEAR 2017 IN 2016 NATIONAL FORECAST)	26	2	1	1	0	30
IOWA AVIATION SYSTEM PLAN (2010)	28	1	1	0	1	31
IOWA AVIATION SYSTEM PLAN (2004)	23	3	4	0	2	32
2001 ALP UPDATE						34
1993 ALP UPDATE						38
1988 AIRPORT MASTER PLAN	34	7	0	1	0	42

1.6.2 Existing Operations

Table 1-2

ANNUAL EXISTING AIRCRAFT OPERATIONS FROM VARIOUS SOURCES							
	ITINERANT				LOCAL		
SOURCE	AIR TAXI & COMMUTER	AIR CARRIER	GA	MILITARY	GA	MILITARY	TOTAL
FAA AIRPORT MASTER RECORD - 5010 (2/21/2017)	900	0	6,603	0	6,603	0	14,106
FAA TAF (YEAR 2017 IN 2016 NATIONAL FORECAST)	900	0	6,603	0	6,603	0	14,106
IOWA AVIATION SYSTEM PLAN (2010)							11,200
IOWA AVIATION SYSTEM PLAN (2004)			8,852		6,732		15,584
2001 ALP UPDATE	900		6,603		6,603		14,106
1993 ALP UPDATE			13,875		8,325		22,200
1988 AIRPORT MASTER PLAN			14,041		8,425		22,466

An original copy of the 5010 Master Record has been included in Appendix C, along with a redlined copy with errors corrected and operations data updated to match the forecast numbers in Section Two of the report. In addition, a copy of the Terminal Area Forecast for MUT and a copy of the Airport/Facilities Directory for MUT has been included in Appendix C.

At the airport layout plan meeting held on December 12, 2016, attendees suggested reaching out to the military to assess if they would like additional use of the airport. Currently, the FAA Terminal Area Forecast and the Airport Master Record (5010) lists no military operations at MUT. However, the Iowa National Guard has a facility adjacent to the airport and leases the property from the City of Muscatine.

According to Greg Wilbur (563.391.3635) at the Iowa National Guard post in Davenport, this is how the National Guard uses MUT:

- They have used MUT on a regular basis out of Davenport since the 1970s.
- All the aircraft they fly out of Davenport are helicopters.
- They typically land on the apron at MUT; although, some of their helicopters have wheels and can land on a runway and then taxi to the terminal area.
- They use the northwest corner of Runway 12/30 for slope operation practice.
- They use MUT for sling load operation practice with concrete blocks.
- They estimate approximately 3,000 takeoffs and landings per year at MUT.
- 40% of the time, their flights are touch and go.
- This year, their Chinooks are deployed overseas, so they are reporting not as much usage of MUT, but they plan to come back.
- Their night vision goggles work well at MUT, since the airport is in a fairly isolated/dark area.
- The National Guard has a "fly neighborly program"; that's why they like to utilize MUT, since they do not receive any noise complaints.
- They utilize GPS, ILS, and VOR at MUT.
- The Muscatine Iowa National Guard post is a ground unit; therefore, they typically do not need direct aviation support. However, they do occasionally transport VIPs in and out of MUT. (The National Guard facility at Muscatine does not have a heliport pad.)
- The nearest National Guard aviation unit is based out of Davenport, and MUT is in the Davenport traffic pattern; therefore, MUT is in a favorable location for their practice flights.

According to Mr. Wilbur, the Iowa National Guard will continue to use MUT as they have in the past; however, he does not anticipate any expanded usage.

1.6.3 Atmospheric Conditions

Local weather conditions have a significant role in the planning and development of an airport. Temperature, wind direction, and speed are influential components in deciding runway length and optimum runway orientation.

Muscatine has a temperate climate with a long-term mean annual precipitation of about 37 inches and an average snowfall of 26 inches. Average temperatures range from a low of 15 degrees during the winter, to a high of 86 degrees during the summer. It is important in airport planning to note the mean daily maximum temperature of the hottest month for Muscatine is 86°F. This information will help determine the optimal runway lengths in the Section Three, Facility Requirements.

FAA AC 150/5300-13A, Airport Design, recommends crosswind runways should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is based on a cross wind not exceeding 10.5 knots (12 mph) for categories A-I and B-I, 13 knots (15 mph) for category B-II, and 16 knots (19 mph) for category C-II.

Wind data specific to Muscatine is available and that data, from years 2007 through 2016, was used for the wind coverage analysis. The following table summarizes the wind coverage for the Muscatine Municipal Airport.

Table 1-3

WIND COVERAGE								
RUNWAY	ALL WEATHER				IFR CONDITIONS			
	10.5 KNOTS	13 KNOTS	16 KNOTS	20 KNOTS	10.5 KNOTS	13 KNOTS	16 KNOTS	20 KNOTS
6/24	87.78%	92.90%	97.66%	99.48%	90.47%	94.27%	97.87%	99.41%
12/30	92.44%	95.85%	98.67%	99.69%	92.38%	95.63%	98.40%	99.45%
COMBINED	97.55%	99.31%	99.84%	99.98%	97.96%	99.33%	99.75%	99.93%

Source: National Climatic Data Center

Wind Rose diagrams for the Muscatine Municipal Airport are included on the Airport Layout Plan.

1.6.4 Pavement

- **Runway 6/24**
  - In 1981, Runway 6/24 was increased in width from 60 feet to 100 feet and in length from 4,000 feet to 4,700 feet. The runway strength was rated at 28,000 pounds single wheel loading.
  - In 1994, the existing runway was extended by 800 feet to the southwest to 5,500 feet in length.
  - In 2016, the runway was reconstructed with 8 inch Portland Cement Concrete (PCC) over a 6-inch recycled concrete aggregate base course.
  - Runway 24 and Runway 6 have approach procedures for aircraft categories A, B, C, and D.
- **Crosswind Runway 12/30**
  - In 1988, Runway 12/30 was 2,726 feet in length by 55 feet in width.
  - In 1999, Runway 12/30 was offset to the northeast by approximately 300' and was moved longitudinally to the northwest. The runway was reconstructed with 6 inch Portland Cement Concrete (PCC) over a 6-inch aggregate base course to a length of 4,000' and a width of 75'.
  - According to the 2014 Iowa Department of Transportation (DOT) Pavement Management Report, which can be viewed at http://www.iowadot.gov/aviation/pavementmanagement/data/documents/docs_reports/muscatine_report_2014.pdf, the average Pavement Condition Index (PCI) of the runway 12/30 pavement was 91. The inspection comments stated that runway 12/30 exhibited medium and high severity joint seal damage throughout, with isolated amounts of low severity small patching, low severity joint spalling, and medium severity corner spalling.
  - Runway 12 and Runway 30 have approach procedures for aircraft categories A and B.

