Outagamie County Regional Airport

Sustainable AIRPORT MASTER PLAN

prepared for:

Outagamie County Airport Authority
Appleton, WI

September 2012

Outagamie County Regional Airport
ATW
Appleton Wisconsin

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Building Sustainability | ATW

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Preface

Introduction

The most basic definition of sustainable practices is that they allow the current generation to meet current needs without compromising the ability of future generations to meet their needs. Sustainable practices foster environmental protection, natural resource conservation, social progress, and stable economic growth and employment.

Like other public or semi-public facilities, airports (especially commercial service airports) are in a unique position to promote and benefit from sustainable practices. Airports encompass relatively large areas of land, serve as significant employment centers, are transportation hubs and serve the aviation needs of the traveling public, cargo companies, corporate aviation and general aviation. Because of this combination of activities, they are a highly visible part of the community. This is especially true of the commercial service passenger terminal, which aside from serving transportation needs, is often seen as a symbolic representation of the community as a whole.

Though relatively small in comparison to the largest U.S. airports such as those in Atlanta or Chicago, this theme of complex activity interaction and high community visibility certainly applies to the subject of this Master Plan, the Outagamie County Regional Airport (ATW).

Building Energy Use Focus

In accordance with the FAA's Sustainable Airport Master Plan Pilot Program, this Sustainable Airport Master Plan looked at ATW's and the community's goals, examined the baseline environmental conditions and considered a variety of potential directions that ATW could take its already strong sustainability programs. In the end, this Master Plan's Sustainable initiatives focus almost exclusively on reducing the energy use of Airport-owned buildings. It seeks to do this through a combination of new construction, energy efficient retrofits and the use of renewable energy sources.

Improved energy efficiency and on-site renewable energy sources will have real long-term economic benefits for the Airport, as money currently spent on purchased electricity and natural gas can be invested elsewhere. It will also have commensurate environmental and social benefits, including reduced air pollution and decreased consumption of non-renewable energy sources such as coal. Both globally and nationally, commercial and residential buildings account for more total energy consumption and greenhouse gas emissions than any other sector of the economy. Therefore improving the energy efficiency and renewable resource portfolio of new and existing buildings has the greatest potential for conserving energy resources, and for combating global climate change and its negative effects on society.

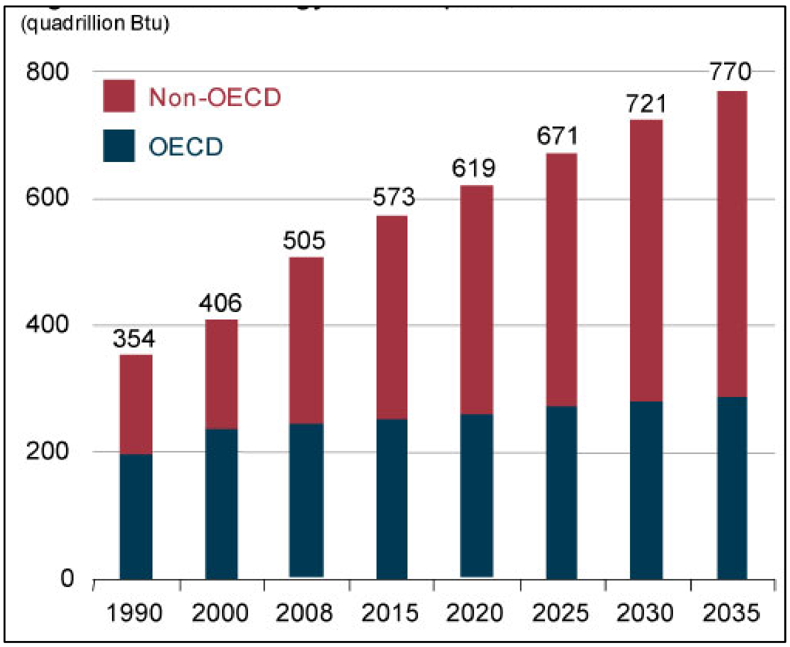
The remainder of this preface gives an overview of global and national building energy use and summarizes current Green Building initiatives. *Note: current year data was not always available. The source date listed was the most recent date for which that particular data could be found.*

Worldwide Energy Consumption and Sources

Overview

Global energy consumption is on the rise, up from 245 quadrillion Btu in 1990 to 505 quadrillion Btu in 2008. The *International Energy Outlook* for 2011 (*IEO2011*) sees this number rising in the next thirty years. According to the *IEO2011* world energy consumption is projected to increase 53 percent between 2009 and 2035. As shown in **Exhibit A**, most of the increase is attributed to developing countries and those countries outside of the Organization for Economic Cooperation and Development (non-OECD nations) where "demand is driven by strong long-term economic growth."

Exhibit A: "World Energy Consumption 1990-2035"

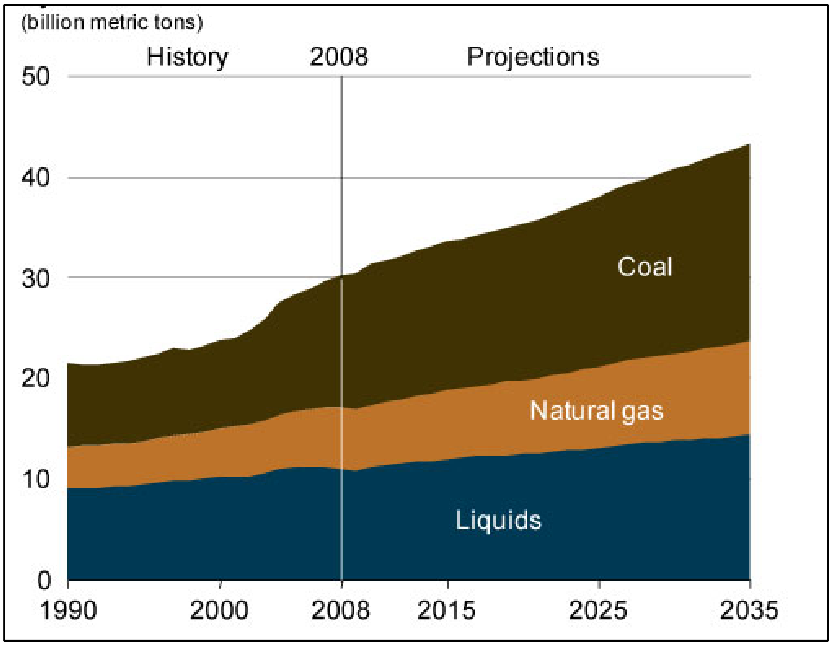


Source: U.S. Energy Information Administration, "Highlights," International Energy Outlook 2011, 19 September 2011, http://www.eai.gov/forcasts/ieo/index.cfm (accessed 15 June 2012).

Energy use is broken into three broad sectors – buildings, industry, and transportation. The building sector was responsible for *40 percent of the world's energy use in 2009* (industry accounted for 32 percent and transportation for the remaining 28 percent). Worldwide, the building sector's energy use is expected to rise between 1.1 and 1.5 percent a year over the next two decades. This sector's energy use is divided into two subcategories, residential energy use and commercial energy use.

Energy, whether as electricity or fuel, is primarily supplied through non-renewable resources – petroleum, coal, and natural gas. The *IEO2011* projects that by 2035 oil will be 29 percent of user demand, coal 27 percent, and natural gas 23 percent. Renewable energy sources such as fuel will constitute 14 percent of the world's energy consumption, rising from 10 percent in 2008. According to the International Energy Agency, nearly 70 percent of the world's electricity is created from fossil fuels and accounts for 40 percent of the global energy-related CO2 emissions. **Exhibit B** shows the projected carbon dioxide emissions by fuel type to 2035.

Exhibit B: "World energy-related carbon dioxide emissions by fuel 1990-2035"



Source: U.S. Energy Information Administration, "Highlights," International Energy Outlook 2011, 19 September 2011, http://www.eai.gov/forcasts/ieo/index.cfm (accessed 15 June 2012).

Each nation is ranked annually for energy consumption. In 2010, the United States ranked second in energy consumption, behind only China. The U.S. consumed 97.8 quadrillion Btu of energy in 2010, which represents 19 percent of the total world energy consumption. China, which supplanted the U.S. for the first time, increased consumption by 22 percent to 104.6 quadrillion Btu while the U.S. decreased consumption by two percent.

United States Energy Consumption – Building Sector

Like global energy consumption measures, the United States Department of Energy also breaks the nation's energy use into three sectors: buildings, industry, and transportation. The building sector, made up of residential and commercial buildings, consumed 41 percent of the nation's energy in 2010 – the largest of any sector, as shown in **Table P-1**. Residential homes accounted for slightly over half of the total building sector stock and represented 22 percent of the energy consumption for the sector, while commercial buildings consumed 18 percent of the sector total use. According to the U.S. Department of Energy, in 2010, "the U.S. building sector alone accounted for 7% of the global primary energy consumption."

The industry sector, comprised of manufacturing, industry, and agriculture, used over 10 percent less energy than the building sector in 2010 at 30 percent. Prior to 1999, this sector was the primary consumer of energy in the United States, but has since decreased its total energy use. The transportation sector's energy use for 2010 is slightly lower than the industry sector, with 28.6 percent energy consumption. This sector comprises the nations' transportation industries, including aviation, rail, automobile, and maritime.

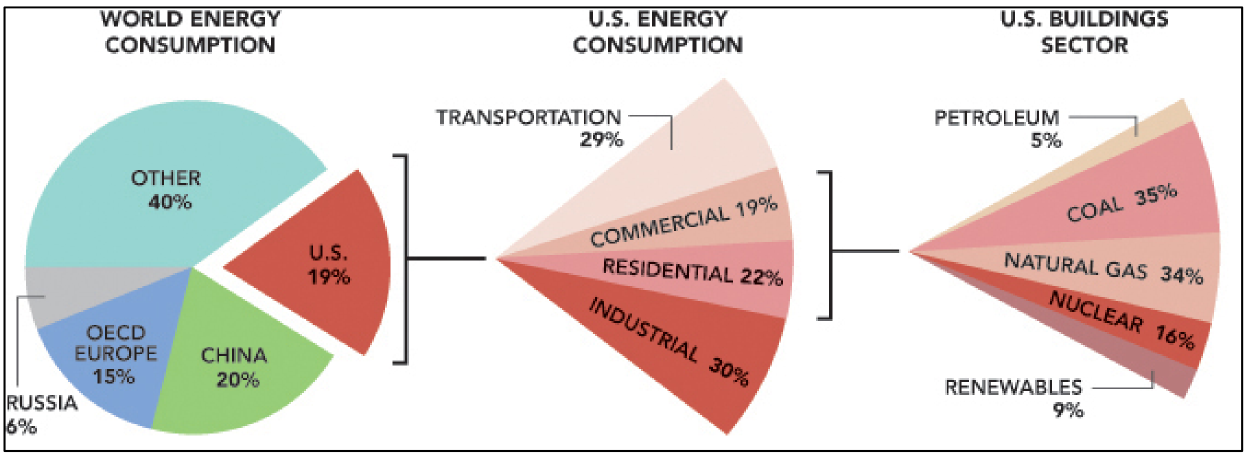
Table P-1. United States Energy Use 2010 by Sector

Sector	Energy use
Building Sector	41.2%
Residential	*(22%)*
Commercial	*(18%)*
Industry Sector	30.2%
Transportation Sector	28.6%
Total	**100%**

Source: Table 1.1.3 "Buildings Share of U.S. Primary Energy Consumption (Percent)," U.S. Department of Energy 2012

Residential and commercial buildings have continued to see continued growth in energy consumption over the last thirty years, up 48 percent from 1980. According to the Department of Energy, 75 percent of energy used by U.S. buildings is from fossil fuels (petroleum, coal, and natural gas), 16 percent from nuclear generation, and nine percent from renewable resources as shown in **Exhibit C**. Additionally, the building sector continues to be the largest consumer of electricity of any other sector. In 2010 alone, 74 percent of the nation's electricity consumption is attributed to the building sector. Because the building sector is the largest consumer of energy, this sector is an increasing contributor of the United States carbon dioxide emissions and represents 40% of U.S. CO2 emissions in 2009.

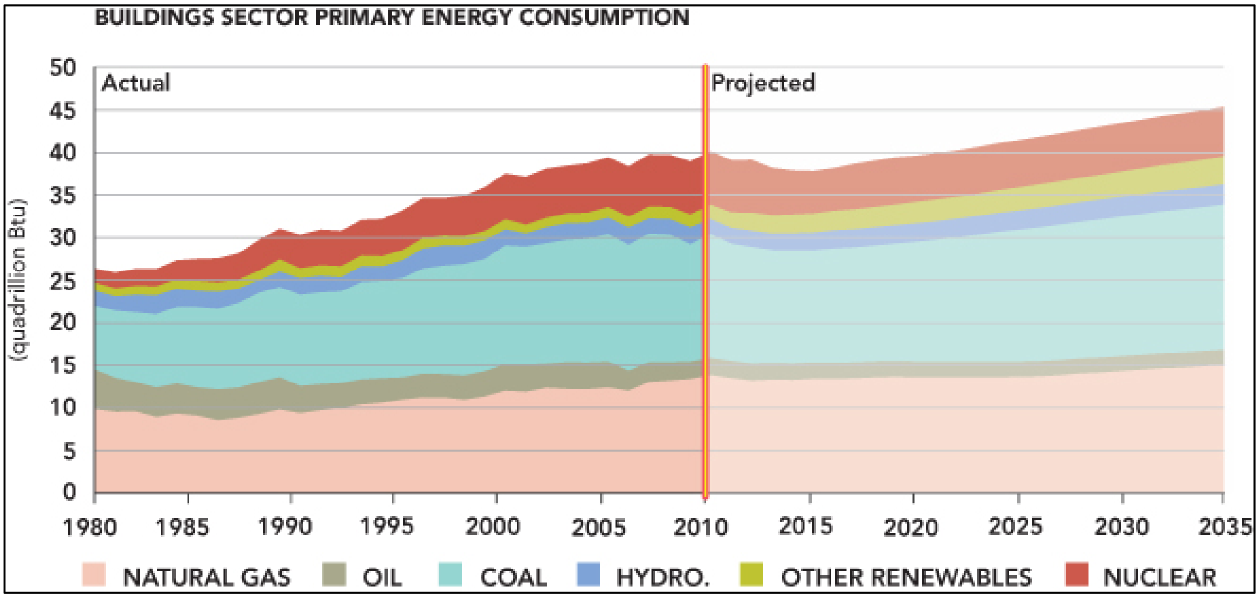
Exhibit C: Energy Consumption



Source: United States Department of Energy - Energy Efficiency & Renewable Energy, Buildings Energy Data Book, "Chapter 1: Buildings Sector," March 2012, http://buildingsdatabook.eren.doe.gov/chapterIntro1.aspx (accessed 14 June 2012).

The economic recession beginning in 2008 led to a decline in overall United States energy consumption. However, the U.S. Department of Energy anticipates that the building sector will continue to be the primary energy consumer, with consumption expected to increase 17 percent between 2010 and 2035. Growth of energy use in the buildings sector will be largely due to the growth in the country's population, increase of the total number of households, and expansion of commercial floor space. Fossil fuels will continue to be the primary energy source, as shown in **Exhibit D**, with use of non-hydroelectric renewable resources, such as wind, solar, and biofuels, increasing 109 percent 2035.

Exhibit D: Buildings Sector Primary Energy Consumption



Source: United States Department of Energy - Energy Efficiency & Renewable Energy, Buildings Energy Data Book, "Chapter 1: Buildings Sector," March 2012, http://buildingsdatabook.eren.doe.gov/chapterIntro1.aspx (accessed 14 June 2012).

State of Wisconsin Energy Consumption – Building Sector

The state of Wisconsin ranked 21st among the states in total energy use in 2009, consuming 1,745 trillion Btus of energy. In the building sector, Wisconsin's buildings consumed 22.1 billion cubic feet of natural gas, 96.60 million gallons of fuel oil, and 43,893 GWh of electricity. This energy consumption resulted in 51.52 million metric tons of CO2 emissions in 2009. Wisconsin uses approximately two percent of the nation's building energy use.

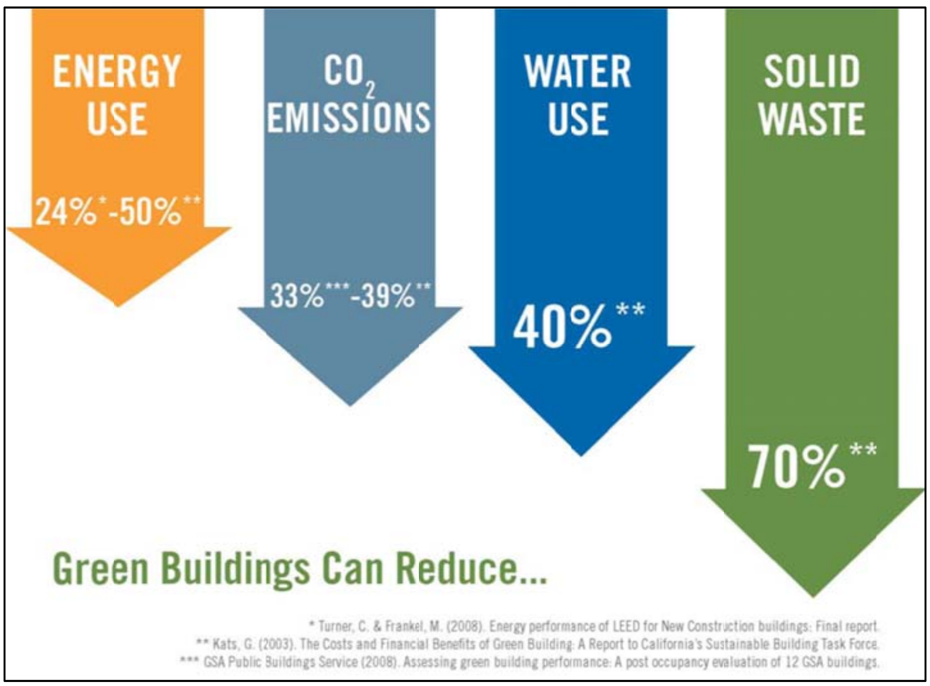
Wisconsin has a number of state-level policies and initiatives that support renewable energy development and use of energy efficiency technologies. The state has a mandatory energy code for residential and commercial construction that is based on the 2006 International Energy Conservation Code. Compared to earlier building codes, this code has high energy efficiency goals. Additionally, the Wisconsin Energy Efficiency and Renewals Act, aims to use renewable energy and improve energy efficiency in all state buildings. The state also offers loans, public funds, and rebates that support energy efficient building projects.

Green Building Impact on the Building Sector

Energy efficient new construction and retrofitting of existing buildings can play a key role in reducing the nation's building sector energy consumption. A 2003 study by the California Sustainable Building Task Force indicates that an initial two percent design investment in green building technologies can produce savings of greater than 10 percent of the initial investment.

Green buildings, or buildings that use sustainable and energy efficient building design and technology, have been proven to reduce energy consumption. According to the United States Green Building Council (USGBC), "the average LEED certified building uses 32% less electricity and saves 350 metric tons of CO2 emissions annually" compared to a contemporary building not constructed with energy-efficiency in mind. Green buildings can reduce total building energy use by 24 to 50 percent, water use up to 40 percent, and solid waste up to 70 percent. As a result of declined energy use, reductions in carbon dioxide emissions of between 33 and 39 percent are possible. **Exhibit E**, below, graphically shows the potential savings as reported in various studies. According to some statistics, if half of all new construction in the United States were built to use 50 percent less energy than current buildings, more than 6 million metric tons of the greenhouse gas carbon dioxide (CO2) would be saved.

Exhibit E: "Green Buildings Can Reduce…"



Of course, all this energy efficiency also leads to cost savings. One well-known example is the Ridgehaven Green Office Building, located in San Diego, California. Renovated in 1996 with green project specifications, this building uses 65 percent less total energy than its identical neighbor that was not renovated with energy efficiency in mind. The green building has yielded more than $70,000 in annual utility costs savings.

ATW Sustainable Master Plan

This Sustainable Master Plan proposes that two major energy goals be achieved for the passenger terminal building by the year 2030. The first goal is to reduce energy usage in the building by 70%, and the second goal is to produce 50% of the building's energy needs from on-site renewable sources. These two goals would reduce the annual greenhouse gas emissions of the terminal building by approximately 85%.

In 2009 (the most recent year for which comparison data was available), the emissions footprint associated with the passenger terminal building's energy usage was equivalent to about 2,772 tons of carbon dioxide. If the greenhouse gas emissions of the passenger terminal building were reduced by 85% over 2009 levels, the Airport's emissions footprint would amount to only 416 tons of carbon dioxide. This reduction in greenhouse gas emissions is equivalent to removing approximately 420 cars from the road for an entire year.

According to recently released energy policy research emissions data, if every building in the State of Wisconsin were to reduce its carbon footprint by 85%, it would be equivalent to removing 6.8 million cars from the road. With a population of about 5.7 million, that is more than one car for every citizen in the State. In fact, Wisconsin only had 5.5 million registered vehicles in 2009. This means that an 85% reduction in greenhouse gas emissions from Wisconsin buildings would be the equivalent of removing every single registered vehicle from Wisconsin's roads.

By implementing the sustainable energy initiatives in this Master Plan, the Airport will reduce its annual energy bills from $400,000 to $60,000. Again, if all buildings in the State of Wisconsin were to achieve similar goals, the savings would be approximately $5.4 billion.

Conclusion

Given immense potential of reducing building energy use (especially at a commercial service airport with a relatively large terminal), the Sustainable Airport Master Plan team chose to focus on building energy use. This focus culminated in the planning (and ultimately the design) of a "demonstration project" GA terminal building (see Chapter 7).

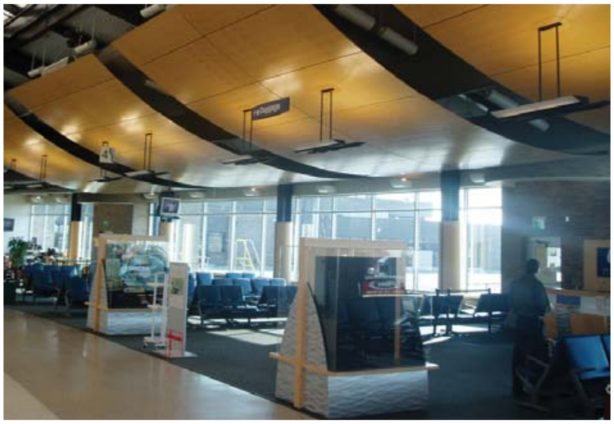
In the local context, we are confident that this direction will lead to cost savings for the Airport and a reduction in emissions. In the state context, we hope that other airports will follow ATW's lead and look to replicate some of the initiatives in their airport buildings. At the regional level, the FAA has already contributed discretionary funds towards the demonstration project. Finally, at the national level, we hope that this plan will contribute something unique to the collective knowledge gained through the Sustainable Airport Master Plan pilot project.

Chapter 1

Airport Inventory

AIRPORT INVENTORY

The inventory element of the traditional master plan process identifies existing infrastructure at an airport and its surrounding community, and describes the framework within which airport facilities function. This chapter presents information on existing airport facilities at Outagamie County Regional Airport (ATW), as well as information on historical aviation activity, local land use controls, and local socioeconomic trends. A baseline assessment of sustainability metrics will be presented in a subsequent chapter.



Airport information is presented in the following sections:

1.1. Airport Background

1.1.1. History

The Outagamie County Regional Airport (ATW) is a county-owned, public-use airport in Outagamie County, Wisconsin. ATW opened for operations on August 23, 1965, replacing the then existing Outagamie County Airport located on Ballard Road in the eastern part of the City of Appleton. At the time of opening, the Airport had approximately 28 acres of pavement and four buildings. Quadrangle maps and aerial photos indicate that the land use in this area was primarily agricultural prior to development of the Airport. Today, the Airport has 29 buildings, two runways, numerous taxiways and paved aircraft aprons available for aeronautical use. The Airport is situated on approximately 1,739 acres of land owned by Outagamie County, much of which is available for future development of new airside and landside facilities. In addition, the Airport controls 29 acres of land through purchase of avigation easements and 9.7 acres through a runway protection zone easement.

1.1.2. Location

ATW is located in east-central Wisconsin in an area commonly referred to as the Fox Cities (see **Exhibit 1-1**). The Fox Cities refers to 14 interconnected communities on the northern and western sides of Lake Winnebago, in Calumet, Winnebago, and Outagamie Counties. The Airport is located four miles west of Appleton, which is the largest principal city of the Fox Cities (see **Exhibit 1-2**).

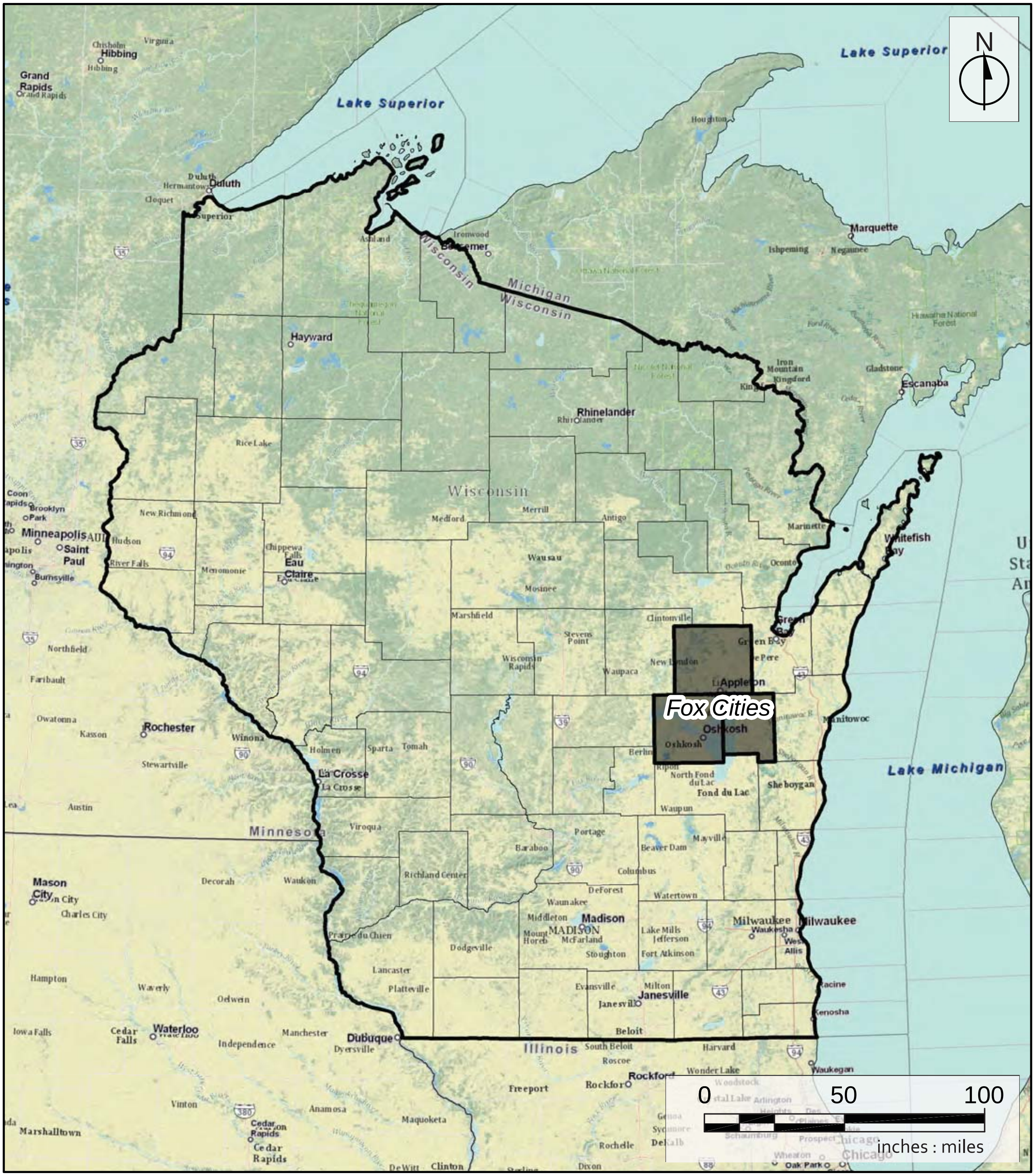
1.1.3. Climate

The climate at ATW is typical of the center of the North American continent at the middle latitudes. Winters are long, cold, and snowy; summers are warm and occasionally humid; and spring and fall are transitional seasons with varying weather conditions. The hottest month of the year is July, with an average daily maximum temperature of 81° F and an average daily minimum temperature of 62° F. The coldest month of the year is January, with an average daily maximum temperature of 23° F and an average daily minimum temperature of 8° F.

Total precipitation at ATW averages 30 inches per year, with an average of 43 inches of snow in the winter. Thunderstorms occur on an average of 25 days a year. Prevailing winds are from the northwest in the winter and from the southwest in the summer.

1.1.4. Topography

The topography of the Airport property slopes gently downhill from northwest to southeast. Elevations vary from approximately 940 feet to 800 feet above mean sea level (MSL). Natural slopes on the Airport range from 0.5% to 5%. The established Airport elevation, defined by the FAA as the highest point on any paved landing surface, is 918 feet MSL. This elevation occurs near Runway End 12. Surface water drains to the southeast for approximately three miles until it joins Mud Creek and the Fox River immediately south of Little Lake Butte des Morts.



N
Lake Superior
Lake Superior
Hibbing
Grand Rapids
Duluth
Superior
Ashland
Bessemer
Ironwood
Houghton
Marquette
Ishpeming
Negaunee
Wisconsin
Michigan
Wisconsin
Michigan
Hayward
Rhinelander
Iron Mountain
Kingsford
Escanaba
Gladstone
Rice Lake
Wisconsin
Medford
Merrill
Antigo
Marinette
Menominee
Minneapolis
Saint Paul
Hudson
River Falls
New Richmond
Eau Claire
Chippewa Falls
Wausau
Mosinee
Oconto
Whitefish Bay
Marshfield
Stevens Point
Wisconsin Rapids
Waupaca
Clintonville
New London
Green Bay
De Pere
Appleton
Fox Cities
Oshkosh
Manitowoc
Northfield
Faribault
Owatonna
Kasson
Rochester
Winona
Holmen
Sparta
Tomah
La Crosse
Berlin
Ripon
North Fond du Lac
Fond du Lac
Sheboygan
Lake Michigan
Austin
Stewartville
Minnesota
Viroqua
Waupun
Portage
Baraboo
Beaver Dam
Mayville
Columbus
Mason City
Charles City
Decorah
Waukon
Richland Center
DeForest
Watertown
Waunakee
Middleton
Madison
MADISON
McFarland
Mount Horeb
Prairie du Chien
Dodgeville
Stoughton
Lake Mills
Jefferson
Fort Atkinson
Milwaukee
Waukesha
West Allis
Lancaster
Platteville
Evansville
Milton
Janesville
Racine
Kenosha
Hampton
Waverly
Oelwein
Iowa Falls
Cedar Falls
Waterloo
Independence
Manchester
Dubuque
Dyersville
Beloit
South Beloit
Illinois
Harvard
Roscoe
Rockford
Freeport
Waukegan
Vinton
Anamosa
Cedar Rapids
Maquoketa
Marshalltown
Rochelle
DeKalb
Chicago
Clinton
0
50
100
inches : miles

Exhibit 1-2
AIRPORT LOCATION

1.1.5. Airport Role

The FAA National Plan of Integrated Airport Systems (NPIAS) is a federal system of over 3,400 public U.S. airports that are deemed significant to national air transportation and eligible to receive Federal Airport Improvement Program (AIP) grants. The most recent NPIAS identifies ATW as a primary non-hub commercial service airport. Of the eight commercial service airports in the State of Wisconsin, ATW was the fourth busiest in terms of passenger enplanements in 2008, as shown in **Table 1-1**. As presented in **Exhibit 1-3**, three commercial airlines serve seven non-stop destinations from ATW as of 2012.

Table 1-1: 2010 Passenger Enplanements at Wisconsin Commercial Service Airports

Airport	City	Enplanements
General Mitchell International	Milwaukee	4,850,918
Dane County Regional - Truax Field	Madison	748,955
Austin Straubel International	Green Bay	349,462
Outagamie County Regional	**Appleton**	**258,058**
Central Wisconsin	Mosinee	144,824
La Crosse Municipal	La Crosse	104,332
Rhinelander-Oneida County	Rhinelander	28,540
Chippewa Valley Regional	Eau Claire	19,790

Source: FAA APO Terminal Area Forecast 2011

FedEx provides cargo service to and from ATW, and operates a dedicated cargo sorting and handling facility on the Airport. FedEx conducts frequent flights to Memphis and Milwaukee utilizing Airbus 300, Airbus 310, and Cessna 208 Caravan aircraft.

ATW hosts a wide variety of general aviation (GA) activities, ranging from training aircraft to corporate jets, with storage, fueling, and maintenance facilities to serve them.

Exhibit 1-3
AIRLINE ROUTES

1.2. Airside Facilities

1.2.1. Runways and Navigational Aids (NAVAIDs)

ATW has two runways, Runway 3/21 and Runway 12/30. Both runways are constructed of grooved concrete, designed to Airport Reference Code (ARC) C-IV standards. There are eight instrument approach procedures at ATW, all of which direct aircraft on approach to either Runway 3/21 or Runway 12/30. Runway 3/21 is considered the primary runway due to its longer length, greater number of instrument approach procedures, and superior wind coverage. **Table 1-2** lists characteristics of each runway, including length, width, lighting, visual glide slope indicator types, weight-bearing capacities, and runway gradients.

Table 1-2: Runway Information

<table>
<tr><th>Runway</th><th>Length x Width</th><th>Lighting</th><th>Visual Glide Slope Indicator</th><th>Weight-Bearing Capacity (hundreds of pounds)</th><th>Runway Gradient</th></tr>
<tr><td>3</td><td rowspan="2">8,002' x 150'</td><td>MALSR, HIRL</td><td rowspan="2">PAPI</td><td rowspan="2">75S/160D/175ST/320DT</td><td rowspan="2">0.137%</td></tr>
<tr><td>21</td><td>REIL, HIRL</td></tr>
<tr><td>12</td><td rowspan="2">6,501' x 150'</td><td>REIL, HIRL</td><td>VASI</td><td rowspan="2">75S/160D/175ST/320DT</td><td rowspan="2">0.914%</td></tr>
<tr><td>30</td><td>MALSR, HIRL</td><td>PAPI</td></tr>
<tr><td colspan="6">HIRL: High Intensity Runway Edge Lights
MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
REIL: Runway End Identification Lights
PAPI: Precision Approach Path Indicator
VASI: Visual Approach Slope Indicator
Weight-Bearing Capacity: S-Single Wheel, D-Dual Wheel, ST-Single Tandem, DT-Dual Tandem</td></tr>
</table>

Source: FAA Airport Facility Directory, 23 August to 20 September 2012; 2012 Airport Layout Plan

Runway wind coverage is the percentage of time a runway can be used without exceeding allowable crosswind velocities. Allowable crosswind velocities vary depending on aircraft size and speed, and are generally grouped into four allowable crosswind components: 10.5 knots (12 mph), 13 knots (15 mph), 16 knots (18 mph), and 20 knots (23 mph). During periods of high crosswinds, traffic may be diverted from the affected runway to a crosswind runway. **Table 1-3** presents individual and combined wind coverage percentages for the two runways at ATW for both all-weather and IFR conditions.

Table 1-3: Runway Wind Coverage

Runway	10.5 knots	13 knots	16 knots	20 knots
All Weather				
Runway 3/21	85.92%	92.36%	97.91%	99.49%
Runway 12/30	82.39%	89.70%	96.31%	98.97%
Combined	97.94%	99.50%	99.93%	99.99%
Instrument Flight Rules				
Runway 3/21	88.45%	94.20%	98.43%	99.65%
Runway 12/30	73.27%	83.21%	92.86%	97.64%
Combined	96.74%	99.11%	99.88%	100.00%

Source: 2010 Airport Layout Plan

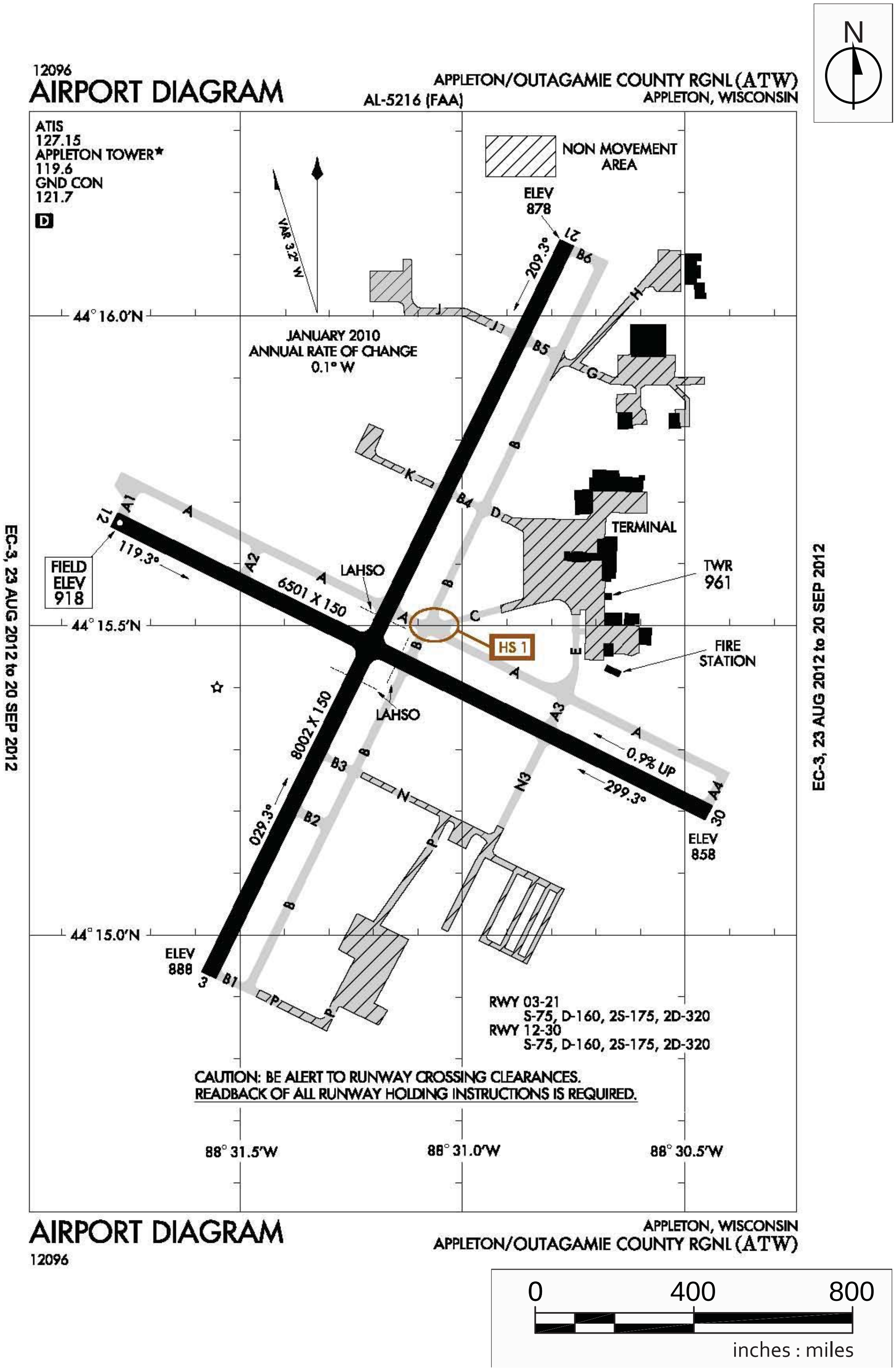
1.2.2. Taxiways

An extensive taxiway system supports aircraft operations at ATW. **Table 1-4** presents taxiway designations, widths, orientations, and locations for all existing taxiways at ATW. The airport diagram published by the FAA is presented in **Exhibit 1-4**.

Table 1-4: Taxiway Information

Designation	Width	Orientation	Function
A	75'	E/W	Northern full-length parallel taxiway for Runway 12/30
A2 thru A4	75'	N/S	Connector taxiways between Runway 12/30 and Taxiway A
B	75'	N/S	Eastern full-length parallel taxiway for Runway 3/21
B1 thru B6	75'	E/W	Connector taxiways between Runway 3/21 and Taxiway B
C	75'	E/W	Connects Taxiways A & B to the south end of the air carrier apron
D	75'	E/W	Connects Taxiway B to the north end of the air carrier apron
E	75'	N/S	Connects Taxiway A to the south end of the air carrier and GA aprons
G	70'	E/W	Connects Taxiway B to northeast corporate hangar area
H	75'	NE/SW	Connects Taxiway B to Federal Express air cargo facilities
J	75'	E/W	Connects Runway 3/21 to northwest air cargo area
K	75'	E/W	Connects Runway 12/30 to compass calibration pad
N3	50’	N/S	Connects Runway 12/30 with south GA hangar area
N	75’	E/W	Connects Taxiway B to south GA hangar area
P	75’	N/S/E/W	Connects Taxiways B & N to south GA ramp

Source: FAA Airport Diagram, 23 August to 20 September 2012



N
12096
AIRPORT DIAGRAM
AL-5216 (FAA)
APPLETON/OUTAGAMIE COUNTY RGNL (ATW)
APPLETON, WISCONSIN
ATIS
127.15
APPLETON TOWER★
119.6
GND CON
121.7
NON MOVEMENT AREA
ELEV 878
VAR 3.2° W
JANUARY 2010
ANNUAL RATE OF CHANGE
0.1° W
44° 16.0'N
44° 15.5'N
44° 15.0'N
TERMINAL
TWR
961
FIRE STATION
FIELD ELEV 918
6501 X 150
8002 X 150
LAHSO
HS 1
0.9% UP
ELEV 858
ELEV 888
209.3°
119.3°
299.3°
029.3°
EC-3, 23 AUG 2012 to 20 SEP 2012
RWY 03-21
S-75, D-160, 2S-175, 2D-320
RWY 12-30
S-75, D-160, 2S-175, 2D-320
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
88° 31.5'W
88° 31.0'W
88° 30.5'W
AIRPORT DIAGRAM
APPLETON, WISCONSIN
APPLETON/OUTAGAMIE COUNTY RGNL (ATW)
12096
0
400
800
inches : miles

1.2.3. Aircraft Apron Areas

An extensive system of aprons serves the various segments of aircraft operators at ATW. There are four types of apron areas at ATW: the air carrier apron, air cargo aprons, GA aprons, and aircraft maintenance aprons. The four apron areas types are summarized in **Table 1-5**.

Table 1-5: Apron Areas

Apron Type	Area (SY)	Location(s)
Air Carrier Apron	54,000	Surrounding the passenger terminal concourse
Cargo Aprons	22,000	Next to FedEx and former Airborne Express facilities
GA Aprons	144,000	Locations: (1) Between ATCT and ARFF buildings, (2) South of Taxiway G, (3) Near Runway End 3, (4 & 5) next to Gulfstream Maintenance hangars
Total Apron (SY)	220,000	

Source: 2012 Airport Layout Plan
Note: Areas are approximate, and include taxilanes.

1.3. Landside Facilities

1.3.1. Airport Buildings Summary

An inventory of existing landside buildings on Airport property is shown in **Exhibit 1-5**. Landside buildings are divided into four general functional areas: a central terminal area, a south general aviation (GA) hangar area, a northeast corporate hangar area, and a northwest air cargo area.

The central terminal area consists of ten buildings surrounding the commercial airline and general aviation aircraft parking apron, just northeast of the Runway 12/30 and Runway 3/21 intersection. These buildings include the passenger terminal, two maintenance and paint shop hangars utilized by Gulfstream Aerospace Corporation, an electrical vault and pump house, an air traffic control tower (ATCT), three fixed base operator (FBO) maintenance and storage hangars, a maintenance and storage hangar utilized by Air Wisconsin, and an aircraft rescue and firefighting (ARFF) building.

The south GA hangar area was constructed in the late 2000s southeast of the Runway 12/30 and Runway 3/21 intersection, to replace a previous GA area that was located immediately to the east of the ARFF building. There are currently four 10-unit T-hangars and eight small box hangars in this area, and planning is underway for additional future hangars.

The northeast corporate hangar area consists of six buildings located in the northeastern corner of Airport property. These buildings include a maintenance and snow removal equipment (SRE) building, a facility utilized by Federal Express, a maintenance hangar and outbuilding utilized by Gulfstream Aerospace Corporation, an FBO terminal building, and a hangar utilized by Kimberly-Clark Corporation.

The northwest air cargo area is largely undeveloped and only contains one small building. This building was occupied by Airborne Express until 2008 and is currently vacant.

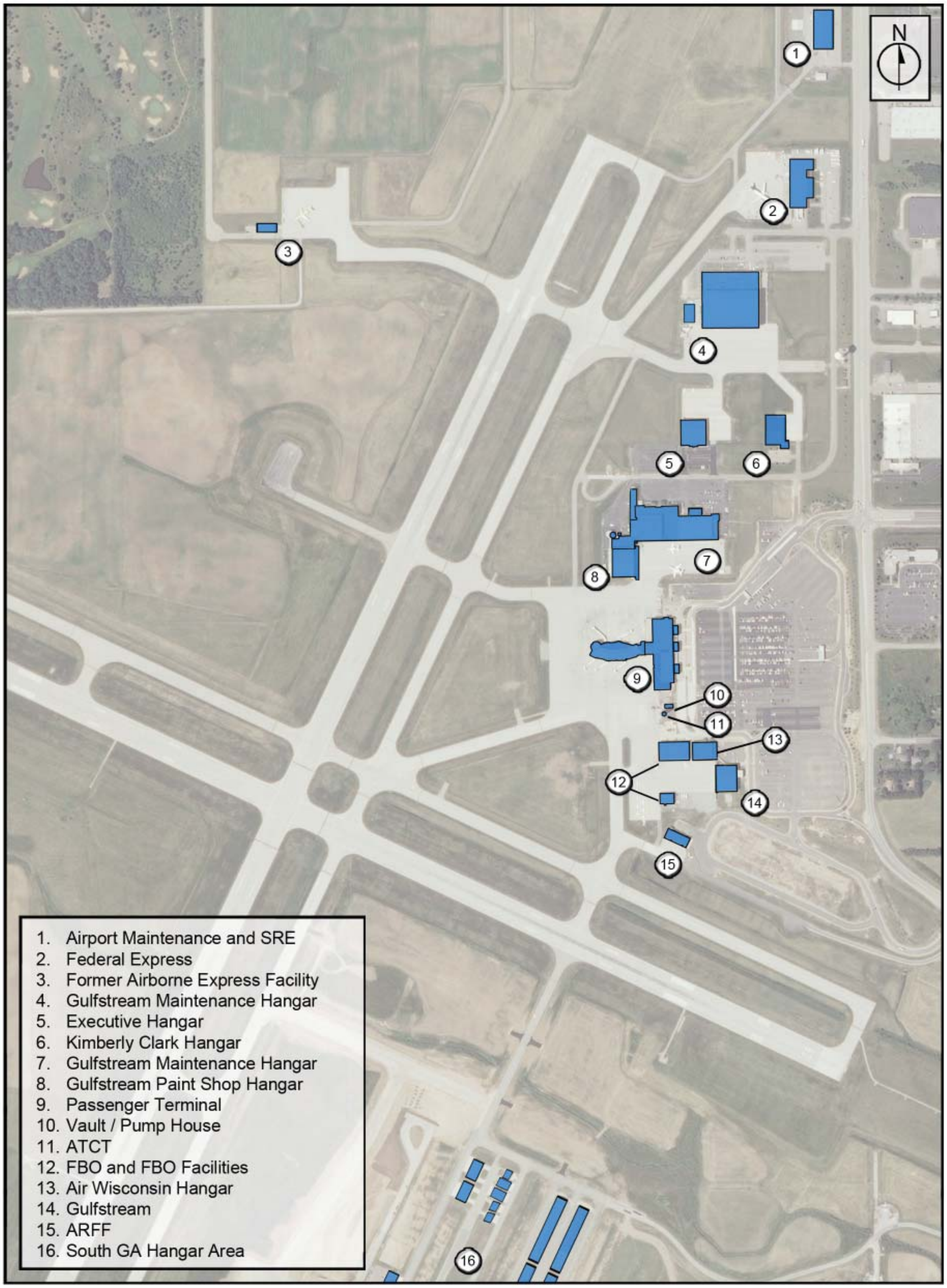


Exhibit 1-5
BUILDING INVENTORY

1.3.2. Passenger Terminal

The passenger terminal is a three-story structure, with two above-grade stories and a basement. The terminal was constructed in several phases, with the latest addition being a concourse expansion completed in 2000. The concourse is a one-story, above-grade structure with a concrete basement that includes a shop area and mechanical/electrical facilities. The older parts of the terminal include the security checkpoint, airline ticketing areas, a gift shop, and the baggage claim area, all on the first above-grade floor. There are also additional offices, airport administrative offices, and mechanical/electrical rooms on the second above-grade floor, and in the basement. The floor plans of the two-above ground stories are presented in **Exhibit 1-6**.

1.3.3. Ground Access

The Airport is bounded by State Highway 76 to the west, State Highway 96 to the north, County Road CB to the east, and County Road BB to the south. Access to the passenger terminal and corporate hangar areas is available from County Road CB, access to the general aviation hangar area is available from County Road BB, and access to the northwest cargo facility area is available from State Highway 96.

1.3.4. Automobile Parking

ATW has several parking lots in the passenger terminal area. These lots contain a combined 2,810 parking spaces for use by airline passengers, rental car companies, airport employees, tower employees, and other airport users. A breakdown of these spaces is presented in **Table 1-6**, and the relative location of the different parking lots is shown in **Exhibit 1-7**.

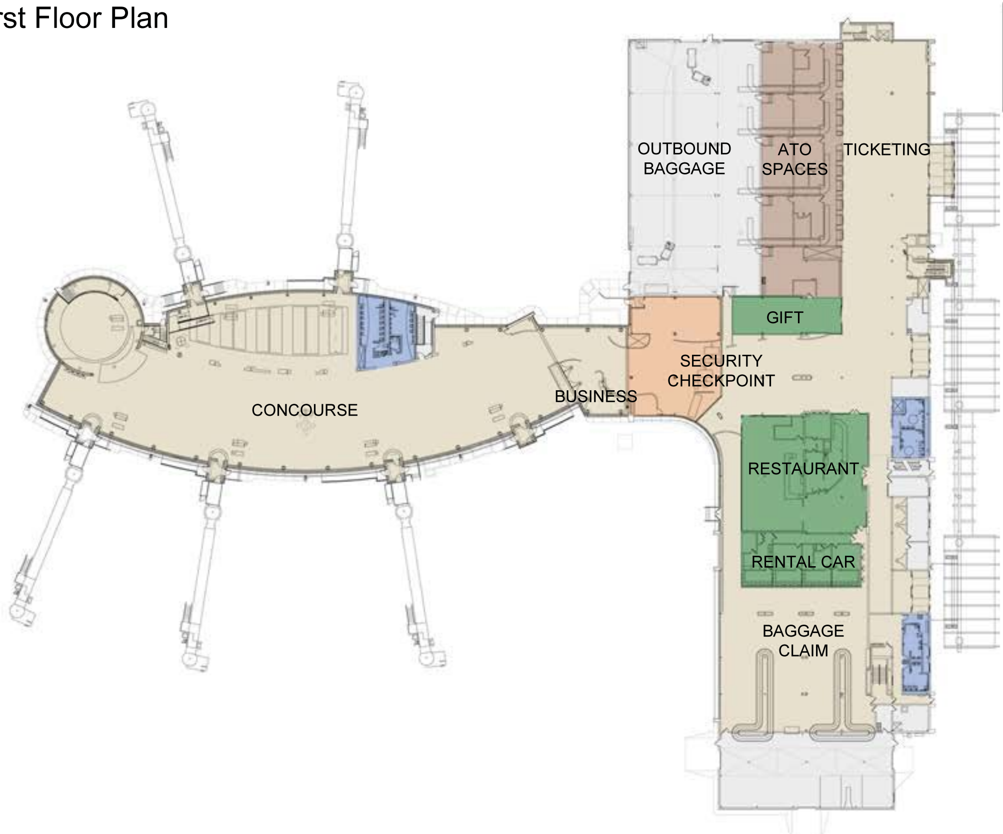
Table 1-6: Passenger Terminal Area Parking Stall Inventory

Parking Lot	Regular Stalls	Handicap Stalls	Total Stalls
Long-Term Passenger	1,439	21	1,460
Short-Term Passenger	237	8	245
Car Rental	345	0	345
Terminal Administrative Employees	50	0	50
Terminal Tenant//Gulfstream/Air Wisconsin	338	20	358
Transient Flight Crew	47	0	47
Fixed Base Operator	26	2	28
Air Traffic Control Tower	9	1	10
Public Safety	23	1	24
Remote	236	7	243
Total Parking Stalls	**2,750**	**60**	**2,810**

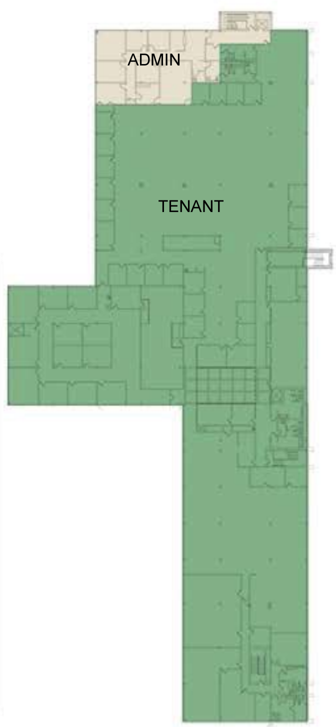
Source: Airport Staff

Notes: Terminal tenant/Gulfstream/Air Wisconsin parking located in the Yellow, Blue, and Orange lots; transient flight crew parking located in the Red lot

First Floor Plan



Second Floor Plan



First Floor Areas -

1. Car Rental - 2,030 sf
2. Restaurant - 4,520 sf
3. Retail - 1,240 sf
4. Airline Ticketing Office - 5,118 sf
5. Baggage Make-Up - 10,090 sf
6. Inbound Baggage - 3,881 sf
7. Baggage Claim Area - 6,557 sf
8. Gates / Hold Rooms - 16,575 sf
9. Circulation - 18,360 sf
10. Seating / Waiting - 1,570 sf
11. Storage / Mech / Elect. - 1,725 sf
12. Restrooms / Janitor - 2,230 sf
13. Business / Conference - 1,700 sf
14. Airport Admin - 175 sf

Second Floor Tenant/ Admin - 39,185 sf

Exhibit 1-6 **EXISTING PASSENGER TERMINAL FLOOR PLAN**

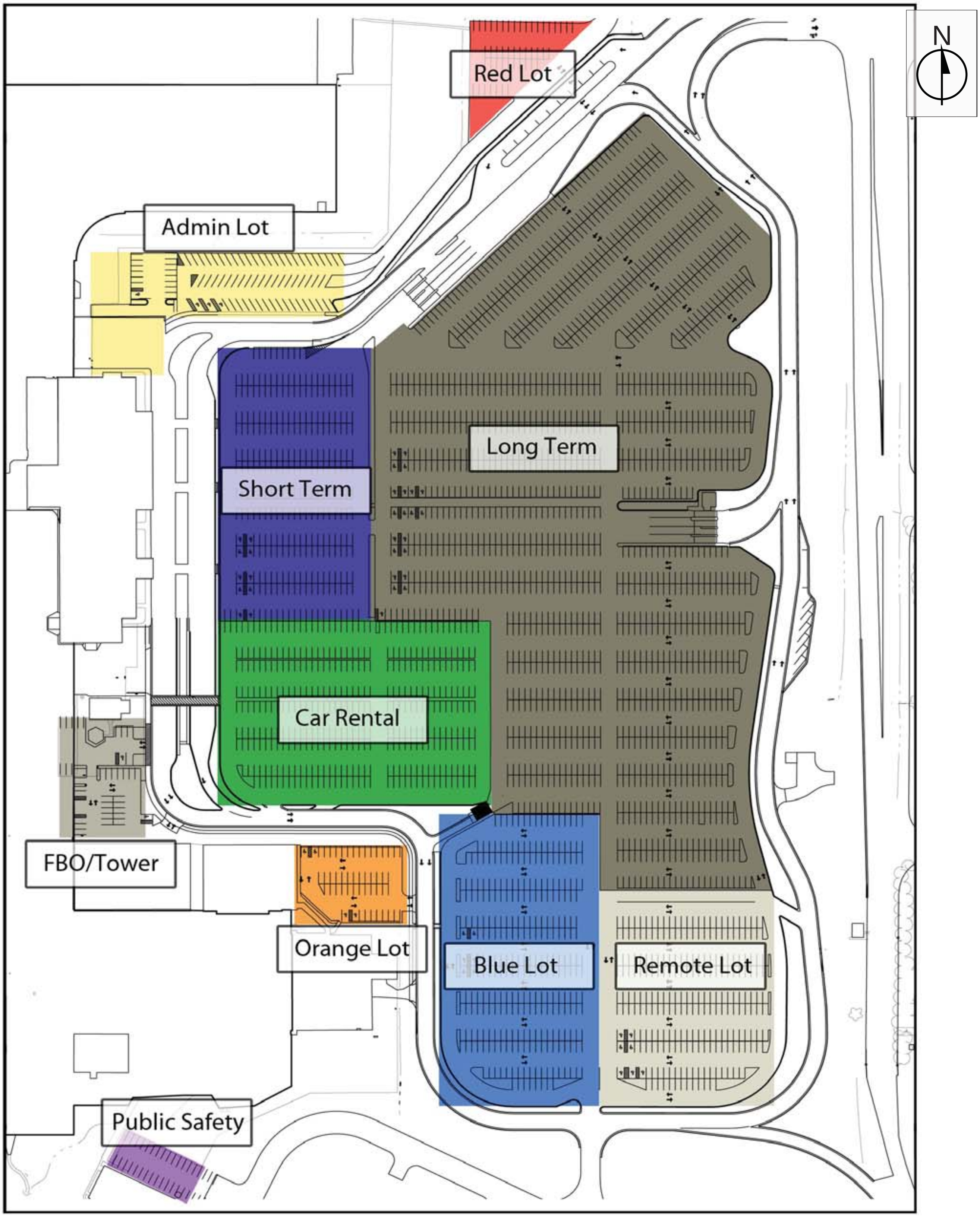


Exhibit 1-7
AUTOMOBILE PARKING INVENTORY

Average and peak monthly short-term and long-term passenger lot car counts for 2010 and 2011 are presented in **Table 1-7**.

Table 1-7: Average and Peak Monthly Short-Term and Long-Term Parking Lot Passenger Car Counts, 2010 and 2011

Month	Short-Term Average	Percent Capacity	Long-Term Average	Percent Capacity	Peak Car Count	Percent Capacity
Jan-10	58	24.5%	496	34.5%	891	61.9%
Feb-10	72	30.4%	746	51.8%	1,008	70.0%
Mar-10	**74**	**31.2%**	**817**	**56.8%**	**1,160**	**80.6%**
Apr-10	64	27.0%	732	50.9%	988	68.7%
May-10	63	26.6%	561	39.0%	866	60.2%
Jun-10	57	24.1%	551	38.3%	830	57.7%
Jul-10	48	20.3%	506	35.2%	778	54.1%
Aug-10	46	19.4%	511	35.5%	776	53.9%
Sep-10	60	25.3%	575	40.0%	940	65.3%
Oct-10	66	27.8%	639	44.4%	944	65.6%
Nov-10	57	24.1%	563	39.1%	959	66.6%
Dec-10	58	24.5%	502	34.9%	705	49.0%
Jan-11	67	28.3%	514	35.7%	914	63.5%
Feb-11	72	30.4%	611	42.5%	937	65.1%
Mar-11	**78**	**32.9%**	**776**	**53.9%**	**1,111**	**77.2%**
Apr-11	72	30.4%	634	44.1%	929	64.6%
May-11	61	25.7%	531	36.9%	832	57.8%
Jun-11	60	25.3%	534	37.1%	855	59.4%
Jul-11	45	19.0%	470	32.7%	756	52.5%
Aug-11	48	20.3%	503	35.0%	776	53.9%
Sep-11	63	26.6%	531	36.9%	776	53.9%
Oct-11	62	26.2%	547	38.0%	837	58.2%
Nov-11	59	24.9%	506	35.2%	837	58.2%
Dec-11	45	19.0%	436	30.3%	824	57.3%

Source: Airport Records

As shown in Table 1-7, March was the peak month for passenger parking in both 2010 and 2011. Short-term average parking counts as a percentage of capacity are generally lower than long-term average parking counts. Although seasonal passenger parking patterns remained similar over the course of these two years, total average and peak passenger parking counts declined slightly in 2011 over 2010. This is likely due the recent decline in passenger enplanements at the Airport.

The adequacy of current parking supply, as wells as strategies for meeting future parking needs, will be examined in later chapters of this master plan.

1.3.5. Aircraft Rescue and Firefighting Facilities and Equipment

The ARFF building is located on the southern edge of the terminal area just northeast of Runway 12/30. ATW is classified as an ARFF Index B airport. The ARFF Index determines the minimum number of ARFF vehicles required and the minimum types and quantities of extinguishing agents carried by those vehicles. The number of ARFF vehicles required for an Index B airport ranges from one to two, with the ability to hold 1,500 gallons of water for foam production and 500 pounds of dry chemical. ATW currently has two Oshkosh model T1500 ARFF trucks. These vehicles are each capable of carrying 1,500 gallons of water, 210 gallons of foam, 500 pounds of dry chemical, and 460 pounds of Halotron 1.

1.3.6. Airport Maintenance Facilities and Equipment

The Airport owns and operates a wide variety of maintenance vehicles and equipment, including approximately eight tractors, twenty trucks, and five utility vehicles. This equipment is used for a variety of maintenance and administrative tasks, including snow removal, de-icing, friction testing, mowing, and emergency response. The equipment is stored and maintained in various buildings on the Airport, with the majority housed in the maintenance building on the northeastern corner of the Airport.

1.3.7. Fixed Base Operators

Platinum Flight Center is the only fixed base operator (FBO) at ATW. The FBO terminal and hangar buildings are located just south of the commercial passenger terminal building. Services offered by Platinum Flight Center include airline and general aviation refueling, executive air charter, flight training and aircraft rental, aircraft maintenance, and corporate aircraft management. Platinum also offers a suite of customer comforts for transient passengers and pilots, including catering, courtesy car, pilot lounge, cable television, wireless internet access, conference rooms, lavatories, and ground power unit services.

1.3.8. Major Tenants

ATW serves as the corporate headquarters for the regional commercial carrier Air Wisconsin Airlines. Air Wisconsin's presence as a regional airline began in 1965 with direct service from Appleton to Chicago, and the airline has since grown to become the largest privately held regional carrier in the United States. Air Wisconsin is a contract carrier for US Airways, utilizing 70 company-owned Canadair Regional Jet 200 aircraft to serve 26 U.S. states and two Canadian provinces. Air Wisconsin also provides ground-handling services for United Express at over 30 airports nationwide. In addition to its corporate offices, ATW hosts an Air Wisconsin maintenance and storage hangar south of the passenger terminal.

Another large tenant at ATW is Gulfstream Aerospace Corporation. Based in Savannah, Georgia, Gulfstream is a producer of several models of corporate, government, private, and military jet aircraft. Gulfstream has regional maintenance and paint shop facilities housed in three large hangars north of the passenger terminal, and employs approximately 800 local workers, including designers, mechanics, engineers, computer-assisted drafting technicians, manufacturers, and others. The Gulfstream facilities at ATW focus on detailing, interiors, paint, and cabinets. Gulfstream would also like to introduce furniture design and manufacturing to their facilities at ATW. Base model aircraft are flown to the ATW Gulfstream facility to be customized to owner specifications. At maximum capacity, the facilities can handle up to 15 separate aircraft at one time. A study of possible expansion in parking, hangar space, and office space for Gulfstream's operations was completed in 2011.

Kimberly-Clark Corporation leases a large corporate hangar northeast of the passenger terminal. Originally headquartered in Neenah when founded during the nineteenth century and throughout most of the twentieth century, the company is now headquartered in Irving, Texas. Kimberly-Clark manufactures mostly paper-based consumer products, with its most well-known brands including Kleenex facial tissue, Kotex feminine hygiene products, Cottonelle, Scott and Andrex toilet paper, and Huggies disposable diapers. Kimberly-Clark Corporation has one jet aircraft based at ATW, a Canadair CL-600-2B16 Challenger 604.

Kimberly-Clark subleases some of its hangar space to Bergstrom Corporation, a local company that owns 24 automobile dealerships representing 33 brands. Bergstrom Corporation has one jet aircraft based at ATW, a Cessna Citation Sovereign Model 680.

Bemis Company, Inc. is a multinational company and major supplier of flexible packaging used by leading food, consumer products, medical and pharmaceutical companies worldwide. Bemis also supplies pressure sensitive adhesive coated materials globally to label, signage, medical and graphics companies. Bemis Company has two jet aircraft based at ATW, both of which are Hawker 800XPs.

1.3.9. Aircraft Fueling Facilities

Prior to 2011, the Airport fuel farm was located to the immediate northeast of the Gulfstream maintenance hangar and adjacent to Taxiway Bravo. In summer 2011, the fuel farm was moved to a location to the east of the ARFF building adjacent to Taxiway Alpha. This new location is more centralized on the Airport than the previous location, and will allow for future expansion of the northeast corporate hangar area. The fuel farm hosts four 20,000 gallon Lannon tanks, three of which hold Jet A fuel and one of which holds AvGas 100LL fuel. There is also a new self-fueling station located in the south GA hangar area.

1.4. Aviation Activity

Detailed discussion of projected aviation activity at Outagamie County Regional Airport, including aircraft operations, passenger enplanements, based aircraft, and air cargo is presented in Chapter 2, *Projections of Aviation Demand*. This section presents historical activity.

1.4.1. Passenger Enplanements

Passenger enplanements at Outagamie County Regional Airport have fluctuated in recent years. Between 2002 and 2010, enplanements increased from 247,428 to 272,420, a compounded annual growth rate (CAGR) of 1.07 percent (see **Table 1-8**). During that timeframe, the Airport experienced the highest number of enplanements in 2005 (304,738). In 2011, however, enplanements dropped to 248,041, a decrease of 8.95% in one year. This decrease can be largely attributed to recent aggressively low fares at General Mitchell International Airport, which have led many catchment area travelers to drive to Milwaukee rather than utilize service at ATW.

Table 1-8: Historical Passenger Enplanements

Year	Enplanements
2002	247,428
2003	246,894
2004	277,783
2005	304,738
2006	277,957
2007	289,471
2008	263,469
2009	273,200
2010	272,420
2011	248,041
CAGR 2002-2011	*0.02%*

Source: Airport Records

1.4.2. Commercial Operations

Although passenger enplanements remained relatively steady between 2002 and 2011 overall, the number of commercial operations at Outagamie County Regional Airport actually decreased during this timeframe. This is primarily due to airlines introducing larger, more fuel efficient aircraft into their fleets and reducing the number of flights to destinations. This results in an increase in passenger load factors and improved efficiency and profit. Between 2002 and 2011, passenger load factor at Outagamie County Regional Airport increased from 68.9 percent to 81.8 percent. Both scheduled commercial operations and unscheduled operations are shown in **Table 1-9**. As shown, there were 21,467 total commercial operations at the Airport in 2002, and 15,521 in 2011.

Table 1-9: Historical Commercial Operations

Year	Scheduled	Unscheduled	Total Commercial
2002	11,590	9,877	21,467
2003	17,614	3,027	20,641
2004	19,179	3,110	22,289
2005	20,506	2,659	23,165
2006	19,794	1,245	21,039
2007	19,749	1,210	20,959
2008	17,893	1,410	19,303
2009	14,733	1,701	16,434
2010	13,832	2,472	13,832
2011	12,288	3,233	15,521
CAGR -2011	0.59%	-10.57%	*-3.19%*

Source: FAA ATADS

1.4.3. Charter Operations

Historically, charter operations do not make up a significant proportion of commercial operations. Between 2002 and 2011 the average was 13 annual operations (see **Table 1-10**). Within recent years, scheduled service at the Airport has expanded to destination markets such as Orlando, Las Vegas, and Denver, which has likely contributed to the decline from 42 charter operations in 2008 to just 22 in 2011.

Table 1-10: Historical Charter Operations

Year	Operations
2002	0
2003	0
2004	0
2005	8
2006	6
2007	20
2008	42
2009	14
2010	16
2011	22
Average 2002-2011	*13*

Source: Airport records – flights reported as charter of operated by Sun Country Airlines

1.4.4. General Aviation Operations

Annual general aviation operations at ATW declined sharply in 2009, but rebounded to some extent in 2010 and 2011. Between 2002 and 2011, operations dropped from 36,209 to 19,039, a CAGR of -6.89 percent (see **Table 1-11**). This is a trend that has been occurring at many U.S. airports. Economic uncertainty coupled with the increasing costs of owning and operating aircraft are the primary drivers of this fall-off. ATW's GA operations appear to be stabilizing at approximately 20,000 annual operations.

Table 1-11: Historical General Aviation Operations

Year	Operations
2002	36,209
2003	33,405
2004	29,523
2005	27,028
2006	28,309
2007	25,334
2008	23,630
2009	17,986
2010	20,790
2011	19,039
CAGR 2002-2011	*-6.89%*

Source: apgDat (DOT T-100)

1.4.5. Based Aircraft

The number of based aircraft at the Airport has also declined, though not nearly at the rate of general aviation operations. Between 2002 and 2011 the number of based aircraft fell from 73 to 69, a CAGR of -0.56 percent (see **Table 1-12**). As shown, the number of single engine piston and turbine powered aircraft has remained relatively constant during that timeframe, while the number of multi-engine piston aircraft has declined.

Table 1-12: Historical Based Aircraft

Year	Single Engine	Multi-Engine	Turbine Powered	Total
2002	52	17	4	73
2003	52	17	4	73
2004	51	16	4	71
2005	52	15	4	71
2006	52	13	4	69
2007	52	13	4	69
2008	53	13	4	70
2009	53	13	4	70
2010	52	13	4	69
2011	52	13	4	69
CAGR 2002-2011	0.00%	-2.64%	0.00%	*-0.56%*

Source: TAF FAA 5010 Forms

1.4.6. Air Cargo

Historically, there has been a significant amount of air cargo activity at Outagamie County Regional Airport. Air cargo activity at Outagamie County Regional Airport includes air cargo operations by Federal Express and commercial passenger service. Historically, Federal Express and Airborne Express/DHL transported the majority of air cargo at the Airport until DHL ceased U.S. domestic freight operations, leaving Federal Express as the primary all-cargo carrier at the Airport. There is also some cargo that is carried “belly-hold” meaning that it is carried on scheduled commercial air carrier flights. Until 2009, Federal Express operated Boeing 727 aircraft at the Airport. Since that time, Federal Express has operated Airbus A300 and A310 aircraft as well as the turboprop Cessna Caravan aircraft. Since 2002, there has been much variation in the total number of pounds of cargo shipped through the Airport but between 2002 and 2011 air cargo activity has increased overall by a CAGR of 1.83 percent (see **Table 1-13**).

Table 1-13: Historical Air Cargo Activity (lbs.)

Year	Outbound Cargo	Inbound Cargo	Total Cargo
2002	10,109,277	11,438,760	21,548,037
2003	8,592,396	10,478,471	19,070,867
2004	8,588,012	11,265,095	19,853,107
2005	9,066,168	12,606,870	21,673,038
2006	9,268,397	14,203,730	23,472,127
2007	9,520,816	15,377,088	24,897,904
2008	10,433,062	20,720,806	31,153,868
2009	8,284,687	11,479,203	19,763,890
2010	10,847,630	15,114,854	25,962,484
2011	10,739,041	14,632,730	25,371,771
CAGR 2002-2011	0.67%	2.77%	1.83%

Source: Airport Records

1.4.7. Military Operations

Military aircraft operations at Outagamie County Regional Airport include training and other operations conducted by the various armed services. However, there are no military installations located at the Airport. Military operations are not influenced by the same factors that affect civil aviation. Rather, military activity is subject to factors relating to national defense. Historical military operations are shown in **Table 1-14**.

Table 1-14: Historical Military Operations

Year	Itinerant Operations	Local Operations	Total Operations
2002	46	33	79
2003	24	6	30
2004	51	34	85
2005	53	58	111
2006	110	8	118
2007	104	43	147
2008	132	185	317
2009	108	96	204
2010	122	102	224
2011	81	48	129
Average 2002-2011	83	61	144

Source: FAA ATADS

1.5. Airspace and Air Traffic Control

1.5.1. Airspace

ATW has its own Class D airspace with a ceiling of 3,400 feet above mean sea level and a horizontal radius of 5 statute miles (or approximately 4.35 nautical miles) from the airport reference point (ARP). Aircraft must establish two-way communications with the airport traffic control tower (ATCT) prior to entering the Class D airspace. In addition, Class D airspace requires that runway separation services are provided and that special visual flight rules are in place.

The Airport's ATCT is managed and staffed under the FAA contract control tower program. When the ATCT is closed, the Class D airspace reverts to Class E airspace and is subject to those requirements. All aircraft conducting IFR operations must be in two-way communication with ATC to enter and operate within Class E airspace. Class E airspace is used by aircraft transiting to and from an Airport below Class A airspace (18,000 feet MSL). Its requirements ensure the safety of instrument approach and departure areas. The airspace in the vicinity of ATW is shown in **Exhibit 1-8**.

1.5.2. Airport Traffic Control Tower

ATW has an ATCT located directly south of the terminal building. The Airport's ATCT is managed and staffed under the FAA contract control tower program. The ATCT location and height provides controllers with generally sufficient visibility of most controlled movement areas, including the runways, taxiways, terminal area, and airspace in the Airport vicinity. There are some areas of limited visibility. See Chapter 5, Alternatives for more information.

The ATCT is operated daily from 5:30 AM to 11:00 PM. Air traffic controllers located in the tower provide instructions to aircraft operating in the air and on the ground. The primary purpose of the ATCT is to ensure that aircraft separation is maintained when operating within the vicinity of the Airport and aircraft operating in the aircraft operating area (AOA) on the ground. The ATCT also provides local weather and limited aviation weather observation. Airborne traffic communication takes place on the 119.6 frequency and ground control communication takes place on the 121.7 frequency. The 119.6 frequency also serves as the Common Traffic Advisory Frequency (CTAF) when the tower is closed. UNICOM communications are handled on the 122.95 frequency, and Automatic Terminal Information Service (ATIS) is handled on the 127.15 frequency.

Air traffic immediately outside the ATCT's Class D airspace is controlled by either the Green Bay Terminal Radar Approach Control (TRACON) or the Minneapolis Air Route Traffic Control Center (ARTCC). Approach and departure control to and from ATW is provided by the Green Bay TRACON from 5:30 AM to 11:30 PM, and by the Minneapolis ARTCC from 11:30 PM to 5:30 AM.

Exhibit 1-8
AIRSPACE ENVIRONMENT

1.5.3. Instrument Approach Procedures

ATW has eight published instrument approach procedures: three for Runway End 3, two for Runway End 21, one for Runway End 12, and two for Runway End 30. The visibility and cloud ceiling minimums for the procedures are presented in **Table 1-15**, and the procedure approach plates are presented in **Exhibit 1-9** through **Exhibit 1-16**.

Table 1-15: Instrument Approach Procedures

Approach Name	TCH	GSA	Visibility	Cloud Ceiling
ILS or LOC RWY 3	54 feet	3.00°	1/2 mile	200 feet
ILS or LOC RWY 30	64 feet	3.00°	1/2 mile	200 feet
RNAV (GPS) RWY 3	47 feet	3.00°	1/2 mile	300 feet
RNAV (GPS) RWY 12	50 feet	3.00°	3/4 mile	200 feet
RNAV (GPS) RWY 21	50 feet	3.00°	1 mile	300 feet
RNAV (GPS) RWY 30	50 feet	3.00°	1/2 mile	200 feet
VOR/DME RWY 3	47 feet	2.99°	1 & 1/2 miles	500 feet
VOR/DME RWY 21	47 feet	3.04°	1 & 3/4 miles	500 feet

Source: FAA Terminal Procedures, 23 August to 20 September 2012

Notes:

For ILS or LOC RWY 3, RVR 1800 authorized with use of specialized aircraft equipment and special flight crew authorization.

Alternate minimums may apply under instrument meteorological conditions (IMC).

Minimums listed are for Category D aircraft. Minimums may be lower for smaller aircraft.

ILS: Instrument Landing System
LOC: Localizer
RNAV: Area Navigation
GPS: Global Positioning System
VOR: Very High Frequency Omnidirectional Range
DME: Distance Measuring Equipment
TCH: Threshold Crossing Height
GSA: Glide Slope Angle

