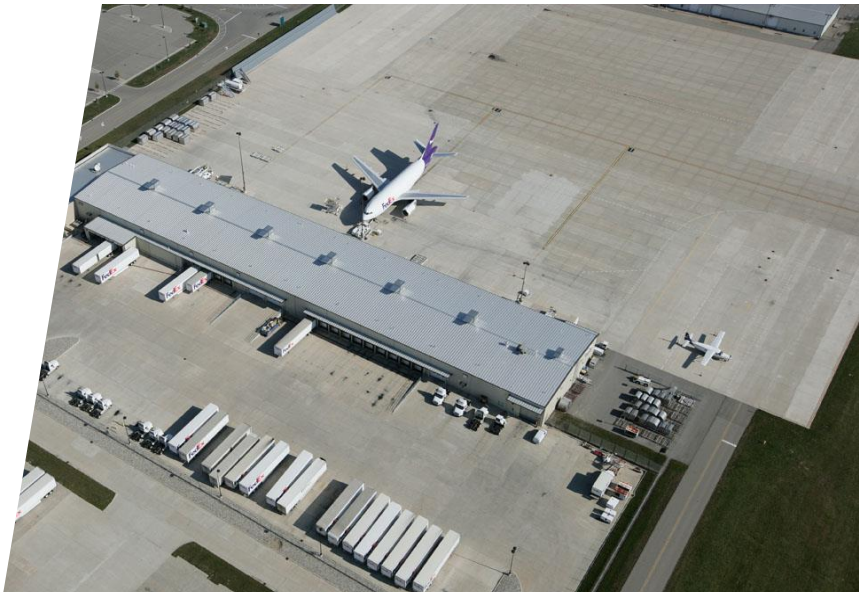
# BISHOP INTERNATIONAL AIRPORT

# MASTER PLAN UPDATE

JANUARY 2019



RS&H

# *PREPARATION*

"The preparation of this document was financed in part through a planning grant from the Federal Aviation Administration (FAA) as provided under Section 505 of the Airport and Airways Improvement Act of 1982, as amended by the Airway Safety and Capacity Expansion Act of 1987. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein, nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws."

# PREFACE

The Bishop International Airport (Airport) Master Plan Update (Update) provides the Bishop International Airport Authority (BIAA) with a strategy to develop the Airport. The intent of the Master Plan Update is to provide guidance that will enable the Authority to strategically position the Airport for the future by maximizing operational efficiency and business effectiveness, as well as maximizing property availability for aeronautical and non-aeronautical development through efficient planning. While long-term development is considered in master planning efforts, the typical planning horizon for the Master Plan Update is 20 years.

The Federal Aviation Administration provides guidance for Master Plan development in FAA Advisory Circular 150 / 5070-6B, Airport Master Plans. Although not required, the Advisory Circular strongly recommends airports prepare a Master Plan. Funding for the Master Plan Update is provided primarily by the Federal Aviation Administration through an Airport Improvement Program grant.

A comprehensive Master Plan Update was last prepared in 2006. This Master Plan Update was initiated in December, 2015 and is anticipated to conclude in 2018. The BIAA entered into a contract with the firm RS&H to lead this effort. In accordance with FAA requirements, the Master Plan Update includes a public and stakeholder involvement program.

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# Acronyms and Abbreviations

| | |
|---|---|
| AAC | Aircraft Approach Category |
| AAD | Annual Average Day |
| AADT | Annual Average Daily Traffic |
| AAGR | Average Annual Growth Rate |
| AC | Advisory Circular |
| ACHP | Advisory Council on Historic Preservation |
| ADA | Americans with Disabilities Act of 1990 |
| ADAPT | Annual Delay and Activity Performance Times |
| ADG | Airplane Design Group |
| ADO | Airports District Office-Detroit |
| AFS-400 | FAA Flight Technologies & Procedures Division |
| AFTIL | Airway Facilities Tower Integration Laboratory |
| AGL | Above Ground Level |
| AIP | Airport Improvement Program |
| ALP | Airport Layout Plan |
| AOA | Air Operations Area |
| ARC | Airport Reference Code |
| ARFF | Aircraft Rescue and Fire Fighting |
| ARPZ | Approach Runway Protection Zone |
| ARTCC | Air Route Traffic Control Center |
| ASL | Above Sea Level |
| ASOS | Airport Surface Observing System |
| ASR | Airport Surveillance Radar |
| ASV | Annual Service Volume |
| ATC | Air Traffic Control |
| ATCT | Airport Traffic Control Tower |
| ATO | Airline Ticket Office |
| BIAA | Bishop Airport Authority Board |
| BRL | Building Restriction Line |
| CAP | Civil Air Patrol |
| CAT | Category I, II, or III Instrument Landing System Approach types |
| CATEX | Categorical Exclusion |
| CBP | Customs and Border Protection |
| CBS | Checked Bag Screening |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CFC | Customer Facility Charge |
| CIP | Capital Improvement Plan |
| CONRAC | Consolidated Rental Car Facility |
| CWA | Clean Water Act |

| | |
|---|---|
| DET ADO | FAA Detroit Airports District Office |
| DH | Decision Height |
| DHS | Department of Homeland Security |
| DME | Distance Measuring Equipment |
| DTW | Detroit Metropolitan International Airport |
| EA | Environmental Assessment |
| EAS | Essential Air Service |
| EDM | Electronic Distance Measurement |
| EIS | Environmental Impact Statement |
| EOC | Emergency Operations Center |
| EPA | Environmental Protection Agency |
| ETD | Explosive Trace Detection |
| FAA | Federal Aviation Administration |
| FAR | Federal Aviation Regulation |
| FBO | Fixed Base Operator |
| FEMA | Federal Emergency Management Agency |
| FIS | Federal Inspection Station |
| FMRA | FAA Modernization and Reform Act of 2012 |
| FNT | Bishop International Airport |
| FONSI | Finding of No Significant Impact |
| FSDO | FAA Flight Standards District Office |
| GA | General Aviation |
| GLD | Glide Slope Indicator |
| GLS | Global Positioning System Landing Systems |
| GPS | Global Positioning System |
| GPU | Ground Power Unit |
| GRE | Ground Run-Up Enclosure |
| HAT | Height Above Terrain |
| HIRL | High Intensity Runway Lighting |
| HVAC | Heating Ventilation and Air Conditioning |
| IAF | Instrument Approach Fix |
| IAP | Instrument Approach Procedure |
| ICAO | International Civil Aviation Organization |
| IFR | Instrument Flight Rules |
| ILS | Instrument Landing System |
| IMC | Instrument Meteorological Conditions |
| INM | Integrated Noise Model |
| LDA | Landing Distance Available |
| LOC | Localizer |
| MALSR | Medium Approach Light System with Runway Alignment Indicator |
| MASP | Michigan Airport System Plan |
| MDEQ | Michigan Department of Environmental Quality |
| MDNR | Michigan Department of Natural Resources |

| | |
|---|---|
| MDOT | Michigan Department of Transportation |
| MIB | Michigan Block Grant State Program |
| MIRL | Medium Intensity Runway Lighting |
| MRO | Maintenance, Repair, and Overhaul |
| MSA | Metropolitan Statistical Area |
| MSL | Mean Sea Level |
| MTOW | Maximum Takeoff Weight |
| NAS | National Airspace System |
| NAVAID | Navigational Aid |
| NDB | Non-Directional Beacon |
| NEPA | National Environmental Policy Act |
| NEXRAD | Next Generation RADAR |
| NextGen | Next Generation Airspace Technologies and Procedures |
| NM | Nautical Mile |
| NOAA | National Oceanic and Atmospheric Administration |
| NPIAS | National Plan of Integrated Airport Systems |
| OFA | Object Free Area |
| OFZ | Obstacle Free Zone |
| PAL | Planning Activity Level |
| PAPI | Precision Approach Path Indicators |
| PCC | Portland Cement Concrete |
| PCN | Pavement Classification Number |
| PFC | Passenger Facility Charge |
| PIR | Precision Instrument Runway |
| POFZ | Precision Obstacle Free Zone |
| QTA | Quick-Turnaround Facility |
| RAD | Remain All Day |
| RDC | Runway Design Code |
| REIL | Runway End Identifier Lights |
| RNAV | Area Navigation |
| ROFA | Runway Object Free Area |
| ROFZ | Runway Object Free Zone |
| RON | Remain Overnight |
| RPZ | Runway Protection Zone |
| RSA | Runway Safety Area |
| RTR | Remote Transmitter Receiver |
| RVR | Runway Visual Range |
| SACS | Secondary Airport Control Station |
| SHPO | State Historic Preservation Office(r) |
| SIDA | Security Identification Display Area |
| SSCP | Security Screening Checkpoint |
| SWMP | Stormwater Management Program |
| SWPPP | Stormwater Pollution Prevention Plan |

| | |
|---|---|
| TACAN | Tactical Air Navigation |
| TAF | FAA Terminal Area Forecast |
| TDG | Taxiway Design Group |
| TDZ | Touchdown Zone |
| TDZE | Touchdown Zone Elevation |
| TERPS | Terminal Instrument Procedures |
| TFMS | Traffic Flow Management System |
| TFMSC | Traffic Flow Management System Counts |
| TLN | Taxilane |
| TODA | Takeoff Distance Available |
| TOFA | Taxiway Object Free Area |
| TORA | Takeoff Run Available |
| TRACON | Terminal Radar Approach Control |
| TSA | Transportation Security Administration |
| TWY | Taxiway |
| UHF | Ultra-High Frequency |
| VASI | Visual Approach Slope Indicator |
| VFR | Visual Flight Rules |
| VHF | Very-High Frequency |
| VMC | Visual Meteorological Conditions |
| VOR | Very-High Frequency Omnidirectional Range |
| WAAS | Wide Area Augmentation Systems |
| WHA | Wildlife Hazard Assessment |
| WHMP | Wildlife Hazard Management Plan |

CHAPTER 1

# INVENTORY OF EXISTING CONDITIONS

## 1.1 INTRODUCTION

The inventory of existing conditions chapter of the Bishop International Airport (the Airport or FNT) Master Plan Update describes the infrastructure and facilities in place at the Airport. The chapter is an essential component in the overall Master Plan process as outlined by the Federal Aviation Administration (FAA) Advisory Circular AC 150/5070-6B, *Airport Master Plan,* Change 2. The data presented in this chapter was compiled through on-site research, tenant interviews and surveys, previous studies, Airport records, and design documents. The data provides detailed information about the Airport's infrastructure and is organized and presented by airside facilities, terminal and landside facilities, airport access infrastructure, general aviation facilities, support facilities such as Aircraft Rescue and Firefighting (ARFF), and environmental conditions. The information supplied in this section of the Master Plan serves as an update to the previous Master Plan effort conducted for FNT, and highlights the major changes and developments that occurred in the Airport community in the last 10 years.

## 1.2 AIRPORT BACKGROUND

This section of the inventory of exiting conditions provides a history of the Airport. The geographical and meteorological conditions of the airport as well as a description of the surrounding areas are also represented. The Airport ownership and organizational structure, the historical activity data for the past ten years are provided throughout this section of the chapter.

### 1.2.1 History

Arthur Giles Bishop, President of Genesee County Savings Bank and General Motors Vice President and board member, set the stage for the creation of Bishop International Airport when he donated 220 acres of his farmland to the City of Flint in October 1928. With this philanthropic donation, made primarily for aeronautical purposes, the Bishop Airport was established at the intersection of Bristol and Torrey Roads. Sidney S. Stewart, an aviation enthusiast, created the operational and managerial plans for the development of the Airport, which opened officially on October 1, 1934.

One concrete and four turf runways powered with airfield lighting facilities, telephone and electrical lines, and an 8,000-square-foot hangar constructed with the help of approximately 1,200 people shaped the Airport. Over time, the Airport continued to improve and develop its infrastructure. Three years following the opening, on January 15, 1937, the first commercial air service flight took place, operated by Pennsylvania-Central Airlines.

In 1941, to accommodate additional growth, Giles Bishop donated an additional 40 acres to the Airport for expansion. The first Air Traffic Control Tower was then established after the Civil Aeronautics Board allocated more funds for airport development, and designated the Airport as a Class Three facility.

Twelve years later, a new terminal building and air traffic control tower were constructed and formally dedicated. The added space allowed for the accommodation of Capital Airlines, later merged with United Airlines, which operated the first non-stop flight from Flint to New York. Upgrades to the navigational aids at the airport occurred in early 1960 with the installation of the Flint very high omnidirectional range tactical air navigation (VORTAC) facility.

In 1970, a second expansion of the terminal building occurred to add 19,200 square feet for two more boarding gates and an automated baggage handling system. A five-member commission was also created that year in order to shift the administrative control and the oversight of operations from the City

Department of Public Works to the Airport Commission Board. The original air traffic control tower was replaced in January 1975 by a seven-story building, which included the addition of radar service.

In order to increase air service development and employment opportunities to Flint and the surrounding communities, the citizens of Genesee County created an Airport Authority Board in 1987. Furthermore, the 1984 Master Plan document was updated in 1990 to assess existing conditions at the airport and address facility requirements. The 1990 Master Plan included recommended improvements such as a new commercial passenger terminal, additional general aviation hangars, land acquisition, automobile parking expansion, and cargo and commercial service aircraft ramp expansion.

The terminal building called for in the 1990 Master Plan was constructed in 1993 and expanded in 1999, 2004, 2006, and 2012. The facility now includes a total of 263,000 square feet of passenger hold room space and 5,000 square feet of individual concession and airline operations space.

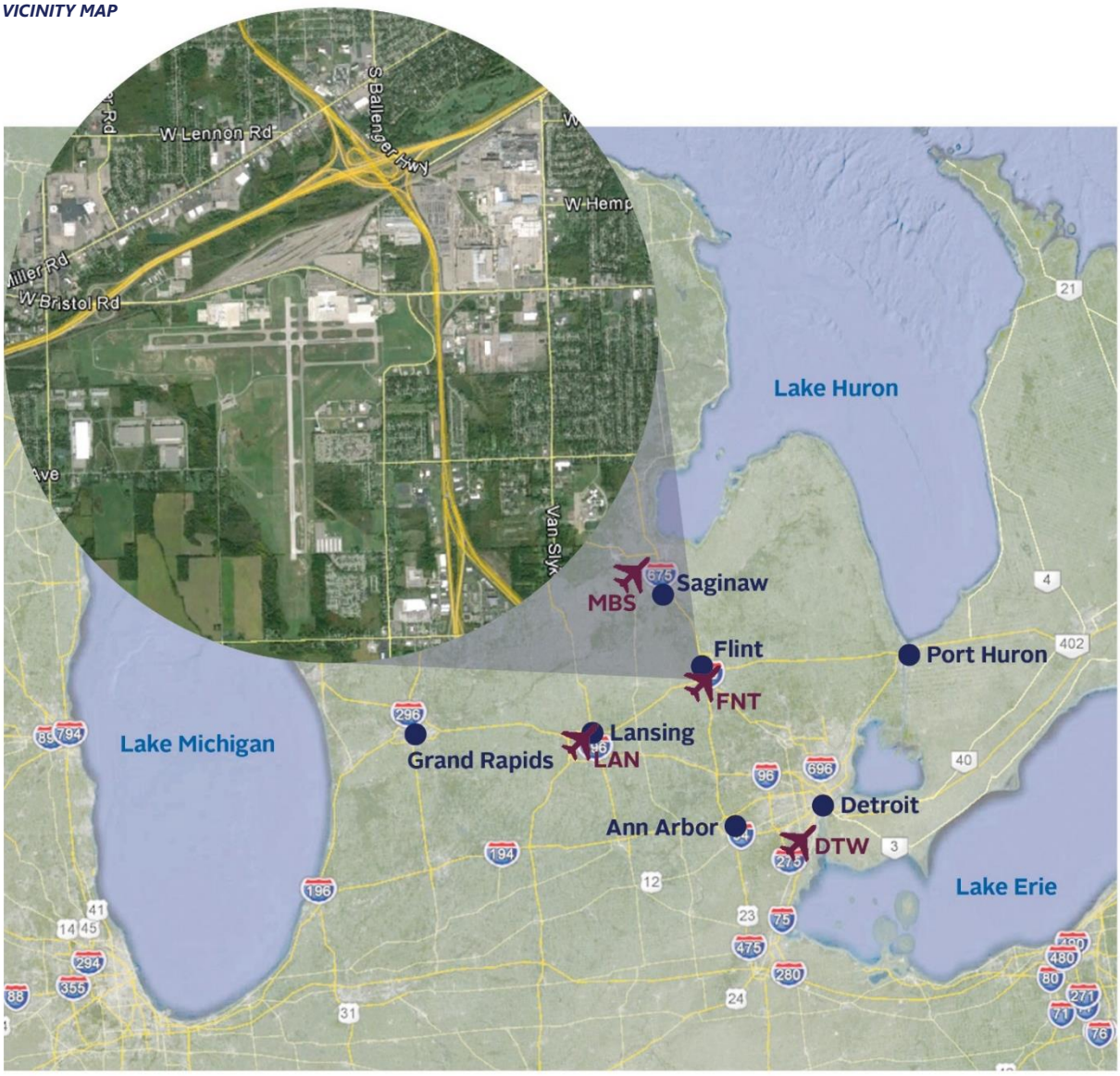
In 2006, an update to the previous Master Plan document was completed. The updated document included facility requirements and recommendations addressing various pavement rehabilitation projects, cargo area expansion, commercial passenger terminal expansions, and removal of Runway 5-23. The maintenance facility was expanded to include 10,000 square feet to the existing maintenance facility for the storage of snow removal equipment. From 2004 until 2011, major parking lot expansions occurred to the economy parking lot as well as the short term and long term parking lots. Runway 5-23 which ran diagonal to and intersected with Runway 18-36 was removed in 2009 followed by the construction of Taxiway B. Several cargo apron expansions projects as well as pavement rehabilitation projects also occurred since the last published update to the Master Plan.