- **Taxiways**
  - Both runways have parallel taxiways, and all taxiways are 35' wide.
  - The 2014 Iowa DOT report indicated the Runway 6/24 parallel taxiway had an average 85 PCI rating.
  - The connecting taxiways to Runway 6/24, within its runway safety area, were reconstructed with the runway project in 2016.
  - The Runway 12/30 connecting taxiway, Taxiway B1 was constructed in 1999. This taxiway has a PCI rating of 93.
  - The runway 12/30 parallel taxiway was constructed in 2009, along with connecting Taxiway B2. These taxiways have a PCI rating of 97.
- **Apron**
  - The apron was reconstructed in 1992. The pavement section is 7" PCC pavement over a 6" aggregate base course. Approximately 22,472 square yards of PC concrete apron area and 5,620 square yards of asphalt apron area.

  - The 2014 Iowa DOT report indicated the apron had an average 93 PCI rating.
  - Eight tiedowns available
  - The apron provides space for aircraft refueling, itinerant aircraft parking, and access to the tee hangar area and to the conventional hangars.

1.6.5 Visual and Navigational Aids (NAVAIDS)

- **Lighting**

  - Runway 6/24 and Taxiway A have medium intensity edge lights that were installed in 2011. The signs were replaced in 2016.
  - Runway 12/30 and Taxiway B have medium intensity edge lights that were installed with their respective paving projects, along with signage.
  - Runway End Identifier Lights (REILs) are operational on Runway 6/24 and Runway 12/30.

- **Airfield Aids**

  - Lighted Wind Indicator
  - Rotating Beacon (recently rehabilitated)
  - Pavement Markings - Precision on Runway 6/24 and non-precision on Runway 12/30.

- **Navigational Aids**

  - The non-Directional Beacon (NDB) is still in place, but is no longer operational.

- A list of NAVAIDs and ownership are provided in Table 1-4 below:

Table 1-4

NAVAIDS		Runway	Owner
Acronym	**Facility**		
ABN	Beacon	All	City
AWOS	Automated Weather Observing System - All Weather Unit IIIP	All	City
GS	Glideslope	24	FAA
LOC	Localizer	24	FAA
MALSR	Medium Intensity Approach Lighting System with Runway Alignment	24	FAA
PAPI	Precision Approach Path Indicator	24, 12, 30	FAA (24), City (12/30)
REIL	Runway End Identifier Light	6, 12, 30	FAA (6), City (12/30)
VASI	Visual Approach Slope Indicator	6	FAA
VOR	VHF Omnidirectional Range	6	FAA
	Runway Lights & Signs	All	City
	Taxiway Lights & Signs	All	City
	Wind Cone	All	City

1.6.6 Landside Facilities

- **Terminal Building**
  - Reconstructed in 2005
  - Approximately 5,900 square feet

- **Aircraft Hangars**
  - Four (4) corporate-style hangars
  - One (1) municipal hangar
  - Twenty (20) tee hangars (all within the 45 to 65-year-old range)

- **Fuel Facilities**
  - 100LL
  - Jet A
  - No self-serve

- **Vehicle Parking**

  - PC Concrete pavement, except for spaces adjacent to the northerly corporate hangar, which are asphalt.

  - Twenty-two (22) parking spaces in terminal building parking lot southeast of building, along with six (6) parking spaces north of the building. Six (6) spaces adjacent to westerly corporate-style hangar. Twelve (12) spaces adjacent to northerly corporate-style hangar.

- **Access to Airport Facilities**

  - Public access to the airport terminal building is provided by an entrance off Highway 61 with a dedicated westbound right turn lane. Highway 61 is a four-lane facility that provides access from downtown Muscatine, Interstate 80 via Iowa Highway 38, and Interstate 280.

  - Access to the westerly hangar area is provided by a separate entrance off Highway 61, which is shared with the Iowa National Guard. This entrance is gated and requires a card key for entry.

  - The airport has a perimeter security fence that has four additional locked gated entrances, which are used by FAA and City employees for airport maintenance purposes.

- **Utilities/Drainage**

  - The City provides water service to the airport; a fire hydrant is located at the main airport entrance.
  - The City provides sewer service to the airport; a lift station is located to the southeast of the terminal building.
  - Drainage within the main apron area is provided via three intakes and connecting storm sewer (reinforced PC concrete pipe) that outlets into a detention pond to the northwest of the apron. Additional intakes and storm sewer (PC concrete pipe) exist along the third row of T-hangars; these also outlet into the same detention pond. An oil water separator exists at the outlet to the detention pond. The areas between the runways and their parallel taxiways are drained by reinforced PC concrete culverts.

- **Snow Removal Equipment**

  - 2009 M2 106V Conventional Chassis Freightliner Truck VIN #: 1FVDC3DJX9HAH3066.
  - 14-foot Reversible Plow Henke 50R14TTP equipped with pneumatic tire running gear. Serial #12406.

  - 11-foot Power Reversible Plow red Henke 41R111S.
  - 2010 John Deere 7830 165 HP Tractor.
  - Pick-up Truck with 7'-6" Western plow.

- **Existing Services provided by the Fixed Base Operator (FBO)**
  - Fuel
  - Aircraft Maintenance and Repair
  - Charter Services
  - Pilot Instruction
  - Aircraft Rental and Sales
  - Tee Hangar Rental
  - Pilot Lounge & Snooze Room
  - Conference Room
  - Rest Rooms/Shower
  - Wireless Internet
  - Weather Computers
  - Crew Cars

1.7 Description of Regional Setting and Land Use

1.7.1 Geographic Service Area

The City of Muscatine is located in Muscatine County Iowa, adjacent to the Mississippi River. The community is approximately 150 miles east of Des Moines, Iowa. Access to the Muscatine Municipal Airport is provided by U.S. Highway 61.

The Muscatine Municipal Airport Service Area coincides, for the most part, with the geographical area of Muscatine and Louisa Counties. However, the northern most townships within Muscatine County lie within a fringe area that is served by airport facilities located in Iowa City, Davenport, and Moline. Consequently, the service area may be defined in terms of a primary and secondary (fringe) service area. The primary airport service area is defined as that geographic area where a majority of the general aviation traffic originates from.

1.7.2 Competing Airports

Area public owned general aviation airports are located in:

- Burlington
- Davenport
- Iowa City
- Mount Pleasant
- Tipton
- Washington

The extent of facility development at each of the public owned airports is summarized below:

Table 1-5
Facility Development at Neighboring Airports

Burlington

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
12/30	CONC	100	5,350	MIRL
18/36	ASPH-CONC	150	6,702	HIRL

Davenport

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
03/21	CONC	100	4,001	MIRL
15/33	CONC	100	5,511	HIRL

Iowa City

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
07/25	CONC	100	5,004	MIRL
12/30	CONC	75	3,900	MIRL

Mount Pleasant

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
03/21	TURF	120	1,965	NONE
15/33	ASPH	75	4,001	MIRL

Muscatine

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
06/24	CONC	100	5,500	MIRL
12/30	CONC	75	4,000	MIRL

Tipton

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
11/29	CONC	60	3,000	MIRL

Washington

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS
13/31	CONC	60	3,400	MIRL
18/36	CONC	75	4,000	MIRL

1.7.3 Local Ordinances

The airport lies within the A-P Airport Zoning District, which is defined in Title 10 of the City Code and can be viewed online at http://muscatineiowa.gov/DocumentCenter/View/12143. The zoning regulations for this district do address height restrictions and restrict the use of land within the vicinity of the airport. The zones established in the code are illustrated on the Muscatine Municipal Airport Zoning Map, consisting of two (2) sheets and dated October 16, 1975, which have been included in Appendix D.