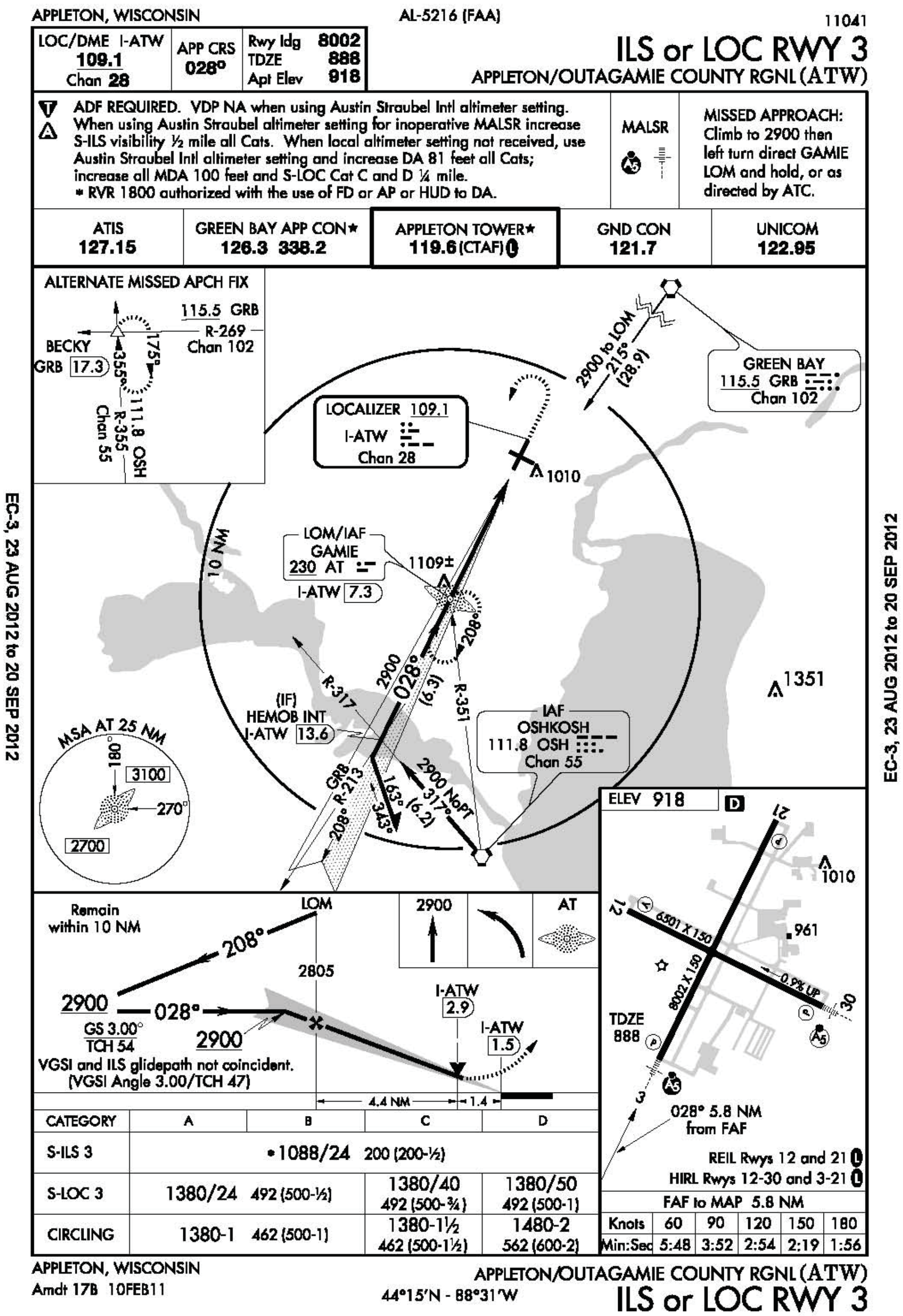


Exhibit 1-9
LOC RWY 3 APPROACH PLATE

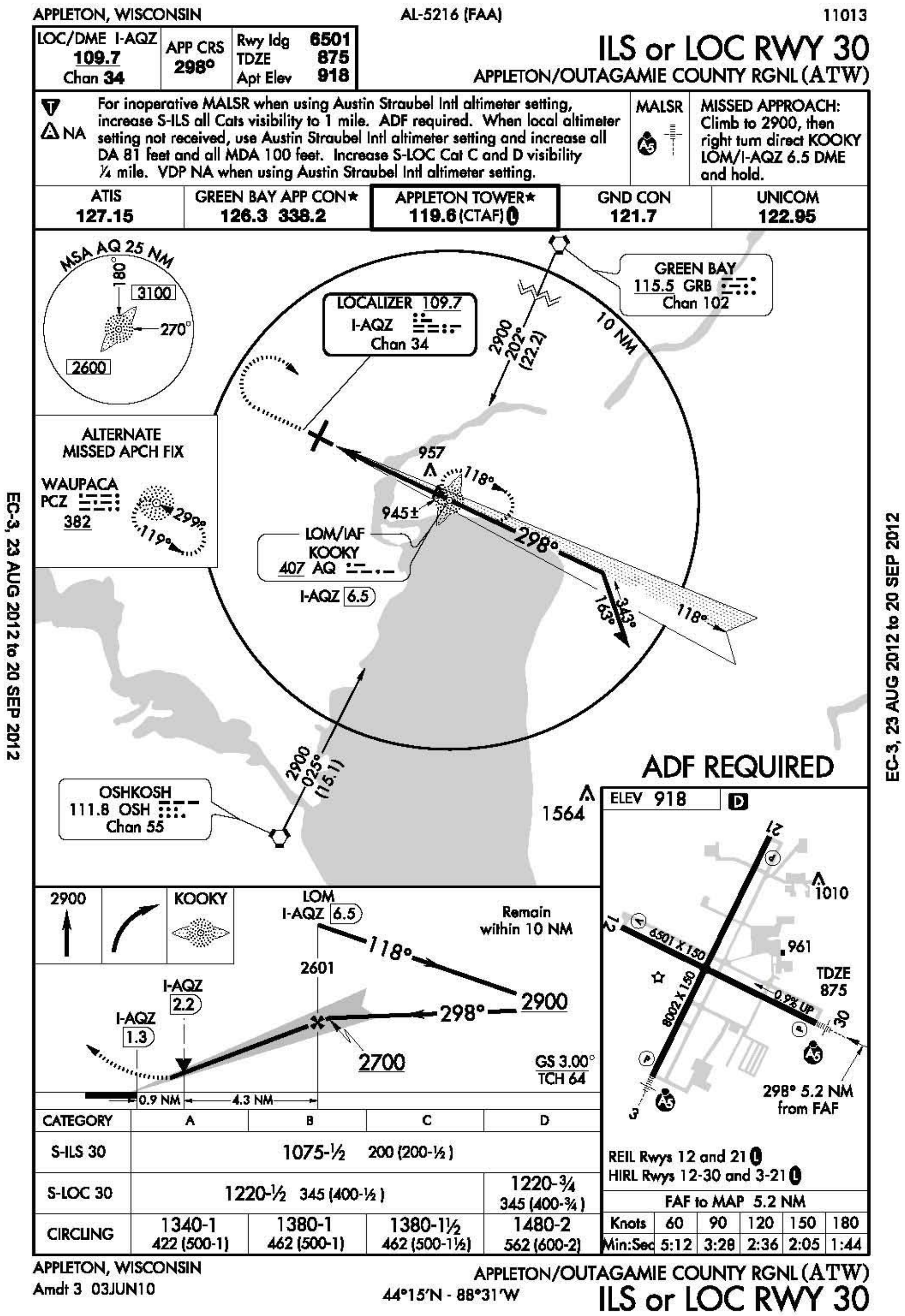


Exhibit 1-10

ILS OR LOC RWY 30 APPROACH PLATE

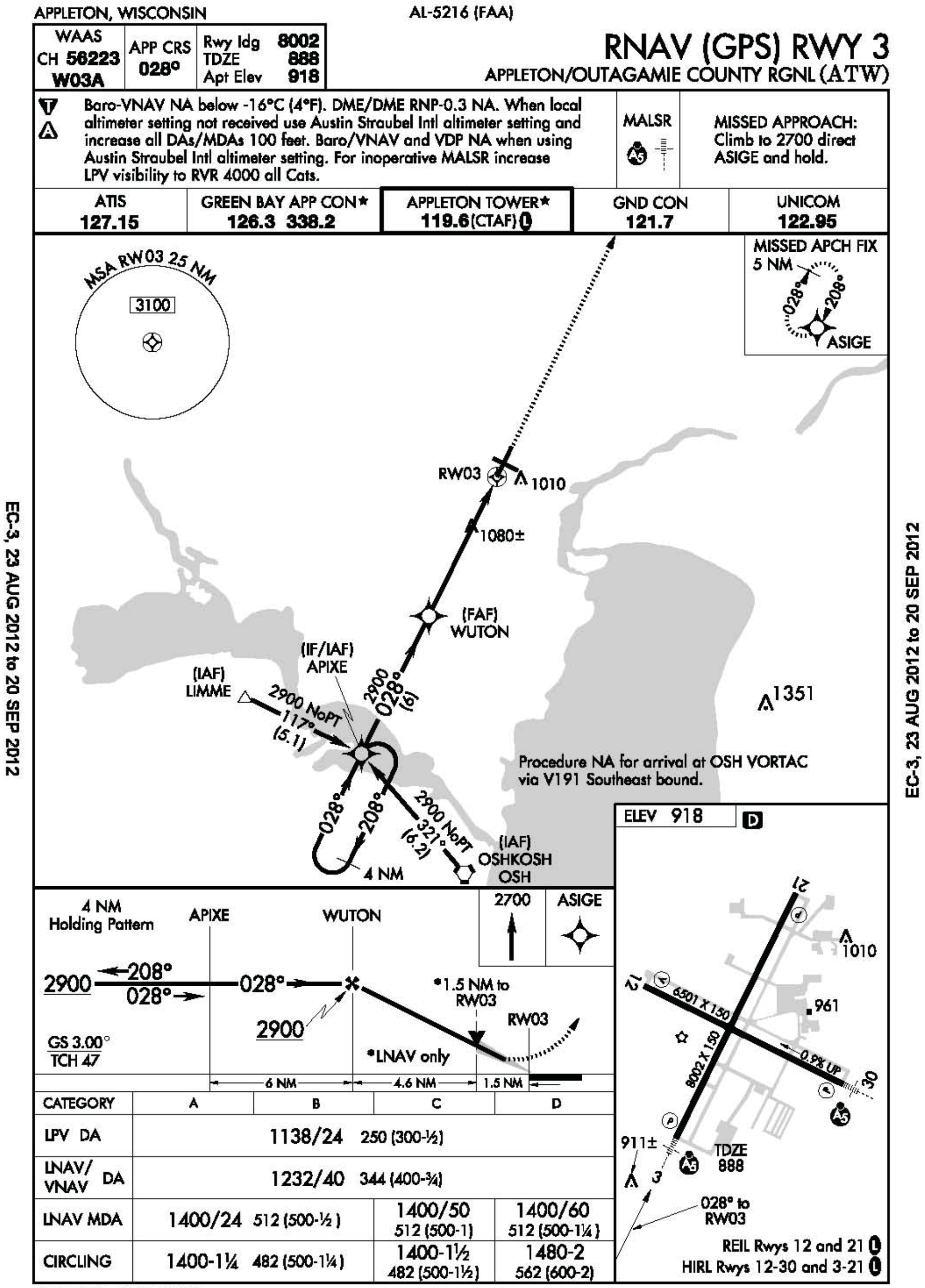


Exhibit 1-11
RNAV (GPS) RWY 3 APPROACH PLATE

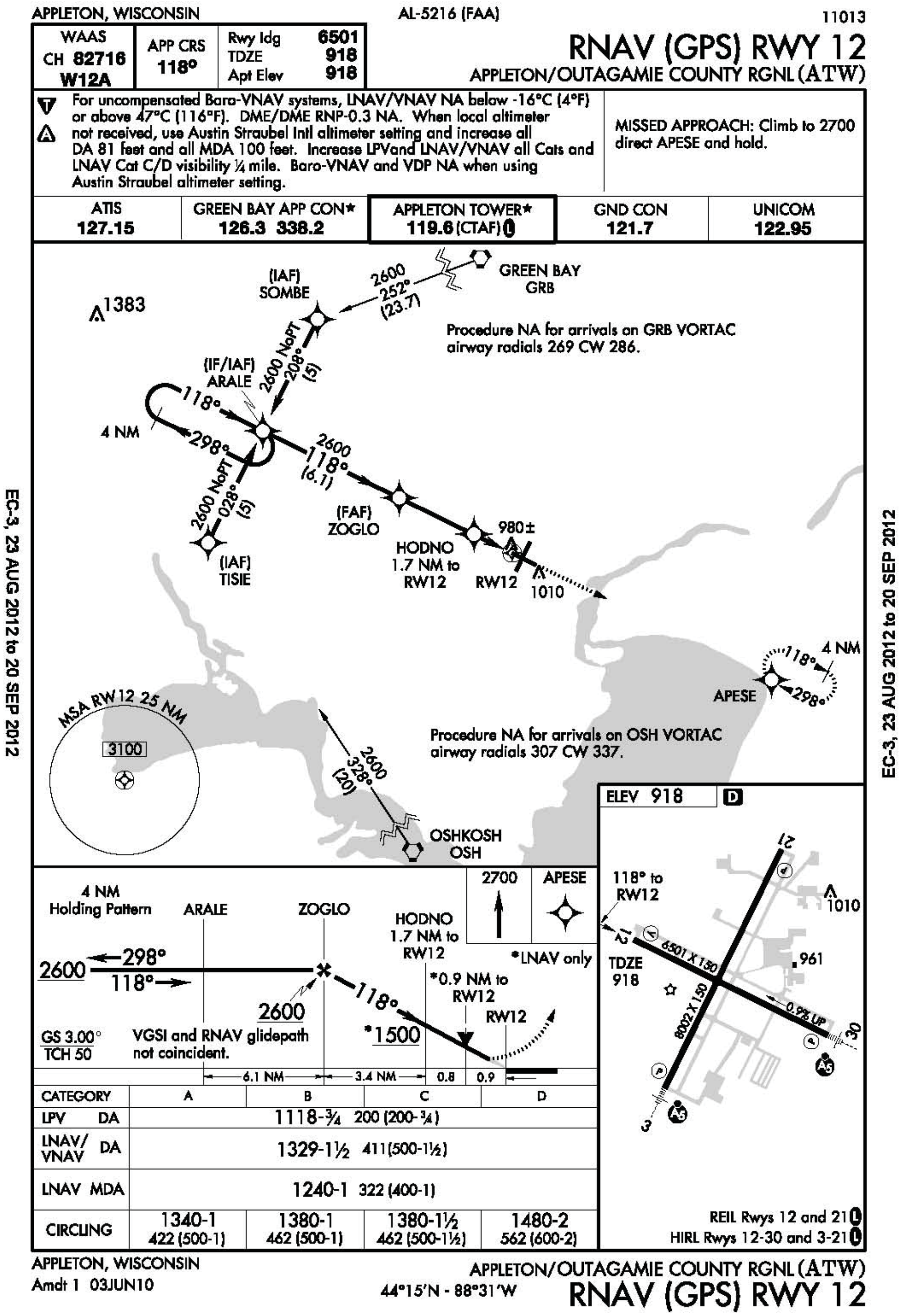


Exhibit 1-12

RNAV (GPS) RWY 12 APPROACH PLATE

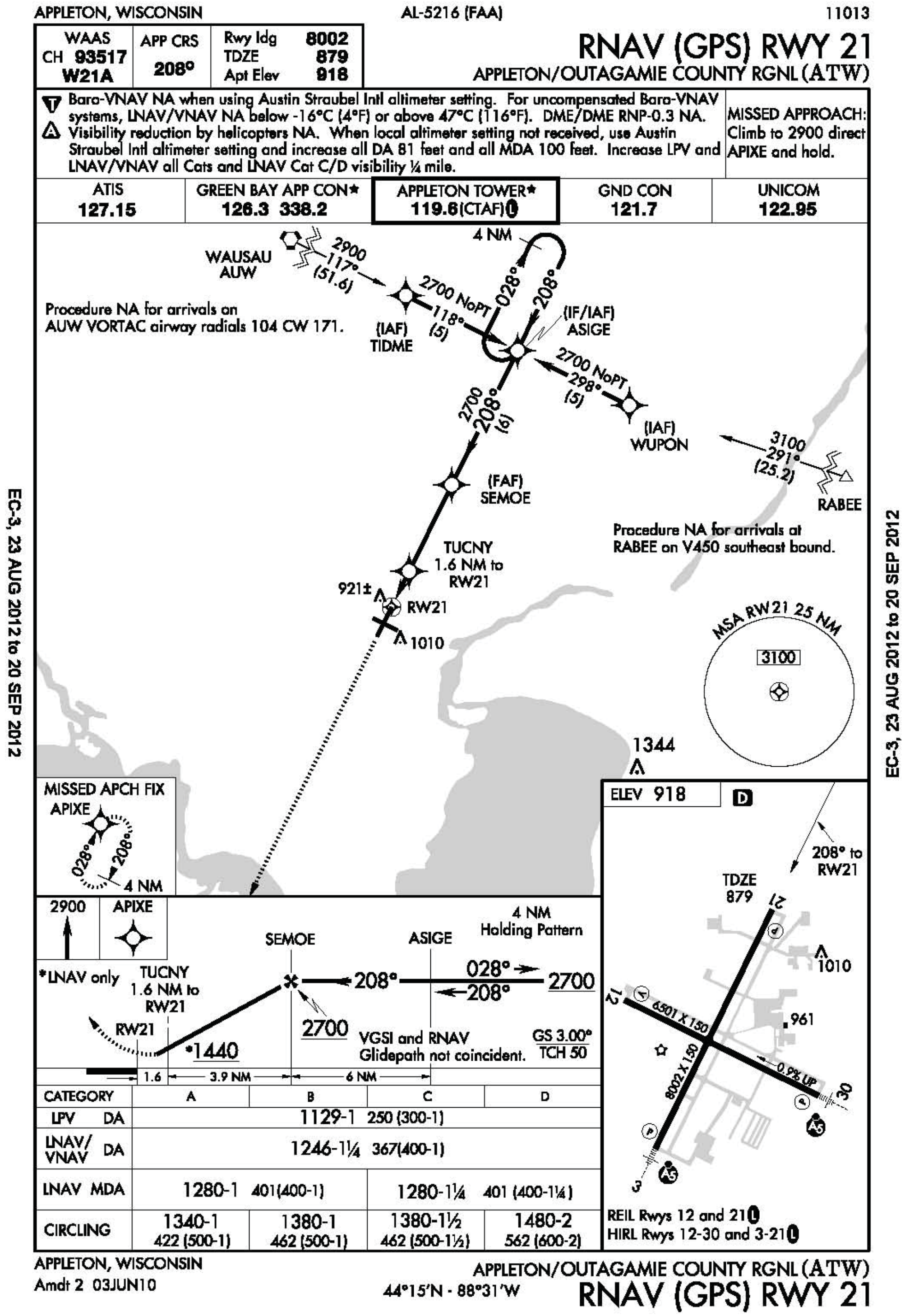


Exhibit 1-13
RNAV (GPS) RWY 21 APPROACH PLATE

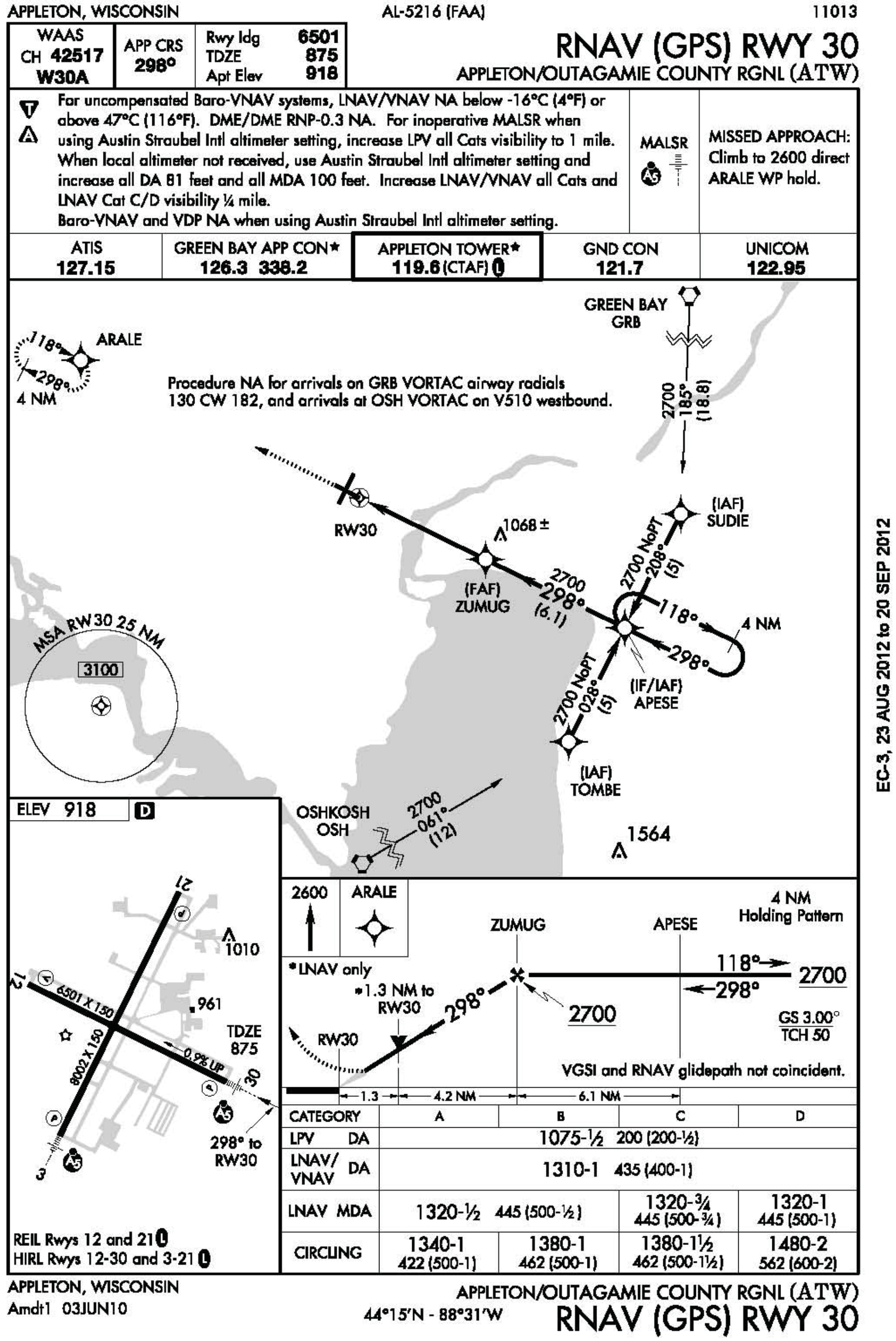


Exhibit 1-14
RNAV (GPS) RWY 30 APPROACH PLATE

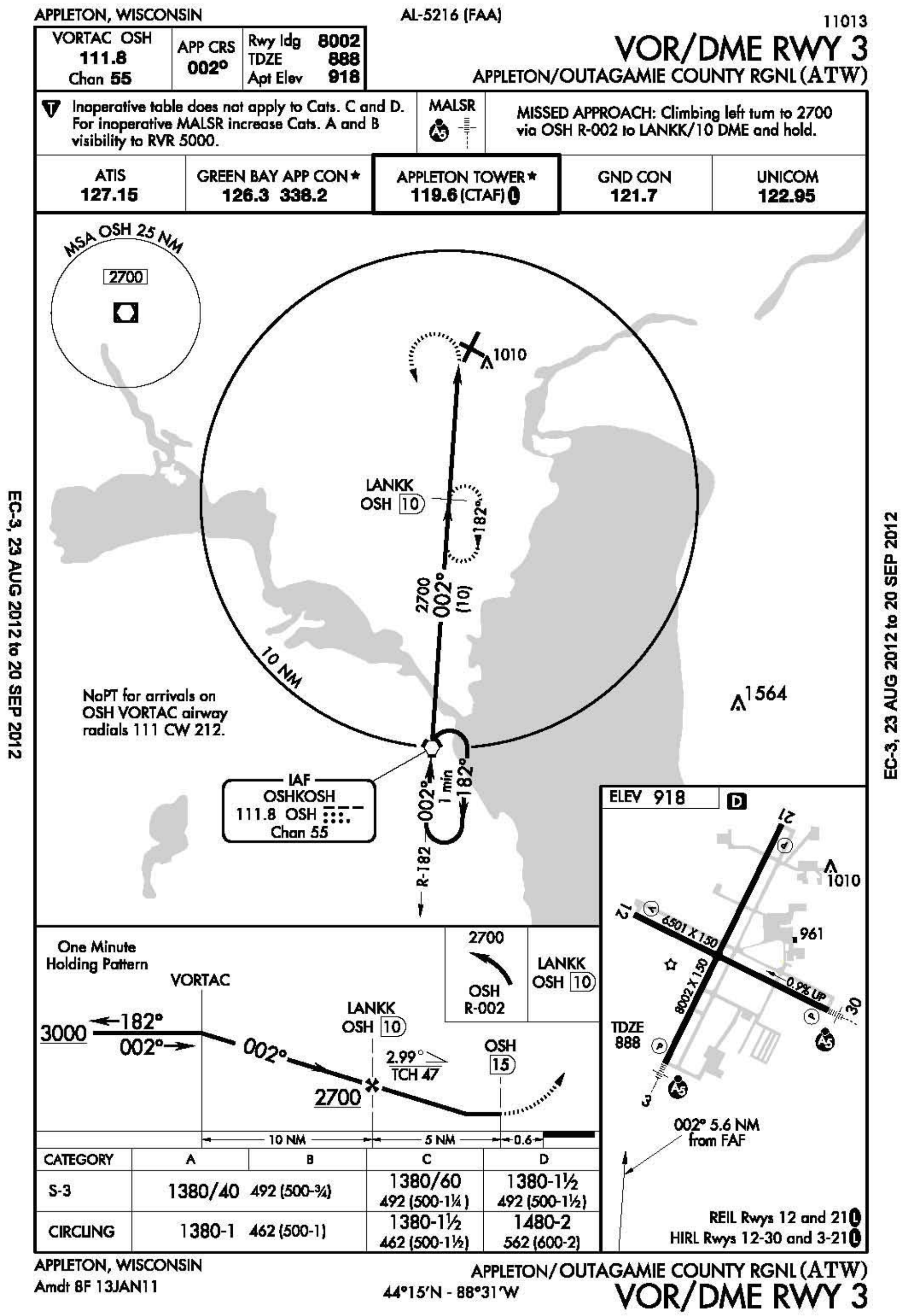


Exhibit 1-15
VOR/DME RWY 3 APPROACH PLATE

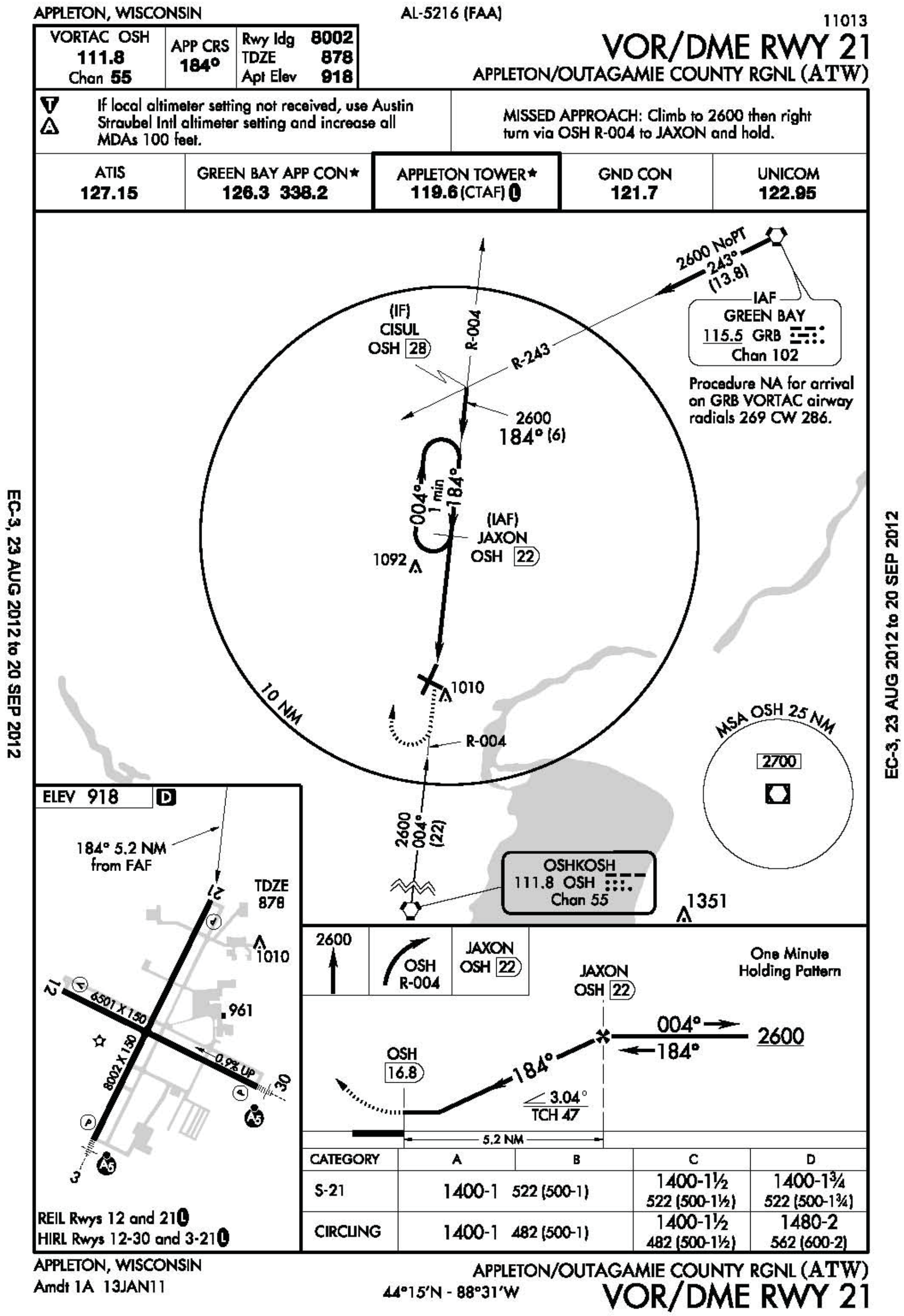


Exhibit 1-16
VOR/DME RWY 21 APPROACH PLATE

1.6. Local Airport Zoning Ordinances

The majority of Outagamie County Regional Airport property is located in the southeast corner of the Town of Greenville. The Town of Clayton is located immediately to the southwest, the City of Menasha immediately to the southeast, and the Town of Grand Chute immediately to the east. While the majority of the Airport lies within the Town of Greenville and Outagamie County, the Airport also owns a small amount of land south of County Highway BB within the Town of Clayton and Winnebago County. The Airport owns this land primarily because it accommodates the approach lighting system to Runway End 3. Areas northwest and southwest of the Airport are primarily used for agriculture and lower density housing. Areas to the northeast and southeast include a mix of residential, industrial, and commercial uses.

Because the Airport and its vicinity are located within unincorporated townships, airport zoning falls under the jurisdiction of Outagamie and Winnebago Counties. Chapter 10 of the *Outagamie County Code* contains the Airport Zoning Ordinance, originally approved by the Board of Supervisors in 1990 and subsequently amended in 1991, 1999, and 2012. All County-owned land that is owned for airport purposes is part of an Airport District (AD) zone. The following uses and structures are permitted in the AD zone:

- Air terminals
- Aircraft hangars
- Aircraft runways, taxiways, aprons and related lighting and air support apparatus
- Airport administration buildings
- Airport maintenance buildings
- Aircraft repair and maintenance buildings and facilities
- Fuel storage and pumps
- Parking lots and driveways
- Commercial uses directly related to the airport operations
- Agricultural crops which are harvested annually, grazing and farm fences
- Public gatherings in conjunction with an airport related activity when first approved by the airport committee

To protect the Airport from incompatible uses and activities, the following uses and structures are specifically prohibited in the AD:

- Residential
- Hospitals, schools, and churches
- Theater, amphitheaters, stadiums, trailer courts, and campgrounds
- Places of public or semipublic assembly
- Any other structure or use which may be susceptible to being adversely affected by loud and extensive noise or which may interfere with the use and operation of the county Airport

The ordinance provides an Airport Industrial District (AID) zone for some portions of Airport property. The purpose of the AID zone is to enable appropriate airport-related manufacturing, assembly, and marketing activities in a planned setting. Permitted uses must have a direct relation to aviation activity at ATW, and are subject to rigorous development standards; environmental, safety, and nuisance controls; controlled access requirements; structure height, marking, and lighting requirements; and permitting.

The ordinance also provides five overlay zoning districts extending beyond Airport property that dictate permitted and prohibited uses and structures in those areas. These zones only apply to properties not owned by the County, and are presented in **Exhibit 1-17**.

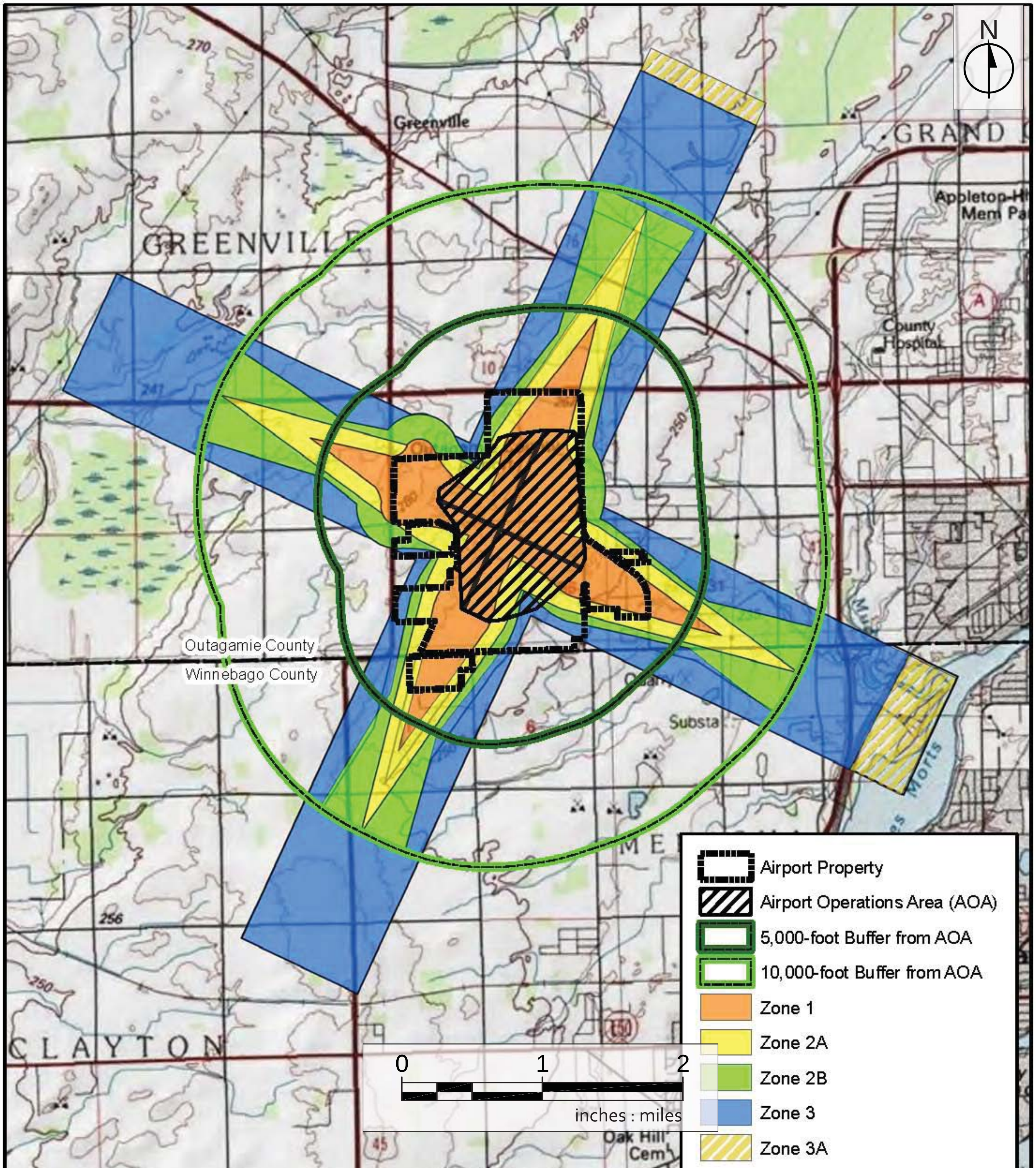
Airport Overlay District Zone 1 “permits uses of land that are considered compatible with the operating and use of the county Airport.” The boundaries of Zone 1 are coterminous with the boundaries of noise exposure forecast 30 (NEF 30), as described in the 1981 Airport Master Plan. Permitted uses in Zone 1 include uses permitted in the AD and AID zones, agricultural uses, and non-spectator light recreational uses. Special commercial and industrial uses may be permitted in Zone 1 on a case-by-case basis.

Airport Overlay District Zone 2 “encourages types of land development contiguous to the Airport which will be compatible with its operation”, and is subdivided in zones 2A and 2B. The only difference between Zones 2A and 2B are separate special use permissions for agricultural residences. The dividing line between zones 2A and 2B begins at a point outward from the end of the runways for a distance of 1,850 feet and connecting at a point 10,000 feet from the end of each runway, excluding Zone 1. Permitted uses in Zone 2 include agricultural and non-spectator light recreational uses. Special residential, commercial, and industrial uses may be permitted in Zone 2 on a case-by-case basis.

Airport Overlay District Zone 3 “permits land uses that will be developed in a manner consistent with the present and future use and operation of the Airport.” Zone 3 is parallel to the runway at a width of one-half mile from its centerline and extends to a length of 16,000 feet from each runway end. Permitted uses in Zone 3 include agricultural uses and non-spectator light recreational uses. Special recreational (spectator), residential, commercial, and industrial uses may be permitted on a case-by-case basis.

Airport Overlay District Zone 3A is a subdivision of Zone 3 at the furthest extents of the zone applying to approaches to Runway 21 and Runway 30. The only difference between Zone 3 and Zone 3A is that existing uses and structures and existing lots of record which legally existed in Zone 3A prior to April 2, 2012, are permitted uses and structures, whereas with Zone 3 they are not necessarily. This new zone was added to the Airport zoning ordinance in 2012.

Also added to the Airport zoning ordinance in 2012 was a provision that ponds, retention, detention, and other man-made water bodies are no longer permitted within the 5,000-foot and 10,000-foot buffers of the airport operations area (AOA). However, such a facility may be permitted if the design requirements of FAA Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports*, are followed. The 2012 amendments also included the addition of a land use matrix as a quick reference tool.



N
Greenville
GREENVILLE
GRAND
Appleton-H
Mem Pa
County
Hospital
Outagamie County
Winnebago County
Substa
CLAYTON
Oak Hill
Cem
Airport Property
Airport Operations Area (AOA)
5,000-foot Buffer from AOA
10,000-foot Buffer from AOA
Zone 1
Zone 2A
Zone 2B
Zone 3
Zone 3A
0
1
2
inches : miles

1.7. Socioeconomic Trends

ATW is the largest airport in the Appleton Metropolitan Statistical Area (MSA), which is defined by the U.S. Census Bureau as the entirety of Outagamie and Calumet Counties. ATW is also the primary commercial service airport for the Oshkosh-Neenah MSA, which is defined as the entirety of Winnebago County. For the purpose of this discussion of socioeconomic trends, the ATW service area consists of these three counties.

1.7.1. Population

Historic and projected population figures for the ATW service area, developed by the economic forecasting firm Woods & Poole, are presented and compared in **Table 1-16**.

Table 1-16: Historical and Projected Population

Year	Outagamie	Winnebago	Calumet
Historical			
1990	140,960	140,871	34,373
2000	161,720	157,103	40,898
2010	176,912	167,059	49,040
CAGR 1990-2010	**1.14%**	**0.86%**	**1.79%**
Projected			
2015	188,087	172,567	53,252
2020	199,695	178,437	57,594
2030	223,202	190,311	66,390
CAGR 2010-2030	**1.17%**	**0.65%**	**1.53%**

Source: Woods & Poole
CAGR= Compound Annual Growth Rate

In 1990, Outagamie and Winnebago Counties had nearly identical populations, with approximately 140,000 residents each. Since that time, Outagamie County population has grown at a faster rate than Winnebago County population, and currently has 12,000 more residents than Winnebago County. Calumet County population is much smaller than either Outagamie or Winnebago County populations, but has grown at a faster rate than either in the past two decades. Population growth is expected to decelerate somewhat for Winnebago and Calumet Counties in coming years, while Outagamie County population growth is expected to remain steady.

1.7.2. Employment

Historic and projected employment for each ATW service area county is presented and compared in **Table 1-17**.

Table 1-17: Historical and Projected Employment

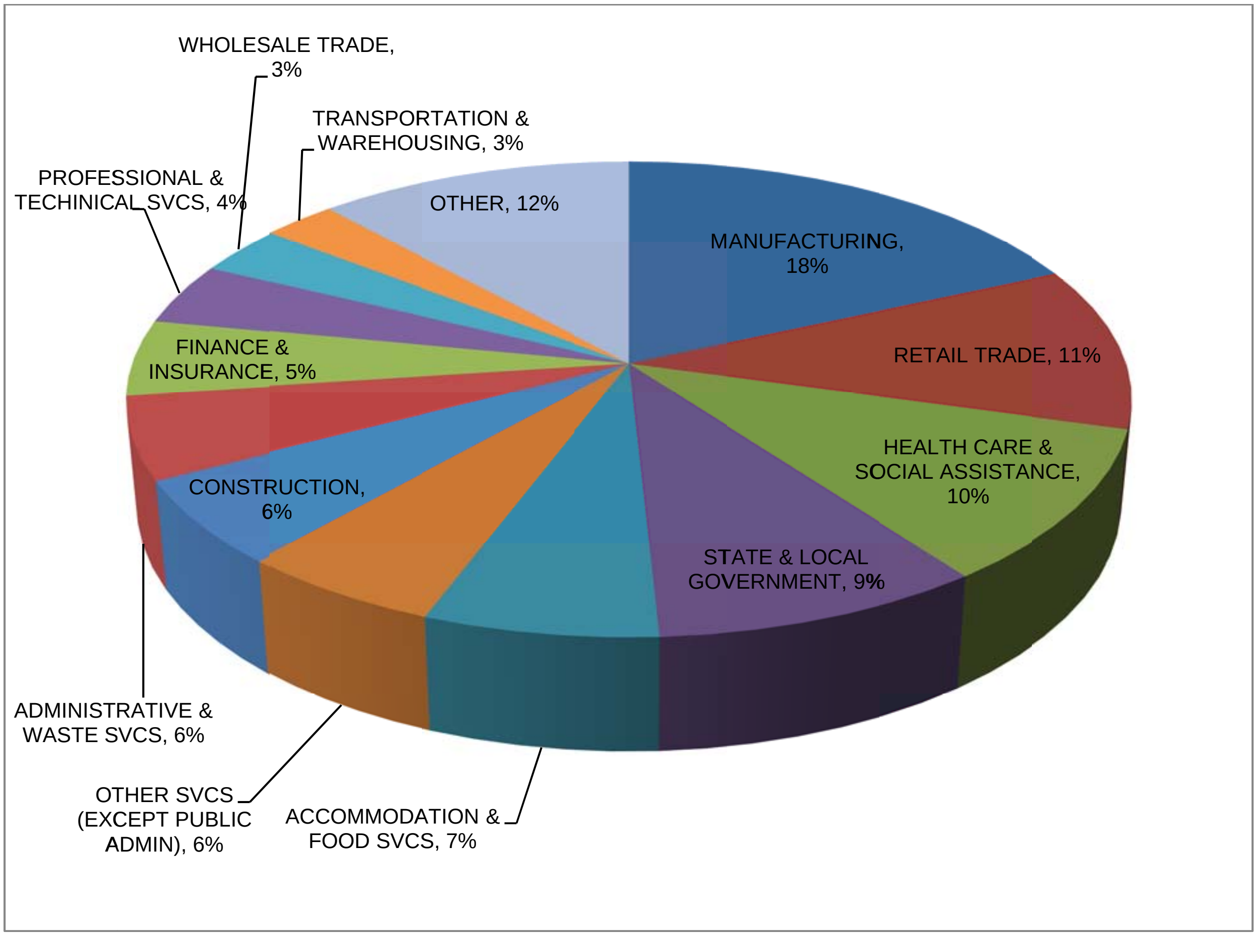
Year	Outagamie County	Winnebago County	Calumet County
Historical			
1990	90,933	86,195	14,343
2000	113,818	106,113	18,122
2010	125,166	107,876	21,106
CAGR 1990-2010	**1.61%**	**1.13%**	**1.95%**
Projected			
2015	133,207	113,082	22,343
2020	142,441	118,063	23,776
2030	162,577	128,114	27,106
CAGR 2010-2030	**1.32%**	**0.86%**	**1.26%**

Source: Woods & Poole
CAGR = Compound Annual Growth Rate

During the last two decades, employment in each service area county has grown at a more rapid rate than its respective population, indicating that an increasingly large percentage of each county's population is becoming employed. Employment growth is expected to decelerate somewhat for each county in coming years, with the relationship between county employment growth rates remaining similar to recent years.

The type of jobs in an airport's service area affects aviation demand. Careers in manufacturing and service industries tend to generate more aviation activity than resource industries such as agriculture or mining. The most common employment sectors in the ATW service area include manufacturing, retail trade, health care and social services, state and local government, accommodation and food services, construction, and administrative and waste services (see **Exhibit 1-18**).

Exhibit 1-18: ATW Service Area Employment by Sector, 2010



Source: Woods & Poole, 2011

Notes: "Other" employment includes real estate, information, agriculture, arts and entertainment, recreation, management, education, forestry, fishing, federal government, utilities, and mining. County employment combined and percentages calculated by Mead & Hunt using Woods & Poole data.

1.7.3. Gross Regional Product

Gross regional product (GRP) is the total market value of goods and services produced annually within a geographic area. Historic and projected GRP for each ATW service area county is presented and compared in **Table 1-18**.

Table 1-18: Historical and Projected GRP, in millions of 2005 dollars

Year	Outagamie	Winnebago	Calumet
Historical			
1990	4,761,2	4,581.8	615.0
2000	6,843,2	6,811.4	849.9
2010	7,869.9	7,331.6	891,4
CAGR 1990-2010	**2.54%**	**2.38%**	**1.87%**
Projected			
2015	8,677.1	8,069.4	1,016.8
2020	9,693.7	8,915.9	1,125.8
2030	12,060.7	10,818.3	1,383.0
CAGR 2010-2030	**2.16%**	**1.96%**	**2.22%**

Source: Woods & Poole

CAGR = Compound Annual Growth Rate

During the last two decades, GRP for each county has grown at a more rapid rate than its respective employment. This trend is most striking in the case of Winnebago County, where GRP has grown at over double the rate of employment, indicating that the economic value of the average new job is rapidly increasing. Like population and employment growth, GRP growth is expected to continue, although at a somewhat slower rate than in the past.

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Chapter 2

Projections of Aviation Demand

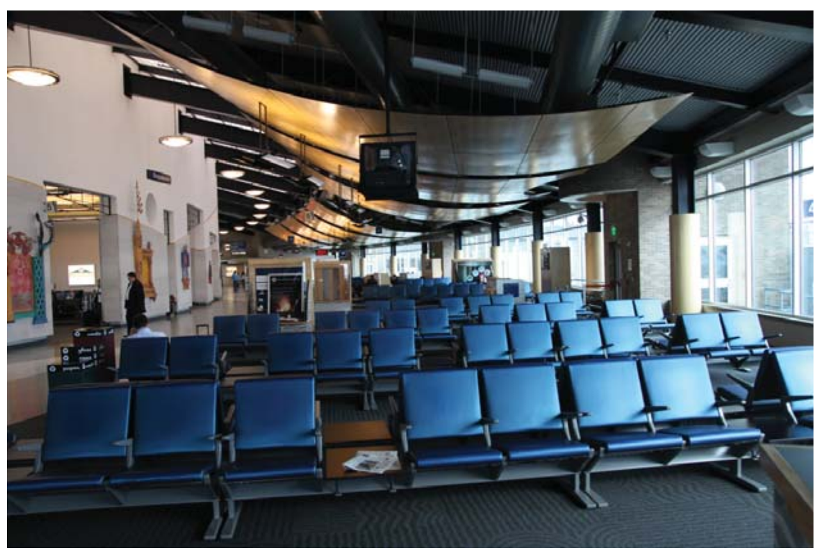
PROJECTIONS OF AVIATION DEMAND

The forecast element of a traditional master plan provides projections of future aviation demand at an airport. These projections estimate potential future activity levels through evaluation of historical data, future trends, and the application of various projection methods. Projections of aviation demand are an important element of the master planning process as they provide the basis for several key analyses.

The forecast information presented includes:

- Airport Role
- Aviation Industry Overview
- Airline Activity Forecasts
- General Aviation Activity Operations
- Cargo and Military Operations
- Peak Activity

Commercial Air Carrier Operations & Fleet Mix Projections



Building Sustainability

2.1. 2012 Update

This Master Plan's forecasts were originally created with 2009 as the base year. Those forecasts were consistent with the FAA's Terminal Area Forecasts (TAF). However, the actual passenger enplanement activity recorded in 2010, 2011 and the first six months of 2012 was lower than forecast in 2010. This drop is related to changes in the commercial service environment at Milwaukee's General Mitchell International Airport (MKE).

As this Master Plan was nearing final production in the summer of 2012, a decision was made to update the forecasts to reflect actual activity in 2010 and 2011. This decision was driven primarily by the enplanement numbers but operations, based aircraft, cargo, and peak hour projections have been updated as well. The remainder of this chapter presents those updated numbers.

This updated chapter is not meant to be a replacement for the comprehensive 2010 forecasts (those forecasts are included in their entirety in **Appendix A**). Instead, this chapter serves as an abbreviated supplement to the 2010 forecasts and much of the background information regarding non-preferred methodologies and other topics has been removed from this updated chapter.

2.1.1. Impact of Enplanement Diversion to Milwaukee

In November 2009, Southwest Airlines began serving (MKE). As is often the case when Southwest enters a new market, the entry was followed by a significant increase in low-fare seat capacity and intense fare competition. Aside from altering the complexion of commercial service at MKE, these changes impacted commercial service activity at other area airports, including ATW.

The MKE low-fare seat capacity increase was driven by aggressive expansion from Southwest, AirTran and Frontier. At the peak of capacity in the second half of 2010, seats on low-fare carriers accounted for 72% of total MKE capacity. The fare competition that followed the capacity increase played a role in decreasing the average MKE fare 22% from 2008 to the latter half of 2010.

During this same time period, ATW's seat capacity and fares generally stayed the same. This resulted in a widened capacity and fare gap between MKE and ATW. In turn, this has led some passengers to choose MKE over ATW, accounting for the 8% drop in 2011 full year and 2012 YTD enplanements.

It should be noted that there does not appear to be any evidence that other factors, such as local economic conditions or the quality and level of service that Appleton provides the traveling public, had a role in the ATW enplanement decrease.

2.1.2. Trend Reversal

2012 data show that the capacity gap is shrinking and that the fare gap has the potential to shrink in the near future.

Decreasing Capacity Gap

MKE's low-fare seat capacity as a percent of the total has decreased from the peak of 72% in 2010 to 58% of the scheduled fourth quarter 2012 capacity. While ATW also lost capacity during 2010 and 2011, it did so at a slower rate than MKE. ATW also is showing a slight capacity increase in 2012. As a result, the capacity gap between the two airports has decreased by almost 50% since the middle of 2011.

Delta plans to acquire 88 Boeing 717 aircraft; with 52 of those aircraft joining the fleet by 2014 (the remainder will join in 2015). Given that ATW is capable of supporting 70 seat and larger aircraft, it is reasonable to assume that the 717 may begin appearing at ATW sometime in 2014. The 717 should drive an increase in overall ATW seat capacity (and result in a further closing of the gap with MKE).

Decreasing Fare Gap

In September of 2010, Southwest announced its intention to purchase AirTran. The purchase went forward and integration of the two fleets is expected sometime in 2013. Once that happens, the deeply discounted AirTran fare structures will no longer be in the MKE marketplace. This should result in the fare gap between ATW and MKE shrinking

2.2. Revised Enplanement Forecasts

Closing the capacity and fare gap will result in fewer ATW travelers diverting to MKE. Given the relative speed with which ATW lost enplanements, the recovery should be relatively rapid as well.

The elimination of AirTran fare structures should occur in 2013 and the 717 should enter service at ATW in 2014. Therefore, the forecasts have been revised to show a reversal of the downward enplanement trend in 2013, with that reversal leading to originally forecast levels in 2019. See section 2.5 for updated enplanement levels.

The remainder of this chapter contains information from the original forecasts, now updated to 2011 data.

2.3. Role of the Airport

In order to project aviation demand at Outagamie County Regional Airport, it is important to understand the role of the Airport. This section presents current and historical information that define the Airport's role, including the geographical area served by the Airport.

The Airport is owned and operated by Outagamie County and serves commercial passenger aircraft as well as general aviation aircraft (aircraft which are not used for military, charter, or scheduled flights). The FAA National Plan of Integrated Airport Systems (NPIAS) identifies 3,380 airports in the United States and lists Outagamie County Regional Airport as a Non-Hub, Primary facility. Commercial service airports that individually enplane less than 0.05 percent of all commercial passenger enplanements, but which have more than 10,000 annual enplanements, are categorized as non-hub primary airports. There are 242 non-hub primary airports that collectively account for approximately three percent of nationwide enplanements.

2.3.1. Airport Catchment Area

The airport catchment area, also referred to as the air trade area or service area, is the geographical area an airport serves (see **Exhibit 2-1**). An airport's catchment area is defined by several factors, including geographical and access considerations and proximity of alternative aviation facilities. More specifically, the airport's catchment area is the geographic area from which an airport can reasonably expect to draw commercial air service passengers; however, airport use by the airport's catchment area population is affected by a variety of factors, including: proximity to a competing airport(s), airfares, destinations, capacity (airline seats), flight frequency, and low-fare carrier presence at nearby airports.

Outagamie County Regional Airport serves Winnebago County and Calumet County and portions of the counties of Waupaca, Outagamie, Waushara, Green Lake, Manitowoc, Sheboygan, Fond du Lac, and Marquette constituting an area of over 3,000 square miles and a population estimated at 543,000.

Several airports are within close proximity to the Appleton area: Austin Straubel International Airport (Green Bay), Central Wisconsin Airport (Mosinee), Dane County Regional Airport (Madison), and General Mitchell International Airport (Milwaukee). The four surrounding airports range between 29 and 114 miles from Appleton (see **Table 2-1)**. The proximity of these airports affects passenger activity at ATW. It is estimated that 41 percent of the catchment area origin and destination air passengers use ATW with the remainder using one of the bordering airports. However, it is also estimated that some passengers from outside the catchment area use ATW as opposed to using their local airport. The close proximity of these airports means that changes in service level or facilities at one airport can impact activity and aviation demand at neighboring airports.

Oshkosh's Wittman Regional Airport is located within the Outagamie County Regional Airport catchment area. Since the airport has no commercial passenger service, it does not affect Outagamie County Regional Airport's scheduled commercial operations and passenger demand. However, Wittman Regional Airport has extraordinary general aviation demand when it annually hosts the world's largest annual fly-in. During the annual Experimental Aircraft Association fly-in, Outagamie County Regional Airport experiences a significant amount of itinerant general aviation traffic due to overflow from Wittman.

Table 2-1: Airport Drive Distances

AIRPORT	MILES
Austin Straubel International Airport	29
Central Wisconsin Airport	87
Dane County Regional Airport	102
General Mitchell International Airport	114

Source: www.worldairportcodes.com

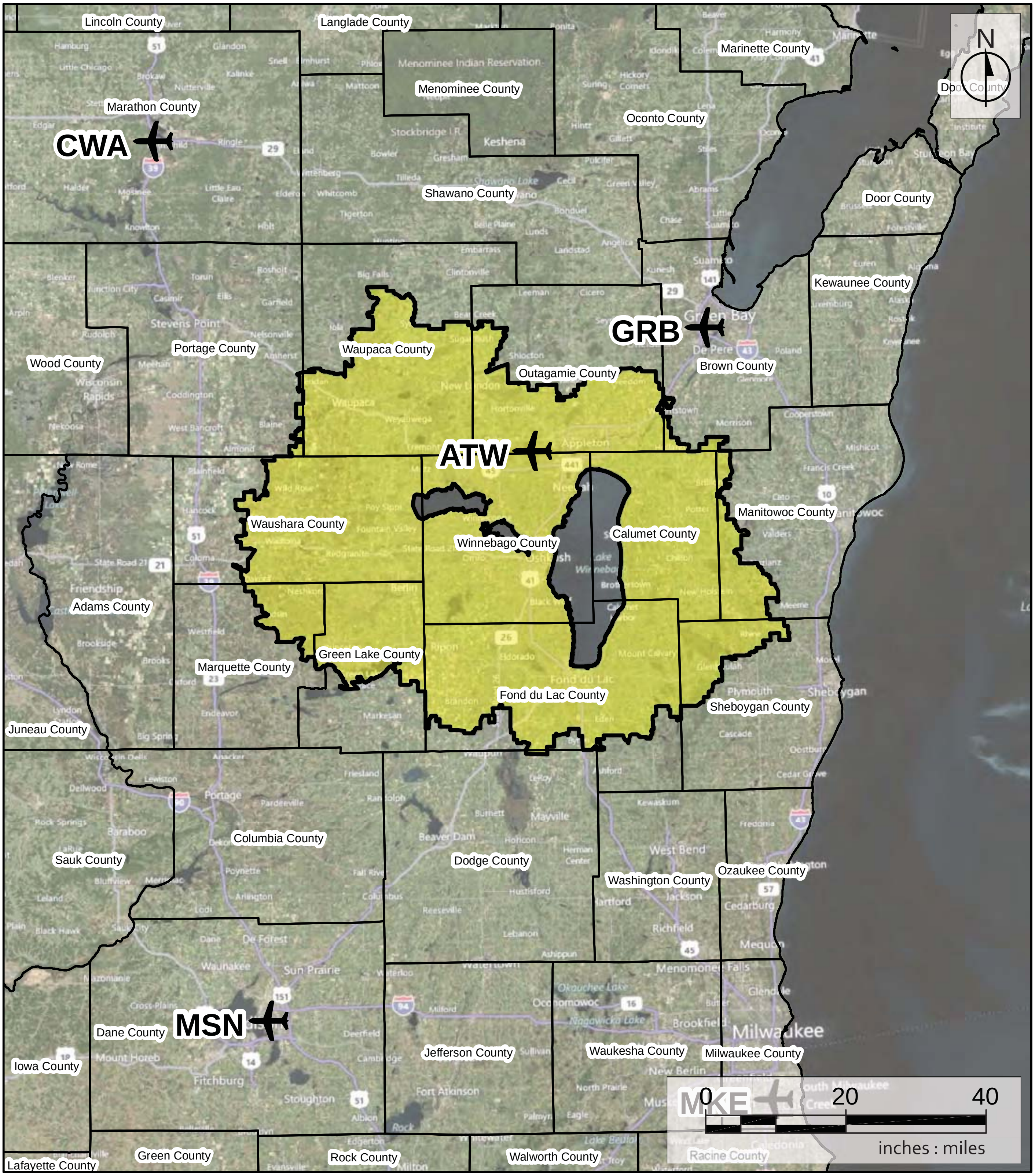


Exhibit 2-1 **ATW CATCHMENT AREA & SURROUNDING AIRPORTS**

Outagamie County Regional Airport **Sustainable Master Plan**

Outagamie County Regional Airport ATW Appleton Wisconsin

2.3.2. Existing and Historical Air Service

The Airport has commercial service provided by United Express, Delta Air Lines, and Allegiant Air. With the exception of Allegiant service, which is operated with narrow-body jet aircraft, regional jet equipment is employed by the airlines to provide service to their respective hubs.

Table 2-2 shows scheduled airline service for the month of March from 2002 through 2011. Overall, flights per week in the month of March decreased from a high in 2005 of 193 to a low in 2011 of 130. The loss of the Cincinnati service, cessation of tag service, and reduced flights to Milwaukee significantly impacted total flights per week with a decrease of 28 percent from 2002 to 2011.

Table 2-2: Scheduled Airline Service - Flights per Week Month of March

Destination	Airline	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Atlanta	Delta			14	21	21	21	20	14	7	7
Chicago (ORD)	United	41	34	41	40	40	53	47	39	39	39
Cincinnati	Delta	34	35	35	33	20	19	17	6		
Denver	United								7	6	
Detroit	Delta / Northwest	27	27	28	28	28	28	21	20	27	32
Las Vegas	Allegiant								4	6	4
Milwaukee	Midwest	31	31	32	37	37	37	25	19	19	19
Minneapolis	Delta / Northwest	33	33	33	34	34	32	35	33	33	27
Orlando, FL (SFB)	Allegiant								2	2	2
Total Weekly Flights		**166**	**160**	**183**	**193**	**180**	**190**	**165**	**144**	**139**	**130**

Source: apgDat

Table 2-3 shows the average weekly departures for each month in calendar year 2011. During 2011, air service changed in several markets. Appleton lost service to Milwaukee but gained seasonal service to Phoenix and Memphis. Several changes to the type of aircraft operating in the market were also made. Flights per week ranged from 98 departures in December to 142 departures in July and August. Outbound seats ranged from 5,612 per week in December and 7,461 per week in July and August. By the end of the year, the Airport had service to Atlanta, Chicago, Phoenix, Detroit, Las Vegas, Minneapolis, and Orlando.

Table 2-3: Average Weekly Departures by Destination and Airline – 2011

		Aircraft	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Atlanta	Delta	CRJ-700			7	7	7	7	7	7	7	7	7	7
Atlanta	Delta	CRJ-900	7	7										
Chicago (ORD)	United	CRJ-200	39	39	39	38	36	37	39	39	38	37	35	30
Phoenix (AZA)	Allegiant	MD-80											2	2
Detroit	Delta	CRJ-200	32	32	32	32	31	32	33	33	30	31	29	30
Las Vegas	Allegiant	MD-80	2	2	4	2	2	2	2	2	2	2	2	2
Memphis	Delta	CRJ-200						4	7	7				
Milwaukee	Midwest	ERJ-135	19	19	19	19	19	19	19	19	1			
Minneapolis	Delta	CRJ-200	26	27	27	27	27	30	33	33	25	27	31	25
Orlando (SFB)	Allegiant	MD-80	2	2	2	2	2		2	2			1	2
		Total departures	127	128	130	127	124	131	142	142	103	104	107	98
		Total seats	6,676	6,751	7,061	6,695	6,229	6,695	7,461	7,461	5,748	5,576	5,678	5,612

Source: apgDat

2.4. Industry Trends

To project aviation demand at ATW, it is important to understand changes occurring locally and those within the U.S. aviation industry as a whole. Local trends have an obvious effect on the use of the Airport, especially with regard to air service. U.S. trends also have an effect on aviation demand. The following subsections provides some discussion of industry dynamics locally, nationally, and specific to the airline industry.

2.4.1. National Aviation Trends

The FAA annually produces a long range forecast of national aviation trends. The FAA's most recent forecast is found in *FAA Aerospace Forecasts – Fiscal Years 2012-2032*. The forecast, recognizing that the industry is facing challenges particularly in the short-term, calls for lackluster performance in the near term, with a return to growth over the long-term. As the economic outlook improves, the three aviation sectors that affect Outagamie County Regional Airport, commercial air service, air cargo, and general aviation, will respond accordingly. However, growth is not forecasted to be as robust as in previous forecasts. The FAA does not see evidence of pent up demand and therefore does not anticipate a return to previously forecasted passengers levels even when recovery takes hold. The following are excerpts from the Forecast:

Since the beginning of the century, the commercial air carrier industry has suffered several major shocks that have led to reduced demand for air travel. These shocks include the terror attacks of September 11, skyrocketing prices for fuel, debt restructuring in Europe and the United States, and a global recession. To manage this period of extreme volatility, air carriers have fine-tuned their business models with the aim of minimizing financial losses by lowering operating costs, eliminating unprofitable routes and grounding older, less fuel efficient aircraft. To increase operating revenues, carriers have initiated new services that customers are willing to purchase. Carriers have also started charging separately for services that were historically bundled in the price of a ticket.

The capacity discipline exhibited by carriers and their focus on additional revenue streams bolstered the industry to profitability in 2011 for the second consecutive year. Going into the next decade, there is cautious optimism that the industry has been transformed from that of a boom-to-bust cycle to one of sustainable profits. As the economy recovers from the most serious economic downturn and slow recovery in recent history, aviation will continue to grow over the long run.

The 2012 FAA forecast now calls for one billion passengers in 2024, three years later than projected last year. Growth over the next five years will be moderate, with a return to historic levels of growth only attainable in the long term. This delayed trajectory represents the downward adjustments of the overall economy, here in the U.S. and abroad, and the aviation sector's responses. One of the many factors influencing the delayed recovery is the uncertainty that surrounds the U.S. and European economies. Despite this and the ambiguity surrounding its own fiscal imbalances, the U.S. economy has managed to avoid a double dip recession and trudges along the path of slow recovery.

System capacity in available seat miles (ASMs) – the overall yardstick for how busy aviation is both domestically and internationally – is projected to remain flat in 2012 after posting a 3.4 percent increase in 2011; it will then grow at an average annual rate of 3.1 percent through 2032. In the domestic market, capacity overall will shrink by 0.8 percent in 2012 after having registered an increase of 2.0 percent in 2011. Domestic capacity is projected to grow at an average annual rate of 2.5 percent for the remainder of the forecast period. Domestic mainline carrier capacity will decrease by 0.8 percent in 2012 after registering a one-year increase in 2011 of 2.3 percent following three years of decline.

For the regional carriers, domestic capacity will shrink by 0.5 percent from 2011 levels thus registering another decline after shrinking in 2009 – the only two periods when the industry has shrunk since deregulation. Commercial air carrier domestic revenue passenger miles (RPMs) are forecast to shrink 0.2 percent in 2012, and then grow at an average of 2.8 percent per year through 2032; domestic enplanements in 2012 will decrease 0.1 percent, and then grow at an average annual rate of 2.4 percent for the remainder of the forecast.

The average size of domestic aircraft is expected to increase by 0.2 seats in FY 2012 to 122.8 seats. Average seats per aircraft for mainline carriers are projected to stay relatively flat as network carriers continue to reconfigure their domestic fleets. While demand for 70-90 seat aircraft continues to increase, the number of 50 seat regional jets in service is expected to fall, increasing the average regional aircraft size in 2012 by 0.5 seats to 56.8 seats per mile. Passenger trip length in domestic markets will decrease by 1.3 miles during the same period.

Although the slow growth and expectations of a European recession has dampened the near-term prospects for general aviation, the long-term outlook remains favorable. Growth in business aviation demand over the long term will be driven by a growing U.S. and world economy especially in the turbo jet and turbine rotorcraft markets. As the fleet grows, the number of general aviation hours flown is projected to increase an average of 1.7 percent a year through 2032. Profitability for U.S. carriers will hinge on a stable environment for fuel prices, an increase in demand for corporate air travel, maintaining the ability to pass along fare increases to leisure travelers, and the continual generation of ancillary revenues. To navigate this volatile operating environment, mainline carriers will continue to drive down costs by better matching flight frequencies and/or aircraft gauge with demand, delaying deliveries of newer aircraft and/or grounding older aircraft, along with pressuring regional affiliates to accept lower fees for contract flying.

Outagamie County Regional Airport is expected to fare similarly to the national trend in warding off challenges to increased air transportation demand.

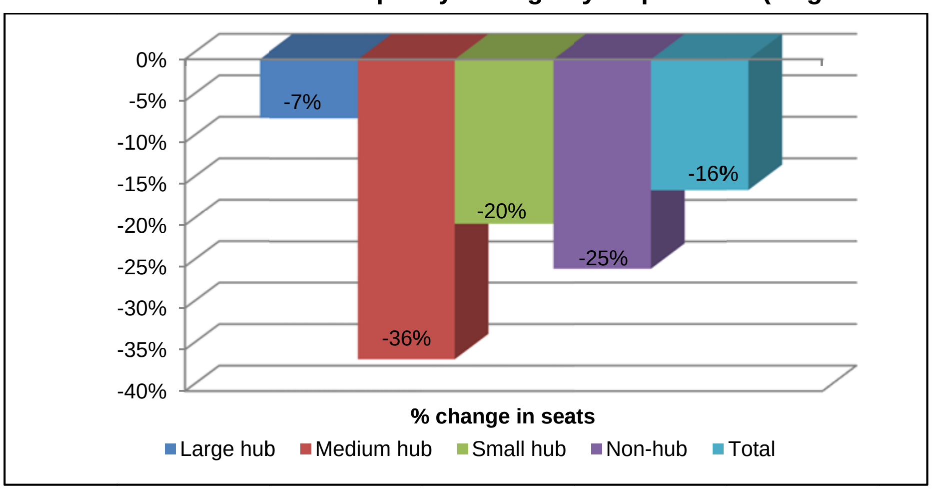
2.4.2. Airline Trends

The U.S. airline industry has experienced considerable change since September 11, 2001. Bankruptcy, liquidation, consolidation, and weak travel demand have forced carriers to reduce costs and service amenities. Dwindling profitability and/or losses in domestic markets have resulted in traditional network carriers scaling back or eliminating capacity growth and shifting capacity to the international arena. However, low-cost carriers such as Southwest Airlines, AirTran Airways, Jet Blue Airways, and others have stepped in with domestic capacity additions. Since low-cost carriers serve only the larger markets, this evolution counters the need of secondary markets for additional and better air service. Secondary markets are dependent on the network carrier's hub and spoke service, the availability of smaller capacity aircraft, and an economic environment in which they can contribute to an airline's profitability. These airline trends will continue to affect air service in smaller communities such as Appleton.

2.4.3. Declining Air Service

On a national basis, air service has declined significantly in smaller communities since 2001. **Exhibit 2-2** demonstrates the change in seat capacity from 2000 to 2012. In their cost cutting efforts, traditional network carriers have reduced more costly, short-haul flights in favor of long-haul and international flights where other transportation alternatives are fewer, time savings are greater, and the profit potential is better. Fleet types are also changing; turboprop aircraft are being phased out or replaced by regional jets that do not have the same operating economics at the shorter stage lengths.

Exhibit 2-2: U.S. Domestic Capacity Change by Airport Size (August 2012 VS 2000)



Source: Diio Mi (August 2000/2012); FAA definitions

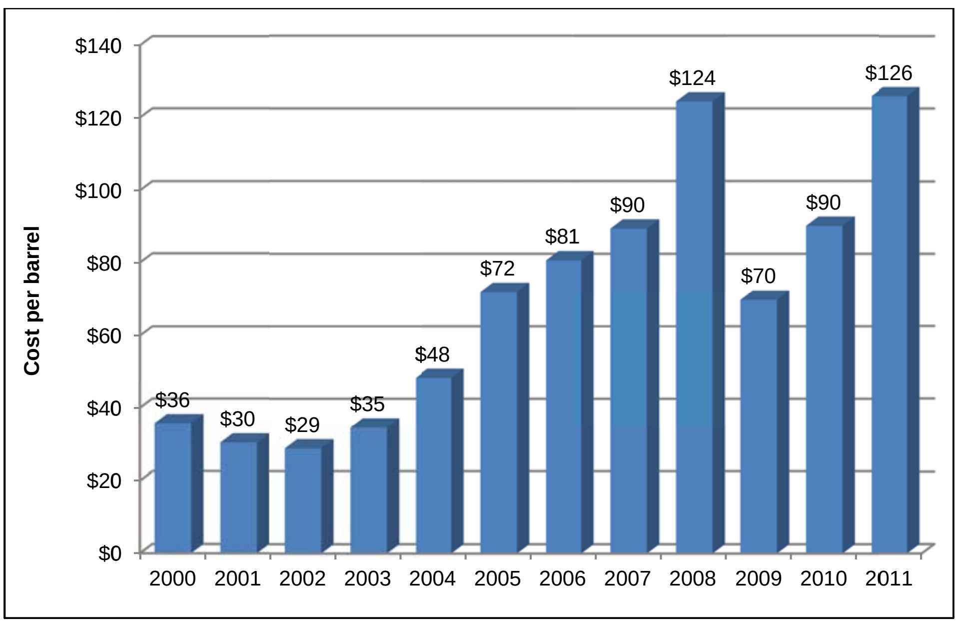
Since September 11, 2001, security requirements have reduced some of the time saving benefits of air travel, particularly in shorter haul markets. Many travelers have reacted by driving since the reduced time savings is considered insufficient to justify the higher cost. This has resulted in fewer scheduled flights, and the lower schedule frequency has reduced the convenience and utility of air travel.

Changes in flight frequency and the reduction of network capacity impacts smaller communities far more than it does larger communities. This disparity is due to smaller community air service being less competitive and the lesser availability of economies of scale makes it more expensive to serve smaller markets and results in greater risk. There is a greater opportunity to adjust flight frequency and/or capacity in larger markets to conform to market demand changes than in smaller markets where any adjustment may result in lowering service below marketable levels. The higher risk small market hurdle is a challenge which Appleton will have to overcome.

2.4.4. Fluctuating Fuel Prices

Although airlines have cut costs dramatically in their quest for profitability, increases in jet fuel costs through 2011 have more than offset the cost savings. The cost of fuel has been the single largest source of the airline industry's inability to sustain on-going profitable operations. **Exhibit 2-3** shows the cost per barrel of jet fuel from 2000 through 2011. These increases and fluctuations in fuel costs adversely affect airlines in two ways: an increase in overall expenses and reduced demand. Higher fuel prices for consumers mean: less discretionary income for air travel; increases in airline operating expenses accompanied by lower demand; and decreases in overall profit opportunities. All of these effects in turn curtail airline growth. Lower capacity growth means less opportunity for smaller communities to improve service levels as competition for limited resources increase.

Exhibit 2-3: Cost per Barrel of Jet Fuel



Source: Airlines for America – jet fuel spot price

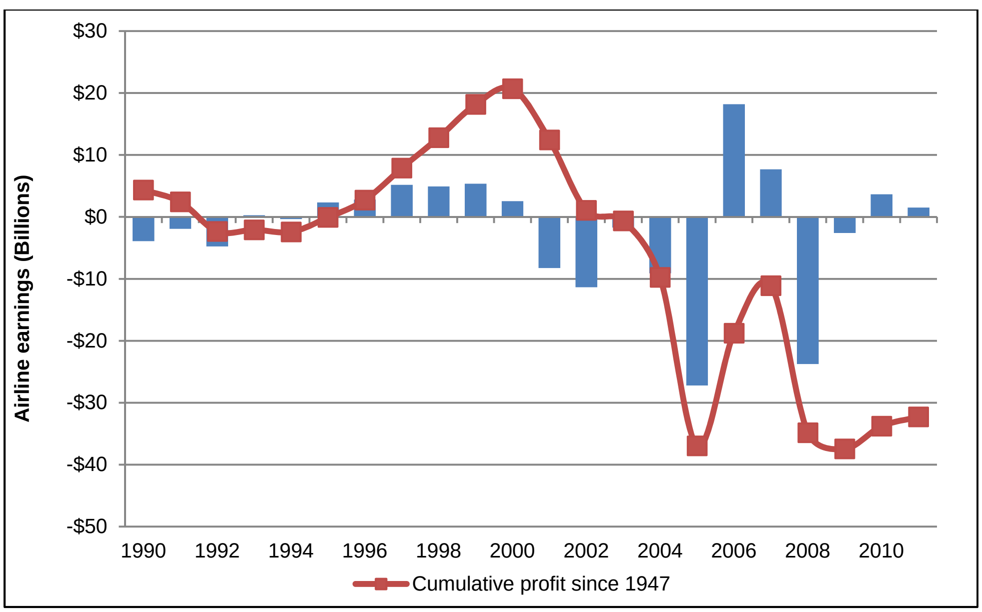
Spikes in fuel prices have caused uncertainty in the airline industry. Fundamental change in the airline industry is likely, and two developments favorable to Outagamie County Regional Airport are poised to emerge. First, the high cost of gasoline has lessened the cost advantages of automobile travel for shorter trips 200 to 300 miles, particularly business trips. It will also augur against driving to alternate airports, low-fare carrier availability notwithstanding, rather than using the local airport.

2.4.5. Airlines Struggling Financially

Traditional network carriers have struggled to survive, much less thrive, in the post September 11, 2001 period. **Exhibit 2-4** provides cumulative profits since 1990 for U.S. airlines. Over the past several years, there has been significant consolidation among the major airlines including United Airlines and Continental Airlines; Delta Air Lines and Northwest Airlines; Frontier Airlines and Midwest Airlines; and Southwest Airlines and AirTran Airways. The regional airlines have also experienced significant consolidation with Pinnacle Airlines Holdings acquiring Colgan Air and Mesaba Airlines; Trans States Holdings acquiring Compass Airlines; and SkyWest Airlines, Inc. acquiring both ExpressJet and ASA. Over the past decade many airlines have also restructured through the bankruptcy courts including Delta Air Lines, Frontier Airlines, Mesa Air Group, Midwest Airlines, Northwest Airlines, Sun Country, United Airlines and US Airways. American Airlines was the last of the legacy airlines to enter bankruptcy and is currently restructuring. During this same time, Aloha Airlines, ATA Airlines, Independence Air, and Sky Bus Airlines have ceased operations.

Initially, not all carriers struggled to turn a profit during this period. Low-cost carriers have remained healthier and continued to expand during the period. However, the onslaught of sharply increasing fuel prices in 2008 and then again in 2011 curtailed much of their planned expansion with only Southwest Airlines and Allegiant Air remaining consistently profitable annually though with lower margins.

Exhibit 2-4: U.S. Airline Cumulative Profits



Source: Airlines for America

2.5. Passenger Enplanement Projections

Enplanements are defined as the activity of passengers boarding commercial service aircraft that depart an airport. Enplanements include passengers on scheduled commercial service aircraft or non-scheduled charter aircraft. Enplanements do not include the airline crew. The total number of passengers using an airport is the sum of the airport's enplanements and deplanements (passengers debarking commercial service aircraft). Though recorded, deplanements are not specifically evaluated in this document as they are roughly equal to the number of enplanements.

Passenger enplanement data is provided to Airport management by commercial passenger service carriers, who maintain that data as they transport people to and from the facility. The FAA has estimated figures in the TAF; however, airport records are generally a more accurate source. It should be noted that the TAF presents annual data for a fiscal year (October 1 to September 30) and the TAF historical and forecast data are also reported for fiscal years. Additionally, the enplanements reported are revenue enplanements (paying passengers either with money or frequent flyer miles).

2.5.1. Forecasting Approach

There are a number of different forecasting techniques available for use in the projection of aviation activity, ranging from subjective judgment to sophisticated mathematical modeling. More information can be found on common forecasting methods, as well as their results when applied to ATW, in Appendix A.

The preferred methodology from the original Master Plan Update forecasts incorporated a regression analysis that took several factors into account such as local employment and sudden changes in annual enplanements. These forecasts utilized base year 2009 and projected a gradual, steady increase in passenger enplanements over the 20 years. This trend was slightly higher than, but generally corresponded with, the TAF that was current at the time.

However; as noted at the start of this chapter, ATW passenger enplanements declined significantly since 2009. In this 2012 update to the forecasts, several methodologies were examined. An updated regression analysis that examined factors such as average airfares, seat capacity, and service destinations at ATW and MKE was developed. This resulted in strong growth trend beginning in 2013 and eventually outstripping the TAF about 15 years from now. Two market share (the method that is often most likely to match the TAF) forecasts were also created. Both of these methods also projected enplanements that exceeded the TAF in about 15 years.

Based on the results of these forecasts and on consideration of the unique "fare war" situation at MKE, a hybrid preferred methodology emerged. The methodology assumes that the recent decline in passenger enplanements at ATW is specifically due to changes in low-cost carrier service at MKE. As fares at MKE begin to normalize, enplanements at ATW are expected to rebound. This rebound will result in a period of stronger than usual growth, as ATW traffic normalizes in relation to other airports in the region. After this normalization, the gradual increase originally forecasted occurs.

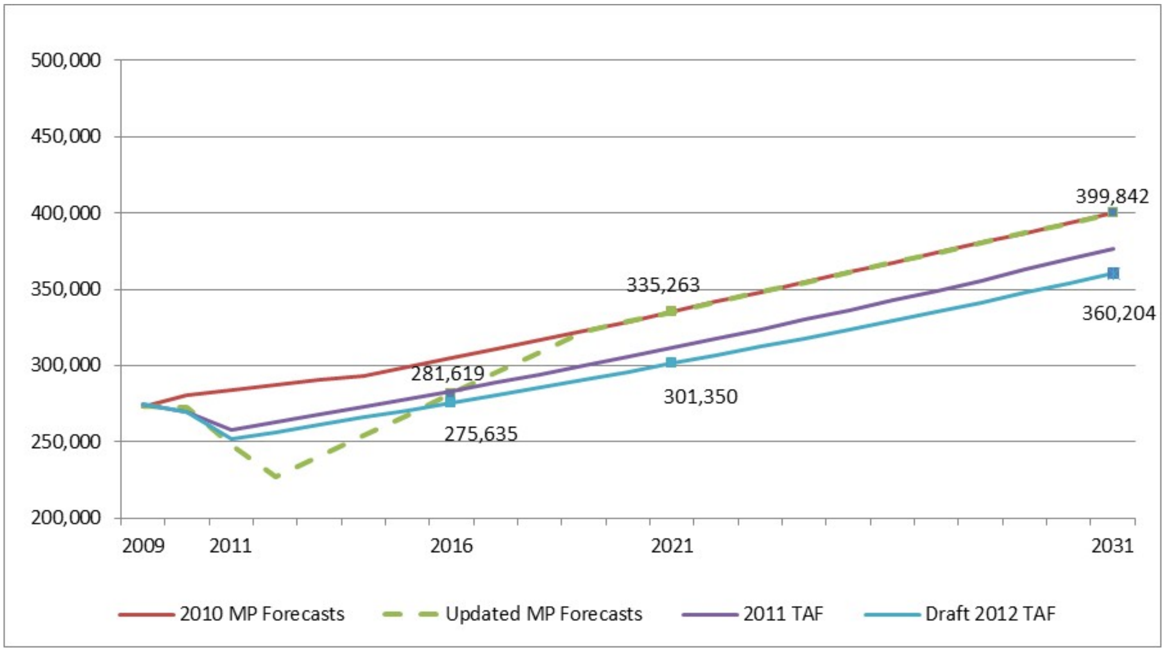
Updated passenger enplanement forecasts are shown in **Table 2-4 and Exhibit 2-5**. As shown, enplanements are projected to increase from 248,041 in 2011 to 399,824 in 2031. The updated forecasts are consistent with the TAF throughout the forecast period.

Table 2-4: Passenger Enplanement Forecast

Year	2010 MP Forecasts	Updated Forecasts	2012 Draft TAF
Historic:			
2003	246,894	246,894	247,184
2004	277,783	277,783	279,541
2005	304,738	304,738	304,558
2006	277,957	277,957	281,219
2007	289,471	289,471	287,655
2008	263,469	263,469	263,831
2009	273,200	273,200	274,737
2010		272,420	269,469
2011		248,041	252,112
	CAGR 2003-2011:	*0.06%*	*0.25%*
Projected:			
2016	305,141	281,619	275,635
2021	335,263	335,263	301,350
2031	399,842	399,842	360,204
	CAGR 2011-2031:	*2.42%*	*1.80%*

Source: Airport Records, 2012 Draft TAF, Mead & Hunt, Inc.

Exhibit 2-5: Enplanement Forecast Comparison



Source: Airport Records, 2012 Draft TAF, Mead & Hunt Inc.

2.6. Commercial Air Carrier Operations and Fleet Mix Projections

Projections of air carrier operations and fleet mix were developed using historical and expected trends in load factors, types of aircraft used, passenger enplanements, and average seats per departure. Air carrier operations projections and air carrier fleet mix projections are presented in this section.

2.6.1. Commercial Air Carrier Operations Projections

The commercial air carrier operations forecast is important for airfield planning because the size and frequency of this component of demand defines runway and taxiway requirements. The FAA also projects commercial air carrier operations as part of the TAF.

The first step to forecasting operations is to examine historical data. **Table 2-5** shows the annual number of scheduled and unscheduled operations by fiscal year from 1995 through 2011. The percent of scheduled commercial operations increased between 1995 and 2011; however, data from 2003 and beyond has more relevance. The U.S. DOT changed reporting requirements at the start of the 2003 fiscal year to include all carriers. From 2003 forward, the percentage of scheduled operations ranged from 79 percent to 94 percent. The remaining portion is categorized as unscheduled air taxi operations.

Table 2-5: Historical Commercial Operations

	Total	Scheduled		Unscheduled	
Year	Operations [a]	Operations	% of total	Operations	% of total
1995	20,169	5,655	28%	14,514	72%
1996	17,947	5,425	30%	12,522	70%
1997	20,688	7,269	35%	13,419	65%
1998	23,146	13,743	59%	9,403	41%
1999	24,531	15,021	61%	9,510	39%
2000	25,528	17,634	69%	7,894	31%
2001	22,061	17,092	77%	4,969	23%
2002	21,467	11,590	54%	9,877	46%
2003	20,641	17,614	85%	3,027	15%
2004	22,289	19,179	86%	3,110	14%
2005	23,165	20,506	89%	2,659	11%
2006	21,039	19,794	94%	1,245	6%
2007	20,959	19,749	94%	1,210	6%
2008	19,303	17,893	93%	1,410	7%
2009	16,434	14,733	90%	1,701	10%
2010	16,304	13,832	85%	2,472	15%
2011	15,521	12,288	79%	3,233	21%
CAGR 1995 - 2011	-1.62%	4.97%		-8.96%	

[a] Source: FAA – ATADS
[b] Source: apgDat (DOT T-100)
Note: Reporting requirements for T-100 changed in October 2002 to include all airlines

Over the last five years, average load factors (seat factor) have increased significantly from 68.9 percent in 2006 to 81.8 percent in 2011. This is seen to be a relatively short-term increase, as ATW's load factor is projected to be 74 percent in 2031. ATW's load factor has been below the national average and that is expected to continue over the long-term.[1]. The Airport's average seats per departure is projected to increase through the forecast period as 50 seat regional jets are retired and replaced by 70 to 90 seat regional jets in the regional carrier fleets.

Passenger enplanements are presented in **Table 2-6** with historical and projected load factors. Scheduled operations are calculated by using the following formula:

Scheduled operations = (Enplanements / (Load Factor x Avg. Seats per Departure)) x 2

Unscheduled operations, including air taxi operations, are calculated using the historical average percentage of scheduled passenger operations. Scheduled and unscheduled operation projections are combined to produce total commercial operations. This methodology projects 16,833 operations in 2016, 17,813 in 2021, and 20,777 in 2031. Table 2.6 provides the projections of total operations including scheduled and unscheduled operations.

Table 2-6: Commercial Operations Forecast

Year	Enplanements	Load Factor [a]	Average Seats per Operation	Scheduled Operations [b]	Unscheduled [b]	Total Operations
Historic:						
2003	246,894	51.8%	53.6	16,701	3,940	20,641
2004	277,783	60.9%	50.4	18,254	4,035	22,289
2005	304,738	58.9%	52.9	19,540	3,625	23,165
2006	277,957	68.9%	43.9	18,502	2,537	21,039
2007	289,471	71.5%	43.6	18,332	2,627	20,959
2008	263,469	67.2%	46.7	16,657	2,646	19,303
2009	273,200	72.7%	52.9	14,131	2,303	16,434
2010	272,420	80.6%	54.0	13,724	2,580	16,304
2011	248,041	81.8%	53.4	11,980	3,541	15,521
CAGR 2003-2011	0.06%			(4.1%)	(1.3%)	(3.5%)
Projected:						
2016	305,141	73.5%	58.8	14,121	2,712	16,833
2021	335,263	73.8%	60.8	14,944	2,870	17,813
2031	399,842	74.0%	62.0	17,430	3,347	20,777
CAGR 2011-2031	2.42%			0.96%	-0.28%	1.07%

[a] Source: apgDat (DOT T-100), load factor is seat factor
[b] Source: Calculated: total ops - scheduled pax ops (includes scheduled cargo flights, aircraft ferries, air taxi, etc.)
[c] Source: Source: FAA - ATADS fiscal year
Note: Reporting requirements for T-100 changed in October 2002 to include all airlines

[1] *The FAA Aerospace Forecast 2012-2032 forecasts the national average load factor at approximately 83.4 percent in 2032.*

2.6.2. Charter operations projections

Charter flights, flights which take place outside normal schedules, are hired by a customer or group of customers. These are a specific category of “other commercial carrier operations” shown in Table 6-2. Tourist charters are generally organized by travel companies. Tickets are not sold directly by the charter airline to the passengers but by travel companies who have chartered the flight (sometimes in a consortium with other companies). Although charter airlines typically carry passengers who have booked individually or as small groups to tourist destinations, sometimes an aircraft will be chartered by a single group such as members of a company, a sports team, or the military.

Table 2-7 presents historical (from Airport records) and projected charter operations for Outagamie County Regional Airport. As shown in the Table 2-7, charter operations between 2005 and 2011 ranged from 8 to 42. A significant portion of annual charter operations are conducted by National Football League teams, which typically use ATW eight to ten times per year. It is projected that charter operations at the Airport will remain flat at 18 operations a year through the 20-year planning horizon. However, this could easily change should leisure travel charters again gain a foothold at ATW, especially when the recurring NFL charters are considered.

Table 2-7: Historical Charter Operations and Forecast

Year	Operations
Historic [a]:	
2005	8
2006	6
2007	20
2008	42
2009	14
2010	16
2011	22
Average 2005-2011:	18
Projected:	
2016	18
2021	18
2031	18

[a] Source: Airport records: flights reported as charter or operated by Sun Country Airlines

2.6.3. Commercial Air Carrier Fleet Mix Projections

In order to project future air carrier operations, the type and capacity of aircraft that will operate at the Airport must be determined. For the purposes of this report, passenger aircraft have been grouped into six categories based on the number of seats they typically provide.

Table 2-8 shows the air carrier fleet mix at Outagamie County Regional Airport over the last eight years grouped by the six aircraft categories. Over the past eight years, the number of aircraft that operated at Outagamie County Regional Airport with less than 60 seats has dropped dramatically, primarily with the phase-out of turboprop aircraft from the market. Service with BAE-146 aircraft was also discontinued over the time period. With these changes, operations with regional jet aircraft in the 50- and 70-seat ranges have increased. Operations in the 101- to 150-seat category ceased in 2004 but then were reinstated with the addition of Allegiant Air in 2008.

Table 2-8: Historical Fleet Mix

			OPERATIONS (percent of total)								
Seat Range	Typical Aircraft	# Seats	2003	2004	2005	2006	2007	2008	2009	2010	2011
<20	Beechcraft 1900	19	392	534	1,344	1,305	415	30	0	0	0
			2.60%	2.90%	6.90%	7.10%	2.30%	0.20%	0.00%	0.00%	0.00%
20-39	Dornier 328, Bombardier Dash 8Q-200, Embraer 120, 135, Saab 340	33	4,091	4,786	3,999	4,755	6,195	4,142	1,717	2,033	2,294
			26.80%	26.30%	20.50%	25.80%	34.00%	25.00%	12.20%	14.70%	18.70%
40-59	Bombardier CRJ-200, Embraer 140, 145	49	5,953	9,504	8,885	11,386	11,607	11,647	10,534	9,678	8,996
			39.10%	52.20%	45.60%	61.70%	63.70%	70.40%	74.50%	70.00%	73.20%
60-85	Avro RJ 85, Bombardier Dash 8Q-400, CRJ-700, CRJ-900 (DL config) Embraer 170, 175	68	695	15	1,712	460	0	707	1,432	1,541	654
			4.60%	0.10%	8.80%	2.50%	0.00%	4.30%	10.10%	11.10%	5.30%
86-100	British Aerospace Bae-146, Boeing 717-200, Bombardier CRJ-900, Embraer 190, 195	91	3,696	3,370	3,532	544	0	0	0	0	0
			24.30%	18.50%	18.10%	2.90%	0.00%	0.00%	0.00%	0.00%	0.00%
101-150	Airbus A318, A319; Boeing 737-300, 737-400, 737-500, 737-600, 737-700, 737-800, Mcdonnell Douglas Dc-9, MD-80	134	412	0	0	0	0	22	448	580	344
			2.70%	0.00%	0.00%	0.00%	0.00%	0.10%	3.20%	4.20%	2.80%
		Totals	**15,239**	**18,209**	**19,472**	**18,450**	**18,217**	**16,548**	**14,131**	**13,832**	**12,288**

Source: APGDat, Airport Records

Table 2-9 provides the forecast of scheduled commercial operations through 2031. The forecast is based on several assumptions. The average size of the fleet mix (based on aircraft seat ranges) is projected to increase through the forecast period as all of the 50-seat regional jets are anticipated to be retired and replaced by 70 to 90 seat regional jets in the regional carrier fleets.

Table 2-9: Projected Commercial Air Carrier Fleet Mix

SEAT RANGE		HISTORICAL		FORECAST						
	AVG #	2011		2016		2021		2031		CAGR
	SEATS	%	OPS	%	OPS	%	OPS	%	OPS	2011-2031
<20	19	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
20-39	34	18.70%	2,294	0.00%	0	0.00%	0	0.00%	0	-100.00%
40-59	50	73.20%	8,996	72.20%	10,181	67.40%	10,129	62.80%	10,880	1.00%
60-85	70	5.30%	654	19.20%	2,715	21.00%	3,164	22.00%	3,811	9.20%
86-100	90	0.00%	0	5.40%	762	8.40%	1,263	12.00%	2,079	100.00%
101-150	137	2.80%	344	3.20%	452	3.20%	481	3.20%	554	2.40%
Total		**100.00%**	**12,288**	**100.00%**	**14,110**	**100.00%**	**15,037**	**100.00%**	**17,324**	**1.70%**
Operations		12,288		13,796		14,579		16,867		
Average Seats		53.4		58		60		62		
Total Seats		656,179		800,194		874,754		1,045,747		

Note: Ops = Commercial operations

2.7. General Aviation Activity Projections

General aviation is defined as that portion of civil aviation that encompasses all facets of aviation except commercial and military operations. General Aviation projections were developed for the number of based aircraft, based aircraft fleet mix, and aircraft operations.

ATW recently purchased the full service fixed base operator (FBO). The FBO is County owned and it's services and operations are contracted out. This arrangement, along with the construction of a new general aviation terminal, is anticipated to result in improvements to the facilities and services offered to general aviation traffic by the FBO and may also increase GA operations overall. It is also expected to direct more traffic to the south side of the Airport, especially during the annual EAA fly-in, when ATW experiences a significant amount of itinerant general aviation traffic due to overflow from Oshkosh.

2.7.1. Based Aircraft Projections

A based aircraft as defined by the FAA is an aircraft that is operational and air worthy and based at the facility for a majority of the year. Records from FAA 5010 forms and the TAF indicate based aircraft at ATW have declined by 10 percent over the past 15 years, falling from 78 in 1995 to 69 in 2011 (**Table 2-10**). While piston aircraft have been on the decline, based turbine powered aircraft have inreased.

Table 2-10: Historical Based Aircraft

Year	Piston		Turbine	Helicopter	Other	Total
	Single Engine	Multi-Engine				
1995	62	13	2	1	0	78
1996	62	13	2	1	0	78
1997	62	13	2	1	0	78
1998	56	14	3	0	0	73
1999	54	14	5	0	0	73
2000	53	21	4	0	0	78
2001	52	19	3	0	0	74
2002	52	17	4	0	0	73
2003	52	17	4	0	0	73
2004	51	16	4	0	0	71
2005	52	15	4	0	0	71
2006	52	13	4	0	0	69
2007	52	13	4	0	0	69
2008	53	13	4	0	0	70
2009	53	13	4	0	0	70
2010	52	4	13	0	0	69
2011	52	4	13	0	0	69
CAGR 1995-2011	-1.09%	-7.10%	12.41%	-100.00%	0.00%	-0.76%

Source: TAF & FAA 5010 Forms

To project based aircraft two unconstrained forecast methodologies were used: the market share and socio-economic methodologies. All indications are that the number of general aviation aircraft at ATW will follow the national growth rate. Therefore, the market share methodology based forecast is the selected forecast for based aircraft.

2.7.2. Market Share Methodology

The market share methodology uses the growth rates for active general aviation and air taxi aircraft from the *FAA Aerospace Forecast – Fiscal Years 2012-2032*. From 2005 to 2011, the national number of aircraft decreased slightly from 224,257 to 222,520. Over the same period, the number of based aircraft at the Airport has reflected that trend. As shown in **Table 2-11**, the Airport's share of national aircraft was between 0.030% and 0.032%, with the average being slightly over 0.031%. Using the market share methodology, this share is held constant throughout the projection period. This results in an increase of 8 based aircraft over the projection period, a 0.57% CAGR.

Table 2-11: Based Aircraft Forecast – Market Share Methodology

Year	ATW Based Aircraft [a]	Total U.S. Active Aircraft [b]	ATW Market Share
Historic:			
2005	71	224,257	0.032%
2006	69	221,942	0.031%
2007	69	231,606	0.030%
2008	70	228,664	0.031%
2009	70	223,876	0.031%
2010	69	223,370	0.031%
2011	69	222,520	0.031%
		Average Market Share:	*0.031%*
Forecast:			
2016	69	224,720	0.031%
2021	71	229,695	0.031%
2031	77	250,380	0.031%
CAGR:	*0.57%*	*0.59%*	

[a] Source: TAF - FAA 5010 Forms
[b] Source: FAA Aerospace Forecasts - Fiscal Years 2012-2032

2.7.3. Based Aircraft Fleet Mix

A breakdown of historical and projected based aircraft fleet mix is presented in **Table 2-12**. Since 1995, the Airport has seen a decline in the percentage of single and multi-engine piston aircraft while turbine aircraft has grown. Near-term, instability of fuel prices and economic concerns are dampening the general aviation industry. The piston aircraft market is mature and little growth is expected.

Accordingly, growth in turbine-powered aircraft at the Airport is projected to outpace single and multi-engine piston aircraft. Over the forecast period, based single engine piston aircraft are expected to grow at a compounded annual growth rate of 0.4 percent to 56; while multi-engine piston aircraft are expected to remain steady at 13 aircraft. The number of turbine based aircraft is expected to grow to eight.

Table 2-12: Based Aircraft Fleet Mix Projections

	Piston Aircraft				Turbine		Other		
Year	Single Engine	% of total	Multi-Engine	% of total	Number	% of total	Number	% of total	Total
Historic [a]:									
1995	62	79%	13	17%	2	3%	1	1%	78
1996	62	79%	13	17%	2	3%	1	1%	78
1997	62	79%	13	17%	2	3%	1	1%	78
1998	56	77%	14	19%	3	4%	0	0%	73
1999	54	74%	14	19%	5	7%	0	0%	73
2000	53	68%	21	27%	4	5%	0	0%	78
2001	52	70%	19	26%	3	4%	0	0%	74
2002	52	71%	17	23%	4	5%	0	0%	73
2003	52	71%	17	23%	4	5%	0	0%	73
2004	51	72%	16	23%	4	6%	0	0%	71
2005	52	73%	15	21%	4	6%	0	0%	71
2006	52	75%	13	19%	4	6%	0	0%	69
2007	52	75%	13	19%	4	6%	0	0%	69
2008	53	76%	13	19%	4	6%	0	0%	70
2009	53	76%	13	19%	4	6%	0	0%	70
2010	52	75%	13	19%	4	6%	0	0%	69
2011	52	75%	13	19%	4	6%	0	0%	69
Forecast [b]:									
2016	52	76%	13	19%	4	6%	0	0%	70
2021	53	75%	13	18%	5	7%	0	0%	72
2031	56	73%	13	17%	8	10%	0	0%	78
CAGR 2011-2031	*0.37%*		0.00%		*3.53%*		0.00%		*0.61%*

2.7.4. General Aviation Operations Projections

General aviation aircraft operations are only partially tied to the number of based aircraft at the Airport. The greatest number of operations was in 1996 when 46,161 were recorded, and the lowest was 17,986 in 2009. This decline reflects other trends of travel behavior both locally and nationally with respect to general aviation. The cost of operation and ownership of aircraft has increased, which has impacted operations and hours flown nationally.

Like the based aircraft projection, two forecast methodologies were used to project general aviation operations: the market share and socio-economic methodologies. The socio-economic methodology projects growth but this method fails to take into account the trend of decreasing operations over the past 15 years. The historical decline in the number of general aviation operations cannot be ignored in selecting a forecast method. For this reason, the market share methodology is the chosen forecast method.

2.7.5. Market Share Methodology

The market share methodology compares ATW operations with national figures to determine market share. Two types of operations were examined and forecast, itinerant operations (flights to other airports) and local operations (flights that originate and end at ATW such as training flights and recreational scenic flights). The results are shown in **Table 2-13**.

Table 2-13: General Aviation Operations Forecast – Market Share Methodology

Year	ATW Operations [a]			Total US Operations (X 1000)			ATW Market Share (/ 1000)		
	Itinerant	Local	Total	Itinerant	Local	Total	Itinerant	Local	Total
Historic [a]:									
1995	28,965	16,803	45,768	20,860	15,066	35,927	0.139%	0.112%	0.127%
1996	28,418	17,743	46,161	20,822	14,476	35,298	0.136%	0.123%	0.131%
1997	24,520	13,126	37,646	21,669	15,164	36,833	0.113%	0.087%	0.102%
1998	24,630	14,660	39,290	22,087	15,960	38,047	0.112%	0.092%	0.103%
1999	23,769	12,608	36,377	23,019	16,980	40,000	0.103%	0.074%	0.091%
2000	25,056	15,319	40,375	22,844	17,034	39,879	0.110%	0.090%	0.101%
2001	22,673	12,246	34,919	21,433	16,194	37,626	0.106%	0.076%	0.093%
2002	24,144	12,065	36,209	21,450	16,203	37,653	0.113%	0.074%	0.096%
2003	21,553	11,852	33,405	20,231	15,293	35,524	0.107%	0.078%	0.094%
2004	20,455	9,068	29,523	20,007	14,960	34,968	0.102%	0.061%	0.084%
2005	20,268	6,760	27,028	19,303	14,844	34,147	0.105%	0.046%	0.079%
2006	20,675	7,634	28,309	18,707	14,365	33,073	0.111%	0.053%	0.086%
2007	19,955	5,379	25,334	18,575	14,557	33,132	0.107%	0.037%	0.076%
2008	17,840	5,790	23,630	17,503	14,107	31,609	0.102%	0.041%	0.075%
2009	12,812	5,174	17,986	15,553	12,437	27,990	0.082%	0.042%	0.064%
2010	15,292	5,498	20,790	14,864	11,716	26,580	0.103%	0.047%	0.078%
2011	13,271	5,768	19,039	14,528	11,437	25,965	0.091%	0.050%	0.073%
CAGR:	*-4.76%*	*-6.46%*	*-5.33%*	*-2.24%*	*-1.71%*	*-2.01%*			
						Averages:	*0.108%*	*0.070%*	*0.091%*
Forecast [b]:									
2016	13,316	5,430	18,746	14,461	11,371	25,832	0.082%	0.042%	0.073%
2021	14,229	5,790	20,019	14,753	11,653	26,405	0.082%	0.042%	0.076%
2031	16,181	6,576	22,758	15,378	12,258	27,636	0.082%	0.042%	0.082%
CAGR 2011-2031	*1.00%*	*0.66%*	*0.90%*	*0.28%*	*0.35%*	*0.31%*	*-0.52%*	*-0.87%*	*0.58%*

[a] Source: FAA ATADS
[b] Source: FAA Aerospace Forecasts - Fiscal Years 2012-2032

National statistics for GA operations are sourced from the *FAA Aerospace Forecast – Fiscal Years 2012-2032*. From 2000 to 2011, the national number of GA operations peaked in 1999 with 40,000,000 then decreased to 25,965,000 in 2009. General aviation operations at ATW began to decrease in 1997.

From 1995 to 2011, Outagamie County Regional Airport's market share of the nation's itinerant general aviation operations has fluctuated greatly, and averaged 0.000108 percent annually. ATW's share of local and itinerant traffic has been trending downward since 1997.

The *FAA Aerospace Forecast – 2012-2032* forecasts a compounded annual growth rate of 0.28 percent for itinerant operations and a rate of 0.35 percent for local operations. The local and itinerant market shares are applied to total U.S. general aviation forecasts. The market share methodology projects 18,746 general aviation operations in 2016, 20,019 in 2021, and 22,758 in 2031, a CAGR of 0.90 percent.

2.8. Air Cargo Activity

Air cargo activity includes air cargo operations by Federal Express and commercial passenger service. Historically, the majority of air cargo at the Airport was transported by Federal Express and Airborne Express/DHL until DHL ceased U.S. domestic freight operations, leaving Federal Express as the primary all-cargo carrier at the Airport. There is also some cargo that is carried "belly-hold" meaning that it is carried on scheduled commercial air carrier flights. Federal Express has operated wide-body Airbus A300 and A310 aircraft as well as the turboprop Cessna Caravan aircraft. Nationally, express carriers, (such as UPS and Federal Express) are gaining market share over commercial passenger carriers, a trend that is expected to continue.

Historical air cargo activity for calendar years 2002 through 2011 as reported by the Airport is presented in **Table 2-14**. From 2002 to 2008, air cargo grew by nearly 45 percent, representing a 6.3 percent compounded annual growth rate and increasing from approximately 21.5 million pounds to 31.1 million. Between 2008 and 2011, total pounds of air cargo shipped through Outagamie County Regional Airport has decreased, which is due to the departure of DHL as well as the recent economic downturn. as well as the departure of DHL. There was a strong rebound in 2010 and 2011 numbers show stabilization, albeit below the levels achieved when DHL was present.

Approximately 59 percent of air cargo shipments are inbound shipments. As shown in Table 2-14, total U.S. domestic commercial air carrier revenue ton miles (RTMS) have decreased slightly from 2002 to 2011. According to the FAA Aerospace Forecasts 2012-2032, annual U.S. RTMS are anticipated to increase steadily throughout the projection period, a CAGR of 1.64 percent from 2011 to 2031. Forecasts of total annual pounds of cargo shipped at the Airport are developed by applying the proportional changes in U.S. activity from 2012-2031 to the Airport's 2011 total of 25,371,771 total pounds shipped. As shown, total shipped air cargo is anticipated to increase to 30,873,890 in 2016, 34,372,291 in 2021, and 42,232,742 in 2031.

Table 2-14: Historical Air Cargo Activity and Forecasts

Year	ATW Air Cargo Pounds [a]			Total Domestic Revenue Ton Miles (millions) [b]
	Total	Outbound	Inbound	
Historic:				
2002	21,548,037	10,109,277	11,438,760	12,967
2003	19,070,867	8,592,396	10,478,471	14,270
2004	19,853,107	8,588,012	11,265,095	16,341
2005	21,673,038	9,066,168	12,606,870	16,090
2006	23,472,127	9,268,397	14,203,730	15,711
2007	24,897,904	9,520,816	15,377,088	15,818
2008	31,153,868	10,433,062	20,720,806	14,411
2009	19,763,890	8,284,687	11,479,203	11,900
2010	25,962,484	10,847,630	15,114,854	12,833
2011	25,371,771	10,739,041	14,632,730	12,048
CAGR 2002-2011	*1.83%*	*0.67%*	*2.77%*	*-0.81%*
Projected:				
2016	30,873,890	12,750,916	18,122,974	13,354
2021	34,372,291	14,195,756	20,176,535	14,209
2031	42,232,742	17,442,122	24,790,620	16,674
CAGR 2011-2031	*2.58%*	*2.45%*	*2.67%*	*1.64%*

[a] Source: Airport records
[b] Source: FAA Aerospace Forecasts 2006-2017, 2010-2030, 2012-2032

2.9. Military Operations Projections

Military operations are an insignificant part of the overall activity picture at ATW. The 2010 forecasts were not updated. See Appendix A for more information.