### 1.2.2 Location and Geography

Located in Flint, Michigan, in central Genesee County, FNT serves as the commercial airport for the area. Other nearby commercial service airports include MBS International Airport (located approximately 53 miles north) and Capital Region International Airport (45 miles southwest). Detroit Metropolitan Wayne County Airport, currently one of the country's largest primary commercial airport and the state of Michigan's busiest airport, is approximately 73 miles southeast of FNT.

The City of Flint is centrally located in the State of Michigan. Nearby cities include Saginaw (located approximately 38 miles north), Lansing (the State Capital, 57 miles southwest), Ann Arbor (55 miles south), Detroit (67 miles southeast), and Port Huron (70 miles east). Three Great Lakes – Erie, Huron and Michigan – surround the region. *Exhibit 1-1* illustrates the vicinity and the surrounding map of FNT.

***EXHIBIT 1-1***
***VICINITY MAP***




Source: RS&H, Inc. 2016

## 1.2.3 Ownership and Organization

FNT is a public use airport owned and operated by the Bishop Airport Authority Board (BIAA), which is composed of nine members from both the City of Flint and the County of Genesee. The members of the board are appointed every three years, with no more than three terms ending in any one year. The general management of the airport, as well as the day-to-day operations, maintenance, administration, and finance duties are under the responsibility of the Airport Director and the 50 additional staff members working in various departments.

## 1.2.4 Role, Layout and Classification

All airports in the country significant to the national air transportation and eligible for federal grants under the Airport Improvement Program (AIP) are included in the FAA's National Plan of Integrated Airport

Systems (NPIAS). The airports listed in the NPIAS are categorized into primary commercial airports, non-primary commercial airports, and non-primary airports based on the total annual enplanements and the percent of total U.S enplanements. The primary commercial airports are further classified in large, medium, small, or non-hub airports, while the non-primary airports are categorized into general aviation or reliever airports. In 2015, FNT enplaned over 411,000 passengers, which accounted for more than 0.05 percent but less than 0.25 percent of the total U.S passenger enplanements in the country. This classifies the Airport as a primary commercial, small hub airport in the most recent NPIAS Report published in October 2014.

The Part 139 Airport Certification Status List updated by the FAA in January 2016 verifies that FNT owns a Class I Airport Operating Certificate (AOC). All Airports with scheduled or unscheduled air carrier services of 31 or seats aircraft are required to obtain an AOC, which is issued by the FAA. Class I is currently the highest classification in the list.

For ARFF purposes, the Airport is also classified by the FAA as an Index B facility. This classification is based on the length of the largest air carrier commercial aircraft that uses the facility regularly, and the average daily departures of air carrier aircraft. The index classification helps define the type and size of firefighting vehicles to be used at the Airport, as well as the minimum amount of extinguishing agent and water that can be contained in the vehicles. The *Support Facilities Section* provides more details on the ARFF facility at FNT. *Table 1-1* displays the different classifications of the Airport.

The Transportation Security Administration (TSA) classifies airports into one of five different categories (X, I, II, III, and IV) based on a variety of factors including but not limited to the number of annual operations and the extent of passenger screening at airports. Typically, TSA category IV airports have the smallest number of passenger boarding, whereas TSA category X airports have the largest number of passenger boarding. FNT processed approximately 411,459 passengers in 2015. This passenger enplanement level groups the Airport as a Category II under the current TSA classification. Table 1-1 displays the different classifications of the Airport.

***TABLE 1-1***
***AIRPORT CLASSIFICATIONS***

| ***BISHOP INTERNATIONAL AIRPORT*** | |
|---|---|
| IATA / FAA Airport Identifier Code | FNT / KFNT |
| NPIAS Classification | Primary Commercial – Small Hub |
| Part 139 | Class I |
| ARFF Index | Index B |
| TSA Security Classification | Category II |

Source: RS&H, Inc. 2016

## Adjacent Airports

A number of both general aviation and commercial service airports are located in the vicinity of FNT. Dalton Airport, a publicly owned general aviation airport, is 10 miles north of FNT. MBS International Airport in Freeland, Capital Region International Airport (LAN) in Lansing, and Detroit Wayne County Airport (DTW) are the three closest airports to FNT with commercial activity and are situated within a 100-mile radius.

MBS serves the cities of Midland, Bay City, and Saginaw and offers domestic flights to Detroit, Chicago, and Minneapolis. With approximately 120,000 passenger enplanements per year, MBS is a non-hub airport

owned jointly by Bay County and the cities of Saginaw and Freeland. The passenger terminal includes four gates and was opened in 2012.

LAN serves Lansing, Watertown and Delta Townships, and processed approximately 323,510 passengers in 2015 according to the Michigan Department of Transportation. The airport currently offers domestic flights to Detroit, Minneapolis, Chicago, and Washington DC. International flights to Mexico and the Dominican Republic are made through a vacation package company. The passenger terminal has nine gates, with four at ground level and five that use passenger boarding bridges.

DTW, one of Delta Air Lines' major hubs, is the state of Michigan's busiest airport with numerous domestic and international flights. The airport handles approximately 16.5 million passengers per year on approximately 380,000 commercial flights. Thirteen US and foreign-based airlines offer commercial service at DTW, which is classified as a large hub airport by the FAA.

Examining the surrounding communities and the volume and types of services the surrounding airports offer is one vital part of assessing FNT's role in meeting the region's air service needs. This analysis helps demonstrate any market leakage or any form of competition surrounding the airport area while identifying those airports that can assist FNT in the event of emergency or airfield closure. *Table 1-2* lists the general aviation airports located within 50 miles of FNT *Table 1-3* lists the commercial aviation airports situated within 200 miles of FNT.

***TABLE 1-2***
***SURROUNDING AIRPORTS – GENERAL AVIATION***

| AIRPORT NAME | CITY | DISTANCE |
|---|---|---|
| Dalton Airport | Flushing | 10 Miles |
| Athelone Williams Memorial Airport | Davison | 13 Miles |
| Cagney Airport | Clio | 15 Miles |
| Price's Airport | Linden | 15 Miles |
| Duford Field Airport | Genesee | 16 Miles |
| Bean Blossom Airport | New Lothrop | 20 Miles |
| Owosso Community Airport | Owosso | 24 Miles |
| WM Zehnder Field | Frankenmuth | 28 Miles |
| Dupont-Lapeer Airport | Lapeer | 29 Miles |
| Maple Grove Airport | Fowlerville | 34 Miles |
| Livingston County Spencer J. Hardy Airport | Howell | 38 Miles |
| Howard-Nixon Memorial Airport | Chesaning | 40 Miles |

Source: Detroit Aeronautical Sectional Chart and FAA Airport Database

*TABLE 1-3*
*SURROUNDING MICHIGAN AIRPORTS – COMMERCIAL AVIATION*

| AIRPORT NAME | CITY | DISTANCE |
|---|---|---|
| Capital Region International Airport | Lansing | 53 Miles |
| MBS International Airport | Freeland | 54 Miles |
| Detroit Metropolitan Wayne County Airport | Detroit | 73 Miles |
| Gerald R. Ford Airport | Grand Rapids | 102 Miles |
| Kalamazoo / Battle Creek International Airport | Kalamazoo | 125 Miles |
| Muskegon County Airport | Muskegon | 146 Miles |
| Alpena County Regional Airport | Alpena | 179 Miles |
| Cherry Capital Airport | Traverse City | 187 Miles |

Source: Detroit Aeronautical Sectional Chart and FAA Airport Database

## 1.2.5 Airspace and Air Traffic Control

### Surrounding Airspace Structure

The national airspace system (NAS) is divided into controlled and uncontrolled airspace, regulated by the FAA, and described in the Federal Aviation Regulations (FAR) Part 71. The various classes of airspace allow for proper separation of aircraft for the safe and efficient use of the airspace. Controlled airspace is sectioned into Class A through Class E, with each class involving different dimensions and operating procedures by pilots. Access to the different airspace classes is governed by rules and regulations typically involving specific aircraft equipment type, and pilot ratings and certifications.

The different kinds of airspace, Class A through Class G, are shown in *Exhibit 1-2*. Class A airspace is for high altitude traffic, generally involving turbine-powered aircraft. Class B airspace surrounds and overlies major airports. Class C airspace surrounds and overlies medium sized airports that have a control tower and radar services. Class D airspace surrounds and overlies medium sized airports that have a control tower. Class E airspace is controlled airspace that does not fall into one of the other categories. Class G airspace is uncontrolled airspace where air traffic controllers have no authority, but where pilots must still operate by established rules.

*EXHIBIT 1-2*
*AIRSPACE CLASSIFICATIONS*


Source: FAA 2016

FNT lies in Class C airspace. Class C airspace is typically customized to fit the airport, its surroundings, the type of instrument approach procedures, and type of operations. The Class C airspace surrounding FNT contains two segments. The first is a cylinder with a radius of five nautical miles centered on the Airport that extends from the surface up to 4,800 feet mean sea level. The second cylinder extends to a 10 nautical mile radius from 2,100 feet to 4,800 feet msl.

To operate in Class C airspace, two-way radio communication between Air Traffic Control (ATC) and the pilot entering the airspace must be established and maintained. A Class B airspace surrounds the Detroit Metropolitan Wayne County Airport and starts approximately 36 miles south of FNT. The airspace environment at FNT is shown in *Exhibit 1-3.*

### Approach Procedures

Aircraft navigate to landing using procedures that are classified as visual, non-precision instrument, and precision instrument approaches. Visual approaches are conducted when the pilot has a clear view of the airport from a distance of at least three miles. Precision approaches involve procedures and ground-based navigational aids known as the Instrument Landing System (ILS), which provides both lateral and vertical guidance. Non-precision approaches are approaches that use either Global Positioning System (GPS) signals or ground-based navigational aids that do not provide vertical guidance.

FNT currently has instrument approach procedures for precision and non-precision approaches.

Table 1-4 below provides a listing of the instrument approach procedures available at the Airport.

| RUNWAY END | APPROACH | CATEGORY | VISIBILITY MINIMUM | DECISION HEIGHT |
|---|---|---|---|---|
| **9** | ILS | Cat I - Precision | ½ mile | 200 ft. |
| | RNAV (GPS) | Non-precision | ½ mile | 200 ft. |
| | VOR | Non-precision | ½ mile | 600 ft. |
| **27** | ILS | Cat I - Precision | ½ mile | 200 ft. |
| | RNAV (GPS) | Non-precision | ¾ mile | 400 ft. |
| | VOR | Non-precision | ½ miles | 800 ft. |
| **18** | RNAV (GPS) | Non-precision | 1¼ miles | 400 ft. |
| | VOR | Non-precision | 1 mile | 800 ft. |
| **36** | RNAV (GPS) | Non-precision | 1¼ miles | 400 ft. |
| | VOR | Non-precision | 1 mile | 800 ft. |


| RUNWAY END | APPROACH | CATEGORY | VISIBILITY MINIMUM | DECISION HEIGHT |
|---|---|---|---|---|
| **9** | ILS | Cat I - Precision | ½ mile | 200 ft. |
| | RNAV (GPS) | Non-precision | ½ mile | 200 ft. |
| | VOR | Non-precision | ½ mile | 600 ft. |
| **27** | ILS | Cat I - Precision | ½ mile | 200 ft. |
| | RNAV (GPS) | Non-precision | ¾ mile | 400 ft. |
| | VOR | Non-precision | ½ miles | 800 ft. |
| **18** | RNAV (GPS) | Non-precision | 1¼ miles | 400 ft. |

| | | | | |
|---|---|---|---|---|
| | VOR | Non-precision | 1 mile | 800 ft. |
| **36** | RNAV (GPS) | Non-precision | 1¼ miles | 400 ft. |
| | VOR | Non-precision | 1 mile | 800 ft. |

***TABLE 1-4***
***PUBLISHED INSTRUMENT APPROACHES***

Source: Detroit Aeronautical Sectional Chart and FAA Airport Database

## Air Traffic Control

Air traffic controllers play a crucial role in ensuring the safety and efficiency of aircraft movement, in the air or on the ground. The air traffic control tower for FNT is located south of the maintenance facilities, south of Runway 9-27 and west of Runway 18-36. The vehicle service road of the Airport, Maple Road and Jennings Road all provide access to and from the air traffic control tower.

The Bishop Air Traffic Control Tower is responsible for air traffic in the airspace around the airport and up to 4,800 feet. The Cleveland Air Route Traffic Control Center handles Instrument Flight Rules traffic in the surrounding area outside of the Bishop Class C airspace.

***EXHIBIT 1-3***
***AIRPORT SECTIONAL CHART***

### 1.2.6 Area Meteorological Conditions

Review of the area meteorological conditions contributes to the Master Plan because weather determines aircraft performance characteristics, which helps define future development and infrastructure requirements, such as recommended runway length, approach minimums, runway orientation, and other crucial infrastructure requirements. Meteorological conditions evaluated are the average annual precipitation, the average annual minimum and maximum temperature for the area, as well as any other noted unusual conditions particular to the region.

The state of Michigan is situated near the Canadian border and is surrounded by the Great Lakes. The state experiences cold to freezing temperatures, with warmer months in late spring and the summer and colder months from fall until early spring. From the years of 2000 until 2015, the Flint area had a total annual average rainfall of 32.72 inches, mostly observed between May and September, and an annual average snowfall, including sleet and hail, of 54 inches observed from December until February. Maximum temperatures for the area average 82.8°F, typically experienced in the month of July. Minimum temperatures average 12.7°F, and are usually experienced in January and February. In 2014, the hottest month was August with an average temperature of 81.7°F, and the coolest month was February with an average temperature of 6.3°F. *Table 1-5* displays the area meteorological statistics documented over the last 15 years.

***TABLE 1-5***
***ANNUAL TEMPERATURE AND PRECIPITATION (2000 – 2015)***

| | |
|---|---|
| Annual Average Temperature | 48.1°F |
| Annual Average Rainfall | 32.7 Inches |
| Annual Average Snowfall | 53.9 Inches |
| Average Maximum Temperature | 82.8°F |
| Average Minimum Temperature | 6.3°F |
| Typical Coldest Months | January, February |
| Typical Hottest Month | July |

Source: NOAA-National Climatic Data Center, 2016
Note: 2015 data only available until June at the time of data retrieval.

### 1.2.7 Activity Statistics

A summary of the aviation activity at FNT is presented in this section, including total enplanements and deplanements, number of aircraft operations, number of based aircraft, and transient aircraft activity. A detail overview and analysis of the historical activity recorded at the Airport in the past 10 years will be presented in Working Paper 2, Aviation Demand Forecasts.

FNT offers flights to and from Atlanta and Minneapolis via Delta Airlines and the Delta Connection carrier; flights to and from Chicago Midway Airport by Southwest Airlines; and flights to and from Chicago O'Hare via American Airlines. United Airlines offers direct flights to Chicago O'Hare International Airport, and began service to Newark Liberty Airport in July 2016. Allegiant Air began services to the Florida markets of Orlando/Sanford and St. Petersburg/Clearwater in April 2016.

In 2015, the Airport reported a total of 411,459 passenger enplanements, down from 419,758 the previous year. Delta Airlines and Delta Connection accounted for 39 percent of the total passenger enplanement in calendar year 2015, while Southwest accounted for 42 percent.

Approximately 33,503 aircraft operations were recorded in 2015, versus 35,793 aircraft operations the year prior. Air cargo and freight operations had a total of 11,642,151 lbs in 2015 and 10,803,020 lbs in 2014, a 7.77 percent change. *Table 1-6* lists the recent airport activity.