The City's height zoning ordinance dates back to 1976. Since that time, the airport instrument landing system has been added, which changed many of the imaginary surfaces for the main runway. Also, since that time, the crosswind runway was relocated. Therefore, it is likely this ordinance needs to be updated. In addition, the airport's imaginary surfaces extend out into Muscatine County, Louisa County, and the City of Fruitland; these entities do not have airport specific height zoning ordinances.

The City currently has a grant from the Iowa Department of Transportation to update these four (4) ordinances and has a contract with Anderson Bogert to complete these zoning ordinance updates. It is anticipated that this separate zoning ordinance update project will start as the Airport Master Plan project is entering its final stages and will take approximately one year to complete.

The Boards and Commissions Section (Title 2) of the City Code (effective July 1, 2015) provides for a Planning and Zoning Commission and an Airport Advisory Commission.

The City's website provides the following information about those commissions:

Planning & Zoning Commission
5-year terms; 7 members appointed by the Mayor
Meetings are held the 2nd Tuesday of the month at 5:30 PM at the City Hall Council Chambers

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Rochelle Conway

Jody Hansen

Wendi Ingram

Gary Mowl

Steve Nienhaus

Jordan Pahl

John Sayles

Airport Advisory Commission
5-year terms
Meetings are held the 4th Monday of the month, as needed, at 5:00 PM at the Airport Terminal Building

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Jerry Page

Bill Leddy

Scott Natvig

Steven Bradford

Stacy Lewis

This ALP update marks the first step in establishing appropriate airport zoning. The ALP depicts the land the airport should own in fee, as well as land for which easements may be necessary. The airspace drawing shows obstructions to navigation and indicates areas that may need to be regulated in order to prevent or remove such obstructions. The Part 77 imaginary surfaces shown on this drawing should be protected through height limitations on development both on and around the airport and especially in the approach areas and departure areas of the runways. The FAA has developed Advisory Circular AC 150/5190-4A "A Model Zoning Ordinance to Limit the Height of Objects Around Airports" for this purpose. This advisory circular can be viewed at the FAA Central Region website at the following link:

https://www.faa.gov/documentLibrary/media/advisory_circular/150-5190-4A/150_5190_4A.PDF

Also, the Iowa Department of Transportation Office of Aviation has developed the Iowa Airport Land Use Guidebook, which is an excellent reference for establishing appropriate airport zoning. It can be viewed at:

http://www.iowadot.gov/aviation/studiesreports/compatibleland.html

1.8 SOCIOECONOMIC DATA

There are many factors that can be evaluated to give an indication of future demands on an airport facility. Past aviation trends can sometimes be extrapolated to indicate future activity. Trends in demographics such as population and economic factors can be important indicators. As the population and/or economy grow, so does aviation activity. Conversely, as the population and/or economy decline, aviation activity decreases. The perceptions and expectations of the airport users can also provide important insight into the future of the airport.

Since so many factors play a part in the direction future demand may take, it must be remembered a forecast is still only a general prediction of what can be anticipated to occur. For this reason, long-range planning must incorporate some flexibility to respond to actual activity.

1.8.1 Population

Since 1995, Muscatine County has shown a steady increase in population, along with the State of Iowa. Table 1-6 shows historic and projected population figures for the City of Muscatine, Muscatine County, and the State of Iowa.

Table 1-6

POPULATION			
YEAR	MUSCATINE	MUSCATINE COUNTY	STATE OF IOWA
1970	22,410	37,310	2,830,460
1975		39,800	2,880,690
1980	23,470	40,590	2,915,500
1985		40,420	2,829,750
1990	22,880	39,970	2,781,020
1995	23,330	41,440	2,867,370
2000	22,920	41,790	2,929,070
2005		41,890	2,964,450
2010	22,886	42,760	3,050,300
2015	23,819	43,020	3,117,430
2020		43,770	3,181,320
2025		44,500	3,244,950
2030		45,160	3,304,940
2035		45,630	3,353,560
2040		45,910	3,388,650
2045		46,020	3,412,990
2050		46,010	3,430,440

Source: Woods and Poole Economics, Inc.

Muscatine is conveniently located at a focal point of numerous different modes of transportation for both commuters and freight travel. These include Interstate 80, U.S. Highways 61 and 6, and State Highways 22 and 38, which all provide regional commuting options for the growing workforce. Muscatine's location also benefits from easy access to the Muscatine Municipal Airport, the Canadian Pacific Railroad service, and freight service on the Mississippi River and its connecting waterways. The 300-mile market radius includes the seven major metropolitan areas of Chicago, Indianapolis, Kansas City, Milwaukee, Minneapolis-St. Paul, Omaha, and St. Louis, with a total population of nearly 39 million.

1.8.2 Employment

Employment levels correlate well with aviation activity. Historic total employment for Muscatine County and for the State of Iowa have established positive trends.

Table 1-7 shows historic and projected total, service, and manufacturing employment figures for Muscatine County and the State of Iowa.

Table 1-7

	TOTAL EMPLOYMENT		SERVICE EMPLOYMENT		MANUFACTURING EMPLOYMENT	
YEAR	MUSCATINE COUNTY	STATE OF IOWA	MUSCATINE COUNTY	STATE OF IOWA	MUSCATINE COUNTY	STATE OF IOWA
1970	17,590	1,294,610	2,740	176,250	5,030	212,550
1975	20,490	1,406,930	3,070	198,030	5,910	224,190
1980	22,830	1,536,820	2,540	235,190	7,230	239,100
1985	22,900	1,495,080	2,740	259,720	7,580	199,700
1990	24,390	1,634,990	1,250	301,300	8,120	231,590
1995	25,840	1,784,930	1,160	344,290	7,320	245,580
2000	27,640	1,913,420	1,660	387,310	8,140	255,680
2005	28,000	1,934,810	1,490	414,490	7,860	234,910
2010	26,320	1,945,120	1,710	425,730	6,690	206,670

	TOTAL EMPLOYMENT		SERVICE EMPLOYMENT		MANUFACTURING EMPLOYMENT	
2015	28,000	2,060,010	2,010	458,380	7,650	226,860
2020	29,380	2,186,160	2,300	488,180	7,930	233,460
2025	30,500	2,299,530	2,600	519,720	8,020	234,690
2030	31,430	2,401,080	1,990	550,520	8,030	233,510
2035	32,180	2,490,150	2,240	578,870	8,000	231,210
2040	32,810	2,569,690	2,480	606,510	7,940	228,190
2045	33,340	2,642,300	2,690	633,900	7,860	224,730
2050	33,780	2,708,910	2,890	660,210	7,770	220,940

Source: Woods and Poole Economics, Inc.