2.10. Peak Activity

Because there are not any near-term projects based on peaking characteristics, the peaking activity was not updated as part of the 2012 forecast update. Please see the 2010 peaking study in Appendix A for more information.

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Chapter 3

Sustainability Baseline Inventory

SUSTAINABILITY BASELINE INVENTORY

The purpose of this chapter is to place past, current, and potential future ATW sustainable efforts within a broader context. This context was formed by first examining the Airport's mission statement and past and current sustainability initiatives. Armed with this information, the Master Plan Advisory Committee (MPAC) was asked to comment on these elements as well as propose potential future areas of focus. As these activities progressed, a variety of baseline sustainability inventories were compiled. These included:

- Airport-Controlled Building Energy Usage
- Operational Emissions Inventory
- Airfield Energy Analysis
- Water Quality Analysis
- Environmental Resources Inventory

After examining the Airport's track record, considering the MPAC's input, and analyzing the results of the inventory, the Project Team felt that a Master Plan focus on reducing energy usage in airport controlled buildings fit in well with the Airport's sustainable track record. It matched input from the committee and attacked by far the largest source of Airport-area emissions that were directly under airport control. See Chapter Six for more information regarding sustainable energy usage and renewable energy initiatives.

This focus on energy did not mean that other areas were ignored – this chapter also contains information that can be used to measure other future sustainable efforts. Finally, the MPAC repeatedly commented on how important "human sustainability" was. This generally refers to creating facilities that foster happy and healthy health human environments and people. This input was incorporated into terminal reconfiguration alternatives. See Chapter Five for more information regarding these alternatives.

3.1. Sustainability Overview

This sustainability baseline inventory identified and assessed baseline conditions for potential areas of focus. Past and on-going sustainability initiatives were also taken into account. This section describes past and on-going sustainability practices and establishes baseline information which can be used in the measurement, tracking and evaluation of future sustainability initiatives and (3) helps the Project Team select the focus area for the sustainability initiatives.

3.1.1. Sustainable Components

Airport sustainability encompasses a wide variety of practices including facility planning, design, construction, and operations. Done with sustainability in mind, such practices contribute to environmental protection and natural resource conservation; social progress; and stable economic growth and employment. These environmental, social, and economic components of sustainable development practices are often referred to as the triple bottom line of the sustainability concept.

Baseline environmental measurements include water quality, air quality, climate change, compatible land use, biodiversity, building materials, solid waste management, wastewater management, and energy efficiency.

Baseline social measurements include those related to accessibility and sustainable transportation, public awareness and education, employee practices and procedures, employee and passenger well-being, respect for local culture and community heritage, and indoor environmental quality.

Baseline economic measurements include those related to local hiring and procurement, the economic impact of an airport on its surrounding community, quantifying other sustainability costs and benefits in monetary terms, airport contributions to research and development, and financial incentives for sustainable individual and business behavior.

3.2. Previous and On-Going Airport Sustainability Initiatives

Outagamie County Regional Airport has a long history of implementing effective sustainability initiatives. This sustainable master plan will allow the airport to streamline and consolidate these initiatives into an overall program. The following sections serve to document and provide information on past and on-going sustainability initiatives at ATW.

3.2.1. Previous Airport Sustainability Initiatives

Facilities Assessment

In 2008, the Airport looked at electricity usage and possible facility enhancements for reduced energy usage in the passenger terminal and other buildings. The assessment resulted in numerous improvements, including installation of high efficiency light bulbs and room occupancy sensors. This assessment also positioned the Airport to take advantage of Sustainable Master Plan funding when it became available.

Passenger Terminal Building Photovoltaic Arrays

In 2010, the Airport installed a 50 kW solar photovoltaic (PV) panel array on top of the terminal concourse. This project was implemented using grant funds provided by the U.S. Department of Energy. The PV system provides approximately 10% of the electrical energy required to run the terminal building during peak periods. In addition, an array of solar thermal panels was installed that provides hot water heating capability. Two solar monitoring stations are set up for public demonstration and education in the terminal: one in the pre-screening area and one in the post-screening area.

Passenger Boarding Bridge Improvements

In 2009, ground power and pre-conditioned air units were installed on a new passenger boarding bridge in the terminal concourse. These units allow aircraft to switch off their engines when parked on the aircraft apron, as aircraft electrical components are powered by the ground power unit and aircraft air conditioning equipment can be turned off. These improvements have multiple benefits, including improved indoor and outdoor air quality, and reduced aircraft engine idling fuel usage. In addition, an energy modeling exercise conducted for the photovoltaic project resulted in the installation of timers on the electric base board heaters in each of the passenger boarding bridges. These new timers have resulted in substantial energy usage reductions and cost savings, especially during the winter months.

South General Aviation Development Area

The layout for the new south GA development area was chosen in 2009 to avoid wetland impacts. A 14-acre “in-basin” wetland mitigation site was established outside the 10,000-foot airport operations area (AOA) buffer for avoidance of wildlife attractants.

Glycol Storage Facility

A new de-icing chemical storage facility was constructed in 2010 that included a controlled environment for containment, storage, and mixing of glycol chemical. The site chosen for the new facility included stormwater detention and biofiltration.

Pavement Project Best Practices

The Airport strives to incorporate best practices into its pavement construction and rehabilitation projects. When Runway 3/21 was reconstructed in 1990, the pavement was crushed and rubbleized on-site and used as a recycled base course, resulting in reduced fuel and natural resource consumption. When Taxiway A was reconstructed in 1999, a similar pavement recycling strategy was utilized. When the passenger parking lot was constructed in 2006, the existing asphalt pavement and base was reclaimed for use in the new pavement, and native plants were used for landscaping to reduce need for fertilizer and irrigation.

Biofilters

Some of the rubbleized concrete from the aforementioned pavement projects was used in construction of biofilters throughout the passenger terminal area. Water quality samples taken since this project was implemented show reduction in pollutant levels and total suspended solids (TSS). In addition, when the commercial aircraft parking apron was expanded in 2008, a new storm sewer collection system was installed and a biofiltration basin was created to test pollutant load reduction capabilities. Although they have more expensive up-front costs than water ponding, biofilters have fewer long-term maintenance costs in comparison with water ponding, and do not have the same wildlife attractant potential.

Baseline WinSLAMM Water Quality Study

In 2009, the Airport conducted total suspended solids (TSS) modeling for the Airport grounds. The purpose of this exercise was to determine compliance with the 20% and 40% TSS removal requirements in the WPDES permit.

3.2.2. On-Going Sustainability Initiatives

Airport Mission Statement

ATW has adopted an official Mission Statement that reflects the importance the Airport places on sustainable practices. The Mission Statement reads as follows:

> The Outagamie County Regional Airport (ATW) is operated as a self-funded enterprise. Fueled by a people-powered approach, ATW offers custom-tailored aviation solutions and service excellence from the ground up. ATW is a valuable asset to our community that continuously promotes aviation and fosters economic development by operating the most effective and efficient airport in Northeast Wisconsin.

Core Values

The Airport has officially adopted five core values that support the Airport Mission Statement. The Airport's five core values are as follows:

- **Self-Funded.** ATW will continue to develop ways to remain financially self-sustaining through a mix of business development, market value leases, and unique marketing partnership.
- **Community.** ATW will continue to be a responsible business and philanthropic partner to the community in order to be the regional airport of choice.
- **Accountability.** ATW actively seeks to attract and retain high-caliber professionals committed to maximizing safety, reliability, and accountability throughout the organization.
- **Communication.** ATW has a philosophy of open, candid communication with each other, policy makers, tenants, passengers, press, and the community.
- **Environment.** ATW strives to be a model steward of our environment, by identifying sustainable development that meets present needs without compromising the ability of future generations.

Public Outreach

The Airport frequently holds public outreach events that both educate the public about its sustainability efforts and solicit input that is used to improve its sustainability profile. The Airport is always looking for ways to educate the public and solicit their input, including passive demonstration strategies such as informational kiosks and public comment boxes.

Recycling

The Airport currently administers a recycling program that includes collection and recycling of cardboard, and other paper products. This program reduces diversion of solid waste to landfills and conserves energy associated with products made from virgin materials.

3.3. Potential Future Areas of Focus

3.3.1. Overview

This section discusses potential future areas of focus. This list comprises areas that the Airport is already pursuing supplemented by those that the Master Plan Advisory Committee (MPAC) suggested in meetings during the master Planning process.

existing conditions and highlights areas where the airport is implementing sustainable initiatives. Second, it begins to point the direction forward towards expanded or altogether new sustainability efforts. These will be discussed further in the initiatives section.

What follows is a baseline assessment of sustainability metrics, including energy consumption, greenhouse gas emissions, recycling and solid waste, mechanical systems, lighting systems, HVAC systems, and stormwater and wastewater management.

MPAC meetings were held in March, September and December of 2011. The MPAC consisted of a representative cross-section of Airport users and tenants, Airport staff, and local government officials and community leaders. One of the purposes of the Committee was to determine a short list of potential future sustainable areas of focus. The following subsections summarize this input. metrics. Potential metrics identified during this meeting included the following:

3.3.2. Energy Usage and Operational Emissions

The Airport has embarked on several initiatives to reduce its energy usage and operational emissions. The initiatives have included the 2008 facilities assessment, the 2009 solar photovoltaic and solar thermal generation installations, recent passenger boarding bridge improvements, and the “net-zero energy” FBO terminal design. This sustainable airport master plan will provide a new framework for measuring, tracking, and reducing the Airport’s baseline energy usage and operational emissions footprints.

3.3.3. Solid Waste Disposal and Recycling

The Airport has not conducted a recycling and solid waste audit before, although it does recycle much of its solid waste. According to the MPAC, solid waste disposal and recycling baselines should be conducted on a unit efficiency basis, and not on a volume basis, to account for growing operations.

3.3.4. Gray Water Reuse and Recycling

The airport currently recovers water used in equipment washing operations. Ways to reuse water and better manage stormwater runoff should be considered by the sustainable airport master plan.

3.3.5. Green Procurement

The Airport currently attempts to purchase items like cleaning supplies, paper towels, and toilet paper from “green” suppliers. Other potential items discussed by the MPAC included healthy options in shops, artesian goods sellers, and refillable, recyclable bottles with Brita water stations in the terminal.

3.3.6.Sustainable Landscaping and Turf Management

The Airport has experimented with native plantings, which have positive impacts on water quality because they require fewer fertilizers and less irrigation. The MPAC recommended that such efforts should be continued

3.3.7.LEED Certification for Airport Buildings

Pursuing LEED certification would require budgetary and policy decision made by the County Board. Energy use in the terminal costs approximately $360,000 to $370,000 per year. The question has been how to slow growth in energy use so that the airport's energy use does not grow as it expands. Reducing energy costs is not just a green initiative, it is a business initiative. The sustainable master plan will consider how best to position new GA and other facilities for energy savings.

3.3.8.Integrate Airport Ground Transport Systems with Existing Local Programs and Initiatives

Integrating airport-centered and wider local transport systems will be an area that will be investigated further in later stages of this Master Plan.

3.3.9.Social Sustainability Metrics

Potential socially sustainable metrics discussed by the MPAC included employee programs including health risk analyses, absenteeism reduction strategies, construction of new walking and biking paths on Airport grounds, and provision of exercise facilities. The sustainable airport master plan should respect and reflect the human element in sustainability planning.

3.3.10. Public Outreach and Education

While the sustainable airport master plan does not have a detailed communications plan, it will have a public outreach/education component that will both educate the public about, and solicit input from the public on, existing and proposed sustainability initiatives. The solar photovoltaic project done a few years ago had a similar public outreach and education component.

3.4. Airport-Controlled Building Energy Usage

Energy usage data for the airport-controlled buildings was gathered from facility records that track the utility bill information back to the year 2006. This data is summarized in Table 3-1.

Table 3-1. Historical energy usage data for selected airport-controlled buildings.

HISTORICAL ELECTRICITY CONSUMPTION					
	2006 [kWh]	2007 [kWh]	2008 [kWh]	2009 [kWh]	2010 [kWh]
Passenger Terminal	3,156,840	3,412,920	3,368,280	3,316,680	3,336,000
SRE*	116,400	125,560	136,640	111,280	114,480
ARFF**	--	--	97,240	105,480	118,160
Glycol Building	--	--	--	--	5,036†
Parking Facilities	--	--	--	198,960	424,640
Annual Total	**3,273,240**	**3,538,480**	**3,602,160**	**3,732,400**	**3,998,316**
HISTORICAL NATURAL GAS CONSUMPTION					

	2006 [therm]	2007 [therm]	2008 [therm]	2009 [therm]	2010 [therm]
Passenger Terminal	43,992	53,881	67,415	71,363	57,769
SRE*	9,803	13,339	18,473	15,007	18,676
ARFF**	--	--	10,462	9,440	8,191
Glycol Building	--	--	--	--	2,987†
Parking Facilities	--	--	--	--	85
Annual Total	**53,795**	**67,220**	**96,080**	**95,810**	**87,708**

***** *Snow Removal Equipment;* ****** *Air Rescue and Fire Fighting;* *†Partial year*

The electricity consumption and natural gas consumption for each airport controlled building listed in Table 3-1 (excluding the Glycol building and the Parking Facilities) was converted to kBtu and added together to obtain the total energy consumption. The total energy consumption was then divided by the building square footage in order to normalize the values for building size. This quantity, listed in kBtu/sq-ft, is known as the Energy Use Intensity (EUI). The EUI is a standard metric for measuring building energy performance. Table 3-2 shows that the Passenger Terminal's EUI increased from 2006 to 2009 and then dropped in 2010.

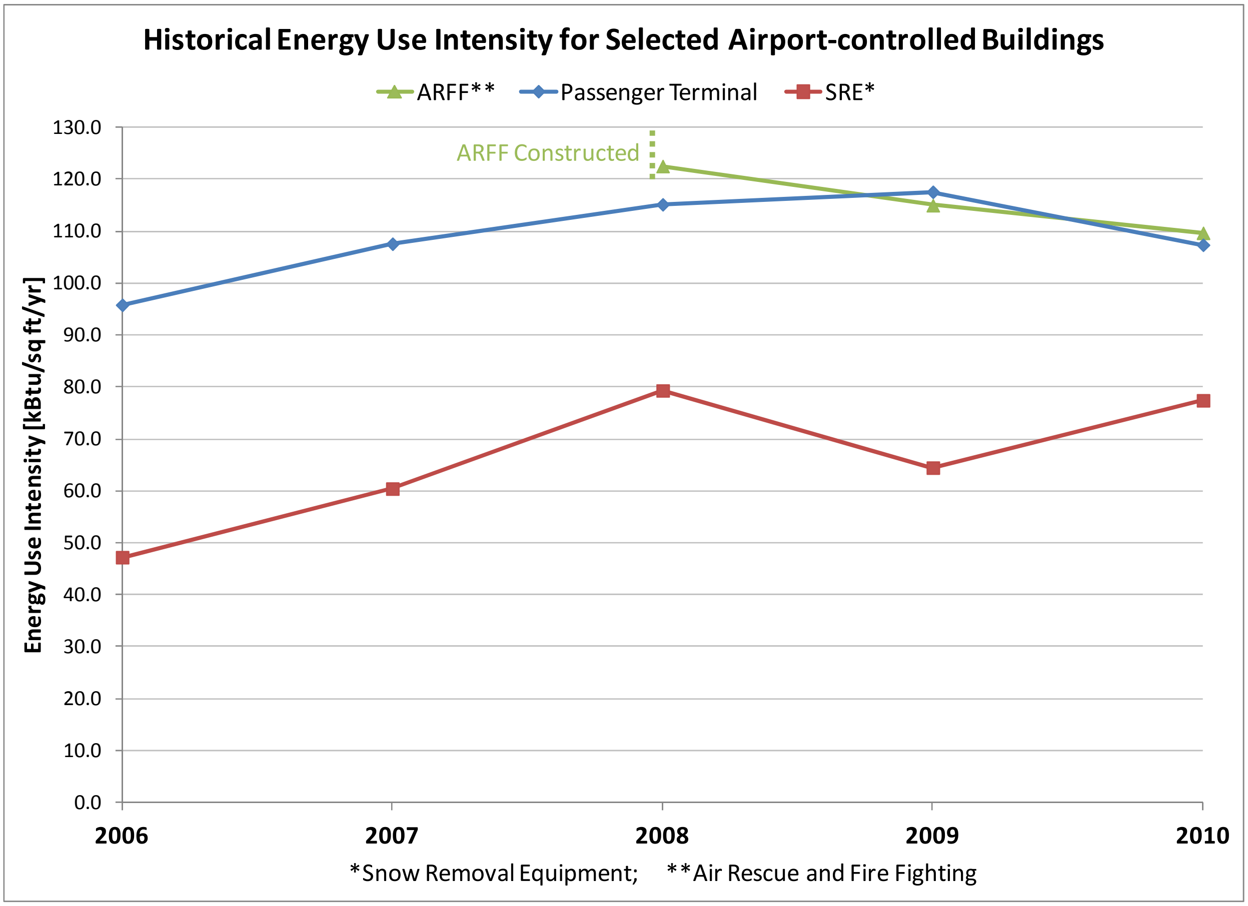
Table 3-2. Historical total energy consumption and Energy Use Intensity for selected airport-controlled buildings.

HISTORICAL TOTAL ENERGY CONSUMPTION					
	2006 [kBtu]	2007 [kBtu]	2008 [kBtu]	2009 [kBtu]	2010 [kBtu]
Passenger Terminal	15,173,495	17,036,396	18,237,440	18,456,129	17,162,668
SRE*	1,377,573	1,762,436	2,313,652	1,880,499	2,258,320
ARFF**	--	--	1,378,080	1,304,003	1,222,380
Annual Total‡	**16,551,068**	**18,798,832**	**21,929,172**	**21,640,631**	**20,643,368**
HISTORICAL ENERGY USE INTENSITY					
	2006 [kBtu/SQ FT]	2007 [kBtu/SQ FT]	2008 [kBtu/SQ FT]	2009 [kBtu/SQ FT]	2010 [kBtu/SQ FT]
Passenger Terminal (158,332 SQ FT)	95.8	107.6	115.2	116.6	108.4
SRE* (29,160 SQ FT)	47.2	60.4	79.3	64.5	77.4
ARFF** (11,245 SQ FT)	--	--	122.6	116.0	108.7
Overall‡ (198,737 SQ FT)	**88.3**	**100.3**	**110.3**	**108.9**	**103.9**

***** *Snow Removal Equipment;* ****** *Air Rescue and Fire Fighting;* *†Partial year* *‡Glycol Building and Parking Facilities were excluded from this calculation.*

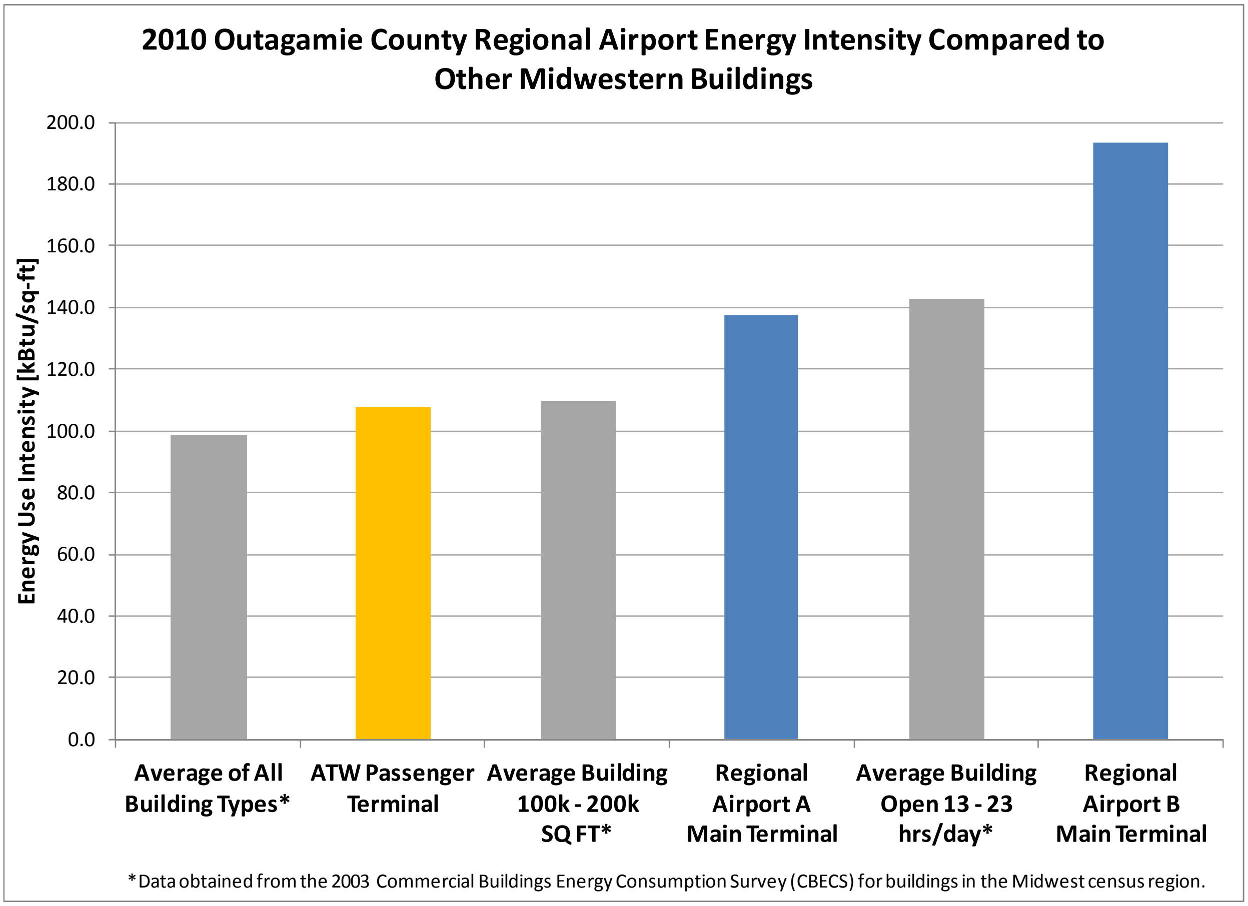
The EUI values from Table 3-2 were plotted on a graph, shown in Exhibit 3-1, in order to show the trends in energy performance among the airport-controlled buildings more clearly.

Exhibit 3-1. Historical energy use intensity (EUI) for the Passenger Terminal, ARFF building, and SRE building.



Comparing the EUI of the Passenger Terminal to other buildings in the Midwest (see Exhibit 3-2) reveals that the Outagamie Airport Passenger Terminal is performing quite well compared to other regional airport terminals. In addition, The Passenger Terminal is performing better than an average building with similar operating hours and about as well as an average building of comparable size. The "average buildings" shown in Exhibit 3-2 are aggregates based on buildings of all types and ages across the Midwest census region.

Exhibit 3-2 Comparison of the Outagamie Airport Passenger Terminal EUI to other Midwestern buildings.



3.5. Operational Emissions Inventory

This criteria pollutant and greenhouse gas (GHG) emissions inventory to provides a baseline of emissions attributable to the Airport. Future projects can then be measured against this baseline.

The data used to generate this 2010 baseline was provided by the Airport, Federal Aviation Administration (FAA) databases, and Airport tenants. For the criteria pollutant inventory, the analysis was completed in accordance with the FAA's "*Air Quality Procedures for Civilian Airports and Air Force Bases*." The Greenhouse Gas inventory relied on the Airport Cooperative Research Program (ACRP) Report 11: "*Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories"* (Guidebook).
This section presents a summary of the operational emissions inventory. Technical terms utilized in this summary are defined in **Appendix A**, *Glossary of Terms and Acronyms*. A detailed breakdown of emissions calculations for aircraft, auxiliary power units (APU), and ground service equipment (GSE) is contained in **Appendix B**, *EDMS Outputs*.

3.5.1. Criteria Pollutant Emissions Inventory

The US Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants:

- Carbon monoxide (CO)
- Volatile organic compounds (VOC)
- Nitrogen oxides (NO_x)
- Sulfur dioxide (SO_2)
- Particulate matter (PM10/PM2.5)
- Lead (Pb)

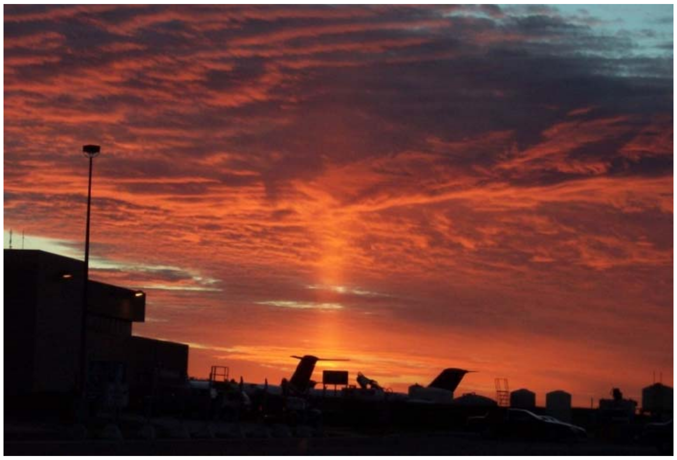


Table 3-3 presents a summary of the Airport's criteria pollutant emissions by source. The aircraft category includes all types; it is not specific to general aviation or airline aircraft. Ground Service Equipment (GSE) includes all airside vehicles used to service aircraft; this includes baggage carts, fueling trucks, tugs, air stairs, etc. The Auxiliary Power Unit (APU) category includes emissions generated by the APUs on airline aircraft. Emissions associated with Ground Access Vehicles (GAV) are broken down into the following categories; Airport employee commute, public travel to/from the Airport in personal vehicles, public travel to/from the Airport in rental vehicles, and Airport tenant commutes. The stationary sources category includes Airport standby generators.

Table 3-3: 2010 Criteria Pollutant Emissions Inventory (tons[1]/year)

SOURCE	POLLUTANT						
	CO	VOC	NOX	SOX	PM-10	PM-2.5	LEAD[2] (Pb)
Aircraft[3]	104.572	13.107	33.545	4.786	0.666	0.666	59 lbs.[4]
GSE	49.884	1.683	4.949	0.128	0.154	0.147	-
APUs	2.892	0.209	1.621	0.301	0.277	0.277	-
Vehicles (GAV)							
Airport Employee Commute	1.27	0.013	0.006	0.002	0.007	0.003	-
Public Personal Vehicle	73.983	0.748	0.334	0.116	0.421	0.191	-
Public Rental Vehicle	9.725	0.098	0.044	0.015	0.055	0.025	-
Other Employee Commute	55.49	0.561	0.25	0.087	0.316	0.143	-
Stationary Sources	0.153	0.036	0.754	0.043	0.046	0.046	-
Grand Total	297.968	16.455	41.503	5.478	1.942	1.499	

The majority of the sources above are not under airport control. For example, there is little the airport can do to reduce aircraft emissions. GSE that are airport-owned and APUs are two exceptions. Future efforts aimed at reducing emissions should concentrate on these areas. Replacing the current GSE fleet with hybrid or electric vehicles could be a good strategy for reducing GSE emissions. The recently installed boarding bridge with efficient APU equipment is a step in the right direction on the APU front. The Airport has little control over vehicles. The best strategy here would be to keep abreast of local and regional transit / carpooling initiatives in an effort to ensure that the proper coordination is occurring.

3.5.2.Greenhouse Gas Emissions Inventory

Although no regulations are currently in place dictating procedures for conducting a greenhouse gas (GHG) inventory, there are several guidance publications available. This GHG inventory relied heavily on the FAA/US Air Force *Air Quality Procedures for Civilian Airports and Air Force Bases*, as well as the Transportation Research Board (TRB) Airports Cooperative Research Program (ACRP) *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories*. For purposes of this inventory, GHGs are defined the six Kyoto pollutants:

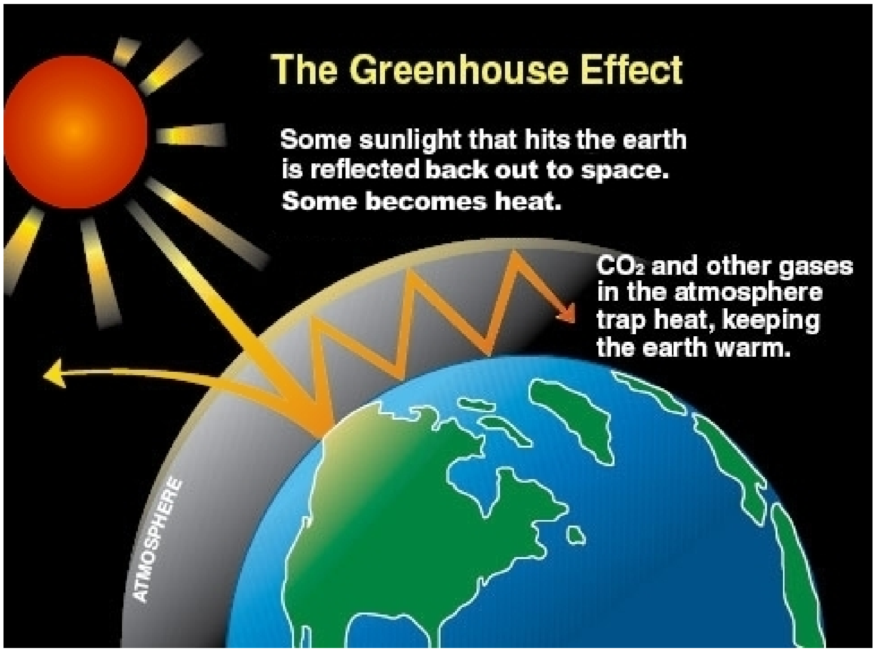
- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydroflurocarbons (HFC)
- Perfluorocarbons (PFC)
- Sulfur hexafluoride (SF_6)

The pollutants CO_2, CH_4, and N_2O constitute the majority of GHG emissions at all airports. The other GHGs occur, but at a much smaller rate.

1 Tons = 2,000 lbs.
2 Lead emissions are only associated with general aviation piston powered aircraft which burn 100LL fuel
3 Aircraft emissions are only associated with the landing and takeoff cycle (LTO) at ATW and do not include emissions above 3,000 feet
4 Assumes 2.12 grams of lead per gallon of 100LL Aviation Gasoline

The greenhouse effect is shown in **Exhibit 3-3** below.

Exhibit 3-3. The Greenhouse Effect



Source: http://www.ecy.wa.gov/climatechange/whatis.htm retrieved on 6-23-12

For simplicity, this report uses the CO_2 equivalency method[5]. This method of simplifying GHGs is represented by the symbol CO_2e (see **Table 3-4**).

Table 3-4: 2010 Greenhouse Gas Emissions Inventory (tons/year)

SOURCE	CO_2E	PERCENT OF CATEGORY	PERCENT OF TOTAL
Airport Owned or Controlled			
Airport Vehicles	292	7.79%	1.15%
Airport Buildings - Electric	2,801	74.78%	11.07%
Airport Buildings - Gas	545	14.56%	2.15%
Airport Employee Commute	105	2.81%	0.42%
Airport Generators	2	0.06%	0.01%
Sub Total	3,745	100.00%	14.80%
Tenant Owned or Controlled			
Tenant Aircraft - Airline only	10,047	68.32%	39.46%
Tenant Buildings - Electric[6]	111	0.76%	0.44%
Tenant Buildings – Gas[6]	132	0.90%	0.52%
Tenant Employees Commute	4,415	30.03%	17.34%
Sub Total	14,705	100.00%	58.10%
Public			
Transportation to/from Airport - personal	4,744	69.18%	18.74%

[5] The IPCC Fourth Assessment Report has assigned the following CO_2e values: 1 for CO_2, 25 for CH_4, and 298 for N_2O
[6] Based on limited data supplied by airport tenants

Transportation to/from Airport - rental	624	9.09%	2.46%
General Aviation Aircraft	1,490	21.73%	5.89%
Sub Total	6,857	100.00%	27.10%
Grand Total	25,307	100.00%	100.00%

Source: Mead & Hunt, Inc.

3.5.3. Boundaries and Ownership

Before any calculations could be conducted, boundaries were established to associate the various entities with the appropriate emissions. Three distinct groups were established:

- Airport-Owned or Controlled Emissions
- Airline- and Tenant-Owned or Controlled Emissions
- Public-Owned or Controlled Emissions

By providing distinct boundaries for the ownership of the emissions, the Airport can take responsibility for the sources of emissions which they have direct control over. The same is true for tenants and the public at large.

3.5.4. Data Availability

While every effort was made to find and use the most appropriate and accurate information regarding sources of emissions, some assumptions and estimates had to be made. In some instances complete historical data was unavailable or had not been collected. In these instances available data was annualized to provide a complete year. The results presented here reflect the use of best available data and the guidance contained in the ACRP Guidebook.

3.5.5. Airport-Owned and Controlled Emissions

The portion of the Airport GHG emissions attributable to Airline-owned or controlled sources is 3,899 tons of CO2e, or approximately 15% of total Airport emissions. This category of emissions sources includes Airport buildings, Airport-owned vehicles, Airport employees, and Airport backup generators.

3.5.6. Airport Buildings

By far the largest Airport-owned or controlled sources which contribute to the Airport's GHG emissions are the Airport buildings. Accounting for nearly 13% of the Airport total and 90% of the Airport-owned or controlled total, the Airport-owned buildings are the easiest target for energy efficiency improvements.

In order to calculate the emissions associated with the electrical consumption at the Airport, an emissions factor was obtained for the local area. **Table 3-5** presents the emissions factors per megawatt hour (MWh) reported by the US Department of Energy for the State of Wisconsin and the United States between 1999 and 2002.

Table 3-5: Emissions Factors

	CARBON DIOXIDE (metric tons/MWh)	METHANE (kg/MWh)	NITROUS OXIDE (kg/MWh)
Wisconsin	0.638	0.01231	0.01048
US Average	0.676	0.01815	0.01053

The annual electrical consumption for the Airport multiplied by this state specific emissions factor provides the annual emissions associated with the Airport's electrical consumption. **Table 3-6** breaks down the usage and emissions by building, while **Table 3-7** provides the breakdown of usage and emissions associated with natural gas consumption per Airport-owned building.

Table 3-6: Airport-Owned Buildings Electrical Consumption

CARBON DIOXIDE CO2						
	Annual Consumption (kWh)	MWh	CO2 Emissions Factor[7] (Metric tons/MWh)	Metric Tons of CO2	Pounds of CO2	Tons of CO2
Passenger Terminal	3,336,000.00	3,336.0	0.638	2,128.4	4,692,200.1	2,346.1
SRE*	114,480.00	114.5	0.638	73.0	161,020.1	80.51
ARFF**	118,160.00	118.2	0.638	75.4	166,196.2	83.10
Glycol Building[8]	15,000.00	15.0	0.638	9.6	21,098.0	10.55
Parking Facilities	377,320.00	377.3	0.638	240.8	530,713.7	265.36
				2,527.2	5,571,228.1	2,785.62
METHANE CH4						
Building Area	Annual Consumption (kWh)	MWh	CH4 Emissions Factor[7] (kg/MWh)	kg of CH4	Pounds of CH4	Tons of CH4
Passenger Terminal	3,336,000.00	3,336.0	0.01231	41.0	90.6	0.05
SRE	114,480.00	114.5	0.01231	1.4	3.1	0.002
ARFF	118,160.00	118.2	0.01231	1.5	3.2	0.002
Glycol Building[8]	15,000.00	15.0	0.01231	0.2	0.4	0.000
Parking Facilities	377,320.00	377.3	0.01231	4.6	10.3	0.005
				48.7	107.6	0.06
NITROUS OXIDE N2O						
Building Area	Annual Consumption (kWh)	MWh	N2O Emissions Factor[7] (kg/MWh)	kg of N2O	Pounds of N2O	Tons of N2O
Passenger Terminal	3,336,00.00	3,336.0	0.01048	35	77.1	0.039
SRE	114,480.00	114.5	0.01048	1.2	2.6	0.001
ARFF	118,160.00	118.2	0.01048	1.2	2.7	0.001
Glycol Building[8]	15,000.00	15.0	0.01048	0.2	0.3	0.000
Parking Facilities	377,320.00	377.3	0.01048	4	8.7	0.004
				41.6	91.4	0.045

***** *Snow Removal Equipment;* ****** *Air Rescue and Fire Fighting; Source: Mead & Hunt, Inc.*

[7] US Department of Energy – State of Wisconsin
[8] Estimated annual consumption

Table 3-7: Airport-Owned Buildings Natural Gas Consumption

CARBON DIOXIDE CO_2				
Building Area	Annual Gas Consumption (Therms)	Annual Consumption (cubic feet)	CO2 Emissions (lbs.)	Tons of CO2
Passenger Terminal	57,769.00	5,586,262.30	673,664.13	336.83
SRE	18,676.00	1,805,969.20	217,787.24	108.89
ARFF	8,191.00	792,069.70	95,518.06	47.76
Glycol Building[9]	8,500.00	821,950.00	99,121.42	49.56
Parking Facilities	85.02	8,221.24	991.42	0.50
			1,087,082.2	543.54

METHANE CH_4						
Building Area	Annual Gas Consumption (Therms)	Annual Consumption (BTUs)	Annual Consumption (Gigajoules)	Annual Consumption (TeraJoules)	lbs of CH4	Tons of CH4
Passenger Terminal	57,769.00	5,776,900,000.00	6,093.50	6.09	67.17	0.034
SRE	18,676.00	1,867,600,000.0	1,969.95	1.97	21.72	0.011
ARFF	8,191.00	819,100,000.00	863.99	0.86	9.52	0.005
Glycol Building[9]	8,500.00	850,000,000.00	896.58	0.90	9.88	0.005
Parking Facilities	85.02	8,501,795.79	8.97	0.01	0.10	0.000
			9,832.99	9.83	108.39	0.055

NITROUS OXIDE N_2O						
Building Area	Annual Gas Consumption (Therms)	Annual Consumption (BTUs)	Annual Consumption (Gigajoules)	Annual Consumption (TeraJoules)	lbs of N2O	Tons of N2O
Passenger Terminal	57,769.0	5,776,900,00	6,093.50	6.09	1.34	0.001
SRE	18,676.0	1,867,600,00	1,969.95	1.97	0.43	0.000
ARFF	8,191.00	819,100,000.	863.99	0.86	0.19	0.000
Glycol Building[9]	8,500.00	850,000,000.	896.58	0.90	0.20	0.000
Parking Facilities	85.02	8,501,795.79	8.97	0.01	0.00	0.000
			9,832.99	9.83	2.16	0.001

Source: Mead & Hunt, Inc.

[9] Estimated annual consumption

3.5.7. Airport-Owned Vehicles

The Airport owns and operates a large fleet of vehicles ranging from tractors to heavy duty work trucks. **Table 3-8** summarizes the fuel types and annual consumption for all Airport-owned vehicles.

Table 3-8: airport-owned vehicles

Fuel Type	Gallons Used Annually
Diesel	18,931.35
Gasoline	8,165.10
Total	27,096.45

The annual consumption was then multiplied by the following fuel specific emissions factors:

- Diesel = 22.384 lbs. CO_2/gallon of fuel[10]
- Gasoline = 19.564 lbs. CO_2/gallon of fuel[11]

This equates to 583,501 pounds or 292 tons of CO_2e annually

3.5.8. Airport Employees

Approximately 1,417 people work within the Airport boundary. However, only 34 people are employed directly by the Airport with the remainder categorized under the tenant section. An average one-way travel distance was calculated at 15 miles per employee. Using the average miles per gallon and emissions rates per gallon as suggested in the ACRP Guidebook, a total of 210,702 pounds, or 105 tons, of CO_2e are directly attributable to Airport employee commutes.

3.5.9. Airport Backup Generators

The Airport owns five standby generators which provide power to critical systems in the event of a power outage. Although these generators serve as a standby source of power, they must be run periodically to ensure proper working condition. Annual runtimes or fuel consumed was provided by the Airport for each of the five generators. The applicable emissions rate as recommended in the Guidebook was then applied to provide an annual total for the Airport generators. A total of 2 tons of CO_2e are attributable to the Airport-owned backup generators.

3.5.10. Airline- and Tenant-Owned and Controlled Emissions

The portion of the Airport GHG emissions attributable to airline or tenant-owned or controlled sources is 14,705 tons of CO2e, or approximately 58% of total Airport emissions. This category of emissions sources includes airline aircraft and tenant employees.

Airline Aircraft

In order to calculate the emissions associated with airlines at the Airport, data was gathered from FAA databases and the current airline schedule.

Airline aircraft and equipment were modeled using Emissions and Dispersion Modeling System (EDMS) version 5.1.3. The model adjusts the performance characteristics of each aircraft in relation with the

[10] Emissions rates provided in ACRP Report 11
[11] Emissions rates provided in ACRP Report 11

runway lengths and airport configuration. Emissions associated with aircraft also reflect the specific taxi-in/out and idle times of aircraft at ATW (see **Table 3-9)**. The EDMS software assigns runtimes for various pieces of GSE and APUs appropriate for each aircraft type.

Table 3-9: Airline Specific Taxi times for ATW (minutes)

AIRLINE	TAXI-OUT	TAXI-IN
Air Wisconsin	12.39	7
Allegiant Air	12.39	7
Atlantic Southeast Airlines	11.32	7
Chautauqua Airlines	15.37	7
Comair	16.61	7
Delta	17.1	7
ExpressJet Airlines	8.78	7
FedEx	12.39	7
Gulf and Caribbean Cargo	12.39	7
Mesa Airlines	9.11	7
Mesaba Airlines	9.11	7
Pinnacle Airlines	15.37	7
Sky King Inc.	9.11	7
SkyWest Airlines	11.46	7
Sun Country Airlines	9.11	7
USA Jet Airlines	9.11	7

Sources: FAA and Mead & Hunt, Inc.

Airline aircraft are responsible for approximately 10,047 tons of CO_2e. This equates to approximately 37% of all GHG emissions from the Airport. For criteria pollutants attributed to airline aircraft see Table 3-1.

It is important to note that the emissions reported for aircraft activity only account for emissions on the ground through climb out at 3,000 feet AGL. If the Airport wishes to identify the emissions associated with aviation activity above 3,000 feet (cruise flight), it can be calculated by annualizing all aviation fuel records sales conducted at the Airport, calculating the appropriate emissions per gallon and subtracting the ground through 3,000 feet totals. The resulting number will represent total emissions from aircraft above 3,000 feet[12].

3.5.11. On-Airport Rental Car Companies

While the rental car companies are located on-Airport and are considered a tenant, the emissions associated with their vehicles have been accounted under the “Public-Owned and Controlled” category. Because the traveling public determines the demand and thus the emissions associated with rental vehicles, the “Public Owned and Controlled” category is more appropriate.

[12] This method will only account for emissions associated with fuel dispensed at the airport, not fuel tankering.

3.5.12. Tenant Employees

As mentioned previously, approximately 1,417 people work within the physical boundaries of the Airport. The majority of these people (1,383) work for tenants on the Airport. The same methodology was applied to these tenant employees as was used for Airport employees. An average one-way travel distance was calculated at 15 miles per employee. Using the average miles per gallon and emissions rates per gallon as suggested in the ACRP guidebook, a total of 4,415 tons of CO2*e* can be attributed to the employees of the Airport tenants

3.5.13. Public-Owned and Controlled Emissions

The portion of the Airport GHG emissions attributable to public-owned or controlled sources is 8,646 tons of CO_2e, or approximately 27% of total Airport emissions. This category of emissions sources includes general aviation aircraft, on-airport rental car companies, and the public traveling to and from the airport via ground transport.

3.5.14. General Aviation Aircraft

Data gathered as part of this Master Plan effort as well as from the FAA databases provided the fleet mix and operations information used to derive the emissions associated with General Aviation (GA) at the Airport. GA operations are conducted by Airport users which are neither tenants nor Airport employees, thus the emissions are being categorized as "public" General Aviation is responsible for 1,490 tons of CO2*e*, or approximately 5% of the total Airport emissions.

3.5.15. On-Airport Rental Car Companies

The annual number of cars rented by all on-Airport rental car companies was provided by the Airport. The average trip distance for the catchment area of ATW was calculated at 24 miles and was used in conjunction with the number of rental vehicles to calculate total emissions of 624 tons of CO_2e, or approximately 2% of the total Airport emissions.

3.5.16. Public Traveling to and From the Airport

Emissions associated with the traveling public were calculated by using the catchment area average distance of 24 miles in conjunction with total enplanements at the Airport. A Wisconsin specific carpool rate was also used in the calculations to account for people traveling to the Airport as a group. The traveling public arriving and departing the Airport is responsible for 4,744 tons of CO_2e, or approximately 19% of the total Airport emissions.

3.5.17. Operational Emissions Inventory Summary

Of the six NAAQS criteria pollutants, the pollutant which the Airport produces the most of annually is carbon monoxide (298.0 tons), followed by nitrogen oxides (41.5 tons), volatile organic compounds (16.5 tons), sulfur dioxide (5.5 tons), particulate matter (3.4 tons), and lead (59 pounds).

The estimated total GHG emissions attributable to the Airport on an annual basis (2010 base year) are 27,250 tons of CO_2e. Approximately 15% of these emissions are attributable to Airport-owned or controlled sources, approximately 58% are attributable to airline- and tenant-owned or controlled sources, and approximately 27% are attributable to public-owned or controlled sources.

3.6. Airfield Lighting, Signage and NAVAIDS

This section examines annual energy usage by existing airfield lighting fixtures, signs, and navigational aids (NAVAIDs). It covers equipment owned by the airport and equipment owned by others (the FAA for the most part).

This analysis:

- Establishes a baseline for airfield energy usage
- Evaluates energy saving fixtures, signs and navigational aids to determine their potential energy savings impact.
- Analyzes data collected by Airport maintenance personnel regarding estimated operational hours, maintenance history, and approximate maintenance and replacement costs
- Calculates potential carbon footprint reductions associated with several energy savings options.

This energy savings analysis will allow the Airport to plan for and potentially develop a timeline for implementing airfield lighting improvement recommendations.

3.6.1. Background

The operational hours of the airside lighting and associated NAVAIDs is based on the needs of the airport users. Pilot radio control of the existing lighting systems provides airborne control of lights by keying the aircraft microphone. All lighting systems that are pilot radio-controlled operate on the same radio frequency, regardless of whether the systems are associated with a single runway or multiple runways. The lighting systems also accept inputs from a local photo control and air traffic control tower employees. Control and operation of the systems are dictated by FAA guidelines. There is no measurable way to safely reduce operational hours and/or intensities as a method to reduce energy consumption, due to practices and procedures required at all airport facilities by the FAA.

Historically, airfield lighting and associated NAVAIDs have been outfitted with incandescent light fixtures. Incandescent lamps emit light by heating a hot filament to a high temperature until it glows. Most of the energy produced by an incandescent lamp is wasted as excess heat, making such fixtures very energy-inefficient. In recent decades, new airfield lighting options have emerged that utilize light-emitting diode (LED) light fixtures. LED lamps utilize a semiconductor light source that creates electroluminescence through the manipulation of electrons. The use of LED light fixtures provides for considerable energy and maintenance savings due to the lower wattage and increased lamp life over standard incandescent lamped fixtures. However, LED lamps are only approved for certain airfield lighting systems due to the relative youth of the LED technology. This airfield energy savings analysis evaluates the energy savings impact of replacing incandescent light fixtures with LED light fixtures, where appropriate given current FAA directives.

3.6.2. Runway Edge Lights

Both runways at ATW are equipped with High Intensity Runway Edge Lights (HIRL). As of 2012, there are no FAA-approved alternative light sources to the standard 200 watt incandescent High Intensity Runway Threshold Lights or the 120 watt incandescent High Intensity Runway Edge Lights currently in place at ATW. Because there are no FAA-approved alternative light sources for the HIRL system, an energy savings analysis was not conducted this system. However the Airport should evaluate the potential benefits of an LED runway edge light systems once there are FAA-approved systems available.

3.6.3. Taxiway Edge Lights

The existing taxiways utilize Medium Intensity Taxiway Edge Lights (MITLs) with 30 watt incandescent lamping. There are FAA-approved LED taxiway edge lights that are currently available for the 30 watt incandescent lamps. These lights are available from multiple manufacturers with various add-ons including "Arctic kits" for use in cold winter weather environments. Unlike incandescent lamped fixtures that generate sufficient heat to defrost or melt snow and ice that accumulates on the light fixture globe, LEDs generate insufficient heat to do so. The Arctic kit allows the fixture to generate ambient heat normally provided by the incandescent light fixture, but with less energy usage. There are also light fixture manufacturers who indicate that their LED designs do not require the use of an Arctic kit. Given the cold winter weather environment in Wisconsin, as well as the relative youth of the LED technology, it is recommended the Airport purchase taxiway edge lights with the Arctic kit option to assure proper visibility and operation.

FAA Engineering Brief 67C, *Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures*, indicates that for runways, the entire runway needs to be changed to the new source, while for taxiways it is permissible to convert "segments" of the taxiway to the new source. However, the Airport's Part 139 inspector has indicated that any retrofits to alternate light sources must retrofit the entire MITL system, requiring that transition to a more efficient source involve replacement of all the existing MITL light fixtures.

It is estimated that replacing the incandescent taxiway edge light fixtures with LED light fixtures would reduce the Airport's annual energy costs by approximately $2,450 and reduce the Airport's annual maintenance costs by approximately $6,675. Given an estimated LED fixture installation cost of $300,000, these energy and maintenance cost savings would allow the LED taxiway edge lighting system to pay for itself in about 33.2 years. This energy savings analysis assumes that a MITL system retrofit using LED fixtures would include an internal heater/thermostat (i.e. Arctic kit) that would operate part of the year. There are other edge light manufacturers indicating that their product will use even less energy, but these manufacturers do not have the Arctic kit option available. Installing LED taxiway edge light fixtures would also reduce annual CO_2 emissions attributable to the Airport by approximately 22.0 metric tons.

Even though LED taxiway lighting shows promise, the FAA requires that all lighting on a given taxiway be "uniform." Applied to the installation of LED lighting, this uniformity requirement means that all of the lights on the taxiway must be incandescent or LED.

The life cycle of the existing taxiway lights at ATW is staggered, so that only portions of a taxiway's lights are scheduled to be replaced in a given project. Replacing all the lights (new and old) at once would significantly raise the cost (and the payback period) of LED lights. Given the already relatively long 33.2 year payback period, LED taxiway lighting is unworkable with the FAA's uniformity requirement in effect.

3.6.4. Precision Approach Path Indicator (PAPIs)

There are currently PAPIs located approximately 1,000 feet from both the Runway 30 and Runway 3 thresholds. A PAPI is a lighting system consisting of four lights, or "boxes", that provide vertical guidance information to help pilots acquire and maintain an on-course approach and descent to the runway touchdown zone. The Runway 30 PAPI is FAA-owned and the Runway 3 PAPI is owned by the Airport. There are PAPIs that have been developed utilizing LED light fixtures; however the FAA does not currently allow LED replacement of FAA-owned PAPI light fixtures. As a result, only the Airport-owned PAPI offers opportunity for upgrade. The lamps in the existing PAPIs are replaced every three months at a cost of $70 for each fixture. Significant energy and maintenance cost savings can be realized by transitioning the PAPIs to LED lamps.

It is estimated that replacing the Runway 3 PAPI light fixtures with LED light fixtures would reduce the Airport's annual energy costs by approximately $1,350 and reduce the Airport's annual maintenance costs by approximately $2,350. Given an estimated LED fixture installation cost of $46,000, these energy and maintenance cost savings would allow the Runway 3 PAPI LED light fixtures to pay for themselves in about 12.4 years. Installing LED light fixtures for the Runway 3 PAPI would also reduce annual CO_2 emissions attributable to the Airport by approximately 12.0 metric tons.

3.6.5. Wind Cones

There are existing externally illuminated wind cones located in all four runway approach zones that meet FAA specifications. There is also an externally illuminated wind cone located near midfield to indicate general wind direction. External illumination for each wind cone is provided by four 150 watt halogen lamps that last approximately 1,000 hours each. Wind cones are available in both internally and externally illuminated versions. LED lamps are currently available as an alternate energy saving light source for internally illuminated wind cones. It is recommended that internally illuminated LED wind cones be considered as retrofits to the existing externally illuminated wind cones. This will provide for the most energy-efficient and visible installation.

It is estimated that replacing the four wind cone illumination light fixtures with LED light fixtures would reduce the Airport's annual energy costs by approximately $725 and reduce the Airport's annual maintenance costs by approximately $1,100. Given an estimated LED fixture installation cost of $22,000, these energy and maintenance cost savings would allow the LED light fixtures to pay for themselves in about 12.1 years. Installing LED light fixtures for the four wind cone illumination light fixtures would also reduce annual CO_2 emissions attributable to the Airport by approximately 6.5 metric tons.

It is estimated that replacing the wind cone illumination light fixture with an LED light fixture would reduce the Airport's annual energy costs by approximately $155 and reduce the Airport's annual maintenance costs by approximately $12. Given an estimated LED fixture installation cost of $7,500, these energy and maintenance cost savings would allow the LED light fixtures to pay for themselves in about 45.3 years. Installing LED light fixtures for the wind cone illumination light fixture would also reduce annual CO_2 emissions attributable to the Airport by approximately 1.4 metric tons.

3.6.6. Runway Guard Lights

Elevated runway guard lights were installed as part of a recent project occurring at the Airport. Runway guard lights operate like flashing traffic signals at the runway hold bar. Elevated runway guard light fixtures are available in both incandescent and LED versions. The LED guard lights used as part of the project not only achieve energy savings, but also minimize lamp outages and associated maintenance and safety issues.

Installing the LED lights instead of incandescent lights for the runway guard lights system will save approximately $715 in annual energy costs and approximately $3,060 in annual maintenance costs. Given an estimated LED fixture installation cost of $17,000, these energy and maintenance cost savings would allow the LED light fixtures to pay for themselves in about 4.5 years. Installing LED light fixtures for the runway guard lights system will also reduce annual CO_2 emissions attributable to the Airport by approximately 6.4 metric tons.

3.6.7. Runway End Identifier Lights (REIL)

There are existing REIL systems located at the thresholds of both Runway 12 and Runway 21. A REIL system consists of two synchronized flashing lights, one on each side of the runway landing threshold. The function of a REIL system is to provide rapid and positive identification of the runway end during landings. The REIL light fixtures at ATW utilize standard omni-directional incandescent lamps. LED lamps for REIL light fixtures are available currently from one manufacturer.

It is estimated that replacing the four existing REIL light fixtures with LED light fixtures would reduce the Airport's annual energy costs by approximately $115 and reduce the Airport's annual maintenance costs by approximately $1,100. Given an estimated LED fixture installation cost of $12,800, these energy and maintenance cost savings would allow the REIL LED light fixtures to pay for themselves in about 10.5 years. Installing LED light fixtures for the Runway 12 and Runway 21 REIL systems would also reduce annual CO_2 emissions attributable to the Airport by approximately 1.0 metric tons.

3.6.8. Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)

There are existing MALSR systems located on the approaches to both Runway 3 and Runway 30. A MALSR is the standard approach lighting system (ALS) installed for runways with CAT I ILS approach procedures. An ALS is configuration of lights arranged symmetrically around the extended runway centerline, starting at the landing threshold and extending into the approach area. Both MALSRs extend approximately one-half mile beyond the runway threshold. The MALSRs at ATW are FAA-owned. The FAA is currently reviewing the possibility of the use of LEDs as a lamp source for MALSRs; however the FAA has neither approved any LED designs nor approved implementation of LEDs on FAA-owned systems. Because there are no FAA-approved alternative light sources for the MALSR systems, an energy savings analysis was not conducted these systems. However the Airport should evaluate the potential benefits of an LED approach lighting system once there are FAA-approved systems available.

3.6.9. Airfield Guidance Signage

All of the existing airfield signage at ATW was replaced in 2011. The previous signage consisted of over 100 standard incandescent lamped signs of various styles and lengths. The replacement signage utilizes similar legend, but also utilizes LED lamp sources for energy efficiency and reduction in lamp maintenance. Other energy saving sources were reviewed for the replacement signage, including fluorescent/cold cathode lamping. However, while these sources offer some energy savings and increased lamp life over incandescent sources, these sources were lacking when compared to the LED source. Fluorescent/cold cathode lamps also present an operational concern due to extreme winter weather that causes such lamps to be dim prior to reaching their optimum operating temperature. This project also included the installation of LED runway status lights at each runway hold line on the airfield to prevent potential runway incursions.

It is estimated that replacing the existing airfield guidance signage light fixtures with LED light fixtures will reduce the Airport's annual energy costs by approximately $5,700 and reduce the Airport's annual maintenance costs by approximately $5,425. Given an estimated LED signage installation cost of $95,500, these energy and maintenance cost savings will allow the new signage to pay for itself in about 7.0 to 10.7 years, depending on the sign style and length. Installing LED light fixtures for new signage will also reduce annual CO_2 emissions attributable to the Airport by approximately 51.0 metric tons.

3.6.10. Airfield Energy Savings Analysis Summary

A detailed breakdown of the airfield energy savings analysis for ATW can be found in **Appendix C**. A summary of the airfield energy savings analysis is presented in **Table 3-10**.

Table 3-10: Airfield Energy Savings Analysis Summary

Proposed Savings Measure	Estimated Annual Energy Cost Savings	Estimated Annual Maintenance Cost Savings	Estimated Installation Cost	Return on Investment (Years)	Annual CO_2 Reduction (metric tons)
Replace Runway Edge Light Fixtures	N/A	N/A	N/A	N/A	N/A
Replace Taxiway Edge Light Fixtures	$2,450	$6,675	$300,000	33.2	22.0
Replace Runway 3 PAPI Light Fixtures	$1,350	$2,350	$46,000	12.4	12.0
Replace L-806 Wind Cone Light Fixtures	$725	$1,100	$22,000	12.1	6.5
Replace L-807 Wind Cone Light Fixture	$155	$12	$7,500	45.3	1.4
Install LED Runway Guard Lights	$715	$3,060	$17,000	4.5	6.4
Replace MALSR Light Fixtures	N/A	N/A	N/A	N/A	N/A
Replace REIL Light Fixtures	$115	$1,100	$12,800	10.5	1.0
Replace Airfield Guidance Signage	$5,700	$5,425	$95,500	7.0 to 10.7	51.0

Source: OMNNI Associates

The energy savings measures identified by this analysis have the potential to save the Airport approximately $11,200 in annual energy costs and approximately $19,700 in annual maintenance costs. Implementing all of these measures would also reduce the Airport's annual CO_2 emissions by approximately 100 metric tons.

3.7. Environmental Resources Inventory

This section provides an overview known environmental resources on and in the vicinity of ATW. This overview identifies environmental resources with particular value which might impose constraints on future Airport development. The purpose of this analysis is to assist in avoidance, minimization, and mitigation of environmental effects associated with proposed Airport projects. The resources discussed in this section may require additional review as part of National Environmental Policy Act (NEPA) documentation processes for these projects.

Federal, State, and local resource and regulatory agencies were contacted to identify such resources as part of the previous Master Plan Update in 2003. In addition, three Environmental Assessment documents have been completed since that time: in 2003 for the relocation of GA development to the southeast Airport quadrant, in 2004 for the extension to Runway 3/21, and in 2007 for GA development build-out, air cargo development, and aviation business development. The following sections consolidate environmental resource information compiled as part of these previous efforts. No field studies were conducted as part of this analysis. It is assumed that comments received from resource and regulatory agencies as part of these projects are still generally valid. This analysis is not intended to satisfy environmental clearance requirement outlined in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, nor is it intended to fulfill the regulatory requirements of NEPA. NEPA requires an action involving Federal funding or permit approval to undergo environmental analysis, to evaluate and document proposed effects. An airport project utilizing Federal funds is considered a *Federal action* and requires NEPA compliance.

The following environmental resources are discussed below (add additional bullets as necessary):

- Air Quality
- Biotic Resources
- Compatible Land Use
- Cultural Resources
- Farmlands
- Federally-Listed and State-Listed Wildlife Species
- Floodplains
- Hazardous Materials
- Noise
- Water Resources
- Water Quality

3.7.1. Air Quality

The FAA's guidance on NEPA and the Clean Air Act Amendment of 1990 (General Conformity) have separate requirement for air quality evaluations. The current and forecasted levels of activity at ATW are below the aircraft operation or enplanement levels for which FAA NEPA guidance requires an air quality evaluation. Activity through the 20 year planning window is less than the number of operations for which a National Ambient Air Quality Standards (NAAQS) assessment is required. The General Conformity Rule applies to areas that the United States Environmental Protection Agency (USEPA) has designated as either being in non-attainment or maintenance for air quality. Outagamie County does not fall into these categories and therefore is not subject to a General Conformity determination and any future projects are assumed to conform to State Implementation Plans. Based on this, it is concluded that there are no air quality impacts with either the preferred alternative or the no action alternative.

3.7.2. Biotic Resources

Biotic communities at the Airport are limited to wide expanses of mown turf grasses and scattered strands of brush and small trees, principally box elder (*Acer negundo*) or aspen (*Populus tremula*), growing along drainage ways that are tributaries to Mud Creek. Trees are normally not allowed to grow to substantial heights on airport property in order to keep aircraft approach surfaces and safety zones clear, to provide unobstructed views for air traffic controllers, and to prevent concentrations of wildlife that could be hazardous to aircraft operations. For these reasons, as part of its maintenance program, the Airport has cleared many of the trees stands on the Airport.

The FAA requires consideration of the potential increases in wildlife attractants that a project may create. USDA Wildlife Services completed a year-long Wildlife Hazard Assessment in 2007. The Airport should continue its monitoring of changes in wildlife habitat and adjust its wildlife control measures accordingly.

3.7.3. Compatible Land Use

ATW is located primarily in the southeast corner of the jurisdictional boundaries of the Town of Greenville. The Town of Clayton is located to the southwest, the Town of Menasha is located to the southeast, and the Town of Grand Chute is located to the east. The Airport is zoned as an airport district, and is surrounded by lands primarily zoned as agricultural, industrial, commercial, institutional, and recreational. The only zoned residential area adjacent to Airport property is a small pocket east of County Highway CB. Existing development adjacent to the Airport is primarily commercial to the north and east, and agricultural to the west and south.

As discussed in Section 1, Outagamie County has enacted an Airport Overlay Zoning Ordinance to recognize the importance of avoiding incompatible land uses and structure heights in the vicinity of the Airport. Compatible land use is described in FAA Order 1050.1E, as “usually associated with the extent of the airport’s noise impacts.” Noise contours developed as part of previous Airport projects are presented and discussed in Section 3.8.9.

3.7.4. Cultural Resources

The National Historic Preservation Act recommends measures to coordinate federal historic preservation activities, and to comment on federal actions affecting historic properties included in, or eligible for inclusion in, the National Register of Historic Places. The Archaeological and Historic Preservation Act “provides the survey, recovery, and preservation of significant scientific, pre-historical, historical, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.” Often airport projects require that buildings be removed or previously undisturbed earth be excavated, which removes evidence of historic resources and archaeological sites. The FAA requires that the effects of projects on historical, architectural, archaeological, and cultural resources be determined prior to improvement.

A November 2011 literature review of architecture/historic resources recorded in the Wisconsin Historic Preservation Database (WHPD) concluded that 34 previously surveyed resources are located within a one-mile radius of the existing airport property. Of the 34 resources, two are listed in the National Register of Historic Places (NRHP) and one was determined eligible for listing in the NRHP. One property - the South Greenville Grange Hall #225, located in the northeast corner of the intersection of Municipal Drive and County Trunk Highway (CTH) BB - is the oldest continually used grange hall in Wisconsin and may be eligible for the NRHP. Other previously identified resources include residential, agriculture-related, religious, educational, commercial, and industrial properties.

Although the Outagamie County Regional Airport has not previously been recorded in the WHPD, it will soon be 50 years of age, the age at which resources are evaluated for historic significance, and may need to be evaluated. Available information indicates that when the Outagamie County Regional Airport began operating in 1965, the property consisted of 28 acres and four buildings. The Airport currently consists of approximately 1,739 acres and more than 25 buildings and structures. The terminal building built in the 1960s has been expanded and modified through the years and may no longer retain sufficient architectural integrity to qualify as eligible for the NRHP.

It is recommended that an architecture/history survey be conducted to identify historic resources located on the property prior to development activities. Additionally, future airport development may require an architecture/history survey of resources not located on airport property to comply with state and federal regulations.

In addition to the literature review of recorded architectural/historic resources, a November 2011 literature review of WHPD was conducted to identify previously recorded archaeological sites located on existing Airport property. Six sites varying from isolated finds and unknown prehistoric to Historic-Euro-American are located on the property. None of the sites are eligible for or listed in the NRHP. It is also recommended that archaeological investigations are conducted prior to ground disturbing activities to identify subsurface cultural resources.

3.7.5.Farmlands

The Airport currently leases land on Airport property for farming. According to the 2007 EA, ultimate development of the southeast GA area will result in 140 acres of Airport land being converted from agricultural to aeronautical use. An AD 1006 form was completed for the project and submitted to the USDA Natural Resource Conservation Service (NRCS) to ensure compliance with the Farmland Protection Policy Act (FPPA), as lands within the Airport were previously been classified as prime farmland. The NRCS responded that since Airport property is zoned as an airport district, it is not subject to the FPPA. As a result, it is expected that future airport development on current airport property will not be subject to FPAA, but that future land acquisitions for airport development may require NRCS consultation.

3.7.6.Federally-Listed and State-Listed Wildlife Species

There are no listed or endangered species with habitat on Airport property, according to the USF&WS. According to the WDNR, there are currently no State-listed species or habitat on Airport property. The land cover on the Airport is primarily grass with limited agricultural use and its historical use was agricultural before the Airport was constructed.

3.7.7.Floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were obtained covering the extent of Airport property. Based on this review, it was concluded that there are no 100-year floodplains on existing Airport property.

3.7.8.Hazardous Materials

A Phase I Hazardous Materials Due Diligence Audit was conducted for the Airport in the 2007 EA. Most of the property within the project area for that project has been in Airport ownership for almost 40 years. The audit concluded that there was no evidence that the project area had been contaminated with hazardous materials.

Any fueling operation will be designed and installed in accordance with current regulation. The Airport must comply with pollution control statutes in effect at the time of any future projects. A Spill Prevention Control and Countermeasure Plan was prepared for the Airport in 2008. The purpose of this plan is to describe the actions the facility will take to prevent spill from tanks and equipment from reaching navigable waterways and includes a secondary containment component. A Stormwater Pollution Prevention Plan was prepared for the Airport in 2010. The purpose of this plan is to identify potential sources of pollutants to stormwater discharges, describe prevention and control measures related to pollutants and stormwater discharges, and create an implementation schedule for these measures. These plans are discussed in more detail in Section 3.8.8.

3.7.9.Noise

Noise at an airport is simply defined as “unwanted sound.” Noise compatibility planning is essential for an airport to maintain a positive relationship with its airport neighbors. The degree of annoyance which people suffer from aircraft noise varies depending on their activities at any given time. The concept of “land use compatibility” has arisen from the variation in human tolerance to aircraft noise. Studies by governmental agencies and private researchers, in particular those by the Housing and Urban Development (HUD) and FAA, have defined the compatibility of different land uses with varying noise levels. Part 150 explicitly states that determinations of noise compatibility and regulation of land use are purely local responsibilities.

This section summarizes the airport noise analysis prepared for the 2003 Master Plan Update and used the FAA’s Integrated Noise Model (INM) Version 6.0. Based upon the input data the INM generates the noise contours by plotting points of the noise level events which represent the average-annual day. The points are then connected to graphically represent the noise contours which the aircraft generate. The FAA, USEPA, and HUD established the 65 DNL as the threshold indicating significant cumulative noise impacts.

Noise contour maps generated as part of the 2003 Master Plan Update are presented in **Exhibit 3-4** and **Exhibit 3-5**. The FAA, USEPA, and HUD have established the 65 DNL as the threshold indicating significant cumulative noise impacts. There are currently two residences to the west of the Airport within the 2000 65 DNL contour. The FAA's threshold of significance has been determined to be a 1.5 DNL increase in noise over any noise sensitive area located within the 65 DNL contour. If an action results in an increase within the 65 DNL contour of 1.5 DNL or greater on any noise sensitive area, it will be necessary to do further analysis within an Environmental Assessment and express in more detail the impact on the specific area. The noise level increase projected for the two residences within the existing 65 DNL contour is not anticipated to exceed the FAA's threshold of significance; however future Environmental Assessments should pay particular attention to these locations.

There is currently zoning in place to limit future incompatible land uses around the Airport. It is generally recommended that new residential development be prohibited in areas subject to noise exceeding 65 DNL, unless location conditions indicate that soundproofed residences would not be adversely impacted. Where existing residential uses occur within the 65 DNL contour, further expansion should be discouraged. The current zoning around the airport is primarily agriculture to the south and west. To the north and east the current zoning is a mix of industrial, agricultural, commercial, and some residential. The only land uses within the projected 2020 65 DNL contour are zoned for agricultural, industrial, and aeronautical uses. However it should be noted that some areas zoned for residential use are located just outside of the 65 DNL contour to the south and the east. Only areas currently zoned for aeronautical use are contained with the 70 and 75 DNL contours. Therefore the current land use zoning plans are compatible with the existing and projected noise exposure levels.

There are not currently any land use or zoning plans surrounding the Airport that are incompatible with cumulative noise levels of 65 DNL or greater. It is important that in the future land use compatibility around the airport be maintained.

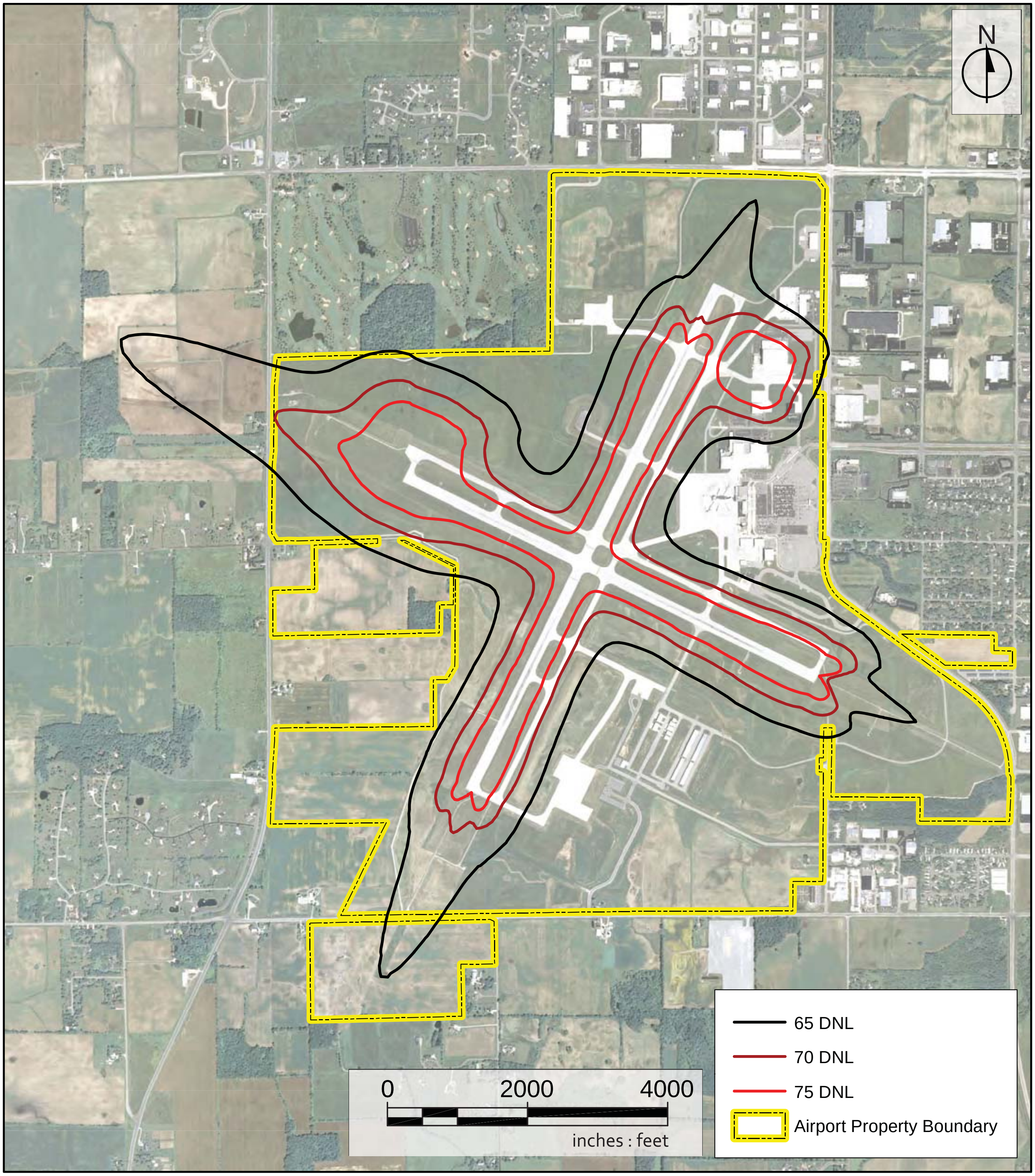


Exhibit 3-4
2000 NOISE CONTOURS

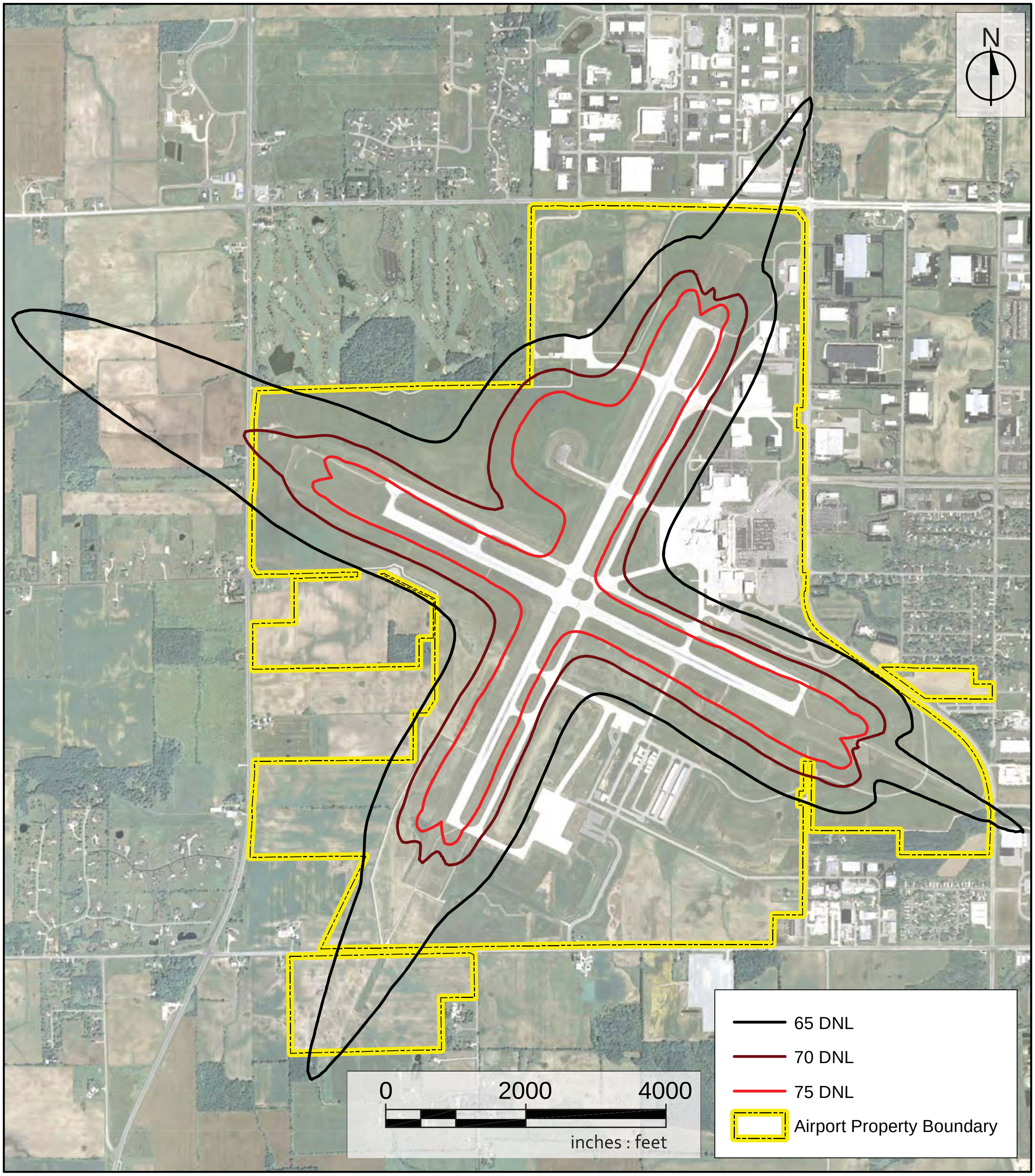


Exhibit 3-5
2020 NOISE CONTOURS

3.7.10. Water Resources

Surface water drainage on the Airport generally flows to the east and southeast. Runoff is generally of low order due the gentle natural slopes of from 0.5 percent to 5 percent that predominate at the Airport.

The U.S. Army Corps of Engineers (USACOE) has jurisdiction over all “waters of the United States” under Section 404 of the Clean Water Act. Wetlands on Airport property delineated by the WDNR and WisDOT in 2005 and 2006 are considered to be jurisdictional under current CWA guidelines. These wetlands are depicted in **Exhibit 3-6**. The delineations conducted in 2005 and 2006 did not include the entirety of Airport property. Additional wetland delineation surveys will be required for projects involving Federal funds. A Section 404 permit issued by the USACOE is required for all the airport improvement projects having impacts to wetlands. Compensatory off-site wetland mitigation may also required for such projects.

Wetlands on Airport property are generally not of the highest quality and organic soils do not appear to run deep or be heavily organic. According to the WDNR, wetland coverage on the Airport lands has been reduced by historic drainage projects and grading over large areas of the Airport. This has been confirmed by field work that revealed the majority of wetlands to be dominated by ruderal, disturbance-resistant species and lying in low areas associated with drainage channels. The dominant vegetation types are wet meadows of reed canary grass (*Phalaris arundinacea*), goldenrod (*Solidago canadensis; S. gigantea*), fox sedge (*Carex* vulpinoidea) and redtop (*Agrostis stolonifera*) with clumps of sandbar willow (*Salix exigua*), silky dogwood (*Cornus amomum*) and aspen. In the eastward trending reach of the drainage way in the southeast quadrant, these shrub species dominate, forming a scrub shrub wetland. At the point where the drainage way turns east, a shallow ditch lined with cattail (*Typha sp.*) drains Taxiway B and joins the main drainage way.

The boundaries of wetlands on Airport property are surrounded by mown turf grasses or by an un-mown plant community of brome (*Bromus inermis*), bluegrass (*Poa pratensis*), milkweed (*Asclepias syriaca*), trefoil (*Lotus corniculatus*) and thistle (*Cirsium vulgare*). There is one small area in the wet meadow where fox sedge, redtop, marsh aster (*Aster simplex*) and giant goldenrod (*S, gigantean*) dominate a flat area with readily apparent micro-topography that is perched somewhat higher above the channel than the remaining wetland and thus more isolated from nutrient-laden flows. Further downstream from this area the drainage way widens slightly, forming a shallow forested basin perhaps 50 feet square dominated by cottonwood (*Populus deltoides*), black willow (*Salix nigra*), american elm (*Ulmus americana*) and box elder.

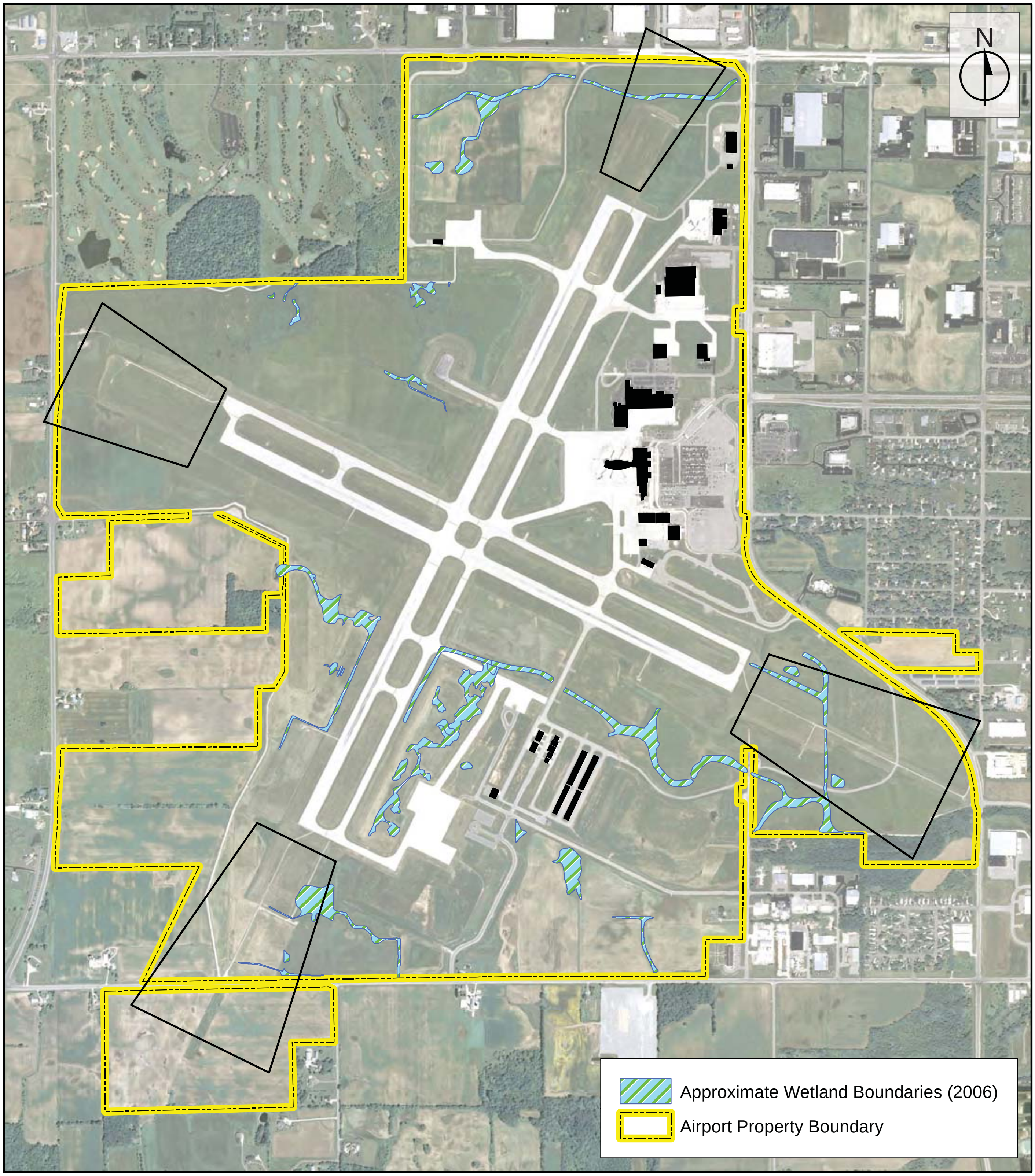


Exhibit 3-6
WETLANDS

The functions of the wetlands are limited by their small size, essentially linear nature, low botanical diversity and predominance of edge habitat. Wildlife habitat is offered for small grassland birds, mammals and insects and some visual relief is provided to the monotony of concrete and mown grass that otherwise predominates in the area. However, they appear to provide some locally important water quality functions in terms of flood flow attenuation and filtration of over-bank flood events. This is due to their dense emergent vegetation and low topographic position in relation to drainage features, which can easily flood them with storm events of common magnitudes. Their riparian position also contributes some value to downstream water quality because they function as sources for particulate organic matter (leaves, stems, etc.) in runoff water, which are important food sources for low-order stream life within the watershed. These wetlands, which connect to navigable waters via tributary systems, are considered to be within United States Corps of Engineers' regulatory jurisdiction.

Most of the Airport is in the Mud Creek basin, which is part of the Lower Fox River watershed. Mud Creek is classified as an 303(d) impaired water body by the Wisconsin Department of Natural Resources (WDNR) due to degraded habitat (or loss of in-stream habitat) and pollution by sediment. As explained on the WDNR's web site, "*Section 303(d) of the federal Clean Water Act requires states to develop a list of impaired waters, commonly referred to as the "303(d) list." A water body is considered impaired if a) the current water quality does not meet the numeric or narrative criteria in a water quality standard or b) the designated use that is described in Wisconsin Administrative Code is not being achieved. A documented methodology is used to articulate the approach used to list waters in Wisconsin*."

Unspecified non-point sources, urbanization, stream bank erosion, construction erosion and storm sewers outfalls have been identified as sediment sources, which in turn causes nutrient enrichment and excess algae growth within the creek. In-stream habitat has been highly degraded by the excessive sediments, nutrients and resulting high turbidity that favors rough fish.

Mud Creek has been assigned a medium priority designation and Maximum Total Maximum Daily Load standards are planned to be issued for these water bodies by the WDNR. According to the WDNR, non-attainment of water quality standards for Mud Creek is due to both point source contributions and non-point source runoff and is primarily related to unmanaged storm water.

3.7.11. Water Quality

Stormwater flow direction is highly manipulated at ATW, as at most airports. The majority of precipitation and snowmelt infiltrates on-site, with runoff routed via artificial drainageways parallel to runways, taxiways, and roadways. Stormwater detention ponds have recently been constructed in the terminal area and south GA development area, and a series of biofilters have been constructed to test various treatment designs for glycol-impacted runoff from Airport deicing areas. Impervious surfaces account for 14.2% of Airport property. There are significant grassed areas at the Airport which serve to retard runoff, capturing significant amounts of suspended solids on-site.

The quality of ground and surface water must not be degraded by future Airport projects. The Airport is located within the Mud Creek basin, which has suffered impairment due to urbanization and its related stormwater issues.

A Stormwater Pollution Prevention Plan (SWPPP) was completed for the Airport in 2010. This plan identifies a SWPPP coordinator and SWPPP implementation team members, and assigns specific duties to these individuals as part of an implementation plan. The SWPPP identifies potential stormwater contaminants, and best management practices (BMPs) for reducing pollutants in Airport stormwater discharges. The SWPPP identified the following potential stormwater contaminant areas subject to SWPPP requirements:

- SRE/Maintenance building fueling station
- SRE/Maintenance building operations
- Aircraft deicing
- Sand, urea, and potassium acetate applications on paved runways, taxiways, roadways, and ramps
- Snow removal on paved runways, taxiways, roadways, and ramps
- Airport construction activities

A wide range of BMPs are identified in the SWPPP for avoiding, minimizing, and mitigating stormwater pollution for each potential contaminant area. A facility monitoring plan is in place that includes the following periodic inspections:

- Biannual visual inspections of major storm system outfalls during dry weather conditions to identify evidence of non-stormwater discharges.
- Quarterly visual inspections of major storm system inlets during rain events to identify evidence of stormwater contamination.
- Annual stormwater compliance inspection to determine if BMPs have been implemented and to assess their effectiveness.

The Airport has a Non-Point Discharge Stormwater Permit from WDNR, which includes as a permitting condition quarterly outflow observations.

A Spill Prevention, Control, and Countermeasure (SPCC) plan was prepared by the Airport in 2008. The purpose of the SPCC plan is to describe measures implemented by the Airport to prevent oil discharges from occurring, and to prepare the Airport to respond in a safe, effective, and timely manner to mitigate the impacts of a discharge. The SPCC plan identifies potential spill sites and details spill prevention procedures, inspection programs, and required training of personnel. The plan was prepared and implemented in accordance with requirements contained in Title 40, Code of Federal Regulations, Part 112, and is used as a reference for oil storage information and testing records. The SPCC plan identifies the following areas as potential spill sites, and describes BMPs for preventing and controlling spills at these sites:

- SRE/maintenance facilities
- Federal Express air cargo facilities
- Gulfstream Aerospace facilities
- Fixed base operator facilities

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Chapter 4

Facility Requirements

FACILITY REQUIREMENTS

The facility requirements element of a traditional master plan analyzes existing airside facilities and aviation activity at an airport to determine required facility improvements. The objective of a facility requirements analysis is to ensure that each of an airport's functional areas has long-term flexibility and growth potential that will enable it to respond to changing demand scenarios. The analysis and conclusions contained in this chapter will provide the basis for developing and evaluating alternative development actions that may be adopted to satisfy the need for improved facilities. Facility requirements are determined in the following sections:

Facility requirements presented in this chapter are based on the preferred projections of aviation demand presented in Chapter 2. These projections are summarized in **Table 4-1** below.

Table 4-1: Forecasts Summary

Item	Actual	Forecast			CAGR
	2009	**2014**	**2019**	**2029**	**2009-2029**
Passenger Enplanements	273,200	293,671	322,347	386,926	1.8%
Based Aircraft	70	69	71	77	0.5%
Cargo Pounds	19,763,890	29,589,683	32,800,201	40,660,652	3.7%
Commercial Operations	16,434	16,250	17,172	19,866	1.0%
Air Carrier Operations	2,489	4,127	5,409	7,390	5.6%
Commuter/Air Taxi Operations	13,945	12,122	11,763	12,476	-0.6%
General Aviation Operations	17,986	18,262	19,471	22,210	1.1%
Military Operations	204	124	124	124	-2.5%
Total Aircraft Operations	**34,624**	**34,636**	**36,767**	**42,200**	**1.0%**

Source: Mead & Hunt, Inc.
CAGR = Compound Annual Growth Rate

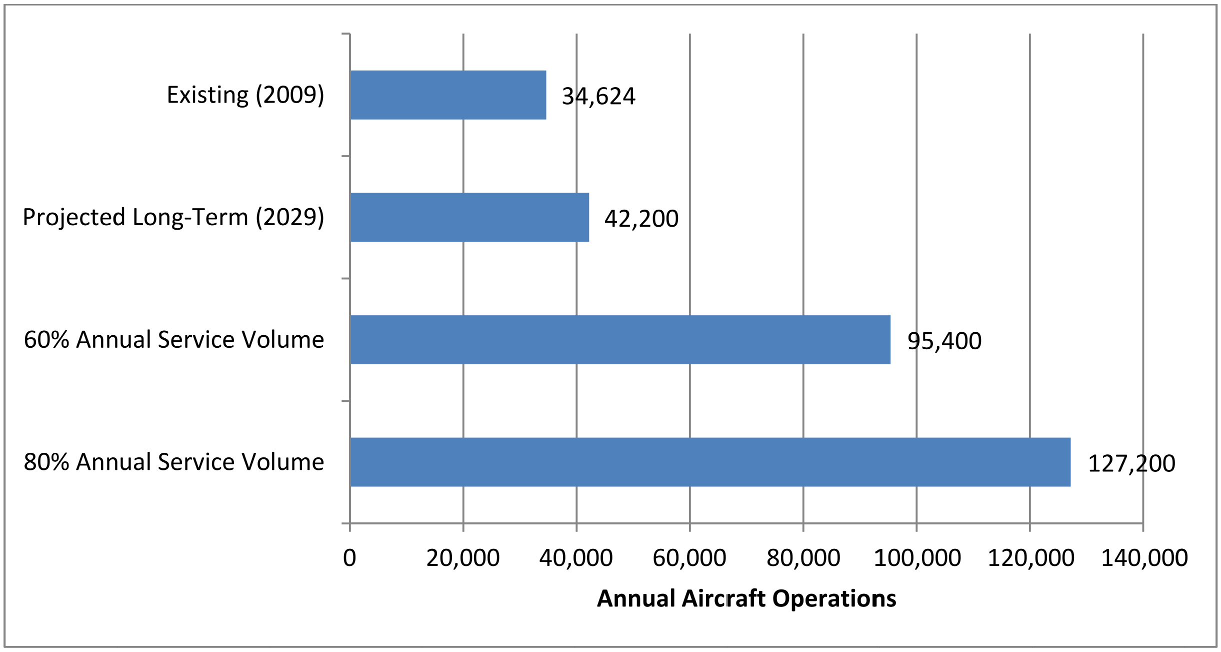
4.1. Demand-Capacity Analysis

The purpose of an airfield demand-capacity analysis is to assess the ability of airfield facilities to accommodate projected operational demand. Demand-capacity analyses should be conducted using methodologies outlined in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

The 2002 Master Plan Update included a detailed demand/capacity analysis for the airfield at ATW. This analysis identified an annual service volume (ASV) of 159,000 aircraft operations for the airfield configuration as it existed at that time. ASV is a reasonable estimate of an airport's annual operational capacity, and encompasses differences in runway usage, aircraft mix, weather conditions, patterns of aviation demand, and other factors. The only significant change to the airfield since the 2002 Master Plan Update was a 1,000-foot extension to Runway 3/21. It is expected that this runway extension did not significantly alter the ASV for the airfield at ATW.