***TABLE 1-6***
***RECENT AIRPORT ACTIVITY***

| | *2014* | *2015* |
|---|---|---|
| Passenger Enplanements | 419,758 | 411,459 |
| Itinerant Aircraft Operations | 28,283 | 27,046 |
| Local Aircraft Operations | 7,510 | 6,457 |
| Air Cargo and Freight (lbs) | 10,803,020 | 11,642,151 |

Source: Bishop International Airport, 2016

### 1.2.8 Recent Infrastructure Projects

Following is a summary of the infrastructure projects the Airport has completed within the last 10 years. These projects range from landside renovations such as parking lot and terminal expansions, to airfield improvements such as pavement rehabilitations.

#### Airside Enhancements

- **Cargo Apron Expansion** – Completed in 2008, this project added approximately 30,000 square yards of cargo apron, a new entrance roadway, and an employee parking lot.
- **Intermodal Sort Facility** – Completed in 2009, this project added a total of 62,000 square feet, which included truck docks, sorting facilities, and office space leased to FedEx.
- **Removal of Runway 5-23 and Construction of Taxiway B** – Completed in 2009, this project eliminated unsafe geometry at the intersection of the Runway 23 and 27 thresholds, and connected Taxiway A to the end of Runway 27.
- **New Deicing Apron** – Completed in 2011, this project included the construction of a concrete deicing apron capable of handling a total of four aircraft, and a runoff collection system to capture and redirect deicing fluids.
- **Terminal Apron Rehabilitation** – Completed in 2013, the rehabilitation project included a selected concrete panel replacement, spall repair, and resealing of concrete joints.
- **Taxiway A and T-Hangar Pavements Rehabilitation** Completed in 2014, this rehabilitation project included pavement repairs and overlay of Taxiway A and the T-Hangar area pavements, as well as the taxiway edge lights.
- **Runway 18-36 Rehabilitation Project** – Completed in 2015, this project included the mill and overlay of the Runway 18-36 pavement as well as runway guard lights, grooving, and edge lighting upgrades.

### Landside Enhancements

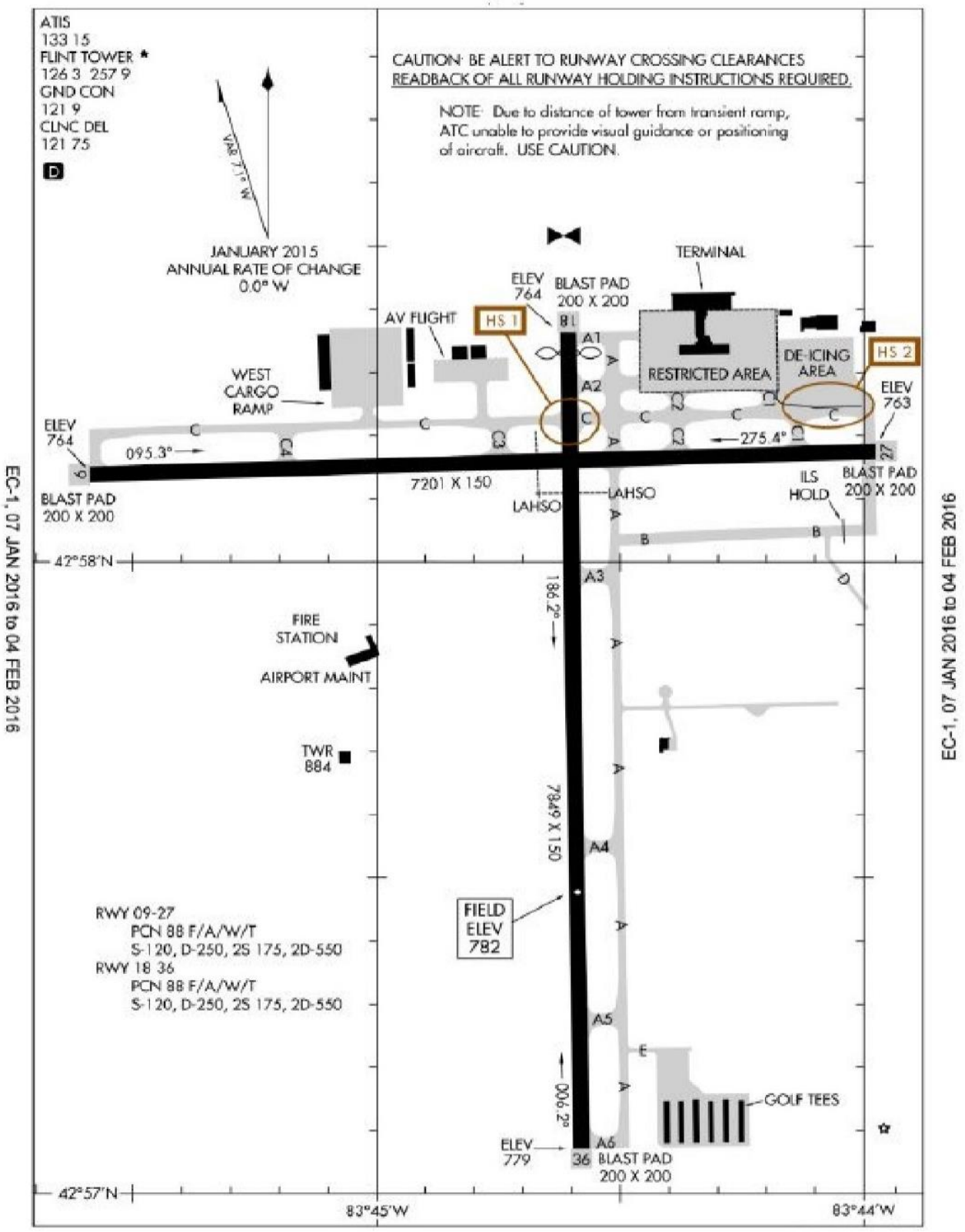
- **Parking Lot Expansions** – The Airport completed several parking lot expansion and rehabilitation projects between 2004 and 2011, including two expansions to the Economy Lot, a reconfiguration of the rental car ready lot, and rehabilitation of the short term and long term parking lots.
- **Maintenance Facility Expansion** – Completed in 2005, the project involved a 10,000-square-foot expansion to the existing maintenance facility to better house snow removal equipment.
- **Baggage Claim Expansion** – Completed in 2006, the project added over 20,000 square feet to the bag claim area.
- **Construction of a Sand Storage Building** – The Airport constructed a new, four-bay, sand storage building in 2009.
- **Terminal Expansion** – The Airport completed this project in two phases, with Phase 1 completed in 2010 and Phase 2 in 2012. New retail space, bar, grill, carpeting, the addition of four hold rooms, the widening of the airside to landside connector corridor, the addition of a third TSA Checkpoint lane increased the square footage of the terminal to 244,700-square-foot.

## 1.3 AIRSIDE FACILITIES

This section reports on the current state of the airfield infrastructure at the Airport. The airfield consists of the portion of the Airport where aircraft activities occur. It includes both the movement areas such as the taxiways and the runways, and the non-movement areas, which include but are not limited to the apron and the taxilanes. *Exhibit 1-4* shows the Airport Diagram for FNT illustrating the layout of the airport.

In the sub-sections below, runway and taxiway characteristics at the Airport are described, supplemented by information regarding the instrument approaches, the Airport's navigational aids (NAVAIDs) as well as specifics regarding the apron configuration, hangar space, pavement conditions, and support facilities.

***EXHIBIT 1-4***
***AIRPORT DIAGRAM***




Source: FAA, 2016

### 1.3.1 Runways

The Airport currently has a two-intersecting runway system oriented north-south and east-west. The orientation of the runways is largely depending upon the prevailing winds of the area, whereas the number of runways is highly correlated with the aircraft volume and operations anticipated at the Airport.

The north-south runway has an approximate magnetic heading of 186 degrees and 006 degrees, designated 18-36. It is an asphalt paved surface in good condition, 7,849 feet long[1] by 150 feet wide, with a threshold displaced 200 feet at the north end. The Runway Design Code (RDC), which establishes the design standards to which the runway is to be built as defined by FAA AC 150/5300-13A, is based on the approach visibility minimum, the Aircraft Approach Category (AAC), and the Airplane Design Group (ADG) of the critical design aircraft for the Airport. Currently, the critical design aircraft for FNT is the Airbus 300-600RF, an ADG IV and AAC C aircraft. The visibility minima established for Runway 18-36 is not lower than 1 mile. Based on these criteria, the RDC of Runway 18-36 has been set to C/IV/5000. Runway 18-36 has non-precision markings and high intensity runway edge lights.

The east-west runway has a magnetic heading of 95 degrees and 275 degrees designated 9-27. Runway 9-27 is 7,201 feet long by 150 feet wide, with an asphalt paved surface in fair condition. The ADG established for the Runway is ADG IV, while the AAC is C. The runway has ILS Category I capabilities. It is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The visibility minimums are not lower than ½ mile, establishing the RDC of Runway 9-27 at C/IV/2400. *Table 1-7* summarizes the characteristics of the runway system at FNT.

The 2006 Airport Master Plan Update identified the Airbus A300-600, an ADG IV and AAC D aircraft used for cargo activities, as the existing and future critical design aircraft for the Airport. Changes to the equipment used by the primary cargo operator means that the existing critical aircraft – defined by FAA as the most demanding aircraft that makes at least 500 takeoffs or landings per year. The future critical aircraft will be identified in Chapter 2: Forecast. The design criteria pertinent to the future critical aircraft as identified in the Forecast will be applied to all infrastructure improvements at the Airport.

[1] Note that some references, including Table 1-7, sometimes show a 1-foot discrepancy in the runway length. This discrepancy appears in FAA records and has been traced to rounding errors involving different measuring techniques. At the conclusion of this Master Plan Update, all FAA references will be reconciled with actual conditions.

***TABLE 1-7***
***RUNWAY DATA***

| *Item* | *Runway* | |
|---|---|---|
| ***Runway 9-27*** | ***9*** | ***27*** |
| Runway length / width | 7,201' x 150' | 7,201' x 150' |
| End Elevation (MSL) | 764' | 762.7' |
| Pavement Surface | Asphalt | Asphalt |
| Pavement Surface Condition | Fair | Fair |
| Runway Instrument Approach Aids | ILS / RNAV (GPS) / VOR | ILS / RNAV (GPS) / VOR |
| Visual Approach Aids | | 4-Box VASI |
| Runway Edge Lighting | HIRL | HIRL |
| Runway Markings | Precision Instrument | Precision Instrument |
| Runway Marking Conditions | Fair | Fair |
| Displaced Threshold Length | None | None |
| TORA | 7,201' | 7,201' |
| TODA | 7,201' | 7,201' |
| ASDA | 7,201' | 7,201' |
| LDA | 7,201' | 7,201' |
| ***Runway 18-36*** | ***18*** | ***36*** |
| Runway length / width | 7,849' x 150' | 7,849' x 150' |
| End Elevation (MSL) | 764' | 779.2' |
| Pavement Surface | Asphalt | Asphalt |
| Pavement Surface Condition | Good | Good |
| Runway Instrument Approach Aids | RNAV (GPS) / VOR | RNAV (GPS) / VOR |
| Visual Approach Aids | 4 Box VASI | 4 Box VASI |
| Runway Edge Lighting | HIRL | HIRL |
| Runway Markings | Non-precision | Non-precision |
| Runway Marking Conditions | Fair | Fair |
| Displaced Threshold | 200' | None |
| TORA | 7,848' | 7,848' |
| TODA | 7,848' | 7,848' |
| ASDA | 7,848' | 7,648' |
| LDA | 7,648' | 7,648' |

Source: National Flight Data Center

### 1.3.2 Taxiways

FNT has a total of five main taxiways, of which two are full length parallel to the runways, Taxiway A and Taxiway C. Taxiway A runs north-south and connects with Runway 18-36 via six connector taxiways A1, A2, A3, A4, A5, and A6; while Taxiway C runs east-west and provides access to Runway 9-27 via four connector taxiways, C1, C2, C3, and C4. Taxiways B and E connect the full length parallel taxiways with the general aviation areas. Taxiway D connects with Taxiway B, and provides access to the east general aviation facility.

AC 150/5300-13A establishes standards for the taxiway design groups (TDG) based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear Distance (CMG) for the existing critical design aircraft, the A300-600. The ADG and other characteristics of the taxiway system at FNT are detailed in *Table 1-8* below.

***TABLE 1-8***
***TAXIWAY DATA***

| | A | A1 | A2 | A3 | A4 | A5 | A6 | B | C | C1 | C2 | C3 | C4 | D | E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width (ft) | 75 | 100 | 110 | 130 | 110 | 110 | 100 | 75 | 75 | 130 | 130 | 130 | 110 | 35 | 35 |
| Lighting | | | | | | | | MITL | | | | | | | |
| Hold Line | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | N/A | N/A |
| TDG | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 |
| ADG | IV | IV | IV | IV | IV | IV | IV | IV | IV | IV | IV | IV | IV | II | II |

Source: RS&H, Inc. 2016

### 1.3.3 Airport Apron

The AC 150/5300-13A, *Airport Design*, Change 1, describes the apron at an airport as a designated space that accommodates aircraft during all loading and unloading, fueling, maintenance, and short or long term parking activities. FNT contains a primary commercial apron located at the passenger terminal, a de-icing apron located southeast of the passenger terminal, and secondary apron spaces for general aviation and cargo activities. The apron areas at the Airport consist of approximately 43 acres of concrete mostly on the commercial, Fixed Based Operator (FBO), and cargo aprons, and 12 acres of asphalt pavement situated mostly on the southeast general aviation apron.

#### Commercial Apron

The commercial apron is located on the northeast portion of the airport, south of West Bristol Rd. It serves as the primary apron for commercial aircraft, capable of accommodating both scheduled and non-scheduled aircraft activities. Access from the movement areas to the commercial apron is facilitated by the connector Taxiways C1, C2, A1, and A2.

The apron totals approximately 99,000 square yards of concrete. Of that total, 84,500 square yards are heavy-duty pavement designed to support the full weight of aircraft and 14,500 square yards are lighter concrete along the edge of the terminal building. The light-duty concrete is suitable for use by ground service equipment but not for aircraft operations.

#### General Aviation Aprons

The general aviation apron areas at FNT encompass all the apron space used for non-commercial aviation related activities, including fixed base operations and transient and based aircraft operations. There are a total of four apron areas dedicated for general aviation. *Exhibit 1-5* displays the general areas reserved for general aviation apron use.

#### Based Aircraft Apron

The area located directly east of the approach end of Runway 36 serves as the primary apron for based aircraft. It consists of approximately 14,256 square yards of apron, capable of holding at least 24 small aircraft. Additionally, there are two based aircraft aprons situated directly south of the approach end of

Runway 27 at the end of Taxiway D, and in the midfield portion of the Airport. Based aircraft apron areas are generally reserved for those privately owned aircraft generally operating out of FNT. *Exhibit 1-5* displays the dedicated apron area for the based aircraft.