In 1892, after a nationwide investigation, H.J. Heinz Company decided to locate one of their principal canning plants in Muscatine, which represented the company's first expansion outside of Pittsburgh. The numerous additions made to the plant since that time now make it the largest Heinz plant outside of Pittsburgh and the largest canning plant between the Mississippi River and the Rocky Mountains.

Due to its rich soils, Muscatine is well known for producing some of the highest quality agricultural products in the world, with the Muscatine Melon being perhaps the most famous.

Muscatine is home to HNI (HON Corporation) and Bandag, which both began in Muscatine as small businesses. HNI is now a leading global provider of office furniture, while Bandag is now a part of Bridgestone, the world's largest manufacturer of tires and other rubber products.

Other companies have major facilities in Muscatine, and a number of these small and medium sized companies have become known nationally and internationally for their products.

Major employers in the City of Muscatine are shown in Table 1-8, along with the number of employees:

Table 1-8

Company Name	Number of Employees
HNI Corporation/The HON Company, Allsteel*	3,600
Grain Processing/Kent Feeds*	900
Muscatine Community School District	855
Trinity Muscatine (formerly Unity Health Care)	485
Hy-Vee Food Store	430
Monsanto Company	400
Heinz, USA	370
Musco Sports Lighting*	320
Wal-Mart Superstore	325
Muscatine Power & Water	290
Stanley Consultants	280
City of Muscatine	225
Raymond-Muscatine, Inc.*	285
Bridgestone Bandag LLC*	200
Muscatine County	200
Carver Pump Company	100
TOTAL	**9,265**

Source: City of Muscatine, Iowa Community Profile

*Local businesses with airport needs/past airport needs/potential future airport needs include: HNI Corporation, Grain Processing/Kent Feeds, Wittich-Lewis Funeral Home, Meeker Farms, Carver Aero, American Engineering, Raymond-Muscatine, Musco Sports Lighting, and Bridgestone Bandag.

Due to its robust and diverse economy, Muscatine placed in the top four percent among Micropolitan Statistical Areas in economic strength ranking in 2016, as determined by the Policom Corporation. The City's ranking climbed from 419th in 2004 to 21st in 2016, among 536 Micropolitan Statistical Areas. Policom examines 23 different economic factors when determining the rankings.

According to a 2014 study by the University of Iowa Marketing Institute, even though Muscatine is the headquarters for many well-known companies, the City did not appeal as a place to live for a significant portion of people employed by these companies, which led to import commuting. The City and local business leaders have been very concerned with this phenomenon and have begun to invest a great deal of resources to make the City a more attractive and self-contained community. The referenced study, Muscatine: Insights and Rebranding Recommendations, has been included in Appendix E.

Focus group members from the study indicated that a strength of Muscatine was availability of employment opportunities. They elaborated by saying that Muscatine companies provide a great environment to work in and that employers take good care of their employees.

One of the weaknesses identified by the focus group was lack of hotel options. In September 2015, construction crews broke ground on the $42 million Merrill Hotel and conference center in downtown Muscatine. The six-story hotel, which is expected to be completed by December 2017, will have 122 rooms, along with 13,500 square feet of conference room space and expects to bring in anywhere from 70 to 80 people per night. In the past, most of the larger Muscatine corporations held their shareholder and board meetings at venues outside the City. Once the new hotel and convention center are complete, the corporations are expected to move these meetings inside the City.

A study completed by PKF hotel experts, a leading hotel consultant, and reviewed by two independent economists from the University of Iowa and the University of Georgia, indicates the hotel will have a significant economic impact, as summarized below.

* Summary of Merrill Hotel Economic Impact:
  - On State of Iowa from Construction = $81 Million/548 jobs
  - On Muscatine County from Construction = $19 Million/100 jobs
  - On Muscatine County from Hotel Operations = $13 Million over 10 years/ 83 jobs
  - On City of Muscatine
    - Hotel Occupancy Tax Revenues: $8 Million/20-year span
    - Hotel Tax Revenues: $5.5 Million/10-year span
    - Projected Tax Revenues: $4.5 Million/20-year span

* Port of Muscatine
  - On another economic development note, the City of Muscatine is studying the feasibility of building a container port facility; the study is funded by an Iowa DOT LIFTS grant (Linking Iowa's Freight Transportation System), along with a match from Kent Corporation. Muscatine was one of six projects funded out of 25 total LIFTS Grant applications received by the Iowa DOT. The LIFTS program aims to fill voids in the multimodal funding system by assisting in strengthening the freight transportation system by using truck, train, barge, airplane, or other modes. With Iowa being a producer state, products grown or made in Iowa travel on multiple modes of transportation throughout the United States and the world.

    This project will help strengthen the economic well-being of Muscatine, Muscatine County, and all of Eastern Iowa and Western Illinois by ensuring efficient, diverse, and economical freight transportation options for area businesses, with extended access to world markets. Currently, no intermodal container facilities exist north of St. Louis on the Mississippi River.

1.9 SUMMARY

The information discussed in Section One establishes the foundation for this plan upon which the remaining components of the airport planning processes will be developed. Information on the basic existing conditions of the airport and local community affect the use of the airport and are important when projecting future activity and facility requirements. Notably, population, total employment, manufacturing employment, and service employment are all expected to grow within the twenty-year planning period, both in Muscatine County and in the state of Iowa. Employment levels correlate well with aviation activity and will be used to help project future aviation activity and the resulting facility requirements.

2. CURRENT AND PROJECTED AVIATION ACTIVITY

This section reviews the past and current aviation activity and develops forecasts which define future air transportation demands for the Muscatine Municipal Airport. These forecasts will be the foundation for identifying the facility requirements to meet the aviation needs of Muscatine and the surrounding area.

This section will examine local and regional aviation trends; it is the analysis of these trends and other important influences that will form the underlying decision in the development of forecast models.

2.1. FORECASTING APPROACH

Information at the local, regional, and national levels is needed for the understanding of historical aviation trends and the forecasting of facility requirements demands. Aviation demand forecasts are developed by combining these past trends in aviation activity, the aviation industry, and the local perception of the airport and its activity. Past trends include information on based aircraft, recorded operations, and operational mix. Analyzing these trends is the initial process of developing aviation demand forecasts.

The second process of demand forecasting is to project the trends into the future using various techniques and assumptions. These projections will form a range of tendencies in which the actual growth should be identified. These tendencies may be altered by possible changes in employment, aviation, and/or new construction in the region and around the airport. Employment opportunities, especially service industries and manufacturing, can have a large impact on aviation activity. The expansion or removal of an industry can essentially shift the level and nature of aviation demand in a community, like Muscatine. New legislation and advances in aviation technology can also alter these aviation trends.