Planning standards indicate that when annual operations reach 60% of ASV (95,400 operations at ATW), new airfield facilities should be planned. When annual operations reach 80% of ASV (127,200 operations at ATW), new airport facilities should be constructed or demand management strategies should be implemented. The preferred aircraft operations forecast presented in Chapter 2 does not anticipate operational levels of this magnitude within the 20-year planning period. As a result, it is not expected that ATW will reach the 60% capacity planning threshold and that the Airport has sufficient runway capacity to handle projected operations throughout the planning period. However, development alternatives should continue to protect for a future general aviation runway to allow for long-term growth. Any proposed landside or airside development should not impede ability to construct this runway at the location depicted in the 2002 Master Plan.

Exhibit 4-1: Comparison of Existing and Projected Aircraft Activity to 60% and 80% ASV



4.2. Runway Length

Note: the bulk of this section is taken directly from the 2003 Master Plan, with minor updates to more accurately reflect current conditions.

ATW has two runways. Runway 3/21 is 8,002 feet long, and Runway 12/30 is 6,501 feet long. This section determines the adequacy of the existing runway lengths. Specific runway length requirements were documented based on aircraft manufacturer performance data and guidance from the FAA Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design.

It is expected that Runways 3/21 and 12/30 will be utilized simultaneously during peak periods to meet projected demand levels throughout the 20-year planning period. In addition, Runway 12/30 serves as the primary runway during certain weather conditions and when Runway 3/21 is unavailable due to snow plowing and construction activities.

4.2.1. Runway Length Analysis

Minimum runway length requirements were determined for some of the more demanding aircraft, in terms of runway length, that are expected to use the Airport throughout the planning period. Runway length requirements were determined for wide-body commercial jet aircraft (e.g. Boeing 767-200), narrow-body commercial jet aircraft (e.g. Boeing 737-900), and corporate jet aircraft (e.g. Gulfstream V) based on aircraft manufacturer performance data. Most aircraft require a greater runway length for takeoff than for landing. Therefore, the runway length required for takeoff was determined for each selected aircraft, using near maximum passenger, cargo, and fuel loads. **Table 4-2** presents the runway takeoff lengths required for the various aircraft.

Table 4-2: Aircraft Manufacturer Runway Length Requirements

Aircraft Type	Engine Type	Takeoff Weight (pounds)	Runway Length Required (feet)	
			Standard Day (ISA)	Hot Day
ERJ-135	AE3007 A3	44,000	6,600	7,200
ERJ-145	AE3007 A1	48,000	7,500	8,000
CRJ-200	CF34-3B1	53,000	6,800	8,200
CRJ-700	CF34-8C1	72,000	5,500	7,200
Gulfstream V	RR BR710A1-10	90,900	6,500	7,300
DC9-50	JT8D-17	120,000	8,000	9,000
B737-300	CFM56-3B-2	135,000	6,800	7,300
MD-88	JT8D-217A	149,500	8,000	8,500
B737-900	CFM56-7B27	170,000	7,800	8,200
B757-200	RB211-535C	240,000	8,100	8,400
B767-200	CF6-80A/80A2	317,000	6,200	6,600
A300-600	JT9D-7R4H1	350,000	7,500	8,000

Notes: Runway length requirements are based on the following:
919 feet (MSL) Airport elevation
Standard Day (ISA, approx. 56 degrees F) and ISA + 25 degrees F (Hot Day)
Zero wind, zero runway gradient, dry runway where specified
Sources: Bombardier Aerospace, Gulfstream Aerospace Corporation, The Boeing Company, Embraer S.A., Airbus

As shown in Table 4-2, in Standard Day conditions at close to maximum takeoff weight (MTOW), the aircraft analyzed require a runway length in the range of 6,200 to 8,100 feet. In hot day conditions at close to MTOW, the aircraft analyzed require a runway length in the range of 6,600 to 9,000 feet, with over half of the aircraft requiring a runway length greater than 8,000 feet. While these aircraft cannot take off from either runway at MTOW during certain weather conditions, operators can still use the Airport at a reduced takeoff weight by reducing their payload, fuel, and/or range.

The B767-200 has been designated as the critical design aircraft for the Airport, as it is the largest and heaviest aircraft anticipated to operate on a regular basis within the planning period. However, in terms of runway length requirements, other aircraft such as the B757-200 require more runway length. Using information supplied by the aircraft's manufacturer, the B757-200 (equipped with RB211-535C engines) requires approximately 8,100 feet of runway length at MTOW in Standard Day conditions and 8,400 feet of runway length at MTOW in hot day conditions.

Aircraft manufacturer performance data for the B757-200 was reviewed to determine the amount of reduced payload and/or range required to operate at ATW. **Table 4-3** depicts the runway length requirements associated with various takeoff weights from ATW. Also depicted is the range available for each takeoff weight with various payloads.

Table 4-3: B757-200 Runway Length Requirements and Range Profile

Takeoff Weight (pounds)	Runway Length Required (feet) ISA	Runway Length Required (feet) Hot Day		Payload (pounds) / Range (NM) 25,000	35,000	51,720	Representative Destination within Range at Maximum Payload
240,000	8,100	8,400		3,600	3,250	2,300	San Juan
230,000	7,000	7,200		3,400	2,750	1,800	
228,000	6,800	7,000		3,300	2,650	1,700	Los Angeles, Seattle
220,000	6,000	6,300		2,900	2,250	1,300	Miami, Phoenix
210,000	5,500	5,800		2,400	1,750	800	Detroit, Cincinnati, New York
200,000	5,000	5,200		1,800	1,200	250	Chicago, Minneapolis

Notes: Runway length requirements are based upon takeoff runway length requirement charts and payload/range charts, as supplied by the Boeing Company. Destinations represent cities within the great circle distance of ATW.
Sources: The Boeing Company, Karl Swartz's Great Circle Flight Mapper, Mead & Hunt Inc.

As shown in Table 4-3, the current 8,002 foot Runway 3/21 is adequate for all circumstances except for a long distance flight at MTOW. This circumstance will not occur regularly at the Airport. However, when taking off from the 6,501-foot Runway 12/30, the B757-200 is limited to a range of approximately 1,300 NM at MTOW in both hot day and standard day conditions. The markets currently served by scheduled commercial carriers with the longest direct flight distances are Memphis (560 NM), Atlanta (670 NM), Orlando (1,000 NM), and Las Vegas (1,300 NM). All of these distances are less than or equal to the 1,300 NM maximum range from Runway 12/30. However, as passenger enplanements and population in the catchment area grows, the ability to provide direct service to longer haul markets such as the West Coast may be required. As shown in Table 4-3, the B757 is capable of providing direct service to virtually all destinations within the continental United States from Runway 3/21, but not from Runway 12/30. Direct service to markets beyond 1,300 NM such as the West Coast may require additional Runway 12/30 length dependent upon the aircraft type being utilized.

4.2.2. Runway Length Summary

The runway needs analysis conducted for ATW concludes that the existing runways at the Airport are adequate to meet the current and near-term needs of the Airport's users. However, as commercial jet activity at the Airport increases, additional runway length could potentially be required by some aircraft types if service to markets beyond 1,300 NM is to be provided. The land and airspace areas at the ends of Runway 12/30 should continue to be preserved for future runway extensions. The implementation of such extensions, however, should not occur until such time as there is an evident need and/or stated desire for regular carrier service to markets beyond 1,300 NM, or other evident need for a runway extension.

4.3. Air Traffic Control Facilities

An Air Traffic Control Tower (ATCT) is located directly south of the terminal building. The ATCT is open every day from 5:30 A.M. to 11:00 P.M. (Central Standard Time). The ATCT is a Federal Contract Tower, which means that the Airport subcontracts for air traffic control services and that these services are not provided by FAA employees. There are three factors related to the ATCT that should be considered when planning for future development.

4.3.1. Line-of-Sight

Line-of-sight is the term used to describe the ability of a person in the ATCT to see a given point on the ground. Areas that are not visible from the ATCT due to a tall object between them and the tower are called “shadow” areas. The most common obstructions to a clear line of sight are buildings. When operational areas have significant shadows they may be classified as “non-movement” areas, which means the ATCT does not control movement in this area.

The line-of-sight of the existing tower is adequate, however it should be noted that some taxiway pavement, portions of the apron surrounding the passenger concourse, and several taxilanes are not visible from the tower. **Exhibit 4-2** shows the approximate shadow areas and current non-movement areas.

Preserving the ATCT line-of-sight restricts the height and location of corporate and other airport-related buildings. This is because some development areas, including the Gulfstream campus, fall directly below the tower’s line of sight to the northern airfield movement areas. In addition, the lighting configuration and building materials for these buildings must be carefully chosen to ensure that they do not introduce glare into the line-of-sight. Future building development locations and heights, lighting choices, and building material selections would be less restricted were the tower located such that its line of sight to airfield movement areas did not pass directly over buildings.

4.3.2. Proximity to Terminal

Another concern with the current ATCT is its current location just to the south of the terminal building. Long-term terminal building expansion would occur to the south, extending into the ATCT area. In addition, the high level of non-tower activities occurring in the immediate vicinity of the tower complicates security.

4.3.3. Overall Building Condition

The tower was constructed several decades ago. Tower facilities are outdated and in need of renovation.

4.3.4. ATCT Relocation Alternatives

ATCT development alternatives should allow for future expansion of the terminal building, simplify security, prevent line-of-sight problems, and meet all of the siting requirements and recommendations set forth in FAA Order 6480.4, *Airport Traffic Control Tower Siting Criteria*.

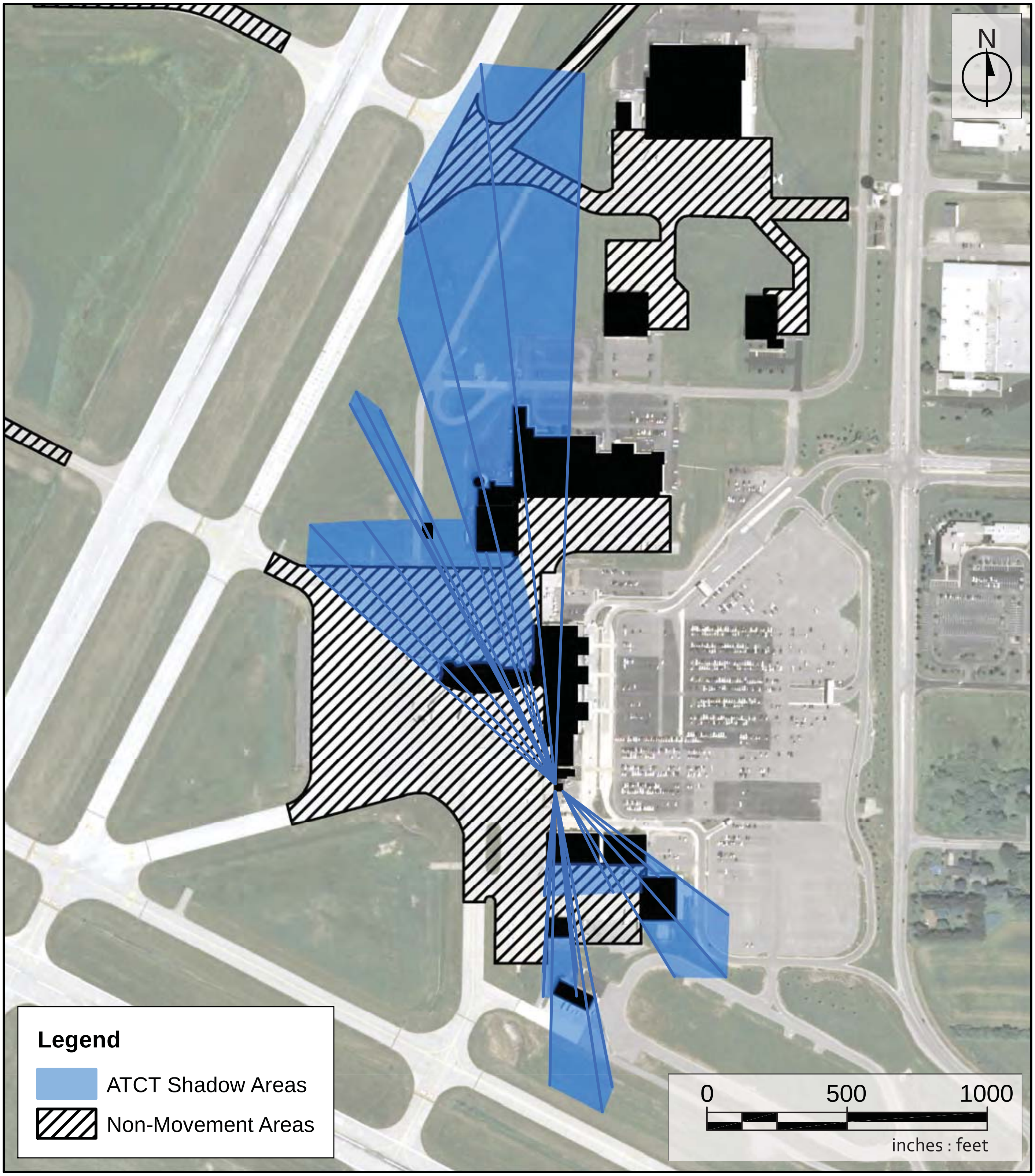


Exhibit 4-2 TERMINAL AREA ATCT LINE OF SIGHT SHADOW AREAS

4.4. Navigational Aids

4.4.1. Instrument Approach Procedures

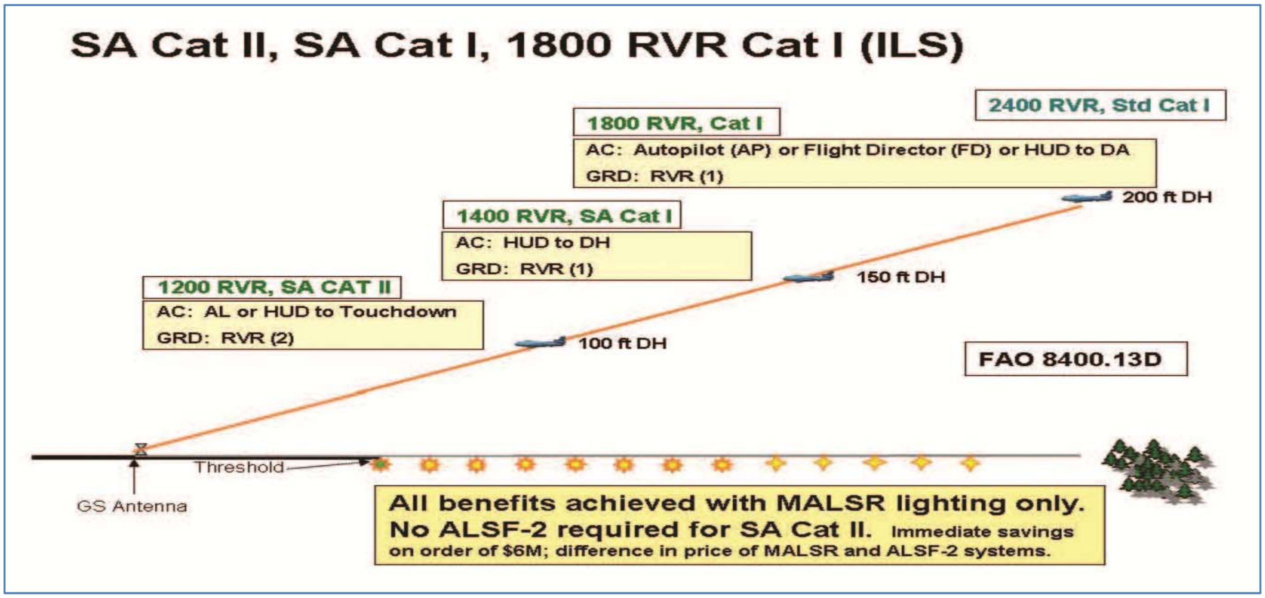
ATW has eight published instrument approach procedures: three for Runway End 3, two for Runway End 21, one for Runway End 12, and two for Runway End 30. ATW is currently equipped with two precision instrument approaches. The Airport can accommodate Category I (CAT I) Instrument Landing System (ILS) approaches to Runways 3 and 30, with approach minimums of ½ mile visibility and a 200-foot ceiling. The Airport is also equipped with six non-precision instrument approaches. These approaches include RNAV (GPS) to each of the four runway ends. The four RNAV (GPS) approaches have various approach minimums, with the Runway 30 RNAV (GPS) approach having the lowest minimums (½ mile visibility and 200-foot ceiling), followed by the Runway 3, Runway 12, and Runway 21 RNAV (GPS) approaches, respectively. The remaining two non-precision instrument approaches are VOR/DME approaches to Runways 3 and 21.

The availability of instrument approach procedures at an airport permits aircraft landings during periods of limited visibility. The main benefits of low approach minimums, in terms of ceiling and visibility, are increased airport capacity during low visibility situations and increased safety. The extent to which approach minimums can be lowered is dependent on a number of factors. These factors include the instrumentation available upon which the approach procedure may be developed and obstructions in the approach and/or missed approach areas. At times, instrument approaches are restricted to certain aircraft and flight crews which have been certified to conduct the procedure by the FAA.

The existing approaches provide ATW with a high level of approach capability. However, passenger airlines and air cargo carriers have expressed a need for upgraded landing equipment and procedures to provide ILS Category II/III (CAT II/III) approach minimums. CAT II/III approaches would allow landings at the Airport when visibility is below ½ mile or when the ceiling is below 200 feet. Arrivals are currently not allowed at the Airport when the weather conditions fall below these thresholds. The Airport should plan for the addition of a CAT II/III precision approach to Runway 3 at some point during the 20-year planning period. In addition to an ILS system, which must meet specific performance requirements for CAT II/III operations, the runway will also require the installation of several new lighting systems, including a High Intensity Approach Lighting System (ALSF-2), runway touchdown zone lights, and runway centerline lights. FAA approval of a CAT II/III ILS system will require completion of a benefit cost analysis that shows the benefits of the new system outweigh the costs of the new equipment.

Aircraft cockpit avionics technology has improved significantly over the past few decades. The FAA has been placing a growing emphasis on performance-based approach procedures that allow specially-qualified and certified flight crews using specific avionics to take advantage of lower approach minimums than those associated with standard CAT I ILS systems, without requiring installation of additional ground navigation equipment. FAA Order 8400.13D, *Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations*, establishes authorization criteria for CAT I procedures with minimums below ½ mile visibility and/or 200 foot cloud ceiling. There are two different CAT I approach procedures covered by Order 8400.13D: CAT I 1800 runway visual range (RVR) procedures, and Special Authorization CAT I procedures. The decision heights and runway visual ranges associated with these procedures, and their primary avionics and facility requirements, are graphically displayed in **Exhibit 4-3**.

Exhibit 4-3: Primary Avionics and Facility Requirements for Special Authorization Procedures



Source: Vaisala, Inc.

CAT I 1800 RVR procedures allow for a CAT I approach with a decision height (DH) of 200 feet and visibility minimum of RVR 1800 feet. To utilize this type of procedure, the flight crew must use an aircraft flight director (FD) or autopilot (AP) with an approach coupler or head-up display (HUD) to the decision altitude. A runway must have the following in place procedures and equipment in place to receive authorization for a CAT I 1800 RVR procedure:

- A CAT I decision height of 200 feet or less and a visibility minimum of not more than 2400 RVR;
- A threshold crossing height not exceeding 60 feet;
- Declared landing distance of 5,000 feet or greater;
- Medium-intensity approach lighting system with runway alignment indicator lights (MALSR) or other approach lighting system specified by FAA Order 8400.13D;
- High-intensity runway edge lighting (HIRL); and
- A touchdown zone (TDZ) RVR reporting sensor.

Runway 3 at ATW meets all of the criteria for a CAT I 1800 RVR procedure, and received this procedure type through an amendment published by the FAA in February 2011. This procedure will enhance safety and capacity during periods of low visibility until the Airport qualifies for a CAT II/III ILS system.

Special Authorization CAT I procedures allow for CAT I approach with a DH as low as 150 feet and a visibility minimum as low as RVR 1400 feet. To utilize this type of procedure, the flight crew and aircraft must be authorized for CAT II operations, and must use a radar altimeter and HUD to the decision altitude. A runway must have the same procedures and equipment as required for a CAT I 1800 RVR procedure. The following additional restrictions also apply to a Special Authorization CAT I procedure:

- The airport must have an operational ATCT to ensure aircraft separation, ensure protection of ILS critical areas, and monitor ground equipment;
- Single pilot operators are prohibited from utilizing the Special Authorization CAT I minimums;
- The procedure glide path angle must be 3.0 degrees;
- Obstacle free zones (OFZ) must meet CAT I OFZ standards described in FAA Advisory Circular (AC) 150/5340-30, *Airport Design*;
- Obstructions must not penetrate the approach light plane in accordance with FAA Order 6850.2, *Visual Guidance Lighting Systems*, and AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*;
- Glide slope clearance below path checks must be satisfactory to the runway threshold; and
- The missed approach procedure segment must meet the CAT II/III development standard until FAA Order 8260.3, *United States Standard For Terminal Instrument Procedures (TERPS)*, is revised with new CAT I approach surfaces which accommodate Special Authorization CAT I.

Runway 3 at ATW meets some of the Special Authorization CAT I procedure criteria, but this procedure type is not currently in place at the Airport. Additional aeronautical studies will be required to determine whether a Special Authorization CAT I procedure will be possible to Runway 3. Carriers have also indicated the need for an additional CAT I ILS to Runway 21. The Airport should plan for the addition of a CAT I ILS to Runway 21, which would require the installation of a new MALSR system beyond that runway end.

4.4.2. Visual NAVAID Facilities

Visual NAVAIDs and airfield lighting provide aircraft guidance once the aircraft is within sight of the Airport. The visual aids and lighting also assist the aircraft in maneuvering on the ground. Visual facilities at ATW include a lighted wind cone, lighted wind tee, a rotating beacon, and medium intensity taxiway lights (MITL). Existing and planned runway-specific visual NAVAIDs are listed in the following **Table 4-4**. Planned new NAVAID facilities are those that would allow CAT II/III precision approaches to either Runway 3 or Runway 30; a new MALSR system to complement the planned Runway 21 ILS; and a Precision Approach Path Indicator (PAPI) on Runway 12 to replace the outdated Visual Approach Slope Indicator (VASI).

Table 4-4: Lighting NAVAIDs

Runway	Approach Lighting			Visual Glide Slope Indicator		Runway Edge Lights	Other	
	REIL	MALSR	ALSF-2	PAPI	VASI	HIRL	TDZ	RCL
3		Existing	Planned	Existing		Existing	Planned	Planned
21	Existing	Planned		Existing		Existing		
12	Existing			Planned	Existing	Existing		
30		Existing		Existing		Existing		

REIL: Runway End Identifier Lights
MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
ALSF-2: High Intensity Approach Lighting System with Sequenced Flashing Lights, Category II Configuration
PAPI: Precision Approach Path Indicator
VASI: Visual Approach Slope Indicator
HIRL: High Intensity Runway Edge Lighting
TDZ: Touchdown Zone Lighting
RCL: Runway Centerline Lighting

4.5. Terminal Building

The Airport undertook a major terminal building expansion project in 1999. This expansion included a new 25,000 square foot, single-story, eight-gate passenger concourse, among other improvements, upgrades, and updates. The terminal building is approximately 159,600 square feet in size. The 1999 terminal building expansion was designed for an estimated 600,000 annual enplanement load capacity. Enplanement projections in Chapter 2 forecast 386,926 enplanements in the year 2029. Therefore, the existing terminal building should be sufficient to accommodate projected passenger loads for the 20-year planning period.

However, the layout of functional areas within the terminal building creates inefficiencies and could be reconfigured to improve passenger flow. In particular, the existing security checkpoint is very constrained by the building layout and needs some modifications. This is due to recent changes in security screening equipment and procedures. The terminal building is shaped like a “T”, with the non-secure area forming the upper line of the “T”, and the secure gate area forming the lower line. The security checkpoint is located at the intersection of the “T”. This creates a bottleneck for passengers transferring between the secure and non-secure areas, with insufficient space for passenger queuing. Strategies should be evaluated for improving this situation. One potential strategy is to “right-size” the restaurant located in the non-secure area, as it is quite large and divides primary passenger functions. This and other strategies will be developed and presented in Chapter 5, Alternatives.

The passenger terminal building has space available for concourse expansion to the west with minimum ramp restrictions. Development alternatives should preserve this space for concourse expansions that may be required beyond the 20-year planning horizon. Long-term expansion potential for the ticketing, administrative, and baggage claim area is limited by other facilities to the north and south of the terminal building. Development alternatives should seek to improve long-term expansion potential for these areas through the 20-year planning period and beyond.

4.6. Automobile Parking

ATW has several parking lots in the passenger terminal area. These lots contain a combined 2,887 parking spaces for use by airline passengers, rental car companies, airport employees, tower employees, and other airport users. A breakdown of these spaces is presented in **Table 4-5**.

Table 4-5: Passenger Terminal Area Parking Stall Inventory

Parking Lot	Regular Stalls	Handicap Stalls	Total Stalls
Long-Term Passenger	1,439	21	1,460
Short-Term Passenger	237	8	245
Car Rental	345	0	345
Terminal Administrative Employees	50	0	50
Terminal Tenant//Gulfstream/Air Wisconsin	338	20	358
Transient Flight Crew	47	0	47
Fixed Base Operator	26	2	28
Air Traffic Control Tower	9	1	10
Public Safety	23	1	24
Remote	236	7	243
Cell Waiting	9	0	9
Total Parking Stalls	**2,759**	**60**	**2,819**

Source: Airport Staff
Notes: Terminal tenant/Gulfstream/Air Wisconsin parking located in the Yellow, Blue, and Orange lots; transient flight crew parking located in the Red lot

ATW is utilized as a "spoke" airport by passenger airlines, which means that most passengers originate or terminate their travel at ATW and very few make connections at ATW. Private automobile is expected to continue to be the primary means of transport to ATW for most originating passengers. The use of public transportation is expected to remain relatively low. Based on these factors, facility requirements for public and rental car parking are expected to continue to be closely associated with passenger enplanement levels. As a result, parking needs forecasts are based on the preferred enplanement forecast for ATW. A parking requirements analysis was conducted for each of the long-term, short-term, rental car, remote, Airport manager, terminal employee, tower employee, parking employee, and cell waiting area parking lots. The parking needs forecast is summarized in **Table 4-6**. The forecast indicates that 382 additional parking stalls will be required in 2016, 991 additional stalls will be required in 2021, and 1,358 additional stalls will be required in 2031.

Table 4-6: Terminal Area Parking Needs Forecast

	Actual	Forecast		Forecast		Forecast	
	2011	2016		2021		2031	
Parking Stall Category	**Existing Stalls**	**Total Need**	**Increase from 2011**	**Total Need**	**Increase from 2011**	**Total Need**	**Increase from 2011**
Long-Term Passenger	1,460	1,658	198	1,973	316	2,164	190
Short-Term Passenger	245	278	33	331	53	363	32
Car Rental	345	392	47	466	75	511	45
Admin Lot	50	57	7	68	11	74	7
Tenants	358	406	48	484	77	531	47
Transient Flight Crew	47	53	6	64	10	70	6
Fixed Base Operator	28	32	4	38	6	41	4
Air Traffic Control Tower	10	11	1	14	2	15	1
Public Safety	24	27	3	32	5	36	3
Remote	243	276	33	328	53	360	32
Cell Waiting	9	10	1	12	2	13	1
Total Parking Stalls	**2,819**	**3,201**	**382**	**3,810**	**610**	**4,177**	**367**

Source: Airport Staff

4.7. Air Cargo Facilities

Air cargo service at ATW includes operations by Federal Express, and commercial passenger airlines offering “belly hold” cargo space. Nationally, express carriers such as Federal Express are gaining market share over commercial passenger carriers, a trend that is expected to continue. Historically, the majority of air cargo at the Airport was transported by Federal Express and Airborne Express/DHL until DHL ceased U.S. domestic freight operations, leaving Federal Express as the primary all-cargo carrier at the Airport. Federal Express operates a standalone air cargo processing, storage, and maintenance facility on the northeast side of the airfield at ATW. In addition, there is an air cargo area on the northwest side of the airfield that is largely undeveloped and contains one small building that was occupied by Airborne Express until the early 2000s. This building is currently vacant.

Air cargo facility requirements are based on air cargo forecasts, operator needs, and industry standards, including guidelines of the Air Transport Association’s *Facility Planning Guidelines – Air Cargo Facilities* and the Airport Council International-North America’s *Air Cargo Guide*.

Air cargo building space requirements are tied to air cargo volume. In 2011, approximately 25 million pounds (12,500 tons) of air cargo were handled at ATW, with the vast majority handled by Federal Express. Air cargo handled at ATW is projected to increase to over 42 million pounds by 2031, an increase of approximately 70 percent. The Federal Express building totals approximately 44,800 SF of building space, with 40,000 SF dedicated to warehouse functions and 4,800 SF dedicated to administrative office functions. If it is conservatively assumed in terms of facility requirements that the existing air cargo buildings are utilized at 100 percent of their capacity, a 70 percent increase in building space will be required by 2031. This implies that an additional 31,360 SF of air cargo building space will be more than adequate to accommodate future air cargo facility needs.

Air cargo buildings should be contiguous to a dedicated cargo apron, for the transfer of cargo between ground and aircraft. Locating the apron in close proximity and with direct access to the primary runway provides operational and cost efficiencies. It is beneficial for the apron to be near ground support equipment (GSE) storage, maintenance facilities, and aircraft de-icing areas. The appropriate number and size of aircraft parking positions on the apron should consider the existing and forecasted aircraft fleet mix. Adequate space for aircraft movement and access should include 15 feet of clearance beyond the wingtips, nose, and tail of the aircraft, in addition to access taxilanes. Apron pavement strength should accommodate the critical design cargo aircraft.

Federal Express currently operates wide-body Airbus A300 and A310 jet aircraft and Cessna 208 Caravan turboprop aircraft at ATW. It is expected that the air cargo fleet mix at ATW will continue to consist of these, or similar, aircraft. The existing Federal Express cargo aircraft apron totals approximately 12,000 SY. If it is conservatively assumed in terms of facility requirements that the existing cargo aircraft apron is utilized at 100 percent of their capacity, a 70 percent increase in apron area will be required by 2031. This implies that an additional 8,400 SY of cargo aircraft apron will be more than adequate to accommodate future air cargo facility needs.

The area required for outside storage of GSE is tied to air cargo volume. Approximately 2.5 SF of GSE storage areas should be provided for each ton of annual air cargo. Based on this ratio and the preferred air cargo volume forecast, ATW will require a total of 52,500 SF of GSE storage area in 2031. The GSE storage area should be located contiguous to the cargo aircraft apron, for direct access to cargo aircraft.

Efficient truck access is as fundamental to air cargo facility functionality as aircraft access. The truck movement area should be based on the number of truck dock spaces. Standard industry planning factors for air cargo truck docks are based on cargo building area, and range from 0.3 to 0.6 docks per 1,000 SF of building area. Based on this planning factor range, ATW will require between 22 and 45 air cargo truck docks by 2031. Truck docks should have a minimum 12’ 6” separation from centerline to centerline, and truck movement areas should accommodate truck staging and parking. For tractor/trailers, 200 feet of space between the building face and the access roadway should provide efficient and safe truck maneuvering.

The area required for employee/customer parking is commonly tied to building square footage. An appropriate correlation is two spaces for each 1,000 SF of cargo building, and 300 SF for each parking space. Based on this correlation, ATW will require 155 employee/customer parking spaces (46,500 SF) by 2031. Employee and customer parking and building access should be separated from truck movement areas, and from each other, for operational efficiency, security, and safety.

Cargo facilities should have easy and direct access to highways. Separating cargo access roadways from passenger terminal access roadways, as currently at ATW, benefits both cargo operators and the traveling public, by eliminating roadway mix and competition between smaller, quicker passenger cars and larger, slower cargo trucks.

4.8. Airport Maintenance and Snow Removal Equipment Facilities

The Airport owns and operates a wide variety of maintenance and snow removal equipment (SRE), including approximately eight tractors, twenty trucks, and five utility vehicles. A list of these vehicles and equipment by vehicle make/model is presented in **Table 4-7**. This equipment is used for a variety of maintenance and administrative tasks, including snow removal, de-icing, friction testing, mowing, landscaping, and emergency response. Other Airport-owned equipment is used by Airport staff for maintenance of terminal facilities, public building structures and their associated heating and plumbing systems, aircraft parking aprons, public automobile parking areas, access roads, and other airport infrastructure. The equipment is stored and maintained in various buildings on the Airport, with the majority housed in a maintenance/SRE building located on the northeastern corner of the Airport.

Table 4-7: Airport Maintenance and Snow Removal Equipment Vehicle List, 2011

Make	Model/Type	Number of Vehicles	Associated Equipment/Notes
Bobcat	2100/Utility	1	Dump Box
Bobcat	5600/Utility	1	Broom, De- Ice, Weed control, Bucket, forks
Case	5220/Tractor	1	Solid De-Icer, 15-foot Batwing
Case	CX80/Tractor	1	11-foot Plow, Solid De-Icer, 6-foot Rear Flail
Case	MX110/Tractor	2	21-foot Flail Mower (1), Liquid De-Icer (1), 15-foot batwing (1)
Chevrolet	Pick-Up Truck	8	8-10 foot Plow (6), Four-door vehicle (1), Response (1)
Chevrolet	Tahoe	1	Response / MU Meter
Chrysler	Town & Country	1	Maintenance Vehicle
Ford	7740/Tractor	1	21-foot Flail Mower, Liquid De-Ice
Ford	Cargo / Van	1	Electrician Vehicle
Ford	Escape	1	Administration Vehicle
Ford	Explorer	1	n/a
GMC	Bus	1	n/a
GMC	C5500/Truck	1	8-11 foot Plow, Salt, Sand
GMC	Pick-Up Truck	1	8-10 foot Plow, MU Meter
Idaho Norland	Truck	1	18-foot Broom
International	Dump Truck	1	11-foot Plow, Sand
John Deere	1445/Tractor	1	6-foot Mower, 5-foot Broom
John Deere	1600/Tractor	2	10-foot Batwing (2)
Kubota	F3060/Tractor	1	6-foot Mower, 5-foot Broom
Oshkosh	H-Series/Truck	4	22/24-foot Plows (3), 20/22-foot Broom (3), De-Ice (3), Blower
Oshkosh	T1500/Truck	2	Fire Rescue
Pierce	Truck	1	500 gallon water tank
Volvo	120/Loader	1	16-foot Plow, Bucket
Volvo	180/Loader	1	24-foot Plow, Bucket
Volvo	90/Loader	1	13-22 foot Plow, Bucket, Broom

Source: Airport staff

Ample space for maintenance and SRE facilities should be maintained throughout the 20-year planning period. FAA AC 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, provides guidance on storing maintenance and snow removal equipment. Maintenance/SRE building needs are related to paved areas, activity levels, and climate. Increases in runway, taxiway, and apron pavement, as well as increases in activity levels, result in additional need for maintenance/SRE building space. Maintenance and SRE should be housed in a heated building to prolong the useful life of the equipment and to enable more rapid response to operational needs. Additionally, facilities should be available within the building for onsite equipment maintenance and repair during the winter season. The Airport's CIP should also allow for replacement of vehicles and equipment as existing vehicles and equipment reach the end of their useful lives.

Current maintenance/SRE facilities at ATW are inadequate in all functional areas; including vehicle storage and circulation, maintenance bays, wash bays, parts and equipment storage, sand/salt/urea storage, and office/personnel/support space. Space issues associated with each functional area are described below.

Vehicle Storage and Circulation. The SRE/maintenance building has approximately 12,600 square feet of space designed for vehicle storage and circulation. The building is designed with a 25-foot wide vehicle circulation corridor running through the center of the building from south to north, with entrance and exit doors at each end. Snow plow attachments used at ATW are wider than this corridor was designed for. A 35-foot wide corridor should be considered and planned for. In addition, vehicle storage bays located on the western side of this corridor are much too small to accommodate many snow removal vehicles used at ATW. Three of the Airport's Oshkosh sweeper/plows are over 70 feet in length, while the storage bays are approximately 45 feet in length. As a result, the sweeper/plows extend into the circulation corridor when stored indoors and often must be stored outdoors. Additional space will be required for similar vehicles the Airport plans to acquire in the future. The vehicles are difficult to maneuver into the storage bays, and new entrance/exit doors dedicated for larger vehicles would solve these issues. In addition, smaller SRE/maintenance vehicles must be stored outdoors, in T-hangars, or at off-Airport storage lockers. It is estimated that the Airport requires an additional 21,400 square feet of space for vehicle storage and circulation.

Maintenance Bays. The SRE/maintenance building has one vehicle and equipment maintenance bay approximately 2,700 square feet in size located to the east of the vehicle circulation corridor. Functional issues associated with this space are similar to those associated with vehicle storage and circulation. The bay is not designed for the larger sweeper/plows the Airport utilizes, it is difficult for staff to maneuver vehicles into the bay, and there is a need for an additional bay in order for staff to work on multiple vehicles simultaneously. It is estimated that the Airport requires an additional 3,800 square feet of space for vehicle and equipment maintenance.

Wash Bays. The SRE/maintenance building has one vehicle wash bay approximately 1,600 square feet in size in the southeast corner of the building. Functional issues associated with this space are similar to those associated with vehicle storage and circulation. The bay is not designed for the larger sweeper/plows the Airport utilizes, and it is difficult for staff to maneuver vehicles into the bay. It is estimated that the Airport requires an additional 1,600 square feet of space for vehicle washing.

Parts and Equipment Storage. The SRE/maintenance building has approximately 8,500 square feet of space designed for parts and equipment storage. This space is currently adequate for the Airport's needs. However, additional space will be needed in the future as the Airport adds new vehicles and equipment to accommodate snow removal requirements. It is estimated that the Airport will require an additional 3,500 square feet of space for parts and equipment storage.

Sand, Salt, and Urea Storage. The SRE/maintenance building has approximately 1,800 square feet of space designed for storage of sand, salt, and urea. An additional salt storage area will be required in order to accommodate sand storage needs. It is estimated that the Airport requires an additional 900 square feet of space for storage of sand, salt, and urea.

Office and Personnel Support Space. The SRE/maintenance building has approximately 2,500 square feet of space designed for staff offices and personnel support. These areas include two offices, a break room, staff dormitories, staff locker rooms, one unisex restroom, one combined unisex restroom and shower, electrical and janitorial closets, and hallways and vestibules. An additional office is required to accommodate a future mechanic. The break room often has double the occupancy it was designed for. The dormitories are designed to accommodate four individuals, but the Airport often has a need to accommodate eight to twelve individuals. As a result, staff beds have to be placed in hallways without adequate separation to prevent sleep interruptions. The staff locker room only has six lockers, with a need for twelve lockers. Up to three additional shower and restroom facilities are required. It is estimated that the Airport requires an additional 5,000 square feet of space for office and personnel support space.

SRE/maintenance space requirements for each functional area are summarized in **Table 4-8**. Development alternatives for SRE/maintenance space will seek to satisfy these requirements. It may not be practical to provide for these requirements at the existing SRE/maintenance building location due to its proximity to Runway 21 aircraft approach paths. The feasibility of expanding the existing building, as well as relocating the building to a different location, will be reviewed in Chapter 5.

Table 4-8: SRE/Maintenance Space Requirements

Functional Area	Existing SF	Required SF
Vehicle Storage and Circulation	12,600	34,000
Maintenance Bays	2,700	6,500
Wash Bay	1,600	3,200
Parts and Equipment Storage	8,500	12,000
Sand/Salt/Urea Storage	1,800	2,700
Office and Personnel Support Space	2,500	7,500
Total	**29,700**	**65,900**

Source: Airport Staff, Mead & Hunt
Note: Existing and required space needs are estimated. Additional analysis will be required to determine Federal funding eligibility and building layout/dimensions.

4.9. NE Corporate Development Area

The NE corporate area is an essential part of the ATW campus. It houses vibrant businesses that are major employers in the area. The Airport completed a study in 2011 that evaluated potential reconfiguration of the NE Corporate Development Area to provide additional hangar, apron, office, and auto parking space for Gulfstream Aerospace. In the event that Gulfstream chooses to expand its operations at ATW, this study will be used as a reference. The Airport should assess what steps will need to be taken for the possible reconfiguration of this area.

4.10. Airport Business Park

An undeveloped area of approximately 120 acres on the northwest side of the Airport is designated as an Airport Business Park dedicated for private development. Airports are attractive locations for many commercial and industrial businesses because they provide easy access to air transportation for employees and goods. The Airport Business Park is located adjacent to the Chaska Golf Course and has direct access to State Highway 96, which provides quick, direct access to U.S. Highway 41. For aviation-related businesses, the Airport Business Park provides easy access to the Airport’s air traffic controlled runways and taxiways, full service FBO, and hangar space.

Commercial and industrial development at an airport is beneficial to the Airport as well. First, private development at the Airport can increase an airport’s operating revenues through lease payments. Second, it has the potential to increase passenger enplanements and aircraft operations by attracting more corporate users. Private development at the Airport, like private development in other locations, also has a positive economic impact on the surrounding community.

The 120-acre Airport Business Park is dividable and available to businesses for lease from the Airport. Lots in the Airport Business Park currently have utilities in place for water, sewer, electricity, natural gas, and high-speed/broadband telecommunications. The area is also outfitted with paved roadways and roadway lighting.

Despite the locational and infrastructure advantages at Airport Business Park, there are no current occupants in the Park as of 2011. However, this area should continue to be protected for future use as an Airport Business Park.

4.11. Facility Requirements Summary

This section presents a summary of the facilities identified for development or in need of additional study within the planning period.

- The Airport should maintain and protect land and airspace for the addition of a future general aviation runway; however, construction is not anticipated to be necessary within the 20-year planning period.
- Alternatives for relocating the ATCT should be developed and evaluated to allow future expansion of the terminal and other buildings in the terminal area, enhance security, eliminate line-of-sight problems, and meet all FAA siting requirements and recommendations.
- The Airport plan should plan for the accommodation of a Special Authorization CAT I ILS approach procedure to Runway 3 within the near-term (5 years), and accommodation of a CAT II/III ILS approach procedure within the long-term (20 years).
- Reconfiguration of functional elements within the existing terminal building should be considered, particularly near the security checkpoint, to provide improved efficiency and functionality.
- Alternatives for additional passenger, rental car, and employee automobile parking should be developed and evaluated. This additional automobile parking should be provided within the near-term (5 years).
- Alternatives for providing additional air cargo building and aircraft parking apron should be developed and evaluated to ensure that the Airport can accommodate projected growth in air cargo activity.
- Alternatives for expanding the existing maintenance/SRE building, and providing additional maintenance/SRE storage capacity, should be developed and evaluated to provide improved equipment storage and maintenance personnel functions.
- The area reserved as an Airport Business Park should continue to be protected for future tenants.
- Alternatives should be developed and evaluated in accordance with the Airport's sustainability guidelines for facility development.

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Chapter 5

Alternatives

Chapter 5

ALTERNATIVES

The alternatives element of the traditional master plan process identifies potential development alternatives and proposes evaluation criteria used to select the preferred development alternative. This chapter presents and analyzes alternatives for meeting the facility requirements documented in Chapter 4. These alternatives take into consideration the long-term development of the Airport, while also planning for the implementation of near-term improvement projects. For each facility type, several airfield improvement scenarios that meet the facility requirements were considered in development of alternatives. Development alternatives are presented and evaluated in the following sections:

- Development Alternatives Evaluation Factors
- Passenger Terminal Alternatives:
- Automobile Parking Alternatives
- Air Traffic Control Tower Alternatives
- SRE Facility Alternatives
- Crosswind Runway Extension Alternatives
- Air Cargo Facility Alternatives
- Instrument Approach Alternatives
- NE Corporate Development Area Alternatives
- Alternatives Summary

5.1. Development Alternatives Evaluation Factors

Alternatives presented in subsequent sections will be evaluated against general criteria which will be used in part to select preferred alternatives. Criteria considered formally and informally in the evaluations include operational, economic, environmental, and implementation feasibility factors, as described below.

5.1.1. Operational Factors

Each alternative will be evaluated to determine its ability to accommodate future demand for aircraft, passengers, and ground vehicles. This evaluation process will identify deficiencies in such areas as aircraft delay, airfield circulation, and passenger convenience. The evaluation will also determine whether the alternatives are in compliance with applicable FAA design standards.

5.1.2. Economic Factors

Estimates of each alternative's development costs will be prepared on the basis of planning cost estimates. These costs estimates will provide a general indication of development costs and will also provide a basis for comparing cost-effectiveness among the various alternatives. The alternatives will also be evaluated based on their ability to utilize existing infrastructure.

5.1.3. Environmental Factors

Environmental factors will focus on key factors such as noise, air quality, water quality, wetlands, land use impacts, and social impacts. Evaluation of these environmental factors will identify development alternatives that can minimize environmental disruption.

5.1.4. Implementation Feasibility

There are often certain factors, both tangible and intangible, that affect an airport's ability to implement certain development projects. This includes items such as community perspective, which will be considered and presented as it is provided. Implementation feasibility factors will be considered on a case-by-case basis.

5.2. Passenger Terminal Alternatives: Security Checkpoint

This section presents four alternatives for reconfiguring the Transportation Security Administration (TSA) security checkpoint area in the passenger terminal. The primary goals of this analysis are to:

- Provide adequate enplaning passenger queuing space to accommodate future growth in passenger enplanements.
- Separate enplaning and deplaning passengers to eliminate co-mingling and congestion in the security checkpoint area, and enlarge enplaning passenger re-composure areas.
- Improve flexibility in terms of functional layout.

The major obstacle in opening up the security checkpoint and improving the functional layout of the security checkpoint are three existing mechanical chases located on the secure side of the checkpoint. These chases house critical mechanical components and utilities, such as cooling pipes and fire mains. Because of the locations of the chases, and the difficulty associated with relocating them, they pose challenges to improving passenger circulation and reconfiguring of law enforcement and TSA spaces.

The checkpoint reconfiguration alternatives discussed in the following sections are either designed around these chases, or include relocation of the chases depending on cost and feasibility. The alternatives address these obstacles in various ways.

5.2.1. Security Checkpoint Alternative 1

Alternative 1 is presented in **Exhibit 5-1**. This alternative involves relocating the gift shop from its current location next to the security checkpoint. Possible locations for the relocated gift shop include the vacant airline ticketing space to the north, or the proposed admin/tenant block to the south (see Section 5.4). Relocating the gift shop out of this area will open up the throat of the security checkpoint, allowing for enlarged queuing and waiting/greeting areas on the non-secure side of the checkpoint.

In addition, this alternative proposes that the existing law enforcement (LEO) and TSA offices be removed and replaced with modular wall systems near the checkpoint. This alternative also proposes that pat-down and TSA monitor rooms also utilize similar modular wall systems. This will allow for future flexibility in terms of the functional layout of the security checkpoint area.

This alternative also includes relocation of the business center located on the secure side of the security checkpoint. Possible locations for the relocated business center include various areas along the terminal concourse. Relocating the business center will enlarge the passenger circulation space in the security checkpoint area, allow for greater separation of passengers entering and exiting the terminal concourse, and enlarge the enplaning passenger re-composure area.

5.2.2. Security Checkpoint Alternative 2

Alternative 2 is presented in **Exhibit 5-2**. This alternative includes all of the improvements associated with Alternative 1, but also includes two major differences.

This alternative proposes expanding the security checkpoint area to the south to fully separate the concourse exit corridor from the security checkpoint and concourse entrance corridor. This would be accomplished by constructing a new exit corridor around the large mechanical chase located on the secure side of the checkpoint. This will require relocation of the concession kiosk located on the concourse side of the mechanical chase, and will also require modifications to exterior walls to accommodate the new corridor. Not only will this proposed expansion eliminate passenger co-mingling and congestion, it will also enlarge the space available for passenger re-composure on the secure side of the checkpoint.

This alternative also proposes relocating the LEO and TSA offices out of the security checkpoint into the vacant airline ticketing space to the north. This will allow for the future addition of a third screening aisle with associated equipment, once passenger enplanement levels demand it. This will also allow for enlarged enplaning passenger re-composure areas.

5.2.3. Security Checkpoint Alternative 3

Alternative 3 is presented in **Exhibit 5-3**. This alternative is similar to Alternative 2, but does not include expansion to the south for a larger, separated concourse exit corridor. Instead, this alternative retains the exit corridor configuration associated with Alternative 1.

The major additional improvement associated with this alternative is the relocation of two mechanical chases on the secure side of the checkpoint. Removing these chases, modifying the exterior walls, and relocating the TSA and LEO offices will allow for the future addition of a third screening aisle with associated equipment, once passenger enplanement levels demand it. This will also allow for enlarged enplaning passenger re-composure areas.

5.2.4. Security Checkpoint Alternative 4

Alternative 4 is presented in **Exhibit 5-4**. This alternative incorporates all of the improvements associated with the previous three alternatives, including:

- Relocating the gift shop to allow for enlarged passenger queuing and waiting/greeting areas.
- Relocating the business center to allow for improved circulation and enplaning passenger re-composure areas.
- Expanding the checkpoint and fully separating enplaning and deplaning passengers by constructing a new exit corridor around the large mechanical chase on the secure side of the checkpoint.
- Relocating the LEO and TSA offices out of the security checkpoint area into the vacant airline ticketing space to the north.
- Relocating two large mechanical chases on the secure side of the checkpoint to allow for addition of a third screening aisle and enlargement of the enplaning passenger re-composure areas.

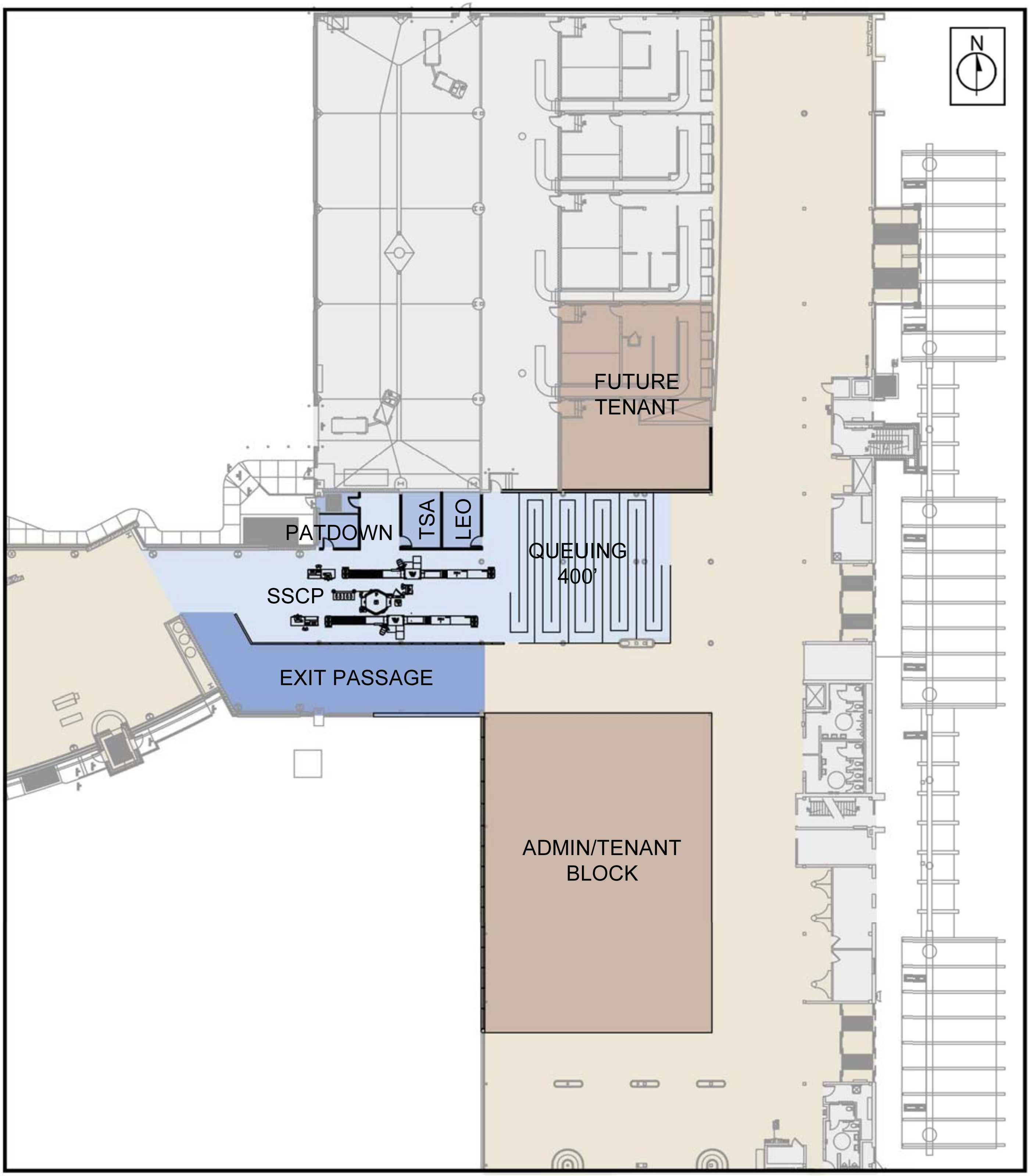

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Exhibit 5-1
SECURITY CHECKPOINT ALTERNATIVE 1

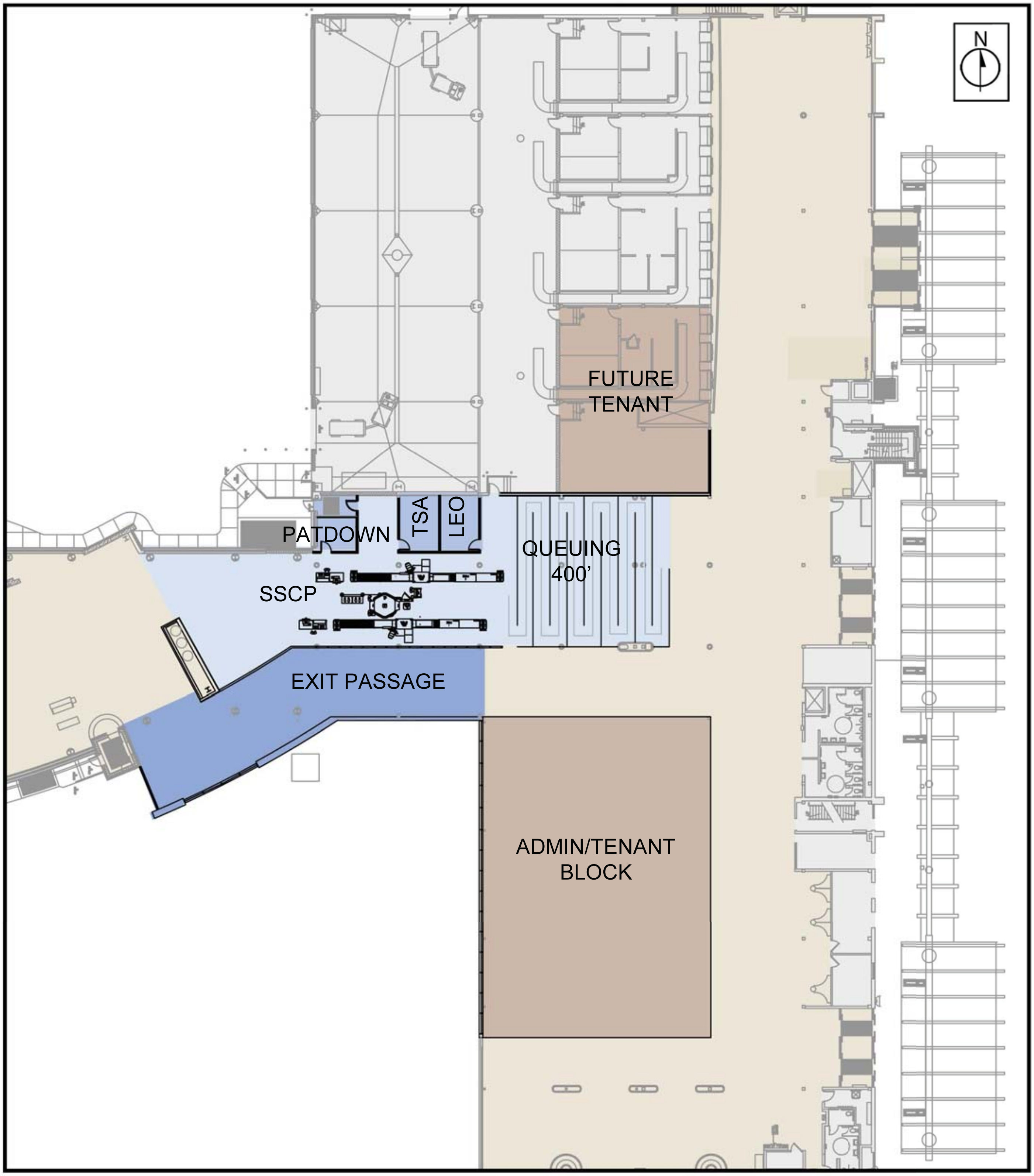


Exhibit 5-2

SECURITY CHECKPOINT ALTERNATIVE 2

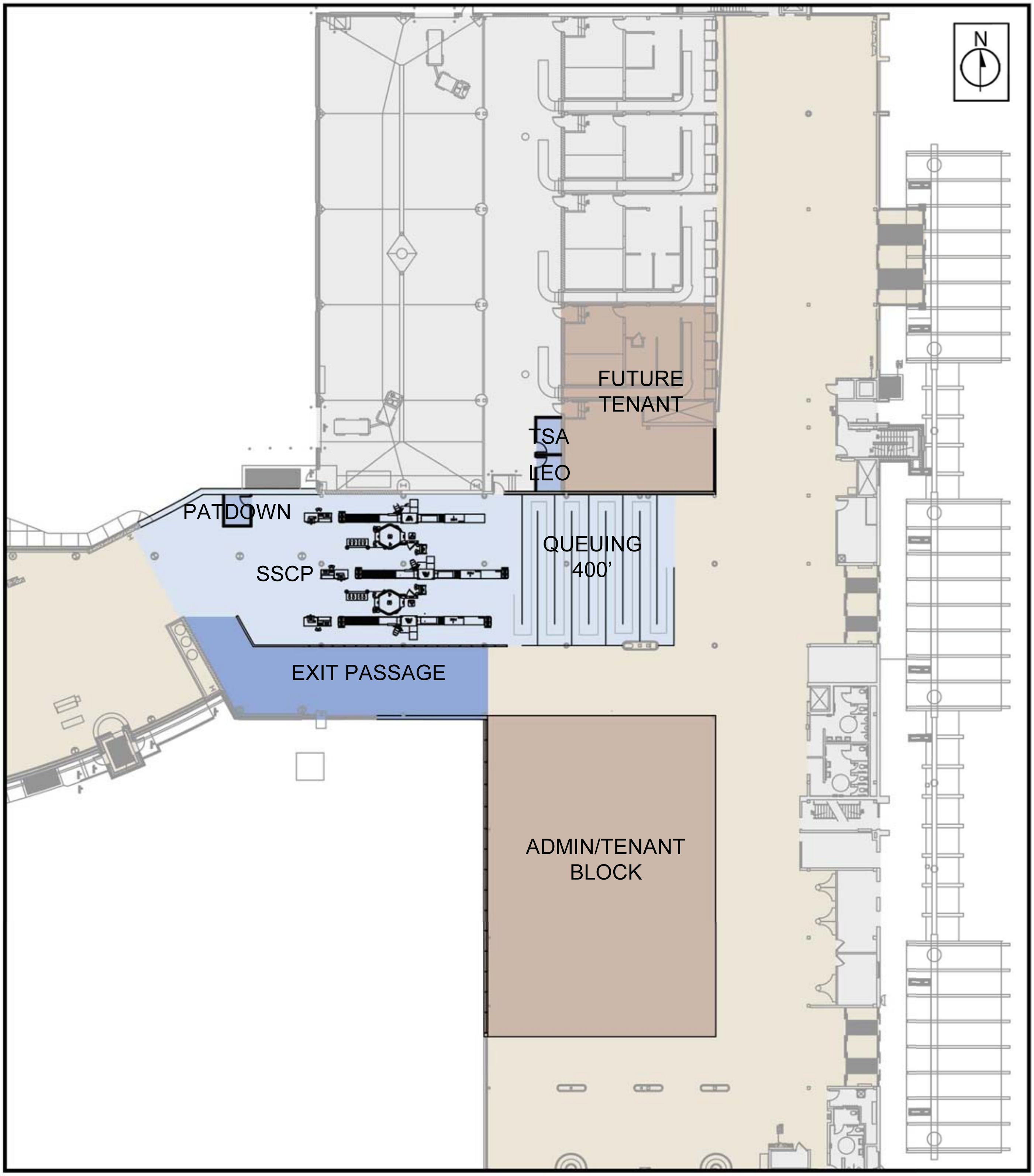


Exhibit 5-3
SECURITY CHECKPOINT ALTERNATIVE 3

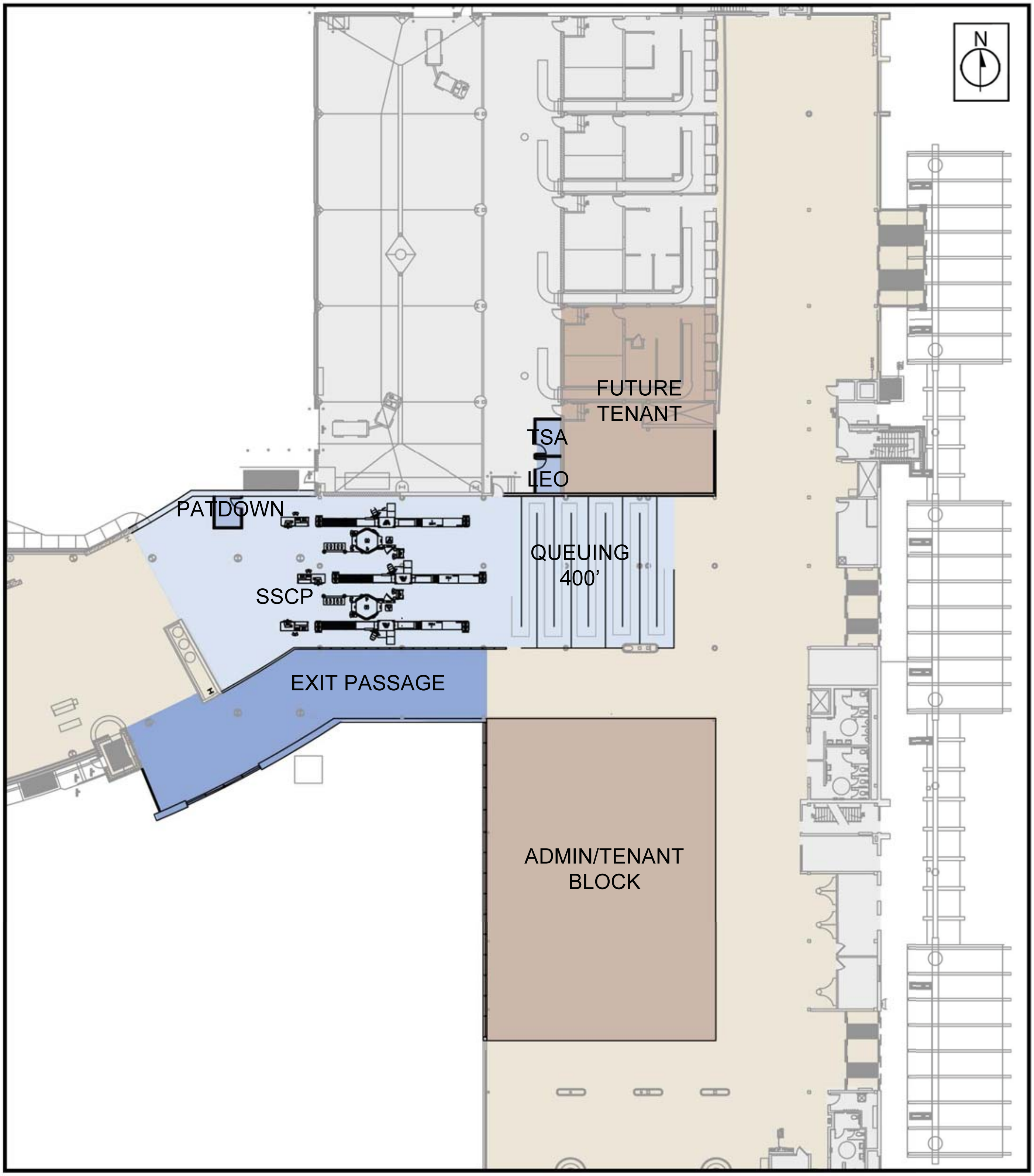


Exhibit 5-4
SECURITY CHECKPOINT ALTERNATIVE 4

5.2.5. Security Checkpoint Alternatives Evaluation

Operational Factors

The primary goal of this security checkpoint alternatives analysis is to improve the functionality and efficiency of the interior space in and surrounding the security checkpoint, while also enhancing Airport security. Alternative 4 is the most effective at achieving the primary goals of this alternatives analysis, and is considered the preferred alternative from an operational standpoint.

Economic Factors

The alternatives are presented in order of their probable cost, with Alternative 1 being the least expensive and Alternative 4 being the most expensive. However, all four alternatives utilize existing infrastructure by reconfiguring existing interior spaces. As a result, all of the alternatives represent little or no change to the existing passenger terminal building footprint.

Environmental Factors

None of the four security checkpoint alternatives are expected to have adverse environmental impacts, and there is no difference among the four alternatives in terms of environmental impacts.

Implementation Feasibility

There are no known significant challenges which inhibit the feasibility of any of the security checkpoint alternatives.

Preferred Alternative

Alternative 4 is considered the preferred alternative due to its collection of operational benefits. This alternative has a higher probable cost than the other three alternatives. However, any of the first three alternatives could be implemented as the first phase in a plan that would ultimately result in all of the improvements represented by Alternative 4.

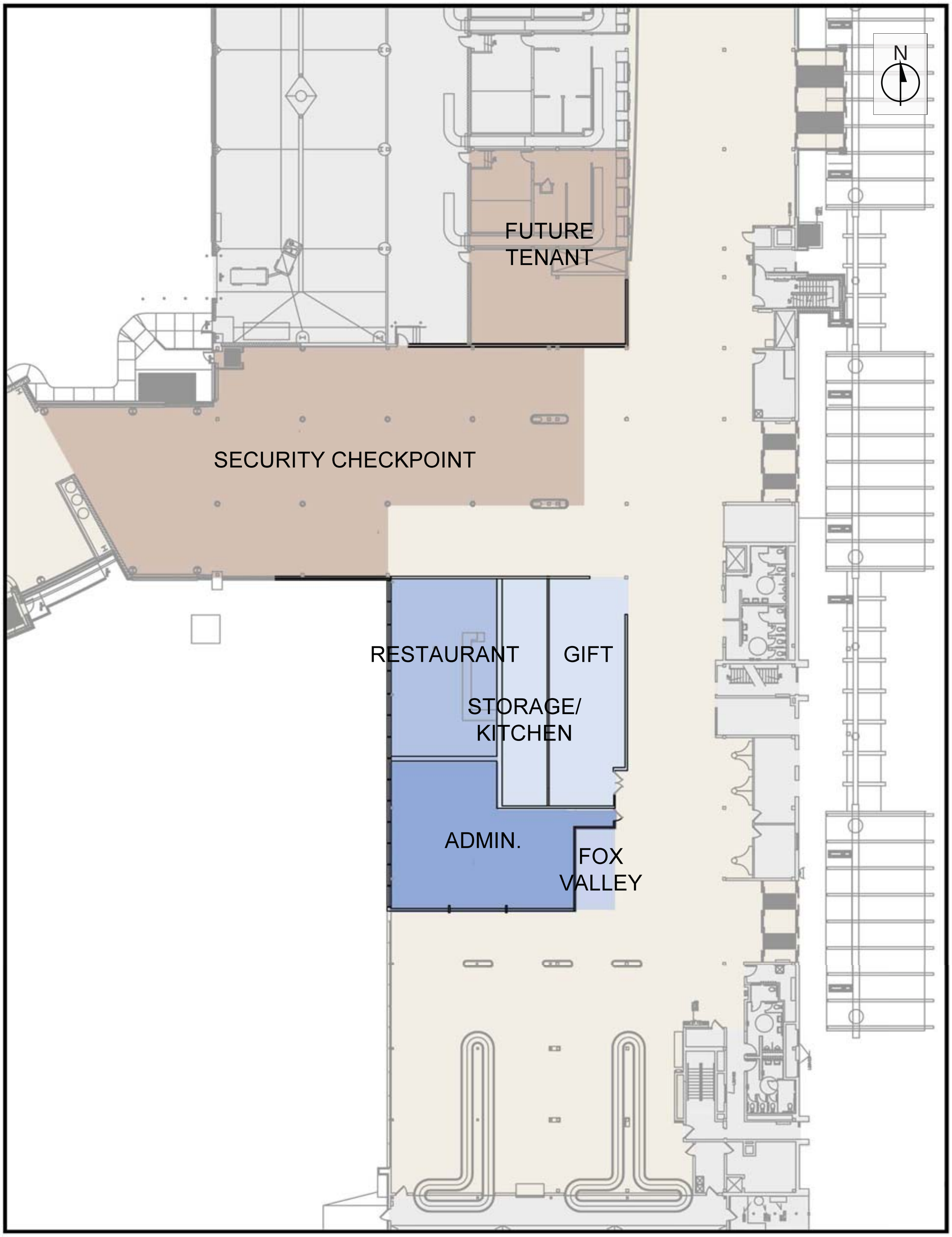
5.3. Passenger Terminal Alternatives: Administrative/Tenant Block

Several alternatives were considered for reconfiguring the proposed Airport administration and tenant block area (Admin/Tenant Block) located to the south of the security checkpoint area and north of the baggage claim area. These alternatives were analyzed with the primary goal of providing deplaning passengers one simple path to follow from the terminal concourse to the baggage claim area. This will require a larger passenger circulation area than is currently provided for the existing paths. The Admin/Tenant Block alternatives were designed to locate the block along the west wall of the terminal, creating a single, larger designated circulation space from the exit passage at the security checkpoint to the baggage claim area. This will provide sufficient circulation space without sacrificing total square footage for admin/tenant spaces. Shifting the Admin/Tenant Block to the exterior wall will also provide these areas with direct natural light from window openings, as well as allow for admin/tenant views of operations on the commercial apron.

Functional spaces for the following uses were considered during the admin/tenant block alternatives analysis:

- **Airport Administration.** The existing administration area on the second floor of the terminal is expected to be leased to new or existing tenants. This will require Airport administration and operations staff to relocate their offices to the proposed Admin/Tenant Block. The administration area will also take over some space currently occupied by rental car company tenants, which will be relocated to a dedicated rental car facility outside the passenger terminal (see Section 5.5). Relocating Airport administration facilities to the first floor will also provide a better public face for the Airport.
- **Consolidated Rental Car Facility.** Each Admin/Tenant Block alternative included relocating rental car company offices into a new standalone facility outside the terminal building closer to the rental car fleets. This will streamline the car rental process, provide adequate space for agency counter and office functions, and utilize the existing rental car area within the terminal more efficiently. It will also allow Airport administration and operations staff to move in to the rental car companies' current space.
- **Restaurant.** While the passenger terminal restaurant is a vital component of the proposed Admin/Tenant Block, this space is currently over-sized and under-utilized. Each Admin/Tenant Block alternative included reducing the size of the restaurant space, which will allow for greater flexibility in overall space management.
- **Gift Shop.** Each Admin/Tenant Block alternative included relocating the gift shop to a location adjacent to the restaurant. This will allow for greater visibility of the gift shop, expansion of passenger waiting areas in the current gift shop area, and future flexibility in concessions space management
- **Fox Valley Convention and Visitors Bureau (CVB).** The Fox Valley CVB does not currently have a dedicated space in the passenger terminal. Providing a dedicated space for Fox Valley CVB will promote local businesses and attractions, and create new branding opportunities for the Fox Valley region. Each Admin/Tenant Block alternative included carving out a space for Fox Valley CVB adjacent to the baggage claim area.
- **Wellness.** A goal of the alternatives analysis was to incorporate a wellness facility into the terminal building for both passengers and the nearly 2,000 employees located around the Airport. This facility will promote active lifestyles and physical health among Airport employees and the general public.

The preferred Admin/Tenant Block alternative is presented in **Exhibit 5-5**.


N
FUTURE
TENANT
SECURITY CHECKPOINT
RESTAURANT
GIFT
STORAGE/
KITCHEN
ADMIN.
FOX
VALLEY

5.4. Passenger Terminal Alternatives: Space Programming

This section evaluates a composite of the preferred security checkpoint and admin/tenant block alternatives, in terms of increases and reductions in the size of each functional area within the passenger terminal building. It then compares the square footages of each functional area under the preferred alternative composite to projected long-term space requirements for the year 2030. The following sections evaluate space programming considerations for each individual functional area.

5.4.1. Terminal Concourse

There are currently 23,310 square feet of floor space in the terminal concourse. This area consists of airline gates, holdrooms, concessionaire spaces, and general circulation space. The preferred alternative composite reduces this area slightly to 21,711 square feet, to allow for expansion of the security checkpoint area. Airline gate, holdroom, and circulation spaces are not expected to be negatively impacted by the preferred alternative composite. However, the preferred alternative composite would eliminate the restaurant adjacent to the security checkpoint, which would negatively impact concessionaire space in the concourse. It is recommended that this space be replaced at the west end of the terminal, which would increase the size of the terminal concourse to 22,146 square feet. It is expected that this will allow for projected long-term terminal concourse space needs.

5.4.2. Airline Ticketing

There are currently 13,660 square feet of floor space in the airline ticketing area. This area consists of lobby, ticketing counters, and airline office space. The preferred alternative composite reduces this area slightly to 12,785 square feet, to allow for expansion of the security checkpoint area. This space reduction is not expected to negatively impact any of the airline ticketing spaces in the near-term. However, it is estimated that an additional 3,630 square feet of airline ticketing space will be required by the year 2030, assuming that an additional airline enters the ATW market by that time. This additional space could feasibly be accommodated by a northern expansion of the existing ticketing area.

5.4.3. Aviation Security

There are currently 3,040 square feet of floor space in the terminal building devoted to aviation security functions. This area consists of security checkpoint passenger queuing, screening, and recomposure areas, as well as LEO and TSA office spaces. The preferred alternative composite will increase to 9,560 square feet the total area devoted to aviation security functions. It is expected that this increase will accommodate long-term demand for aviation security space.

5.4.4. Baggage Handling

There are currently 20,805 square feet of floor space in the terminal building devoted to baggage handling functions. This area consists of outbound baggage screening and make-up, inbound baggage handling, and passenger baggage claim areas. The preferred alternative composite reduces this area slightly to 19,135 square feet. This includes reduction in outbound baggage screening and make-up areas to allow for expansion of the security checkpoint area, and reduction in passenger baggage claim areas to allow for reconfiguration of the admin/tenant block area. These reductions are not expected to negatively impact any of the baggage handling areas in the near-term. However, it is estimated that an additional 10,710 square feet of baggage handling area will be required by the year 2030. This assumes that an in-line outbound baggage screening system and an additional baggage claim carousel are required by that time. This additional space could feasibly be accommodated by a western expansion of the existing inbound and outbound baggage handling areas.

5.4.5. Non-Secure Concessions

There are currently 7,695 square feet of floor space in the non-secure portion of the terminal building devoted to concessions space. This area consists of restaurant, gift shop, and car rental agency spaces. The preferred alternative composite reduces this area to 3,825 square feet. This includes reduction in the restaurant floor area, which is currently over-sized, to allow for expansion of the security checkpoint area. Reductions in non-secure concessions space also reflect the preferred consolidated rental car facility alternative, which would relocate car rental agency spaces to outside the terminal building and actually enlarge the amount of space devoted to car rental to 8,725 square feet. The reductions in non-secure concessions space are not expected to negatively impact concessions in the near-term. However, it is estimated than an additional 2,755 square feet of non-secure concessions area will be required by the year 2030, assuming that the need for non-secure restaurant and retail space increases with passenger enplanements. This additional space could feasibly be accommodated by a western expansion of the non-secure concessions area.

5.4.6. Airport Administration and Tenant Offices

There are currently 57,045 square feet of floor space in the terminal building devoted to Airport administration and tenant office space. This includes administrative offices in the basement and on the first and second floor, and tenant space on the second floor. The preferred alternative composite increases this area to 59,550 square feet, as administrative offices currently located on the second floor will move to the first floor, allowing expansion of the tenant space on the second floor. It is estimated that an additional 1,390 square feet of Airport administration space will be required by the year 2030, assuming the addition of new Airport staff positions. This additional space could feasibly be accommodated by a western expansion of the Airport administration offices.

5.4.7. General Non-Secure Circulation

There are currently 17,603 square feet of general circulation floor space located in the non-secure portion of the terminal building. The preferred alternative composite slightly increases this area to 18,693 square feet to eliminate circulation bottlenecks and improve passenger flow. It is estimated that an additional 3,567 square feet will be required by the year 2030, in proportion to the aggregate increase of other functional spaces.

5.4.8. Utilities

There are currently 25,134 square feet of utility floor space in the terminal building. This includes restrooms, storage rooms, mechanical rooms, electrical rooms, janitor closets, structural spaces, and vertical and horizontal building chases. The preferred alternative composite slightly decreases this area to 24,687 square feet to allow for expansion of the security checkpoint area. The reduction in utility space is not expected to negatively impact utilities in the near-term. However, it is estimated that an additional 7,074 square feet of utility space will be required by the year 2030 to allow for future expansion of other functional areas.

5.4.9. Passenger Terminal Space Program Summary

The 20-year passenger terminal space program is summarized in **Table 5-1**. The preferred alternatives composite will result in a slight increase in the total size of the passenger terminal building, from 168,292 square feet to 169,946 square feet. This increase is solely attributable to expansion of the security checkpoint area. The total projected passenger terminal building space requirement for the year 2030 is 199,507 square feet, which include increases in space requirements for all functional areas. It is expected that it will be feasible to expand the functional spaces associated with preferred passenger terminal alternatives composite to meet these long-term needs.

Table 5-1: Terminal Building Space Programming

Functional Area	Existing	Preferred Alternatives Composite	Projected 2030 Need
Terminal Concourse	23,310	21,711	22,146
Airline Ticketing	13,660	12,785	16,415
Aviation Security	3,040	9,560	9,560
Baggage Handling	20,805	19,135	29,845
Non-Secure Concessions	7,695	3,825	6,580
Airport Admin and Tenant Offices	57,045	59,550	60,940
General Non-Secure Circulation	17,603	18,693	22,260
Utility	25,134	24,687	31,761
Total	**168,292**	**169,946**	**199,507**

5.5. Automobile Parking Alternatives

This section presents three alternatives for accommodating future increases in automobile parking demand. As discussed in Section 4.6, approximately 1,200 additional automobile parking spaces will be required by the end of the 20-year planning period. The alternatives discussed in the following sections identify various ways to address this need.

5.5.1. Automobile Parking Alternative 1: Parking Lot Expansion

Expanding the existing parking lot is the clearest and most cost-effective strategy for accommodating future automobile parking needs. Parking facilities near the terminal building provide the most convenient parking spaces for passengers. Maximum distances between parking spaces and the terminal building should be established to avoid long walking distances for passengers. According to Transportation Research Board (TRB) Airports Cooperative Research Program (ACRP) Report 25, *Airport Passenger*

Terminal Planning and Design, a typical maximum walk distance from aircraft door to car door without mechanical assistance is between 900 and 1,000 feet. As shown in **Exhibit 5-6**, the distance from the furthest aircraft gate to the northeast corner of the parking lot is approximately 1,650 feet; the distance from the furthest aircraft gate to the eastern extent of the parking lot is approximately 1,450 feet; and the distance from the furthest aircraft gate to the southeastern extent of the parking lot is approximately 2,150 feet. All of these distances far exceed the typical maximum walk distance identified by ACRP Report 25. In addition, the potential expansion areas to the north and south of the existing parking lot are expected to accommodate future expansion of Airport tenant facilities. As a result, it is concluded that expansion of the existing parking lot is not a feasible or practical alternative for accommodating future growth in automobile parking demand.

5.5.2. Automobile Parking Alternative 2: Remote Parking Lot

Alternative 2 is presented in **Exhibit 5-7**. This alternative involves constructing a new remote parking lot on the northern edge of existing Airport property. This location was identified based on current ground transportation infrastructure and expected future uses for Airport property. Access to this remote lot would be provided by shuttle bus service. The approximate shuttle distance from this remote parking lot location to the passenger terminal is approximately two miles. The approximate capacity of this 360,000 square foot parking lot footprint is estimated at 1,200 spaces, which would provide the additional automobile parking spaces that will be required within the 20-year planning period. It is expected that this remote lot would accommodate a combination of long-term and rental car parking, while the existing parking lot would be reconfigured to accommodate increases in other parking categories.

5.5.3. Automobile Parking Alternative 3: Parking Structure

Alternative 3 is presented in **Exhibit 5-8**. This alternative involves constructing a new three-story parking structure in the existing parking lot near the passenger terminal building. The approximate capacity of this 200,000 square foot parking structure footprint is estimated at 2,000 spaces. This capacity would provide for the additional 1,200 additional automobile parking spaces that will be required within the 20-year planning period. The parking structure would be designed to incorporate the proposed consolidated rental car facility on its first floor. It is expected that this parking structure would accommodate a combination of short-term, long-term, and rental car parking, while the remainder of the existing parking lot would be reconfigured to accommodate increases in other parking categories.

5.5.4. Automobile Parking Alternatives Evaluation

Operational Factors

Alternative 1 is not effective from an operational standpoint, as it requires overly long passenger walk distances and constricts expansion of tenant facilities onto high-value Airport real estate. Alternative 2 and Alternative 3 would both satisfy the need for additional automobile parking. However shuttle bus rides to the remote parking lot proposed under Alternative 2 would present passenger inconveniences, while Alternative 3 would increase passenger convenience by decreasing walk distances. Alternative 3 is considered the preferred alternative from an operational standpoint.

Economic Factors

The alternatives are presented in order of their probable cost, with Alternative 1 being the least expensive and Alternative 3 being the most expensive.

Environmental Factors

Alternative 2 may have adverse impacts to wetlands on the north side of the airfield. Both Alternatives 1 and 2 would increase the amount of impervious surface on the Airport, thereby leading to increased stormwater runoff and possible water quality impacts. Alternative 3 is not expected to have any wetland or water quality impacts.

Implementation Feasibility

There are no known significant challenges which inhibit the feasibility of any of the automobile parking alternatives.

Preferred Alternative

Alternative 3 is considered the preferred alternative due to its relative operational and environmental benefits.

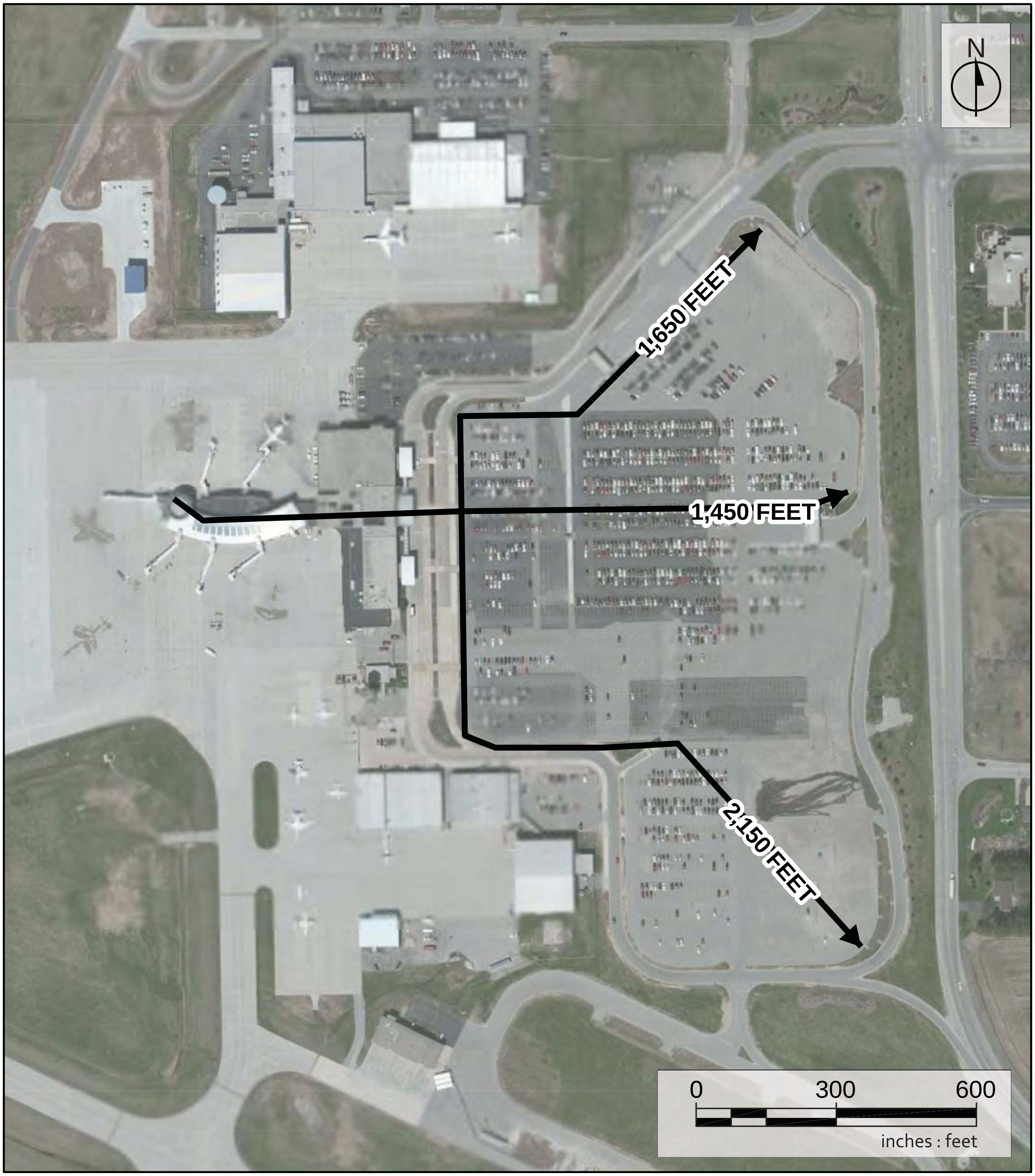


Exhibit 5-6
PARKING LOT WALKING DISTANCES

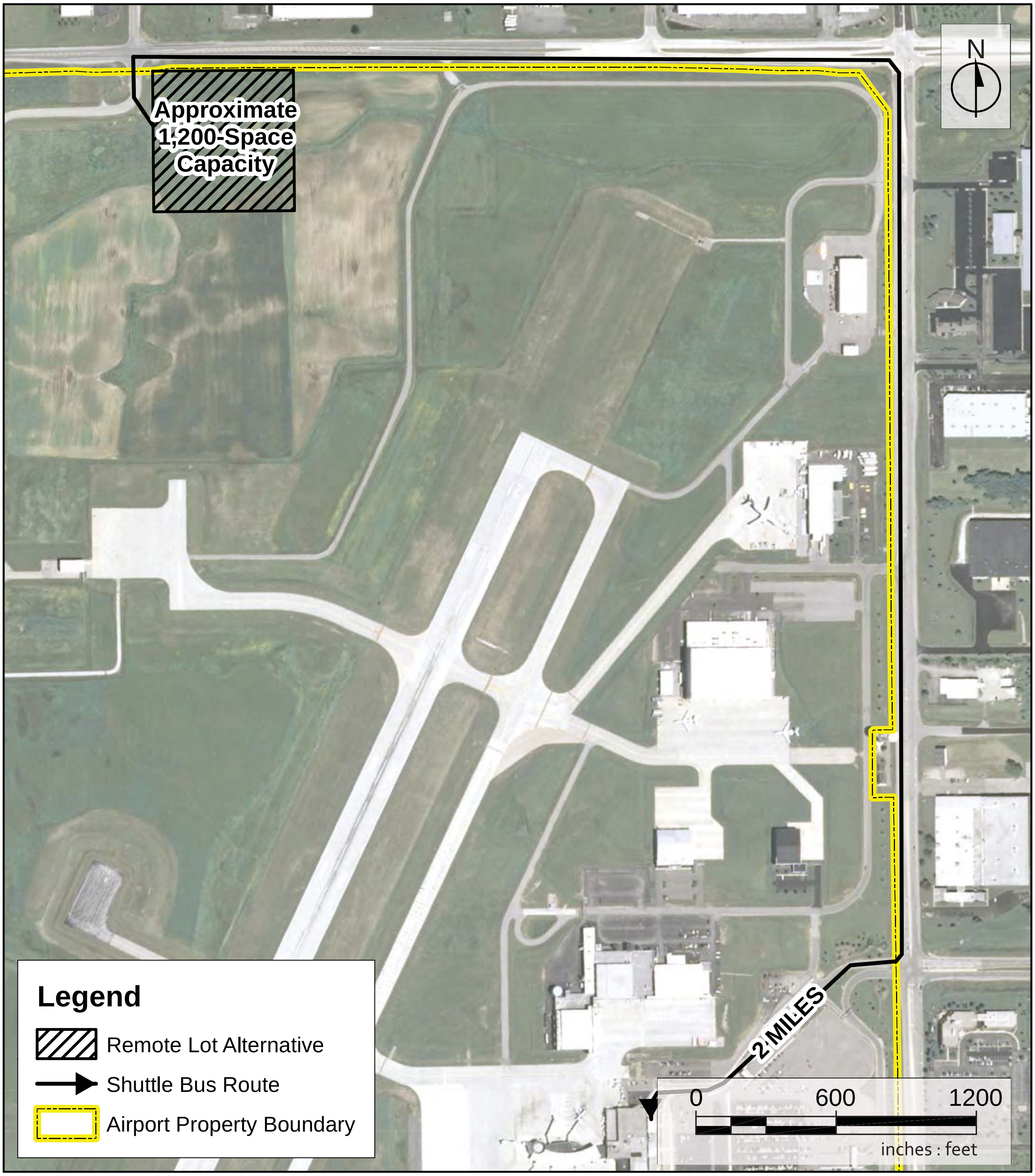


Exhibit 5-7 AUTOMOBILE PARKING
ALTERNATIVE 2 : REMOTE PARKING LOT

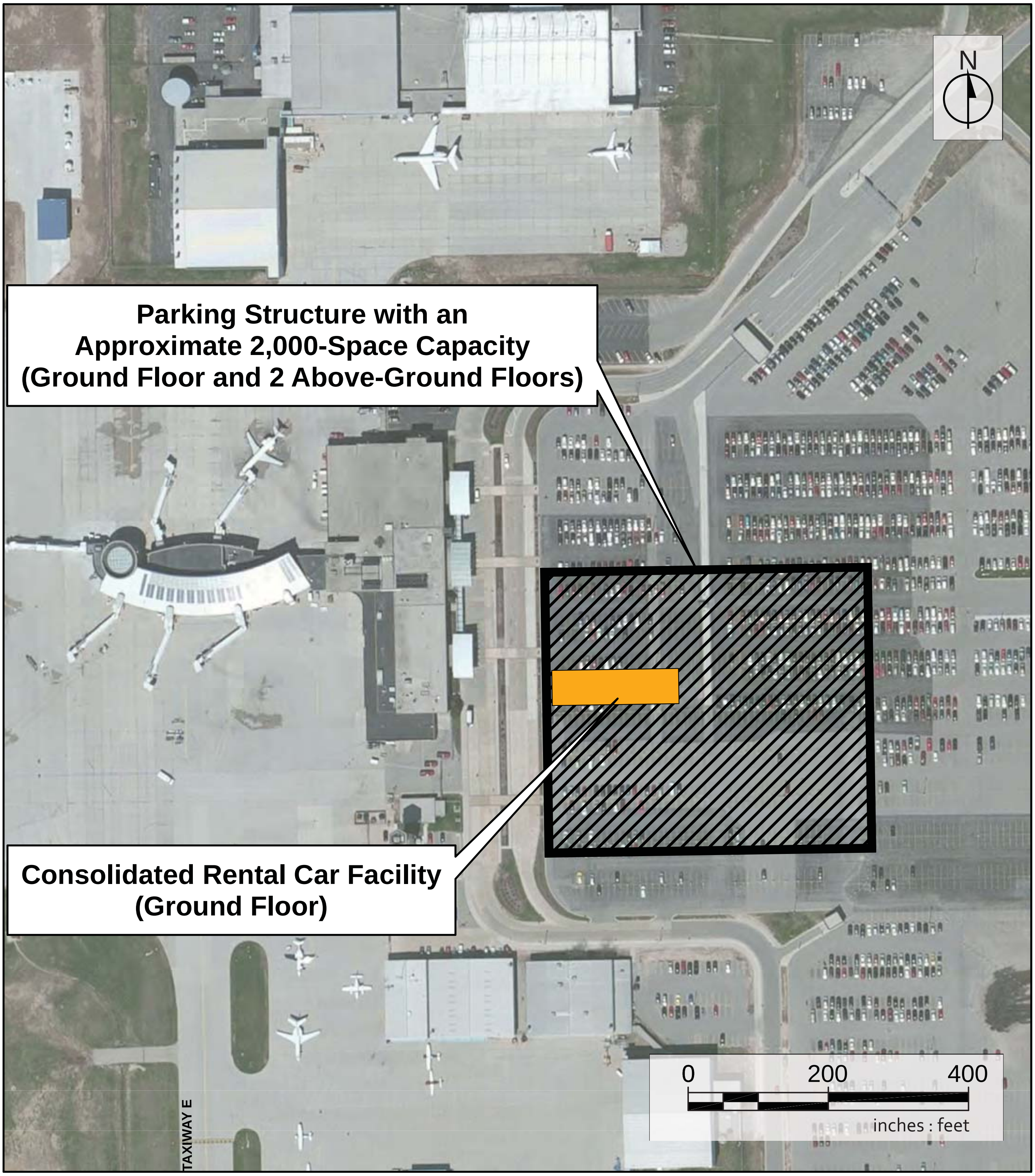


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Exhibit 5-8 AUTOMOBILE PARKING ALTERNATIVE 3 : PARKING STRUCTURE

5.6. Air Traffic Control Tower Alternatives

A detailed air traffic control tower (ATCT) siting study was done as part the previous airport master plan, completed in 2003. The following sections re-evaluate and validate the results of the 2003 study.