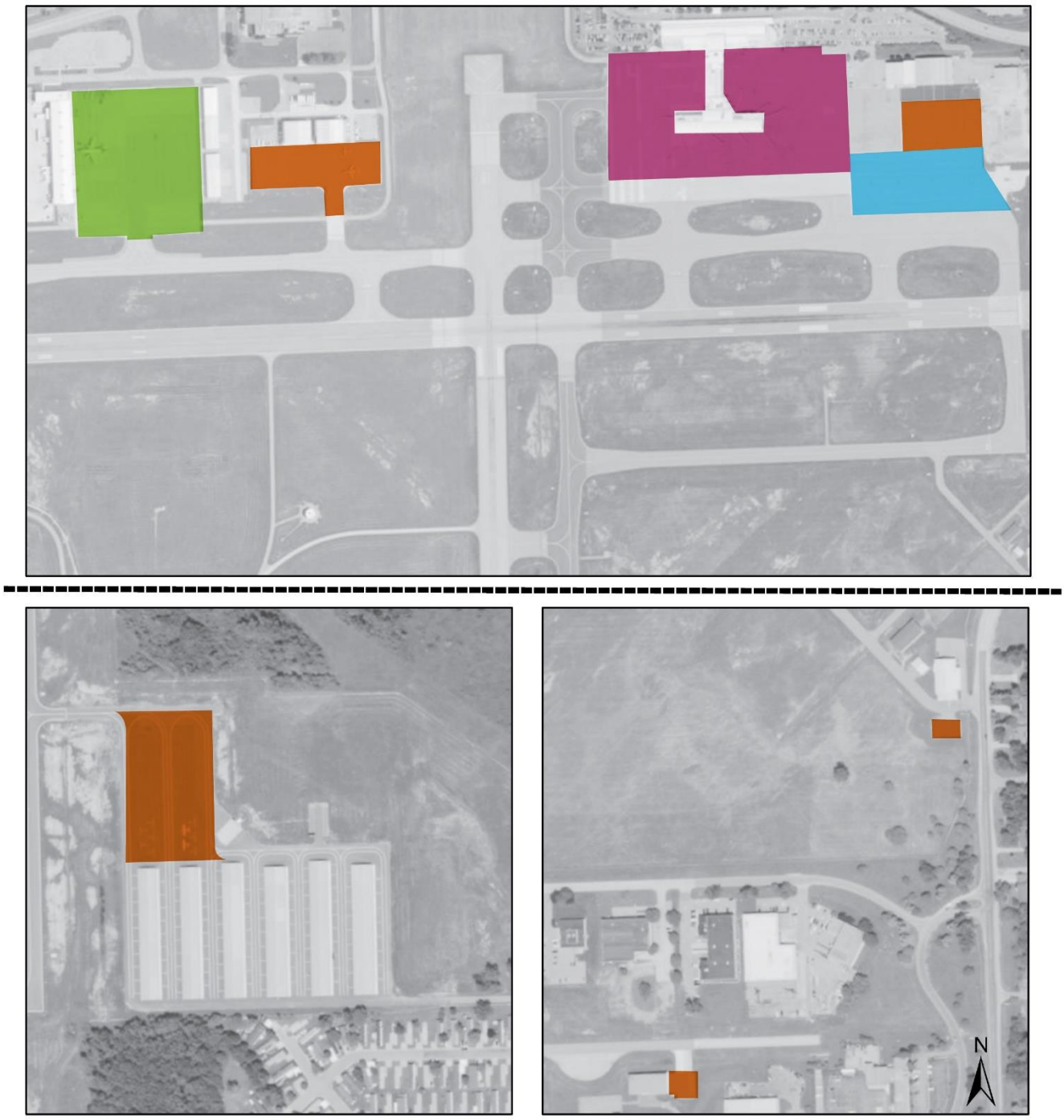
### Transient Apron

Transient apron area provides parking availability to those aircraft transiting and not based out of FNT. The transient parking areas are situated on the north side of the airfield, west of the approach end of Runway 18, and east of the cargo apron and facilities. The transient apron area has a total of 11,822 square yards, capable of accommodating at least 15 small aircraft. Transient apron area provides parking to those aircraft transiting and not based out of FNT.

### Cargo Apron

The Cargo apron area, illustrated in *Exhibit 1-5* serves the cargo facilities at the Airport. It is located on the northwest portion of the airfield, west of the commercial passenger terminal and the approach end of Runway 18. A new entrance roadway constructed in 2008 connects the facility and the apron area to West Bristol Road. Recent expansion to the cargo area completed in 2008 added 30,000 square yards to the total apron area. There are currently three parking positions on the cargo apron, designed for ADG IV aircraft, and three additional parking positions designed for smaller aircraft.

***EXHIBIT 1-5***
***APRON USAGE***



### 1.3.4 Navigation, Communication, Weather, and Surveillance Aids

Navigation, communication, weather, and surveillance equipment are installed at airports to guide pilots during approaches to and departures from the airport, assist Air Traffic Control in organizing flight operations among many aircraft, and to maintain safe and efficient operations on the airfield. Per FAA AC 150/5300-13A, the communication, navigation, and surveillance aids serve a specific runway or airport environment, provide safety and increase capacity for air traffic operations. The facilities typically consist of instrument landing system (ILS), approach lighting system and several others.

#### Navigational Aids

As illustrated in *Exhibit 1-6*, FNT currently has four types of navigational aids commonly referred to as NAVAIDs. The Flint very high frequency omnidirectional range/TACAN (VORTAC) transmitter provides radio signals that allow properly equipped aircraft to determine their position and distance relative to the Airport. The VORTAC for the Flint area supplies enroute navigation information to aircraft transiting the area as well as to aircraft approaching FNT for landing, using the VOR non-precision approach. The Flint VORTAC is located on airport property.

The non-directional beacon or NDB allows the pilot to navigate without line of sight limitations by transmitting NDB signals to the automatic direction finder (ADF) equipment placed on the aircraft. The NDB serving the airport is Howell and is located approximately 22.5 nautical miles southwest of the Airport.

The Airport also has an ILS, a precision approach NAVAID that provides vertical and horizontal guidance to the runway. The ILS has two components, a localizer (LOC) that is positioned at the far end of the runway and provides lateral guidance to the pilots, and a glide slope placed near the approach end of the runway, slightly to the side, which provides vertical guidance. Bishop Airport has ILS approaches for Runway 9-27.

The Global Positioning System (GPS) is also used for navigation to and from the Airport. GPS is a space-based radio positioning system that serves as the primary component of Area Navigation (RNAV) approaches to calculate an aircraft's position in order to determine the distance, the bearing, and the estimated time to the next waypoint. Both runways at the Airport have RNAV (GPS) approach capabilities.

#### Communication and Weather Aids

The communication aids at the Airport, shown in *Table 1-9,* are facilitated by the Terminal Radar Approach Control (TRACON), the Air Traffic Control Tower frequencies, the Automated Surface Weather Observation System (ASOS), the Common Traffic Advisory Frequency (CTAF), and the Universal Communication Unit (UNICOM). The airport ground controller, who handles all traffic on the taxiways can be accessed on the 121.9 MHz frequency and the tower or local controllers on the 126.3 MHz and 257.9 MHz frequencies. The ATIS transmits current weather conditions on the airfield on 133.15 MHz. The Common Traffic Advisory Frequency (CTAF) is 126.3 MHz and is used by pilots to identify position and intentions when the tower is closed.

***TABLE 1-9***
***COMMUNICATION AND WEATHER FREQUENCIES***

| COMMUNICATION / WEATHER AIDS | FREQUENCY (MHz) |
|---|---|
| CTAF | 126.3 |
| UNICOM | 122.95 |
| ATIS | 133.15 |
| FNT Ground Control | 121.9 |
| FNT Tower | 126.3, 257.9 |
| FNT Approach and Departure | 118.8, 128.55, 257.9, 133.8 |
| Cleveland ARTCC | 127.7 |
| Clearance Delivery | 121.75 |

Source: Airnav, 2016; RS&H, Inc. 2016

### Surveillance and Visual Aids

The Airport Surveillance Radar (ASR) Model 7 system at FNT is used to detect and track aircraft within a radius of approximately 60 nm. The system interrogates equipment on each aircraft, which then returns information regarding the aircraft's identity and altitude. The ASR-7 also detects precipitation and helps controllers route aircraft away from storm cells and anticipate when various instrument approach procedures may be required.

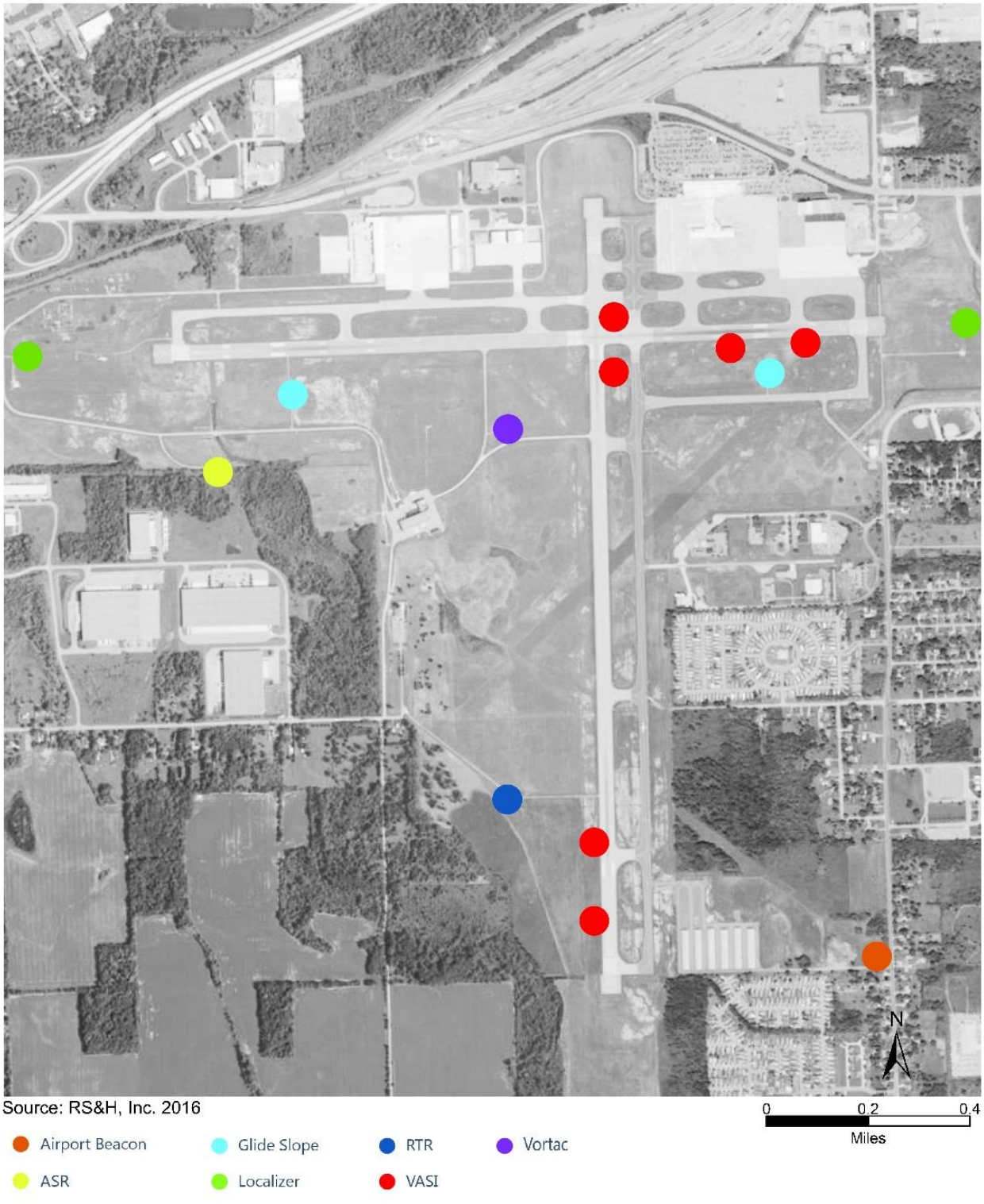
FNT's visual aids consist of the Airport beacon, the visual approach slope indicators (VASI), the approach lighting systems, and other visual aids such as threshold lights and runway edge lights. The Airport beacon alternates green and white identifying the airport as a civilian land airport, and is located on the southeast portion of the airport, east of the T-hangars. The beacon operates typically from dawn until dusk, and other hours when the airport is operating under instrument flight rules. The VASI lights provide visual descent guidance information during the approach for a runway. There are currently three sets of four-box VASI situated left of the approach end of Runway 18, Runway 27, and Runway 36. The threshold lights are located at the end of the each runway threshold indicating to the pilot that the runway pavement end is approaching.

The approach lighting systems at FNT are MALSR. They serve Runway 9 and Runway 27 and consist of signal lights that guide approaching aircraft to the runway threshold. The MALSR assist the pilots in transitioning from instrument meteorological conditions to visually identifying the runway environment.

The runway edge lights consist of a single row of lights on either side of the runway pavement edge. The lighting intensity on the runway edge lights are either low intensity (LIRL), medium intensity (MIRL), or high intensity (HIRL). Both runways on the airfield are equipped with HIRL.

The markings on Runway 9-27 and Runway 18-36 contain aiming points and touchdown zones in addition to the threshold markings, reflecting the characteristics of a precision approach runway, capable of supporting both visual and instrument flight rule operations.

***EXHIBIT 1-6***
***AIRPORT NAVAIDS***



### 1.3.5 Pavement Conditions

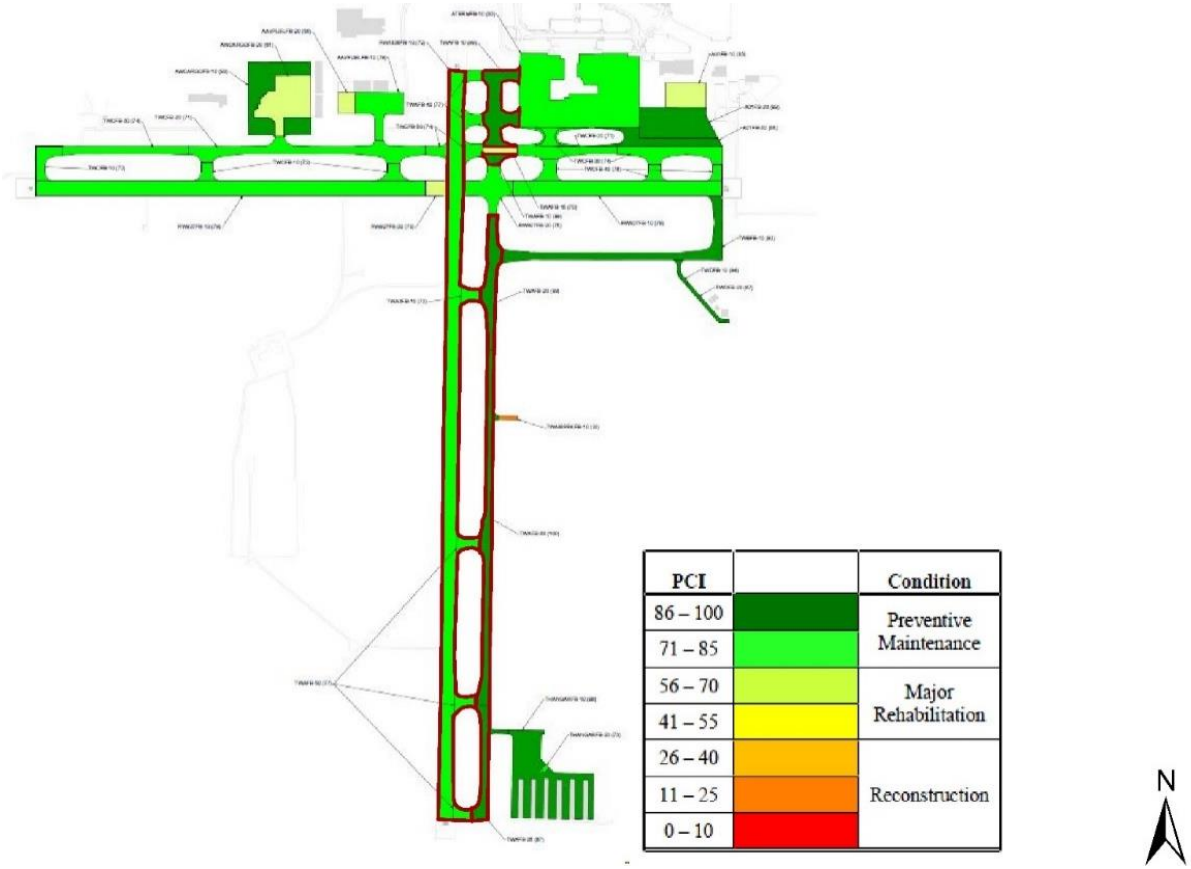
The airside pavement encompasses a total of 758,202 square yards covering areas such as the runways, the taxiways, the taxilanes, and the aprons. In 2014, The Aeronautics Office of the Michigan Department of Transportation produced a Pavement Management Report that describes the condition of the pavement at the Airport.

The study assigned a pavement condition index (PCI) by assessing the overall pavement condition and noting the type and severity of any pavement distress. The PCI ranges from 0 to 100, with 0 indicating a failing pavement condition, and 100 an excellent pavement condition.

The pavements at FNT were inspected on October of 2014, and resulted in an area-weighted PCI of 81. A recent rehabilitation project of Taxiway A was completed around the time of the pavement condition inspection. With this new pavement, the Taxiway A resulted in a PCI of 94.

At the time of the pavement condition inspection, Runway 18-36 and Runway 9-27 were given a PCI of 72 and 78, respectively. However, in 2015 the Airport completed a pavement rehabilitation project on Runway 18-36; thus the recent condition of the runway was not captured in the earlier inspection. *Exhibit 1-7* shows the general conditions of the airfield pavement of FNT at the time of the pavement inspection. The areas outlined in red were rehabilitated after the inspection.