Aviation forecasts should only be used as general indication of future demand. There are many factors that may have a tendency to be altered; any one can change aviation trends. Variations in the demand forecast should be expected, anticipated, and airport decisions need to have some flexibility in order to respond to actual activity and changes in aviation.

2.2. Designating a Forecast Model

Selecting the appropriate forecast model is possibly the most important factor in determining future aviation activity. Trends such as population, employment, based aircraft, aircraft operations, and airport user beliefs need to be analyzed. Forecast models can then be compared and contrasted and a suitable methodology and technique can be chosen.

A trend line projection model has been selected for Muscatine Municipal Airport based on the information available. This model is possibly the simplest and most familiar technique used in airport planning and also has very reliable predictions when compared to the other types of projections. Trend line projections utilize historic trends to develop growth curves and extend them into the future. This technique does not take into account any unforeseen exterior influences; rather, this technique makes projection based solely on past trends.

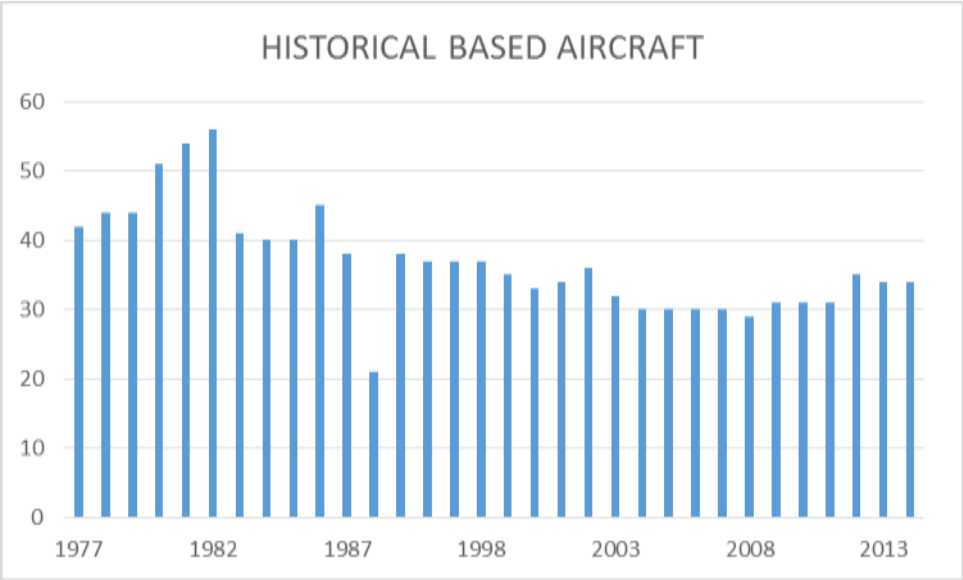
2.3. Air Traffic Activity

Air traffic activity is an important factor in determining the appropriate types of facilities which should be planned for the Muscatine Municipal Airport. These factors include based aircraft, aircraft operations, and information on the current and projected use of the airport.

2.3.1. Based Aircraft

The historic based aircraft information from 1999 to 2013 for the Muscatine Municipal Airport was obtained from the Iowa Department of Transportation. This data was supplemented with data from the 1988 Master Plan report and the 1993 Airport Layout Plan Narrative Report and is summarized in the following chart.

Table 2-1



Source: Iowa Department of Transportation Office of Aviation, 1988 Master Plan Report, and 1993 ALP Narrative Report

As of 2/22/2017, the Fixed Based Operator (FBO) reported thirty-four (34) based aircraft at the Muscatine Municipal Airport. These aircraft include one (1) helicopter, four (4) multi engine, one (1) jet, four (4) gliders, and twenty-four (24) single engine. The following table exhibits information about these based aircraft:

Table 2-2

DETAILED BASED AIRCRAFT		
AIRCRAFT	N-NUMBER	HANGAR LOCATION
2013 Cessna TTX	N101FR	4
2002 Zenith Zodiac (experimental)	N1095J	15
2002 Gulfstream 200 (jet)	N110WA	
Glider	N126MD	
1982 Cessna 182R	N2427E	14
Glider	N2521X	
1965 Cessna 310 (twin engine)	N3048L	8

DETAILED BASED AIRCRAFT		
AIRCRAFT	N-NUMBER	HANGAR LOCATION
1980 Piper Warrior	N394DS	7
1967 Piper Cherokee 6	N3991W	3
Glider	N414KR	
1983 Piper Saratoga	N42942	22
1975 Cessna 150M	N45327	27
1944 Beech Staggerwing	N4612N	31
1977 Piper Archer	N47786	2
1979 Cessna 172N	N5279G	6
1981 Cessna 172P	N53437	24
1974 Piper Warrior	N544CA	21
1993 Lear 60 (jet)	N588BA	
2016 Cessna Citation XLS+ (jet)	N62WA	28
1975 Cessna 172M	N64340	5
2005 Lancair	N654P	23
1981 Mitsubishi MU-2 (turboprop)	N68CL	29
1960 Cessna 175A	N7068E	19
1946 Luscombe 8A	N71306	16
1957 Piper Tri Pacer	N7422D	12
1957 North American T-28	N75947	30
Glider	N7644	
2000 Aviat Huskey	N76HY	13
1946 Piper Super Cruiser	N7847H	10

DETAILED BASED AIRCRAFT		
AIRCRAFT	N-NUMBER	HANGAR LOCATION
2001 Raytheon Hawker 800Xp (jet)	N793RC	
1970 Cessna 177RG	N8007G	20
1992 Beech Baron (twin engine)	N8123N	9
1982 Cessna Citation II (jet)	N82ML	
2001 Skystar Kitfox Classic (experimental)	N927CW	18

Source: Muscatine Fixed Base Operator on 12/9/2016

In determining the average annual growth rate to use at the Muscatine Municipal Airport to forecast the based aircraft over the 20-year planning period, the growth rates in the following table were considered. These rates range from 0% to 3.39% and average to 1.33%.

Table 2-3

AVERAGE ANNUAL GROWTH RATE SUMMARY	
SOURCE	Annual Average Growth Rate
1987 MUT ALP	3.39%
1993 MUT ALP	2.76%
2001 MUT ALP	1.65%
Iowa Aviation System Plan 2010-2030	1.25%
Total Employment 2015-2040	0.64%
Service Employment 2015-2040	0.89%
FAA Terminal Area Forecast 2016	0%
FAA Aerospace Forecast 2017-2037 Total General Aviation Fleet	0.10%
FAA Aerospace Forecast 2017-2037 General Aviation Hours Flown	0.90%
FAA Aerospace Forecast 2017-2037 General Aviation Aircraft Fuel Consumption	1.70%
Average	**1.33%**

Since a close correlation exists between employment and aviation activity, future-based aircraft are often projected to increase at a rate parallel to the projected increase of employment in an airport service area. In Muscatine, according to Woods and Poole, the average annual growth rate for total employment will be 0.64%, while the average annual growth rate for service employment will be 0.89%, over the 20-year planning period.