5.6.1. 2003 ATCT Siting Study

The 2003 ATCT siting study evaluated the existing ATCT site and a range of alternative relocation sites, with reference to both the mandatory and non-mandatory criteria contained in FAA Order 6480.4, *Airport Traffic Control Tower Siting Criteria*. Mandatory siting criteria considered included the following:

- Visibility of all airport surface areas under ATCT control;
- Visibility of aircraft in airborne traffic patterns;
- Development area available on-site for initial and planned ultimate building components, including personnel vehicle parking, fuel storage, and exterior transformers;
- Relation to imaginary airspace surfaces described in Federal Aviation Regulations (FAR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*; and
- Relation to performance of existing or planned electronic NAVAID facilities.

Non-mandatory siting criteria considered by the study included the following:

- Controller depth perception;
- Tower cab orientation with respect to runway approaches and the rising/setting sun;
- Controller visibility with relation to external light sources;
- Controller visibility with relation to ground operations by aircraft and airport ground vehicles;
- Unique local weather phenomena and their impact on controller visibility;
- Exterior noise;
- Site access;
- Planned expansion as shown on the airport layout plan; and
- Spatial relation to potential jet exhaust fumes and industrial smoke, dust, and fumes.

Four distinct relocation alternatives were initially identified, including the existing ATCT site identified as Site 1. Due to airspace impacts associated with the initial three alternative sites, three additional sites were identified slightly further from each runway but in the same general area as the three initial sites. **Exhibit 5-9** identifies the location of the existing ATCT and the six alternative relocation sites identified by the 2003 study.

The 2003 study found that only Site 1 (existing ATCT) had any existing objects or structures between the tower location and any controlled movement areas. The study found that the controlling object for Site 1 is the Gulfstream paint hangar, which requires an eye elevation of 941 feet above mean sea level (AMSL) for controller line-of-sight to clear the hangar, slightly below the actual controller eye elevation of 943 AMSL.

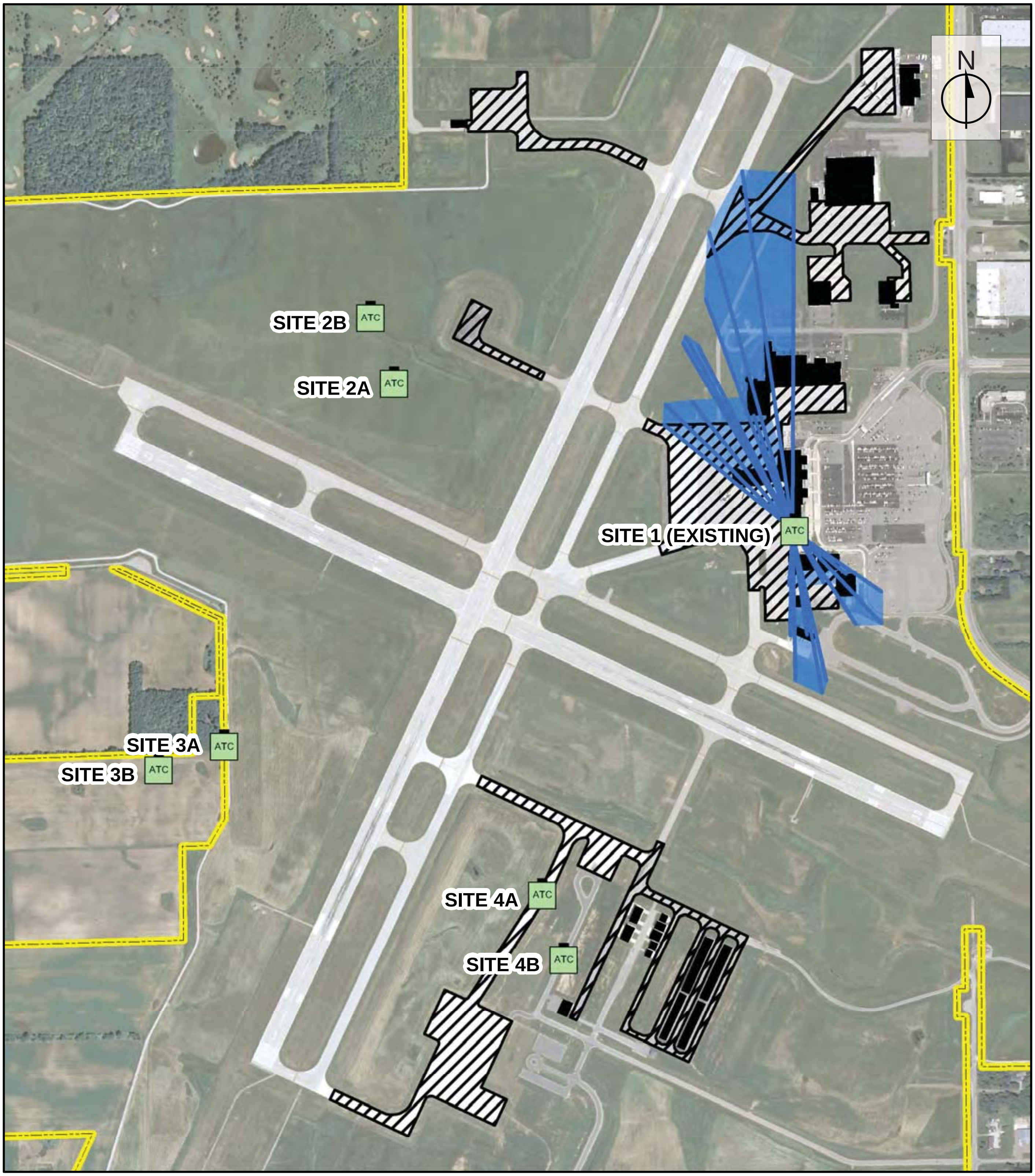


Exhibit 5-9
ATCT RELOCATION ALTERNATIVES

The study stated that, given that there were no objects between all non-movement areas and any of the six alternative relocation sites, the controlling line-of-sight issue for these sites is controller depth perception to all future runway ends. Controller depth perception is the controlling factor for required controller eye elevation in these situations. However, the study found that none of the six alternative relocation sites are significantly different in terms of required minimum controller eye elevation, with the minimum eye elevations ranging from 941 to 966 feet AMSL. These minimum eye elevations were used to determine minimum top-of-tower elevations for each alternative relocation site.

The 2003 study then evaluated each minimum top-of-tower elevation for potential airspace impacts. The purpose of the airspace evaluation was to identify any ATCT height restrictions associated with "imaginary surfaces" defined in FAA regulations and orders related to airspace protection. The airspace evaluation identified impacts to the following imaginary airspace surfaces:

- Obstruction identification surfaces described in Federal Aviation Regulations (FAR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace;*
- Approach and missed approach surfaces described in FAA Order 8260.3B, *United States Standard for Terminal Instrument Procedures (TERPS)*, for the existing Runway 3 and Runway 30 CAT I ILS approach procedures; and
- Approach and missed approach surfaces described in *TERPS* for the planned future Runway 3 and Runway 30 CAT II/III ILS approach procedures.

The results of the airspace analysis are summarized in **Table 5-2**. As shown in Table 5-2, the study found that only Sites 2A and 3A would have airspace restrictions that may prove a fatal flaw. However, required ATCT heights at these sites would only impact the FAR Part 77 surfaces and would not impact any existing or planned future TERPs surfaces. Although FAA clearance requirements require an airspace study for ATCTs that are obstructions to FAR Part 77 surfaces, FAA AC 150/5300-13, *Airport Design*, specifically notes that most ATCTs penetrate a FAR Part 77 surface. The study concluded that none of the candidate sites would be considered a hazard to air navigation or impact any of the Airport's existing or planned future approach or missed approach procedures.

Table 5-2: 2003 Airspace Analysis Results for Alternative ATCT Relocation Sites

	Is the required ATCT height at the site an obstruction to…				
Site	**FAR Part 77 Surfaces?**	**Existing Runway 3 CAT I TERPS Surfaces?**	**Existing Runway 30 CAT I TERPS Surfaces?**	**Future Runway 3 CAT II/III TERPS Surfaces?**	**Future Runway 30 CAT II/III TERPS Surfaces?**
1	No	No	No	No	No
2A	Yes	No	No	No	No
2B	No	No	No	No	No
3A	Yes	No	No	No	No
3B	No	No	No	No	No
4A	No	No	No	No	No
4B	No	No	No	No	No

Source: 2003 Master Plan Update

The 2003 study concluded that Site 3B "appears to be the best long-term solution in terms of control tower location." According to the study, Site 3B is capable of meeting all of the FAA siting requirements and provides good airfield visibility without any airspace impacts. The study specifically noted that selecting Site 3B would allow the ATCT to face predominantly to the north, which is recommended within the northern hemisphere.

5.6.2. Re-Evaluation of 2003 ATCT Relocation Site Recommendation

Operational Factors

Since 2003, the Airport has embarked on an ambitious program to relocate general aviation (GA) landside facilities to the southeastern quadrant of the airfield. GA improvements built in this area since 2003 include new aprons, taxiways, hangars, and access roads. Due to these improvements, Sites 4A and 4B are no longer viable alternative ATCT relocation sites. As a result, these sites should be removed from further consideration. As discussed previously, the 2003 study found that only Sites 2A and 3A would result in new obstructions to any critical airspace surfaces. Because there are potential sites other than Sites 2A and 3A with less airspace impact, these sites should be removed from further consideration.

The two remaining ATCT relocation sites are Site 2B and Site 3B. The main operational difference between is tower cab orientation. As mentioned previously, Site 3B allows the ATCT to face predominantly to the north, which is recommended in the northern hemisphere. However, if environmental study were to find that Site 2B is preferable for a specific reason, new window glazing technologies could be utilized to mitigate effects associated with a south-facing tower at Site 2B.

Economic Factors

A relocated ATCT at either Site 2B or Site 3B would require extensive new access roads and utilities due to their currently undeveloped state. However, the probable costs associated with construction of an ATCT at either Site 2B or Site 3B are of a similar order of magnitude.

Environmental Factors

The main environmental difference between the Site 2B and Site 3B is the current disposition of the property on which they reside. Site 2B is entirely within current Airport property boundaries, while Site 3B would require land acquisition for implementation. However, it is expected that the land acquisition associated with Site 3B would be minor, and would protect against future encroachment of incompatible uses in close proximity to both runways.

Implementation Feasibility

There are no known significant challenges which inhibit the feasibility of any of the security checkpoint alternatives.

Preferred Alternative

For the purpose of this Master Plan, Site 3B will be retained as the preferred site for a relocated ATCT due its north-facing orientation. A more formal siting study will need to be completed in accordance with FAA Order JO 6480.4B, *Airport Traffic Control Tower Siting Process*. Because the ATCT at ATW participates in the Federal Contract Tower program, the siting process is less detailed and more abbreviated than for FAA-staffed towers. Below is an estimated timeline for relocation of the ATCT, from initiation of the siting process to opening of a relocated ATCT facility.

Table 5-3: Estimated Timeline for ATCT Relocation

Phase	Description	Duration
1	Siting Study	6 months
2	ALP Update, Airspace Review, and Environmental Documentation	6 months
3	Facility Design	12 months
4	Construction	12 months
5	Commissioning	3 months

5.7. SRE Facility Alternatives

This section presents three alternatives for accommodating existing and future requirements for additional SRE/maintenance facility capacity. As discussed in Section 4.8, the existing 29,700 square foot facility in the northeastern corner of the airfield is inadequate for the Airport's needs. An estimated 65,900 square feet of indoor space is required to accommodate these needs. Based on airfield size, vehicle dimensions, and required separations between various functional areas, a building footprint of 200 feet by 300 feet will be utilized by this alternatives analysis as a rough estimate of ideal SRE/maintenance facility dimensions. Each alternative considered will also provide an estimated 150 feet of paved apron on three sides of the facility, to allow for vehicle maneuvering and potential outdoor storage.

5.7.1. SRE Alternative 1: Existing Facility Expansion

Alternative 1 is presented in **Exhibit 5-10**. This alternative involves an expansion to the existing SRE/maintenance facility by 180 feet to the west. This is the only direction in which the existing building can be expanded while providing for Airport SRE/maintenance needs in various functional areas. The east side of the building contains numerous utilities both within and outside the structure walls, including hydraulic lifts, and water, electrical, and gas pipes and wires. Relocating these utilities after a building expansion would present logistical and financial challenges, and extensive reconfiguration of the building's functional areas would be required to make each area fit in relation to one another. In addition, there is not enough space between a potential eastern expansion and County Road CB for the expanded building to comply with local setback requirements. Expansion to the north and south of the building is not feasible either, as the building is in need of additional width to accommodate circulation and storage of longer vehicles, and does not necessarily require additional length. Expansion to the west will accommodate longer vehicle circulation and storage, but may also require some reconfiguration of the various functional areas to meet space requirements.

As shown in Exhibit 5-10, this expansion would result in the SRE/maintenance facility entering underneath the 40:1 surface required for Runway 3 instrument departures under AC 150/5300-13, *Airport Design*, Appendix 2. The expanded facility would not penetrate this surface. However it is not desirable to build new facilities below the surface, as it will not allow for long-term facility modifications or expansions. In addition, the facility expansion will require the construction of additional apron pavement surrounding the building to the north, west, and south to allow for vehicle maneuvering and potential outdoor storage. The apron expansion required under this alternative would also enter underneath the

40:1 departure surface, as well as the 34:1 surface required for Runway 21 instrument approaches under Federal Aviation Regulations (FAR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. As a result, SRE vehicles maneuvering in the area below the 34:1 approach surface would pose a potential hazard to aircraft on approach to Runway 21, depending on vehicle heights and the ultimate elevation of the new apron pavement.

5.7.2. SRE Alternative 2: New Facility at Existing Site

Alternative 2 is presented in **Exhibit 5-11**. This alternative involves constructing a brand new, reconfigured SRE/maintenance facility immediately south of the current site. The existing facility would be demolished following construction of the new facility. The siting of the new facility avoids it entering underneath the 40:1 Runway 21 departure surface, and the siting of the newly-constructed apron surrounding the facility avoids it entering underneath the 34:1 Runway 21 approach surface. This alternative would constrict future growth in corporate aviation and air cargo facilities to its immediate south. There is also limited long-term modification and expansion potential associated with this alternative due to the proximity of the Runway 21 approach and departure surfaces.

5.7.3. SRE Alternative 3: Relocated Facility

Alternative 3 is presented in **Exhibit 5-12**. This alternative involves constructing a brand new SRE/maintenance facility next to the preferred ATCT alternative location on the west side of Airport property. This location was identified based on current ground transportation infrastructure, expected future uses for Airport property, and its co-location with the preferred ATCT alternative. Co-locating the SRE/maintenance facility with the ATCT facility would provide cost savings and efficiencies associated with new utilities, access roads, and automobile parking lots. This site is also in closer proximity to all runway ends than the existing facility, which will provide cost, time, and fuel-burn savings during snow removal operations.

5.7.4. SRE Facility Alternatives Comparison

Operational Factors

The location of the existing SRE/maintenance facility is constrained by airspace requirements associated with approaches to and departures from Runway 3/21. Expanding the existing facility as proposed under Alternative 1 may violate these requirements, and are otherwise inadvisable because it will not allow for long-term facility modifications or expansions. Alternative 2 also has limited long-term modification and expansion potential due to the proximity of the Runway 3/21 approach and departure surfaces. Alternative 3 does not pose airspace concerns and is in closer proximity to all runway ends than the existing facility, which will provide cost, time, and fuel-burn savings during snow removal operations. Alternative 3 is considered the preferred alternative from an operational standpoint.

Economic Factors

Alternative 3 would require extensive new access roads and utilities due to the currently undeveloped state of the site. However, this alternative would realize cost savings when combined with preferred ATCT relocation alternative, and when considering cost, time, and fuel-burn savings associated with its location in closer proximity to both runways. Alternatives 1 and 2 would both realize cost savings over Alternative 3 through use of existing infrastructure, but both also constrain future expansion of revenue-producing air cargo and Airport tenant facilities south of the existing SRE/maintenance facility.

Environmental Factors

Alternatives 1 and 2 would take place entirely within current Airport property boundaries, while Alternative 3 would require land acquisition for implementation. However, it is expected that the land acquisition associated with Alternative 3 would be minor, and would protect against future encroachment of incompatible uses in close proximity to both runways.

Implementation Feasibility

There are no known significant challenges which inhibit the feasibility of any of the SRE/maintenance facility alternatives.

Preferred Alternative

Alternative 3 is considered the preferred alternative due to its relative operational benefits.

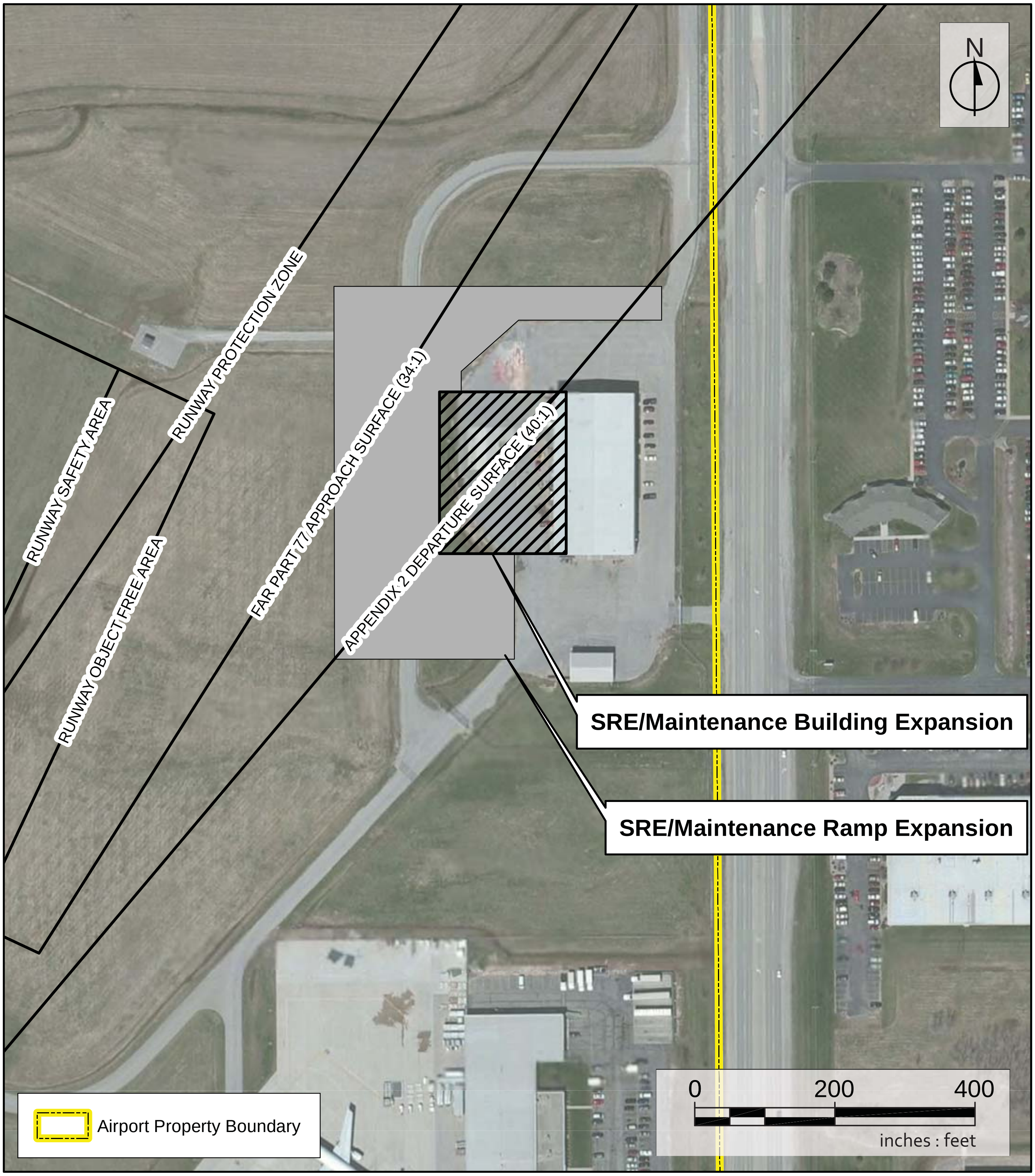
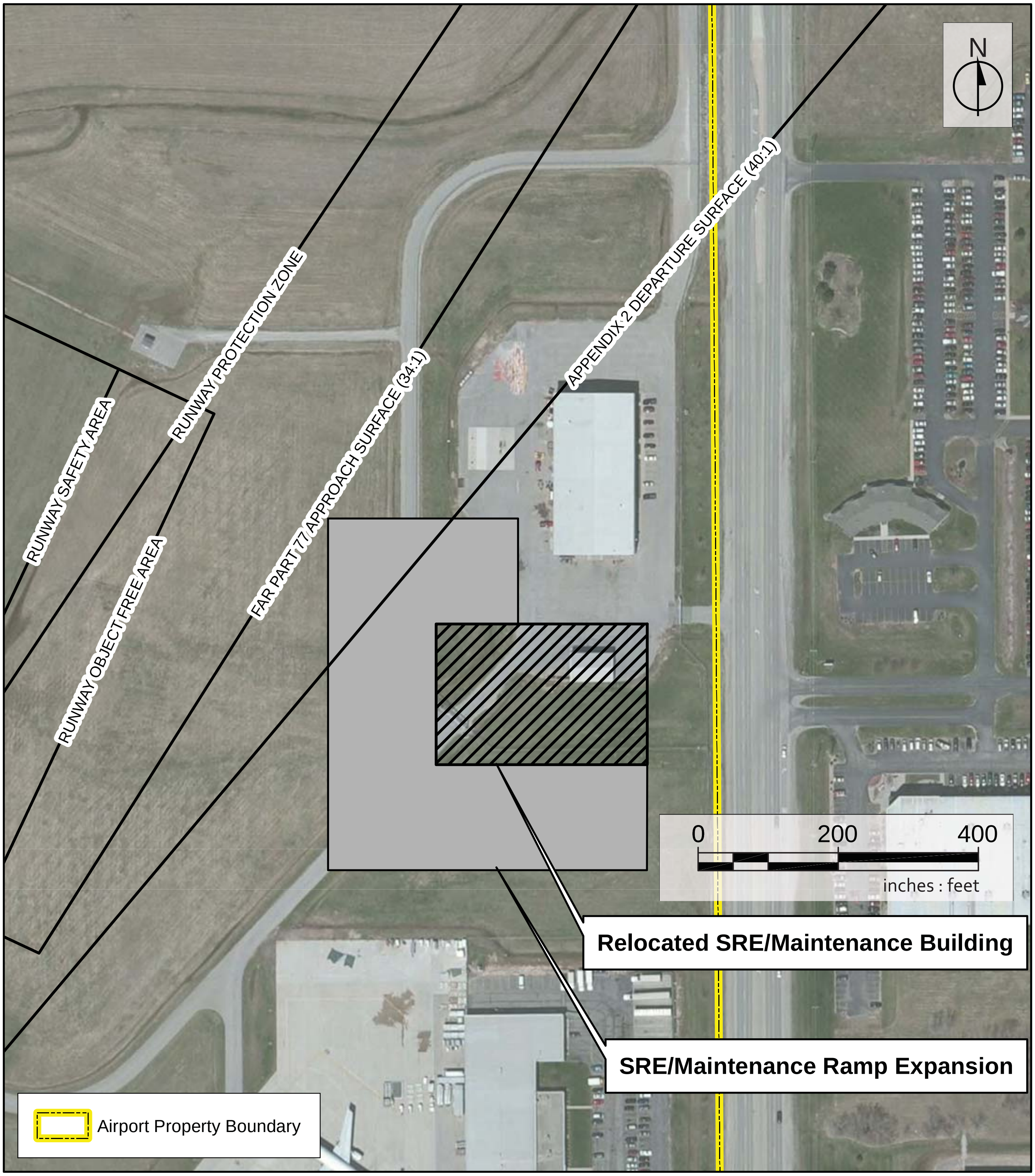


Exhibit 5-10 SRE ALTERNATIVE 1 : EXISTING FACILITY EXPANSION



N
RUNWAY SAFETY AREA
RUNWAY PROTECTION ZONE
RUNWAY OBJECT FREE AREA
FAR PART 77 APPROACH SURFACE (34:1)
APPENDIX 2 DEPARTURE SURFACE (40:1)
0
200
400
inches : feet
Relocated SRE/Maintenance Building
SRE/Maintenance Ramp Expansion
Airport Property Boundary

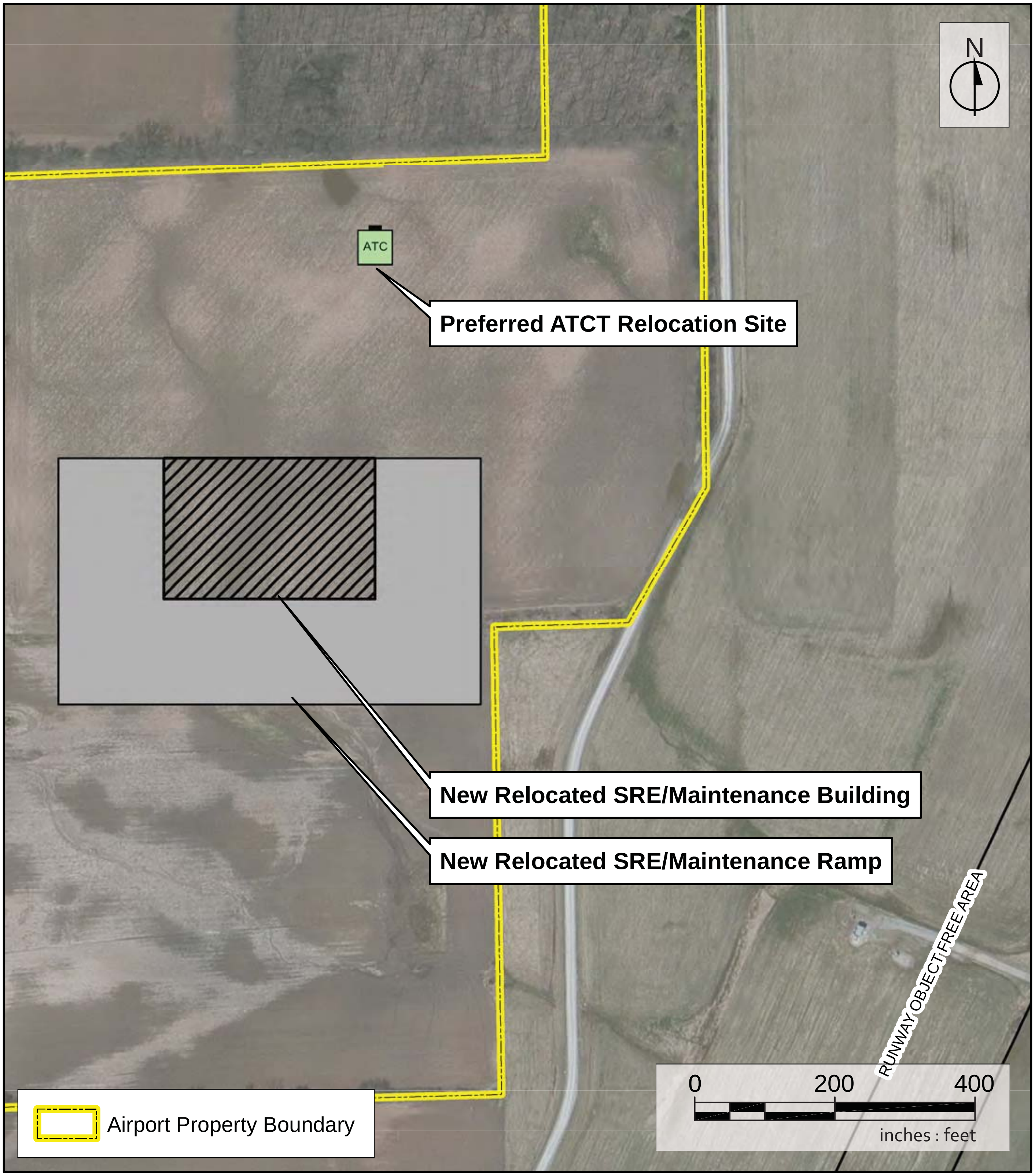


Exhibit 5-12 **SRE ALTERNATIVE 3**
RELOCATED NEW FACILITY

5.8. Crosswind Runway Extension Alternatives

This section presents four alternatives for accommodating Runway 12/30 length requirements. As discussed in the previous chapter, an additional 1,500 feet in crosswind runway length is required to accommodate the existing airline fleet at ATW. The alternatives discussed in the following sections identify various ways to address this need. Land acquisition required is also identified for each alternative based on the amount of land that falls within the runway protection zones (RPZs) for each runway end.

5.8.1. Crosswind Runway Alternative 1: Extend to Southeast by 1,500 Feet

Alternative 1 is presented in **Exhibit 5-13**. This alternative extends Runway 12/30 by 1,500 feet to the southeast, resulting in a total 8,000-foot runway length. This extension would require the relocation of the Runway 30 medium-intensity approach lighting system with runway alignment indicator lights (MALSR). At least four Runway 30 MALSR light stations would need to be relocated outside existing Airport property. Approximately 42 acres of off-Airport property would fall within the Runway 30 RPZ. In addition, at least five off-Airport buildings or structures would fall within the Runway 30 RPZ.

5.8.2. Crosswind Runway Alternative 2: Extend to Northwest by 1,500 Feet

Alternative 2 is presented in **Exhibit 5-14**. This alternative extends Runway 12/30 by 1,500 feet to the northwest, resulting in a total 8,000-foot runway length. This would require the relocation of State Highway 76 out of the runway safety area (RSA) and runway object free area (ROFA) for the extended runway. Approximately 40 acres of off-Airport property would fall within the Runway 12 RPZ. In addition, at least five buildings or structures would fall within the Runway 12 RPZ, RSA, and ROFA.

5.8.3. Crosswind Runway Alternative 3: Extend to Northwest by 750 Feet and to Southeast by 750 Feet

Alternative 3 is presented in **Exhibit 5-15**. This alternative extends Runway 12/30 by 750 feet to the northwest and 750 feet to the southeast, resulting in a total 8,000-foot runway length. This extension would require the relocation of the Runway 30 MALSR. One of Runway 30 MALSR light stations would need to be relocated outside existing Airport property. Approximately 19 acres of off-Airport property would fall within the Runway 12 RPZ, and approximately 18 acres of off-Airport property would fall within the Runway 30 RPZ. In addition, at least five off-Airport buildings or structures would fall within the Runway 12 RPZ, and at least three off-Airport buildings or structures would fall within the Runway 30 RPZ.

5.8.4. Crosswind Runway Alternatives Comparison

Operational Factors

All three crosswind runway alternatives provide the required runway length identified in the last chapter. Extension to the northwest is preferable from an airspace perspective, due to potential obstructions in the approach path to and departure from a southeastern runway extension.

Economic Factors

The probable costs associated with each of the crosswind runway alternatives are of a similar order of magnitude.

Environmental Factors

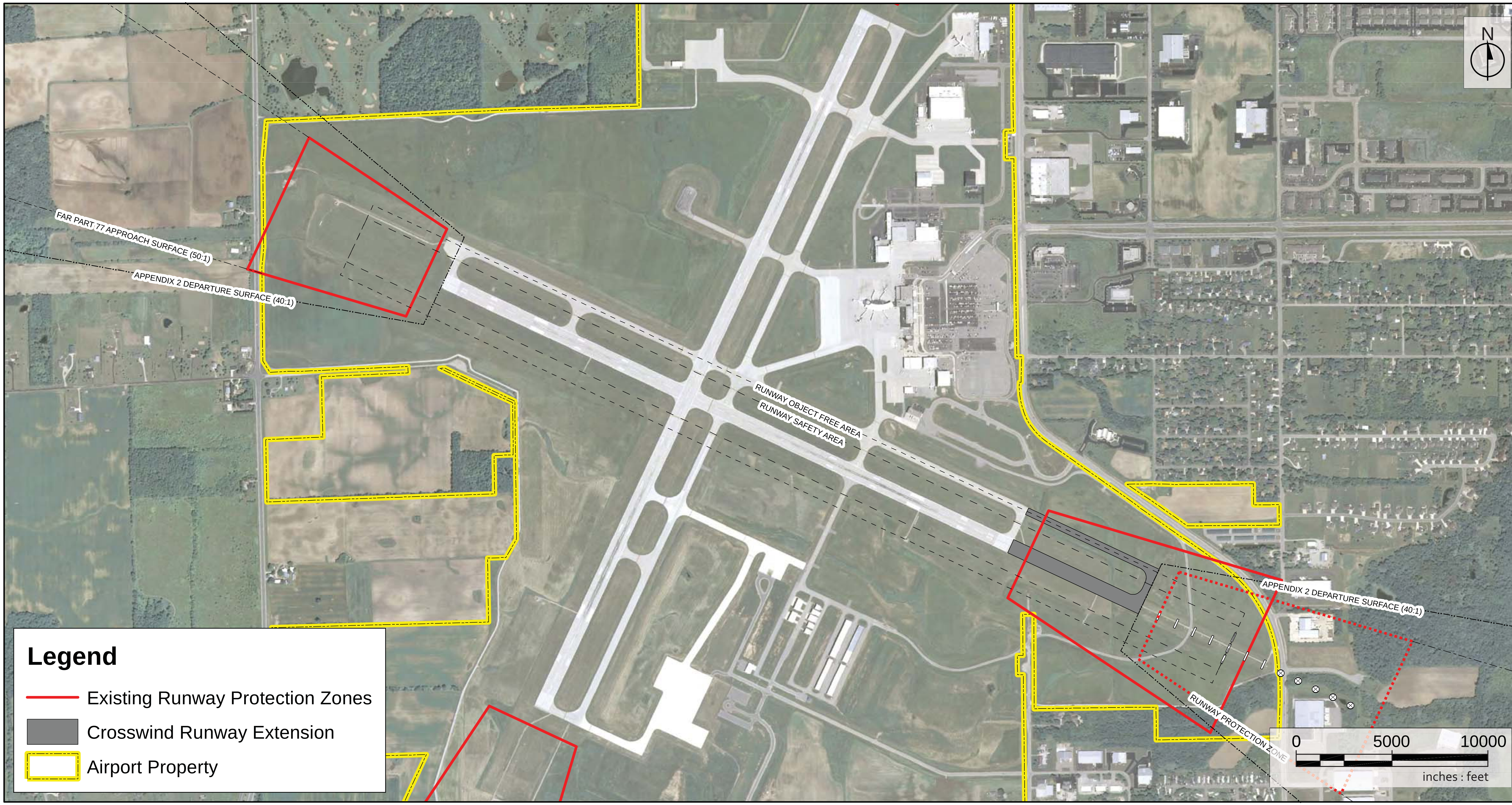
Each of the crosswind runway alternatives would require significant land acquisition to comply with FAA land control standards. Each alternative would also result in incompatible buildings and structures within the RPZ. Alternative 3 is preferable from a land use perspective as it balances land use impacts on either end of the runway.

Implementation Feasibility

Due to land use impacts, all of the crosswind runway alternatives are expected to arouse some controversy in the community.

Preferred Alternative

Alternative 3 is considered the preferred alternative due to its relative operational and environmental benefits.



Outagamie County Regional Airport ATW Appleton Wisconsin

Exhibit 5-13

CROSSWIND RUNWAY ALT. 1 : EXTEND SOUTHEAST BY 1500 FT

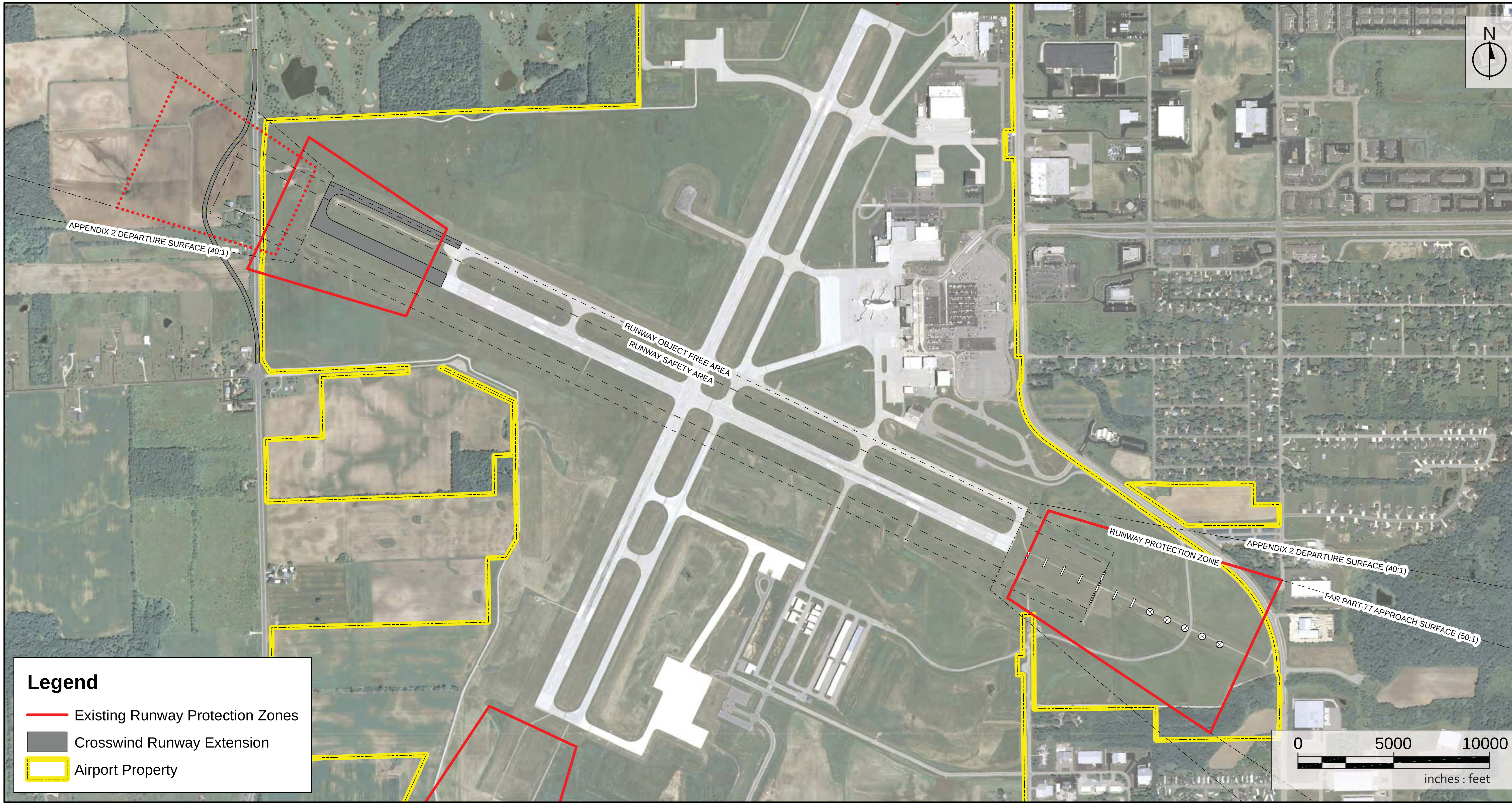
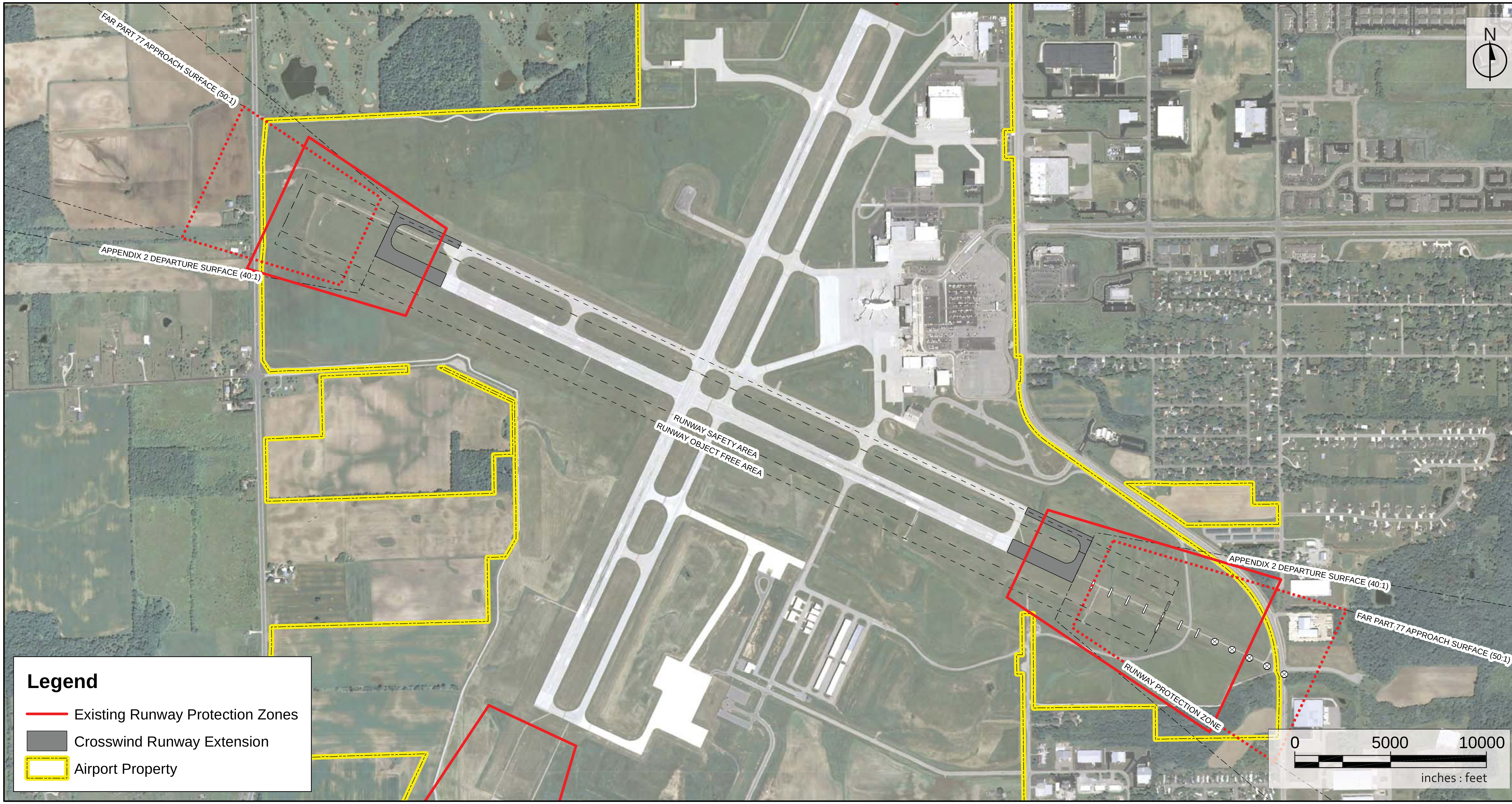


Exhibit 5-14

CROSSWIND RUNWAY ALT. 2 : EXTEND NORTHWEST BY 1500 FT



Outagamie County Regional Airport ATW Appleton Wisconsin

Exhibit 5-15

CROSSWIND RUNWAY ALT. 3 : EXTEND NORTHWEST AND SOUTHEAST BY 750 FT

5.9. Air Cargo Facility Alternatives

This section presents three alternatives for accommodating long-term requirements for air cargo facilities. As discussed in Section 4.7, an additional 31,360 SF of air cargo building space and 8,400 SY of air cargo apron space will be required to accommodate anticipated growth in air cargo activity at ATW over the next 20 years. Similar increases in ground service equipment (GSE) storage space, cargo truck movement area, and employee/customer parking will also be required. The alternatives discussed in the following sections identify various ways to address these needs.

5.9.1. Air Cargo Alternative 1: Existing Facility Expansion

Air Cargo Alternative 1 involves expanding the existing air cargo building, aircraft parking apron, GSE storage areas, cargo truck movement areas, and employee/customer parking areas. Alternative 1 is presented in **Exhibit 5-16**. This alternative would accommodate either the addition of a new air cargo operator, or the expansion of the existing air cargo operator's operations. Due to the existing layout of other existing tenant facilities, expansion must occur to the north of the existing air cargo facilities. For the purposes of long-term planning, this alternative will result in further restricting future expansion of SRE/maintenance facilities to the north and other tenant facilities to the south. Furthermore, this alternative would require the relocation of the SRE/maintenance facility access road. Initial planning indicates that possible access road relocation options may not accommodate required Runway 4/22 approach and departure airspace clearances for SRE vehicles traversing the relocated access road.

5.9.2. Alternative 2: New Separate Facility at Alternate Site

Air Cargo Alternative 2 involves the establishment of a second, separate air cargo facility area on the northwest side of the airfield. Alternative 2 is presented in **Exhibit 5-17**. This alternative assumes that growth in air cargo facility needs will be associated with a second air cargo operator rather than expansion of the existing air cargo operator, as separate facilities for a single air cargo operator would be functionally and operationally inefficient. This alternative will allow for some future expansion of existing SRE/maintenance facilities to the north of the existing air cargo facilities, as well as other tenant facilities to the south of the existing air cargo facilities.

5.9.3. Alternative 3: New Consolidated Facility at Alternate Site

Air Cargo Alternative 3 involves relocating the existing air cargo facilities to the northwest side of the airfield and expanding their sizes. Alternative 3 is presented in **Exhibit 5-18**. This alternative would accommodate either the addition of a new air cargo operator, or the expansion of the existing air cargo operator's operations. This alternative would also eliminate the existing air cargo facilities, allowing for future expansion of existing SRE/maintenance facilities and other tenant facilities on the east side of the airfield. Another advantage of this alternative is that it would separate cargo truck traffic from other ground vehicle traffic.

5.9.4. Air Cargo Facility Alternatives Comparison

Operational Factors

Alternative 1 will result in further restricting future expansion of SRE/maintenance facilities to the north and other tenant facilities to the south, and would require the relocation of the SRE access road. Alternatives 2 and 3 allow for air cargo expansion in an unconstrained location.

Economic Factors

Alternatives 1 and 2 would have probable costs of a similar order of magnitude, while Alternative 3 would cost more due to its larger size. Alternatives 2 and 3 would make best use of existing infrastructure on the northwest side of the airfield that is currently sitting idle.

Environmental Factors

None of the three air cargo facility alternatives are expected to have adverse environmental impacts, and there is no significant difference among the four alternatives in terms of environmental impacts.

Implementation Feasibility

There are no known significant challenges which inhibit the feasibility of any of the air cargo facility alternatives.

Preferred Alternative

Alternative 2 is considered the preferred alternative due to its relative operational and economic benefits.

Exhibit 5-16 AIR CARGO ALT. 1 : EXISTING FACILITY EXPANSION

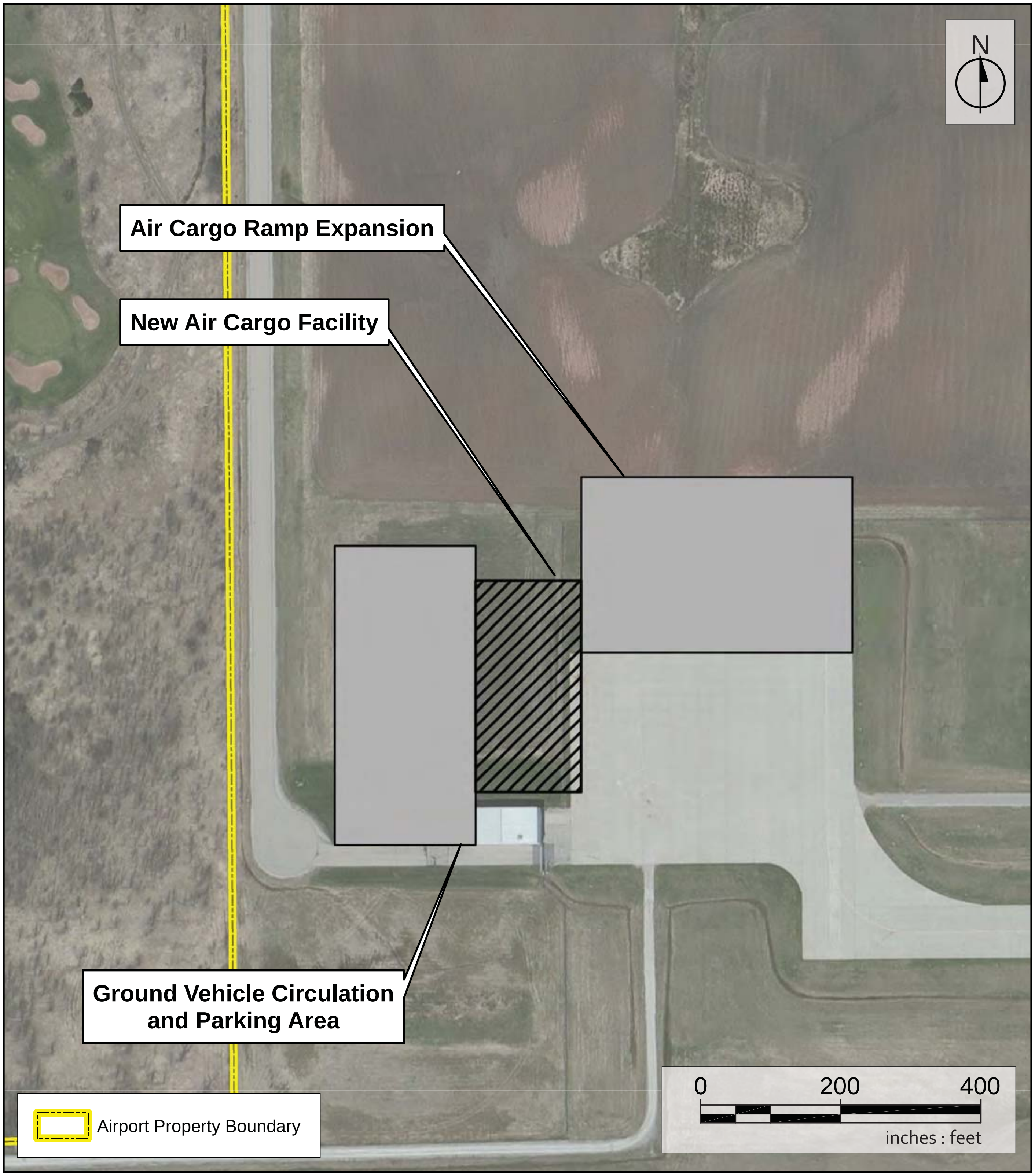


Exhibit 5-17 AIR CARGO ALT. 2 : NEW SEPARATE FACILITY AT ALT. SITE

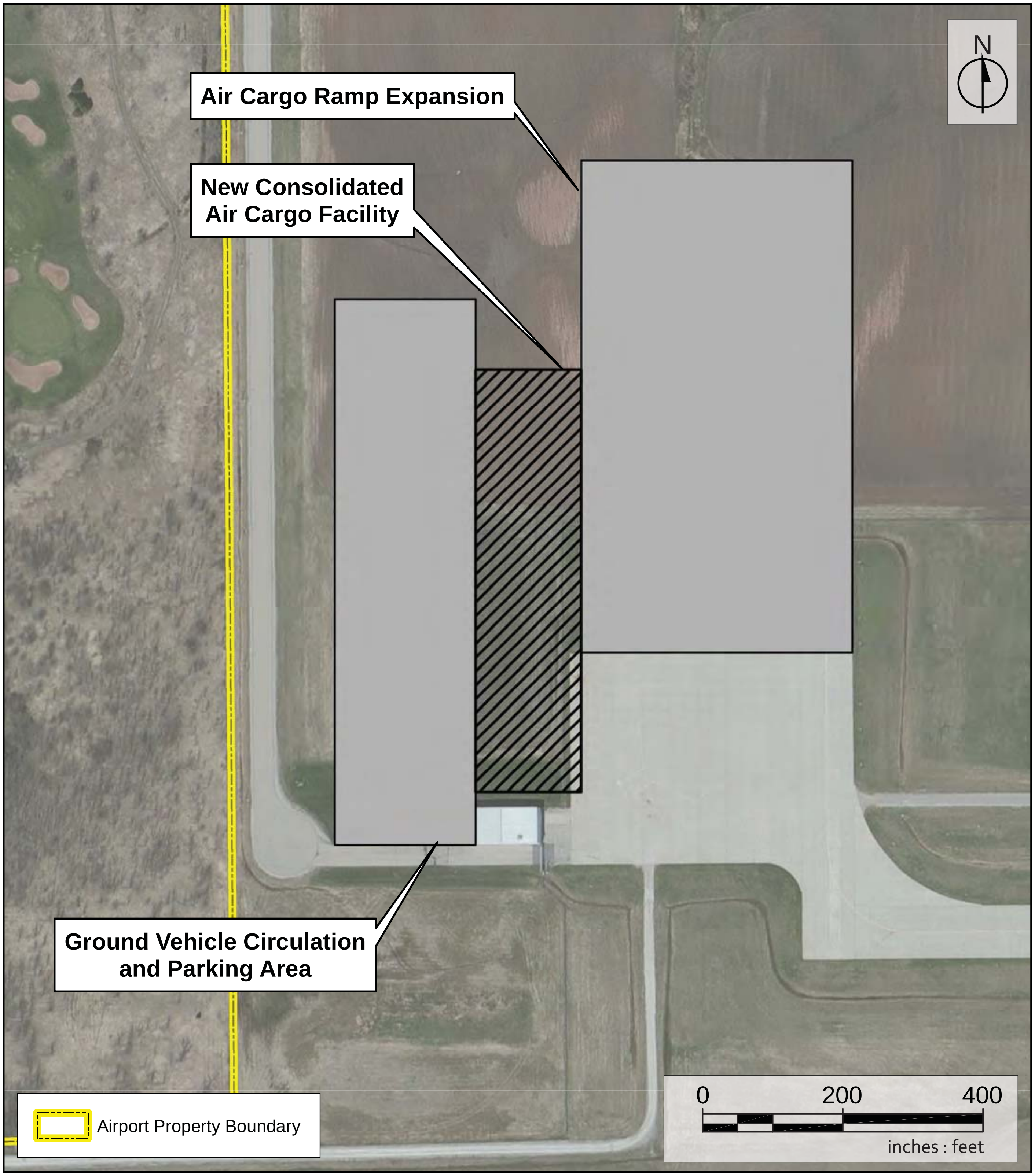


Exhibit 5-18 **AIR CARGO ALT. 3 : NEW CONSOLIDATED FACILITY AT ALT. SITE**

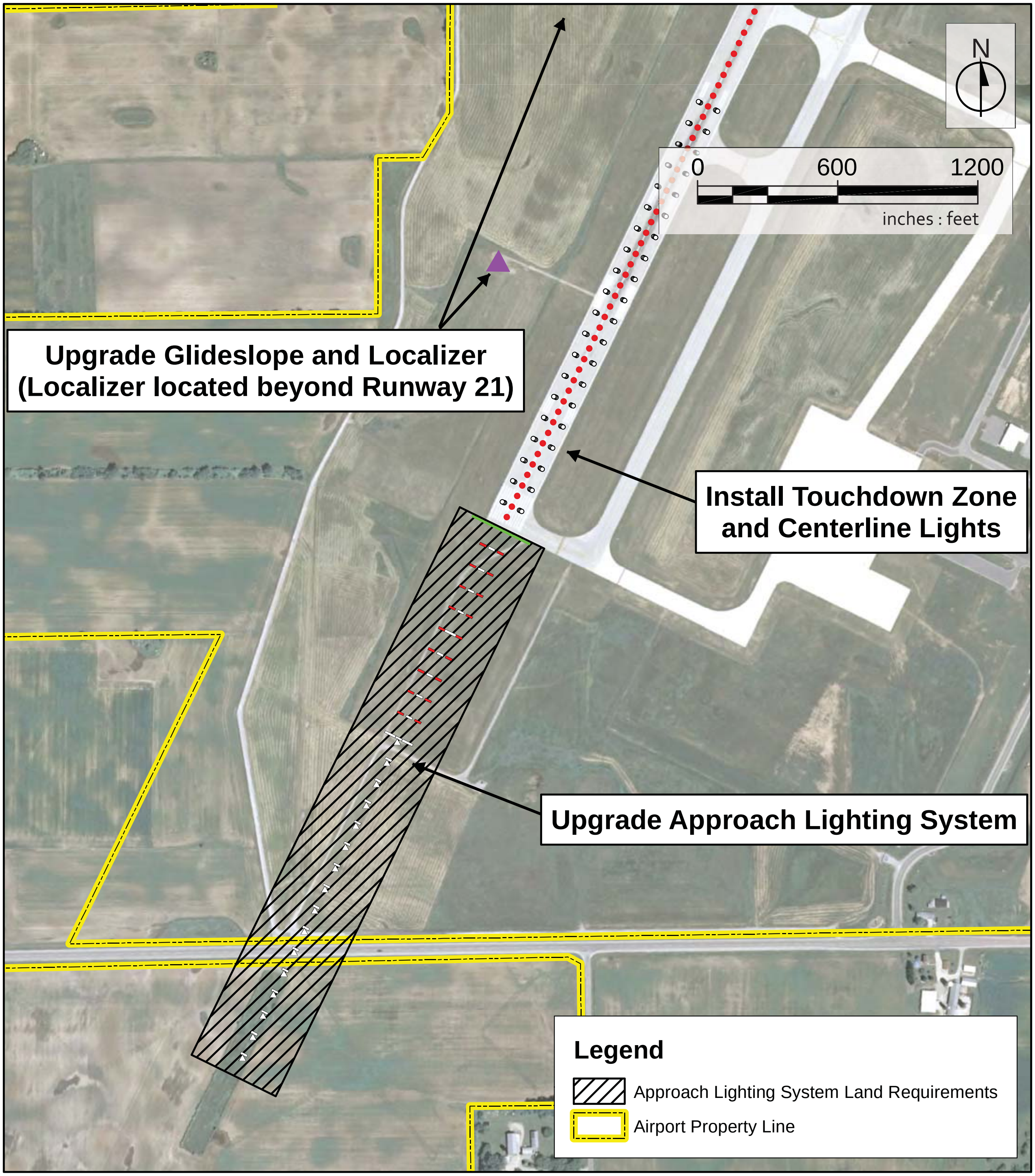
5.10. Instrument Approach Upgrade Alternative

Existing instrument approaches at ATW provide the Airport with a high level of approach capability. However, as discussed in Section 4.4, passenger airlines and air cargo carriers have expressed a need for upgraded landing equipment and procedures to provide ILS Category II/III (CAT II/III) approach minimums. Due to inferior existing approach NAVAIDs and likely off-Airport impacts, Runways 21, 12, and 30 are unsuitable candidates for implementation of ILS CAT II/III approach minima. Runway 3/21 is the primary runway and the longest runway, and Runway 3 allows aircraft to land and exit the runway as close as possible to the passenger terminal and air cargo areas on the north side of the airfield. Furthermore, Runway 3 has slightly better IFR wind coverage than Runway 30, 99.65% versus 97.64% assuming a 20-knot crosswind component. As a result, Runway 3 is the preferred runway end for implementing CAT II/III minima.

Upgrading the CAT I Runway 3 ILS for CAT II/III approach minima will require a cost-benefit screening conducted according to applicable FAA criteria. As shown in **Exhibit 5-19**, necessary improvements to accommodate a CAT II/III ILS approach include new high-performance glideslope and localizer components, as well as the addition of the following lighting systems:

- High Intensity Approach Lighting System (ALSF-2)
- Runway Touchdown Zone Lights (TDZL)
- Runway Centerline Lights (RCLS)

TDZL and RCLS systems are in-pavement lighting systems that can be installed within the existing runway pavement. The existing MALSR footprint is capable of accommodating the equipment associated with the ALSF-2 system.


N
0
600
1200
inches : feet
Upgrade Glideslope and Localizer
(Localizer located beyond Runway 21)
Install Touchdown Zone
and Centerline Lights
Upgrade Approach Lighting System
Legend
Approach Lighting System Land Requirements
Airport Property Line

5.11. Alternatives Summary

The following is a summary of the preferred improvement alternatives and improvement proposals.

Airfield

- Extend Runway 12/30 by 750 feet to the northwest and 750 feet to the southeast, as described under Crosswind Runway Alternative 3.
- Pursue a CAT II/III instrument approach for Runway 3, as described under Instrument Approach Alternative 1.

Passenger Terminal Building

- Reconfigure the security checkpoint, administration, and tenant spaces as described under Security Checkpoint Alternative 4 and the Preferred Admin/Tenant Block Alternative.
- Relocate the rental car company counters and offices to a dedicated facility outside the passenger terminal building.

Automobile Access and Parking

- Construct a new 2,000-space parking structure, as described under Automobile Parking Alternative 3.

Support Facilities

- Relocate the Air Traffic Control Tower to the southwest side of the airfield, as described under ATCT Alternative Site 3B.
- Relocate and expand the Snow Removal Equipment Building, as described under SRE Alternative 3.
- Construct a new, separate air cargo facility in the northwest cargo area, as described under Air Cargo Alternative 2.

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Chapter 6

Sustainable Initiatives

Chapter 6

SUSTAINABLE INITIATIVES

The focus of this Sustainable Master Plan is on improving the energy efficiency of Airport buildings, and enhancing the Airport's on-site portfolio of renewable energy sources such as solar and geothermal. Improved energy efficiency and on-site renewable energy sources will have real long-term economic benefits for the Airport, as money currently spent on purchased electricity and natural gas can be invested elsewhere. It will also have commensurate environmental and social benefits, including reduced air pollution and decreased consumption of non-renewable energy sources such as coal. Both globally and nationally, commercial and residential buildings account for more total energy consumption and greenhouse gas emissions than any other sector of the economy. Therefore improving the energy efficiency and renewable resource portfolio of new and existing buildings has the greatest potential for conserving energy resources, and for combating global climate change and its negative effects on society.

Chapter 3 provided baseline energy data for Airport buildings against which future energy use can be measured. This chapter establishes measurable goals for minimizing future energy use and enhancing on-site renewable energy sources, and identifies a phased set of initiatives for achieving these goals. The sustainable goals and initiatives for Airport building energy use are presented in the following sections:

- Sustainable Initiatives Evaluation Factors
- Relationship between Energy Usage and Emissions
- Passenger Terminal Energy Goals
- Energy Use Reduction Initiatives
- Renewable Energy Initiatives

Building Sustainability

6.1. Sustainability Initiatives Evaluation Factors

Each sustainability initiative presented in this chapter was evaluated on its ability to meet the "triple bottom line" goals and its ability to meet those goals in a way that is compatible with the Core Values from the mission statement.

6.1.1. Environmental Protection and Natural Resource Conservation

Related Core Values:

- Accountability. ATW actively seeks to attract and retain high-caliber professionals committed to maximizing safety, reliability, and accountability throughout the organization.
- Environment. ATW strives to be a model steward of our environment, by identifying sustainable development that meets present needs without compromising the ability of future generations.

6.1.2. Social / Cultural Progress

Related Core Values:

- Community**.** ATW will continue to be a responsible business and philanthropic partner to the community in order to be the regional airport of choice.
- Accountability**.** ATW actively seeks to attract and retain high-caliber professionals committed to maximizing safety, reliability, and accountability throughout the organization.
- Communication**.** ATW has a philosophy of open, candid communication with each other, policy makers, tenants, passengers, press, and the community.

6.1.3. Stable Economic Growth and Employment

Related Core Values:

- Self-Funded**.** ATW will continue to develop ways to remain financially self-sustaining through a mix of business development, market value leases, and unique marketing partnership.

6.2. Relationship between Energy Usage and Emissions

Energy usage and greenhouse gas emissions are inextricably linked. The amount of energy consumed and the amount of emissions produced depend on the type of fuel burned and the efficiencies of all the steps involved in converting that fuel into useful energy inside the building. To gain a better understanding of how the choices made for the building systems affect the environmental impact, let's follow the energy conversion trail from source to site for three types of heating systems: electric resistance heat, natural gas-fired boiler or furnace, and an electric heat pump.

6.2.1. Electric Resistance Heat

In Wisconsin, most electricity is produced by coal-fired power plants. A coal-fired power plant converts only about 33% of the energy stored in the fuel into electricity; the rest is wasted as heat. The electricity is then delivered to the site where it is available to be converted back into heat for the building spaces. Electric resistance heat is very simple and cheap. Electricity is routed through a ceramic heating element, which generates heat due to the material's high resistance to electric current. At the site, the efficiency of electric resistance heat looks very impressive; nearly 100% of the electric energy is converted into useable heat for the building. However, the overall efficiency is quite low.

Overall efficiency = 100% x 33% = 33%.

6.2.2. Natural Gas-fired Boiler or Furnace

Natural gas-fired boilers and furnaces are powered by combustion reactions that produce water vapor in addition to other exhaust gases. A standard boiler or furnace simply vents the exhaust gases from the combustion chamber at high temperature. The result is that the potential energy stored in the water vapor is lost to the atmosphere. A condensing boiler or furnace uses the exhaust gases to pre-heat the cooler incoming water or air in order to recover the latent heat stored in the water vapor. As the water vapor in the exhaust cools, it condenses and the liquid water is drained away

The main advantage of natural gas (and other combustion-based) building heating systems is that the heat produced by combustion is exactly the desired end result, with no energy wasted through intermediate conversion steps. A typical natural-draft boiler or furnace has a thermal efficiency of about 80%. A condensing boiler or furnace can achieve even higher efficiencies, up to 98%. Since there are no intermediate energy conversion steps, the combustion efficiency is the same as the overall (source) efficiency.

Overall efficiency = 80%

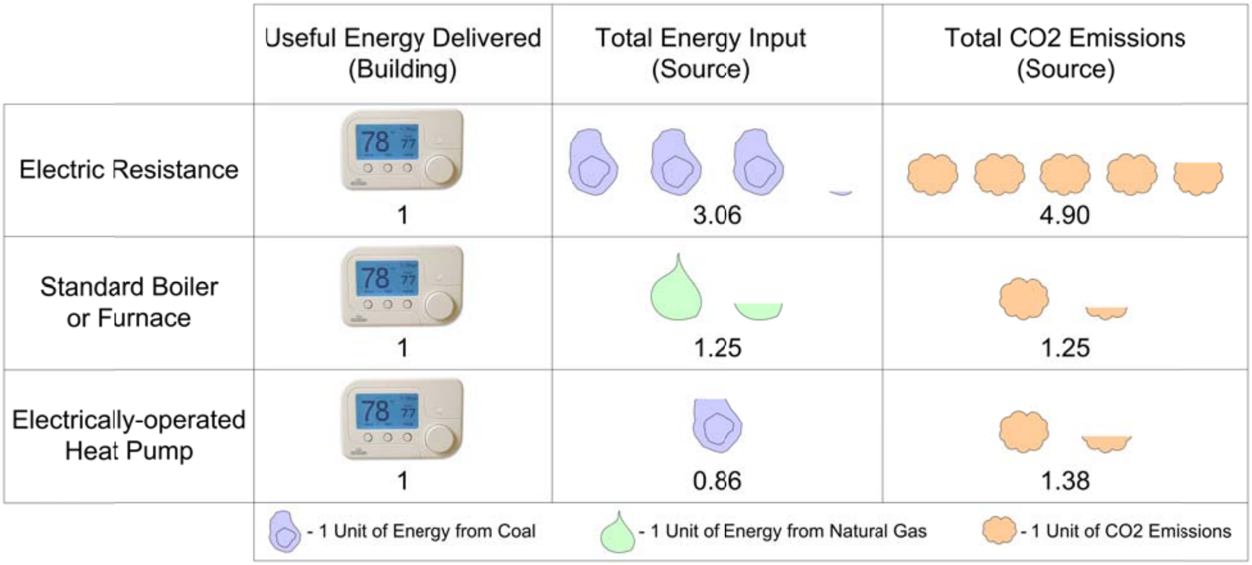
6.2.3. Electrically-operated Heat Pump

As its name implies, a heat pump “produces” heat by moving it from one location to another. Because the heat pumps are not heat engines that convert energy through combustion, they can achieve efficiencies over 100%. The efficiency of a heat pump is described by its Coefficient of Performance (COP), or the ratio of the energy output to the energy input. The COP will vary based on the type and number of compressors used, but most significantly, based on the relative temperatures of the heat source-fluid and the heat rejection-fluid. A typical geothermal heat pump in Wisconsin has a heating COP of about 3.5, equivalent to a “thermal efficiency” of 350%. Since heat pumps are electrically operated, the efficiency of the power plant must be taken into account in order to derive the overall efficiency.

Overall efficiency = 350% x 33% = 116%.

The differences in efficiencies among the three heating systems do not quite account for all of the differences in the CO2 emissions. Coal produces approximately 1.6 times as much CO2 as natural gas per unit of fuel energy. **Exhibit 6-1** summarizes the overall efficiencies for each heating system and the CO2 emissions generated.

Exhibit 6-1. Total fuel input compared to the useful energy output for each type of heating system.



6.3. Passenger Terminal Energy Goals

Because the Passenger Terminal is the main building at the Outagamie Airport and the building that consumes the most energy, the energy goals developed for the Airport focus on the Passenger Terminal. These goals are to:

- Reduce the Passenger Terminal building's total energy consumption by at least 70% compared to the 2010 baseline by the year 2030.
- Increase the production of on-site renewable energy at the Airport in order to offset 50% of the Passenger Terminal building’s total energy consumption by the year 2030.

The energy goals were developed based the Zero Net Energy Commercial Buildings Initiative from the Energy Independence and Security Act of 2007 (EISA 2007). A Zero Net Energy (also called Net Zero Energy) building is a building that produces as much renewable energy on-site as it consumes over the course of a year. The timeline for the EISA 2007 initiative is to make all new commercial buildings Zero Net Energy by the year 2030, half of the existing commercial buildings by the year 2040, and all commercial buildings by the year 2050.

6.3.1. Energy Conservation Goal

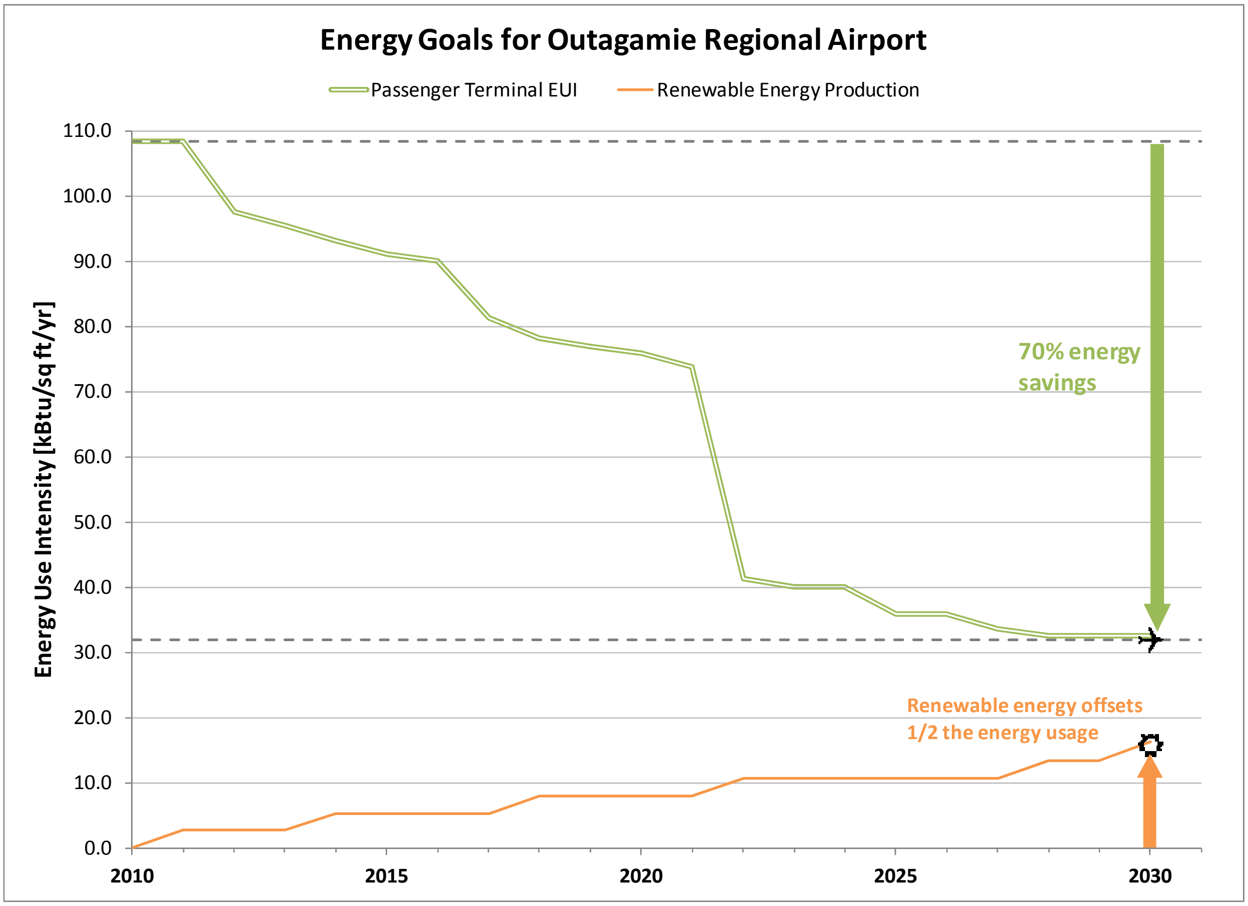
In order to be able to generate enough renewable energy to offset its consumption, a building must have greatly reduced energy requirements compared to an average building that exists today. Case studies conducted on large commercial buildings show that 70% energy savings is feasible for retro-fits. Therefore, the energy efficiency goal for the Passenger Terminal is to achieve 70% total energy consumption reduction over the 2010 baseline.

6.3.2. Renewable Energy Goal

In addition to being extremely energy efficient, a building that is on track to achieve Net-Zero Energy must also include renewable energy sources to offset its energy consumption. Outagamie Airport has already taken steps to incorporate renewable energy at the Airport by installing a 50-kW solar electric (PV) system and a 12-panel solar hot water system on the terminal concourse roof in 2011. The second energy goal is aimed at continuing these efforts to eventually achieve Zero Net Energy for the Passenger Terminal within the timeframe specified in EISA 2007. By the year 2030, the target date for this master plan, it is projected that 50% of the Passenger Terminal building's energy consumption will be offset by renewable energy sources.

Exhibit 6-2 illustrates the energy savings and renewable energy production over time for the Passenger Terminal, ending at the energy targets for the year 2030.

Exhibit 6-2: Energy Goals for Outagamie Regional Airport



6.4. Energy Conservation and Renewable Energy Initiatives Summary

The energy conservation sustainability initiatives are presented below in chronological order corresponding to the Energy Goals as found in **Tables 6-1 and 6-2**. Twenty energy conservation initiatives are shown in Table 6-1, while five renewable energy are shown in Table 6-2. The major initiatives will be discussed further in the Energy Sustainability Initiatives section.

Table 6-1: Energy Conservation Initiatives

Goal #1 Reduce the Passenger Terminal building's total energy consumption by at least 70% compared to the 2010 baseline by the year 2030.				
	Specific Initiatives	**Date to be Completed**	**Est. Energy Savings [% of 2010]**	**Comment**
1-1	Perform retro-commissioning activities on Airport-controlled buildings	2013	10%	Focus On Energy may pay for a portion of this effort through the Building Tune-up Program (http://www.focusonenergy.com/Business/Commercial-Business/Retro/building_tuneup.aspx)
1-2	Perform thermal imaging of the buildings and re-insulate and/or seal up any leaky parts of building envelope	2013	5%	Thermal imaging is used to detect areas of heat loss through the building envelope.
1-3	Require use of only ENERGYSTAR-rated equipment (refrigerators, microwaves, coffee pots, copiers etc.)	2020	3%	Also consider upgrading other appliances that may not have ENERGYSTAR ratings and or using intelligent vending machine controls.
1-4	Install high efficiency hand dryers in restrooms	2015	<1%	May also be an initiative to consider for the Solid Waste Disposal and Recycling and/or Green Procurement sustainability categories.
1-5	Perform comprehensive daylighting study and aim to maximize natural lighting in all occupied spaces	2013	2%	All occupied areas to be equipped with automatic dimming controls. Occupancy sensors will be installed in all other spaces.
1-6	Replace all motors with high efficiency type	2022	1%	Determine which and how many motors that could be replaced. Also, consider when major equipment is to be replaced as part of long-term EE measures.

Goal #1 Reduce the Passenger Terminal building's total energy consumption by at least 70% compared to the 2010 baseline by the year 2030.				
	Specific Initiatives	**Date to be Completed**	**Est. Energy Savings [% of 2010]**	**Comment**
1-7	Set up a Green-Team led by facilities manager that includes building operators, users and any others that might affect energy usage	On Going	--	Buy-in from stakeholders is a very effective means of ensuring buildings are operated efficiently.
1-8	Upgrade building controls system to reduce run-time on equipment	2015	2%	Review existing DDC system and determine if a newer version can help operate the building energy systems more efficiently.
1-9	Replace remaining pneumatic controls with electronic controls	2015	<1%	Pneumatic controls are still used with several of the older air handling units. Pneumatic controls are inefficient due to leaks in the air lines and the low efficiency of the old air compressors and motors.
1-10	Install demand-controlled ventilation	2016	2%	Demand-controlled ventilation modulates the amount of ventilation air supplied to the building based on the real-time occupancy of the spaces.
1-11	Install LED lighting throughout buildings	2017	10%	As LED technology develops, upgrade to replacement LED lighting. Consider installing incrementally. 1st phase will take place within the next few years and to include well-developed applications.
1-12	Install Geothermal Heating and Cooling systems	2022	30%	Geothermal is currently being designed into the new GA Terminal. The ground conditions and conductivity assessed at the GA Terminal will be extrapolated to the rest of the airport.
1-13	Replace gas-fired water heaters with geothermal heat pumps to augment the solar hot water system used for domestic water heating.	2022	4%	Could also be done at the same time as the main geothermal heat pump installation, depending on the age of the existing equipment.
1-14	Utilize energy recovery wherever possible	2022	2%	Includes using energy recovery wheels for pre-treating ventilation air as well as potential heat recovery applications from food service areas, data centers, or other energy-intensive spaces

Goal #1 **Reduce the Passenger Terminal building's total energy consumption by at least 70% compared to the 2010 baseline by the year 2030.**				
	Specific Initiatives	**Date to be Completed**	**Est. Energy Savings [% of 2010]**	**Comment**
1-15	Install continuous metering systems for all electric and gas consumption in buildings	2022	--	Connect to the DDC system to enable real-time monitoring of energy consumption.
1-16	Setup a continuous commissioning system	2022	--	A continuous commissioning program will help prevent the building systems from going out of calibration and "losing" the energy savings that have been gained.
1-17	Create a comprehensive preventative maintenance plan	2022	--	The comprehensive preventative maintenance may be part of the continuous commissioning system.
1-18	Create an online Systems Manual and make this manual and the DDC system available on tablet computers	2022	--	All Operations and Maintenance (O&M) documentation to be readily available. No more "lost" or "missing" drawings and specs.
1-19	Re-circuit specific electrical outlets to operate on time-clock	2028	1%	Reduces the "phantom power" phenomenon that occurs when receptacle equipment consumes power at a low level even when it is supposedly turned off.
1-20	Consider use of snow collection systems for summertime cooling	2030	--	Might be a long shot but worth exploring. Mentioned as an option on the FAA spreadsheet.
TOTALS			**72%**	**$187,400**

Table 6-2: Renewable Energy Initiatives

Goal #2 **Increase on-site renewable energy production to offset at least 50% of the Passenger Terminal building's total energy consumption by the year 2030.**				
	Specific Initiatives	**Date Installed**	**Energy Offset [% of 2030 Terminal energy consumption]**	**Installation Cost [Today's $]**
2-1	Install additional 125-kW PV system on Passenger Terminal Roof	2016	11%	$562,000
2-2	Install 25-kW PV system on ARFF roof	2018	2%	$112,000
2-3	Install 25-kW PV system on the S-facing portion of the roof of the FBO Storage/Maintenance Hanger near the ARFF building.	2020	2%	$112,000
2-4	Install 45-kW PV system on the S-facing portion of the roof of the old FBO building	2024	4%	$202,000
2-5	Convert approximately half of the S parking lot to covered parking and install up to 400 kW of PV on top.	2030	34%	$2,000,000
TOTALS			**53%**	**$2,988,000**

6.5. Sustainable Energy Initiatives

The following sections describe the energy conservation and renewable energy initiatives summarized in the previous section. Each section includes a brief explanation of the energy savings potential, implementation process, approximate implementation date, anticipated cost, and potential financial incentives associated with each initiative.

Energy Conservation Initiative 1: Perform Retro-commissioning Activities on Passenger Terminal Building

Description

Building commissioning is a construction best practice that incorporates a process for verifying the performance of all building subsystems, including heating, cooling, ventilation, plumbing, electrical, fire safety, building envelope, lighting, wastewater, security, and control systems. Commissioning is quickly becoming a widely-accepted process throughout the construction industry, particularly for buildings that are designed with sustainable systems in mind. For existing buildings for which commissioning was not conducted, systems often underperform because they may not be configured correctly, or they simply may not have been designed for maximum efficiency. In these cases, retro-commissioning can often be a cost-effective strategy for improving the operation and overall efficiency of most building systems.

Building walkthroughs are performed during the Investigation phase of a retro-commissioning project.

Process

A retro-commissioning (RCx) project typically has four phases:

1. Planning—the building(s) to be retro-commissioned are selected, the goals and objectives for the project are defined, a retro-commissioning provider is hired, and a retro-commissioning plan is developed.
2. Investigation—the purpose of the investigation phase is to establish how and why the building systems are currently being operated as they are, to identify issues and potential improvements, and to select appropriate measures to implement.
3. Implementation—the improvement measures are implemented and the enhanced building operation is verified.
4. Hand-Off and Persistence Strategies—the retro-commissioning provider prepares a final report summarizing all of the activities performed, conducts facility staff training, and develops persistence strategies for the O&M staff to implement that will help ensure the continued

performance of the building.

Examples of retro-commissioning recommendations may include:

- Retrofitting spaces with demand-controlled ventilation controls
- Repair and/or replace areas of the building envelope
- Upgrade to modern DDC controls from pneumatic
- Integrate daylighting and occupancy controls.

In order to enter into the Building Tune-up Program (BTUP) and qualify for a grant, Focus on Energy must receive and approve the building owner's application, available here: http://www.focusonenergy.com/Incentives/Business/whole_building_systems.aspx. Focus on Energy reviews applications for BTUP with primary regard to: the historical annual energy consumption of the facility, the cost effectiveness of energy consumption reduction, and general facility age, condition, and expected longevity. Some of the important terms of the BTUP agreement include: only approve trade-allies may perform work under the BTUP, building owners must implement facility improvement measures (FIMs) that have a payback period less than 1.5 years up to a cumulative total of $10,000 or $0.025/sq-ft, whichever is greater, and the FIMs must be implemented up to the building owner's required contribution within 90 days of BTUP acceptance.

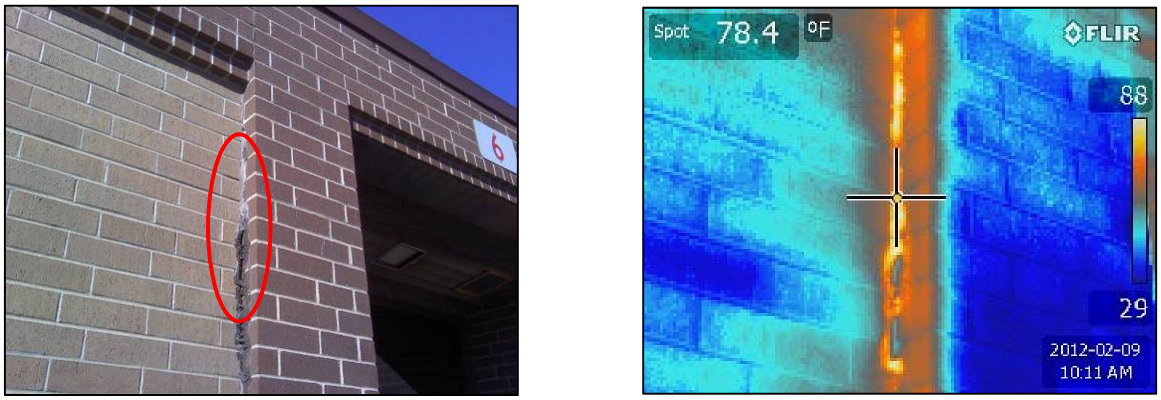
Summary

Energy Savings:	10% of 2010 Passenger Terminal total energy consumption
Start date:	July 2012
Completion date:	December 2012
Implementation Cost:	$30,000
Potential Incentives:	WI Focus on Energy may provide a grant of $0.05/sq-ft through the Building Tune-up Program.
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 2: Minimize air infiltration through the building envelope

Description

The building envelope consists of the entire exterior enclosure of a building, and includes the roof, walls, floor slab, windows, and skylights. The building envelope has three main functions: to provide structural support to the building; to control the flow of matter, energy, and people in and out of the building; and to provide a medium for expressing aesthetic and design sensibilities. Careful attention to the second function of the building envelope – control – is most important for meeting sustainability goals. Maximizing the air tightness and thermal performance of the building envelope will allow for significant energy efficiency gains.



Typical results of an infrared (IR) imaging study. Orange areas in the photo on the right indicate gaps in the building façade where warm air is leaking out.

Process

1. Perform infrared (IR) imaging study, including blower door testing, to determine which areas of the envelope to remediate.
2. Seal up leaky areas with weather stripping, caulk and spray foam insulation.
3. Re-test using IR imaging and verify that air infiltration measures are successful.

Summary

Energy Savings:	5%
Start Date:	Fall 2012
Completion Date:	2013
Implementation Cost:	$50,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 3: Require Use of Only ENERGY STAR®-qualified Equipment

Description

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. The program was established in 1992 to promote energy-efficient products and reduce greenhouse gas emissions. ENERGY STAR® began as a voluntary labeling program for a limited number of consumer products, and has since been adopted by manufacturers of over 60 product categories, including major appliances, heating and cooling systems, office equipment, light fixtures, and home electronics. ENERGY STAR®-labeled products deliver the same or better performance as comparable product models while consuming less energy and saving money. According to policy analysts, the ENERGY STAR® program prevented 210 million metric tons of greenhouse gas emissions, reduced electricity usage by 270 billion kilowatt hours, and reduced utility bills by $23 billion in 2011 alone.

ENERGY STAR®-qualified products display a sticker with the ENERGY STAR® logo.

Process

1. Conduct an inventory of all large airport-owned receptacle equipment such as vending machines, copiers, televisions, commercial kitchen equipment, refrigerators, freezers, clothes washers, etc. Select candidates for immediate replacement based on age, condition, and energy efficiency.
2. Also conduct an inventory of airport-owned personal computer equipment. Select candidate equipment for immediate replacement based on age and operating requirements.
3. Of the personal computer equipment selected for immediate replacement, determine which computers may be replaced with notebook computers since notebooks consume significantly less energy than desktops. Other factors such as the user's job requirements, security, ergonomics, and productivity should also be considered.
4. Modify procurement language and educate personnel. To specify the purchase of ENERGY STAR(R)-qualified equipment, only a single clause is necessary to add to the services contract or purchasing agreement:

The Vendor must provide products {or insert name of specific products of interest} that earn the ENERGY STAR® and meet the ENERGY STAR® specifications for energy efficiency. The vendor is encouraged to visit https://energystar.gov/products for complete product specifications and updated lists of qualifying products.

Inform purchasing agents, upper management, and key stakeholders about the ENERGY STAR® purchasing requirements, savings benefits, and available mechanisms for making these purchases.

5. Investigate options for recycling or donating old equipment.
6. Complete purchases of new ENERGY STAR®-qualified equipment and apply for Focus on Energy incentives for applicable equipment. Information and applications for the Focus on Energy Financial Incentives for Business are available here: http://www.focusonenergy.com/Incentives/Business/. Proof of purchase in the form of complete, itemized invoices must be submitted along with the incentive applications in order to qualify for financial incentives.
7. Update the receptacle equipment inventory annually.

Summary

Energy Savings:	3%
Start Date:	July 2012
Completion Date:	Replacement of existing equipment complete by 2020
Implementation Cost:	No additional procurement costs if equipment is replaced at end-of-life
Potential Incentives:	WI Focus on Energy may provide incentives of up to $25,000 for purchasing ENERGY STAR®-qualified commercial food service equipment, and up to $25,000 for specialty measures which include purchasing ENERGY STAR®-qualified vending machines.
Sustainability Categories:	Energy & Emissions, Green Procurement, Solid Waste Disposal

Energy Conservation Initiative 4: Install High-speed Energy-efficient (HSEE) Hand Dryers in Restrooms

Description

All restroom hand dryers, regardless of model type, have the potential to reduce solid waste by decreasing or eliminating paper towel use. However, traditional, standard efficiency hand dryers usually take more time to dry hands than paper towels, leading many building operators to offer occupants a choice between using either a hand dryer or paper towels. Newer high-speed models use air jets to push water off of both sides of the hand, rather than slowly evaporating it. These newer models also benefit from advances in energy-efficient technology, providing a superior product that also reduces energy consumption.

High-speed Energy-efficient hand dryers can help eliminate paper towel waste.

Process

1. Determine when the restrooms in each area of the Passenger Terminal will most likely be renovated.
2. For restrooms that will not be renovated before the end of 2015 and do not already use HSEE hand dryers, begin replacing the standard efficiency hand dryers and paper towel dispensers immediately with high efficiency models such as the Excel Dryer XCELERATOR®, Dyson Airblade™, World Dryer AIRFORCE™, Mitsubishi Jet Towel®, etc. In some cases, existing paper towel dispensers may be able to be retrofitted to house the HSEE dryer.
3. For restrooms that will be renovated before the end of 2015, specify the installation of HSEE dryers at that time by using language similar to the following in the construction specifications, services contract, or purchasing agreement:

   "The hand dryers shall be: warm air, rapid drying, high efficiency, self-contained, and electrically-operated. The hand dryers shall use an infrared sensor to automatically turn the dryer on when hands are placed under the air outlet."