***EXHIBIT 1-7***
***AIRPORT PAVEMENT CONDITIONS***




Source: Michigan Department of Transportation, Airports Division, 2014

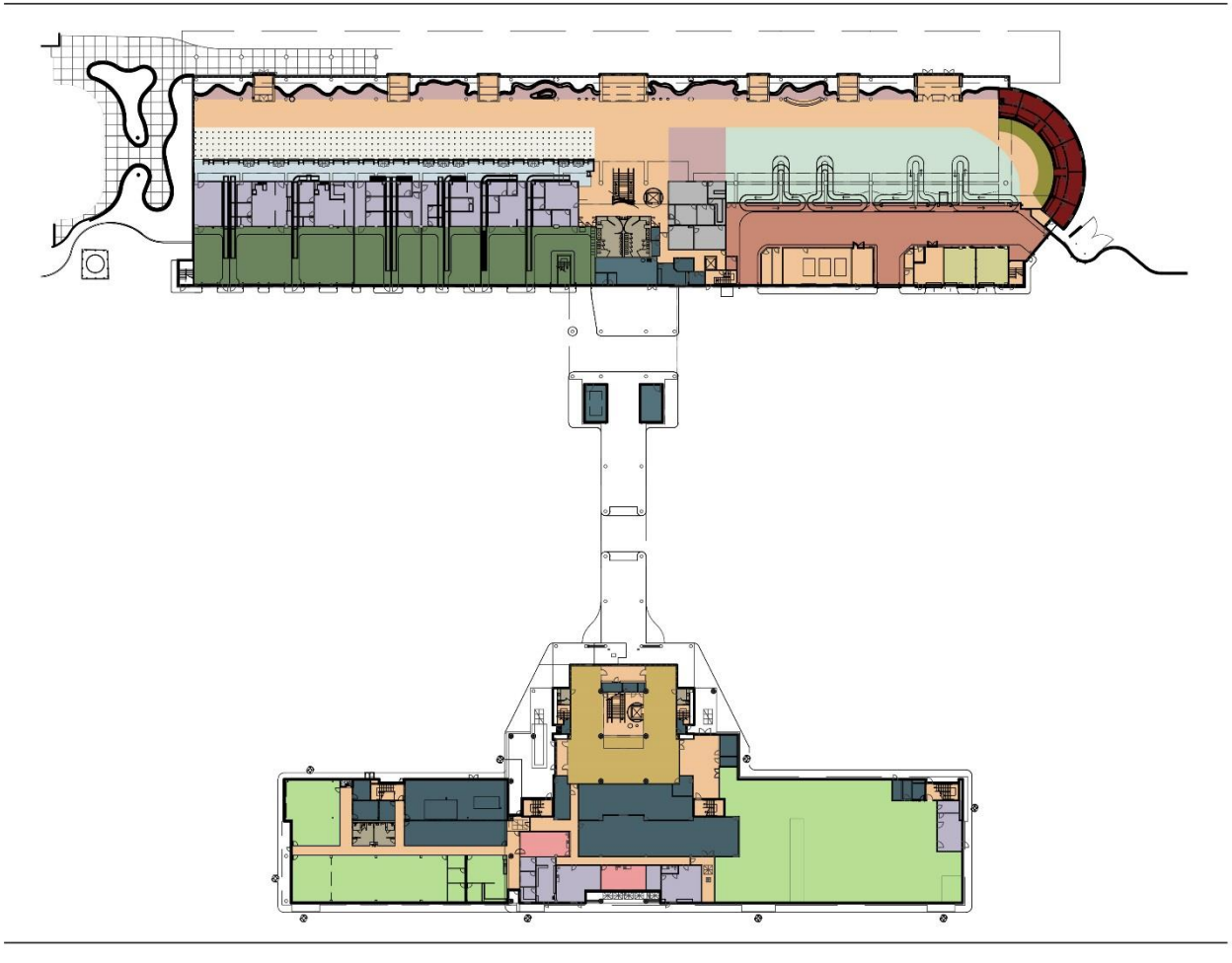
## 1.4 PASSENGER TERMINAL AND AIRPORT FACILITIES

The landside facilities consist of the portion of the airport where movement of passengers and ground transportation occur. The following section describes the landside facilities currently available at FNT, including the passenger terminal area, the airport access roadway, the vehicle parking facilities, and the rental car parking areas.

### 1.4.1 Passenger Terminal Area

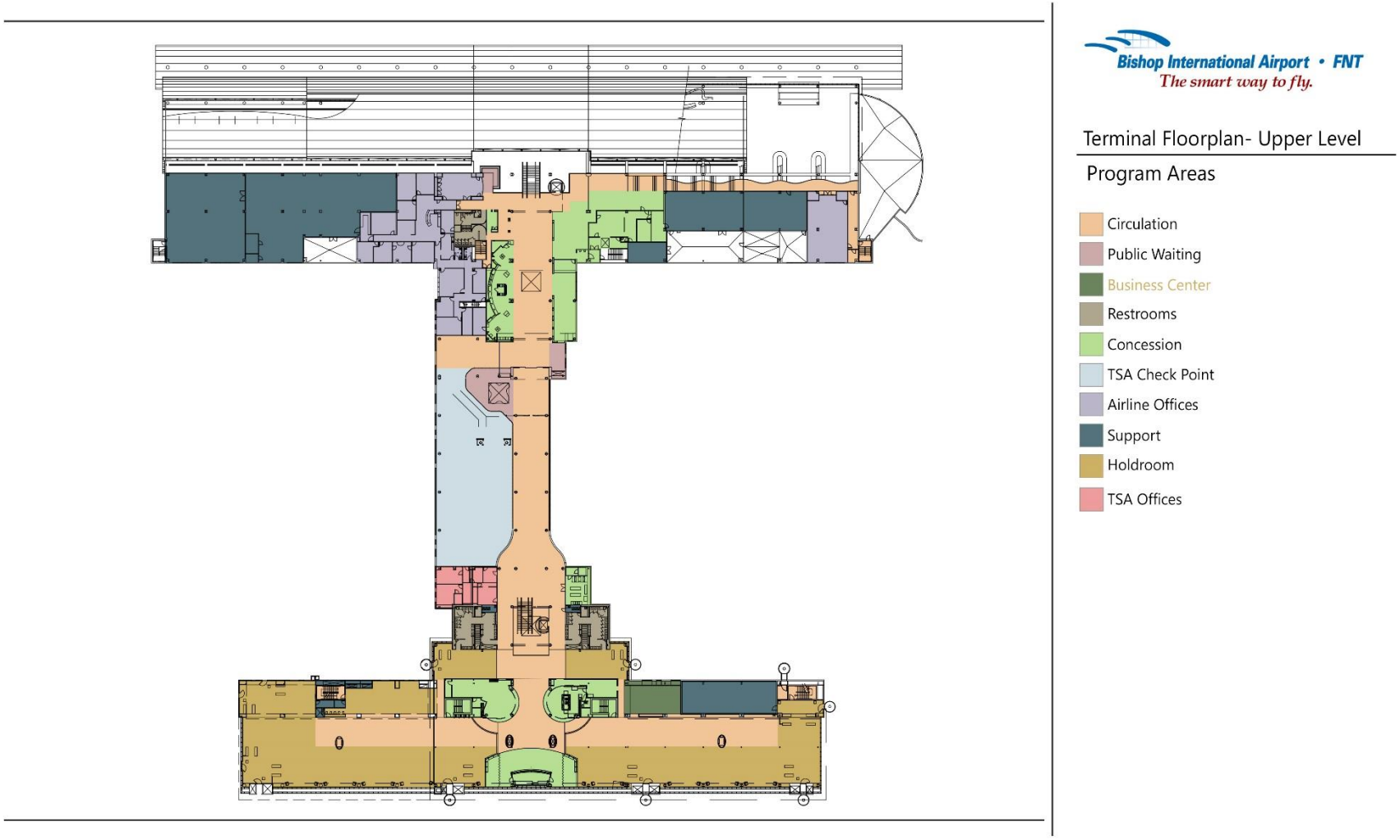
The passenger terminal building at FNT is located on the north side of the airport, east of the Runway 18 approach end and south of West Bristol Road. The passenger terminal area was designed following the airside-landside terminal concept, and encompasses the terminal building, divided in a landside area, a passenger connector area, and an airside area. The building consists of a two-story structure originally constructed in 1993, and expanded in 1999, 2004, 2006, and 2012. This section presents a summary of these facilities as shown in *Exhibit 1-8* and *Exhibit 1-9*.

***EXHIBIT 1-8***
***TERMINAL AREAS – LOWER LEVEL***




Source: RS&H, Inc. 2016

***EXHIBIT 1-9***
***TERMINAL AREAS – UPPER LEVEL***




Source: RS&H, Inc. 2016

### Landside Area

The landside portion of the passenger terminal is dedicated to the movement of passengers and ground transportation. It includes the terminal curb front, the passenger check-in area, the lobby area for meeting and greeting, and the baggage make-up and processing areas. The terminal curb front currently consists of four ground transportation lanes of which two are dedicated for the loading and unloading of passengers, and two for through vehicle circulation. The passenger check-in area is situated on the first level of the building and is typically designed for passenger ticketing, airline ticket offices, and other passenger processing activities. The lobby area can also be found on the lower level of the passenger terminal building. The baggage make-up and processing area, also located on the first floor of the passenger terminal building along with the rental car agencies, includes outbound baggage, baggage claim, and inbound baggage. The second floor of the landside holds concession spaces, the airport administrative areas, and circulation spaces.

The baggage claim area was expanded in 2006. The project added a total of 22,000 square feet to the existing area and doubled the number of baggage claim carousels to four. This expansion also added new rental car offices.

*Table 1-10* provides detail regarding the different areas of the passenger terminal building.

***TABLE 1-10***
***AIRPORT TERMINAL BUILDING FUNCTIONAL AREAS***

| TERMINAL FUNCTIONAL AREAS | NUMBER | AREA (SQ. FT) |
|---|---|---|
| ***Airline*** | | |
| Ticket Counters | 9 | 4,001 |
| Ticket Queuing Space | 2 | 39,740 |
| Office Spaces | 25 | 4,733 |
| Break Rooms / Lounge | 4 | 1,787 |
| Operations Room | 2 | 958 |
| Storage Spaces | 6 | 870 |
| Corridors | 2 | 591 |
| Luggage Processing | 1 | 125 |
| Baggage Make-Up | 9 | 9,955 |
| Inbound Baggage | 2 | 7,113 |
| Baggage Claim Lobby | 2 | 14,052 |
| Conveyor Belts | 4 | - |
| ***Rental Car*** | | |
| Reservation Counters | 6 | 920 |
| Office Spaces | 6 | 1,255 |
| Rental Car Lobby | 1 | 1,516 |
| ***TSA*** | | |
| Office Spaces | 5 | 1,200 |
| Training Room / Operations | 3 | 1,082 |
| Break Room / Locker Room | 2 | 450 |
| Conference Room | 1 | 184 |
| Checkpoints / Private Screening | 5 | 9,278 |
| Communications Rooms | 1 | 51 |
| Storage Space | 1 | 125 |
| Corridors | 1 | 64 |

| TERMINAL FUNCTIONAL AREAS | NUMBER | AREA (SQ. FT) |
|---|---|---|
| ***Administration*** | | |
| Office Spaces | 10 | 2,467 |
| Conference / Committee / Board Rooms | 4 | 2,952 |
| Reception | 1 | 335 |
| Communications Room | 1 | 64 |
| Storage / Copy Room | 3 | 403 |
| Cleaning Closet | 4 | 136 |
| Breakrooms / Kitchen | 3 | 814 |
| Balcony | 1 | 1,175 |
| ***Law Enforcement / Security*** | | |
| Badging Offices | 2 | 513 |
| Locker Room | 1 | 325 |
| Police Hold Room | 1 | 152 |
| Lieutenant Office | 1 | 128 |
| AOC / Security Room | 1 | 234 |
| ***Concession*** | | |
| Offices | 2 | 162 |
| Bar / Lounge Spaces | 3 | 2,522 |
| Storage | 4 | 439 |
| Cafeteria / Kitchen | 3 | 4,486 |
| Others | - | 2,259 |
| ***Others*** | | |
| Holdrooms | 5 | 36,422 |
| Restrooms | 16 | 3,882 |
| Vestibules | 8 | 2,806 |
| Stairs | 10 | 3,402 |
| Corridors | 6 | 2,376 |
| Hallway / Walkway | 9 | 21,782 |
| Meet and Greet | 1 | 1,105 |
| Utility Rooms1 | - | 34,434 |
| Business Center | 1 | 1,078 |
| Future FIS | 1 | 12,657 |

Note: [1]Utility Rooms include communication, electrical, mechanical, and other storage rooms.
Source: RS&H, Inc. 2016

### Passenger Connector

The passenger connector area at the airport connects the travelers from the landside area of the terminal building to the secured area and vice versa. This designated space serves as a controlled access and egress point, and comprises the concession spaces and the Transportation Security Administration (TSA) checkpoint. The connector area was recently expanded by 15,000 square feet, and is currently capable of holding four TSA security lanes. There is currently one TSA checkpoint with three lanes in operations in the connector area.

#### Airside Area

The airside area at the airport consists of a two-story sterile area connecting the passengers to the waiting areas and their respective gates. The area typically consists of the holdroom spaces, the utility areas for mechanical, storage and communication rooms, the gates, and the concession areas including restaurants, bar and lounges, and retail stores.

There are approximately 36,000 square feet of holdroom spaces in the sterile area. Paradies and MSE are the two concessions companies currently servicing the airport. Together the concessionaires occupy a little over 9,860 square feet at the Airport, including offices and food preparation areas, retail stores, restaurants, and bars. The gate area was recently expanded to add two more passenger boarding bridges for a total of nine. Two gates (Gate 2 and Gate 4) do not have passenger boarding bridges. There are multiple areas throughout the sterile area reserved for utility storage mainly mechanical, electrical, and communication.

## 1.4.2 Airport Access Road System

A vital part of the airport system is ground transportation infrastructure. As shown in *Exhibit 1-10* a local roadway system connects surface transportation to the Airport. The roadway system surrounding FNT includes the off-airport roads that connect the Airport with the surrounding areas and communities, and on-airport roads that provide circulation on the Airport and also connect the airport with the off-Airport roads.

#### Off-Airport Roadway System

Directly adjacent to the terminal is Bristol Road, an off-airport roadway that provides access and egress to the Airport and to the vehicle parking lots. Bristol Road runs east-west and intersects with two major interstate highways, Interstate 69 and Interstate 75. Interstate 475 also connects with Bristol Road approximately 2.5 miles east of the Airport.

Interstate 75 is directly east of the Airport and runs north-south. It connects the Flint area with the States of Ohio, Kentucky, Tennessee, Georgia, and Florida. Access to the southwestern states is facilitated by the Interstate 69, which connects the Flint area with the states of Indiana, Kentucky, Tennessee, and Mississippi, and to Ontario, Canada to the east.

Torrey Road, which runs east of the airport, connects with the on-airport roads of Airpark Drive North and Airport Drive South. Maple Road intersects the Airport. On the west side it provides access to the Air Traffic Control Tower, the maintenance facility at the Airport, and to the east side it serves the neighborhood directly east of Taxiway A.

Jennings Road is an unimproved road that runs north-south and intersects with Maple Road, providing access to the maintenance and ARFF facilities.

US Route 23 connects with Interstate 75, and from the Airport can be accessed via Hill Road and West Maple Road. The roadway runs north-south and connects the Airport with the cities south of the Airport such as Ann Arbor. *Exhibit 1-10* illustrates the off-airport roadway system.

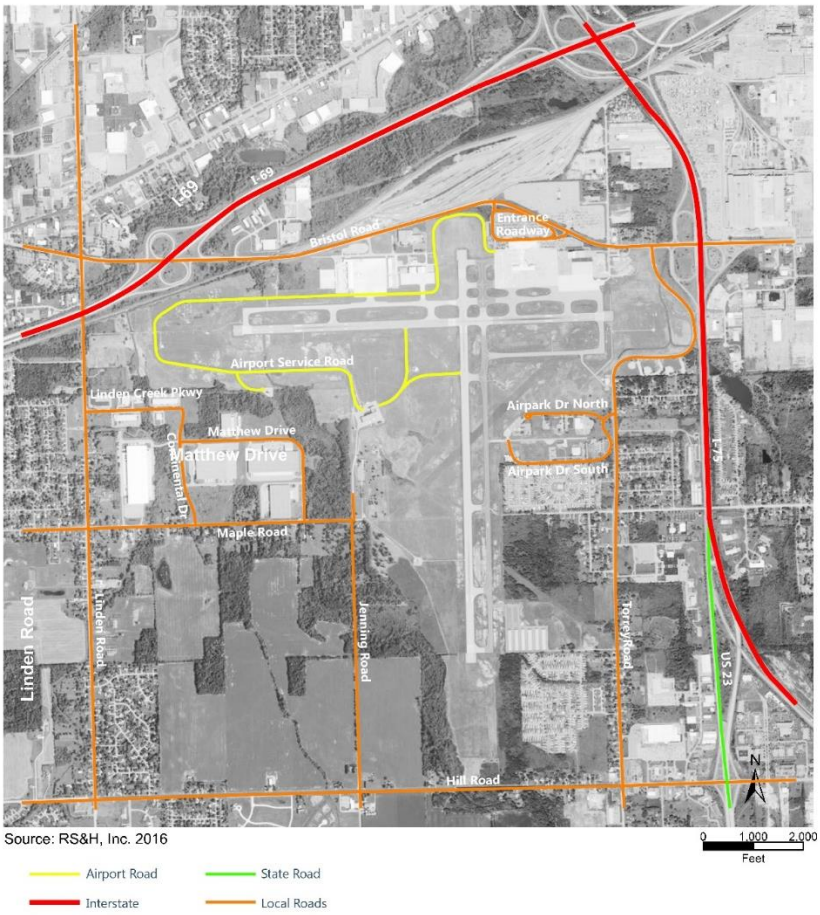
### On-Airport Roadway System

A public loop road serves as the primary entrance to the Airport. It connects the passenger terminal, the curb front, and the short and long term parking with West Bristol Road.