These two growth rates are much lower than those used in previous master plan studies at the Muscatine Municipal Airport and lower than the rate used in the Iowa Aviation System Plan. Since the City is expecting greater employment growth due to its overall economic strength rating and due to the specific projects discussed in Section One (Rebranding Muscatine initiative, Merrill Hotel, and the Port of Muscatine), the annual average growth rate of 1.25% used in the Iowa Aviation System Plan, which is very close to the average of the values in

the preceding table, will be used to forecast the based aircraft over the 20-year planning period at Muscatine.

Projected based aircraft are presented in the following table.

Table 2-4

PROJECTED BASED AIRCRAFT	
YEAR	*BASED AIRCRAFT using 1.25% Annual Growth Rate*
2016	*34*
2020	*36*
2025	*38*
2030	*41*
2035	*44*
2040	*46*

Source: Anderson Bogert and City of Muscatine

2.3.2. Aircraft Operations

An aircraft operation is a landing (arrival) or a take-off (departure) from an airport. Aircraft operations are difficult to quantify at airports without control towers, since continuous monitoring does not exist.

A commonly accepted method of projecting aircraft operations is to develop a ratio of operations to the number of based aircraft. In the Iowa Aviation System Plan, aircraft operations were projected by multiplying the forecasted number of based aircraft by an adopted Office of Aviation estimation guideline outlined in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS). According to the system plan, this is an acceptable procedure to forecast operations where limited or no historical data may be available. In the system plan, airports with 31 to 99 based aircraft were assigned 350 operations per based aircraft.

The following table presents projected operation levels, using 350 operations per based aircraft.

Table 2-5

PROJECTED OPERATIONS			
YEAR	BASED AIRCRAFT using 1.25% Annual Growth Rate	OPERATIONS PER BASED AIRCRAFT	TOTAL
2016	34	350	11,900
2020	36	350	12,600
2025	38	350	13,300
2030	41	350	14,350
2035	44	350	15,400
2040	46	350	16,100

Source: Anderson Bogert and City of Muscatine

There are two types of operations associated with general aviation, local, and itinerant. In general, local operations are arrivals and departures of aircraft which operate in the local traffic pattern and are known to be arriving from within a 20-mile radius. Also, simulated instrument approaches or low passes are considered to be a local operation. Itinerant operations include all arrivals and departures other than local. The Fixed Based Operator estimates that itinerant operations account for approximately 50 percent of total operations.

2.4. Critical Aircraft and Reference Code

Future airport facilities at Muscatine need to be planned in such a manner they will safely accommodate anticipated aircraft operations in order to accomplish transportation and economic goals.

The designation of the appropriate Federal Aviation Administration Design Standards for the planning and development of the airport facilities is based primarily on the operational and physical characteristics of the aircraft expected to operate at the airport. The FAA defines the *Critical Design Aircraft* as the most demanding category of aircraft which makes 500 or more

operations per year. These 500 operations are required by the FAA to justify the construction of new or improved facilities. The *Airport Reference Code* (ARC) of the aircraft has important characteristics which related to its approach speed and size and are defined in two categories. The first component, depicted by a letter, is the *Aircraft Approach Category* (AAC)and relates to aircraft approach speed. The second component, depicted by a Roman numeral, is the *Airplane Design Group (ADG)* and relates to aircraft wingspan.

The types of facilities to plan for are based on these components and are characterized as:

Aircraft Approach Category (AAC)

Category A:	Speed less than 91 knots
Category B:	Speed between 91 knots and 121 knots
Category C:	Speed between 121 knots and 141 knots
Category D:	Speed between 141 knots and 166 knots
Category E:	Speed 166 knots or greater

Airport Design Group (ADG)

Group I:	Wingspan up to, but excluding 49 feet
Group II:	Wingspan 49 feet up to, but excluding 79 feet
Group III:	Wingspan 79 feet up to, but excluding 118 feet
Group IV:	Wingspan 118 feet up to, but excluding 171 feet
Group V:	Wingspan 171 feet up to, but excluding 214 feet
Group VI:	Wingspan 214 feet up to, but excluding 262 feet

Examples of aircraft in various ARC's are as follows:

- Small Airplane
  (An aircraft of 12,500 pounds or less maximum certified takeoff weight.)
  - A-I Beech Baron E55, Beech Bonanza A-36, Cessna 150, Cessna 177
  - B-I Beech Baron 58, Beech King Air B100, Cessna 402, Piper Navajo
  - B-II Beech King Air B200

- Large Airplane
  (An aircraft of more than 12,500 pounds maximum certified takeoff weight.)
  - B-I Gates Learjet 28/29, Rockwell Sabre 40, Rockwell Sabre 60
  - C-I Gates Learjet 24, Gates Learjet 25, Jet Commander, Westwind

- B-II Cessna Citation II, Cessna Citation III, Gulfstream I, Sabre 65
- C-II Gulfstream III, Rockwell Sabre 80

Source: FAA AC 150/5300-13. – Airport Design

Combining the critical aircraft's approach category and design group identifies a coding system which sets criteria for airport layouts. The aircraft approach speed relates to the runway and runway related facilities, while the aircraft wingspan relates to separation criteria involving taxiways and turnarounds. In order to develop this system, the ARC of the critical aircraft at Muscatine needs to be determined. This will enable the application of the airport design criteria.

The Iowa Aviation System Plan identifies the Muscatine Municipal Airport as an Enhanced Service airport, which has the following specific criteria:

- 5,000 foot or greater paved runway
- Airport Reference Code (ARC) of C-II or greater
- Full-time staffing during regular weekday and weekend business hours
- Availability of the following based services:
  - Aircraft maintenance and repair
  - Flight training
  - Rental aircraft
  - Aircraft charter
  - Airport or Fixed Base Operator (FBO) staffing 24 hours a day
  - Availability of jet fuel
  - Weather observing system located on airport (ASOS or AWOS)

The Iowa Aviation System Plan identifies fifteen airports in Iowa as Enhanced Service airports. All of these airports have an airport reference code of C-II, except for Ottumwa, which has a reference code of C-III. The following table summarizes based aircraft and operations for these airports based on their FAA Airport Master Record.