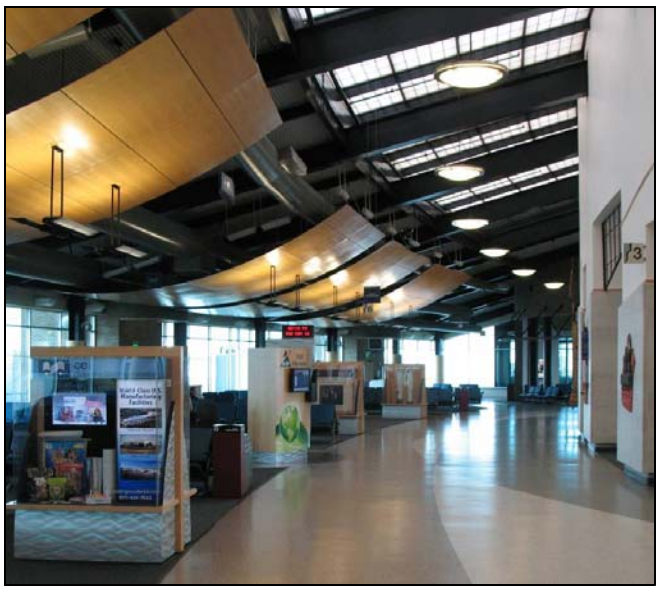
Summary

Energy Savings:	<1%
Start Date:	July 2012
Completion Date:	December 2015 or when bathrooms are renovated, whichever is earlier
Implementation Cost:	$20,000
Sustainability Categories:	Energy & Emissions, Green Procurement, Solid Waste Disposal

Energy Conservation Initiative 5: Maximize the availability and usage of natural light in the building spaces

Description

Indoor lighting is traditionally accomplished utilizing artificial light from electrically-powered light fixtures. The need for artificial light can be reduced by utilizing thoughtful building design strategies that maximize the availability and usage of natural light that reaches interior spaces through windows and skylights. Greater reliance on natural lighting can reduce energy consumption by decreasing electricity consumed by light fixtures and requiring less artificial heating and cooling. There is also evidence that substituting natural lighting for artificial indoor lighting can have positive effects on human physiological and psychological health, as well as employee performance.



Maximizing the availability of natural light within a building helps save energy and may also improve the well-being of the occupants.

Process

1. Inventory of existing light fixtures and circuiting arrangements.
2. Pre-retrofit monitoring of lighting energy usage and space luminance levels. Also, periodic walk-throughs to assess illumination levels, task-level lighting use, and management of window blinds/shades.
3. Target areas to install photosensors and dimming ballasts where significant reductions in energy inputs can be achieved through controls. In areas which require very low luminance, using fixtures with efficient fixed ballasts might be preferable to fixtures with dimming ballasts (assuming comparable light output).

Summary

Energy Savings:	2%
Start Date:	Fall 2012
Completion Date:	Fall 2013
Implementation Cost:	$45,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 6: Upgrade motors to premium efficiency type

Description

Electric motors drive pumps, fans, and compressors in buildings, industry, and public infrastructure. Motor technology has made great efficiency gains in recent years. The U.S. Department of Energy estimates that a premium-efficiency motor program launched by the National Electrical Manufacturers Association (NEMA) has the potential to reduce national electrical consumption by 5.8 terrawatts and reduce greenhouse gas emissions by 80 million metric tons over the next 10 years. Voluntary, fast-track deployment of equipment meeting these standards will accelerate and increase these potential benefits.

Rewinding an electric motor can help improve its efficiency and may be more cost-effective than replacement for motors that run less than 4000 hours per year.

Process

1. Conduct a motor replacement analysis and categorize your motor systems into the following groups:
   a) Immediate Replacement—typically, these motors are full-load (approximately 8000 hours per year), are currently inefficient or are not reliable due to age or ill repair. Replacing these motors can offer immediate payback through energy savings or increased reliability and productivity. Order an energy efficient replacement model and install at the next convenient opportunity, such as a scheduled downtime.
   b) Replace at Time of Failure—these motors are currently in good working order and are operating at 4000 hours per year or more. Replacing these motors would offer an extended payback, but do not justify the cost of immediate replacement. Begin inquiring into cost effective replacements for these models and keep the information on hand for future needs.
   c) Do Not Replace—motors that are reasonably efficient and operate at an average of less than 4000 hours per year. These motors can be rewound or replaced with a high efficiency model when repair is no longer a viable option.

MotorMaster+, software developed by the U.S. Department of Energy (DOE), is available to help users select efficient, cost-effective motors. Users can compare a motor's costs based on operating conditions, utility rates, demand charges and other factors. The software then compares the cost, in kWh and dollars, of buying a new, more efficient motor compared to rebuilding an existing one. The program can also calculate the payback period for the new motor's cost premium, if any. MotorMaster+ is available as a download from the DOE Web site.

2. When installing new motors, only specify and install NEMA Premium grade or equivalent

Summary

Energy Savings:	1%
Start Date:	2014
Completion Date:	2022
Implementation Cost:	$30,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 7: Set up a "Green Team" led by facilities manager that includes building operators, users and any others that might affect energy usage

Description

Buy-in from stakeholders is a very effective means of ensuring buildings are operated efficiently. User behavior patterns have a significant impact on the success of energy efficiency programs. Stakeholders like airport employees and tenants have intimate knowledge of how the terminal building is used on a day-to-day basis, and as such have a unique ability to identify softer conservation measures that can be implemented by building occupants. Collaboration across stakeholder groups can also generate innovative new methods of doing business that contribute to reducing the Airport's energy footprint.

Establishing a "Green Team" can help improve energy efficiency through modifying occupant behavior as well as demonstrating the facility's commitment to sustainability.

Process

1. Identify stakeholders
2. Conduct periodic meetings (quarterly or bi-annually)
3. Develop strategies that stakeholders can share with colleagues and implement throughout the building

Track progress and reward accomplishments

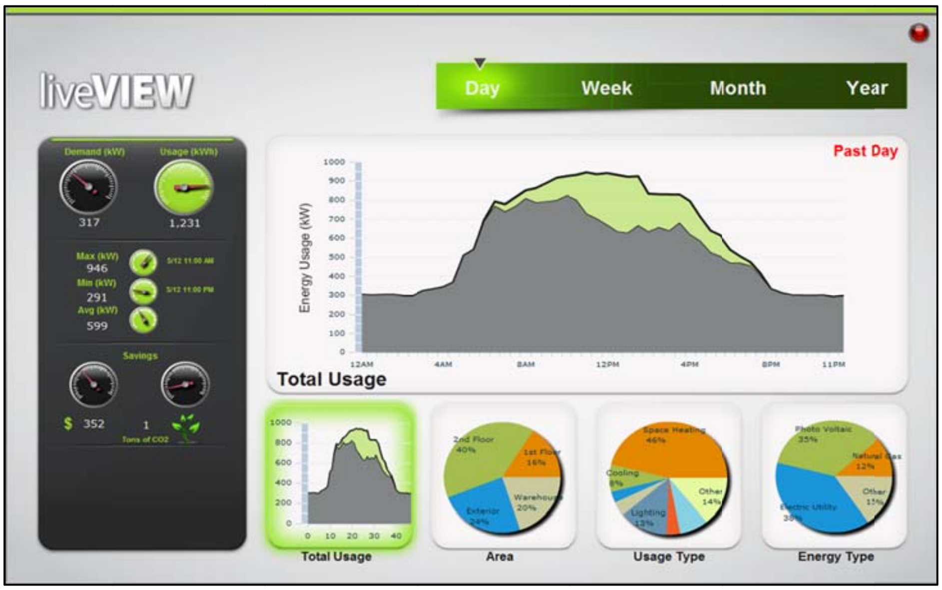
Summary

Energy Savings:	--
Start Date:	Fall 2012
Completion Date:	Ongoing
Implementation Cost:	--
Potential Incentives:	--
Sustainability Categories:	Energy & Emissions, Green Procurement, Solid Waste Disposal, Wastewater Reuse and Recycling, Sustainable Landscaping, Transportation, Social Sustainability, Public Outreach.

Energy Conservation Initiative 8: Upgrade the building control system

Description

A building automation system is an intelligent network of electronic devices used to monitor and control temperature, humidity, lighting, and ventilation throughout a building. Computerized metering systems measure and optimize the energy consumed from grid-sources and from on-site solar photovoltaic panels utilizing direct digital control (DC) of HVAC and electrical systems. Building control systems are becoming more sophisticated, and opportunities may exist for enhancing building operations through an automation system upgrade.



New software for building control systems often includes advanced energy management features.

Process

1. Inventory existing DDC system including type, quantity of devices, controllers, points list, etc.
2. Determine if a newer version can help operate the building energy systems more efficiently.
3. Install controls upgrade and integrate with other HVAC work

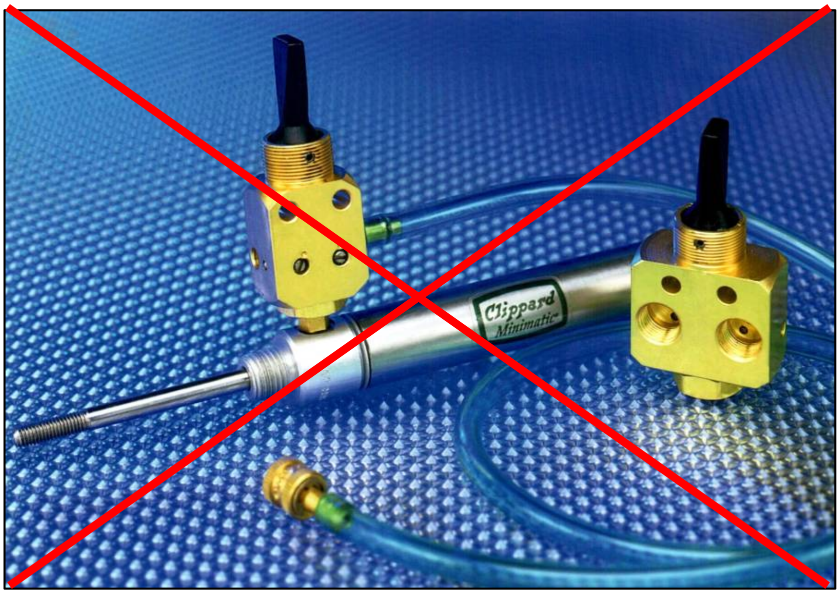
Summary

Energy Savings:	2%
Start Date:	Spring 2015
Completion Date:	Fall 2015
Implementation Cost:	$160,000
Potential Incentives:	custom incentives may be available from Focus on Energy
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 9: Replace remaining pneumatic controls with electronic controls

Description

Traditional HVAC control systems consist of pneumatic controls, which utilize pressurized air to control the flow of heated or cooled air. Pneumatic control systems have been superseded by electronic direct digital control (DDC) systems described under Initiative 1-8, but many buildings built prior to these advancements are still outfitted with pneumatic controls. Electronic DDC systems offer many advantages, one of which is reduced energy consumption by the controls themselves.



Replacing pneumatic controls with electronic controls eliminates the need for an air compressor, saving energy.

Process

1. Inventory existing pneumatic system including type, quantity of devices, controllers, points list, etc.
2. Determine what DDC points need to be created to replace pneumatic controls.
3. Integrate controls upgrade with other HVAC work

Summary

Energy Savings:	<1%
Start Date:	Spring 2015
Completion Date:	Fall 2015
Implementation Cost:	$12,000
Potential Incentives:	custom incentives may be available from Focus on Energy
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 10: Install demand-controlled ventilation

Description

A demand-controlled ventilation (DCV) system is one component of some DDC building automation systems. DCV systems modulate the flow of outside ventilation air supplied to a building based on real-time building occupancy and the ventilation demands created by the building occupants. This improves indoor air quality by ensuring sufficient outside air is being supplied during high occupancy periods. It also eliminates the possibility of heating or cooling unnecessary amounts of outside air during periods of low building occupancy, thereby reducing overall energy consumption by the HVAC system. This type of building control system is particularly suited to building spaces like airport terminals, which accommodate large groups of people but are frequently only partially occupied.

Carbon dioxide sensors are used to track the level of occupancy in the building spaces.

Process

1. Determine which spaces have variable occupancy patterns and which spaces are occasionally densely occupied.
2. Determine a reasonable quantity of minimum ventilation that is to be supplied to these spaces when occupied.
3. Install CO_2 sensors in these spaces to monitor CO_2 concentration and based on the CO_2 vary the quantity of ventilation supplied to the spaces between minimum and maximum levels.
4. Include CO2 sensors in preventative maintenance plan (see 1-17) and continuous commissioning system (see 1-16) to ensure sensors operate effectively.

Summary

Energy Savings:	2%
Start Date:	Spring 2016
Completion Date:	Summer 2016
Implementation Cost:	$16,000
Potential Incentives:	custom incentives may be available from Focus on Energy
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 11: Replace all interior lighting with LED

Description

Large interior spaces in buildings such as airport terminals are typically outfitted with fluorescent light fixtures. Fluorescent light tubes contain a small amount of mercury which emits ultraviolet light when exposed to an electric discharge in a partial vacuum. A fluorescent material coating on the inside of the light tube absorbs the ultraviolet light and re-emits visible light. When first developed in the early 20th century, fluorescent lamps were widely adopted for large interior spaces because they are more efficient than incandescent lamps. In recent decades, light-emitting diode (LED) light fixtures have been developed which utilize a semiconductor light source that creates electroluminescence through the manipulation of electrons. The use of LED light fixtures can provide for considerable energy and maintenance savings due to the lower wattage and increased lamp life over fluorescent lamped fixtures.

LED lighting is significantly more energy-efficient than fluorescent fixtures.

Process

1. On an annual basis review LED product offerings. Consideration should be given to LED products with a reliable installation history (proven track record) and strong technical support for distributors and installers (from manufacturer).
2. Request a lighting retrofit feasibility study from preferred vendor(s) or contractor(s). Consider hiring a lighting designer to assist with this task.
3. Consider light quality (lumens), efficiency (lumens/watt), installation cost, and replacement costs when evaluating different technologies

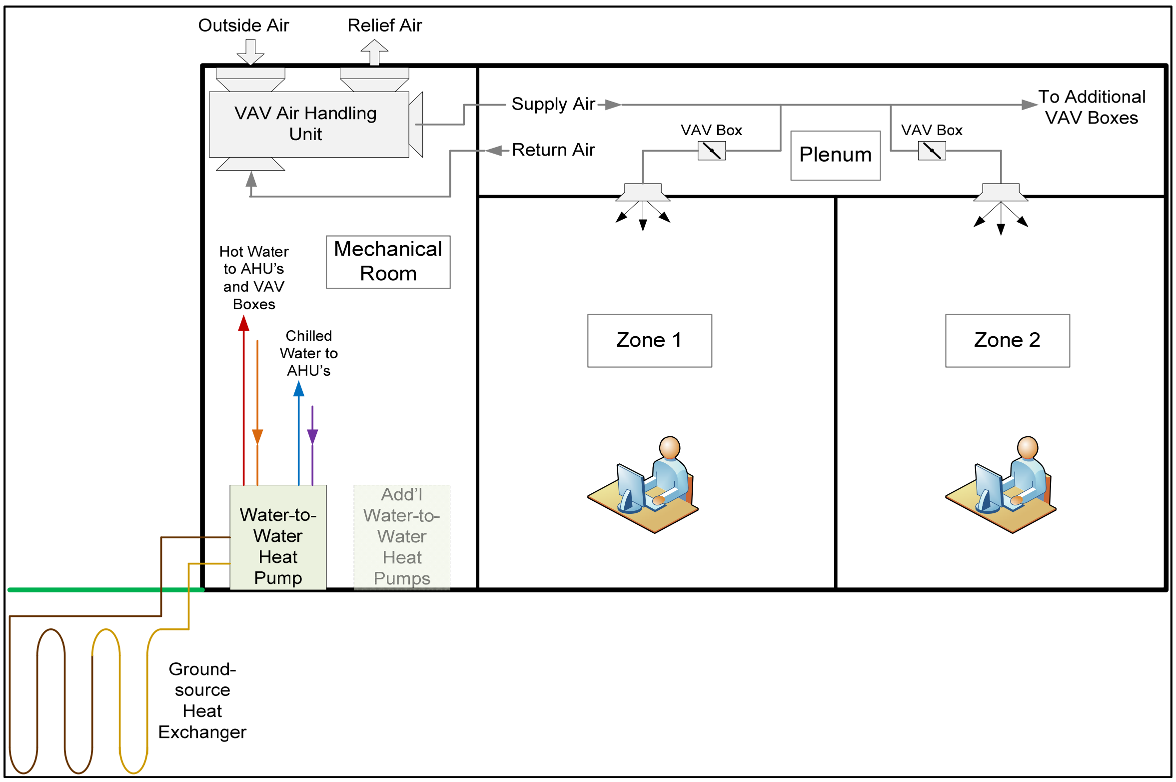
Summary

Energy Savings:	10%
Start Date:	Spring 2017
Completion Date:	Fall 2017
Implementation Cost:	$336,000
Potential Incentives:	prescriptive Focus on Energy incentives may be available
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 12: Replace HVAC systems with geothermal heating and cooling

Description

A geothermal system uses the ground as a “thermal battery”. In the summer the geothermal system will reject heat to the ground, and in the winter will absorb heat from the ground. A geothermal heat pump “produces” heat by moving it from one location to another. This initiative involves replacing the terminal building’s conventional boiler/chiller system with a geothermal system that uses central water-to-water heat pumps to produce chilled water and hot water. Conditioned air is supplied by central air handling units (AHU) to variable air volume (VAV) boxes with hot water reheat coils serving the zones.



Schematic drawing of a geothermal system utilizing central water-to-water heat pumps.

The exterior portion of the geothermal system consists of the geothermal borefield, or ground-source heat exchanger. The central water-to-water heat pumps use the geothermal water to make up the energy balance between the heating and cooling loads, rejecting heat into the ground during the summer, and absorbing heat from the ground in the winter. The ground-source heat exchanger has:

- Approximately 200 vertical wells, 300-ft deep. Each well is filled with geothermal grout around DR-11 High Density Polyethylene (HDPE) pipe.
- A 15- to 20-ft spacing between the vertical wells, resulting in a required open space area of approximately 40,000 sq-ft.

Potential geothermal borefield location serving the Passenger Terminal.

Process

1. Conduct a preliminary engineering study that addresses the following areas:
   a. Determine when the majority of the existing heating and co ling plant equipment (boilers, chillers, cooling towers, etc.) will have reached end-of-life or when the costs of operating the existing heating and cooling plants are outweighed by the benefits of replacing these systems.
   b. Decide what, if any, heating and cooling equipment should be re-used. For example, it may be simpler to re-use the boilers for the radiant floor system and keep it separate from the geothermal system.
   c. The heating water temperature supplied by a geothermal system is typically lower than that supplied by a conventional boiler system. Check heating coils for appropriate sizing with the lower water temperature and flag under-sized coils for replacement. Also check for leaks and other problems due to age.
   d. Determine which components of the air-side system (air handlers, ductwork, VAV boxes, etc.) will be re-used.
   e. Create preliminary mechanical room layouts showing the new and re-used equipment.
   f. Determine potential geothermal borefield locations and the approximate size required.
   g. Drill a test bore and perform a formation and thermal conductivity (F&TC) test.
2. If there are plans to reconstruct portions of the tarmac near the Passenger Terminal before the year 2022, consider laying supply and return piping under the new tarmac out to the future geothermal borefield to save on construction costs later.

3. Hire mechanical design firm(s) to design the interior and exterior components of the geothermal system. A commissioning authority should also be contracted at this stage to ensure that the design meets the owner's intent and to help prevent issues that could arise during construction and operation.
4. Hire a mechanical contractor to install the new equipment. The commissioning authority will provide quality assurance during construction, verification of system performance, and assurance of adequate operator training.

Summary

Energy Savings:	30%
Start Date:	2022
Completion Date:	2023
Implementation Cost:	$4 million
Potential Incentives:	prescriptive Focus on Energy incentives may be available
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 13: Replace gas-fired domestic water heaters with geothermal heat pumps

Description

The Airport recently installed a solar hot water (SHW) system as its primary domestic water heating system for the terminal building, which greatly reduced the amount of natural gas used for heating water. However, during certain times of the year the SHW system there is not enough solar heat to produce sufficient hot water for the building's domestic hot water needs. As a result, the building retains back-up gas-fired water heaters to supplement the SHW system. This initiative proposes replacing the gas-fired water heaters with a new back-up water heaters powered by geothermal heat pumps.

Process

1. Evaluate the domestic hot water loads within the building and determine the approximate sizes required for the heat pump water heater and storage tank.
2. Design the geothermal domestic hot water heating along with the geothermal heating and cooling system.
3. Continue to use solar hot water as primary system; when solar hot water is not able to satisfy load, then use the geothermal DHW system
4. Install geothermal DHW system at the same time as the geothermal heating and cooling system

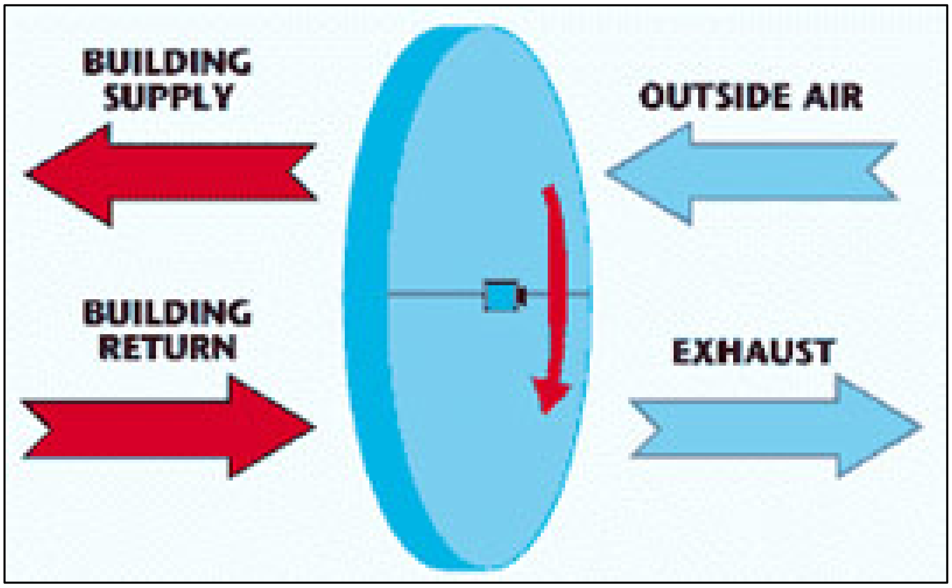
Summary

Energy Savings:	4%
Start Date:	2022
Completion Date:	Install with Geothermal System (see 1-12)
Implementation Cost:	$21,000
Potential Incentives:	prescriptive Focus on Energy incentives may be available
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 14: Utilize energy recovery wherever possible

Description

An HVAC energy recovery system captures building exhaust air and uses it as energy to precondition incoming outdoor ventilation air. During the cooling season, the system pre-cools and dehumidifies incoming air. During the heating season, it pre-heats and humidifies.



Conceptual illustration of an exhaust air energy recovery system.

Process

1. Include energy recovery with geothermal design and consider rerouting bath exhaust fans to energy recovery unit
2. Continue to use economizer cycle on air handlers
3. Install energy recovery with the geothermal system

Summary

Energy Savings:	2%
Start Date:	2022
Completion Date:	Install with Geothermal System (see 1-12)
Implementation Cost:	$30,000
Potential Incentives:	prescriptive incentives from Focus on Energy may be available
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 15: Install continuous metering systems for electricity consumption, electric demand, and natural gas consumption

Description

Electricity and natural gas consumption data for the terminal building is currently collected at a small number of meters. These meters collect aggregate data for large parts of the building, and do not offer real-time monitoring or advanced record-keeping capabilities Because of this, it is difficult for Airport staff to analyze energy loads for specific parts of the terminal building at specific times. Installing sub-meters with continuous metering will allow the Airport to monitor real-time energy consumption and demand data and to analyze trends in energy usage. As a result, the continuous metering system will make it much easier for to identify areas where building systems are underperforming and where potential energy efficiency improvements can be made.

Continuous metering allows the building operator to view details about the building's energy consumption and demand in real time.

Process

1. Install building and/or sub-meters where needed to monitor the operation of systems or sub-system.
2. Connect meters to the DDC system to enable real-time monitoring of energy consumption.
3. Review metering data periodically to determine if peaks and consumption are in line with historical data or trending downwards
4. Set meters to alarm building operators when new peaks are set
5. Implement routines in DDC system to predict electric-peak demand which adjust building operation to avoid peaks.

Summary

Energy Savings:	--
Start Date:	2022
Completion Date:	2022
Implementation Cost:	$20,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 16: Set up a continuous commissioning system

Description

A continuous commissioning program will help prevent building systems from going out of calibration and "losing" the energy savings that have been gained through their sustainable design and retrofitting. The continuous commissioning program will include implementation of a comprehensive building systems and equipment maintenance plan; periodic building occupant and staff surveys; regular review of trend logs produced by the building automation system; periodic review of building automation programming schedules and sequences; and annual review and benchmarking of building performance measures.

Process

1. Create and implement a comprehensive preventative maintenance plan for all of the building systems and equipment (see initiative 1-17).
2. Survey the building occupants and maintenance staff on a seasonal basis to identify potential problem areas within the building.
3. Set up trend logs on the building automation system for critical control points and regularly review trend data for anomalies and opportunities to improve operational efficiency. Document changes made to the programming and the reasons for making them.
4. Perform a twice-yearly review of the occupancy schedules, set points, and sequences of operation that are programmed into the building automation system for consistency with the intended building operation. Again, document changes made to the programming and the reasons for making them.
5. Conduct functional performance testing of the building systems and equipment every 5 years to make sure systems are operating within normal parameters. Maintain records of the results of the system performance tests to use for benchmarking building performance and planning equipment upgrades.
6. Benchmark building performance by reviewing current utility bills and comparing them to past years'. Dramatic changes may be a sign of mechanical issues and require additional investigation to determine root cause.

Summary

Energy Savings:	--
Start Date:	2022
Completion Date:	Ongoing
Implementation Cost:	$10,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 17: Develop a comprehensive preventative maintenance plan

Description

In order to maintain a high level of building performance and energy efficiency, proper maintenance of the building is critical. Proper maintenance of building systems will minimize utility costs and reduce costly contractor repairs. The comprehensive preventative maintenance plan may be included as part of the continuous commissioning system (see initiative 1-16).

HVAC Preventative Maintenance and Calibration Schedule

Note: *Refer to the manufacturer's literature in the Operation & Maintenance manual for additional and more detailed maintenance requirements for each type of equipment.*

Equipment Name	Tag	Every One Month	Every Three Months	Every Six Months	Every Year
York Rooftop Units	**RTU-1 to 19**				
Inspect/change air filter		X			
Inspect entire heating section					X
Inspect/clean blower wheel & motor					X
Inspect/clean condenser coil.					X
Inspect dampers & linkages.					X
Energy Recovery Units	**ERV-18 & 19**				
Inspect dampers, linkages and bearings.					X
Inspect/clean permanent air filter. Do not discard.					X
Inspect belt alignment, wear & tension.					
Inspect/clean enthalpy wheel.					

Sample preventative maintenance schedule.

Process

1. Gather information about preventative maintenance (PM) activities from the Operation and Maintenance (O&M) manuals to create a comprehensive PM schedule and procedures list.
2. Discuss the impact of these tasks on the workload of facilities staff. Keep in mind that performing PM tasks on a regular, proactive basis should actually save staff time in the long run, because these activities will help to reduce occupant complaints and prevent equipment malfunction.

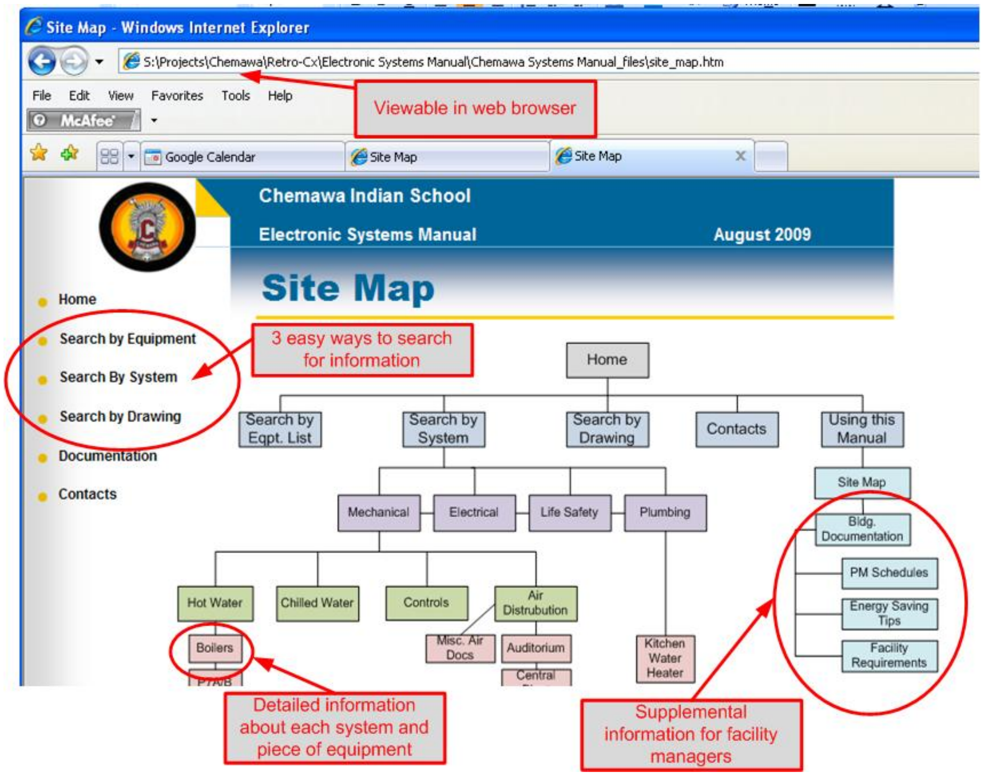
Summary

Energy Savings:	--
Start Date:	2022
Completion Date:	Ongoing
Implementation Cost:	$5,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Energy Conservation Initiative 18: Create an online Systems Manual and make this manual and the DDC system available on tablet computers

Description

This initiative involves consolidating all Operations and Maintenance (O&M) documentation and DDC system information into an electronic Systems Manual that is readily available to Airport staff in an easy-to-use, searchable format. This will allow employees to access the information they need to conduct operations and maintenance tasks, which will save labor hours, eliminate the occurrence of lost or missing documentation, and ensure continued system performance.



Sample online building systems manual.

Summary

Energy Savings: --

Start Date: 2022

Completion Date: 2022

Implementation Cost: $25,000

Potential Incentives: $0

Sustainability Categories: Energy & Emissions

Energy Conservation Initiative 19: Re-circuit specific electrical outlets to operate on a time-clock

Description

Most electronic and electrical devices continue to consume a low level of power when they are switched off, not performing their primary function, or in standby mode. According to various studies, this "phantom power" phenomenon accounts for anywhere from 5 to 20 percent of a building's total energy usage. This initiative involves retrofitting the electrical system with outlets that operate on a time-clock that disconnects plugged devices from electrical power during unnecessary periods.

New energy management systems allow the receptacle outlets to be remotely controlled.

Summary

Energy Savings:	1%
Start Date:	2028
Completion Date:	2028 (2 months)
Implementation Cost:	$45,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Renewable Energy Initiative 1: Install additional 125-kW PV system on Passenger Terminal Roof

Description

Photovoltaic (PV) panels are a technology that can readily be incorporated into an existing airport landscape because of their relatively simple, modular construction. PV can be placed in locations that are not used for aviation activities and therefore have little value to the airport or for alternative developments.

Roofs are an optimal location for solar panels because they commonly receive unobstructed sun exposure. Roofs may also provide a ready-made support structure for a solar installation, reducing the engineering and construction costs. South-facing, angled roofs require less of a support structure than flat roofs or roofs facing a direction other than south. Airports often have buildings with both flat roofs (e.g., terminal buildings) and angled roofs (e.g., hangars). An analysis of the existing roof loading capacity must be conducted to determine if structural reinforcement is required which will impact project cost. Project size is also a cost consideration as roof-mounted systems are typically more cost-effective for "smaller" projects whereas ground-mounted projects provide better pricing for larger projects. However, the feasibility of a solar PV system depends first and foremost on good solar exposure and efficient utilization.

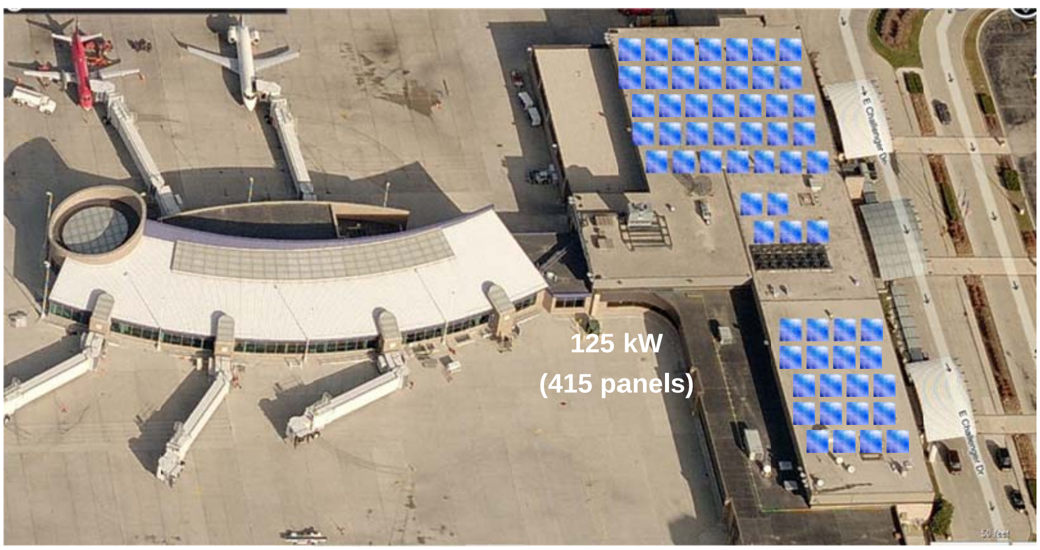


Illustration showing approximately 125 kW of PV panels installed on the Passenger Terminal roof. Each square represents 6 panels.

Process

1. Siting and Feasibility—The siting and feasibility stage involves an assessment of the potential siting locations for a PV system and other issues such as compatibility with aviation activities, potential size and architecture of the system, and cost/benefit analyses for alternative scenarios.
2. Design and Permitting—Once a project has been defined, it must go through a more detailed design process and obtain permits. The airport operator or its representatives should initiate early coordination with the FAA as the design is developed to ensure that the project complies with FAR Part 77, NEPA, and FAA requirements for land leases and funding, as applicable. Once the design has been finalized, applications are filed for Federal and state permit approvals.

3. Installation—Typically, solar projects are relatively simple to install with construction completed within a short timeframe. Like any construction project, the installation process involves mobilization, preparation, building and connecting the system, testing, and finishing.
4. Operations and Maintenance—Once the PV system has begun operating, regular operations and maintenance (O&M) activity is minimal, with only periodic cleaning of the panels and vegetation management required as necessary. The system should be constantly monitored to ensure that its electricity production is as expected.

Summary

Energy offset:	11%
Completion Date:	2016
Implementation Cost:	$562,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Renewable Energy Initiative 2: Install 25-kW PV system on the ARFF building roof

Description

This initiative involves installation of a 25-kW solar PV system on the aircraft rescue and firefighting (ARFF) building roof.

Illustration of approximately 25-kW of PV panels on the ARFF building roof. Each square represents 6 panels.

Process

1. Siting and Feasibility—The siting and feasibility stage involves an assessment of the potential siting locations for a PV system and other issues such as compatibility with aviation activities, potential size and architecture of the system, and cost/benefit analyses for alternative scenarios.
2. Design and Permitting—Once a project has been defined, it must go through a more detailed design process and obtain permits. The airport operator or its representatives should initiate early coordination with the FAA as the design is developed to ensure that the project complies with FAR Part 77, NEPA, and FAA requirements for land leases and funding, as applicable. Once the design has been finalized, applications are filed for Federal and state permit approvals.
3. Installation—Typically, solar projects are relatively simple to install with construction completed within a short timeframe. Like any construction project, the installation process involves mobilization, preparation, building and connecting the system, testing, and finishing.
4. Operations and Maintenance—Once the PV system has begun operating, regular operations and maintenance (O&M) activity is minimal, with only periodic cleaning of the panels and vegetation management required as necessary. The system should be constantly monitored to ensure that its electricity production is as expected.

Summary

Energy offset:	2%
Completion Date:	2018
Implementation Cost:	$112,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Renewable Energy Initiative 3: Install 25-kW PV system on the FBO Hangar near the ARFF building

Description

This initiative involves installation of a 25-kW solar PV system on the fixed base operator (FBO) hangar roof.

Illustration of approximately 25-kW of PV panels on the FBO Hangar roof (near the ARFF building). Each square represents 6 panels.

Process

1. Siting and Feasibility—The siting and feasibility stage involves an assessment of the potential siting locations for a PV system and other issues such as compatibility with aviation activities, potential size and architecture of the system, and cost/benefit analyses for alternative scenarios.
2. Design and Permitting—Once a project has been defined, it must go through a more detailed design process and obtain permits. The airport operator or its representatives should initiate early coordination with the FAA as the design is developed to ensure that the project complies with FAR Part 77, NEPA, and FAA requirements for land leases and funding, as applicable. Once the design has been finalized, applications are filed for Federal and state permit approvals.
3. Installation—Typically, solar projects are relatively simple to install with construction completed within a short timeframe. Like any construction project, the installation process involves mobilization, preparation, building and connecting the system, testing, and finishing.
4. Operations and Maintenance—Once the PV system has begun operating, regular operations and maintenance (O&M) activity is minimal, with only periodic cleaning of the panels and vegetation management required as necessary. The system should be constantly monitored to ensure that its electricity production is as expected.

Summary

Energy offset:	2%
Completion Date:	2020
Implementation Cost:	$112,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Renewable Energy Initiative 4: Install 45-kW PV system on the FBO building

Description
This initiative involves installation of a 45-kW solar PV system on the FBO building roof.

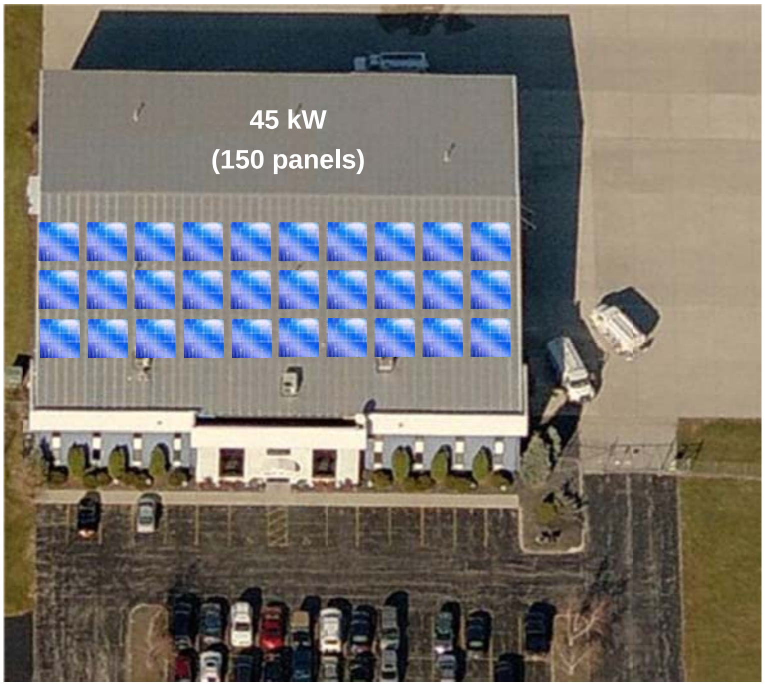


Illustration of approximately 45 kW of PV panels on the FBO building roof. Each square represents 6 panels.

Process
1. Siting and Feasibility—The siting and feasibility stage involves an assessment of the potential siting locations for a PV system and other issues such as compatibility with aviation activities, potential size and architecture of the system, and cost/benefit analyses for alternative scenarios.
2. Design and Permitting—Once a project has been defined, it must go through a more detailed design process and obtain permits. The airport operator or its representatives should initiate early coordination with the FAA as the design is developed to ensure that the project complies with FAR Part 77, NEPA, and FAA requirements for land leases and funding, as applicable. Once the design has been finalized, applications are filed for Federal and state permit approvals.
3. Installation—Typically, solar projects are relatively simple to install with construction completed within a short timeframe. Like any construction project, the installation process involves mobilization, preparation, building and connecting the system, testing, and finishing.
4. Operations and Maintenance—Once the PV system has begun operating, regular operations and maintenance (O&M) activity is minimal, with only periodic cleaning of the panels and vegetation management required as necessary. The system should be constantly monitored to ensure that its electricity production is as expected.

Summary

Energy offset:	4%
Completion Date:	2024
Implementation Cost:	$202,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

Renewable Energy Initiative 5: Convert approximately half of the S parking lot to covered parking with 400 kW of PV

Description

This initiative involves installation of a 400-kW solar PV system on the roof of the proposed parking structure.

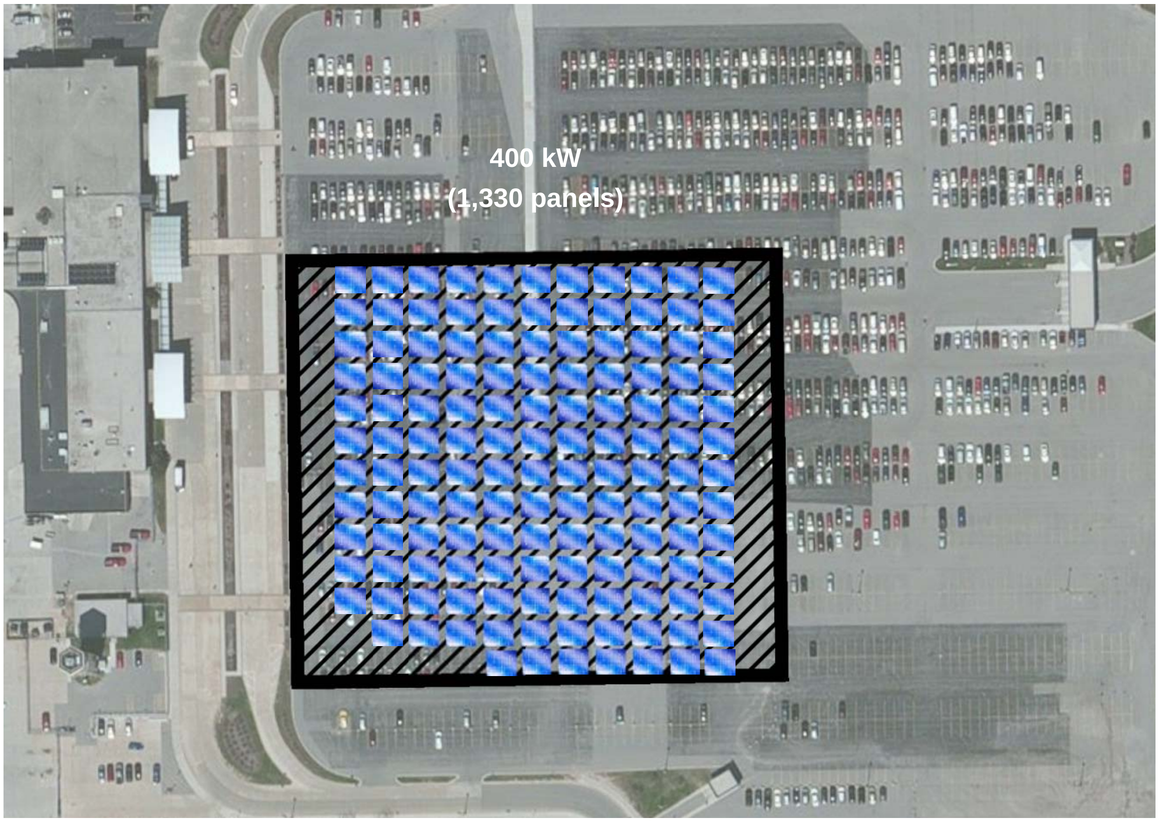


Illustration of approximately 400 kW of PV panels installed on top of covered parking in the parking lot near the Passenger Terminal. Each square represents 10 panels.

Process

1. Siting and Feasibility—The siting and feasibility stage involves an assessment of the potential siting locations for a PV system and other issues such as compatibility with aviation activities, potential size and architecture of the system, and cost/benefit analyses for alternative scenarios.
2. Design and Permitting—Once a project has been defined, it must go through a more detailed design process and obtain permits. The airport operator or its representatives should initiate early coordination with the FAA as the design is developed to ensure that the project complies with FAR Part 77, NEPA, and FAA requirements for land leases and funding, as applicable. Once the design has been finalized, applications are filed for Federal and state permit approvals.
3. Installation—Typically, solar projects are relatively simple to install with construction completed within a short timeframe. Like any construction project, the installation process involves mobilization, preparation, building and connecting the system, testing, and finishing.
4. Operations and Maintenance—Once the PV system has begun operating, regular operations and maintenance (O&M) activity is minimal, with only periodic cleaning of the panels and vegetation

management required as necessary. The system should be constantly monitored to ensure that its electricity production is as expected.

Summary

Energy offset:	34%
Completion Date:	2030
Implementation Cost:	$2,000,000
Potential Incentives:	$0
Sustainability Categories:	Energy & Emissions

6.6. Other Sustainable Initiatives

The following sections provide a brief description of other sustainable initiatives the Airport plans to undertake unrelated to energy conservation or renewable energy. Each section also includes a description of how the south GA terminal sustainability demonstration project described in Chapter 7 will advance these initiatives. The initiatives are grouped into four general categories:

- Water Quality Initiatives
- Landscaping and Turf Management Initiatives
- Social Sustainability – Community Initiatives
- Social Sustainability – Human Initiatives

6.6.1. Water Quality Initiatives

- Glycol analysis
- Off-site wetlands mitigation
- Wetland-sensitive airfield design (Taxiway N)
- Stormwater outflow monitoring
- Gray water reuse and recycling

6.6.2. South GA Terminal Contribution

- Water efficiency for the GA terminal will be achieved through rain water collection, low flow fixtures, and point-of-use hot water. Rain water collection cisterns will be located just outside the building on the south side. Water collected in the cisterns will be used for landscape irrigation and toilet flushing, eliminating the use of potable water for these purposes.
- Vegetated surfaces surrounding the building will be substituted for impervious surfaces to reduce storm water runoff.
- All landscaping will require minimal maintenance and irrigation, and will reduce use of herbicides and pesticides.

6.6.3. Sustainable Landscaping and Turf Management Initiatives

Native Plants

As much as possible, the Airport will utilize native plantings in its landscaping and turf management projects. Native plants are adapted to the local ecosystem and do not require application of chemical fertilizers, pesticides, or herbicides. Utilizing native plants therefore reduces the amount of synthetic chemicals that reach our waterways in stormwater runoff. Native plants are also adapted to the local climate and thus do not require irrigation, resulting in significant water use reduction. These environmental benefits also have cost benefits, including reduced labor, systems, and inventory required for maintenance.

South GA Terminal Contribution

All landscaping materials will be native, adapted to the local climate and drought resistant. This will allow the terminal to exceed the US Green Building Council guidelines of 50% water use reduction and elimination of potable water use for irrigation.

6.6.4. Social Sustainability – Community Initiatives

Educational Opportunities

Wetland mitigation projects will utilize support from faculty and students at Fox Valley Technical College (FVTC). This will provide educational opportunities for students while also building and strengthening relationships within the community.

Wellness Center

An employee "wellness center" is integrated into the preferred passenger terminal reconfiguration alternative, and will include exercise equipment and locker room facilities. Wellness center membership will be open to both Airport and tenant employees, creating new opportunities for relationship- and community-building on the Airport.

Local Materials and Labor

Local materials and labor will be used for Airport construction projects as often as possible. Use of local materials and labor stimulates the local economy, and reduces energy consumption and emissions associated with transporting materials and workers.

South GA Terminal Contribution

- The construction of the GA terminal will make use of regional materials such as structural steel and masonry. The building will exceed the US Green Building Council guideline of 20% regional materials.
- Local labor & contractors will be used as much as possible during construction. Building operations will be supported by local vendors and suppliers.
- Local landscaping material and seed will be used.
- FVTC faculty and students will be part of the GA Terminal continuous commissioning team. They will work alongside a local energy efficiency engineering services firm. This will reduce the ongoing cost of continuous commissioning and also provide valuable "hands-on" experience to the faculty and staff.
- The proposed south GA terminal described above will be offered for use as a "classroom" for local educational programs, for the FVTC and other educational institutions.

6.6.5. Social Sustainability – Human Initiatives

Cool Choices

The Airport will coordinate with Cool Choices, a nonprofit based in Madison, to improve the employee work environment and to offer social sustainability assistance to Airport tenants. Cool Choices helps individuals, communities, and small businesses pursue emission reductions through voluntary actions.

Wellness Center

The wellness center in the passenger terminal building will provide new opportunities for enhanced employee physical fitness and well-being. Because the wellness center is located at their place of employment, it will offer efficiencies that make it easier for employees to incorporate regular exercise into their daily work routine.

South GA Terminal Contribution

- The building will be constructed with human scale and needs in mind. Examples are ample daylighting, varying ceiling heights, easily viewed spaces, and direct views to nature. One tangible benefit of the “human scale” of the building is that one receptionist will be able to easily monitor the whole of the main GA terminal area.
- Natural materials will also lend a sense of warmth, familiarity and variety to the human experience of the building.

6.7. Glossary of Terms

kWh – 1 kilowatt-hour. A unit of energy in the International System of Units (SI). Commonly used as the billing unit of energy for electric utilities. 1 kWh = 0.03413 therm

MWh – 1 megawatt-hour. A unit of energy equivalent to 1,000 kilowatt-hours.

therm – a unit of energy in the U.S. Customary system of measurement equivalent to 100,000 British thermal units (Btu). Commonly used as the billing unit of energy for North American natural gas utilities. 1 **therm** = 29.3 kWh

Btu – British thermal unit. Approximately the amount of energy needed to heat 1 pound (lb.) of water from 39°F to 40°F.

Kilo – An SI prefix designating 1,000. For example, 1 kilowatt-hour = 1,000 Watt-hours.

kBtu – 1 kiloBtu, equivalent to 1,000 British thermal units.

M – a prefix that can either designate the Latin numeral M (1,000)—usually used with U.S. Customary **units**—or the prefix ‘mega’ (1,000,000) when used with SI units.

MM – a prefix that designates 1,000,000 (1,000 x 1,000); usually used with U.S. Customary units. Note that this usage differs from the Latin usage where MM would represent 2,000.

MBH – 1,000 Btu per hour. A unit of power in the U.S. Customary system of measurement. The input capacity of furnaces, boilers, and other heating devices are often rated in MBH in the U.S.

EUI – Energy Use Intensity. A metric used to compare building energy consumption. Defined as total energy consumption divided by the conditioned floor area. In U.S. Customary units, EUI is usually defined as kBtu/sq. ft.

Efficiency (thermal) – A dimensionless measure of the performance of a device that uses thermal energy (e.g. internal combustion engine, boiler, furnace, etc.). Defined as the total energy output divided by the total energy input, in percent.

COP – Coefficient of Performance. A dimensionless measure of the performance of a heat pump. Defined as the total energy delivered divided by the total energy input.

Input Capacity – the total amount of input or fuel power required for a heating device. Furnaces, boilers and other heating devices are often rated in terms of their input capacity.

Power – energy per unit of time. For example, kW and MBH are units of power, as opposed to kWh and kBtu, which are units of energy. Heating and cooling loads, HVAC equipment capacities, and electrical demand are typically report in units of power.

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Chapter 7

Sustainability Demonstration Project – South GA Terminal

Chapter 7

SUSTAINABILITY DEMONSTRATION PROJECT SOUTH GA TERMINAL

This chapter discusses the relocated general aviation (GA) terminal building on the south side of the Outagamie County Regional Airport (ATW). The 2003 Airport Master Plan proposed that all GA facilities be relocated to the Airport's south side. The goal of this relocation was to provide space for long-term GA development and to separate GA and commercial aviation activity. The factors driving the need for this relocation are even stronger in 2012 when compared to 2003. The proposed GA terminal is a key piece in the overall development of the south GA campus. Without the services it will provide, GA and commercial traffic would not be truly separated. The chapter is comprised of the following sections:

South GA Development Area Background

South GA Terminal Functional & Operational Benefits

South GA Terminal Sustainable Design Elements

7.1. Introduction

The GA terminal relocation project had strong momentum prior to initiation of the Master Plan process. This meant that the relocation project and the Sustainable Master Plan could build off one another's ideas and initiatives. After the Baseline Inventory was completed, the Project Team realized that the GA terminal could serve as a demonstration of the building energy use focus of this Sustainable Master Plan. Mead & Hunt architects and others working on the relocation project agreed.

Therefore, as the design for the new GA terminal proceeded, the relocation project and the Master Plan inspired and shaped one another. The emissions inventory and other information from the Baseline Inventory provided greater context for the sustainable innovations proposed for the GA terminal design. Similarly, the GA terminal's innovations reinforced the Project Team's decision to focus on the sustainable energy initiatives for the passenger terminal building.

The GA terminal relocation project exemplifies the potential of the *Sustainable* Master Plan concept. The need for relocating the GA terminal was driven purely by safety and operational factors – it would have been recommended whether or not the Master Plan had a sustainability focus. However, the manner in which the relocation was performed was highlighted because it took place within a Sustainable Master Plan.

7.2. South GA Development Area Background

ATW is located in east-central Wisconsin in a metropolitan area commonly referred to as the Fox Cities, which include Appleton, Menasha, and Neenah. The most recent National Plan of Integrated Airport Systems (NPIAS) identifies ATW as a primary non-hub commercial service Airport. GA services, facilities, and activity at the Airport are just as important to the local community and economy as passenger service. Historically, GA activity has accounted for approximately half of all activity at ATW. GA activity is conducted by a variety of users, including corporate and business operators, cargo operators, recreational users, flight training, agricultural applications, and law enforcement and other government uses. GA services at ATW include aircraft fueling and maintenance services provided by the fixed base operator (FBO) Platinum Flight Center. GA facilities include taxiways, aircraft parking aprons, and aircraft storage hangars.

Prior to the 2003 Airport Master Plan, all commercial and GA facilities were located in the Airport's northeast quadrant. The 2003 Master Plan recommended a long-term GA facilities plan with the eventual relocation of existing GA facilities from the passenger terminal area. As part of this plan, GA apron, hangar, and access road layouts were prepared for the Airport's undeveloped south side. Between 2003 and 2012, over $13 million was spent to construct new GA facilities in this new south GA development area. Completed improvements in the south GA development area include construction of ground access roads in 2003, and construction of taxiway and apron pavements in 2008. There are currently three County-owned T-hangars (43 units) and one privately-owned hangar in this area, and private hangar development is on-going. However, several GA facilities remain to the immediate south of the passenger terminal, including the FBO/GA terminal, three FBO maintenance and storage hangars, and a maintenance and storage hangar utilized by Air Wisconsin. An additional $16 million is programmed over the next five years for relocating these remaining facilities and constructing associated improvements in the south GA development area. The location and ultimate layout of the south GA development area is presented in **Exhibit 7-1**.

7.3. South GA Terminal Functional and Operational Benefits

The cornerstone of the GA development plan proposed by the 2003 Airport Master Plan is a new centrally-located GA terminal building in the south GA development area. A new GA terminal will house the Outagamie County-owned FBO ATW Platinum Flight Center, which offers a range of services including airline and GA refueling, executive air charter, flight training, aircraft rental, aircraft maintenance, and corporate aircraft management. The Platinum Flight Center also offers a suite of customer comforts for transient passengers and pilots, including catering, courtesy car, pilot lounge, cable television, wireless internet access, conference rooms, lavatories, and ground power unit services.

The south GA terminal will allow for the relocation of all FBO services and GA activity from the area immediately south of the passenger terminal building. Relocating GA facilities to the Airport's south side will have numerous benefits and address current safety, function, and operational issues near the passenger terminal.

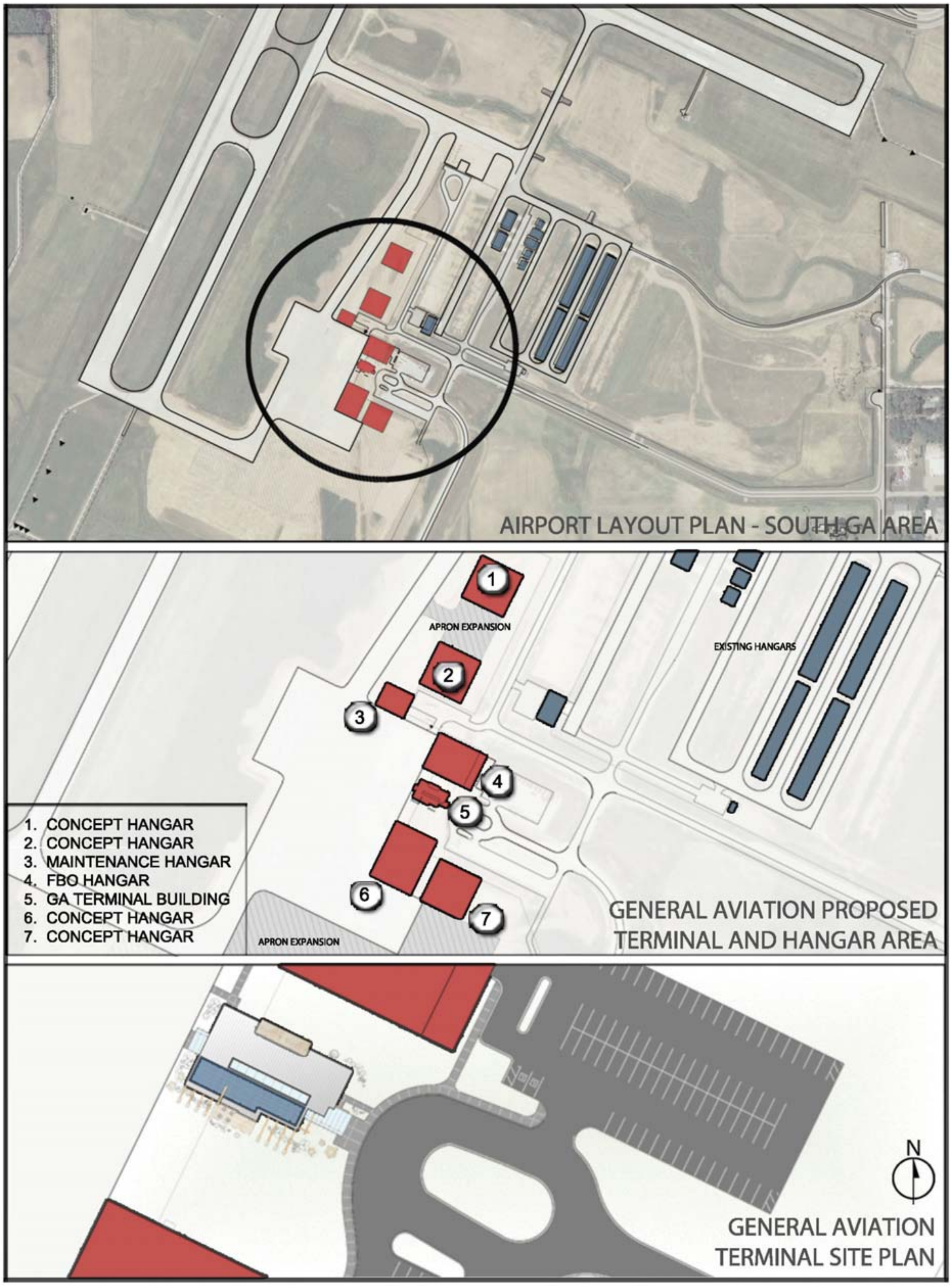


Exhibit 7-1 SOUTH GA DEVELOPMENT AREA LOCATION AND ULTIMATE LAYOUT

7.3.1. Eliminate Mixing of Landside Ground Vehicle Traffic

Due to the configuration of the entry road, ground vehicles currently must pass in front of the passenger terminal in order to access the GA terminal (see **Exhibit 7-2**). This configuration reduces the capacity of the passenger terminal curbside, which should be protected for passenger terminal use. Relocating the GA terminal will provide a dedicated, less congested, and more secure passenger terminal area. Also, the GA terminal will also provide a GA area separated from the commercial area that is more accessible and attractive to GA users.

7.3.2. Reduce Mixing of Airside Traffic and Security Levels

The configuration of the current commercial and GA aprons is presented in **Exhibit 7-3**. The proximity of the commercial and GA aprons presents safety and security issues at the Airport. As shown in **Exhibit 7-4**, a painted blue line on the apron pavement currently provides the only separation between the two aprons. This configuration is unsafe because it increases the risk of aircraft incidents. Additionally, the proximity of the aprons mixes commercial and private pilots, who often have different skills and levels of training. Lastly, it mixes security requirements between commercial and GA areas. This is a security issue as dedicated GA apron areas do not typically have requirements for a security identification display area (SIDA), while all commercial apron areas typically do have these requirements.

7.3.3. Separate Aircraft Parking

The current GA aircraft parking apron is located immediately adjacent to the commercial aircraft parking apron. The shared space creates aircraft parking management issues, particularly during peak periods such as the annual Experimental Aircraft Association (EAA) AirVenture festival in Oshkosh. As shown in Exhibit 7-4, GA aircraft must be parked on the infield between the commercial aircraft apron and the taxiway system during peak periods. The parked aircraft must be contained with temporary fencing in order to control ingress and egress from aircraft movement areas. This creates potential for aircraft incidents, particularly between commercial aircraft taxiing between the passenger terminal and the runway, and general aviation aircraft whose pilots are unfamiliar with facilities and procedures at ATW.

7.3.4. Provide Long-Term Passenger Terminal Expansion Area

The passenger terminal is currently constrained in terms of long-term expansion potential. Gulfstream Aerospace facilities are located to its immediate north of the passenger terminal and automobile parking areas are located to the immediate east. The 2003 Master Plan Update identified the area south of the terminal as the only feasible expansion area for the passenger terminal (see **Exhibit 7-5**). Relocating the GA terminal will provide space for long-term passenger terminal expansion in the future. However, this is a relatively minor reason for relocating GA facilities when compared with the current functional, safety, and operational issues next to the passenger terminal building.

7.3.5. Provide FBO Services in the South GA Area

GA users currently must taxi across Runway 12/30 from the south GA area to receive basic services such as aircraft fueling and maintenance. The proposed south GA terminal will provide basic services for the south GA development area, eliminating the need for this long taxi distance across Runway 12/30.

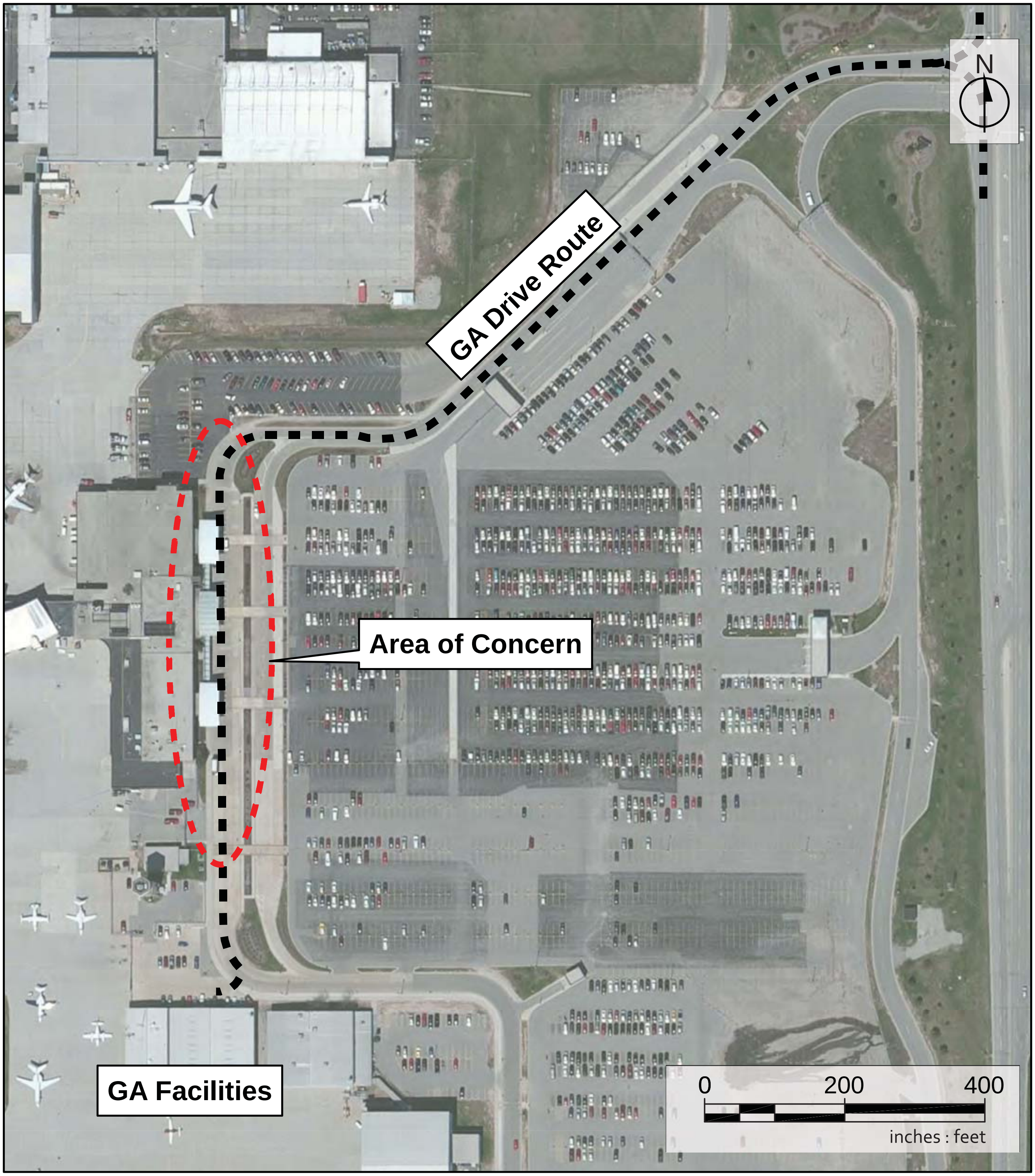


Exhibit 7-2
CURRENT GA GROUND VEHICLE DRIVE ROUTE

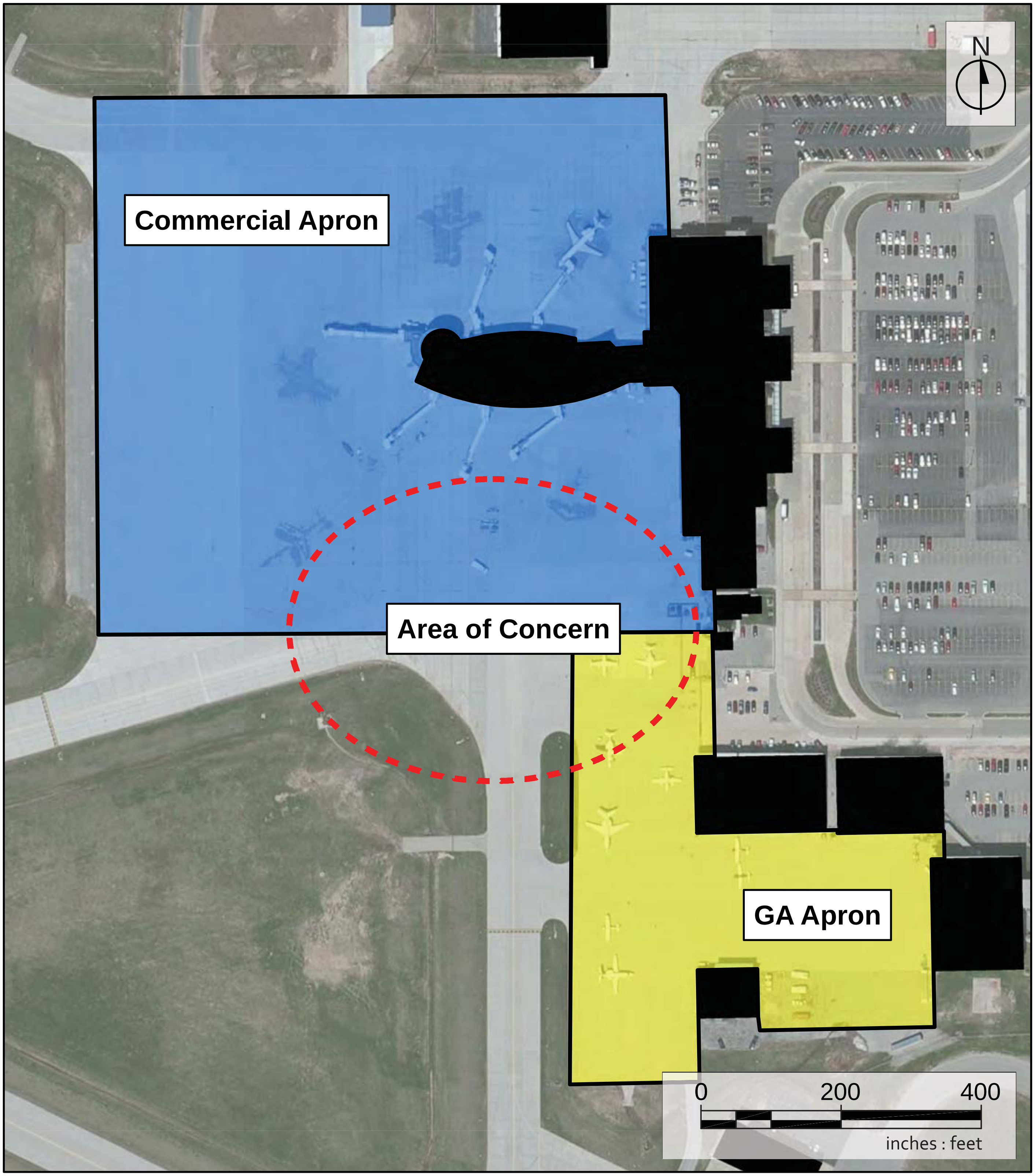


Exhibit 7-3

CURRENT AIRCRAFT PARKING APRON

Exhibit 7-4 AIRCRAFT APRON PARKING AND SEPARATION ISSUES

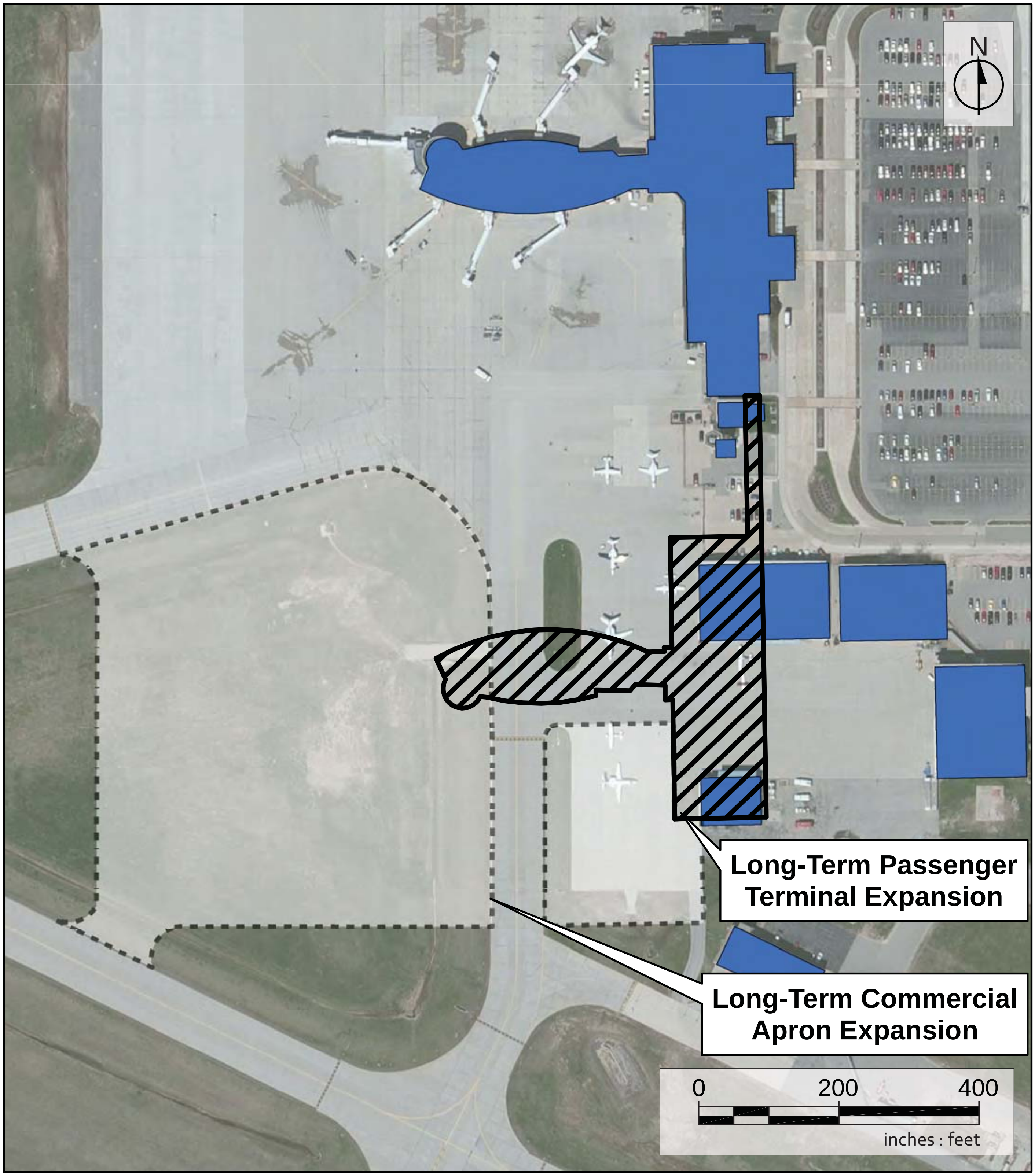


Exhibit 7-5 LONG -TERM PASSENGER TERMINAL EXPANSION

7.4. South GA Terminal Sustainable Design Elements and Strategies

Preliminary design for the GA terminal building was completed by Airport consultants in 2011, and groundbreaking for the facility is planned for 2012. The initial project will include the terminal building itself and associated apron and landside improvements. Future phases of the project will include an FBO aircraft maintenance hangar and additional apron expansion.

The new GA terminal building design will encompass approximately 8,000 square feet of floor space and consist of a main level and partial second floor. The first floor will include the main lobby, reception desk, administrative offices, passenger waiting area, kitchen, dining area, pilot lounge and office, executive office suite, and restrooms. Above the south portion of the main level is an atrium that extends up to the vaulted ceiling, exposing the beams. The second floor will house a conference room, Tailwind Flight Center, and mechanical space. Computer-generated renderings of the south GA terminal exterior are shown in **Exhibit 7-6**.

The GA terminal building will incorporate a wide range of design elements and strategies that will help the Airport achieve several of the sustainability goals prescribed by this Sustainable Master Plan. These goals include:

- Net Zero Energy Building
- Community Sustainability

7.5. Net Zero Energy Building

The south GA terminal building is designed to be a net zero energy building (NZEB). In the broadest sense, an NZEB is a building with greatly reduced energy needs compared to a traditional building, which uses renewable energy to offset its energy consumption. However, there is no “best” definition of net zero energy. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) recognizes four sub-categories of NZEBs:

- Class A: Net Zero Site Energy – a building that produces at least enough renewable energy on-site to offset its total site annual energy use.
- Class B: Net Zero Source Energy – a building that produces or purchases at least as much renewable energy in order to offset its total annual energy, calculated at the source. Source energy refers to the primary energy used to extract, process, generate, and deliver the energy to the site.
- Class C: Net Zero Energy Costs – the amount of money that the utility pays to the building owner for the renewable energy produced is at least equal to the amount of money that the owner pays for utility energy services and energy used over the course of the year.
- Class D: Net Zero Emissions – a building that produces or purchases enough emissions-free renewable energy to offset the emissions from all energy used in the building annually.

Exhibit 7-6 SOUTH GA TERMINAL RENDERINGS

The initial goal for the south GA terminal building was to design a Class A NZEB – Net Zero Site Energy. According to a March 2012 report published by the New Buildings Institute (NBI), there are currently only 21 commercial Class A NZEBs in the United States. Early in the design process for the south GA terminal, the design team determined that achieving the goal of Class A NZEB would be difficult without either sacrificing some of the amenities expected in an executive-class terminal or requiring a larger renewable energy system than could be reasonably accommodated.

As a result, the project goal was revised to design the south GA terminal to be as close to a Class A NZEB as possible. Precedents set by other high performance building projects show that a total energy savings reduction of 60% to 80% over a traditional building is feasible with proven technologies and without significantly altering the look and feel of the building. With this in mind, a target of 80% total energy savings, including the offset provided by on-site renewable energy systems, was set for the building. The remainder of the building's energy needs would be purchased from off-site renewable sources, making the south GA terminal a Class D NZEB – Net Zero Emissions. The GA terminal design is projected to consume 53,710 kilowatt hours (kWh) of electricity annually, which is less than one-third the energy consumption of a similarly-sized, traditionally-designed building. The terminal will produce the majority of its electricity on-site with a 25.8 kilowatt (kW) solar photovoltaic (PV) panel system

To achieve 80% total energy savings over a conventionally-designed building and meet the requirements of a Class D NZEB, the terminal design incorporates a range of energy-related elements in the following categories:

- Building Envelope
- Heating, Ventilation, and Air Conditioning
- Lighting
- Service Water Heating
- Renewable Energy Sources
- Other Efficiencies

7.5.1. Building Envelope

The building envelope consists of the entire exterior enclosure of a building. It has three main functions: to provide structural support to the building; to control the flow of matter, energy, and people in and out of the building; and to provide a medium for expressing aesthetic and design sensibilities. Careful attention to the second function of the building envelope – control – is most important for meeting sustainability goals. Each component of the building envelope for the south GA terminal was designed to maximize air tightness and thermal performance, including the roof, walls, floor slab, window glazing, and skylights.

The south GA terminal roof will protect the building from the elements, serve as part of the building's thermal, moisture, and air barrier, and provide space to mount a solar PV panel system. As designed, the roof has a large surface area that will contribute significantly to the thermal performance of building envelope as a whole. The thermal conductivity, or U-factor, of the roof design exceeds the minimum requirements for green buildings as defined by ASHRAE Standard 189.1, *Standard for the Design of High-Performance Green Buildings*.

The walls of the proposed terminal will be made up primarily of concrete masonry units with insulated metal panel cladding on the exterior and polyisocyanurate board insulation on the interior. Spray foam insulation will provide a continuous thermal barrier at the interface of the walls and roof. The U-factor of the walls is also significantly better than the minimum specified in ASHRAE Standard 189.1.

The building floor slab will be insulated to reduce heat loss during the winter months, particularly at the corners and edges of the slab. Because a radiant floor heating system will be used, the area under the slab will also be insulated to prevent excessive heat loss. Additional board insulation will be inserted where the slab meets the foundation wall. The slab will also exceed standards specified in ASHRAE Standard 189.1.

Three options were considered for energy-efficient window glazing. The preferred option was chosen not only for aesthetic reasons, but also because it performed the best in terms of reducing total building energy consumption. The U-factor for this "low-e" argon-filled glazing just meets the requirements of ASHRAE Standard 189.1. However, the glazing has a significantly better solar heat gain coefficient (SHGC) than the ASHRAE Standard 189.1. The SHGC is a measure of how much heat gain from solar radiation the glass allows into the building space. Glass with a low SHGC will help improve the GA terminal building's performance during the cooling season.

Finally, the GA terminal design includes a bank of skylights just below the ridge on the south-facing portion of the roof. These skylights help provide daylight to the central building spaces, reducing reliance on electric lighting systems. However, there will be a negative impact on the insulation value of overall building envelope associated with such a large expanse of skylights. This lost insulation value will be reduced by using aerogel-filled skylight glazing, which has significantly better thermal resistance than standard skylights.

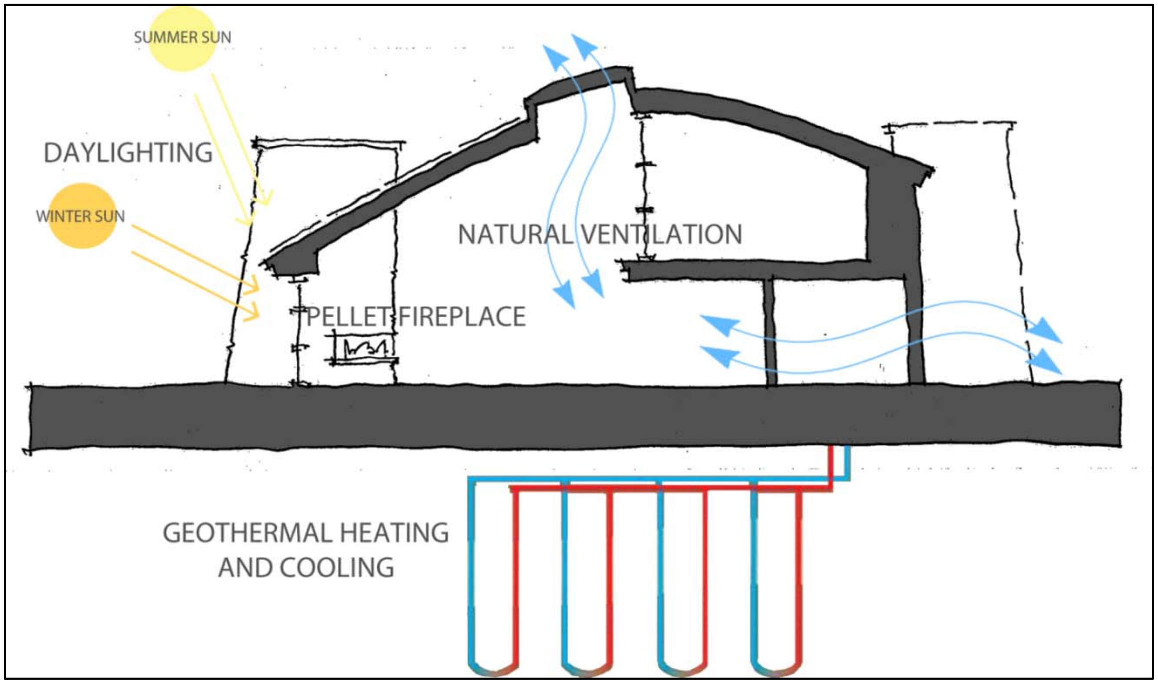
7.5.2. Heating, Ventilation, and Air Conditioning (HVAC)

The main HVAC system for the south GA terminal will consist of geothermal water-to-air heat pumps, as no other system types are energy-efficient enough to achieve the 80% energy savings goal. A geothermal system uses the ground as a "thermal battery". In the summer the geothermal system will reject heat to the ground, and in the winter will absorb heat from the ground. A geothermal heat pump "produces" heat by moving it from one location to another.

The geothermal heat pumps selected for the project are the most efficient available. The heat pumps also have dual-speed compressors and variable speed fan motors that help the units better match their output to the heating/cooling load. Heat exchange between the building and the ground will be accomplished by a ground-source heat exchanger. The ground-source heat exchanger for the south GA terminal is a vertical-bore type, which consists of a formation of deep, vertical boreholes with supply and return piping containing the geothermal fluid running the length of each borehole.

In addition to the water-to-air heat pumps that provide conditioned air to the building spaces, the GA terminal design includes a radiant floor heating system. This type of system supplies heat directly to the floor using a geothermal water-to-water heat pump, which operates identically to the water-to-air heat pumps except that it heats water instead of air. The heated water will be circulated through tubing embedded within the concrete slab floor, which will evenly distribute low-temperature heat throughout the building. The thermal mass of the concrete slab floor will have a high heat capacity that is ideal for storing and radiating heat. The heat pump for the design radiant floor system is at least three times as efficient as electric resistant heat. Radiant heating is more efficient than baseboard or forced-air heating because no heat is lost through ducts and the system uses little electricity.

Exhibit 7-7: Heating and Cooling Schematic



7.5.3. Lighting

The GA terminal will be rectangular in shape with the long axis running east to west. This site orientation will allow daylight to provide the primary interior lighting source during daytime hours, in both the summer and winter seasons. As mentioned previously, windows and skylights will help provide daylight to the central building spaces, reducing reliance on electric lighting systems. Maximizing the availability of natural light will not only save energy but may also improve the well-being of GA terminal occupants.

Electric lighting systems will utilize high efficiency fluorescent and LED light fixtures that are connected to occupancy sensors that control when additional light is needed or can be switched-off. Furthermore, daylighting controls will automatically dim the electric lights in response to the available daylight. As a whole, the GA terminal will be designed to have the lowest light power density (measured in watts per square feet) that is achievable without compromising the required luminance levels. The perceived light level in a building space is affected by how much light is reflected from interior surfaces. A room with light-colored interior surfaces will reflect more light and seem brighter than a room with same fixtures but darker surface finishes. In order to achieve the highest possible reflectance values, the interior wood surfaces of the south GA terminal will be painted with lightest stain colors that fit with the chosen design scheme. High-efficiency fixtures, automated lighting systems, daylighting controls, and low interior lighting power density are projected to reduce electricity used for lighting by 30% over traditional building systems.

7.5.4. Service Water Heating

Domestic water heating for the south GA terminal will be provided by an air-to-water heat pump. This type of water heater uses heat from the building's air to heat water. A heat pump water heater is most effective when it is placed in a location with a lot of excess heat, such as a mechanical room.

7.5.5. Renewable Energy

The south GA terminal design includes a 25.8-kW capacity solar photovoltaic (PV) system mounted directly to the surface of the south-facing portion of the roof, which has a pitch angle of 34°. This system will produce electricity to offset some of the building's energy consumption in order to achieve the 80% energy savings goal. Excess electricity production will be sold back to the local utility. Overall, the PV system is expected to produce approximately 29,711 kWh per year.

7.5.6. Other Efficiencies

Additional systems, fixtures, and building commissioning strategies will enhance the overall resource efficiency of the south GA terminal, including water systems, efficient equipment, building automation systems, and a continuous commissioning program.

Water Systems. Water efficiency for the GA terminal will be achieved through rain water collection, low flow fixtures, and point-of-use hot water. Rain water collection cisterns will be located just outside the building on the south side.

Efficient Equipment. The geothermal heat pump and natural ventilation design will reduce the need for traditional pumps and fans. Equipment loads and run-times will be decreased by employing task-specific lighting and electricity use, controlled through a building automation system. Use of only ENERGY STAR®-qualified equipment will be required for appliances, such as refrigerators, microwaves, and copy machines.

Building Automation Systems. An intelligent building automation system will be used to monitor and control temperature, humidity, lighting and natural ventilation throughout the building. An electronic metering system will be used to measure and optimize the energy consumed from grid-sources and from the on-site solar photovoltaic panels.

Continuous Commissioning Program. A continuous commissioning program will help prevent building systems from going out of calibration and "losing" the energy savings that have been gained through their sustainable design. The continuous commissioning program will include implementation of a comprehensive building systems and equipment maintenance plan; periodic building occupant and staff surveys; regular review of trend logs produced by the building automation system; periodic review of building automation programming schedules and sequences; and annual review and benchmarking of building performance measures.

7.6. Net Zero Energy Summary

Overall, the south GA terminal building is expected to save 80.7% in energy consumption compared to a baseline building. The baseline building was created according to modeling requirements listed in Appendix C of ASHRAE Standard 189.1-2009, with modifications to conform to Wisconsin code requirements made where necessary. **Chart 7-1** summarizes the effect of the sustainable design elements will have on the building's annual energy use per square foot (also known as energy use intensity), and **Table 7-1** summarizes the expected energy performance of the GA terminal compared to the baseline building.

In order to conform to the requirements of a Class D NZEB – Net Zero Emissions Building, the GA terminal must produce or purchase enough emissions-free renewable energy to offset emissions from all energy used in the building annually. The GA terminal is projected to use 53,710 kWh of grid-supplied electricity per year after counting the electricity produced by the on-site PV system. By participating in We Energies' Energy for Tomorrow program, the Airport will purchase all of the grid-supplied electricity for the GA terminal from 100% renewable sources. The remaining emissions generated by the fireplace, about 1.2 tons of carbon per year, will be offset in the form of renewable energy certificates or greenhouse gas offsets. Typical costs for carbon offsets range from about $10 to $30 per ton of carbon emissions.

Chart 7-1: Energy Use Intensity for Outagamie Airport GA Terminal: Final Design

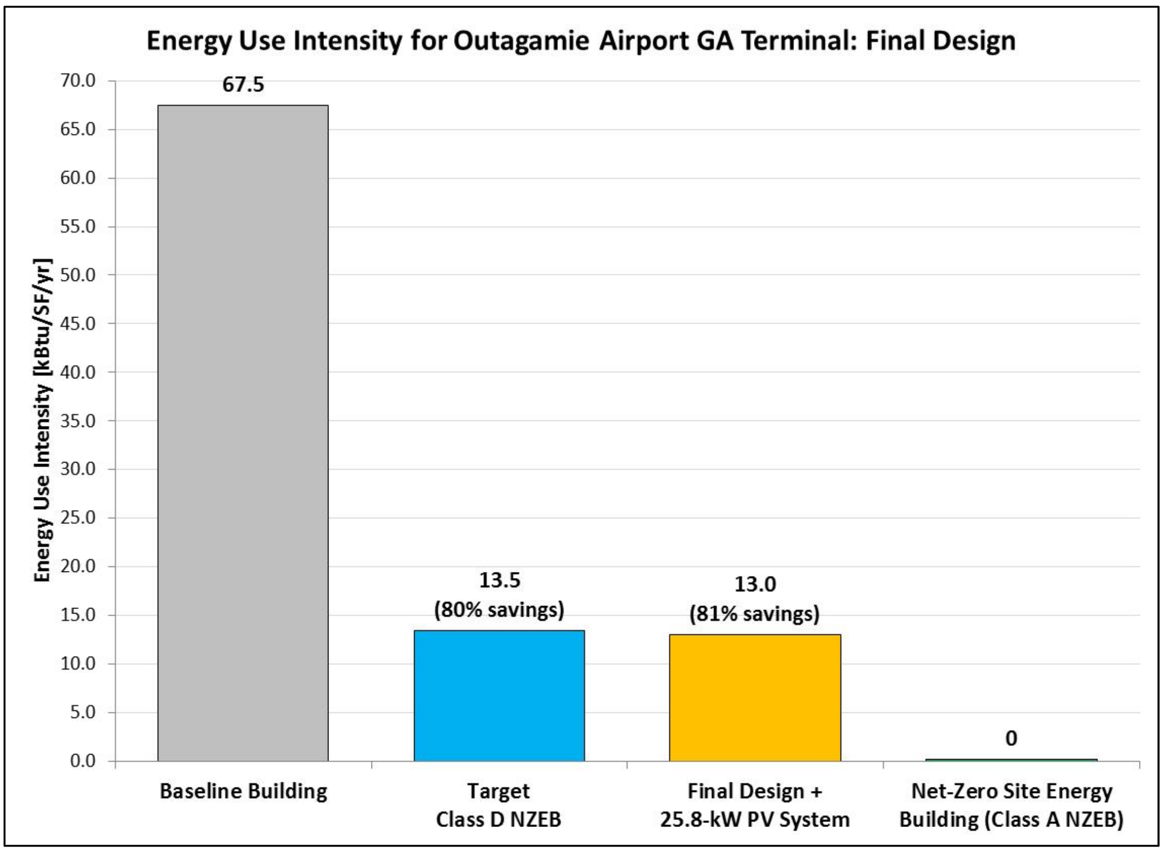


Table 1: Energy Performance of Final GA Terminal Design Compared to the Baseline Building					
	Baseline Building	25.8-kW PV System	Target Class D NZEB	Final Design + 25.8-kW PV System	Net-Zero Site Energy Building (Class A NZEB)
Natural Gas Consumption [therm]	215			204	
Electricity Consumption [kWh]	153,100	-28,995		53,710	
Peak Electrical Demand [kW]	37.21			10.73	
Total Energy Use [kBtu]	543,887	-98,960		203,669	
Annual Energy Savings (KBTU)	--		435,110	340,219	543,887
Energy Use Intensity [kBtu/sq-ft]	67.5	-12.3	13.5	13.0	0
Energy Savings Over Baseline (%)	**--**	**--**	**80.0%**	**80.7%**	**100%**

7.7. Community Sustainability

Another initiative associated with creating a truly sustainable GA facility is to fulfill the social aspect of sustainability by connecting with the community. The Sustainable Master Plan suggests one way to connect with the community is to involve students and faculty at the Fox Valley Technical College in the continuous commissioning program. Through this collaborative program, the Airport will provide cutting-edge, real-world experience for local students while also reducing operation and maintenance expenses.