East of the airfield are Airpark Drive South and Airpark Drive North. Both roadways converge in an ending loop and connect with Torrey Road.

A perimeter roadway serves as the vehicle service road for the Airport, and provides internal access around the air operations area. The service road begins on the western portion of the passenger terminal apron and continues north of the approach end of Runway 18 and the cargo facilities. It continues west of the approach end of Runway 9 and connects with the maintenance and ARFF facilities, and the VORTAC equipment area. The final portion of the vehicle service road splits in two segments connecting the ARFF facility with both Runway 9-27 and Runway 18-36. The service road allows authorized airport personnel and escorted individuals to access the movement and non-movement areas of the airfield. *Exhibit 1-10* also shows the location of the on-airport roads.

***EXHIBIT 1-10***
***AIRPORT ROADWAY ACCESS***




Source: RS&H, Inc. 2016

### 1.4.3 Vehicle Parking Facilities

The sections reserved for passenger parking are located directly north of the passenger terminal building, and on both sides of West Bristol Road. The Airport currently has a short-term, a long-term, and an economy parking lot for public use; and an employee lot and rental ready car lot for private use. *Exhibit 1-11* illustrates the designated parking lot areas at FNT, and *Table 1-11* lists the total number of parking spaces available.

#### Public Parking

The short-term parking lot is an uncovered surface parking area, with a total of 194 spaces located directly across the terminal access road and curb front. In 2008, the Airport completed a rehabilitation project of the short-term lot to allow minor reconfigurations of the layout. The short-term parking lot can be accessed via the airport loop road, in two locations.

The long-term parking area is situated south of West Bristol Road, and offers a total of 778 uncovered parking spaces. The long-term parking area can also be accessed via the terminal access road in two locations.

The economy parking lot at the Airport typically offers the lowest parking rate to travelers. It is located north of West Bristol Road, and can be accessed using the continuous free shuttle service offered by the Airport to all travelers using the lot. The parking lot was expanded in 2004 and 2005 and now contains a total of 3,200 parking spaces. The economy parking lot can be accessed via West Bristol Road.

The employee parking lot is co-located with the cellphone lot, southwest of the long-term and short-term parking lots, and offers a total of 220 parking spaces to employees and travelers. Directly east of the passenger terminal building is the rental car ready lot with a total of 330 parking spaces.

***TABLE 1-11***
***AIRPORT PARKING AREAS***

| Parking Lot | Parking Spaces |
|---|---|
| ***Public Lots*** | |
| Short-Term | 194 |
| Long-Term | 778 |
| Economy | 3,200 |
| Total | 4,172 |
| ***Private Lots*** | |
| Employee Lot | 220 |
| Rental Car Ready Lot | 330 |
| Total | 550 |

Source: RS&H, Inc. 2016

***EXHIBIT 1-11***
***AIRPORT PARKING SPACES***

### 1.4.4 Rental Car Facilities

FNT offers rental car services to passengers and the general public. The car rental agencies available at the Airport are Dollar and Thrifty, Hertz, Enterprise and affiliates, and Budget and Avis. The facilities are located inside the airport on the lower level of the passenger terminal building, near the east end. There are a total of six rental car counters totaling 920 square feet, and six offices for the agency employees for a total of 1,255 square feet. A lobby area of approximately 1,516 square feet serves as circulation and queuing space for customers and passengers.

## 1.5 GENERAL AVIATION FACILITIES

The following paragraphs of this section provide an overview of the general aviation facilities at FNT. These facilities encompass the fixed based operator (FBO), the private hangars, and existing tenants at the Airport. *Table 1-12* lists a summary of the general aviation inventory.

### 1.5.1 Fixed Base Operator

The FBO at the Airport provides general services to pilots and air carriers such as aircraft fuel storage and handling, hangar rentals, aircraft parking and tie-downs, aircraft maintenance, and pilot amenities, supplies, services and training. AvFlight Flint presently serves as the FBO for FNT. The building is located on the North side of the airport. The leasehold area for the FBO is approximately 135,472 square feet.

### 1.5.2 Hangars and Tenants

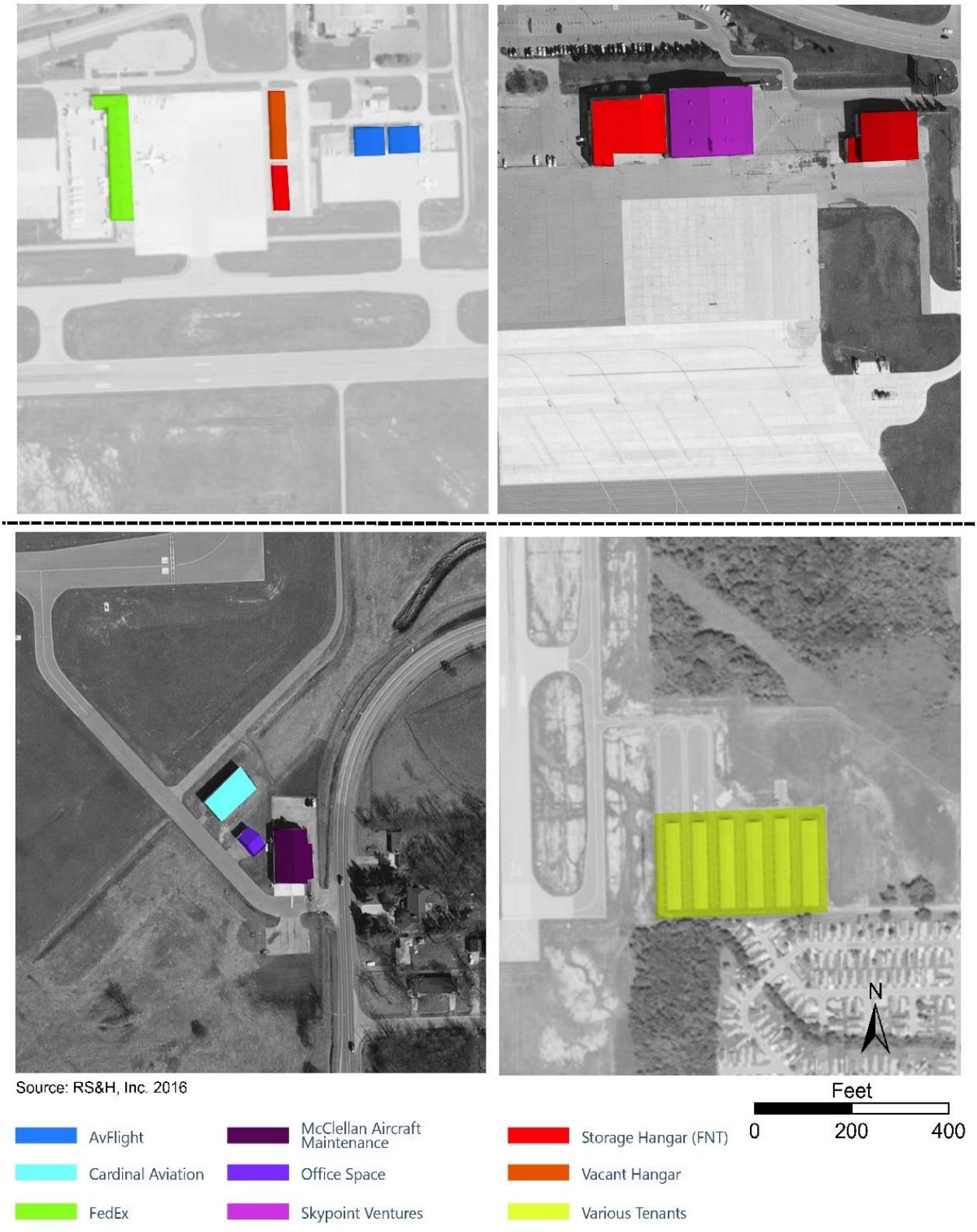
Most airports have dedicated space available to the general public for leasing and storing aircraft, typically referred to as hangars. Some hangars come in various sizes and offer office and workshop space as well. FNT currently has 110 T-hangars, occupied by various tenants and comprising 147,600 square feet of building space over an area of approximately 9.5 acres; three conventional size hangars occupied by Cardinal Aviation, a corporate tenant, Skypoint Ventures a Flint-based real estate investment firm, and McClellan Aircraft Maintenance, a general aviation aircraft maintenance and service company. AvFlight leases two box hangars encompassing of a total of 33,700 square feet. Approximately four hangars are used primarily by the Airport for storage purposes and office space. *Exhibit 1-12* illustrates the different tenants and hangar spaces at FNT.

***TABLE 1-12***
***GENERAL AVIATION INVENTORY***

| Tenants | Leasehold Area (sq. ft) | Hangar(s) | Size (sq. ft) |
|---|---|---|---|
| AvFlight | 135,472 | 2 conventional | 16,850[1] |
| Cardinal Aviation | 5,000 | 1 conventional | 4,747[1] |
| Private Aircraft Owners | N/A | 110 T-Hangars | 147,600 |
| Skypoint Ventures | 27,900 | 1 conventional | 28,900 |
| McClellan Aircraft Maintenance | 22,325 | 1 conventional | 8,110 |
| Storage and Vacant Space | N/A | 4 conventional | 31,660 |

Note: [1]Size for each box hangar. Also includes office space.
Source: RS&H, Inc. 2016

***EXHIBIT 1-12***
***GENERAL AVIATION FACILITIES***



## 1.6 SUPPORT FACILITIES

The following sub-sections describe the support facilities that can be found at the Airport. Support facilities play an integral role in the daily operations of the airport, and consist of the aircraft fuel storage facilities, the maintenance areas, the ARFF facilities, the air traffic control tower, and the utilities. *Exhibit 1-13* on Page 40 shows the support facilities at FNT.

### 1.6.1 Aircraft Fuel Storage

FNT stores both aviation and non-aviation fuel. There currently are five storage tanks of Jet A located north of the FBO facility, Avflight, which can store a total of 69,000 gallons. There are also two storage tanks of 100 Low Lead (LL) fuel situated north of AvFlight and on the southeast general aviation ramp near the T-hangars. Additionally, there are three diesel storage tanks situated near the ARFF facilities and the passenger terminal building, and two unleaded gasoline storage containers located near the rental car agencies and the ARFF facilities as well. *Table 1-13* lists the inventory for the fuel storage at the Airport.

***TABLE 1-13***
***FUEL STORAGE INVENTORY***

| Storage Location | Fuel | Capacity (per tank) | Number | Responsible Party |
|---|---|---|---|---|
| AvFlight | 100LL | 12,000 gal | 1 Above Ground | AvFlight |
| | Jet A | 12,000 gal | 4 Above Ground | AvFlight |
| | Jet A | 20,000 gal | 2 Above Ground | AvFlight |
| | Jet A | 5,000 gal | 1 Above Ground | AvFlight |
| Rental Car | Unleaded | 15,000 gal | 1 Underground | BIAA |
| T-Hangar Ramp | 100 LL | 6,000 gal | 1 Above Ground | AvFlight |
| ARFF | Unleaded | 6,000 gal | 1 Underground | BIAA |

Source: Bishop International Airport Authority (BIAA)

### 1.6.2 Aircraft and Airport Maintenance

Aircraft maintenance at the Airport is provided by McClellan Aviation, an on-site light maintenance service provider located directly south of the approach end of Runway 27 on the east end of the airfield.

The airport maintenance facilities, owned and operated by FNT, are located on the west end of the airfield, south of Runway 9-27 and west of Runway 18-36. The facility stores equipment needed for maintaining the Airport grounds and pavement, as well as handling repair and upkeep of Airport buildings. In order to house snow removal equipment, 10,000 square feet was added to the existing maintenance facility in 2005. A new, four-bay sand storage building located adjacent to the maintenance facility was constructed in 2009 in order to store sand for winter operations. *Table 1-14* shows the available maintenance equipment at the Airport. *Exhibit 1-13* displays the location of the aircraft and airport maintenance facilities.

***TABLE 1-14***
***AIRPORT MAINTENANCE EQUIPMENT***

| Equipment Type | Quantity |
|---|---|
| Snow Removal Landside | 2 small plow trucks |
| Snow Removal Airside | 3 brooms, 5 snow plows, 1 blower, 2 front end loaders |
| Grass Cutting | 2 mowers, 4 riding mowers, 2 walk-behinds |

Source: RS&H, Inc. 2016

### 1.6.3 Aircraft Rescue and Fire Fighting

*Exhibit 1-13* illustrates the Aircraft Rescue and Firefighting (ARFF) facility at FNT. As a Part 139 certificate holder, the Airport is required to provide ARFF services. These facilities at airports are responsible for providing emergency response services when needed, including but not limited to firefighting, rescue, medical responses, and fire prevention. The facilities are typically located inside the airport property boundary, and strategically situated to be able to attain the farthest midpoint of the runway in three minutes or less.

The FAA categorizes the ARFF facilities at airports by Airport Index, based on the length of the largest air carrier commercial aircraft that uses the facility regularly, and the average daily departures of air carrier aircraft. FNT is an Index "B" ARFF facility, with 24 hour emergency assistance availability. This index classification helps define the type and size of firefighting vehicles to be used at the Airport, as well as the minimum amount of extinguishing agent and water that can be contained in the vehicles. The facility is equipped with two firetrucks, one Chevrolet Suburban, one GMC Yukon XL Quick Response, one Oshkosh Striker, and a Rosenbauer Panther. *Table 1-15* lists the equipment and an inventory of the safety vehicles available at the Bishop Airport ARFF station.

***TABLE 1-15***
***ARFF EQUIPMENT***

| Call-Sign | Vehicle Type | Capacity |
|---|---|---|
| Rescue 41 | 2013 Chevrolet Suburban | N/A |
| Rescue 42 | 2011 GMC Yukon XL | N/A |
| Rescue 43 | 2003 Oshkosh Striker | 1500 gal of water, 220 gal of foam, 450 lbs of Purple-K |
| Rescue 44 | 2015 Rosenbauer Panther | 30 lbs of carbon dioxide, 1500 gal of water, 200 gal of foam, 500 lbs of Purple-K |

Source: RS&H, Inc. 2016

### 1.6.4 ARFF Building

The ARFF building at FNT is co-located with the airport maintenance facility on the west side of the Airport, north of the Air Traffic Control facility. It consists of a 6,800-square-foot building with three ARFF vehicle bays and office space. The department contains a total of 10 full-time employees and four part-time employees. Two to three employees are staffed seven days a week and 24 hours a day.

### 1.6.5 Air Traffic Control Facility

Directly west of Runway 18-36 is the FNT Air Traffic Control facility. The building is co-located with the TRACON facility, and strategically situated to provide unobstructed line of sight to the airfield key points. The control tower building, including the tower cab, contains seven floors. The overall tower height is approximately 87 feet. The air traffic control tower was commissioned in January 1975, and also houses FAA Technical Operations and a contractor for Air Traffic training. *Exhibit 1-13* illustrates the location of the Air Traffic Control Facility.

### 1.6.6 Utilities

This section summarizes all the major on-site utilities at FNT, including but not limited to electric power, water, sewer, gas and communication. The availability of the utilities at the Airport is an important factor for the continued operability of the Airport.

#### Water and Sewer

FNT receives its water and sewer supply from the Flint Township Sewer and Water Department, which originates from the lower Lake Huron Watershed through the City of Detroit. The sanitary sewer line currently runs north and south through the Airport.

#### Electricity and Gas

Electricity and gas services at the Airport are supplied by the Consumers Power Company. All energy vital to the operational components of the airfield such as taxiway and runway lighting, NAVAIDs lighting and signage is powered through an electrical vault located south of Runway 9-27 near the maintenance facilities.