Table 2-6

Iowa Enhanced Service Airports						
Airport	Based Aircraft			Operations		
	Single Engine	Multi Engine	Jet	Local	Itinerant	Total
Ames Municipal	62	7	2	12,639	18,957	33,751
Ankeny Regional	86	9	5	19,440	29,160	48,600
Arthur N. Neu (Carroll)	11	4	0	3,910	3,123	7,700
Clinton Municipal	33	3	1	5,855	8,782	15,400
Council Bluffs Municipal	60	14	3	22,157	22,157	46,350
Davenport Municipal	88	12	3	12,160	14,567	28,251
Fairfield Municipal	17	2	2	3,737	3,078	7,700
Independence Municipal	30	2	0	5,297	2,638	9,100
Iowa City Municipal	70	7	7	3,700	13,100	19,287
Keokuk Municipal	16	3	0	3,949	3,645	8,050
Marshalltown Municipal	42	4	0	5,546	7,299	13,650
Muscatine Municipal	**26**	**2**	**1**	**6,603**	**6,603**	**14,106**
Newton Municipal	21	2	1	4,896	3,436	9,000
Ottumwa Industrial	24	5	6	7,102	9,348	16,450
Spencer Municipal	34	3	1	4,672	6,748	15,090

Source: FAA Airport Master Record

Iowa Enhanced Service Airports						
Airport	Based Aircraft			Operations		
	Single Engine	Multi Engine	Jet	Local	Itinerant	Total
Ames Municipal	62	7	2	12,639	18,957	33,751

Ankeny Regional	86	9	5	19,440	29,160	48,600
Arthur N. Neu (Carroll)	11	4	0	3,910	3,123	7,700
Clinton Municipal	33	3	1	5,855	8,782	15,400
Council Bluffs Municipal	60	14	3	22,157	22,157	46,350
Davenport Municipal	88	12	3	12,160	14,567	28,251
Fairfield Municipal	17	2	2	3,737	3,078	7,700
Independence Municipal	30	2	0	5,297	2,638	9,100
Iowa City Municipal	70	7	7	3,700	13,100	19,287
Keokuk Municipal	16	3	0	3,949	3,645	8,050
Marshalltown Municipal	42	4	0	5,546	7,299	13,650
Muscatine Municipal	26	2	1	6,603	6,603	14,106
Newton Municipal	21	2	1	4,896	3,436	9,000
Ottumwa Industrial	24	5	6	7,102	9,348	16,450
Spencer Municipal	34	3	1	4,672	6,748	15,090

The FAA Airport Master Plans Advisory Circular states:

1. Short-term forecasts (up to 5 years) are used to justify near-term development and support operational planning and environmental improvement programs.
2. Medium term forecasts (6-10-year time frame) are typically used in planning capital improvements, and
3. Long-term forecasts (beyond 10 years) are helpful in general planning.

According to the Fixed Based Operator, the six jet aircraft shown on the Table 2-7 use the airport on a regular basis. The table also shows the FBO's estimate of percentage of the total jet operations by each aircraft.

In 2008, when the global financial crisis occurred, Muscatine temporarily lost some of its corporate jet traffic and corporate based jets. Before that time,

Bandag (now Bridgestone Bandag LLC) had a 1993 Lear 60 (CI ARC) based at MUT, while HNI (HON Corporation) had two early 1990s Cessna 560 Citation V's (B-II ARC) based at MUT. With the new hotel/convention center opening soon in Muscatine, increased jet traffic (charter flights) and increased based jet aircraft are highly expected.

Table 2-7

JET OPERATIONS									
ID	**YEAR/ MAKE/ MODEL**	**ESTIMATED % OF JET OPERATIONS**	**AAC**	**ADG**	**TDG**	**APPROACH SPEED (KTS)**	**WINGSPAN (FT)**	**LENGTH (FT)**	**MTOW (LBS)**
N110WA	2002 Israel Aircraft Industries Gulfstream G200	12%	C	II	1B	125	58.0	62.0	35,360
N257H	1993 Gulfstream Aerospace G-IV	3%	C	II	1B	125	77.8	88.3	74,600
N588BA	1993 Lear 60	5%	C	I		125	44.0	59.0	23,500
N62WA	CESSNA CITATION XLS	71%	B	II	1B	106	55.8	51.8	20,000
N793RC	2001 Raytheon Hawker 800XP	6%	B	II		113	51.4	51.0	28,000
N82ML	1982 Cessna 550 Citation II	3%	B	II		108	51.7	47.0	14,800

Source: Muscatine Fixed Base Operator and FAA Aircraft Characteristics Database

Iowa Enhanced Service Airports

Airport	Based Aircraft			Operations		
	Single Engine	Multi Engine	Jet	Local	Itinerant	Total

Ames Municipal	62	7	2	12,639	18,957	33,751
Ankeny Regional	86	9	5	19,440	29,160	48,600
Arthur N. Neu (Carroll)	11	4	0	3,910	3,123	7,700
Clinton Municipal	33	3	1	5,855	8,782	15,400
Council Bluffs Municipal	60	14	3	22,157	22,157	46,350
Davenport Municipal	88	12	3	12,160	14,567	28,251
Fairfield Municipal	17	2	2	3,737	3,078	7,700
Independence Municipal	30	2	0	5,297	2,638	9,100
Iowa City Municipal	70	7	7	3,700	13,100	19,287
Keokuk Municipal	16	3	0	3,949	3,645	8,050
Marshalltown Municipal	42	4	0	5,546	7,299	13,650
Muscatine Municipal	26	2	1	6,603	6,603	14,106
Newton Municipal	21	2	1	4,896	3,436	9,000
Ottumwa Industrial	24	5	6	7,102	9,348	16,450
Spencer Municipal	34	3	1	4,672	6,748	15,090

Using the Appendix F data, approximately 88% of the jet operations are currently estimated to be by B-II aircraft, while 6% are by C-II aircraft, 4% are by B-I aircraft, and 2% are by C-I aircraft. The Fixed Based Operator estimated 80% of the jet operations to be by B-II aircraft, while 15% are by C-II aircraft and 5% are by C-I aircraft. The Fixed Based Operator's estimates are in reasonably close conformity with the FAA's TFMSC 2016 data for MUT, especially considering the closure of the main runway and the length modifications to the crosswind runway that occurred last year.

In reviewing the FAA TFMSC data for 2016, it was noted that many of the Airport Reference Code B-I and B-II operations at Muscatine were by aircraft that are not jets. The following table summarizes the FAA TFMSC 2016 operation data by

Airport Reference Code (ARC), which is divided into Airport Approach Category (AAC) and Airport Design Group (ADG).

Table 2-8

FAA TFMSC DATABASE SUMMARY - 2016			
AAC	ADG	# OF OPERATIONS (with Flight Plans)	% OF TOTAL OPERATIONS (with Flight Plans)
A	I	364	35.4%
A	II	5	0.5%
B	I	93	9.0%
B	II	533	51.5%
C	I	8	0.8%
C	II	22	2.1%
D	III	2	0.2%
UNK	UNK	8	0.8%
TOTAL		**1,035**	**100.0%**

Source: FAA TFMSC Database and FAA Aircraft Characteristics Database

The information in Table 2-8 will be used to form the basis for breaking down the overall projected operations into the individual Airport Reference Code (ARC) categories. The FAA TFMSC data will be the baseline for estimated itinerant operations, except for Category A-I. Since the majority of the operations at the airport are by ARC A-I aircraft, any remaining operations will be assigned to that category. The following table summarizes the annual operations forecast by Airport Reference Code.