Additional efforts in connecting with the community include the use of local materials and workmanship. For example, design, construction, and operation of the GA terminal will strive to make use of local materials, contractors, vendors, and suppliers. Construction materials such as structural steel and masonry will be acquired from locally or regionally available materials. Local landscaping material and seed will also be used.

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Chapter 8

Financial Plan

FINANCIAL PLAN

The purpose of this chapter is to evaluate Outagamie County Regional Airport's capability to fund the recommended six-year Capital Improvement Plan (CIP) through a variety of funding sources. These funding sources include FAA Airport Improvement Program (AIP) entitlement and discretionary grants, passenger facility charge (PFCs) and customer facility charges (CFCs), WisDOT BOA funds, and local Airport funds. The financial plan also evaluates the Airport's ability to fund operations during the six years from 2012 to 2017 through both airline and non-airline revenue. The financial plan includes the following components:

- Airport Capital Improvement Plan
- Funding Plan Analysis
- Financial Structure
- Historical and Projected Airport Revenues
- Historical and Projected Operating Expenses

8.1. Overview

As presented herein, an investment totaling approximately $43.9 million is required between fiscal years 2012 and 2017 to complete all necessary aviation safety, preservation and capacity enhancement projects programmed in this plan. The following funding sources are required in order to complete this program as more fully described later in this chapter:

Table 8-1: Capital Improvement Funding Source Summary

Funding Source	Amount	Percent of Total
FAA Discretionary	$ 13,174,537	30%
FAA Entitlement	$ 14,008,115	32%
Wisconsin Bureau of Aeronautics	$ 3,274,881	7%
Airport Funds	$ 4,475,069	10%
Passenger Facility Charges	$ 5,592,222	13%
Customer Facility Charges	$ 2,686,844	6%
Sustainability Projects	$ 669,000	2%
	$ 43,880,667	100%

Of equal importance to ATW's ability to garner sufficient funding to complete this capital program is the need to understand its capability to generate sufficient revenues to fund ongoing operations and obligations. To this end, this chapter includes an analysis of historical and forecasted operating revenues and expenditures for ATW.

In the context of examining both the proposed development plan and operating capacity of ATW, the following factors were considered in developing this financial feasibility analysis:

- Projections of enplaned passengers as presented in Chapter Two to derive Federal Aviation Administration (FAA) Airport Improvement Program (AIP) entitlements and Passenger Facility Charge (PFC) revenues required to complete the program.
- A funding plan for the capital improvement plan utilizing AIP entitlement and discretionary funds as well as the State of Wisconsin, Bureau of Aeronautics, Grant-in-Aid Program; PFC revenues; Customer Facility Charge (CFC) revenues; Airport Funds; and other sources of revenue.
- ATW's existing financial structure, airline agreements, and agreements with other major tenants.
- Actual revenues and expenses for the period FY 2006 through FY 2010.
- Budgeted revenues and expenses for the Airport for FY 2011 and FY 2012.
- Projections of revenues, expenses, and net cash flows from the operation of the Airport between FY 2013 through FY 2017 based on historical actual (FY 2006–2010) and budgeted (FY 2011 & 2012).
- A detailed cash flow analysis for the planning period FY 2012 through FY 2017 identifying the sources and uses of funds applied to the CIP.

The techniques utilized in this analysis are consistent with industry practices for similar studies which are used to evaluate the feasibility of large-scale airport capital improvement plans. While it is believed that the approach and assumptions are reasonable, it should be recognized that some assumptions regarding future trends and events might not materialize. Achievement of the proposed capital improvement plan as well as the operating results described herein is dependent upon the occurrences of future events and variations may be material.

8.2. Airport Capital Improvement Plan

All airports receiving federal AIP funding are required to maintain a current Capital Improvement Plan (CIP) with the FAA which identifies projects to be undertaken at an airport over a specified period of time. This plan further estimates the order of implementation as well as total project costs and funding sources. It incorporates all projects recommended as part of this Master Plan Update for the short-term planning horizon (FY2012-2017) and includes projects currently addressed in the Airport's existing CIP, ATW's PFC application 12-07-C-00-ATW as approved by the FAA in January 2012, the Airport's Customer Facility Charge (CFC) program, and the County of Outagamie Capital Improvement Plan.

The recommended CIP and its corresponding cost estimates are based on a planning level of detail and are presented in **Table 8-2**. While accurate for master planning purposes, actual project costs will likely vary from these planning estimates once project design and engineering estimates are developed. Costs as shown in Table 8-2 are based on current year (2012) construction dollar values and also include contingencies, design costs, and construction management costs. Each project was analyzed for AIP and PFC funding eligibility and a preliminary funding scenario was developed for each project from AIP, PFC, CFC, local, and other funding sources.

8.2.1. Funding for the Program

Table 8-2 presents an overall funding strategy for completion of ATW's Five Year (FY2012-2017) Airport Development Program based on a phased approach to accomplishing all necessary construction and other related program elements described above. The Program requires an investment of approximately $43.9 million with allocations of $14.0 million (FAA Entitlement), $13.2 million (FAA Discretionary), $3.3 million (State of Wisconsin), $5.6 million (PFC Revenue pay-as-you-go), $2.7 million (CFC), $4.5 million (Airport Funds), and $0.7 million (other sources) to fund recommended sustainability initiatives.

FAA funding participation in the proposed plan is based on the AIP as reauthorized in 2012. To this end, this analysis assumes continuance of AIP and PFC funding through the planning period absent major changes to appropriation levels by Congress. However, in the past, the AIP has experienced fluctuations in levels of funding and interruptions in availability of resources. Despite historical fluctuations in authorized appropriations and current potential threats to existing funding levels, the controlling objectives of this proposed plan are to maximize the use of resources from the AIP and PFC revenues and to minimize costs to the Airport and local funding requirements. Further description of both funding sources and anticipated timing of funding allocations are discussed in greater detail below.

Table 8-2: Capital Improvement Plan

			Project Funding Sources						
Year	**Project**	**Total Cost**	**FAA Entitlement**	**Ent. Carryover**	**Discretionary**	**State**	**Airport**	**PFC**	**CFC**
2012	Construct Taxiway N, Connect R/W 30 Threshold, Panel Replace	$2,650,000	$230,000	$1,470,000	$685,000	$132,500	$132,500		
	Reconstruct North Half Taxiway B	$2,250,000	$1,966,584		$58,416	$112,500	$112,500		
	Runway 12/30 Panel Replacement	$2,000,000			$1,800,000	$100,000	$100,000		
	Construct Public GA Terminal	$3,300,000			$750,000	$750,000	$1,800,000		
	Pave Perimeter Road Runway 3 Approach/GA Area	$350,000			$315,000	$17,500	$17,500		
	Design Airport Taxiway N Extension	$125,000				$100,000	$25,000		
	Design Perimeter Road Paving	$100,000				$80,000	$20,000		
	Land Reimbursement -- Wetland Mitigation	$370,500				$296,400	$74,100		
	Design South GA Ramp	$250,000					$250,000		
	Gulfstream Central Parking Area, Phase 1	$300,000					$300,000		
	ARFF Access Road (Reimburse)	$747,711						$747,711	
	Expand Terminal Apron (Reimburse)	$575,923						$575,923	
	Hertz Property Acquisition (Reimburse)	$469,410						$469,410	
	Aircraft Deice Truck(Reimburse)	$124,250						$124,250	
	Construct Glycol Mixing Building(Reimburse)	$37,916						$37,916	
	Upgrade Flight Display Monitoring System(Reimburse)	$60,000						$60,000	
	PFC Administration Fees(Reimburse)	$39,500						$39,500	
	Year 2012 Total Project Costs	$13,750,210	$2,196,584	$1,470,000	$3,608,416	$1,588,900	$2,831,600	$2,054,710	$0
2013	Replace Runway 3-21 Edge Lights	$200,000	$180,000			$10,000	$10,000		
	Widen/Strengthen Taxiway L	$750,000	$675,000			$37,500	$37,500		
	Obstruction Removal	$300,000	$270,000			$15,000	$15,000		
	Construct GA Ramp, Phase 1	$2,200,000	$944,813		$1,035,187	$110,000	$110,000		
	Terminal - Design	$354,575			$319,118	$17,729	$17,729		
	Sealcoat Asphalt	$100,000				$80,000	$20,000		
	Purchase ARFF Vehicle	$220,000					$220,000		
	Replace Small Tractor with Mower	$60,000					$60,000		
	Purchase SRE -- Snowblower	$90,000					$90,000		
	Gulfstream Parking Area, Phase 2	$325,000					$325,000		
	Repair Airport Sanitary Sewer	$500,000					$500,000		
	Upgrade SRE Fleet	$1,190,000					$238,240	$951,760	
	Terminal - Sustainable Initiatives	$125,000							
	Year 2013 Total Project Costs	$6,414,575	$2,069,813	$0	$1,354,305	$270,229	$1,643,469	$951,760	$0
2014	Design North GA Ramp Improvements	$250,000	$225,000			$12,500		$12,500	
	Construct North GA Improvements	$4,000,000	$1,557,033		$2,042,967	$200,000		$200,000	
	Replace Runway 30-12 Edge Lights	$200,000	$180,000			$10,000		$10,000	
	Upgrade SRE Fleet-P.II	$720,000						$720,000	
	Consolidated Rental Car Facility - Design	$300,000							$300,000
	Year 2014 Total Project Costs	$5,470,000	$1,962,033	$0	$2,042,967	$222,500	$0	$942,500	$300,000

Table 8-2: Capital Improvement Plan (continued)

			Project Funding Sources						
Year	**Project**	**Total Cost**	**FAA Entitlement**	**Ent. Carryover**	**Discretionary**	**State**	**Airport**	**PFC**	**CFC**
2015	Terminal - Circulation Reconfiguration Construction	$1,800,750	$1,620,675			$90,038		$90,038	
	Upgrade ARFF Fleet	$950,000						$950,000	
	Consolidated Rental Car Facility Construction	$2,886,844				$500,000			$2,386,844
	Terminal - Sustainable Initiatives	$192,000							
	Year 2015 Total Project Costs	$5,829,594	$1,620,675	$411,958	$0	$590,038	$0	$1,040,038	$2,386,844
2016	Terminal - Security Checkpoint Construction	$1,922,288	$1,318,101	$411,958		$96,114		$96,114	
	Purchase SRE -- Replace Plow Truck w/Broom & Deice	$900,000	$279,327		$530,673	$45,000		$45,000	
	Install PV on Terminal	$562,000	$505,800			$28,100		$28,100	
	Terminal - Sustainable Initiatives	$16,000							
	Year 2016 Total Project Costs	$3,400,288	$2,103,228		$530,673	$169,214	$0	$169,214	
2017	Pave Perimeter Road -- West Quadrants	$1,180,000	$1,062,000			$59,000		$59,000	
	Construct SRE Building	$7,500,000	$1,111,824		$5,638,176	$375,000		$375,000	
	Terminal - Sustainable Initiatives	$336,000							
		$9,016,000	$2,173,824		$5,638,176	$434,000	$0	$434,000	
	TOTAL PROJECT COSTS FY 2012 - FY 2017	***$43,880,667***	$12,126,157	$1,881,958	$13,174,537	$3,274,881	$4,475,069	$5,592,222	$2,686,844

8.2.2. Federal AIP Grants

Federal grants for the FY 2012-2017 ATW Capital Improvement Plan are anticipated to be made available through the FAA's AIP program. On February 14, 2012, President Obama signed into law the FAA Modernization and Reform Act of 2012, the current AIP legislation which provides both Entitlement funds and Discretionary grant allocations for eligible projects undertaken by an airport sponsor. As a general rule, only those airport projects that are related to non-revenue producing facilities, such as the vast majority of those listed in ATW's proposed capital improvement program, are eligible for federal funding for up to 90 percent of total project costs.

The AIP is authorized by Chapter 471 of Title 49 of the United States Code (U.S.C.). Title 49 U.S.C., Section 47104(a) authorizes the FAA Administrator to make grants for airport planning and development in the United States and certain other entities. AIP grants assist the development of public-use airports served by air carriers, commuters, air cargo and general aviation and as noted above are awarded based upon formula (Entitlements) as well as through a prioritization process (Discretionary). For purposes of considering entitlement grant-in-aid funding, ATW is categorized as a non-hub primary airport.

Pursuant to AIP funding guidelines, each primary airport funding apportionment is based upon the number of passenger boardings at an airport. If Congress enacts legislation allocating full funding, the minimum amount apportioned to the sponsor of a primary airport is $650,000, and the maximum is $22,000,000 (Title 49 U.S.C., Section 47114(c)(1)(B)). These allocations are calculated as follows:

- $7.80 for each of the first 50,000 passenger boardings
- $5.20 for each of the next 50,000 passenger boardings
- $2.60 for each of the next 400,000 passenger boardings
- $0.65 for each of the next 500,000 passenger boardings
- $0.50 for each passenger boarding in excess of 1 million

Also, in any fiscal year in which the total amount made available under Title 49 U.S.C., Section 48103 is $3.2 billion or more the amount to be apportioned to a sponsor is increased by doubling the amount that would otherwise be apportioned under the formula. Under this scenario, the minimum apportionment to an airport sponsor is increased to $1,000,000 rather than $650,000, and the maximum apportionment to a sponsor is increased to $26,000,000 rather than the $22,000,000. The FAA Modernization and Reform Act of 2012 provides annual authorized funding levels for AIP in the amount of $3.35 billion per year for federal fiscal years 2012 through 2015. Provided the annual appropriation by Congress is equal to or greater than $3.2 billion, the minimum entitlement for primary airports (i.e., an airport with a minimum of 10,000 enplaned passengers) will total $1.0 million a year during this period.

Table 8-3 forecasts FAA Entitlement funds during the period FY2012-17 based on the enplaned passenger forecasts developed as part of this master planning effort as well as the Entitlement formula described above. The projected entitlement funds presented in Table 8-3 are based on total enplanements at ATW from the calendar year two years prior (i.e., entitlements for FY 2012 are based on enplanements from FY 2010). Notwithstanding the potential for reductions in federal aid, ATW's AIP entitlements for the period FY 2012 through FY 2017 are expected to range from $1.96 million in FY 2014 to $2.19 million in FY 20124, or $12.5 million total for this period. ATW is also expected to have AIP

Entitlement Fund "carryover" allocations in the amount of $1.47 million available in FY 2012 to aid in the completion of projects programmed in this initial year of the program. In addition, it is anticipated that projects undertaken in FY 2015 will result in approximately $411,000 in AIP entitlement funds being carried over for work scheduled in FY 2016.

Table 8-3: Projected Entitlement Funds and Passenger Facility Charge Revenue

Fiscal Year	Projected Enplanements 1/	Projected Enplanements (2 yrs. Prior)	Entitlement Funds	Passenger Facility Charges 2/	Total Funds
2012	227,314	272,420	$2,196,584	$898,118	$3,094,702
2013	240,891	248,041	$2,069,813	$951,760	$3,021,574
2014	254,467	227,314	$1,962,033	$1,005,399	$2,967,432
2015	268,043	240,891	$2,032,633	$1,059,038	$3,091,671
2016	281,619	254,467	$2,103,228	$1,112,677	$3,215,905
2017	295,195	268,043	$2,173,824	$803,470	$2,977,294
TOTAL PROJECTED REVENUE			***$12,538,115***	***$5,830, 462***	***$18,368,577***

Source: Mead & Hunt, Inc.

Note: 1/ Includes charters.

2/ Assumes a net collection of $4.39 per eligible enplaned passenger.

Assumes 90 percent of the Airport's enplanements are eligible for PFC collection.

The AIP program also allows for discretionary funding to be made available from the FAA to provide financial support for major capacity- or safety-related projects. The CIP as presented in Table 8-2 anticipates FAA discretionary funds totaling approximately $13.2 million being made available for this program over the next five years. The likelihood of receiving the required level of discretionary funding is considered extremely high given the important airfield capacity and safety enhancements that will result through undertaking this work. This is borne out by the fact that all of the proposed FY2012 projects requiring discretionary aid ($3.62 million total) are either under grant at this time or, are expected to be by the close of the current federal fiscal year.

8.2.3. State of Wisconsin Department of Transportation Funds

Because ATW is considered a Primary Commercial Service Airport with scheduled air carrier service and enplanes greater than 10,000 or more passengers annually, it is eligible to receive individual grants from the State of Wisconsin Department of Transportation, Bureau of Aeronautics (Bureau) based on its annual enplanement volume. Although ATW may use these funds for any federally eligible work to be undertaken on the airport, it is required to ensure that its projects are reflected in the Bureau's Five Year Airport Capital Improvement Program (Program).

Transportation user fees (including aviation user fees) deposited in the State's Transportation Trust Fund provide the revenue to support the Bureau's grant-in-aid Program. Funds are issued based upon a finding of need approved by the Governor and are appropriated based upon individual airport needs and Bureau priorities. For projects receiving federal financial aid, the airport owner, and Bureau share equally the non-federal costs. For projects not involving federal financial aid, the Bureau normally pays 80 percent of the cost of airside development and 50 percent of landside development projects. The recommended plan proposes securing $3.3 million in grant-in-aid funding from the Bureau to provide 5.0 percent of the non-federal share for projects being completed through the AIP, 80 percent funding for state-local projects, and a total of $500,000 for construction of the proposed Consolidated Rental Car Service Facility.

8.2.4. Passenger Facility Charge Revenue

In addition to AIP funding and grants from the State of Wisconsin, Bureau of Aeronautics, ATW has the ability to levy an Airport Passenger Facility Charge (PFC) to provide locally generated funds for implementation of this recommended capital plan. Collection of a PFC is authorized under the Aviation Safety and Capacity Expansion Act of 1990 and Part 158 of the Federal Aviation Regulations, the Passenger Facility Charge Program (14 CFR, Part 158). PFCs are collected for enplaning passengers at an Airport and these funds are used to finance all or portions of capital improvements that are identified by the Airport Sponsor and approved by the FAA. To be eligible for PFC funding, a project must preserve or enhance safety, security, or capacity of the national air transportation system; reduce or mitigate airport noise from an airport; or provide opportunities for enhanced competition between or among air carriers.

ATW began collecting PFCs in 1994 and is in the process of completing work associated with its sixth application. In addition, ATW has received FAA approval to collect and use an additional $4.915 million in PFC revenues starting in January 2013. Collectively, ATW is authorized to impose and use PFC funding totaling $20.42 million through May 2017 and is currently levying and collecting a $4.50 PFC.

Table 8-3 forecasts projected PFC revenues during the period FY2012-17. PFC Revenue forecasts are based on the enplaned passenger forecasts developed as part of this master planning effort. As indicated, PFC collections for the Airport are projected to total $6.2 million over the planning period; however, only $5.6 million of this amount is programmed for collection and use on a “pay-as-you-go” basis. Accordingly, additional capacity exists in ATW’s PFC program to provide resources to complete projects recommended in this program and thereby reducing the need to utilize resources from the Airport’s Fund balance.

8.2.5. Airport Funding

Funding totaling $4.5million is required from the Airport’s Fund Balance and cash flow in order to facilitate completion of the programmed improvements for ATW during the next five (5) year period. Projects to be undertaken at ATW and financed in part by Airport Funds are reflected in the adopted County Capital Improvements Program (CCIP) for Outagamie County. This plan incorporates major County projects expected to be undertaken over a five (5) year period. The CCIP is an administrative, internal planning document and is not an adopted County Board plan. Therefore, it serves as a strategic planning document which informs the County and ATW about making future allocations of limited capital resources. Moreover, it provides a basis for future financial long-term planning while at the same time informs the annual budget process by providing insights to the operating cost impacts of proposed projects as well as their effect on the tax levy and debt service levels. Projects in the CCIP are not undertaken until such time as a formal appropriation is made by the County Board. A total of 42 airport projects are currently listed in the CCIP.

8.2.6. Customer Facility Charge Revenue

In December 2008, the County Board authorized establishing a $3.50 per transaction day Customer Facility Charge (CFC) for all rental car transactions occurring at ATW. Rental car companies collect the fees on behalf of the County and remit them to the ATW for use on capital expenditures and/or to fund operating expenditures associated with facilities constructed for the sole benefit of rental car customers. Funds accruing to the Airport as the result of this assessment are earmarked for the construction of a consolidated Rental Car Service and Storage Facility in FY2015. Upon completion of construction, the Airport intends to continue to impose this fee in order to provide sufficient revenues for the payment of any debt service required for construction of the facility as well as the operation, maintenance, and establishment of reserve funds required for this facility. It is anticipated that upon occupancy of the facility, the Airport may reassess the level of CFC and adjust it accordingly to ensure that the revenue generated each year does not exceed authorized uses. Based upon the County's adopted FY2012 Operating Budget, a balance of $1,219,323 is anticipated to be available in ATW's CFC fund for use on this project as of December 31, 2012.

8.2.7. Other Revenue

Approximately $0.7 million in sustainability projects which will benefit ATW's air carrier terminal are expected to be completed during this period. These projects will be designed to reduce environmental impacts associated with the operation of this facility and the sources of funding to achieve them will be determined as ATW implements this program.

8.2.8. Funding Plan Analysis

Table 8-4 depicts the required annual allocations of funding from the FAA and PFC Revenues in order to complete the airport development program.

Table 8-4: Capital Improvement Plan Funding Analysis

Year	Total CIP Costs	Required FAA Entitlements	Anticipated FAA Discretionary	Passenger Facility Charges	Required PFC Funds	Annual PFC Balance	Required Airport Funds
2012	$13,750,210	$2,196,584	$3,608,416	$2,054,710	$2,054,710	$0	$2,831,600
2013	$6,414,575	$2,069,813	$1,354,305	$951,760	$951,760	$0	$1,643,469
2014	$5,470,000	$1,962,033	$2,042,967	$1,005,399	$942,500	$62,899	$0
2015	$5,829,594	$2,032,633	$0	$1,059,038	$1,040,038	$81,900	$0
2016	$3,400,288	$2,103,228	$530,673	$1,112,677	$169,214	$1,025,362	$0
2017	$9,016,000	$2,173,824	$5,638,176	$1,166,315	$434,000	$1,757,678	$0
TOTAL	***$43,880,667***	***$12,538,115***	***$13,174,537***	***$7,349,899***	***$5,592,222***		***$4,475,069***

Sources: Outagamie County Financial Services Department; Mead & Hunt

As previously stated, the most critical elements for the successful implementation of this plan are receipt of grant-in-aid funding from the FAA and State of Wisconsin, Department of Transportation, Bureau of Aeronautics as well as allocation of resources available from the Airport Fund Balance. Collectively, these sources are expected to provide $40 million or 91 percent of all funding for this five year program. Assuming these entities allocate the amount of funding requested, PFC revenues are generated as programmed and the requisite funding is provided by the FAA AIP program, it is reasonable to assume that completion of this program is attainable within the proposed timeframe. However, approximately $1.4 million in unencumbered PFC revenue is expected to be generated during this period. Accordingly, ATW should evaluate the feasibility of seeking additional PFC collection authority to reimburse the Airport Fund Balance for its share of costs during the initial years of this plan and provide resources to support projects during the period FY2014-17.

8.2.9. Conclusions and Recommendations -- Capital Plan

To ensure to the greatest extent possible that the required funding is provided to complete this plan as detailed herein, it is recommended that ATW undertake the following initiatives:

- Enter into a dialogue with the State of Wisconsin, Department of Transportation, Bureau of Aeronautics about the feasibility of fully funding its overall 7 percent share ($3.3 million).
- Confirm the County's adopted capital improvement plan includes the funding required from the Airport Fund Balance to provide non-PFC revenues for the required local share.
- Initiate a new PFC application process in FY2013 to enable the collection and use of an additional $3,980,585 to provide resources for projects to be undertaken in FY2014-17 ($2,585,752), and partially reimburse the Airport Fund Balance for projects undertaken/funded in FY12-13 ($1,394,833). This initiative is estimated to extend ATW's authorization to collect PFC funds from May 2017 to approximately November 2021.
- Pursue federal and state funding to complete construction of the $0.7 million in sustainability projects recommended for this plan.

8.3. Financial Structure

The Airport is considered an Operating Department of the County of Outagamie, Wisconsin government and its financial results are reported within the composite financial statements of the County as a distinct self-supporting Enterprise Fund business activity. The County's Finance Department acts as the fiscal agent for the Airport and is responsible for maintaining its budgetary as well as revenue and expenditure accounts. The County reports the Airport's financial results within its combined financial statements and maintains discrete financial records to account for the itemized revenues and expenses of the Airport and also prepares an Annual Financial Report on the Airport's financial condition. The County's fiscal year runs concurrently with the calendar year (January 1 to December 31) and it utilizes an accrual basis of accounting for reporting financial results. As such, revenues are reported when earned and expenses are booked when a liability is incurred regardless of the timing of cashflows. In August of each year, the Airport submits its proposed operating budget for the ensuing fiscal year to the County Executive. Following an internal review process, including consideration by the Board's five (5) member Property/Airport/Recreation and Economic Development Committee, the Airport Budget is submitted as part of the County Executive's overall funding request to the County Board in early October. The Board generally adopts its budget in November.

The County has established the following ten (10) cost centers for tracking Airport revenues and expenses:

- Terminal
- T-Hangars
- Airport Operations
- Gulfstream Hangar
- Car Rental Lot
- Employee Parking
- Public Parking
- Rental Properties
- Public Safety
- FBO Operations

Within each cost center, the County assigns distinct revenue accounts for income generating fees and charges assessed to tenants and users as more fully described in this Chapter. Expenditures are accounted for in six (6) functional areas: Salaries, Fringe Benefits, Travel/Training, Supplies, Purchased Services, and Capital Outlay. For purposes of this analysis, historical financial data from these distinct categories were aggregated into broader functional areas except for several key Purchased Services expenditures which were segregated given their level of budgetary obligation. Expenditure data generally corresponds to County records and reconciles with U.S. Department of Transportation, FAA Form 5100-27 Operating and Financial Summaries for FY2006-2010 and adopted County Budget data for FY2011 and 2012. Revenue data aligns with County records for all fiscal years considered as part of this analysis. All ensuing fiscal year projections (FY2013-17) correspond with the functional categories defined in the above referenced reports and are based upon historical actual results, input from Airport management and industry trends.

The County deploys a proactive property management and lease administration program to ensure that the Airport charges market-based fees and rental rates to its users/tenants which enables it to provide aviation services and amenities in the most cost-effective and self-sufficient manner possible. The County has in effect an airline lease and use agreement with scheduled airlines serving the Airport. It further maintains multi-year rental car concession agreements and contracts with firms to manage its public parking concession operation and provision of general aviation services. The current airline agreement establishes landing fees, terminal building rentals and terminal building joint use and common use fees and is currently in effect through December 31, 2012, with one extension option. Air carrier tenants are presently charged $26.44/square foot per year for both exclusive and non-exclusive space for use of terminal facilities while the airline landing fee is calculated at a rate of $1.20 per thousand pounds of certified landed weight. In 2010, the County acquired all assets of the then current full service Fixed Based Operator (FBO) and has been providing these general aviation services since that time through a management agreement. In addition, the County holds a myriad of land and hangar leases and receives revenue from the operation of the public parking facility. These activities generate the majority of operating revenue for the Airport.

The purpose of this analysis is to offer ATW a baseline evaluation of revenues and expenses over the past seven (7) years in order to provide a framework for understanding future impacts associated with implementation of the selected Master Plan CIP as well as ongoing expenditures and revenue streams. It seeks to provide, on a very broad basis, reasonable guidelines for matching projected financial resources with financial needs. It is not intended to serve as a true airport profit and loss statement; instead, it offers insight to emerging trends that could impact the future performance of ATW and the affordability of the proposed CIP.

8.4. Historical and Projected Airport Revenues

To aid this analysis as well as provide a clearer understanding of historical trends, the following broad revenue categories established by the County were utilized:

AIRLINE REVENUE

- Landing Area – Airline and Cargo Landing Fees
- Terminal Area – Airline Operational Exclusive/Non-Exclusive space

NON-AIRLINE REVENUE

- Airfield Area – T-Hangar/Hangar Rent, Fuel Flowage Fees, Apron and Tiedown Charges
- Terminal Area – Rental Car Operations/Concessions, Food/Beverage/Retail Concessions, Ground Transportation Concessions, Sale of Property and Miscellaneous Charges for Service
- Parking Area – Public and Employee Parking Functions
- Administrative Revenue – Interest Earnings
- Other – Federal Government, Other Land Rentals and Air Wisconsin, Inc. Corporate Functions

Table 8-5 depicts the Airport's historical revenues from FY2006 through FY2010 along with budgeted revenues for FY 2011 and FY 2012. During this seven year period, total airport revenue experienced strong growth increasing from $5,891,963 in FY2006 to $9,095,831 in FY2012 (budgeted); representing an increase in revenue of approximately $3.2 million and translating to an 8 percent compounded annual growth rate for this period.

As of FY2012, non-airline sources of revenue are expected to account for approximately 81 percent of the ATW's revenue base. The proposed FY2012 budget expects that the primary generators of non-airline revenue will be FBO Operations, Parking, Other Revenues, and Rental Car Concessions, providing approximately $5.3 million in revenue to support the FY2012 Budget. These activities have historically been the largest generators of non-airline revenues. From a broader perspective, the following activities/initiatives contributed to ATW being able to generate a compound annual growth rate of 8 percent during this period:

- ATW assumed ownership and operation of the FBO in October 2010
- A weekly Parking Rate was established in FY2008 which was upwardly adjusted in subsequent years
- Parking Rate changes for hourly/daily use were implemented in fiscal years 2007, 2008 and 2010. Current Parking Rates are as follows:

Short Term (1st 30 minutes free)	**Long Term (1st 30 minutes free)**
Per ½ hour = $1.00	1 hour = $2.00
1 hour = $2.00	Additional hours = $1.00
Per Day = $12.00	Per Day = $7.00
	Per Week = $35.00

Table 8-5: Historical Airport Revenues

	2006	2007	2008	2009	2010	Budget 2011	Budget 2012	CAGR FY06 to FY12
AIRLINE REVENUES								
LANDING AREA								
Airline Landing Fees - Scheduled	$352,257	$356,483	$377,741	$374,519	$395,532	$456,668	$377,509	1%
Cargo Landing Fees - Scheduled	$83,085	$90,450	$101,797	$85,180	$93,245	$97,900	$104,000	4%
TERMINAL AREA								
First Floor Exclusive	$168,603	$168,603	$168,603	$178,342	$203,695	$208,898	$163,292	-1%
First Floor Non-Exclusive	$510,398	$500,824	$499,800	$588,751	$858,595	$882,754	$954,671	11%
Total Airline Revenue	***$1,114,343***	***$1,116,360***	***$1,147,941***	***$1,226,792***	***$1,551,067***	***$1,646,220***	***$1,599,472***	**6%**
NON-AIRLINE REVENUE								
AIRFIELD AREA								
T-Hangar Rent	$87,202	$83,301	$75,277	$76,647	$78,220	$81,677	$80,095	-1%
Hangar Rentals (4400) (Gulfstream)	$622,491	$623,903	$622,666	$645,197	$692,487	$695,357	$696,157	2%
Fixed Based Operations	$0	$0	$0	$0	$463,516	$2,252,862	$2,573,064	14%
Fuel Flowage Fees	$65,839	$63,600	$54,823	$49,356	$59,581	$55,800	$56,500	-3%
Apron Charges/Tiedowns								
TERMINAL AREA								
Rental Auto Concessions	$673,196	$696,698	$687,035	$664,021	$724,227	$724,252	$794,375	3%
Car Rental Counter	$37,737	$38,869	$40,249	$46,539	$52,513	$52,500	$54,125	6%
Taxi Concession	$4,019	$5,410	$5,267	$6,097	$5,088	$5,450	$5,560	6%
Terminal -- food and beverage	$102,163	$108,254	$114,725	$120,806	$136,246	$128,500	$127,500	4%
Terminal -- retail stores	$87,394	$98,290	$104,942	$102,975	$107,015	$110,400	$111,200	4%
Miscellaneous Charges for Service	$24,758	$45,921	$63,071	$50,307	$41,037	$40,150	$46,600	11%
Sale of Property	$40,464	$185,000	$10,950	$11,534	$0	$0	$0	-100%
PARKING AREA								
Public Parking Facility	$1,515,950	$1,672,084	$1,567,540	$1,719,374	$1,891,084	$2,007,850	$1,836,200	3%
Employee Parking	$26,785	$8,633	$26,974	$29,683	$24,456	$22,300	$14,700	-10%

Table 8-5: Historical Airport Revenues (continued)

	2006	2007	2008	2009	2010	Budget 2011	Budget 2012	CAGR FY06 to FY12
NON-AIRLINE REVENUE (CONTINUED)								
ADMINISTRATIVE REVENUE(Interest)	$274,379	$387,476	$158,986	$83,888	$65,410	$65,000	$65,000	-21%
OTHER AREAS								
Airline Corporate Office Lease (2nd Floor)	$403,621	$409,410	$420,988	$420,988	$423,024	$392,926	$343,922	-3%
Airline Corporate Office Lease (Basement)	$165,270	$194,704	$202,000	$202,896	$204,261	$203,779	$180,104	1%
Federal Government	$193,178	$185,688	$178,793	$160,253	$160,504	$163,286	$160,000	-3%
Other Land Rentals (5000117)	$453,174	$458,338	$441,630	$473,126	$543,748	$347,291	$351,257	-4%
Total Non-Airline Revenue	***$4,777,620***	***$5,265,578***	***$4,775,914***	***$4,863,687***	***$5,672,419***	***$7,349,380***	***$7,496,359***	**8%**

Source: Outagamie County Financial Services Department

CAGR = Compound Annual Growth Rate

- T-hangar rental rates were adjusted in FY2008 and additional units were brought on line in FY2010
- Airline leases were renegotiated during FY2009 which generated additional airline rents for the terminal building and increased landing fees in ensuing years
- Air and cargo scheduled service reductions in FY2009 and 2011 impacted landed weight and rates. **Table 8-6** depicts historical landing fee rates and weight for ATW during this period.

Table 8-6: Historical Cargo Landing Fees and Weights

Year	Weight	Rate per 1,000 lbs
2006	586,942	$0.88
2007	494,342	$0.91
2008	474,982	$0.97
2009	458,205	$1.07
2010	408,777	$1.13
2011	429,634	$1.15
2012	367,427	$1.20

It is noteworthy that the Airport provides a favorable operating environment for air carriers as reflected in its airline cost per enplaned passenger calculation, a key efficiency benchmark for airlines/airports to gauge reliance on airline rents and fees. This indicator is utilized to convey the relative "cost of doing business" for an airline at an airport as reflected in an airline's ability to spread its expense associated with renting and utilizing airport facilities among its passengers. For FY2012, the airline cost per enplaned passenger ratio for ATW is expected to be $5.76; consistent with other comparable non-hub commercial service airports. Although airline fees grew at a compounded annual growth rate of 6 percent during the period FY2006 – FY 2012 (budget), thereby increasing the cost per enplaned passenger ratio from $3.96 to $5.76, this increase was driven in large part by changes in airline operations which resulted in less airline landed weight rather than extraordinary increases in airport expenditures or loss of non-airline revenue. In addition, the renegotiated airline use agreement adjusted terminal fees and charges to be more reflective of market conditions.

Estimates of the Airport's future revenues were developed based on historical trends from FY2006 through FY2010, the Airport's FY2011 and 2012 adopted budgets, and an analysis of future revenue potential. **Table 8-7** presents budgeted revenues for FY2011 and 2012 as well as projected revenues for the period from FY2013 through FY2017, the end of the short-term planning period for the Airport's CIP. It is expected during this period, revenue growth will moderate from a compounded annual growth rate of 8 percent to 2 percent resulting in overall revenue levels increasing from approximately $9.1 million to $10.3 million. While revenue is expected to moderate in growth, several key initiatives may propel revenue levels beyond this estimate including construction of a new large span hangar expected to be completed in 2013, enhancements to the Airport's General Aviation terminal, and maturation of the County's FBO business line.

Table 8-7: Projected Airport Revenues

	Budget 2011	Budget 2012	Projected 2013	2014	2015	2016	2017
AIRLINE REVENUES							
LANDING AREA							
Airline Landing Fees - Scheduled	$456,668	$377,509	$381,284	$385,097	$388,948	$392,837	$396,766
Cargo Landing Fees - Scheduled	$97,900	$104,000	$107,120	$110,334	$113,644	$117,053	$120,565
TERMINAL AREA							
First Floor Exclusive	$208,898	$163,292	$166,558	$169,889	$173,287	$176,753	$180,288
First Floor Non-Exclusive	$882,754	$954,671	$973,764	$993,240	$1,013,105	$1,033,367	$1,054,034
Total Airline Revenue	***$1,646,220***	***$1,599,472***	***$1,628,726***	***$1,658,559***	***$1,688,983***	***$1,720,009***	***$1,751,652***
NON-AIRLINE REVENUE							
AIRFIELD AREA							
T-Hangar Rent	$81,677	$80,095	$80,896	$81,705	$82,522	$83,347	$84,181
Hangar Rentals (4400) (Gulfstream)	$695,357	$696,157	$710,080	$724,282	$738,767	$753,543	$768,614
Fixed Based Operations	$2,252,862	$2,573,064	$2,675,987	$2,783,026	$2,894,347	$3,010,121	$3,130,526
Fuel Flowage Fees	$55,800	$56,500	$57,630	$58,783	$59,958	$61,157	$62,381
Apron Charges/Tiedowns							
TERMINAL AREA							
Rental Auto Concessions	$724,252	$794,375	$810,263	$826,468	$842,997	$859,857	$877,054
Car Rental Counter	$52,500	$54,125	$55,208	$56,312	$57,438	$58,587	$59,758
Taxi Concession	$5,450	$5,560	$5,671	$5,785	$5,900	$6,018	$6,139
Terminal -- food and beverage	$128,500	$127,500	$130,050	$132,651	$135,304	$138,010	$140,770
Terminal -- retail stores	$110,400	$111,200	$113,424	$115,692	$118,006	$120,366	$122,774
Miscellaneous Charges for Service	$40,150	$46,600	$48,464	$50,403	$52,419	$54,515	$56,696
Sale of Property	$0	$0					

Table 8-7: Projected Airport Revenues (continued)

	Budget 2011	Budget 2012	Projected 2013	2014	2015	2016	2017
NON-AIRLINE REVENUE (CONTINUED)							
PARKING AREA							
Public Parking Facility	$2,007,850	$1,836,200	$1,891,286	$1,948,025	$2,006,465	$2,066,659	$2,128,659
Employee Parking	$22,300	$14,700	$14,847	$14,995	$15,145	$15,297	$15,450
ADMINISTRATIVE REVENUE(Interest)	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000
OTHER AREAS							
2nd Floor Lease	$392,926	$343,922	$350,800	$357,816	$364,973	$372,272	$379,718
Basement Lease	$203,779	$180,104	$181,905	$183,724	$185,561	$187,417	$189,291
Federal Government	$163,286	$160,000	$164,800	$169,744	$174,836	$180,081	$84,279
Other Land Rentals (5000117)	$347,291	$351,257	$365,307	$379,920	$395,116	$410,921	$427,358
Total Non-Airline Revenue	***$7,349,380***	***$7,496,359***	***$7,721,618***	***$7,954,329***	***$8,194,756***	***$8,443,170***	***$8,598,646***

Source: Mead & Hunt, Inc. Analysis

CAGR = Compound Annual Growth Rate

8.4.1. Airline and Cargo Landing Fees

Scheduled commercial and cargo airlines operating at the Airport are currently charged a landing fee of $1.20 per thousand pounds of landed weight. Revenue derived from airline/cargo operations constitutes approximately 7.0 percent of the Airport's revenue base, or $481,509, as of FY2012. The County's airline use agreement establishes the methodology for setting landing fees which includes transferring a portion of revenues from Rental Properties as a credit to this fee base to reduce charges to airlines. Total airline landing fee revenue for FY2012 is anticipated to be $481,509 with $104,000 of this amount being generated from cargo operations and the balance ($377,509) through airline operations. Between FY2006 and 2012, airline landed weight fluctuated significantly requiring the County to consistently increase its landing fee rate. While collections of cargo landing fees increased 4 percent each year during this period, airline landing fees remained relatively constant increasing only 1 percent each year. Projections of future landing fee collections assumes the County will continue its airport and airline use agreement as well as its current practice of crediting airline rates/fees with other non-airline revenue. It is further expected that cargo operations will generate the largest growth opportunity for this source of revenue. Should these assumptions be realized, the County can assume that airline/cargo landing fee collections will increase from $481,509 to $517,330 over the next five (5) years.

8.4.2. Airline Operations -- Exclusive/Non-Exclusive

This category of revenue represents fees the County charges airlines operating at ATW for the use and occupancy of exclusive and non-exclusive space in its air carrier terminal building. Leasing activities associated with airline use and occupancy of the terminal building produce 12.0 percent of total revenue for the Airport or approximately $1.1 million each year. In 2010, the County entered into a new airline/airport use agreement and established the rate of $26.44 per square foot per year for both exclusive and non-exclusive space. Because of this adjustment, non-exclusive lease rental income increased at a compounded annual growth rate of 11 percent during the period. Going forwarded, it is expected that Exclusive Use space rentals will increase from $163,292 to $180,288 while non-exclusive space revenue will grow from $954,671 to approximately $1,054,034.

8.4.3. Non-Airline Airfield Revenue

This category of revenue includes fees collected for T-Hangar/Hangar Rent, Fuel Flowage Fees, Apron Charges and Tiedowns as well as revenue derived from FBO operations. These sources of revenue increased from $775,532 in FY2006 to approximately $3.41 million in FY2012 (budgeted) due primarily to the acquisition and operation of the Airport's FBO in 2010. Because of this action, the Airport witnessed a compounded annual growth rate of 28 percent in these areas during this period. Although FBO revenues were the primary driver of increased revenue for this category, it is noteworthy that fuel flowage fees, the per gallon charge the County assesses for fuel dispensed at the Airport, actually dropped from approximately $66,000 in 2006 to $57,000 in 2012. Since the majority of revenue derived from this category is typically in-to-plane fees to airlines, this trend is reflective of the change in scheduled service that has occurred at ATW over the past seven years.

Provided the economy of the Fox Cities remains stable and the aviation forecasts projected in this study are realized, the County can expect FBO revenues to mature to an annual growth rate of 4 percent assuming it maintains established profit margins for fuel sales and other service offerings. Such annual growth can result in total revenue for the FBO of $3,130,526 million by FY2017. Overall, Non-Airline Airfield Revenue is expected to increase from $3,405,816 to $4,045,701 by FY2017 assuming current growth levels for FBO revenues and Hangar Rental income are maintained throughout this period. Further growth is likely in the event airline operations grow due to an increase in the number of carriers/flight serving ATW and/or additional general aviation amenities are offered at the Airport, which may boost the number of based aircraft and fuel sales.

8.4.4. Terminal Area Rentals

Terminal Area Rentals represents fees received by the County for rent of all terminal area space except for airline operations including Rental Car Operations/Concessions, Food/Beverage/Retail Concessions, Ground Transportation Concessions, Sale of Property and Miscellaneous Charges for Service. Revenues from these activities increased from $969,731 in FY2006 to an expected level of approximately $1.14 million in FY2012; translating to a compound annual growth rate of 3 percent during this period. Rental Car concession fees represent the largest source of revenue for this category (66 percent). Currently, the County's concession agreement with its rental car operators is effective through 2018. As such, it is expected that revenue derived through rental car activity will continue to contribute the preponderance of revenue for this area. Food/Beverage/Retail Concessions constitute approximately 21 percent of revenue for this category. Historically, revenue derived from these activities has grown at 4 percent per year and it is expected that in FY2012 this will translate to $238,700 in revenue for the Airport. Moving forward, it is assumed the County will continue a market-based ratemaking approach for these concession agreements and rentals/fees received from non-airline use of the Terminal are projected to increase from current levels to approximately $1.26 million in FY2017 representing an annual growth rate of 2 percent.

8.4.5. Parking Area

Public parking facility revenues represent fees collected from the Airport's 1,786 stall surface parking facility. The County currently operates its parking facility through a concession agreement with Standard Parking Company, Inc. which is in effect through 2012 with two extension options. The Airport also provides 457 stalls for employee parking which it collects a monthly fee for use/occupancy. The Airport averages 230,300 transactions each year for its long and short term parking operations. With this level of activity, Public Parking revenue increased from $1,515,950 FY2006 to an expected level of $1,836,200 in FY2012; translating to a compound annual growth rate of 3 percent during this period. Future projections of public parking revenue are based on projections of passenger activity and previous results. Accordingly, public parking revenue is projected to increase from an expected level of $1,836,200 in FY2012 to $2,128,659 in FY2017 continuing its historical rate of growth of 3 percent per year.

8.4.6. Other Revenue

Lease of space to the Transportation Security Administration (TSA), Air Wisconsin, Inc. and rental income from the lease of land constitute the sources of revenue for this category. ATW has served as the corporate headquarters for Air Wisconsin since its inception in 1965. The County leases space in its air carrier terminal and provides maintenance and storage hangar facilities south of the passenger terminal to support the operation of this carrier. In addition, the County leases Airport property to support several hangar facilities and provides space to the TSA in its air carrier terminal building. Historically, these activities have generated on average approximately $1.2 million each year on average, approximately 21 percent of all non-airline revenue. Although these sources have generated this level of revenue in the past, the County has witnessed a 3 percent decline/year in this category since FY2006 as witnessed by the fact that in FY2012 the County expects to receive $1,035,283 in revenue. This decrease is due to renegotiated lease terms with Air Wisconsin, Inc. While these adjustments will stabilize revenues in the short-term, the County's newly renegotiated lease with the TSA commencing in FY2017 will mean an additional loss of approximately $100,000 in annual rent from this federal agency due to reduced space needs. As such, it is expected that by the close of this five (5) year period, revenue derived from these sources will total approximately $1.08 million; slightly more than the current level of $1.04 million. Continued growth in land rents will mitigate the impact of the loss in TSA revenue in FY2017.

8.4.7. Summary of Airport Revenue

As shown in Table 8-7, total revenues at ATW are projected to increase from $9,095,831 in FY2012 to $10,266,019 in FY2017, representing a compounded annual growth rate of approximately 2 percent. These projections were developed by examining several key business factors that have an impact on major elements of Airport revenue. While such estimates are believed reasonable, actual levels of future revenue may differ from these projections. Examples of factors that could impact future levels of Airport revenue include changes in the level of passenger and general aviation activity and the corresponding continued success of the County in providing general aviation services through its FBO operation. Of critical importance to the County is its ability to maintain current profit margins in all existing/future FBO business lines and ensuring that it continues to establish rates and charges for its terminal facilities as well as its other buildings/land rentals consistent with market trends. Success in these areas could yield a greater level of revenue than projected in this analysis.

8.5. Historical and Projected Operating Expenses

The Airport's historical operating expenses for FY2006 through FY2012 (Budget) are presented in **Table 8-8**. During this seven year period, total airport operating expenses grew at a compounded annual growth rate of 13.0 percent; increasing from $3,351,505 in FY2006 to $7,115,779 in FY2012 (Budget). The acquisition and operation of the FBO commencing in the fall of 2010 is the primary reason for expenditure growth during this period. Discounting the impact of this operation on the Airport's budget/financial results yields an annual growth rate of 7 percent.

Personnel expenses (including salaries and fringe benefits), Supplies, Utilities, ARFF Services and Purchased Services have consistently represented the largest categories of non-FBO related Airport expenditures. It is expected that during FY2012 salaries and fringe benefits will total $1,595,651 and represent approximately 31 percent of all non-FBO operating expenses. The next largest components of total Airport operating expenditures are public utility services ($596,725), Purchased Services ($578,041), ARFF Services ($537,331) and Supplies ($483,250). As previously noted, the County reports expenses in the following six (6) functional areas:

1) Salaries
2) Fringe Benefits
3) Travel/Training
4) Supplies
5) Purchased Services
6) Capital Outlay

Table 8-8: Historical Airport Operating Expenses

	2006	2007	2008	2009	2010	Budget 2011	Budget 2012	CAGR FY06-FY12
AIRPORT OPERATING EXPENSES								
Salaries	$768,387	$898,826	$1,065,604	$1,004,935	$1,035,419	$1,138,666	$1,136,773	7%
Fringe Benefits	$269,098	$399,001	$452,081	$492,431	$500,476	$537,653	$458,688	9%
Supplies	$282,321	$349,065	$624,713	$507,249	$698,824	$463,975	$483,250	9%
Travel/Training	$9,016	$17,185	$25,604	$30,818	$27,702	$47,600	$45,600	31%
Purchased Services	$390,057	$375,429	$426,702	$415,962	$507,401	$634,942	$578,041	7%
ARFF Services	$339,716	$512,772	$448,367	$651,759	$475,896	$514,458	$537,331	8%
Sheriff Security Services	$254,881	$261,137	$264,420	$278,938	$286,477	$302,430	$291,082	2%
Maintenance and Repairs	$206,364	$190,398	$252,061	$210,192	$170,663	$144,700	$155,000	-5%
Utilities	$442,901	$522,228	$517,199	$491,625	$500,585	$558,130	$596,725	5%
Contractual Services	$169,317	$192,248	$228,023	$183,938	$206,287	$173,206	$182,960	1%
MIS Charges	$17,678	$18,223	$22,592	$32,267	$36,273	$50,134	$74,929	27%
Advertising, Promotion, Publicity	$18,617	$15,331	$209,881	$382,149	$328,794	$305,000	$350,000	63%
Insurance	$131,930	$122,580	$118,545	$116,988	$118,726	$132,964	$122,284	-1%
FBO Operating Expense	$0	$0	$0	$0	$199,875	$1,820,155	$1,803,916	-1%
Capital Outlay	$51,223	$189,277	$334,761	$84,198	$96,621	$448,200	$143,000	19%
Total Airport Operating Expenses	***$3,351,505***	***$4,063,699***	***$4,990,553***	***$4,883,449***	***$5,190,019***	***$7,272,213***	***$6,959,579***	13%
NON-OPERATING EXPENSES								
Debt Service	-	-	-	-	-	$152,191	$156,200	3%
Total Non-Operating Expenses	***$0***	***$0***	***$0***	***$0***	***$0***	***$152,191***	***$156,200***	3%

Source: Outagamie County Financial Services Department

The operating expense categories shown in Table 8-8 represent all expenses associated with the day-to-day operations of the Airport. Due to the scope and magnitude of several expenditures/obligations in the County's "Purchased Services" category, several specific purchased services were considered, including ARFF Services; Sheriff Security Services; Maintenance and Repairs; Utilities; Contractual Services; MIS Charges; and Advertising, Promotion, Publicity. Consideration was also given to FBO Operating Expense trends due to the impact this activity has on the Airport and its future viability. Estimates of the Airport's future operating expenses were developed based on historical trends from FY2006 through FY2010; and the Airport's FY2011 and 2012 adopted budgets. **Table 8-9** presents budgeted expenses for FY2011 and 2012 as well as projected expenses for the period from FY2013 through FY2017, the end of the short-term planning period for the Airport's CIP. Major expense categories, and the assumptions used to project expenses for each, are discussed in the following sections.

8.5.1. Salaries

Salaries represent personnel expenditures for the current 20.0 full time equivalent (FTE) County employees who provide Airport Management, Clerical and Building/Facilities Maintenance functions for the Airport. Between FY2006 and FY2012 (Budget), these costs increased from $768,387 to $1,136,773. Three (3) additional staff positions were approved in FY2007; including a Marketing Position and building/grounds maintenance staff. This action drove much of the increase in salaries during this period. As shown in Table 8-9, future salaries and labor expenses are projected to increase from $1,136,773 in FY2012 to $1,651,318 in FY2017, representing a compounded annual increase of approximately 6.0 percent. These projections were developed based on an estimated rate of inflation and assume two (2) new positions are authorized for the Airport by FY2015, an Administrative position in FY2013, and a Maintenance position in FY2014.

8.5.2. Fringe Benefits

Employee benefits expenses include fringe benefit costs, such as employee wage-related taxes, health care and employee pensions. Employee benefit expenses increased from $269,098 in FY2006 to $458,688 in FY2012 (Budget) increasing at a compounded annual growth rate of 9 percent per year. Since FY2007, when the three (3) additional positions were provided the Airport, the rate of growth for employee fringe benefits has moderated to 4 percent per year. As such, this category of Airport operating expense is projected to increase at approximately 4.0 percent per year increasing from $458,688 in FY2012 to $606,568 in FY2017 after accounting for the impact of adding staff in FY2013 and 2014.

8.5.3. Supplies

This category of expenditure represents the cost of materials and supplies needed for a host of activities aimed at maintaining and repairing all of the Airport's grounds and facilities. The cost of materials and supplies for ATW grew at a compounded annual growth rate of 9 percent between FY2006 and FY2012 (Budget) increasing from $282,321 in the first year of this model to $483,250 by FY2012. Most of the increases experienced in this category of expenditures are attributable to the escalating cost of fuel, natural gas and snow removal supplies. FY2010 experienced total expenditures of $698,824, the highest level of costs during this period reflective of the rapid increase in fuel and extraordinary winter weather experienced during that year. As shown in Table 8-9, this category is expected to increase from current funding of $483,250 to $560,219 in FY2017 assuming no extraordinary spikes occur in energy costs.

Table 8-9: Projected Airport Operating Expenses

	Budget 2011	Budget 2012	Projected 2013	2014	2015	2016	2017
AIRPORT OPERATING EXPENSES							
Salaries	$1,138,666	$1,136,773	$1,274,979	$1,386,478	$1,469,667	$1,557,847	$1,651,318
Fringe Benefits	$537,653	$458,688	$505,036	$539,237	$560,806	$583,239	$606,568
Supplies	$463,975	$483,250	$497,748	$512,680	$528,060	$543,902	$560,219
Travel/Training	$47,600	$45,600	$46,056	$46,517	$46,982	$47,452	$47,926
Purchased Services	$634,942	$578,041	$589,602	$601,394	$613,422	$625,690	$638,204
ARFF Services	$514,458	$537,331	$548,078	$559,039	$570,220	$581,624	$593,257
Sheriff Security Services	$302,430	$291,082	$291,082	$291,082	$291,082	$291,082	$291,082
Maintenance and Repairs	$144,700	$155,000	$158,100	$161,262	$164,487	$167,777	$171,133
Utilities	$558,130	$596,725	$626,561	$657,889	$690,784	$725,323	$761,589
Contractual Services	$173,206	$182,960	$184,790	$186,637	$188,504	$190,389	$192,293
MIS Charges	$50,134	$74,929	$76,428	$77,956	$79,515	$81,106	$82,728
Advertising, Promotion, Publicity	$305,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000
Insurance	$132,964	$122,284	$123,507	$124,742	$125,989	$127,249	$128,522
FBO Operating Expense	$1,820,155	$1,803,916	$1,894,112	$1,988,817	$2,088,258	$2,192,671	$2,302,305
Capital Outlay	$448,200	$143,000	$175,000	$175,000	$175,000	$175,000	$175,000
Total Airport Operating Expenses	***$7,272,213***	***$6,959,579***	***$7,341,077***	***$7,658,731***	***$7,942,777***	***$8,240,351***	***$8,552,142***
NON-OPERATING EXPENSES							
Debt Service	$152,191	$156,200	$156,200	$156,200	$156,200	$156,200	$156,200
Total Non-Operating Expenses	***$152,191***	***$156,200***	***$156,200***	***$156,200***	***$156,200***	***$156,200***	***$156,200***

Source: Mead & Hunt

8.5.4. Supplies

This category of expenditure represents the cost of materials and supplies needed for a host of activities aimed at maintaining and repairing all of the Airport's grounds and facilities. The cost of materials and supplies for ATW grew at a compounded annual growth rate of 9 percent between FY2006 and FY2012 (budgeted) increasing from $282,321 in the first year of this model to $483,250 by FY2012. Most of the increases experienced in this category of expenditures are attributable to the escalating cost of fuel, natural gas and snow removal supplies. FY2010 experienced total expenditures of $698,824, the highest level of costs during this period reflective of the rapid increase in fuel and extraordinary winter weather experienced during that year. As shown in **Table 7-7**, this category is expected to increase from $483,250 in FY2012 to $560,219 in FY2017, assuming no extraordinary spikes occur in energy costs.

8.5.5. Purchased Services

Included in this broad category of expenditures is a myriad of cost factors for the Airport. As previously noted, growth in several sub-functional areas of Purchased Services have impacted overall operating expenses for ATW in recent years including ARFF Services, Sherriff Security Services, Maintenance & Repair, Utilities, Contractual Services and Advertising, Promotion and Publicity. Given the influence of these sub-functional areas on overall operating costs for ATW, they are listed separately in Tables 8-8 and 8-9. Thus, the broad category of Purchased Services has been decreased to reflect this breakout/analysis. Trends in these areas are discussed in further detail below:

ARFF Services

The County maintains a contract with a private firm for the provision of Aircraft Rescue and Firefighting Services (ARFF) to meet requirements of Federal Aviation Regulations Part 139. These expenditures have ranged from a low of $339,716 in FY2006 to an expected $537,331 in FY2012, resulting in a compound annual growth rate of 8 percent. Much of this increase is attributable to a requested modification in the scope of work for the ARFF contractor to include security services in FY2007. It is expected that over the next five (5) years, these expenditures will moderate yielding a 2 percent annual growth rate with the County incurring $593,257 for this contract in FY2017.

Sherriff Security Services

The Outagamie County Sherriff provides contractual law enforcement officer personnel and support to the Airport in order to ensure compliance with Transportation Security Administration regulations. The value of this contract is currently $291,082 per year. This contract is periodically renegotiated; however, for planning purposes this financial analysis assumes that this rate will remain unchanged over the next five (5) years.

Maintenance & Repairs

Maintenance and repair expenses represent the cost of maintaining and repairing all of the Airport's grounds and facilities. Over the past seven years, this category of expenditure decreased by 5 percent per year from $206,354 in

FY2006 to $155,000 in FY2012. The County has been very aggressive in implementing a strong preventative maintenance program for airport grounds and infrastructure. This investment has yielded positive results for the County. As shown in Table 8-9, maintenance and repair expenses at the Airport are projected to increase slightly from $155,000 in FY2012 to $171,133 in FY2017.

Utilities

Public Utility Service expenses are comprised of charges for electricity, telephone, water and sewer service for all Airport facilities. These expenditures have ranged from a low of $442,901 in FY2006 to $596,725 in FY2012, yielding a compounded annual increase of approximately 5.0 percent. As shown in Table 8-9, utility expenses are projected to increase from $596,725 in FY2012 to $761,589 in FY2017, representing a compounded annual increase of approximately 5.0 percent. Increases in Utility outlays were driven by rate increases across all sources and additional facilities being brought on-line for lease or operation during the past seven (7) years. Although this category grew at a compounded annual growth rate of 5 percent, ATW did install solar energy panels on its air carrier terminal building which assisted with energy conversation and mitigating the impact of these increases. Moving forward, ATW plans to implement additional sustainable and energy-saving measures; however, expected savings to be generated from use of these technologies are not reflected in this analysis.

Contractual Services

Contractual Service expenses represent the annual costs of providing professional services to aid in the efficient operation of the Airport such as legal, auditing, engineering and other various consulting services. This expense category remained relatively stable during the period between FY2006 through FY2012 increasing 1.0 percent per year from $169,317 to $182,960. These expenditures are projected to increase from $182,960 in FY2012 to $192,293 in FY2017, continuing the historic compounded annual increase experienced over the past seven (7) years.

MIS Charges

This expense category represents the costs associated with providing ATW with a broad-range of Information Technology Services including its electronic Airfield Safety Management Program. Expenditures associated with this functional area increased at a rate of 27.0 percent per year between FY2006 and FY2012 ($17,678 in FY2006 to $74,929 in FY2012) due to factors such as the deployment of the airfield safety management program and new service for the FBO. Expenditures are expected to stabilize over the next five (5) years increasing at a more modest rate of 2.0 percent each year from $74,929 in FY2012 to $82,728 in FY2017.

Advertising, Promotion and Publicity

In order for the Airport to retain and recruit the strongest possible mix of commercial air service for the Fox Cities region, the County invested significant resources into targeted marketing and advertising programs over the past seven years. These efforts resulted in two (2) new air carriers (Allegiant/Frontier) commencing service in the market and enhanced the overall awareness of air service and related Airport amenities in the region. Advertising, Promotion and Publicity expenditures increased from approximately $18,617 in FY2006 to $350,000 in FY2012. It is expected that the County will continue this effort throughout the next five (5) years; focusing on existing airline service and attempting to attract new carriers to the Airport and that funding levels for these activities will remain unchanged during this period.

8.5.6. Capital Outlay

The County maintains a five (5) year planning program for both large capital improvement projects as well as for smaller initiatives and vehicle/equipment replacements. Between FY2006 and FY2012, the County programmed approximately $1.35 million to ensure its fleet of equipment and vehicles remained modern and efficient and to address major repairs identified through its preventative maintenance program. For the period FY2013 to FY2017, the County is planning to invest $875,000 in equipment/vehicles/facility upgrades for its Terminal facility, Airfield, ARFF Equipment and the FBO.

8.5.7. FBO Expense

The County's acquisition of the Airport's FBO in 2010 provides a means for revenue streams to be further diversified with less reliance on the volatile nature of airline landing fees and terminal rentals. Such an undertaking requires the County to remain constantly attuned to maintaining profit margins for its key FBO business lines including fuel sales, aircraft servicing and hangar rentals. Moreover, as additional and/or expanded general aviation services are contemplated or undertaken, it is vital that the County assess such initiatives in terms of overall profitability and income generating potential including construction of additional hangar storage facilities which provide the means to increase hangar rental revenue and fuel volume. Given the relatively short period of time the County has been providing general aviation services it is difficult to forecast future expenses. For Budget Year 2012, the County anticipates total FBO expenditures to be approximately $1.8 million with cost of goods sold totaling $1.13 million or 63 percent of all costs for this business line. Because of the magnitude of these costs, maintaining fuel profit margins is paramount especially during periods of increasing fuel prices. The industry has observed modest increases in both profit margins and volume of Jet-A fuel product sold during the recent economic downturn; however, it is perhaps too early to predict continuation of this trend. Because of this uncertainty, it is critical that the County maintain an understanding of its market through tracking the extent to which transient versus based traffic generates the bulk of fuel sales and whether a single entity or a group of customers comprises the bulk of fuel sales for the Airport. Beyond maintaining desired profit margin levels for key services/products, the County should remain focused on monitoring potential increases in insurance costs (IE: completed products and hangar keepers). Rates for these types of coverage have remained very flat for some time and it is certain that at some point in the future the cost to insure both property and services associated with general aviation operations will witness increases.

Because the County has been providing FBO services for a very limited period of time, historical data is not available to provide a reliable forecast of future expenditures. As such, several similar-sized FBOs were surveyed and it was determined that, on average, more mature operations have and expect to continue to observe annual expenditure increases of 5.0 percent. Accordingly, this rate of growth was applied to ATW operations and translates to current projected annual FBO expenditures of $1,803,916 increasing to $2,302,305 by FY2017.

8.5.8. Summary of Historical and Projected Total Airport Expense

As depicted in **Table 7-6**, Airport Expenditures increased from $3,351,505 in FY2006 to $7,115,779 in FY2012 reflecting a compounded annual growth rate of 13 percent. As previously discussed, this change was primarily the result of the County:

- Assuming operation of the FBO in October 2010;
- Providing three (3) additional staff positions FY2007 including a Marketing Position and building/grounds maintenance staff ;
- Absorbing significant increases in the cost of fuel, natural gas and snow removal supplies;
- Incurring Utility rate increases and the cost of additional facilities being brought on-line for lease or operation (largely due to three consecutive harsh winters);
- Providing periodic increases for service fees to other County Departments including the Sheriff's Office and IT Department ;
- Increasing the scope of work for its ARFF contractor to include security services; and
- Implementing targeted marketing programs for new air carriers (Allegiant/Frontier)

Projections of future Airport expenses are presented in Table 8-9. It is forecast that expenditure levels will increase from $7,115,779 in FY2012 to $8,708,342 in FY2017 representing a compound annual growth rate of 4 percent.

8.6. Conclusion

Based on the foregoing analysis, including the underlying assumptions under which it was made, the CIP recommended for the Airport is expected to be both feasible and implementable. Moreover, the Airport is capable of sustaining its operations during the next five years void of placing extended or undue burdens on its tenants, operators and concessionaires. The results of this analysis affirm that from an operational and financial perspective ATW "***is positioned to be a valuable asset for the Fox Cities region that continuously promotes aviation and fosters economic development by operating the most effective and efficient airport in northeast Wisconsin***." (ATW Mission Statement). The following factors and key indicators substantiate this assessment:

- The Airport maintains a very low debt profile requiring only $165,000/year in payments through 2030. This amount of debt represents less than 2 percent of overall airport operating revenues in FY2012
- The Airport maintains a very strong cash balance ensuring the provision of an appropriately funded Reserve for Contingencies
- A proactive lease management and monitoring system is deployed to ensure market rate rents are set and fees are collected in a timely manner. Where appropriate, lease rates are established by independent appraisals and a database is maintained to track major terms and payment

requirements of tenants/concessionaires

- A host of services (ARFF, Parking, Security/LEO and FBO) are contracted out to private sector companies thereby reducing the need for County staff to fulfill these roles
- Best management practices are deployed by airport management including:
  - Five year capital planning for vehicles/equipment/buildings & grounds repairs and maintenance projects not otherwise eligible for federal or state funding
  - Use of preventative maintenance practices for airport facilities and grounds
  - Diversification of the airport's revenue base to minimize reliance on airline rates and charges through assuming operation of the FBO and lease of airport property for non-aviation related purposes to entities such as Fox Valley Technical College
  - An aggressive air service retention and recruitment program
- Cutting edge and sustainable initiatives are actively pursued as evidenced by the installation of solar panels on the air carrier terminal building to reduce reliance on traditional energy sources
- Insurance premiums have decreased over the past seven (7) years indicative of an organization that stresses safety and mitigation of risk

As the Airport commences work on implementing the recommended capital improvement program contained in this analysis, it should remain focused on these unique endowments and seek to further capitalize on the positive benefits they provide. In the end, it is imperative that ATW strive to continue to provide an economical and sustainable platform for airlines and other key tenants to operate and prosper in order to fulfill the Airport's mission.

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Appendix A

2010 Forecasts

PROJECTIONS OF AVIATION DEMAND

The forecast element of a traditional master plan provides projections of future aviation demand at an airport. These projections estimate potential future activity levels through evaluation of historical data, future trends, and the application of various projection methods. Projections of aviation demand are an important element of the master planning process as they provide the basis for several key analyses.

The forecast information presented includes:

- Airport Role
- Aviation Industry Overview
- Airline Activity Forecasts
- General Aviation Activity Operations
- Cargo and Military Operations
- Peak Activity

Commercial Air Carrier Operations & Fleet Mix Projections

Building Sustainability

2.1. Executive Summary

2.1.1. Role of the Airport

Outagamie County Regional Airport is owned and operated by Outagamie County. The Airport serves commercial passenger aircraft as well as general aviation aircraft (aircraft which are not used for military, charter, or scheduled flights). The FAA 2009-2013 National Plan of Integrated Airport Systems (NPIAS) lists Outagamie County Regional Airport as a Non-Hub, Primary facility. The Airport serves Winnebago County and Calumet County and portions of the counties of Waupaca, Outagamie, Manitowoc, Sheboygan, Fond Du Lac, and Marquette constituting an area of over 3,000 square miles and a resident population estimated at 543,000. This area constitutes the best estimate of Outagamie County Regional Airport's air service area. The population derived accordingly is based on the population of the postal codes that comprise this area as shown in **Exhibit 2.1** (Page 2-6).

2.1.2. Industry Trends

In recent years, there has been significant fluctuation in aviation related activity. Economic uncertainty has contributed to decreases in passenger enplanements at many U.S. airports. The costs associated with owning and operating personal aircraft has impacted the general aviation sector as well. Despite this, the FAA projects growth in most areas of aviation over the long term. The following sections describe historical activity at the Airport as well as local and national industry trends.

2.1.3. Passenger Enplanement Projections

Based on information developed in the *Passenger Demand Analysis*, the Airport served 41 percent of the passenger traffic in the Airport's catchment area. Enplanements have fluctuated over the past 15 years while trending generally upward, ranging from 190,818 in 1995 to 304,738 in 2005. National passenger demand shows slight growth in 2010 as passenger enplanements increased 0.5 percent. Supported by a growing U.S. economy system passengers are projected to increase an average of 2.6 percent through 2011 and beyond. By 2030, U.S. commercial air carriers are projected to transport 1.2 billion enplaned passengers. A regression analysis projects that the Airport's enplanements will grow from 273,200 in 2009 to 386,926 in 2029.

2.1.4. Commercial Air Carrier Operations and Fleet Mix

Commercial operations and airport enplanements are closely tied. The projected increase in enplanements will lead to increased commercial operations at Outagamie County Regional Airport. Increasing load factors and aircraft size indicates that operations will grow more slowly than enplanements. While enplanements are expected to grow at a compounded annual rate of 1.8 percent, operations are expected to grow at a slightly slower compounded annual rate of 1.0 percent. A slower growth rate in commercial operations is projected due to the increasing average number of seats per operation. The air carrier average aircraft size is projected to increase as all of the 34-seat Saab 340's and some of the 50-seat regional jets are anticipated to be retired and replaced by 70 to 90 seat regional jets in the regional carrier fleets. By 2029, the Airport is projected to have 19,866 commercial operations.
Federal Express, the Airport's largest cargo operator, operates wide-body jet aircraft and a mix of turboprop aircraft, a trend that is expected to continue.

2.1.5. General Aviation Activity

Outagamie County Regional Airport has completed the purchase of the full service Fixed Base Operator (FBO). The FBO is County owned and it's services and operations contracted out. This arrangement is anticipated to result in improvements to the facilities and services offered to general aviation traffic by the FBO. Aircraft owners can also rent Airport-owned hangars or fully developed lease land on which they can build their own hangar. The forecast for based aircraft applies a market share methodology and projects that based aircraft will increase from 70 to 77 during the planning period with sport aircraft and turbine aircraft increasing and multi-engine piston aircraft decreasing.

General aviation aircraft operations are only partially tied to the number of based aircraft at the Airport. The greatest number of operations was in 1996 when 46,161 were recorded, and the lowest was 17,986 in 2009. This decline reflects other trends of travel behavior both locally and nationally with respect to general aviation. The cost of operation and ownership of aircraft has increased, which has impacted operations and hours flown nationally. General aviation operations are expected increase slightly over the 20-year planing horizon, increasing to 22,210 operations in 2029.

2.1.6. Air Cargo

Air cargo service at Outagamie County Regional Airport includes air cargo operations by Federal Express and commercial passenger airlines offering “belly hold” cargo space. Cargo volume is highly dependent on economic activity levels. Due to the recession, the Airport's air cargo volume decreased from 31 million pounds in 2008 to 20 million pounds in 2009; however year-to-date activity through June of 2010 is up over 36% above 2009. As the economy improves, air cargo activity is expected to rebound. The forecast predicts that cargo volume will increase to over 29 million pounds by 2014 and over 40 million pounds by 2029.

2.1.7. Military Operation Projections

Military aircraft operations at Outagamie County Regional Airport include training and other operations conducted by the various armed services. However, there are no military installations located at the Airport. Military operations are not influenced by the same factors that affect civil aviation. Rather, military activity is subject to factors relating to national defense. Airport military operations are projected to remain flat at 124 operations a year through the 20-year planning horizon.

2.1.8. Peak Activity

Historically, March has been the busiest month in terms of passenger activity with approximately nine percent of annual activity. The peak day of the peak month is typically a Wednesday when approximately 16 percent of all seats arrive and depart. The peak point of passenger demand is between 1:00pm and 2:00pm. Currently, this peak point is driven by Allegiant Air's operations at Outagamie County Regional Airport. July is the peak month for total operations at the Airport. July on average represents approximately 13 percent of annual operations.

2.1.9. Summary

Projections of short-, intermediate-, and long-term activity at the Airport that are based on 5-, 10-, and 20-year milestones (i.e. 2014, 2019, and 2029) are presented in **Table 2.1**.

Table 2.1 Summary of Forecasts

ITEM	ACTUAL 2009	2014	2019	2029	CAGR 2009-2029
Passenger Enplanements	273,200	293,671	322,347	386,926	1.8%
Commercial Operations	16,434	16,250	17,172	19,866	1.0%
Air Carrier Operations	2,489	4,127	5,409	7,390	5.6%
Commuter/Air Taxi Operations	13,945	12,122	11,763	12,476	-0.6%
Based Aircraft	70	69	71	77	0.5%
General Aviation Operations	17,986	18,262	19,471	22,210	1.1%
Cargo Pounds	19,763,890	29,589,683	32,800,201	40,660,652	3.7%
Military Operations	204	124	124	124	(2.5%)
Total Aircraft Operations	**34,624**	**34,636**	**36,767**	**42,200**	**1.0%**

Source: Mead & Hunt, Inc.

Note: CAGR = Compounded Annual Growth Rate

2.2. Role of the Airport

In order to project aviation demand at Outagamie County Regional Airport, it is important to understand the role of the Airport. This section presents current and historical information that define the Airport's role, including the geographical area served by the Airport.

Outagamie County Regional Airport is owned and operated by Outagamie County. The Outagamie County Regional Airport is located on approximately 1,700 acres within the county. Outagamie County Regional Airport serves commercial passenger aircraft as well as general aviation aircraft (aircraft which are not used for military, charter, or scheduled flights). The FAA 2009-2013 National Plan of Integrated Airport Systems (NPIAS) lists Outagamie County Regional Airport as a Non-Hub, Primary facility. Commercial service airports that enplane less than 0.05 percent of all commercial passenger enplanements, but which have more than 10,000 annual enplanements, are categorized as non-hub primary airports. There are 244 non-hub primary airports that together account for three percent of nationwide enplanements.

2.2.1. Airport Catchment Area

The airport catchment area, also referred to as the air trade area or service area, is the geographical area an airport serves. An airport's catchment area is defined by several factors, including geographical and access considerations and proximity of alternative aviation facilities. More specifically, the airport's catchment area is the geographic area from which an airport can reasonably expect to draw commercial air service passengers; however, airport use by the airport's catchment area population is affected by a variety of factors, including: proximity to a competing airport(s), airfares, destinations, capacity (airline seats), flight frequency, and low-fare carrier presence at nearby airports.

Outagamie County Regional Airport serves Winnebago County and Calumet County and portions of the counties of Waupaca, Outagamie, Manitowoc, Sheboygan, Fond Du Lac, and Marquette constituting an area of over 3,000 square miles and a population estimated at 543,000. The catchment area is illustrated (shown in yellow) in **Exhibit 2.1**.

Several airports are within close proximity to the Appleton area. Surrounding airports include: Austin Straubel International Airport (Green Bay), Central Wisconsin Airport (Mosinee), Dane County Regional Airport (Madison), and General Mitchell International Airport (Milwaukee). The four surrounding airports range between 29 and 114 miles from Appleton (see **Table 2.2)**. The proximity of these other airports affects passenger activity at Outagamie County Regional Airport; *Passenger Demand Analysis* estimates that 41 percent of the 1,048,000 catchment area origin and destination air passengers use the local airport (429,000) while the other 619,000 passengers use one of the bordering airports. However, it is also estimated that 107,000 passengers from outside the catchment area use Outagamie County Regional Airport as opposed to using their local airport (Green Bay). The close proximity of these airports means that changes in service level or facilities at one airport can impact activity and aviation demand at neighboring airports.

Oshkosh's Wittman Regional Airport is located within the Outagamie County Regional Airport catchment area. Since the airport has no commercial passenger service, it does not affect Outagamie County Regional Airport's scheduled commercial operations and passenger demand. However, Wittman Regional Airport has extraordinary general aviation demand when it annually hosts the world's largest annual fly-in. During the annual Experimental Aircraft Association fly-in, Outagamie County Regional Airport experiences a significant amount of itinerant general aviation traffic due to overflow from Wittman.

Table 2.2 Airport Drive Distances

AIRPORT	MILES
Austin Straubel International Airport	29
Central Wisconsin Airport	87
Dane County Regional Airport	102
General Mitchell International Airport	114

Source: www.worldairportcodes.com

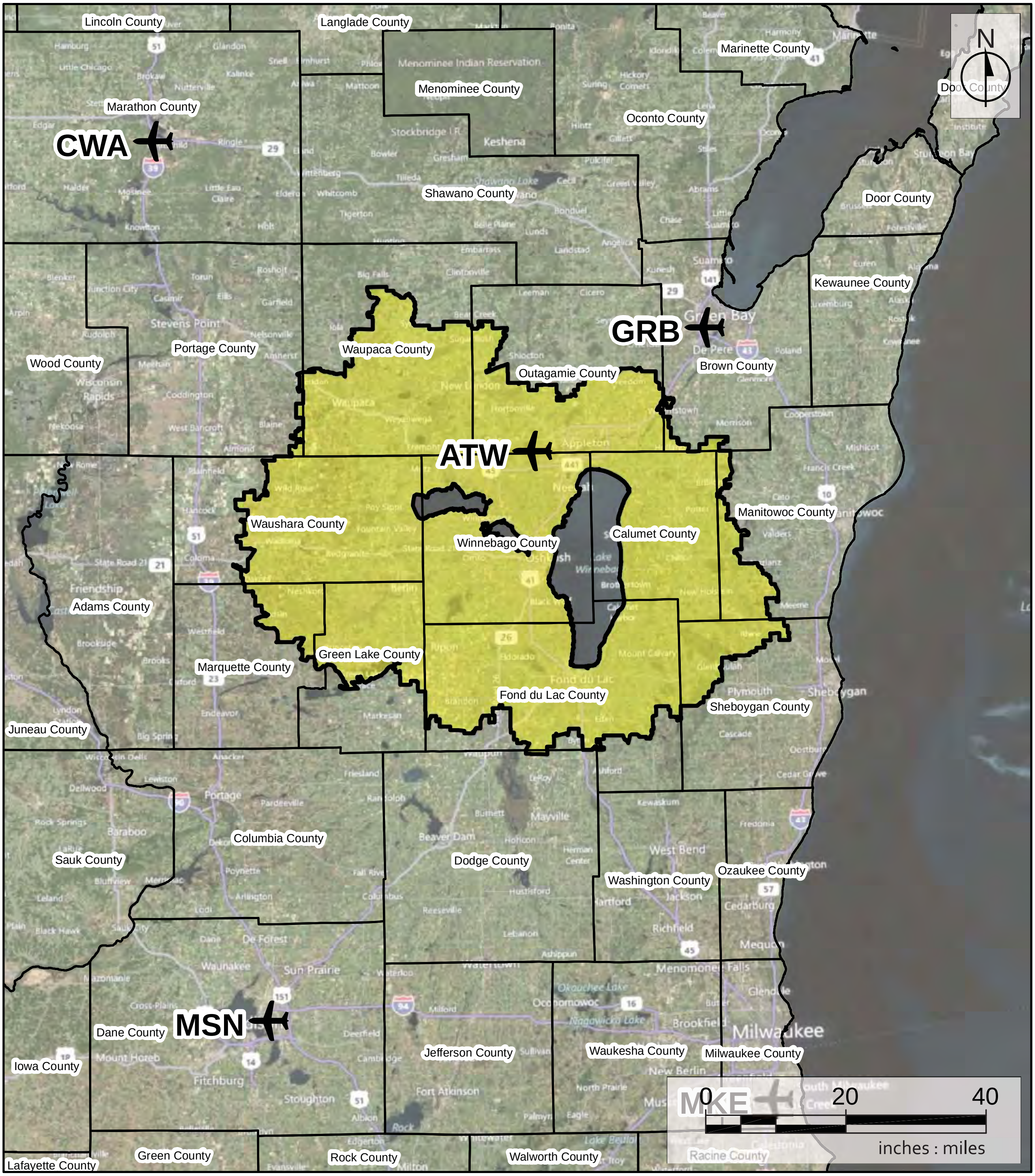


Exhibit 2-1 ATW CATCHMENT AREA & SURROUNDING AIRPORTS

2.2.2. Existing and Historical Air Service

Air service at Outagamie County Regional Airport has little seasonal variation. The Airport has commercial service provided by United Express, Midwest Connect, Delta Air Lines, and Allegiant Air. With the exception of Allegiant service, which is operated with narrow-body jet aircraft, regional jet equipment is employed by the airlines to provide service to their respective hubs. Federal Express also operates a significant cargo operation at the airport with wide-body and turboprop aircraft.

Table 2.3 shows scheduled airline service for the month of March from 2001 through 2010. In 2001, Outagamie County Regional Airport had nonstop service to five destinations and tag service over Madison, Rhinelander, and Wausau. The number of destinations increased to eight by 2010 with the addition of nonstop service to Atlanta, Denver, Las Vegas, and Orlando; however, the increase was offset with the loss of Cincinnati service. Overall, flights per week in the month of March decreased from a high in 2001 of 204 to a low in 2010 of 139. The loss of the Cincinnati service, cessation of tag service, and reduced flights to Milwaukee significantly impacted total flights per week with a decrease of 32 percent from 2001 to 2010.

Table 2.3 Scheduled Airline Service - Flights Per Week Month of March

		MONTH OF MARCH									
DESTINATION	**AIRLINE**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Atlanta, GA	Delta				14	21	21	21	20	14	7
Chicago, IL (ORD)	United	40	41	34	41	40	40	53	47	39	39
Cincinnati, OH	Delta	34	34	35	35	33	20	19	17	6	
Denver, CO	United									7	6
Detroit, MI	Delta/ Northwest	27	27	27	28	28	28	28	21	20	27
Las Vegas, NV	Allegiant									4	6
Madison, WI	United	14									
Milwaukee, WI	United	7									
	Midwest	30	31	31	32	37	37	37	25	19	19
Minneapolis, MN	Delta/ Northwest	39	33	33	33	34	34	32	35	33	33
Orlando, FL (SFB)	Allegiant									2	2
Rhinelander, WI	Northwest	6									
Wausau, WI	United	7									
Total flights per week		204	166	160	183	193	180	190	165	144	139

Note: As of January 15, 2010; Source: apgDat

Table 2.4 shows the average weekly departures for each month in calendar year 2009. During 2009, air service changed in several markets. Appleton lost service to Cincinnati but gained service to Denver, Las Vegas, and Orlando. Several changes to the type of aircraft operating in the market were also made. For part of the year the Airport had some service operated with turboprop aircraft; however, by the end of the year, only jets were serving the market. Flights per week ranged from 125 departures in January to 144 departures in April. Outbound seats ranged from 6,212 per week in January and 7,818 per week in March. By the end of the year, the Airport had service to Atlanta, Chicago, Denver, Detroit, Las Vegas, Milwaukee, Minneapolis, and Orlando.

Table 2.4 Departures by Destination and Airline - 2009

			AVERAGE WEEKLY DEPARTURES											
DESTINATION	AIRLINE	EQUIPMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Atlanta, GA	Delta	CRJ - 200	12	14	14	13	13	13	13	8	6	6	6	6
Chicago, IL (ORD)	United	CRJ - 700	19	18	23	9	9	11	12	12	18	17	10	7
Chicago, IL (ORD)	United	CRJ - 200	18	19	16	26	26	27	26	26	19	21	27	33
Cincinnati, OH	Delta	CRJ - 200	6	6	6	6								
Denver, CO	United	CRJ - 200			7	6	6	6	6	6	7	6	6	7
Detroit, MI	Delta	CRJ - 200	20	20	20	26	26	28	28	26	20	20	26	28
Detroit, MI	Delta	Saab 340									6	6		
Las Vegas, NV	Allegiant	MD-80			4	4	2	3	2	2	2	2	2	2
Milwaukee, WI	Midwest	CRJ - 200	18	19	19	19	19	19	19	19	19			
Milwaukee, WI	Midwest	ERJ-135										19	19	19
Minneapolis, MN	Delta	CRJ - 200	13	14	14	13	13	14	20	26	33	32	30	25
Minneapolis, MN	Delta	Saab 340	19	19	19	20	20	20	14	7				
Orlando, FL (SFB)	Allegiant	MD-80			2	2	2	2	2	2			2	2
Total departures			125	129	144	144	136	143	142	134	130	129	128	129
Total seats			6,212	6,398	7,818	7,606	7,006	7,484	7,444	7,156	6,892	6,579	6,713	6,715

Source: apgDat

2.3. Industry Trends

To project aviation demand at Outagamie County Regional Airport, it is important to understand changes occurring locally and those within the U.S. aviation industry as a whole. Local trends have an obvious effect on the use of the Airport, especially with regard to air service. U.S. trends also have an effect on aviation demand. The following subsections provides some discussion of industry dynamics locally, nationally, and specific to the airline industry.

2.3.1. Local Aviation Trends

As a precursor to the development of passenger enplanement projections, a competitive overview and analysis of the current Outagamie County Regional Airport air service situation was conducted. The output of that exercise is the *Air Service Market Research* report. The report examined Outagamie County Regional Airport's airline performance including: airfares, primary origin and destination passenger markets, primary origin and destination revenue markets, yields, and airline gross revenue. Outagamie County Regional Airport's air service related performance data was compared with other airports in the region, the nation, and at the incumbent carriers other stations/airports.

Additionally, a *Passenger Demand Analysis* developed a realistic estimate of current airline passenger demand. Marketing Information Data Tapes (booking data) and U.S. Department of Transportation statistics were analyzed to quantify: Outagamie County Regional Airport's share of the market, passenger diversion to other airports, airlines used by local air travelers, and top destinations of air travelers in the catchment area. Air service gaps and opportunities at the Airport were identified.

2.3.2. Air Service Market Research Report

The *Air Service Market Research* report describes current market conditions and provides valuable information and analysis for the development of the passenger enplanement projections. The following are excerpts from the report:

Outagamie County Regional Airport is an $87 million domestic market [U.S. DOT reported carrier statistics]. Las Vegas, Atlanta, Orlando (SFB/MCO), and Tampa were Appleton's top five markets based on passengers with Orlando (MCO) and Dallas the only two of the top five markets without nonstop service. Las Vegas is the largest market from Appleton boosted by Allegiant Air's nonstop service. Delta Air Lines is the dominant carrier in the Appleton market. United Airlines, Midwest Airlines, and Allegiant Air followed in passenger shares.

In a ranking of domestic and international passengers, Outagamie County Regional Airport ranked 145th in passengers of all U.S. airports. Appleton's percent of international passengers is less than the national average but similar to other airports with a comparable level of passengers. Appleton ranks highly in a national comparison of fare and yield as Appleton's overall fare and yield surpassed the national average. Regionally, Appleton's average airfare was 15 percent greater than the Great Lakes region average, and the average yield exceeded the Great Lakes region's average by four percent.

In general, incumbent airlines at Appleton are doing well. Allegiant's load factor in the Appleton market of 90 percent was in line with Allegiant's system average; however, Appleton's yield was below Allegiant's system average reflecting the longer average itinerary miles/stage length. Revenue per available seat mile (RASM) generation in the Appleton-Las Vegas market was above average; however, the Appleton-Orlando RASM is below average.

Appleton's overall Delta load factor was below Delta's domestic system average by three percent. On a RASM basis, Appleton performed above average for Delta at Atlanta, Detroit, and Minneapolis. Above average RASMs and load factors for the Appleton-Cincinnati service indicate that service was not pulled due to performance but likely due to a hub realignment resulting from the Delta/Northwest Airlines merger.

Midwest Airlines' performance in the Appleton market on a load factor basis was low at an average of 52 percent, 14 percent less than Midwest's domestic system average. Appleton also performed below average on a RASM basis for Midwest at Milwaukee.

Appleton's United Airlines load factors were 14 percent less than United's domestic system average. On a RASM basis, Appleton performed above average in their Chicago O'Hare market but below average to date in the Denver market.

2.3.3. Passenger Demand Analysis

For the purpose of forecasting enplanements at Outagamie County Regional Airport, there are three key outputs in this study that are relevant. First, passenger diversion of the local passengers to competing airports is key to calculate the share of the local air travel market that is using the local airport. Second, data produced in this study provides the basis for calculating the total size of the local catchment area air travel market, called the “true market”, and the volume of traffic traveling to specific destinations. Finally, based on analysis of the data in the study, a situation analysis was completed to identify potential air service opportunities. The following are excerpts from the report:

<u>True Market</u>

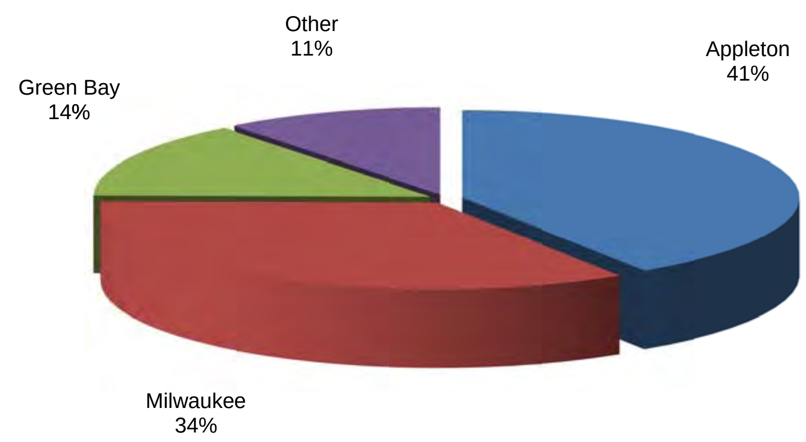
The true market estimates the number of passengers in the catchment area regardless of airports used. The true market estimate gives a snapshot of total passengers in the airport catchment area for a one-year period, in this case from November 1, 2008, through October 31, 2009. This time period includes the deepest portion of the late 2000’s economic recession. Therefore, the true market size can be considered to be a conservative estimate of the level of commercial air travel generated by the catchment area. It is likely that the true market size will increase as general economic conditions improve. An estimated 41 percent of catchment area air travelers, 428,987, used the local airport, resulting in a calculated catchment area true market size of 1,047,781 origin and destination passengers, 523,890 annual enplanements.

<u>Market Share</u>

Due to the proximity of surrounding airports, there is the possibility of drawing passengers from adjacent airport’s catchment areas. Many people from the Austin Straubel International Airport catchment area use Outagamie County Regional Airport and vice versa. Studying both catchment areas resulted in an estimate that of the 535,487 origin and destination passengers who used Outagamie County Regional Airport, 428,987 passengers are estimated to have been generated by the Airport’s catchment area and the remaining 106,500 are believed to be traveling to/from the Austin Straubel International Airport catchment area. There is substantial risk of diversion to surrounding airports, particularly to Milwaukee which has extensive low-fare service as well as Green Bay. This creates a highly competitive environment in which to retain passengers and attain air service improvements.

The local airport captured 41 percent of the passenger traffic in the Airport’s catchment area. The remaining 59 percent diverted to a competing airport. Milwaukee’s General Mitchell International Airport garnered 34 percent of the catchment area passengers, 14 percent of passengers used Green Bay’s Austin Straubel International Airport, and other airports (Dane County Regional Airport and Central Wisconsin Airport) served 11 percent (**Exhibit 2.2**).

Exhibit 2.2: Airport Use



Note: Other includes CWA and MSN

Source: Outagamie County Regional Airport Passenger Demand Analysis – March 2010

2.3.4. Air Service Situation and Opportunities

In Outagamie County Regional Airport's competitive environment, consistent growth has been difficult to achieve, but Appleton's annual enplanements have remained fairly steady between approximately 250,000 and 300,000 from calendar year 2000 to calendar year 2009. While many regional airports throughout the country have seen significant declines due to the economic downturn in 2007-2009, Allegiant Air's low-fare service to Las Vegas and Orlando (SFB) has been a key factor in buoying enplanements in recent months. While the 43 percent domestic retention rate seems somewhat modest, it represents a good performance given the market-place circumstances. Seat availability intertwined with competitive fare availability undoubtedly contributed to catchment area passenger diversion to other airports. The estimated 142 domestic passengers per day each way from outside the catchment area who use the Outagamie County Regional Airport cannot be counted on to continue using the airport: the 728 domestic catchment area passengers per day each way who are diverting to other airports represent a major opportunity for airport growth given enhanced service and a reasonable fare environment.

Additional service in existing markets could take the form of added frequency or larger aircraft. The Atlanta, Denver, and Detroit markets fall into this category. Due to the catchment area market size and the number of competing airports, new service opportunities primarily are limited to service to additional hubs. Continental Airlines' service to Cleveland is a possibility given the high Detroit load factors. If Delta Air Lines is reluctant to increase Atlanta service, service to Memphis would be an option as has been done in Madison. American Airlines has become more aggressive in competing with United Airlines in Chicago (ORD) feeder markets and is likely to consider Appleton service. Point-to-point service opportunities are limited to Allegiant service to Fort Lauderdale, Tampa, and perhaps Phoenix.