The Airport is also served by two standby generators. One is a Cummins 450 kW diesel generator with a 720 gallon under-belly fuel tank. It is located in the electrical vault just north of the maintenance/ARFF facility and is designed to power the airfield lighting and signage. It was installed in 2001. The other is a Caterpillar 750 kW diesel generator with a 2,500 gallon underground fuel tank. The generator is located in the terminal building, behind the baggage claim area, and the underground tank is under the apron pavement just outside of the building. The generator also has an internal 75 gallon "day" fuel tank, which has enough fuel for approximately 24 hours of operation in case there is an issue with the main tank. This generator powers the terminal building. It was installed in 2011.

## 1.7 CARGO FACILITIES

The cargo apron and facilities for FNT are located on the north end of the airfield, west of the passenger terminal facility. Currently, Federal Express (FedEx) serves as a cargo operator at the Airport. FedEx currently occupies one cargo facility of approximately 66,000 square feet located on the west side of the cargo apron. Two additional cargo facilities are located east of the apron. One facility, measuring 25,000 square feet, is vacant. The other, a 14,900-square-foot building, is vacant except for approximately 2,210 square feet, which is leased to AvFlight for storage.

The cargo facilities at FNT can be accessed via a new entrance roadway constructed in 2008. The entrance roadway connects the facility and the apron area to West Bristol Road. Additionally, the vehicle service road at the Airport facilitates service vehicle movement and access to the cargo facilities. The

facilities also connect with Taxiway C and Runway 9-27, providing accessibility to the movement areas. *Exhibit 1-13* also shows the cargo areas on the airfield.

***EXHIBIT 1-13***
***CARGO AND SUPPORT FACILITIES***

# 1.8 ENVIRONMENTAL OVERVIEW

## 1.8.1 Introduction

The purpose of considering environmental factors in airport master planning is to assist in evaluating current and future airport development, as well as provide information that will help expedite subsequent environmental processing. FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, N*ational Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, are the FAA's environmental guidance for aviation projects/actions to comply with NEPA. It is important to note that the environmental analysis included in this Master Plan Update is not in and of itself a NEPA document.

FAA Order 1050.1F identifies the following environmental impact categories:

- Air Quality
- Biological Resources
- Climate
- Coastal Resources
- Department of Transportation Act, Section 4(f) Resources
- Farmlands
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Historical, Architectural, Archeological, and Cultural Resources
- Land Use
- Natural Resources and Energy Supply
- Noise and Noise-Compatible Land Use
- Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Visual Effects
- Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)

## 1.8.2 Air Quality

Responsibility for protecting and improving the nation's air quality rests with the U.S. Environmental Protection Agency (USEPA). Section 109 of the Clean Air Act establishes National Ambient Air Quality Standards (NAAQS) to protect public health and environmental welfare. The USEPA identifies the following six criteria pollutants for which NAAQS apply: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. The USEPA considers geographic areas that are in violation of one or more NAAQS nonattainment areas. Section 110 of the Clean Air Act requires states with nonattainment areas to develop a state implementation plan (SIP) that demonstrates how the area will reach attainment of the NAAQS within a specific timeframe. According to the USEPA, the Airport property is located in an attainment area for all criteria pollutants.[2]

[2] USEPA. (2016, February 22). *Michigan Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*. Retrieved February 2016, from Green Book: http://www3.epa.gov/airquality/greenbook/anayo_mi.html

### 1.8.3 Biological Resources

Biological resources include terrestrial and aquatic plant and animal species; game and non-game species; special status species; and environmentally sensitive or critical habitats. Provisions have been set forth in NEPA for the protection of biological resources. The following are relevant federal laws, regulations, Executive Orders (EOs), and guidance[3] that protect biotic communities:

- Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544)
- Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668 *et seq.*)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 *et seq.*)
- Fish and Wildlife Coordination Act (16 U.S.C. § 661-667d)
- EO 13112, *Invasive Species* (64 FR 6183)
- Marine Mammal Protection Act (16 U.S.C. § 1361 *et seq.*)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703 *et seq.*)
- EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (66 FR 3853)
- Council on Environmental Quality (CEQ) Guidance on Incorporating Biodiversity Considerations into Environmental Impact Analysis under NEPA
- Memorandum of Understanding to Foster the Ecosystem Approach

Although the Endangered Species Act does not protect state-protected species or habitats, the NEPA documentation ensures that environmental analysis prepared for airport actions addresses the potential effects to state-protected resources.

Habitat characteristics of the Airport property include wetlands, vegetated marsh, open water, forested areas, mowed grass, bare areas (e.g., areas cleared of vegetation), and developed areas (e.g., terminal, hangars, runways, roads, parking, etc.). The developed areas of the Airport, aside from the airfield development (e.g., runways and taxiways) are mostly in the northern portion of the Airport property. The undeveloped land around those areas has been primarily cleared of dense vegetation. Airport personnel regularly mow and maintain grasses in these areas. There are ditches that run through the cleared/grassland areas that are part of the Airport's stormwater management system. Forested areas on the Airport property are mostly in the western and southern portion of the Airport property. A local arborist identified the following species of trees in and around the Airport during a field survey as part of an Airport project: ash, Austrian pine, basswood, beech, birch, black cherry, black locust, boxelder, buckthorn, catalpa, cherry, cottonwood, elm, evergreen, hawthorn rose, hickory, honey locust, maple, Norway spruce, oak, pine, poplar, red maple, red oak, Scotts pine, Siberian elm, spruce, walnut, white oak, white pine, and willow. See the Water Quality section for a description of the surface water and wetland resources at the Airport.

A wildlife hazard assessment was completed at the Airport in 2012, with fieldwork performed from April 2011 through March 2012. During this time, 36 bird species and one mammal species were observed in and around the Airport. Tracks of other species were also observed (e.g., deer), but the species themselves were not seen. None of the species observed were listed as threatened or endangered. Many of the birds observed during the fieldwork are protected by the Migratory Bird Treaty Act.

[3] Due to the number of federal laws and EOs applicable to the Proposed Action, this section presents only the legal citations or references for those requirements in lieu of summarizing their requirements. See FAA Order 1050.1F Desk Reference for more information.

In an effort to reduce wildlife hazards at the Airport, the Authority acquired a U.S. Fish and Wildlife Service (USFWS) Migratory Bird Depredation permit for the Airport. This permit allows the Authority to "take" gulls, red-tail hawks, rough-legged hawks, mallards, Canada geese, American kestrels, great blue herons, and sandhill cranes. The permit also allows for red-tail hawks, rough-legged hawks, and American kestrels to be live-trapped and relocated. The Authority also has a Michigan Department of Natural Resources (DNR) permit for deer, as well as one for small mammals and birds. The Authority renews these permits on an annual basis.

### 1.8.4 Climate

Relevant federal laws, regulations, and EOs that relate to climate include:

- CAA (42 U.S.C. §§ 7408, 7521, 7571, 7661 *et seq.*)
- EO 13514, *Federal Leadership in Environment Energy and Economic Performance* (74 FR 52117)
- EO 13653, *Preparing the United States for the Impacts of Climate Change* (78 FR 66817)
- EO 13693, *Planning for Federal Sustainability* (80 FR 15869)

Greenhouse gases (GHG) are gases that trap heat in the earth's atmosphere. Both naturally occurring and man-made GHGs primarily include water vapor, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Activities that require fuel or power are the primary stationary sources of GHGs at airports. Aircraft and ground access vehicles which are not under the control of an airport, typically generate more GHG emissions than airport controlled sources.

Research has shown there is a direct correlation between fuel combustion and GHG emissions. In terms of U.S. contributions, the Government Accountability Office reports that "domestic aviation contributes about three percent of total carbon dioxide emissions, according to EPA data," compared with other industrial sources, including the remainder of the transportation sector (20 percent) and power generation (41 percent).[4]

### 1.8.5 Coastal Resources

The primary statutes, regulations, and EOs that protect coastal resources include:

- Coastal Barrier Resources Act (16 U.S.C. § 3501 *et seq.*)
- Coastal Zone Management Act (16 U.S.C. § 1451-1466)
- National Marine Sanctuaries Act (16 U.S.C. §1431 *et seq.*)
- EO 13089, *Coral Reef Protection* (63 FR 32701)
- EO 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes* (75 FR 43021-43027)

The Coastal Zone Management Act and the National Oceanic and Atmospheric Administration provide procedures for ensuring that an action is consistent with approved coastal zone management programs. The Michigan Coastal Zone Management Program was established in 1978 as a state and federal

[4] U.S. Government Accountability Office. (2009). *Aviation and Climate Change: Aircraft Emissions Expected to Grow, but Technologicals and Operational Improvements and Government Polices Can Help Control Emissions.* Washington, DC: GAO. Retrieved February 2016, from http://www.gao.gov/news.items/d09554.pdf

partnership with the National Oceanic and Atmospheric Administration.[5] Michigan's coastal boundary generally extends about 1,000 feet inland from the ordinary high water mark. In order to encompass important coastal features, there are areas where the boundary extends further inland.

The Airport is not within the Michigan Coastal Zone Management Program's coastal boundary.[6] The closest Coastal Barrier Resources System unit is about 70 miles southeast of the Airport.[7]

### 1.8.6 Department of Transportation Act, Section 4(f) Resources

Relevant federal laws, regulations, and EOs that protect Section 4(f) resources include:

- U.S. Department of Transportation (USDOT) Act – Section 4(f) (49 U.S.C. § 303.)
- Land and Water Conservation Fund Act of 1965 (16 U.S.C. §§ 4601-4604 *et seq.*)
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) – Section 6009 (49 U.S.C. § 303.)
- U.S. Department of Defense Reauthorization (Public Law (P.L.) 105-185, Division A, Title X, Section 1079, November 18, 1997, 111 Stat. 1916)

The USDOT Act, Section 4(f) provides that no project that requires the use of any land from a public park or recreational area, wildlife and waterfowl refuge, or historic site be approved by the Secretary of the Interior unless there is no viable alternative and provisions to minimize any possible harm are included in the planning. Similarly, the Land and Water Conservation Fund Act prevents the conversion of lands purchased or developed with Land and Water Conservation funds to non-recreation uses, unless the Secretary of the Interior, through the National Park Service, approves the conversion. Conversion may only be approved if it is consistent with the comprehensive statewide outdoor recreation plan in force when the approval occurs. Additionally, the converted property must be replaced with other recreation property of reasonably equivalent usefulness and location, and at least equal fair market value.

The closest Section 4(f) property to the Airport is a historic property at 4305 South Linden Road (Reference Number 8200516).[8] This historic site is listed on the National Register of Historic Places, about one-half mile west of the Airport.[9] The closest public park is Swartz Creek Valley Park, about one mile northwest of the Airport.[10] Land and Water Conservation funds have been used at various parks throughout Genesee County.[11] Of those parks, the Riverbank Park (about four miles northeast of the Airport) is the closest park to the Airport.

[5] Michigan Department of Environmental Quality. (2016). *Coastal Management Program*. Retrieved April 2016, from Great Lakes: http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3696-11188--,00.html

[6] Michigan Department of Environmental Quality. (2016). *Coastal Zone Boundary Maps*. Retrieved February 2016, from Coastal Management: http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3696-90802--,00.html

[7] USFWS. (2016, February). *Coastal Barrier Resources System Mapper*. Retrieved February 2016, from Coastal Barrier Resources Systems: http://www.fws.gov/CBRA/Maps/Mapper.html

[8] Although the house is no longer at this address, the National Park Service identifies the site as historic.

[9] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[10] City of Flint. (2015). *J. Dallas Dort Memorial Park System City of Flint 2015*. Retrieved March 2016, from Parks and Recreation: https://www.cityofflint.com/wp-content/uploads/2015-Trails-and-Park-Map-8x11.pdf

[11] National Park Service. (2016, February 19). *Detailed Listing of Grants Grouped by County, Michigan, Genesee*. Retrieved February 2016, from Project List by County and Summary Reports: http://waso-lwcf.ncrc.nps.gov/public/index.cfm

### 1.8.7 Farmlands

Farmlands are agricultural areas that are considered important and protected by federal, state, and local regulations. Important farmlands can include all pasturelands, croplands, and forests considered prime, unique, or of statewide or local importance. The following statutes, regulations, and guidance pertain to farmlands:

- Farmland Protection Policy Act (7 U.S.C. §§ 4201-4209)
- CEQ Memorandum on the Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act (45 FR 59189)
- Michigan Public Act 116, *Preserving Farmland in Michigan*

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, a majority of the Airport property is crosier loam soil with 0 to 2 percent slopes. The NRCS considers this soil type prime farmland if drained.[12] The 2010 U.S. Census identifies the entire Airport property as an "urbanized area."[13] Under Section 523(10)(B) of the Farmland Protection Policy Act, land identified as urbanized areas on Census Bureau maps are not subject to the provisions of the Farmland Protection Policy Act. Therefore, there are no prime, unique, state, or locally important farmland soils in the Airport property.

### 1.8.8 Hazardous Materials, Solid Waste, and Pollution Prevention

Federal laws, regulations, and EOs that relate to hazardous materials, solid waste, and pollution prevention include:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. §§ 9601-9765)
- Emergency Planning and Community Right to Know Act (42 U.S.C. §§ 11001-11050);Federal Facilities Compliance Act (42 U.S.C. § 6961)
- Hazardous Materials Transportation Act (49 U.S.C. §§ 5101-5128)
- Oil Pollution Prevention Act of 1990 (33 U.S.C. §§ 2701-2762)
- Pollution Prevention Act (42 U.S.C. §§ 13101-13109)
- Toxic Substances Control Act (TSCA) (15 U.S.C. §§ 2601-2697)
- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §§ 6901-6992k)
- EO 12088, *Federal Compliance with Pollution Control Standards* (43 FR 47707)
- EO 12580, *Superfund Implementation* (52 FR 2923), (63 CFR 45871), and (68 CFR 37691)
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (72 FR 3919)
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (74 FR 52117).

[12] NRCS. (2015, September 18). *Soil Data Explorer*. Retrieved February 2016, from Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

[13] U.S. Census Bureau. (2010). *2010 Census Urban Area Reference Maps for Flint, Michigan*. Retrieved February 2016, from The U.S. Census Bureau: https://www.census.gov/geo/maps-data/maps/2010ua.html

In a regulatory context, the terms "hazardous wastes," "hazardous substances," and "hazardous materials" have very precise and technical meanings:

Subpart C of the RCRA defines hazardous wastes (sometimes called characteristic wastes) as solid wastes that are ignitable, corrosive, reactive, or toxic. Examples include waste oil, mercury, lead or battery acid. In addition, Subpart D of RCRA contains a list of specific types of solid wastes that the USEPA has deemed hazardous (sometimes called listed wastes). Examples include degreasing solvents, petroleum refining waste, or pharmaceutical waste.

Section 101(14) of the CERCLA defines the hazardous substances broadly. It includes hazardous wastes, hazardous air pollutants, or hazardous substances designated as such under the Clean Water Act and TSCA and elements, compounds, mixtures, or solutions, or substances listed in 40 CFR Part 302 that pose substantial harm to human health or environmental resources. Pursuant to CERCLA, hazardous substances do not include any petroleum or natural gas substances and materials. Examples include ammonia, bromine, chlorine, or sodium cyanide.

According to 49 CFR Part 172, hazardous materials are any substances commercially transported that pose unreasonable risk to public health, safety, and property. These substances include hazardous wastes and hazardous substances as well as petroleum and natural gas substances and materials. As a result, hazardous materials represent hazardous wastes and substances. Examples include household batteries, gasoline, or fertilizers.

Aircraft fuel constitutes the largest quantity of hazardous substances stored and consumed at the Airport. As the Aircraft Fuel Storage section of this chapter describes, there are three above ground and four underground fuel storage tanks at the Airport. These tanks have the capacity to store a total of 59,000 gallons of fuel. The USEPA identifies the Airport (Handler ID: MID985650266) as a hazardous waste site under RCRA.[14] According to the USEPA, the Airport is a conditionally exempt small quantity hazardous waste generator.[15]

The USEPA also identifies 10 hazardous waste sites on Airport property, though some of the entities identified with the site no longer do business at the Airport:[16]

- Federal Express Corporation (Handler ID: MID982618324)
- FEDEX Express (Handler ID: MIK885111328)
- Simmons Airline (Handler ID: MID982628398)[18]
- Lewis R P Co (Handler ID: MID985657923)[18]
- IFC Aviation (Handler ID: MID981776909)[18]
- Flint Air Service, Inc. (Handler ID: MIR000006007)[18]
- ABX Air, Inc. (Handler ID: MIK242547396)[18]
- DHL Express (USA), Inc. (Handler ID: MIK745158683)[17]
- Emery Worldwide A Cf Co. (Handler ID: MI0000058412)[18]

[14] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[15] USEPA. (2016). *RCRAInfo*. Retrieved March 2016, from Envirofacts: https://oaspub.epa.gov/enviro/rcrainfoquery_3.facility_information?pgm_sys_id=MID985650266

[16] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[17] No longer operates at the Airport.