Table 2-9

ANNUAL OPERATIONS FORECAST BY AIRPORT REFERENCE CODE

	ITINERANT								LOCAL							
YEAR	A-I	A-II	B-I	B-II	C-I	C-II	D-III	UNK	A-I	A-II	B-I	B-II	C-I	C-II	D-III	UNK
2016	5,261	5	93	533	8	40	2	8	5,261	5	93	533	8	40	2	8
2020	5,567	5	98	564	8	45	2	8	5,567	5	98	564	9	45	2	8
2025	5,851	6	104	596	9	52	2	9	5,851	6	104	596	9	52	45	9
2030	6,332	6	112	643	10	61	2	10	6,332	6	112	643	10	61	2	10
2035	6,790	6	120	690	10	70	3	10	6,790	6	120	690	10	70	3	10
2040	7,091	7	126	721	11	81	3	11	7,091	7	126	721	11	81	3	11

Source: FAA TFMSC Database, FAA Aircraft Characteristics Database, FBO, and FAA Aerospace Forecast.

Please note for Table 2-9,

1. FBO estimates of C-II activity from 2015 have been used to adjust the baseline C-II operations to account for the runway closures in 2016.

2. The growth rate (3.0%) used for C-II operations was obtained from Table 29 of the FAA Aerospace Forecast, Fiscal Years 2017-2037.

3. An annual growth rate of 1.25% was used for all other categories, except A-I.

The ARC used when establishing existing safety dimensional criteria at Muscatine was DII, as shown on the 2001 FAA approved ALP.

Runway 24 has a precision approach, which means the minimum runway width = 100', which is also the width of the newly reconstructed runway (2016 construction). No matter if Aircraft Approach Category C or D is chosen in AC 150/5300-13A, Runway design standards matrix, the resulting runway width is 100'.

Currently, no DII aircraft are based at MUT or use MUT on a regular basis. DII aircraft are typically fast corporate jets and are very rare; in the FAA Aircraft Characteristics Database, only two aircraft out of 728 are listed as DII. In addition, according to the Iowa Aviation System Plan, only one airport in Iowa (presumably Muscatine) currently has the D-II Airport Classification. For these reasons, a C-II aircraft is a more realistic choice than a DII for the design aircraft and is consistent with the Iowa Aviation System Plan. C-II is also consistent with the 1988 Master Plan Study. As a comparison, the 1993 Airport Layout Plan Narrative Report listed the design aircraft as a large aircraft 60,000 pounds or less (no ARC given), while the 2001 Airport Layout Plan Narrative Report listed the design aircraft as a Learjet 35 (DI), which also represents a rare combination of AAC and ADG.

However, as shown in Table 2-9, it is estimated that less than 500 operations occurred in 2016 in the C-II category. By the FAA definition, to determine federal funding eligibility for new and improved facilities, at least 500 operations are required. Using that definition, the existing critical design aircraft category is B-II, since that category is estimated to have greater than 500 annual operations currently. Changing the airport critical aircraft design standards from C/D-II to B-II would reduce the size of the Runway Safety Area, the Runway Object Free Area, and the Runway Protection Zone. Since 1991, it is estimated that nearly $13,000,000 in federal funding has been spent on improvements to the Muscatine Airport to meet the C-II/D-II standards. And this estimate does not include the Instrument Landing System and related improvements. Decreasing the size of the safety dimensional criteria at MUT would not enhance or protect the sizable federal investment already made in MUT. In addition, since no site constraints exist in the vicinity of MUT to impede the implementation of the C-II/D-II safety dimensional criteria, we recommend maintaining the C-II/D-II safety dimensional standards at MUT for this ALP update by using the C-II family of aircraft as the Ultimate Critical Design aircraft.

The primary runway (6/24) has wind coverage of 92.9% for the 13 knot crosswind component (applicable to B-II aircraft), which is below the recommended 95% wind coverage. With the addition of the crosswind runway (12/30) to the analysis, the combined 13 knot wind coverage with the primary runway is 99.3%. Accordingly, the crosswind runway is necessary for safe operation of B-II aircraft and for smaller than B-II aircraft. According to the FBO, the crosswind runway is used by B-II aircraft, when the prevailing wind is in that direction. The FBO estimates that the prevailing wind blows along the crosswind runway alignment approximately 65% of the time during the colder months and approximately 25% of the time during the warmer months. Those numbers average to approximately 50% of the time over the whole year, and judging from the FAA-provided TFMSC data, the B-II flights are spread throughout the year. Using the data in Table 2-9, Runway 6/24 currently experiences approximately 533 B-II flights per year, while Runway 12/30 also currently experiences approximately 533 B-II flights per year. Consequently, the B-II designation is justified for the crosswind runway, since the annual B-II operations are greater than 500.

The 2004-2024 Iowa Aviation System Plan estimated the annual instrument approaches for the Muscatine Airport to be 24% of the total itinerant operations. Using the estimated percentage in the System Plan, results in the following forecasted instrument approaches.

Table 2-10

ANNUAL INSTRUMENT APPROACHES			
YEAR	TOTAL OPERATIONS	ITINERANT OPERATIONS	ANNUAL INSTRUMENT APPROACHES
2016	11,900	5,950	1,428
2020	12,600	6,300	1,512
2025	13,300	6,650	1,596
2030	14,350	7,175	1,722
2035	15,400	7,700	1,848
2040	16,100	8,050	1,932

Source: Anderson Bogert and 2004-2024 Iowa Aviation System Plan

2.5. SUMMARY

Section Two has generated the future trends in various aviation demand categories that can be anticipated at the Muscatine Municipal Airport. Based aircraft are projected to increase from 34 in 2016 to 46 in 2040, and operations are projected to increase from 11,900 in 2016 to 16,100 in 2040. The existing critical aircraft is the B-II family, and the ultimate critical aircraft if the C-II family. Section Three will translate these forecasts and analyze the existing airport facilities to determine what facilities will need to be improved or added to accommodate the projected demand.

CITY OF MUSCATINE
CITY COUNCIL GOAL SETTING SESSION
Lower Level Conference Room – 5:30 p.m. – November 15, 2018

The City Council goal setting session for Thursday, November 15, 2018, was called to order at 5:45 p.m. Councilmembers present were Spread, Fitzgerald, Brockert, Brackett, Saucedo, Harvey, and Malcom. City Administrator Mandsager reviewed the draft or proposed goals prepared by city staff following their October 29th, 2018, goal setting session. Each section was reviewed with discussion and edits suggested for council review and consideration. City Administrator Mandsager will make the suggested edits and place the goals on the agenda for an upcoming meeting. Councilmember Spread moved the meeting be adjourned at 6:54 p.m. Seconded by Councilmember Brackett. All ayes; motion carried.

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Gregg Mandsager, City Administrator