2.3.5. National Aviation Trends

The FAA annually produces a long range forecast of national aviation trends. The FAA's most recent forecast, *FAA Aerospace Forecasts – Fiscal Years 2010-2030* (Forecast), was published in March 2010. The forecast, recognizing that the industry is facing challenges particularly in the short-term, calls for lackluster performance in the near term, with a return to growth over the long-term. As the economic outlook improves, the three aviation sectors that affect Outagamie County Regional Airport, commercial air service, air cargo, and general aviation, will respond accordingly. However, growth is not forecasted to be as robust as in previous forecasts. The FAA does not see evidence of pent up demand and therefore does not anticipate a return to previously forecasted passengers levels even when recovery takes hold. The following are excerpts from the Forecast:

Passenger demand shows slight growth in 2010 with system RPMs forecast to grow 0.3 percent (flat for mainline carriers and up 4 percent for regional carriers) as passenger enplanements increase 0.5 percent (down 0.7 percent for mainline carriers and up 4.6 percent for regional carriers). Growth is projected to accelerate in 2011 with system RPMs and passengers increasing 2.6 and 2.1 percent, respectively, on a capacity increase of 2.5 percent.

For the overall forecast period, system capacity is projected to increase an average of 3.4 percent a year. Supported by a growing U.S. economy and falling real yields, system RPMs are projected to increase 3.5 percent a year, with regional carriers (4.2 percent a year) growing faster than mainline carriers (3.4 percent a year). System passengers are projected to increase an average of 2.6 percent a year, with regional carriers growing faster than mainline carriers (3.0 versus 2.5 percent a year). By 2030, U.S. commercial air carriers are projected to fly 1.9 trillion ASMs and transport 1.2 billion enplaned passengers, a total of 1.6 trillion passenger miles. Planes will remain crowded, with load factor projected to grow moderately during the early years of the forecast period and then tapering during the mid to latter years, growing by 2.7 points over the forecast period to 82.4 percent in 2030. Passenger trip length is also forecast to increase by more than 221 miles over the forecast to 1,314.5 miles (up 10.5 miles annually). The growth in passenger trip length reflects the faster growth in the relatively longer international and domestic trips as compared to shorter-haul flights.

Regional carrier aircraft size flown domestically is projected to grow at a much faster pace than their mainline counterparts. The faster growth in regional aircraft size is stimulated by the wave of 70-90 seat regional jet aircraft that are entering the fleet as well as reductions in the 50 seat and under jet fleet. Regional carriers are better equipped to support operations of their mainline partners by providing capacity that complements market demand. The greater number of the larger 70- and 90-seat regional jets in the fleet coupled with significant 50-seat jet retirements over the next few years increases the average seating capacity of the regional fleet from 55.0 seats in 2009 to 56.8 seats by 2011. Over the course of the forecast, average seats per aircraft for the regional carriers increases by 0.5 seats per year to 65.4 seats in 2030. The changing aircraft fleet mix is narrowing the gap between the size and aircraft types operated by the mainline and regional carriers.

Historically, air cargo activity tracks with GDP. Additional factors that have affected the growth in air cargo traffic include the global financial crisis, declining real yields, and globalization. Significant structural changes have occurred in the air cargo industry. Among these changes are the following: air cargo security regulations by the FAA and TSA; market maturation of the domestic express market; modal shift from air to other modes (especially truck); increases in air fuel surcharges; growth in international trade from open skies agreements; use of all-cargo carriers (e.g., FedEx) by the U.S. Postal Service to transport mail; and increased use of mail substitutes (e.g., e-mail).

Total revenue ton miles (RTMs) are forecast to grow 3.4 percent in 2010 and again in 2011 by 4.9 percent. For the balance of the forecast period, driven by steady economic growth, total RTMs are forecast to increase at an average annual rate of 5.1 percent. The forecast of 86.6 billion RTMs in 2030 represents an average annual increase of 5.0 percent over the entire forecast period. Domestic cargo RTMs are forecast to grow 1.3 percent in 2010 and 2.0 percent in 2011, driven by a slow recovery in the U.S. economy. Between 2011 and 2030, domestic cargo RTMs are forecast to increase at an average annual rate of 2.2 percent. The forecast of 18.5 billion RTMs in 2030 represents an average annual increase of 2.1 percent over the entire forecast period.

The active general aviation fleet is projected to increase at an average annual rate of 0.9 percent over the 21-year forecast period, growing from an estimated 229,149 in 2009 to 278,723 aircraft by 2030. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at an average of 3.0 percent a year over the forecast period, with the turbine jet portion increasing at 4.2 percent a year.

Outagamie County Regional Airport is expected to fare similarly to the national trend in warding off challenges to increased air transportation demand.

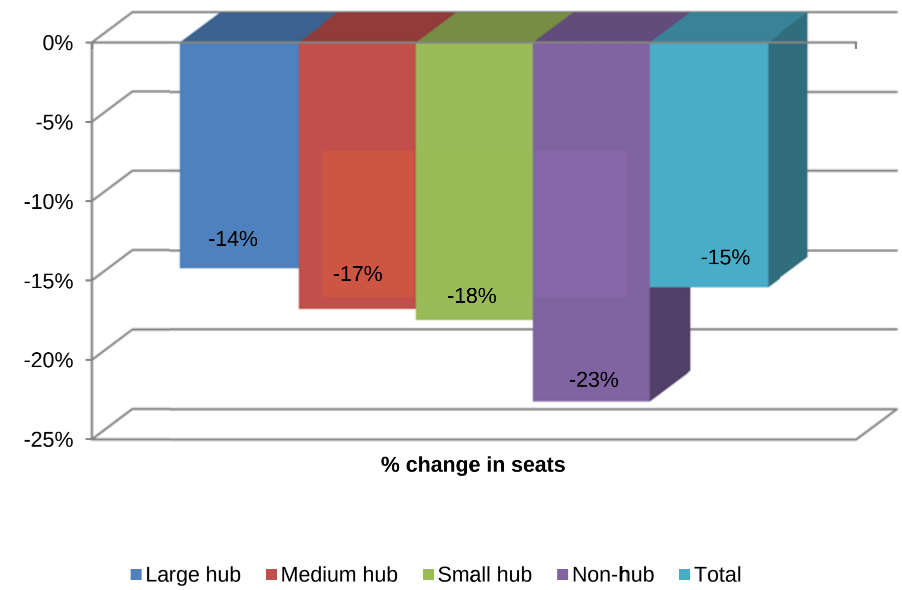
2.3.6. Airline Trends

The U.S. airline industry has experienced considerable change since September 11, 2001. Bankruptcy, liquidation, consolidation, and weak travel demand have forced carriers to reduce costs and service amenities. Dwindling profitability and/or losses in domestic markets have resulted in traditional network carriers scaling back or eliminating capacity growth and shifting capacity to the international arena. However, low-cost carriers such as Southwest Airlines, AirTran Airways, Jet Blue Airways, and others have stepped in with domestic capacity additions. Since low-cost carriers serve only the larger markets, this evolution counter the need of secondary markets for additional and better air service. Secondary markets are dependent on the network carrier’s hub and spoke service, the availability of smaller capacity aircraft, and an economic environment in which they can contribute to an airline’s profitability. These airline trends will continue to affect air service in smaller communities such as Appleton.

2.3.7. Declining Air Service

On a national basis, air service has declined significantly in smaller communities since 2001. **Exhibit 2.3** demonstrates the change in seat capacity from 2000 to 2009. In their cost cutting efforts, traditional network carriers have reduced more costly, short-haul flights in favor of long-haul and international flights where other transportation alternatives are fewer, time savings are greater, and the profit potential is better. Fleet types are also changing; turboprop aircraft are being phased out or replaced by regional jets that do not have the same operating economics at the shorter stage lengths.

Exhibit 2.3: U.S. Domestic Capacity Change By Airport Size (July 2009 VS 2000)



Source: apgDat (June 2000/2009); FAA definitions

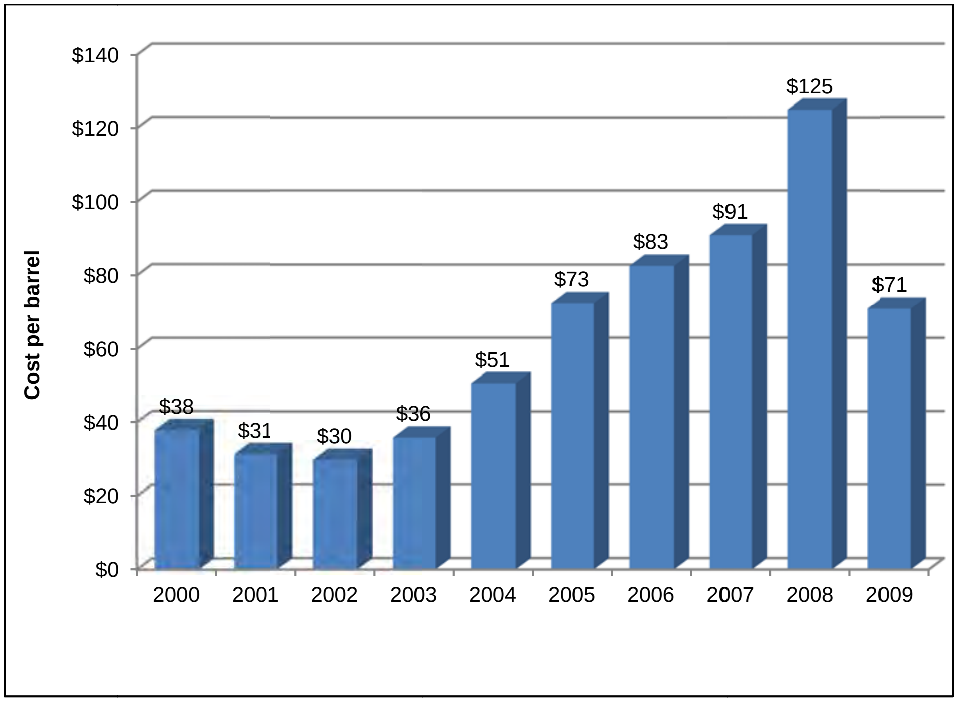
Since September 11, 2001, security requirements have reduced some of the time saving benefits of air travel, particularly in shorter haul markets. Many travelers have reacted by driving since the reduced time savings is considered insufficient to justify the higher cost. This has resulted in fewer scheduled flights, and the lower schedule frequency has reduced the convenience and utility of air travel.

Changes in flight frequency and the reduction of network capacity impacts smaller communities far more than larger communities. This disparity is due to smaller community air service being less competitive and the lesser availability of economies of scale makes it more expensive to serve smaller markets and results in greater risk. There is a greater opportunity to adjust flight frequency and/or capacity in larger markets to conform to market demand changes than in smaller markets where any adjustment may result in lowering service below marketable levels. The higher risk small market hurdle is a challenge which Appleton will have to overcome.

2.3.8. Fluctuating Fuel Prices

Although airlines have cut costs dramatically in their quest for profitability, increases in jet fuel costs through 2008 have more than offset cost savings that have been painfully extracted over the past several years. The cost of fuel has been the single largest source of the airline industry's inability to sustain on-going profitable operations. **Exhibit 2.4** shows the cost per barrel of jet fuel from 2000 through 2009. These increases and fluctuations in fuel costs adversely affect airlines in two ways: an increase in overall expenses and reduced demand. Higher fuel prices for consumers mean: less discretionary income for air travel; increases in airline operating expenses accompanied by lower demand; and decreases in overall profit opportunities. All of these effects in turn curtail airline growth. Lower capacity growth means less opportunity for smaller communities to improve service levels as competition for limited resources increase.

Exhibit 2.4: Cost Per Barrel of Jet Fuel



Source: Air Transport Association – jet fuel spot price

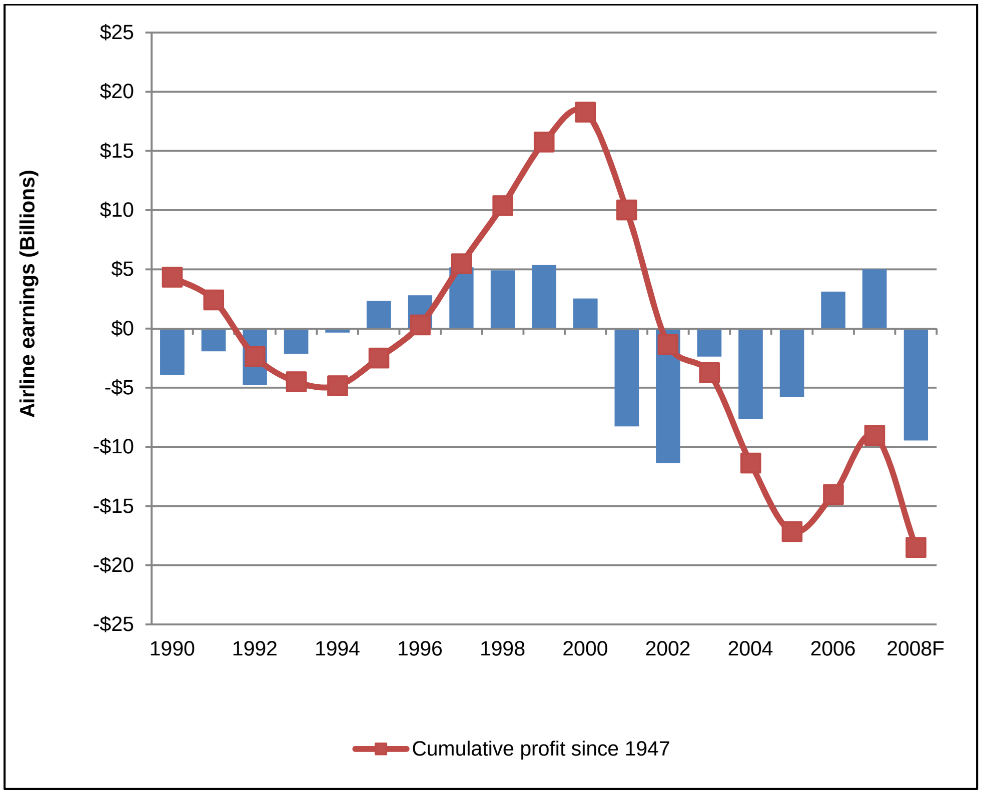
Spikes in fuel prices have caused chaos in the airline industry in the past. Despite recent declines in the price of fuel, indications point to prices increasing to historic highs once the general world economic picture improves. Fundamental change in the airline industry is likely, and two developments favorable to Outagamie County Regional Airport are poised to emerge. First, the high cost of gasoline will lessen the cost advantages of automobile travel for shorter trips 200 to 300 miles, particularly business trips. It will also augur against driving to alternate airports, low-fare carrier availability notwithstanding, rather than using the local airport.

2.3.9. Airlines Struggling Financially

Traditional network carriers have struggled to survive, much less thrive, in the post September 11, 2001 period. **Exhibit 2.5** provides cumulative profits since 1990 for U.S. airlines. Over the past several years, Delta Air Lines, Northwest Airlines, United Airlines, US Airways, Midwest Airlines, and Frontier Airlines have entered and exited bankruptcy protection. Sun Country Airlines and Mesa Airlines remain in bankruptcy court protection. During this same time period, Aloha Airlines, ATA Airlines, Independence Air, and Sky Bus Airlines have ceased operations, while US Airways and America West Airlines; Frontier Airlines and Midwest Airlines; and Delta Air Lines and Northwest Airlines have merged; and United and Continental have a merger pending.

Initially, not all carriers struggled to turn a profit during this period. Low-cost carriers have remained healthier and continued to expand during the period. However, the onslaught of sharply increasing fuel prices in 2008 curtailed much of their planned expansion with only Southwest Airlines and Allegiant Air remaining consistently profitable though with lower margins. The Air Transport Association estimates 2009 U.S. airline industry losses at $2.5 billion.

Exhibit 2.5: U.S. Airline Cumulative Profits



Source: Air Transport Association

2.4. Passenger Enplanement Projections

Enplanements are defined as the activity of passengers boarding commercial service aircraft that depart an airport. Enplanements include passengers on scheduled commercial service aircraft or non-scheduled charter aircraft. Enplanements do not include the airline crew. The total number of passengers using an airport is the sum of the airport's enplanements and deplanements (passengers debarking commercial service aircraft). Though recorded, deplanements are not specifically evaluated in this document as they are roughly equal to the number of enplanements.

Passenger enplanement data is provided to Airport management by commercial passenger service carriers, who maintain data as they transport people to and from the facility. The FAA has estimated figures in its Terminal Area Forecasts (TAF); however, airport records are generally a more accurate source. It should be noted that the TAF presents annual data for a fiscal year (October 1 to September 30), to aid in the comparison of the forecasts created here and the TAF all historical and forecast data are also reported for fiscal years. Additionally, the enplanements reported are revenue enplanements (paying passengers either with money or frequent flyer miles). For projections presented in this chapter, historical data provided by the Airport is used.

This section examines the data that pertains to passenger enplanements and describes enplanement projections in the following subsections:

- Historical Enplanements
- Forecasting Approach
- Passenger Projections
- High Growth Scenario
- Forecast Summary

2.4.1. Historical Enplanements

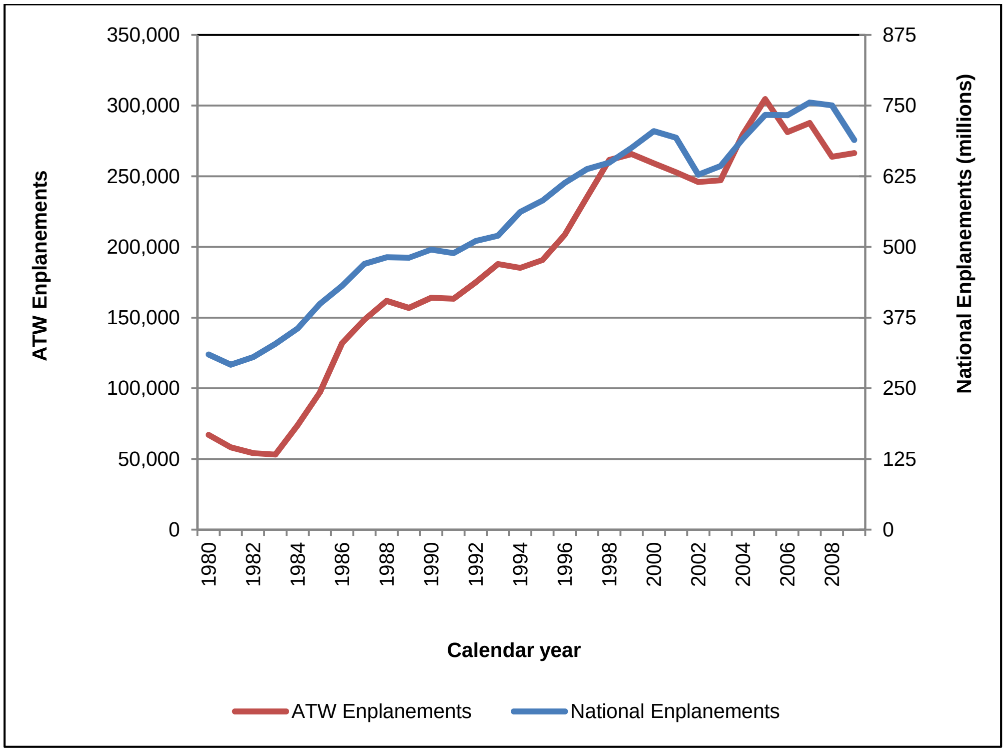
Most often, historical performance is the best indicator of future performance. With that in mind, Outagamie County Regional Airport's historical enplanement data, i.e. the number of enplanements in each calendar year, are examined to provide relevance to projections of future enplanements.

Exhibit 2.6 graphs the historical enplanements at Outagamie County Regional Airport from 1980 to 2009. For perspective, the national enplanement trend is also shown. Enplanements at Outagamie County Regional Airport grew rapidly from 1984 through 1989; during this period enplanements more than doubled. From 1990 through 1995 enplanements increased at a slower pace but then improved dramatically increasing quickly from 1995 through 1999 from 190,818 to 265,786. Beyond, 2000 enplanements fluctuated, yet increased overall. Outagamie County Regional Airport enplanements generally mimicked the national enplanement trends. This indicates that national trends are a good indicator of local trends for the Airport.

Though not shown, the Airport in the past has had a large number of non-revenue passengers. Non-revenue passengers, as the name implies, are air travelers who fly without charge. Typically non-revenue passengers are airline employees or family members. Air Wisconsin, a regional airline, is headquartered at the airport, and its employees travel for both business and pleasure as non-revenue passengers. In the past, Air Wisconsin had contracts with United Airlines to operate as United Express. While these contracts were in place it was not unusual for non-revenue passenger volume to make up nearly six percent of the Airport's total enplanements. However, since April 2006, Air Wisconsin has not operated as United Express or any other carrier in the Appleton market. Some Air Wisconsin facilities have moved away from Appleton and, as a result, non-revenue passengers have declined to less than two percent of airport enplanements.

The historical trends demonstrate the difficulty in forecasting enplanements at Outagamie County Regional Airport. For example, a forecaster examining the period from 1980 to 1983 would be unlikely to accurately predict the rapid growth in enplanements from 1984 through 1989. Likewise a forecaster in 1998 projecting enplanements through the late 2000's would be unlikely to forecast that timeframe as a period of instability.

Exhibit 2.6: Historical Enplanements



Source: Outagamie County Regional Airport Records; FAA TAF

2.4.2. Forecasting Approach

There are a number of different forecasting techniques available for use in the projection of aviation activity, ranging from subjective judgment to sophisticated mathematical modeling. Based on historical changes in enplanements, four modeling techniques lend themselves well to forecasting Outagamie County Regional Airport's future enplanements: regression analysis, historical trend line analysis, market share analysis, and trip generation analysis (i.e. high growth scenario).

2.4.3. Regression Analysis

Regression analysis relates a difficult-to-forecast dependent variable to easier-to-forecast independent variables. By forming a mathematical relationship between the variables, a forecast for a dependent variable can be created based on projected changes in the independent variables. In this case, Outagamie County Regional Airport enplanements are relatively more difficult to forecast than certain economic and demographic variables. Therefore, socio-economic factors such as population, income, and employment were also analyzed for suitability as independent variables in the regression model. The analysis included the assessment of historical trends of aviation activity data at the local, regional, and national level. Aviation activity statistics on passenger enplanements were collected, reviewed, and analyzed. As previously stated in *Industry Trends*, there are a number of elements that may affect aviation demand. Least square linear regression analysis was used for the comparison of relationships among these various economic and demographic indicators (independent variables) and enplanements (dependent variable). It provides the initial step in the development of realistic forecasts of aviation demand.

In linear regression analysis, the coefficient of determination, represented by R^2, is the proportion of variability in a data set that is accounted for by the statistical model. It provides a measure of how well future outcomes are likely to be predicted by the regression model. In the case of a linear regression (used here), the coefficient of determination can range between 0 and 1. A value of 0 indicates that there is no statistical relationship between independent variables and enplanements while a value of 1 dictates that all the change in enplanements can be matched perfectly to changes in the independent variables.

2.4.4. Historical Trend Line Analysis

A historical trend line, or linear extrapolation analysis, is one of the most widely used methods of forecasting. It is a special case of linear regression analysis where enplanements are forecast solely on the basis of enplanement history. A linear equation is derived using a least squares methodology and assumes that the same factors which have influenced demand will continue to affect future demand, and also continue to grow linearly with time. While this is a rather broad assumption, linear extrapolation often provides a reliable benchmark for comparing the results of other analyses.

2.4.5. Market Share Analysis

Market share, ratio, or top-down models are used to scale large-scale aviation activity projections down to a local level. Inherent to the use of such a method is the demonstration that the proportion of the large-scale activity which can be assigned to the local level is a regular and predictable quantity. This method has been used extensively in the aviation industry for aviation demand forecasting at the local level, and its most common use is in the determination of the share of total national traffic activity that will be captured by a particular region, or airport. Historical data is examined to determine the ratio of local airport traffic to total national traffic. From outside data sources, in this case the FAA, projected levels of national activity are determined and then proportioned to Outagamie County Regional Airport based upon the observed and projected trends.

2.4.6. High Growth Scenario

A trip generation model predicts the number of trips originating in or destined for the Airport catchment area. The number of trips is based on past service levels and then adjusted for the future, increased or decreased, on the basis of airport catchment area, air service travel demand and airlines strategy, and ability to take advantage of demand changes. This type of analysis reduces the effect past service levels have on the forecast. A trip generation model can be especially useful when changes in air service levels or demand are expected in the future. However, this type of forecast is subject to optimism bias, the systematic tendency for people to be over-optimistic about the outcome of planned actions. Therefore this approach is deemed a “high growth scenario”.

2.4.7. Passenger Projections

The following sections describe the results of the forecasting methodologies listed above.

2.4.8. Regression Analysis

A multivariate linear regression analysis examines the relationship between two or more sets of historical data. Using multivariate regression analysis, Appleton and Fond Du Lac Metropolitan Statistical Areas

(MSA) employment (which include the Oshkosh and Neenah metropolitan areas) and Outagamie County Regional Airport yield (i.e. average airfare per mile) were used as the independent variables to model historic enplaned passengers from 1995 through 2009. Shocks (i.e. occurrences which may have an isolated profound effect on a dependent variable) such as the September 11, 2001, terrorist attacks and economic recessions were also analyzed in the model for their effect on passenger enplanements. The following equation was used as a model for enplanement growth:

Equation: Enplanements = –174,356 + 2.9 (employment) – 1,416.4 (yield) – 8,802 (GRB low-fare service) – 15,192 (attack)

Variable:	Source/notation:
Employment	Appleton and Fond Du Lac MSA non-farm employment, US Bureau of Labor Statistics
Yield	ATW domestic average yield in 2008 cents, Data Base Products, Inc.
GRB low fare service	Represents Allegiant Air service, value of 1 (2006, 2007, 2008)
Attack	2001 terrorist attacks, value of 1 (affected 2001, 2002)

The equation's coefficient of determination is 0.923. Enplanements and employment are positively correlated, while enplanements are negatively correlated to yield, Austin Straubel International Airport having low-fare carrier service, and terrorist attacks. This relationship means that as local employment increases so do enplanements; conversely, as yield increases or while Green Bay has low-fare service and terrorist attacks occur enplanements at Appleton decrease. Based upon the observed and projected correlation between historical aviation activity and the socio-economic data sets, future aviation activity projections were developed.

For the forecast, employment was expected to grow at the rate indicated by Woods & Poole, an economic forecasting business, for the Appleton and Fond Du Lac Metropolitan Statistical Areas (MSA). Yield is expected to change at a rate equal to that of the US average yield as projected by *FAA Aerospace Forecasts – Fiscal Years 2010-2030.* Austin Straubel International Airport will have Frontier Airlines service beginning in May. This service is deemed to be "low fare" and is expected to continue throughout the forecast period. Another terrorist attack was not projected. The assumed values for the dependent variables and the forecast are shown in **Table 2.5**. As shown, enplanements are projected to increase from 273,200 in 2009 to 386,926 in 2029, which results in a CAGR of 1.76 percent.

Table 2.5 Regression Analysis Forecast

YEAR	ENPLANEMENTS	EMPLOYMENT	2008 YIELD	GRB LOW FARE SERVICE	ATTACK
Historic:					
1995	190,818	147,100	28.5	0	0
1996	209,932	151,400	27.9	0	0
1997	236,467	153,900	25.6	0	0
1998	261,552	156,600	24.8	0	0
1999	265,782	159,100	24.0	0	0

2000	260,199	163,400	25.9	0	0
2001	253,240	162,100	22.7	0	1
2002	247,428	161,600	19.5	0	1
2003	246,894	162,100	18.1	0	0
2004	277,783	163,900	17.0	0	0
2005	304,738	166,400	17.2	0	0
2006	277,957	167,000	18.5	1	0
2007	289,471	167,900	18.2	1	0
2008	263,469	167,600	18.4	1	0
2009	273,200	159,700	13.7	0	0
CAGR 1995-2009	2.60%	0.59%	(5.07%)		
Projected:					
2014	293,671	170,594	12.9	1	0
2019	322,347	180,144	12.2	1	0
2029	386,926	201,787	11.0	1	0
CAGR 2009-2029	1.76%	0.79%	(2.55%)		

Source: Mead & Hunt, Inc.

2.4.9. Historical Trend Line Analysis

The trend line projection presented in this section is based on one primary assumption; that future trends will continue to mimic those of the selected time period and that the factors that affect those trends will continue to influence demand levels in similar fashion. With the establishment of a linear trend line based on historical data and application of the least squares methodology, this type of projection often serves as a baseline that represents static market conditions.

In this case, historical data from 1995 to 2009 is used as the basis for trend line projections. There is a coefficient of determination of 0.57 for these years. Trend line projections of passenger enplanements are presented in **Table 2.6**. As shown, enplanements are projected to increase from 273,200 in 2009 to 316,157 in 2014, 340,697 in 2019, and 389,777 in 2029, which results in a CAGR of 1.79 percent.

Table 2.6 Trend Line Forecasts

YEAR	ENPLANEMENTS
Historic:	
1995	190,818
1996	209,932
1997	236,467
1998	261,552
1999	265,782
2000	260,199
2001	253,240
2002	247,428
2003	246,894
2004	277,783
2005	304,738
2006	277,957
2007	289,471
2008	263,469
2009	273,200
CAGR 1995-2009	2.60%
Projected:	
2014	316,157
2019	340,697
2029	389,777
CAGR 2009-2029	1.79%

Source: Mead & Hunt, Inc.

2.4.10. Market Share Analysis

The Airport's passenger enplanement market share of U.S. domestic enplanements has ranged from 0.03279 percent (1995) to 0.04153 percent (2005). Outagamie County Regional Airport's share in seven of the 15 years increased and in eight of the years declined (see **Table 2.7**). As shown, the Airport's market share has varied by a relatively small amount.

This demand scenario assumes that the Airport's market share of 0.0378 percent in 2009 will remain constant throughout the projection period. There is a coefficient of determination of 0.74 between U.S.

domestic enplanements and Outagamie County Regional Airport enplanements from 1995 to 2009. Using the FAA's projections of U.S. domestic enplanements this market share results in 295,979 passenger enplanements in 2014, 340,351 in 2019, and 447,702 in 2029, resulting in a CAGR of 2.5 percent.

Table 2.7 Market Share Methodology

YEAR	ENPLANEMENTS	TOTAL U.S. DOMESTIC ENPLANEMENTS	MARKET SHARE
Historic:			
1995	190,818	581,963,300	0.0328%
1996	209,932	613,518,432	0.0340%
1997	236,467	637,639,427	0.0369%
1998	261,552	649,002,127	0.0403%
1999	265,782	675,525,321	0.0393%
2000	260,199	704,848,031	0.0368%
2001	253,240	693,148,020	0.0365%
2002	247,428	627,651,689	0.0392%
2003	246,894	643,225,115	0.0384%
2004	277,783	690,968,138	0.0405%
2005	304,738	733,406,794	0.0415%
2006	277,957	732,886,752	0.0384%
2007	289,471	756,525,465	0.0380%
2008	263,469	746,909,759	0.0353%
2009	273,200	689,323,986	0.0387%
Average 1995-2009			0.0378%
Projected:			
2014	295,979	781,851,701	0.0378%
2019	340,351	899,063,843	0.0378%
2029	447,702	1,182,641,568	0.0378%
CAGR 2009-2029	2.50%	2.74%	

Source: Mead & Hunt, Inc.

2.4.11. High Growth Scenario

The high growth scenario takes a strategic approach to long-range facility planning. The strategic approach recognizes that the future cannot always be successfully predicted from past events. To more effectively plan for the future, uncertainties in the projections are recognized and allow for contingencies. As such, this scenario defines the future of air service at Outagamie County Regional Airport by evaluating current air service demand and assuming that airlines act on air service opportunities in the Appleton market. Future enplanements are then projected based on the level of commercial air service offered at the Airport.

As calculated in the *Passenger Demand Analysis*, the current catchment area produces annual demand of approximately 500,000 total passenger enplanements. Yet due to the current air service situation at Outagamie County Regional Airport and nearby airports, Outagamie County Regional Airport serves approximately 41 percent of catchment area passengers. It is reasonable that airlines could increase service at Appleton to better capture demand locally. Should the Airport secure the service outlined in "Air Service Opportunities" within the *Industry Trends* section, the Airport will serve a larger share of its market and enplanements will increase. Air service improvements assumed in the high growth scenario include:

- Delta Air Lines' will add capacity to Detroit. Detroit load factors are over 80 percent. Capacity additions would be added through the substitution of larger aircraft such as the DC-9 or equivalent sized aircraft. Delta has already substituted DC-9 aircraft (105 seats) for one regional jet flight (50 seats) in January 2010. This scenario assumes the equivalent of two regional jet flights will be substituted for narrow-body aircraft.
- Allegiant Air will add service to new markets. This scenario assumes that Allegiant will add service to an additional Florida destination on a twice a week basis.
- Delta Air Lines' will add capacity to Atlanta. Atlanta load factors are over 80 percent. An additional daily flight operated with a regional jet is projected.
- United Airlines will add capacity to Denver. Denver load factors are over 80 percent. An additional daily flight operated with a regional jet is projected.
- New service to a hub will be added. Either Continental Airlines or American Airlines could add service to their hubs at Chicago or Cleveland. This service is projected to be three times daily on 50-seat regional jet aircraft.

The high growth scenario assumes that Detroit, Atlanta, and Denver capacity will increase within the first five years of the forecast. Additional Allegiant service and service by Continental will be added within 10 years, and American service will be added within the 20-year projection. **Table 2.8** provides the results of the high growth scenario assuming the new air service operates with load factors of 80 percent, while load factors on current service remain unchanged.

Table 2.8 High Growth Scenario Enplanements

FORECAST	ACTUAL 2009	FORECAST			CAGR 2009 -2029
		2014	2019	2029	
Added operations		1,456	2,288	2,912	
Added outbound seats over 2010		76,440	146,640	201,240	
Added enplanements		61,152	117,312	160,992	
High growth scenario enplanements	273,200	334,352	390,512	434,192	2.34%

Source: Mead & Hunt, Inc.

2.4.12. Forecast Summary

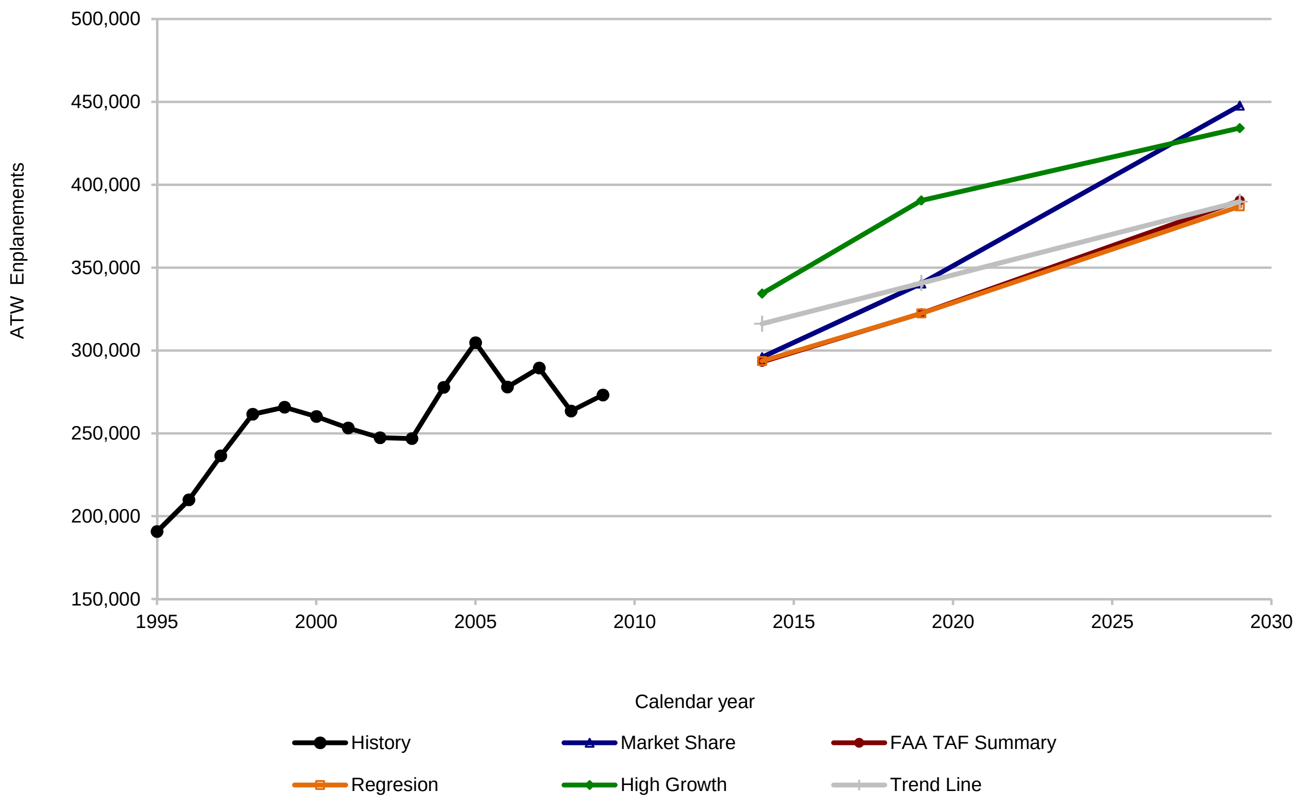
Table 2.9 and **Exhibit 2.7** provide a summary of the different forecast enplanement outcomes. Of the three methodologies used that are based on historical inputs (i.e. regression, trend line, and market share), the regression analysis has the least variance between observations and modeled outcomes for past history with a coefficient of determination of 0.923. Given this high level of correlation, the regression analysis is the selected methodology for projecting enplanements. A comparison to the TAF is included in the *Conclusions and Recommendations* section of this document.

Table 2.9 Forecast Comparisons

FORECAST	ACTUAL 2009	2014	2019	2029	CAGR 2009 - 2029
Regression	273,200	293,671	322,347	386,926	1.76%
Trend Line	273,200	316,157	340,697	389,777	1.79%
High Growth	273,200	334,352	390,512	434,192	2.34%
Market Share	273,200	295,979	340,351	447,702	2.50%
2009 FAA TAF	266,464	293,123	322,488	390,499	1.93%

Source: Mead & Hunt, Inc.

Exhibit 2.7: Forecast Enplanements



Source: Mead & Hunt, Inc.

2.5. Commercial Air Carrier Operations and Fleet Mix Projections

Projections of air carrier operations and fleet mix were developed using historical and expected trends in load factors, types of aircraft used, passenger enplanements, and average seats per departure. Air carrier operations projections and air carrier fleet mix projections are presented in this section.

2.5.1. Commercial Air Carrier Operations Projections

The commercial air carrier operations forecast is important for airfield planning because the size and frequency of this component of demand defines runway and taxiway requirements. The FAA also projects commercial air carrier operations as part of the TAF. The forecast prepared herein is compared with the TAF in the *Conclusions and Recommendations* section.

Similar to forecasting enplanements, the first step to forecasting operations is to examine historical data. **Table 2.10** shows the annual number of scheduled and unscheduled operations by fiscal year from 1995 through 2009. The percent of scheduled commercial operations increased between 1995 and 2009; however, data from 2003 and beyond has more relevance. The U.S. DOT changed reporting requirements in 2003 to include all carriers. From 2003 forward, the percentage of scheduled operations ranged from 85 percent to 94 percent.

Table 2.10 Historical Commercial Operations

YEAR	COMMERCIAL OPERATIONS [a]	SCHEDULED COMMERICAL OPS [b]	% SCHEDULED	UNSCHEDULED COMMERCIAL OPS	% UNSCHEDULED
1995	20,169	5,655	28%	14,514	72%
1996	17,947	5,425	30%	12,522	70%
1997	20,688	7,269	35%	13,419	65%
1998	23,146	13,743	59%	9,403	41%
1999	24,531	15,021	61%	9,510	39%
2000	25,528	17,634	69%	7,894	31%
2001	22,061	17,092	77%	4,969	23%
2002	21,467	11,590	54%	9,877	46%
2003	20,641	17,614	85%	3,027	15%
2004	22,289	19,179	86%	3,110	14%
2005	23,165	20,506	89%	2,659	11%
2006	21,039	19,794	94%	1,245	6%
2007	20,959	19,749	94%	1,210	6%
2008	19,303	17,893	93%	1,410	7%
2009	16,434	14,733	90%	1,701	10%
CAGR 1995 - 2009	(1.5%)	7.1%		(14.2%)	

[a] Source: FAA – ATADS
[b] Source: apgDat (DOT T-100)
Note: Reporting requirements for T-100 changed in October 2002 to include all airlines

Table 2.11 provides the projections of total operations including scheduled and unscheduled operations. It is important to present both scheduled and unscheduled operations as Outagamie County Regional Airport has a significant number of unscheduled flights.

Over the last five years, average load factors (seat factor) have increased significantly from 51.8 percent in 2003 to 72.7 percent in 2009. Given historically increasing load factors at Outagamie County Regional Airport and the national trend of increasing load factors[1], the load factor at Outagamie County Regional Airport is projected to increase to 74 percent by 2029. Historically, the Airport's load factor has been below the national average load factor, a trend that is anticipated to continue. Average seats per departure are projected to increase through the forecast period as Saab 340's and 50 seat regional jets are retired and replaced by 70 to 90 seat regional jets in the regional carrier fleets.

Passenger enplanements using the selected regression methodology are presented in **Table 6.2** with historical and projected load factors. Scheduled operations are calculated by using the following formula:

Scheduled operations = (Enplanements / (Load Factor x Avg. Seats per Departure)) x 2

Unscheduled operations, including air taxi operations, are calculated using the historical average percentage of scheduled passenger operations. Scheduled and unscheduled operation projections are combined to produce total commercial operations. This methodology projects 16,250 operations in 2014, 17,172 in 2019, and 19,866 in 2029, resulting in a CAGR of 0.95 percent.

Table 2.11 Commercial Operations Forecast

YEAR	PASSENGER ENPLANE-MENTS	LOAD FACTOR [a]	AVG. SEATS PER COMMERCIAL OPERATION	SCHEDULED PAX COMMERICAL OPS [a]	UNSCHEDULED COMMERCIAL OPS [b]	TOTAL COMERCIAL OPS [c]
Historic:						
2003	246,894	51.8%	53.6	16,701	3,940	20,641
2004	277,783	60.9%	50.4	18,254	4,035	22,289
2005	304,738	58.9%	52.9	19,540	3,625	23,165
2006	277,957	68.9%	43.9	18,502	2,537	21,039
2007	289,471	71.5%	43.6	18,332	2,627	20,959
2008	263,469	67.2%	46.7	16,657	2,646	19,303
2009	273,200	72.7%	52.9	14,131	2,303	16,434
CAGR 2003-2009	1.70%			(2.7%)	(8.6%)	(3.7%)
Average percent of scheduled pax operations					17.8%	
Projected:						
2014	293,671	73.4%	58.0	13,796	2,453	16,250
2019	322,347	73.7%	60.0	14,579	2,592	17,172
2029	386,926	74.0%	62.0	16,867	2,999	19,866
CAGR 2009-2029	1.76%		0.80%	0.89%	1.33%	0.95%

[a] Source: apgDat (DOT T-100), load factor is seat factor
[b] Source: Calculated: total ops - scheduled pax ops (includes scheduled cargo flights, aircraft ferries, air taxi, etc.)
[c] Source: Source: FAA - ATADS fiscal year
Note: Reporting requirements for T-100 changed in October 2002 to include all airlines

[1] *The FAA Aerospace Forecast 2010-2030 forecasts the national average load factor at approximately 82.4 percent in 2030.*

Table 2.12 compares forecasted commercial air carrier operations to the FAA TAF projections for the same 20-year forecast window. The TAF forecast projects a similar growth rate in commercial operations.

Table 2.12 Commercial Air Carrier Operations Projections Comparison

YEAR	PROJECTED				FAA TAF [a]
	SCHEDULED	UN-SCHEDULED	TOTAL	% DIFF FROM TAF	TOTAL
2009	14,131	2,303	16,434	0%	16,434
2014	13,796	2,453	16,250	-6%	17,325
2019	14,579	2,592	17,172	-6%	18,266
2029	16,867	2,999	19,866	-2%	20,311
CAGR 2009-2029	0.9%	1.3%	1.0%		1.1%

[a] Only Total operations projections are available from the FAA TAF for comparison

2.5.2. Charter operations projections

Charter flights, flights which take place outside normal schedules, are hired by a customer or group of customers. These are a specific category of "other commercial carrier operations" shown in Table 6.2. Tourist charters are generally organized by holiday companies. Tickets are not sold directly by the charter airline to the passengers but by holiday companies who have chartered the flight (sometimes in a consortium with other companies). Although charter airlines typically carry passengers who have booked individually or as small groups to tourist destinations, sometimes an aircraft will be chartered by a single group such as members of a company, a sports team, or the military. **Table 2.13** presents historical (from airport records) and projected charter operations for Outagamie County Regional Airport. As shown in Table 6.4, charter operations between 2002 and 2009 ranged from 0 to 42, with an average of 11 per year, 18 for the years when charters occurred. Given the small number of charter operations in the past, few charter operations are projected for the future. It is projected that charter operations at the Airport will remain flat at 18 operations a year through the 20-year planning horizon.

Table 2.13 Historical Charter Operations and Forecast

YEAR	OPERATIONS
Historic [a]:	
2002	0
2003	0
2004	0
2005	8
2006	6
2007	20
2008	42
2009	14
Average 2005 - 2009	18
Projected:	
2014	18
2019	18
2029	18

[a] Source: Airport records-flights reported as charter or operated by Sun Country Airlines

2.5.3. Commercial Air Carrier Fleet Mix Projections

In order to project future air carrier operations, the type and capacity of aircraft that will operate at the Airport must be determined. For the purposes of this report, passenger aircraft have been grouped into five categories based on the number of seats they are typically configured with. In the future, these aircraft will be phased out of airline fleets and replaced with newer model aircraft within the seat ranges.

Table 2.14 shows the historical air carrier fleet mix at Outagamie County Regional Airport over the last five years grouped by the five aircraft categories. Over the past seven years, the number of aircraft that operated at Outagamie County Regional Airport with less than 60 seats has dropped dramatically, primarily with the phase-out of turboprop aircraft from the market. Service with BAE-146 aircraft was also discontinued over the time period. With these changes, operations with regional jet aircraft in the 50- and 70-seat class have increased. Operations in the 101- to 150-seat category ceased in 2004 but then were reinstated with the addition of Allegiant Air in 2008.

Table 2.14 Historical Fleet Mix

SEAT RANGE	TYPICAL AIRCRAFT TYPE	AVG # OF SEATS	OPERATIONS 2003	2004	2005	2006	2007	2008	2009	CAGR 2004-2008
<20	Beechcraft 1900	19	392	534	1,344	1,305	415	30	0	-100.0%
			2.6%	2.9%	6.9%	7.1%	2.3%	0.2%	0.0%	
20-39	Dornier 328, Bombardier Dash 8Q-200, Embraer 120, 135, Saab 340	33	4,091	4,786	3,999	4,755	6,195	4,142	1,717	-13.5%
			26.8%	26.3%	20.5%	25.8%	34.0%	25.0%	12.2%	
40-59	Bombardier CRJ-200, Embraer 140, 145	49	5,953	9,504	8,885	11,386	11,607	11,647	10,534	10.0%
			39.1%	52.2%	45.6%	61.7%	63.7%	70.4%	74.5%	
60-85	Avro RJ 85, Bombardier Dash 8Q-400, CRJ-700, CRJ-900 (DL config) Embraer 170, 175	68	695	15	1,712	460	0	707	1,432	12.8%
			4.6%	0.1%	8.8%	2.5%	0.0%	4.3%	10.1%	
86-100	British Aerospace Bae-146, Boeing 717-200, Bombardier CRJ-900, Embraer 190, 195,	91	3,696	3,370	3,532	544	0	0	0	-100.0%
			24.3%	18.5%	18.1%	2.9%	0.0%	0.0%	0.0%	
101-150	Airbus A318, A319; Boeing 737-300, 737-400, 737-500, 737-600, 737-700, 737-800, Mcdonnell Douglas Dc-9, MD-80	134	412	0	0	0	0	22	448	1.4%
			2.7%	0.0%	0.0%	0.0%	0.0%	0.1%	3.2%	
Total		**N/A**	**15,239**	**18,209**	**19,472**	**18,450**	**18,217**	**16,548**	**14,131**	**(1.3%)**

Source: APGDat

Table 2.15 provides the forecast of scheduled commercial air carrier operations through 2029. The forecast is based on several assumptions. Since seats on flights begin to be sold months in advance, the schedule for fiscal year 2010 is already available. The fleet mix (based on aircraft seat rages) is projected to increase through the through the forecast period as all of the 34-seat Saab 340's and some of the 50-seat regional jets are anticipated to be retired and replaced by 70 to 90 seat regional jets in the regional carrier fleets.

Table 2.15 Projected Commercial Air Carrier Fleet Mix

SEAT RANGE	AVG # OF SEATS	HISTORICAL		FORECAST						CAGR 2009-2029
		2009		2014		2019		2029		
		%	OPS	%	OPS	%	OPS	%	OPS	
<20	19	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0%
20-39	34	12.2%	1,717	0.0%	0	0.0%	0	0.0%	0	(100.0%)
40-59	50	74.5%	10,534	74.6%	10,292	68.5%	9,987	62.8%	10,592	61.3%
60-85	70	10.1%	1,432	18.2%	2,511	20.8%	3,032	22.0%	3,711	69.1%
86-100	90	0.0%	0	4.0%	552	7.5%	1,093	12.0%	2,024	100.0%
101-150	137	3.2%	448	3.2%	441	3.2%	467	3.2%	540	62.8%
Total		**100.0%**	**14,131**	**100.0%**	**13,796**	**100.0%**	**14,579**	**100.0%**	**16,867**	**0.0%**
Total Scheduled Passenger Operations		**14,131**		**13,796**		**14,579**		**16,867**		
Average Seats per Operation		**52.9**		**58.0**		**60.0**		**62.0**		
Total Inbound and Outbound Seats		**746,915**		**800,194**		**874,754**		**1,045,747**		

Note: Ops = Commercial operations; LF = Load factor; ENP = Enplanements

2.6. General Aviation Activity Projections

General aviation is defined as that portion of civil aviation that encompasses all facets of aviation except commercial and military operations. General Aviation projections were developed for the number of based aircraft, based aircraft fleet mix, and aircraft operations.

Outagamie County Regional Airport recently purchased the full service Fixed Base Operator (FBO). The FBO is County owned and it's services and operations contracted out. This arrangement is anticipated to result in improvements to the facilities and services offered to general aviation traffic by the FBO.

For aircraft storage, aircraft owners can choose from Airport owned hangars for rent or fully developed lease land with access to water, sewer, electric, and natural gas to build their own hangar, both of which are conveniently located adjacent to runway 11/29 (6,501' x 150') and runway 3/21 (8,002' x 150'). Amenities include a pilot's lounge with computer/Internet access, restrooms, and airplane washing station.

Oshkosh's Wittman Regional Airport is located in close proximity to the Outagamie County Regional Airport. Wittman Regional Airport has extraordinary general aviation demand when it annually hosts the world's largest annual fly-in. During the annual EAA fly-in, Outagamie County Regional Airport experiences a significant amount of itinerant general aviation traffic due to overflow from Wittman.

2.6.1. Based Aircraft Projections

A based aircraft as defined by the FAA is an aircraft that is operational and air worthy and based at the facility for a majority of the year. Records from FAA 5010 forms and the TAF indicate based aircraft at Outagamie County Regional Airport have declined by 10 percent over the past 15 years, falling fom 78 in 1995 to 70 in 2009 (**Table 2.16**). While piston aircraft have been on the decline, based turbine powered aircraft have inreased.

Table 2.16 Historical Based Aircraft

YEAR	PISTON AIRCRAFT SINGLE ENGINE	PISTON AIRCRAFT MULTI-ENGINE	TURBINE POWERED	HELI-COPTER	OTHER	TOTAL
1995	62	13	2	1	0	78
1996	62	13	2	1	0	78
1997	62	13	2	1	0	78
1998	56	14	3	0	0	73
1999	54	14	5	0	0	73
2000	53	21	4	0	0	78
2001	52	19	3	0	0	74
2002	52	17	4	0	0	73
2003	52	17	4	0	0	73
2004	51	16	4	0	0	71
2005	52	15	4	0	0	71
2006	52	13	4	0	0	69
2007	52	13	4	0	0	69
2008	53	13	4	0	0	70
2009	53	13	4	0	0	70
CAGR 1995-2009	(1.1%)	0.0%	5.1%	(100.0%)	0.0%	(0.8%)

Source: TAF - FAA 5010 Forms

To project based aircraft at Outagamie County Regional Airport, two unconstrained forecast methodologies were used: the market share and socio-economic methodologies. The *2002 Master Plan Update* also used a market share methodology.

2.6.2. Market Share Methodology

The market share methodology uses the growth rates for active general aviation and air taxi aircraft from the *FAA Aerospace Forecast – Fiscal Years 2010-2030*. Historic data from 2004 to 2009 was used because the FAA's methodology for counting aircraft changed beginning that year. From 2004 to 2009, the national number of aircraft decreased slightly from 182,759 to 182,524. Over the same period, the number of based aircraft at the Airport has kept step with the national number of aircraft. As shown in **Table 2.17** the Airport's share of national aircraft ranged from 0.037 percent to 0.039 percent. The average market share at the Airport between 2004 and 2009 was 0.1245 percent. This figure is applied to total U.S. based aircraft projections and is held constant throughout the projection period. The market share methodology projects that based aircraft will increase from 70 to 77 from 2009 to 2029, a 0.5 percent CAGR.

Table 2.17 Based Aircraft Forecast

	Selected					
	MARKET SHARE METHODOLOGY			**SOCIO-ECONOMIC METHODOLOGY**		
YEAR	**ATW BASED AIRCRAFT [a]**	**TOTAL U.S. ACTIVE AIRCRAFT [b]**	**ATW MARKET SHARE**	**ATW BASED AIRCRAFT [a]**	**COUNTY POPULATION [c]**	**BASED AIRCRAFT PER 1000 RESIDENTS**
Historic:						
2004	71	182,759	0.039%	71	552,626	0.1285
2005	71	185,371	0.038%	71	557,541	0.1273
2006	69	182,183	0.038%	69	561,570	0.1229
2007	69	186,805	0.037%	69	564,669	0.1222
2008	70	182,965	0.038%	70	567,647	0.1233
2009	70	182,524	0.038%	70	570,026	0.1228
	Average (2004-2009)		*0.038%*	*Average (2004-2009)*		0.1245
Forecast:						
2014	69	182,373	0.038%	73	588,813	0.1245
2019	71	185,244	0.038%	76	608,710	0.1245
2029	77	201,878	0.038%	81	650,021	0.1245
CAGR 2009-2029	0.5%	0.5%		0.7%	0.7%	

[a] Source: TAF - FAA 5010 Forms
[b] Source: FAA Aerospace Forecasts - Fiscal Years 2010-2030, March 2010 exclusive of rotorcraft, experimental, sport aircraft and other.
[c] Source: Wisconsin Department of Administration, Demographic Services Center: Calumet, Fond Du Lac, Outagamie, Waupaca, Waushara, and Winnebago counties. Growth forecast by Woods & Poole.

2.6.3. Socio-Economic Methodology

The socio-economic methodology, also shown in Table 2.17, uses the population growth rate of Calumet, Fond Du Lac, Outagamie, Waupaca, Waushara, and Winnebago Counties and the average based aircraft per resident since 2004 to forecast based aircraft at Outagamie County Regional Airport. While the population has increased at a compounded annual rate of 0.6 percent since 2002, based aircraft have declined slightly resulting in a decrease in based aircraft per 1,000 residents from 0.1285 in 2002 to 0.1228 in 2009. Using the average based aircraft per 1,000 residents from 2004 through 2009 of 0.1245 and the expected population growth, it is projected there will be a demand for 81 based aircraft by 2029 using the socio-economic methodology.

2.6.4. Selected Methodology

The market share projected a slightly slower growth rate than the socio-economic methodology. Piston aircraft make up 93 percent of based aircraft at the Airport. The *FAA Aerospace Forecast Fiscal Years 2010-2030* projects this category of aircraft to decrease through 2017 then grow at a slow rate. For the forecast period through 2030, a compounded annual growth rate of 0.1 percent is expected for that aircraft type. All indications are that the number of general aviation aircraft at Outagamie County Regional Airport will follow the national growth rate. Given its slower growth rate and the tie to national trends, the market share methodology based forecast is the selected forecast for based aircraft.

2.6.5. Based Aircraft Fleet Mix

A breakdown of historical and projected based aircraft fleet mix is presented in **Table 2.18**. Since 1995, the Airport has seen a decline in the percentage of single and multi-engine piston aircraft while turbine aircraft has grown. Near term, instability of fuel prices and economic concerns are dampening the general aviation industry. The piston aircraft market is mature and little growth is expected. However, turbine aircraft and sport aircraft are expected to grow, increasing at compounded annual rates of 3.1 percent and 3.9 percent, respectively. Accordingly, growth in turbine-powered aircraft at the Airport is projected to outpace single- and multi-engine piston aircraft. Over the forecast period, based single engine piston aircraft are expected to grow at a compounded annual growth rate of 0.2 percent to 55; while multiengine piston aircraft are expected to decline at a 0.8 percent compounded annual rate to 11 aircraft. The number of turbine based aircraft is expected to grow to seven. With the popularity of sport aircraft increasing, four new aircraft are expected to be based at the Airport.

Table 2.18 Based Aircraft Fleet Mix Projects

	PISTON AIRCRAFT								
YEAR	SINGLE ENGINE	%	MULTI ENGINE	%	TURBINE POWERED	%	OTHER	%	TOTAL
Historic [a]:									
1995	62	80%	13	17%	2	3%	1	1%	78
1996	62	80%	13	17%	2	3%	1	1%	78
1997	62	80%	13	17%	2	3%	1	1%	78
1998	56	76%	14	19%	3	4%	0	0%	74
1999	54	73%	14	19%	5	7%	0	0%	74
2000	53	67%	21	27%	4	5%	0	0%	79
2001	52	69%	19	25%	3	4%	0	0%	75
2002	52	70%	17	23%	4	5%	0	0%	74
2003	52	70%	17	23%	4	5%	0	0%	74
2004	51	71%	16	22%	4	6%	0	0%	72
2005	52	72%	15	21%	4	6%	0	0%	72
2006	52	74%	13	19%	4	6%	0	0%	70
2007	52	74%	13	19%	4	6%	0	0%	70
2008	53	75%	13	18%	4	6%	0	0%	71
2009	53	75%	13	18%	4	6%	0	0%	71
Forecast [b]:									
2014	52	75%	12	18%	4	6%	1	1%	69
2019	52	74%	12	17%	4	6%	3	4%	71
2029	55	71%	11	14%	7	10 %	4	5%	77
CAGR 2009-2029	0.2%		(0.8%)		3.1%		100.0%		0.4%

[a] Source: TAF - FAA 5010 Forms

[b] Source: FAA Aerospace Forecasts - Fiscal Years 2010-2030, March 2010; other includes rotorcraft, experimental, sport aircraft and other.

2.6.6. General Aviation Operations Projections

General aviation aircraft operations are only partially tied to the number of based aircraft at the Airport. The greatest number of operations was in 1996 when 46,161 were recorded, and the lowest was 15,553 in 2009. This decline reflects other trends of travel behavior both locally and nationally with respect to general aviation. The cost of operation and ownership of aircraft has increased, which has impacted operations and hours flown nationally. Due to the downturn in general aviation operations, time series projection methodologies will only extrapolate this trend eroding their relevance. Like the based aircraft projection, two unconstrained forecast methodologies were used to project general aviation operations: the market share and socio-economic methodologies.

2.6.7. Market Share Methodology

The market share methodology compares Outagamie County Regional Airport's operations with national figures to determine Outagamie County Regional Airport's market share. Two types of operations were examined and forecast, itinerant operations (between Outagamie County Regional Airport and other airports) and local operations (i.e. flights that originate and end at Outagamie County Regional Airport such as training flights and recreational scenic flights). The results are shown in **Table 2.19**. National statistics for general aviation operations are sourced from the *FAA Aerospace Forecast – Fiscal Years 2010-2030*. From 2000 to 2009, the national number of general aviation operations peaked in 1999 with 40,000,000 then decreased to 27,990,000 in 2009, a 30.0 percent decline. General aviation operations at Outagamie County Regional Airport began to decrease in 1997.

Over the past 15 years Outagamie County Regional Airport's market share of the nation's itinerant general aviation operations has fluctuated greatly, and averaged 0.000112 percent annually (excluding 2009 and outlier year). The percentage share has been trending downward at an average annual rate of 2.148 percent yearly for itinerant operations while local operations have trended downward by 5.198 percent yearly. The *FAA Aerospace Forecast – 2010-2030* forecasts a compounded annual growth rate of 1.15 percent for itinerant operations and a rate of 1.19 percent for local operations. The local and itinerant market shares for year 2009 are applied to total U.S. general aviation forecasts and held constant throughout the projection period. The market share methodology projects 18,262 general aviation operations in 19,471 in 2019, and 22,210 in 2029, a CAGR of 1.05 percent

Table 2.19 General Aviation Operations Forecast – Market Share Methodology

YEAR	ATW GA OPERATIONS [a]			TOTAL U.S. GA OPERATIONS (000) [b]			ATW MARKET SHARE (X 1000)		
	ITINER	LOCAL	TOTAL	ITINER	LOCAL	TOTAL	ITINER	LOCAL	TOTAL
Historic [a]:									
1995	28,965	16,803	45,768	20,860	15,066	35,927	0.139%	0.112%	0.127%
1996	28,418	17,743	46,161	20,822	14,476	35,298	0.136%	0.123%	0.131%
1997	24,520	13,126	37,646	21,669	15,164	36,833	0.113%	0.087%	0.102%
1998	24,630	14,660	39,290	22,087	15,960	38,047	0.112%	0.092%	0.103%
1999	23,769	12,608	36,377	23,019	16,980	40,000	0.103%	0.074%	0.091%
2000	25,056	15,319	40,375	22,844	17,034	39,879	0.110%	0.090%	0.101%
2001	22,673	12,246	34,919	21,433	16,194	37,626	0.106%	0.076%	0.093%
2002	24,144	12,065	36,209	21,450	16,203	37,653	0.113%	0.074%	0.096%
2003	21,553	11,852	33,405	20,231	15,293	35,524	0.107%	0.078%	0.094%
2004	20,455	9,068	29,523	20,007	14,960	34,968	0.102%	0.061%	0.084%
2005	20,268	6,760	27,028	19,303	14,844	34,147	0.105%	0.046%	0.079%
2006	20,675	7,634	28,309	18,707	14,365	33,073	0.111%	0.053%	0.086%
2007	19,955	5,379	25,334	18,575	14,557	33,132	0.107%	0.037%	0.076%
2008	17,840	5,790	23,630	17,503	14,107	31,609	0.102%	0.041%	0.075%
2009	12,812	5,174	17,986	15,553	12,437	27,990	0.082%	0.042%	0.064%
Average [c]							*0.112%*	*0.074%*	*0.096%*
Forecast [b]:									
2014	12,967	5,295	18,262	15,742	12,727	28,469	0.082%	0.042%	0.064%
2019	13,839	5,633	19,471	16,800	13,539	30,339	0.082%	0.042%	0.064%
2029	15,791	6,419	22,210	19,169	15,429	34,599	0.082%	0.042%	0.064%
CAGR 2009-2029	1.05%	1.08%	1.06%	1.05%	1.08%	1.07%			

[a] Source: FAA ATADS
[b] Source: FAA Aerospace Forecasts - Fiscal Years 2010-2030, March 2010 - Traffic control service airports only
[c] Average 1995 - 2008 was used in all cases except local operations because of the downward skewing effect of 2009. For local operations, average of 1995 - 2009 was used

2.6.8. Socio-Economic Methodology

The socio-economic methodology, shown in **Table 2.20**, uses the growth rate of the population of the eight county service area and operations per capita to forecast general aviation operations at Outagamie County Regional Airport. While the population has increased at a compounded annual rate of 0.99 percent since 1995, general aviation operations have declined, resulting in a negative correlation between the two factors. Because of these trends, 2009 per capita (as opposed to a historical average) figures are applied to future population projections. As shown in Table 7.5, the socio-economic methodology projects 18,579 general aviation operations in 2014, 19,207 in 2019, and 20,510 in 2029, a CAGR of 0.66 percent.

Table 2.20 General Aviation Operations Forecast Socioeconomic Methodology

YEAR	ATW GA OPERATIONS [a]			AREA POPULATION	GA OPERATIONS PER CAPITA		
	ITINERANT	LOCAL	TOTAL		ITINERANT	LOCAL	TOTAL
Historic [a]:							
1995	28,965	16,803	45,768	496,900	0.058	0.034	0.092
1996	28,418	17,743	46,161	502,336	0.057	0.035	0.092
1997	24,520	13,126	37,646	509,619	0.048	0.026	0.074
1998	24,630	14,660	39,290	515,480	0.048	0.028	0.076
1999	23,769	12,608	36,377	519,977	0.046	0.024	0.070
2000	25,056	15,319	40,375	524,789	0.048	0.029	0.077
2001	22,673	12,246	34,919	534,935	0.042	0.023	0.065
2002	24,144	12,065	36,209	542,999	0.044	0.022	0.067
2003	21,553	11,852	33,405	547,940	0.039	0.022	0.061
2004	20,455	9,068	29,523	552,626	0.037	0.016	0.053
2005	20,268	6,760	27,028	557,541	0.036	0.012	0.048
2006	20,675	7,634	28,309	561,570	0.037	0.014	0.050
2007	19,955	5,379	25,334	564,669	0.035	0.010	0.045
2008	17,840	5,790	23,630	567,647	0.031	0.010	0.042
2009	12,812	5,174	17,986	570,026	0.022	0.009	0.032
Average (1995-2009)					0.042	0.021	0.063
Forecast [b]:							
2014	13,234	5,345	18,579	588,813	0.022	0.009	0.032
2019	13,681	5,525	19,207	608,710	0.022	0.009	0.032
2029	14,610	5,900	20,510	650,021	0.022	0.009	0.032
CAGR 2009-2029	0.66%	0.66%	0.66%	0.66%			

[a] Source: Operations FAA ATADS; Population Wisconsin Department of Administration, Demographic Services Center: Calumet, Fond Du Lac, Outagamie, Waupaca, Waushara, and Winnebago counties

[b] Source: Population growth projected by Woods & Poole

2.6.9. Forecast Summary

Table 2.21 provides a summary of the different general aviation operations forecasts. Of the two forecast methods, the socio-economic methodology projects growth. However, this method fails to take into account the trend of decreasing operations over the past 15 years. The historical decline in the number of general aviation operations cannot be ignored in selecting a forecast method. For this reason, the market share methodology is the chosen forecast method.

Table 2.21 General Aviation Forecast Comparisons

FORECAST	ACTUAL 2009	2014	2019	2029	CAGR 2009 - 2029
Market Share Methodology	17,986	18,262	19,471	22,210	1.06%
Socioeconomic Methodology	17,986	18,579	19,207	20,510	0.66%
2009 FAA TAF	17,986	20,141	21,755	25,391	1.74%

Source: Mead & Hunt, Inc.

2.7. Air Cargo Activity

Air cargo activity at Outagamie County Regional Airport includes air cargo operations by Federal Express and commercial passenger service. Historically, the majority of air cargo at the Airport was transported by Federal Express and Airborne Express/DHL until DHL ceased U.S. domestic freight operations, leaving Federal Express as the primary all-cargo carrier at the Airport. There is also some cargo that is carried “belly-hold” meaning that it is carried on scheduled commercial air carrier flights. Federal Express has operated wide-body Airbus A300 and A310 aircraft as well as the turboprop Cessna Caravan aircraft. Nationally, express carriers, (such as UPS and Federal Express) are gaining market share over commercial passenger carriers, a trend that is expected to continue.

Historical air cargo activity for calendar years 2002 through 2009 as reported by the Airport is presented in **Table 2.22**. From 2002 to 2008, air cargo grew by nearly 45 percent, representing a 6.3 percent compounded annual growth rate and increasing from approximately 21.5 million pounds to 31.1 million. Air cargo increased in six of the seven years for that time period. Between 2008 and 2009, total pounds of shipped cargo at Outagamie County Regional Airport decreased by approximately 37 percent, which is likely a direct cause of the recent economic downturn. Through June of 2010 air cargo activity has rebounded and is 36.35% above 2009 levels. This puts the Airport on track for 26,948,000 total pounds of cargo for 2010.

Approximately 58.7 percent of air cargo shipments are inbound shipments. In 2009, air cargo shipments averaged 34.7 pounds per person in the six-county area that the airport serves (Calumet, Fond Du Lac, Outagamie, Waupaca, Waushara, and Winnebago counties).

As shown in Table 2.22, total U.S. domestic commercial air carrier revenue ton miles (RTMS) have decreased slightly from 2002 to 2009. According to the FAA Aerospace Forecasts 2010-2030, annual U.S. RTMS are anticipated to increase steadily throughout the projection period, a CAGR of 2.2 percent from 2010 to 2029. Forecasts of total annual pounds of cargo shipped at the Airport are developed by applying the proportional changes in U.S. activity 2010-2029 to the Airport’s projected 2010 total of 26,948,064 total pounds shipped. As shown, total shipped air cargo is anticipated to increase to 29,589,683 in 2014, 32,800,201 in 2019, and 40,660,652 in 2029.

Table 2.22 Historical Air Cargo Activity and Forecasts

YEAR	AIR CARGO (POUNDS) [a]			U.S. COMMERCIAL AIR CARRIERS TOTAL DOMESTIC REVENUE TON MILES (MILLIONS) [b]
	TOTAL	OUTBOUND	INBOUND	
Historic:				
2002	21,548,037	10,109,277	11,438,760	12,967
2003	19,070,867	8,592,396	10,478,471	14,270
2004	19,853,107	8,588,012	11,265,095	16,341
2005	21,673,038	9,066,168	12,606,870	16,090
2006	23,472,127	9,268,397	14,203,730	15,711
2007	24,897,904	9,520,816	15,377,088	15,818
2008	31,153,868	10,433,062	20,720,806	14,411
2009	19,763,890	8,284,687	11,479,203	11,860
2010 (est.)	26,948,064	11,129,550	15,818,514	12,008
CAGR 2002-2010	2.8%	1.2%	4.1%	-1.0%
Projected:				
2014	29,589,683	12,220,539	17,369,144	13,185
2019	32,800,201	13,546,483	19,253,718	14,616
2029	40,660,652	16,792,849	23,867,803	18,118
CAGR 2010-2029	2.2%	2.2%	2.2%	2.2%

[a] Source: Airport records
[b] Source: FAA Aerospace Forecasts 2006-2017, 2010-2030.

2.8. Military Operations Projections

Military aircraft operations at Outagamie County Regional Airport include training and other operations conducted by the various armed services. However, there are no military installations located at the Airport. **Table 2.23** presents historical and projected military operations for Outagamie County Regional Airport. As shown in Table 2.23, total military operations between the fiscal years of 1995 and 2009 ranged from 30 to 317, with an average of 124 per year. In projecting military activity, it is important to recognize that an airport's military operations are not influenced by the same factors that affect civil aviation. Rather, military activity is subject to factors relating to national defense. Therefore, it is projected that military operations at the Airport will remain flat at 124 operations a year through the 20-year planning horizon.

Table 2.23 Historical Military Operations and Forecast

YEAR	ATW MILITARY OPERATIONS [a]		
	ITINERANT	**LOCAL**	**TOTAL**
Historic [a]:			
1995	98	101	199
1996	48	42	90
1997	14	20	34
1998	30	70	100
1999	29	87	116
2000	49	110	159
2001	20	50	70
2002	46	33	79
2003	24	6	30
2004	51	34	85
2005	53	58	111
2006	110	8	118
2007	104	43	147
2008	132	185	317
2009	108	96	204
Average 1995 - 2009	61	63	124
Forecast [b]:			
2014	61	63	124
2019	61	63	124
2029	61	63	124

[a] Source: FAA ATADS

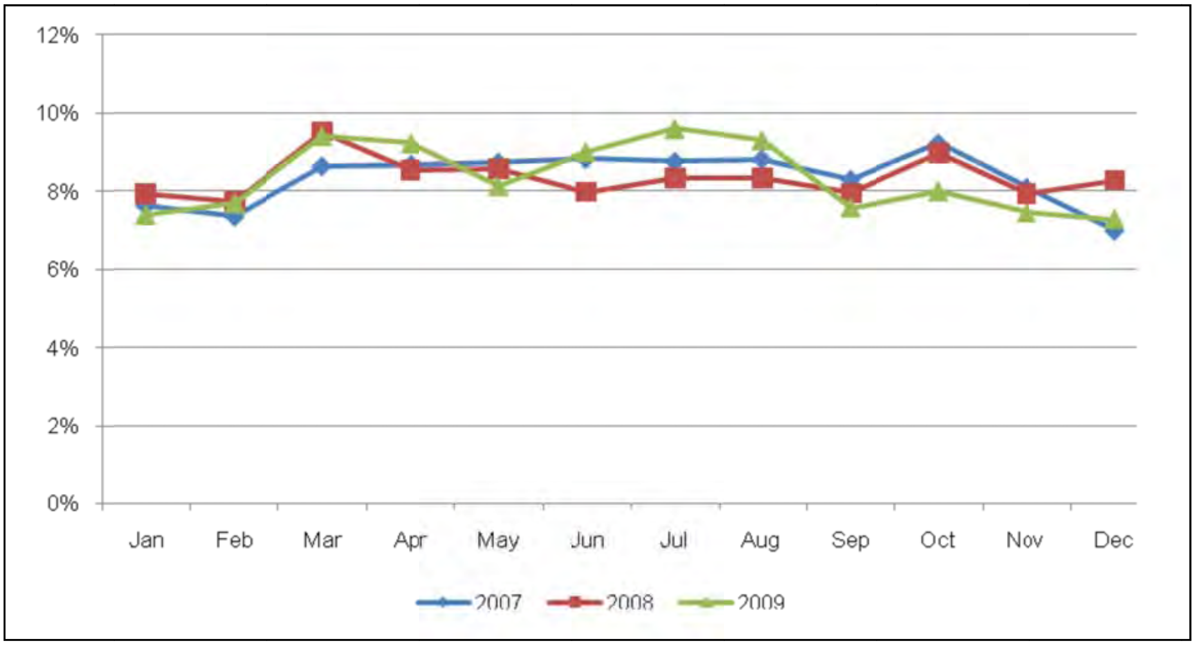
2.9. Peak Activity

Projected peak demand and utilization periods drive fundamental planning decisions for facility and equipment requirements. This section features annual, monthly, daily, and hourly peak figures for airport passenger activity (enplanements plus deplanements) and aircraft operations.

2.9.1. Peak Passenger Activity

The Airport records data for annual passenger enplanements and deplanements. Historically, March has been the busiest month in terms of activity. The percentage of passenger enplanements is shown by month from 2007 to 2009 in **Exhibit 2.8.** During this timeframe, the percentage of passenger activity in the peak month (March) relative to annual activity is approximately nine percent. To determine peak month enplanements, this figure is applied to projected annual passenger enplanements that are presented in the *Passenger Enplanement Projections* section.

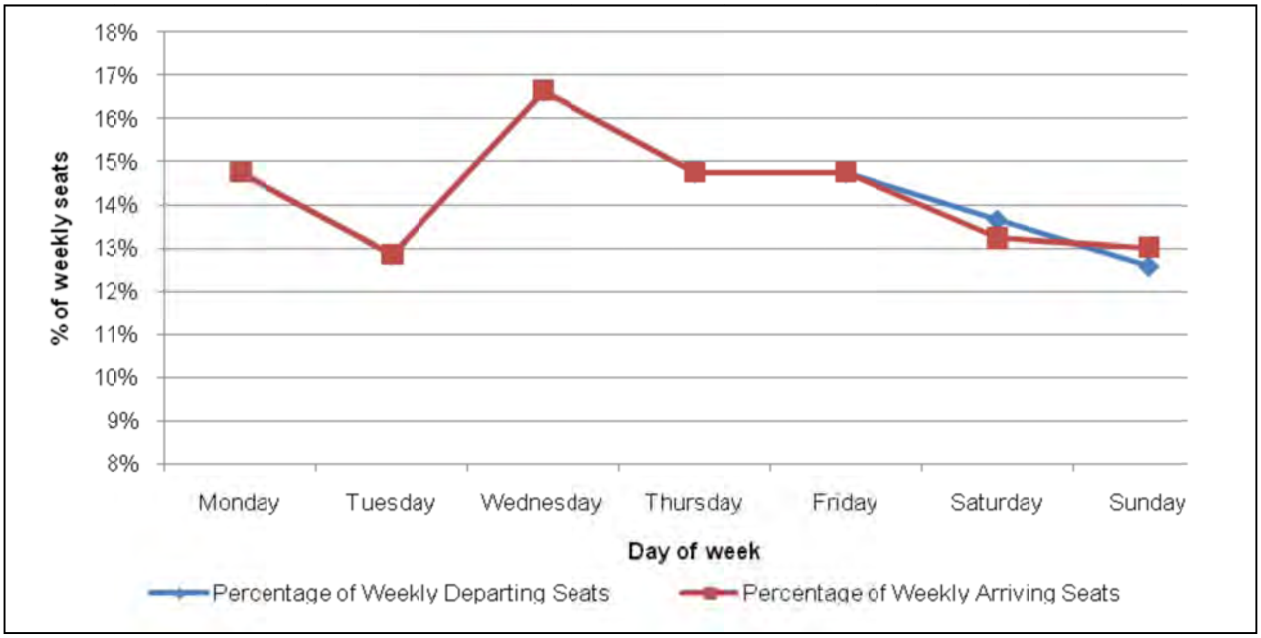
Exhibit 2.8: Passenger Enplanements by Month



Source: Airport records

In **Exhibit 2.9**, the percentages of weekly commercial airline/air carrier seats by day during the peak month are shown. These numbers are derived by using data available from apgDat which includes daily departure and arrival times as well as aircraft seat capacity. The red line shows the percentage of arriving seats for the week by day, and the blue line shows the percentage of weekly departing seats by day. The peak day of the peak month is typically a Wednesday when approximately 16 percent of all seats arrive and depart. The peak point of passenger demand is between 1:00pm and 2:00pm. Currently, this peak point is driven by Allegiant Air's operations at Outagamie County Regional Airport.

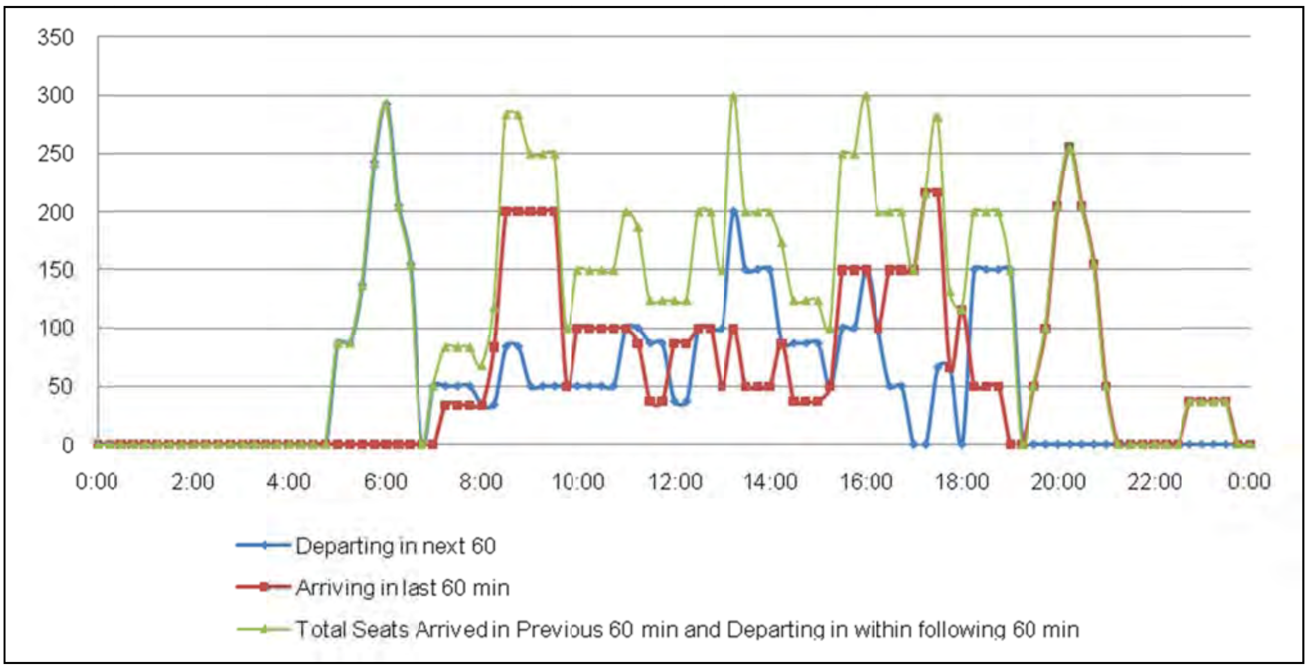
Exhibit 2.9: Arriving and Departing Seats by Day



Source: apgDat

Exhibit 2.10 is a representation of maximum passenger flow throughout the day based on the arriving and departing seats at the airport. The red line shows seats that will depart within the next one hour, the blue line shows seats that have arrived in the last hour, and the green line is an aggregate of both.

Exhibit 2.10: Peak Hour Passengers



Source: apgDat

Table 2.24 summarizes peaking information in conjunction with forecasted enplanements and deplanements. The percentages of peak month and peak hour relative to annual passenger activity are used to determine an approximate terminal passenger demand.

Table 2.24 Terminal Peak Enplanements and Passenger Activity

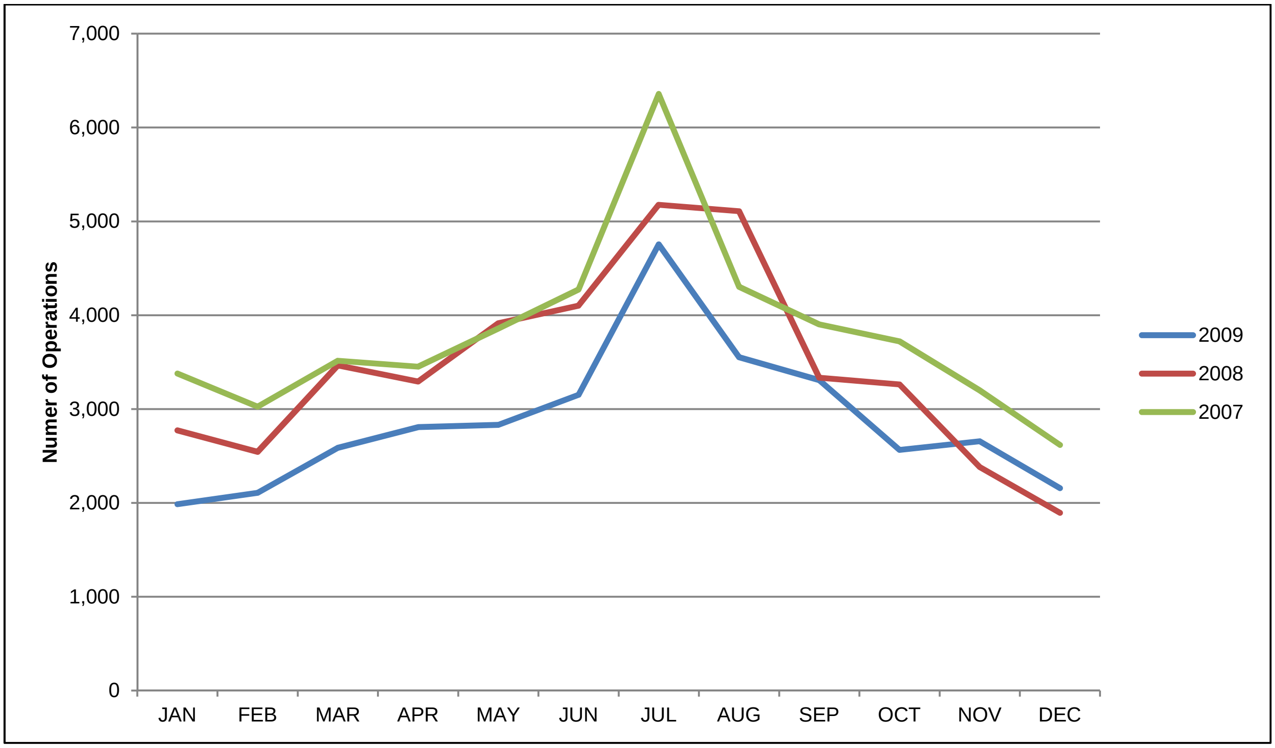
PEAK FACTOR	ENPLANEMENTS	DEPLANEMENTS	TOTAL
2009 BASE YEAR			
Annual	273,200	265,004	538,204
Peak Month	25,954	25,175	51,129
Peak Month Avg. Day	837	812	1,649
Peak Day	937	909	1,818
Peak Day Peak Hour	92	89	181
2014 BASE + 5 YRS			
Annual	293,671	284,861	578,532
Peak Month	27,899	27,062	54,961
Peak Month Avg. Day	900	873	1,773
Peak Day	1,008	977	1,954
Peak Day Peak Hour	99	96	195
2019 BASE + 10 YRS			
Annual	322,347	312,677	635,024
Peak Month	30,623	29,704	60,327
Peak Month Avg. Day	988	958	1,946
Peak Day	1,106	1,073	2,145
Peak Day Peak Hour	109	105	214
2029 BASE + 20 YRS			
Annual	386,926	375,318	762,244
Peak Month	36,758	35,655	72,413
Peak Month Avg. Day	1,186	1,150	2,336
Peak Day	1,328	1,288	2,575
Peak Day Peak Hour	130	127	257
Sources: Airport Administration Records, apgDat, FAA TAF, Mead & Hunt, Inc.			

Notes: Historically, peak month passenger deplanements are approximately three percent lower than peak month enplanements. This figure is applied to peak month enplanements to determine peak month deplanements; peak hour is determined to be 11 percent of daily enplanements; peak month is determined to be nine and one-half percent of annual enplanements; peak day is approximately 16 percent of weekly enplanements

2.9.2. Peak Airport Operations

Projected annual aircraft operations are presented in the *Commercial Air Carrier Operations and Fleet Mix Projections* section. The following section breaks down total operations to peak month, day, and hourly operations. **Exhibit 2.11** shows that July is the peak month for total operations at the Airport. July on average represents approximately 13 percent of annual operations averaging approximately 5,000 total operations in the month over the past three years.

Exhibit 2.11: Operations by Month



Source: Airport Administration Records

Table 2.25 is a summary of the operational peaks that occur in July in tandem with the operations forecasts. On average, the peak day for total operations is a Friday when approximately 22 percent of all operations occur. These percentages are used with the operations forecast to determine peak day and peak month operation demand. The peak hour experiences approximately 10 percent of daily operations. This percentage is based upon professional judgment, general industry planning standards, and FAA ATADS data.

Table 2.25 Peak Aircraft Operations

PEAK FACTOR	Air Carrier/Air Taxi (JULY)	GA (JULY)	MILITARY (JULY)	TOTAL (JULY)
2009 BASE YEAR				
Annual	16,434	17,986	204	34,624
Peak Month	2,136	2,338	27	4,501
Peak Month Avg. Day	69	75	1	145
Peak Day	106	116	1	224
Peak Day Peak Hour	7	8	1	15
2014 BASE + 5 YRS				
Annual	16,250	18,262	124	34,636
Peak Month	2,112	2,374	16	4,503
Peak Month Avg. Day	68	77	1	145
Peak Day	105	118	1	224
Peak Day Peak Hour	7	8	1	15
2019 BASE + 10 YRS				
Annual	17,172	19,471	124	36,767
Peak Month	2,232	2,531	16	4,780
Peak Month Avg. Day	72	82	1	154
Peak Day	111	126	1	237
Peak Day Peak Hour	7	8	1	15
2029 BASE + 20 YRS				
Annual	19,866	22,210	124	42,200
Peak Month	2,583	2,887	16	5,486
Peak Month Avg. Day	83	93	1	177
Peak Day	128	143	1	272
Peak Day Peak Hour	8	9	1	18

Sources: Airport Administration Records, apgDat, FAA TAF, Mead & Hunt, Inc.

2.10. Conclusions and Recommendations

A comparison of projections of aviation-related activity described in this chapter is depicted in **Table 2.26** and **Table 2.27**. Forecasts that are developed for airport master plans and/or federal grants must be accepted by the FAA. It is the FAA's policy, listed in AC 150/5070-6B, *Airport Master Plans*, that FAA approval of forecasts at non-hub airports with commercial service should be consistent with the TAF. Master plan forecasts for operations, based aircraft, and enplanements are considered consistent with the TAF if they meet the following criteria:

- Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10-year or 20-year period, or
- Forecasts do not affect the timing or scale of an airport project, or
- Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, Field Formulation of the National Plan of Integrated Airport Systems.

The recommended forecasts shown in Table 2.27 meet the criteria outlined by the FAA. Enplanements forecast and the TAF are nearly equal for the planning period. Operations, however, differ from the TAF. The forecast projects that general aviation operations will decrease slowly while the TAF projects a slow increase. The forecast calls for commercial operations to increase at a faster rate than the TAF. Overall operations projected by the forecast differ from the TAF by less than the amount required for approval.

Table 2.26 Comparison of Airport Forecasts to TAF Forecasts – FAA Template

	BASE YEAR				AVERAGE CAGR		
STATISTIC	**2009**	**2014**	**2019**	**2029**	**2014**	**2019**	**2029**
Passenger Enplanements							
Air Carrier & Commuter	273,200	293,671	322,347	386,926	1.5%	1.7%	1.8%
Total Enplanements	273,200	293,671	322,347	386,926	1.5%	1.7%	1.8%
Commercial Operations							
Itinerant							
Total Commercial Operations	16,434	16,250	17,172	19,866	(0.2%)	0.4%	1.0%
Air Carrier [a]	2,489	2,509	2,704	3,254	0.2%	0.8%	1.3%
Air Taxi [a]	13,945	13,741	14,468	16,612	(0.3%)	0.4%	0.9%
General Aviation	12,812	12,967	13,839	15,791	0.2%	0.8%	1.1%
Charter	14	18	18	18	5.2%	2.5%	1.3%
Military	108	61	61	61	(10.8%)	(5.6%)	(2.8%)
Local							
General Aviation	5,174	5,295	5,633	6,419	0.5%	0.9%	1.1%
Military	96	63	63	63	(8.1%)	(4.1%)	(2.1%)
Total Operations	34,624	34,636	36,768	42,200	0.0%	0.6%	1.0%
Based Aircraft							
Single Engine Piston	53	52	52	55	(0.3%)	(0.2%)	0.2%
Multi Engine Piston	13	12	12	11	(0.8%)	(0.8%)	(0.8%)
Turbine	4	4	4	7	0.0%	0.0%	3.1%
Other	0	1	3	4	100.0%	100.0%	100.0%
Total Based Aircraft	70	69	71	77	(0.2%)	0.1%	0.5%
Other							
Average Aircraft Size (seats)	53	53	53	53			
Average Enplaning Load Factor	72.7%	73.4%	73.7%	74.0%			
GA Operations per Based Aircraft	257	263	276	289			

[a] Percent operations that are air carrier or air taxi comes from TAF

Table 2.27 Comparison of Airport Forecasts to TAF Forecasts – FAA Template

YEAR		AIRPORT FORECAST	FAA TAF	AF/TAF (% DIFFERENCE)
Passenger Enplanements				
Base Year	2009	273,200	266,464	2.5%
Base Year + 5 years	2014	293,671	293,123	0.2%
Base Year + 10 years	2019	322,347	322,488	0.0%
Base Year + 20 years	2029	386,926	390,499	-0.9%
Commercial Operations				
Base Year	2009	16,434	16,434	0.0%
Base Year + 5 years	2014	16,250	17,325	-6.2%
Base Year + 10 years	2019	17,172	18,266	-6.0%
Base Year + 20 years	2029	19,866	20,311	-2.2%
Total Operations				
Base Year	2009	34,638	34,624	0.0%
Base Year + 5 years	2014	34,636	37,670	-8.1%
Base Year + 10 years	2019	36,768	40,225	-8.6%
Base Year + 20 years	2029	42,200	45,906	-8.1%

Outagamie County
Regional Airport

SUSTAINABLE MASTER PLAN

BUILDING SUSTAINABILITY

Mead & Hunt

OMNNI Associates

Sustainable Engineering Group