» Michigan Department of Transportation (Handler ID: MI0001010792)

There are no CERCLA superfund sites on or around the Airport.[18] Prior to the 1970s, there was one uncontrolled landfill generally situated in the triangle formed by the Runway 9 end, Swartz Creek, and the Canadian National Railway. According to the Authority, this site was previously covered. The area is undeveloped, with the exception of a portion of the Airport service road. The type and extent of hazardous materials that may be present at the site, if any, are unknown.

The Citizen's Disposal Inc., landfill is the closest landfill to the Airport (about two miles southeast of the Airport).[19] Based on the most recent annual report on solid waste management by the Michigan Department of Environmental Quality, the Citizen's Disposal Inc. landfill is not expected to reach capacity for 18 years.[20]

### 1.8.9 Historical, Architectural, Archeological, and Cultural Resources

The National Historic Preservation Act (NHPA) (54 U.S.C. §§300101 et seq.) establishes the Advisory Council on Historic Preservation (ACHP). The ACHP oversees federal agency compliance with the NHPA. The NHPA also established the National Register of Historic Places (NRHP), which the National Park Service (NPS) oversees. Other applicable statutes and EOs include:

» American Indian Religious Freedom Act (42 U.S.C. § 1996)
» Antiquities Act of 1906 (54 U.S.C. §§320301-320303)
» Archeological and Historic Preservation Act (54 U.S.C. §§ 312501-312508)
» Archeological Resources Act (16 U.S.C. §§ 470aa-470mm)
» Department of Transportation (USDOT) Act, Section 4(f) (49 U.S.C. § 303)
» Historic Sites Act of 1935 (16 U.S.C. §§ 461-467)
» Native American Graves Protection and Repatriation Act (25 U.S.C. §§ 3001-3013)
» Public Building Cooperative Use Act (40 U.S.C. §§ 601a, 601a1, 606, 611c, and 612a4)
» EO 11593, *Protection and Enhancement of the Cultural Environment* (36 FR 8921)
» EO 13006, *Locating Federal Facilities on Historic Properties in Our Nation's Central Cities* (61 FR 26071)
» EO 13007, *Indian Sacred Sites* (61 FR 26771)
» EO 13175, *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249)
» Executive Memorandum, Government-to-Government Relations with Native American Tribal Governments (April 29, 1994), Executive Memorandum on Tribal Consultation (Nov. 5, 2009) (65 FR 67249)
» DOT Order 5650.1, *Protection and Enhancement of the Cultural Environment*

[18] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[19] Michigan Department of Environmental Quality. (2016). *Map of Landfills in Michigan*. Retrieved April 2016, from Solid Waste Facilities: http://www.arcgis.com/home/webmap/viewer.html?webmap=3aaaee3073d7496182cea794a228a14d&extent=-93.9543,40.8717,-77.7275,47.5911

[20] Michigan Department of Environmental Quality. (2016, January 29). Report of Solid Waste Landfilled in Michigan for Fiscal Year (FY) 2015. Retrieved April 2016, from Annual Reports of Solid Waste Landfilled in Michigan: https://www.michigan.gov/documents/deq/DEQ-OWMRP-SW_Landfill_Annual_Rpt_FY2015_512594_7.pdf

The closest NRHP-listed resource is a historic site at 4305 South Linden Road, about one-half mile west of the Airport.[21] The closest Michigan historic site is the Whaley Historic House Museum, about four miles northeast of the Airport.[22] Chapter 2, Article XIX of the City of Flint Code of Ordinances establishes historic districts and the historic district commission for the City. According to Section 2-141 of the Article, the purpose of the ordinance is the recognition, preservation, and protection of historical, architectural, and archaeological sites, buildings, structures, objects, open spaces, and features. The closest City of Flint historic site is the Superintendent's Cottage, about three miles northeast of the Airport.[23]

### 1.8.10 Land Use

Various statutes, regulations, and EOs relevant to land use include:

- Airport and Airway Improvement Act of 1982, and subsequent amendments (49 U.S.C. 47107(a)(10))
- Airport Improvement Program (49 U.S.C. 47106(a)(1)
- Airport Safety, Protection of Environment, Criteria for Municipal Solid Waste Landfills (40 CFR § 258.10)
- City of Flint Code of Ordinances, Chapter 50, *Zoning*
- Bishop International Airport Ordinance 98-1, as amended

The Airport property is within the limits of the City of Flint. The City of Flint classifies the Airport as a heavy commercial limited manufacturing district within its zoning code.[24] According to the City's Code of Ordinances, Chapter 50, Article XIII, the intent of the heavy commercial limited manufacturing district classification is to accommodate heavy commercial and certain light manufacturing uses. These uses are typically incompatible with uses appropriate in retail business districts, but do not warrant an exclusive industrial classification.

The Bishop International Airport Joint Airport Zoning Board established Ordinance 98-1 limiting the height of structures and objects of natural growth, and otherwise recommended the use of property within a 10-mile radius of the Airport. With regards to height, the 10-mile area around the Airport is separated into zones (A, B, C, and D) that define height limitations. Developers must obtain a permit for structures and objects exceeding 25 feet in height in Zone A, exceeding 35 feet in height in Zone B, exceeding 50 feet in height in Zone C, and exceeding 100 feet in height in Zone D. The ordinance does not allow for the following uses of land within 10-miles of the Airport that would:

- Create electrical interference with radio communications between the Airport and aircraft or create interference with navigations aids employed by aircraft
- Make it difficult for pilots to distinguish between Airport lights and others or cause glare to the eyes of pilotsusing the Airport
- Create air pollution in such amounts as to impair the visibility of flyers in the use of the Airport

[21] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[22] State of Michigan. (2016). Whaley Historic House Museum – Flint. Retrieved March 2016, from Interactive Map: http://www.michigan.org/interactive-map/#rid=B19140&ips=b514

[23] City of Flint Code of Ordinances, § 2-143 (2012)

[24] City of Flint. (2014). Current City of Flint Zoning. Retrieved April 2015, from Planning and Zoning: https://www.cityofflint.com/wp-content/uploads/Zoning_9-2014.pdf

- Locate or permit the operation of a dump, waste disposal site, sanitary landfill, hazardous waste facility, solid waste transfer station, or recycling facility within 10,000 feet of any runway
- Endanger the landing, taking off, maneuvering of aircraft
- Attract birds

Land uses in the immediate vicinity of the Airport include industrial, commercial, and residential land uses. Immediately north of the Airport is the Canadian National Railway. There are various commercial developments east and west of the Airport. The closest residential area is about 750 feet east of the Runway 18/36 centerline. This is a mobile home park and a majority of the lots are vacant. There are also residential areas southeast of Runway 18/36 and west of Runway 9/27.

### 1.8.11 Natural Resources and Energy Supply

Statutes and EOs that are relevant to natural resources and energy supply include:

- Energy Independence and Security Act (42 U.S.C. § 17001 et seq.)
- Energy Policy Act (42 U.S.C. § 15801 et seq.)
- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (72 FR 3919)
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (74 FR 52117)

Natural resources (e.g., water, asphalt, aggregate, etc.) and energy use (e.g., fuel, electricity, etc.) at an airport is a function of the needs of aircraft, support vehicles, airport facilities, support structures, and terminal facilities. Water is the primary natural resource used at the Airport on a daily basis (see the Water Resources section for further details). Asphalt, aggregate, and other natural resources have also been used in various construction projects at the Airport. None of the natural resources that the Airport uses, or has used, are in rare or short supply.

### 1.8.12 Noise and Noise-Compatible Land Use

Noise is the most apparent environmental effect from an airport, and at most airports accounts for the majority of comments from nearby residents. Statutes and EOs relevant to noise and noise-compatible land use include:

- The Control and Abatement of Aircraft Noise and Sonic Boom Act of 1968 (49 U.S.C. § 44715)
- The Noise Control Act of 1972 (42 U.S.C. §§ 4901-4918)
- Aviation Safety and Noise Abatement Act of 1979 (49 U.S.C. § 47501 et seq.)
- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47101 et seq.)
- Airport Noise and Capacity Act of 1990 (49 U.S.C. §§ 47521-47534, §§ 106(g)
- Section 506 of the FAA Modernization and Reform Act of 2012, *Prohibition on Operating Certain Aircraft Weighting 75,000 Pounds of Less Not Complying with Stage 3 Noise Levels* (49 U.S.C. §§ 47534)

As the Land Use section describes, there are residential land uses near the Airport. These areas may be sensitive to aircraft noise associated with the Airport. The Authority conducted a FAR Part 150 Airport Noise

Compatibility Study in 1999 to determine potential noise effects from the Airport to the surrounding area, and potential incompatible land uses. The Airport's aviation noise contours were updated in 2006 as part of the Airport's previous Master Plan Update. Similarly, the contours are being updated as part of this Master Plan Update.

### 1.8.13 Socioeconomics, Environmental Justice, and Children's Health and Safety

The primary considerations of a socioeconomics analysis are the economic activity, employment, income, population, housing, public services, and social conditions of the area. The Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970 (42 U.S.C. § 61 et seq.), implemented by 49 CFR Part 24, is the primary statute related to socioeconomic impacts. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (62 FR 19885) is the primary EO related to Children's Environmental Health and Safety Risks. Statutes, EOs, memorandums, and guidance that are relevant to environmental justice include:

- Title VI of the Civil Rights Act, as amended (42 U.S.C. §§ 2000d-2000d-7)
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629)
- Memorandum of Understanding on Environmental Justice and EO 12898
- USDOT Order 5610.2(a), *Environmental Justice in Minority and Low-Income Populations* (77 FR 27534)
- CEQ Guidance: *Environmental Justice: Guidance Under the National Environmental Policy Act*
- Revised USDOT Environmental Justice Strategy (77 FR 18879)

Table 1-16 provides the socioeconomic and environmental justice characteristics of the area around the Airport. This data is from the U.S. Census Bureau 2010-2014 American Community Survey at the tract level (the tract that the Airport is in and the adjacent tracts).

| ***Characteristics*** | |
|---|---|
| Total Population | 14,684 |
| Percent Minority | 11.42% |
| Percent Living Below the Poverty Level | 7.52% |
| Percent of the Population below 18 Years of Age | 21.25% |
| Percent Unemployed (above 16 Years of Age) | 9.25% |
| Total Housing Units | 6,569 |
| Vacant Housing Units | 602 |


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***TABLE 1-16***
***SOCIOECONOMIC AND ENVIRONMENTAL JUSTICE CHARACTERISTICS***

Sources: U.S. Census Bureau American Community Survey 2010-2014 (Census Tracts 109.12, 110.10, 129.04, and 9800); RS&H, 2016

With regards to children's environmental health and safety risks, the closest school to the Airport is the Madison Academy, about 0.5-mile southeast of the Airport. The school serves students in kindergarten through twelfth grade.

### 1.8.14 Visual Effects

Aesthetic effects are generally more difficult to quantify because of the subjective nature of annoyances associated with light emissions and visual impacts. Various landside lighting illuminates current Airport facilities such as the airfield (e.g., runways and taxiways), buildings, access roadways, automobile parking areas, and apron areas. As previously described, the Airport is zoned as a heavy commercial limited manufacturing district. The Airport is developed in a manner that is consistent with this zoning. Structures at the Airport include, but are not limited to, the terminal building, FBO, hangars, and maintenance buildings.

Vegetation (e.g., trees and shrubs) helps to reduce light emissions from the Airport to nearby residential areas and block a direct line of sight from most residential areas to the Airport. Commercial land uses have a direct line of sight to the Airport; however, the visual effects of the Airport to commercial or industrial land uses are not typically considered a nuisance.

### 1.8.15 Water Resources

Water resources are considered wetlands, floodplains, surface waters, and groundwater. These resources typically function as a single, integrated natural system that are important in providing drinking water and in supporting recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. Statutes and EOs that are relevant to water resources include:

- EO 11990, *Protection of Wetlands* (42 FR 26961)
- Clean Water Act (33 U.S.C. §§ 1251-1387)
- Fish and Wildlife Coordination Act (16 U.S.C. § 661-667d)
- USDOT Order 6660.1A, *Preservation of the Nation's Wetlands*
- EO 11988, *Floodplain Management* (42 FR 26951)
- National Flood Insurance Act (42 U.S.C. § 4001 *et seq.*)
- USDOT Order 5650.2, *Floodplain Management and Protection*
- Clean Water Act (33 U.S.C. §§ 1251-1387)
- Fish and Wildlife Coordination Act (16 U.S.C. § 661-667d)
- Rivers and Harbors Act (33 U.S.C. § 401 and 403)

- Safe Drinking Water Act (42 U.S.C. §§ 300(f)-300j-26)
- Safe Drinking Water Act (42 U.S.C. §§ 300(f)-300j-26)
- Wild and Scenic Rivers Act (16 U.S.C. §§ 1271-1278)
- Michigan Natural Resources and Environmental Protection Act (1994 PA 451)

There are various water resources in and around the Airport property. According to the USFWS National Wetland Inventory, there are freshwater emergent wetlands and freshwater forested/shrub wetlands on Airport property (see *Exhibit 1-14*).[25] There are similar wetlands, as well as freshwater ponds, in the area surrounding the Airport.

According to current FEMA Flood Insurance Rate Maps for the Airport area, there are 100-year floodplains and regulatory floodways in and around the Airport property.[26] The floodplains and floodways are in the western and southern portions of the Airport (see *Exhibit 1-15*). The 100-year floodplain is the area that FEMA classifies as having a 1-percent annual chance of flooding. FEMA defines a regulatory floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."[27]

The Airport property intersects three streams (see *Exhibit 1-16*). Hewitt Drain is on the western side of the Airport. Swartz Creek is also on the western side of the Airport property and extends to the southern portion of the Airport property. Carman Creek (also referred to as Call Drain Canal) is on the east side of the Airport Property. The USEPA identifies these streams as impaired due to the presence of polychlorinated biphenyls in the water.[28, 29] With regards to Wild and Scenic Rivers, the Flint River, about 2.5 miles north of the Airport, is the closest protected river segment.[30]

The Airport intersects three 12-digit hydrologic units.[31] The most western portion of the Airport is in the West Branch Swartz Creek watershed (Hydrologic Unit Code (HUC) 12 ID: 040802040304). The central and western portion of the Airport is in the Indian Creek-Swartz Creek watershed (HUC 12 ID: 040802040305). The northern and eastern portion of the Airport is in the Swartz Creek watershed (HUC 12 ID: 040802040307). The Flint Township Sewer and Water Department, which receives water supplies from the Lower Lake Huron Watershed through the City of Detroit, provides water services to the Airport. According to the latest Water Quality Report, the Airport's source of water meets all standards for regulated contaminates.[32]

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[25] USFWS. (2015, October 1). *National Wetlands Inventory Mapper*. Retrieved February 2016, from National Wetlands Inventory: http://www.fws.gov/wetlands/Data/Mapper.html

[26] FEMA. (2009, August 25). *Panels 26049C0282D, 26049C0284D, 2604C0301D, and 2604C0303D.* Retrieved February 2016, from FEMA Flood Map Service Center: Search by Address - Flint, Michigan: http://msc.fema.gov/portal/search?AddressQuery=Flint%2C%20Michigan#searchresultsanchor

[27] FEMA. (2015, April 24). *Definition/Description*. Retrieved May 2016, from Floodway: http://www.fema.gov/floodway

[28] USEPA. (2012). *2012 Waterbody Report for Rivers/Streams in HUC 040802040305*. Retrieved March 2016, from Waterbody Quality Assessment Report: http://ofmpub.epa.gov/waters10/attains_waterbody.control?p_list_id=MI040802040305-01&p_cycle=2012

[29] USEPA. (2012b). *2012 Waterbody Report for Rivers/Streams in HUC 040802040307*. Retrieved March 2016, from Waterbody Quality Assessment Report: https://ofmpub.epa.gov/waters10/attains_waterbody.control?p_list_id=MI040802040307-01&p_cycle=2012

[30] National Park Service. (2009, February 27). *Michigan Segments*. Retrieved March 2016, from Conservation and Outdoor Recreation: http://www.nps.gov/ncrc/programs/rtca/nri/states/mi.html

[31] USEPA. (2016). *NEPAssist*. Retrieved March 2016, from http://nepassisttool.epa.gov/nepassist/nepamap.aspx?action=searchloc&wherestr=bishop%20international%20airport

[32] Genesee County Water & Waste Services. (2015, July 1). 2014 Water Report. Retrieved April 2016, from Annual Report: http://www.gcdcwws.com/pages/Annual-Report

***EXHIBIT 1-14***
***WETLANDS***

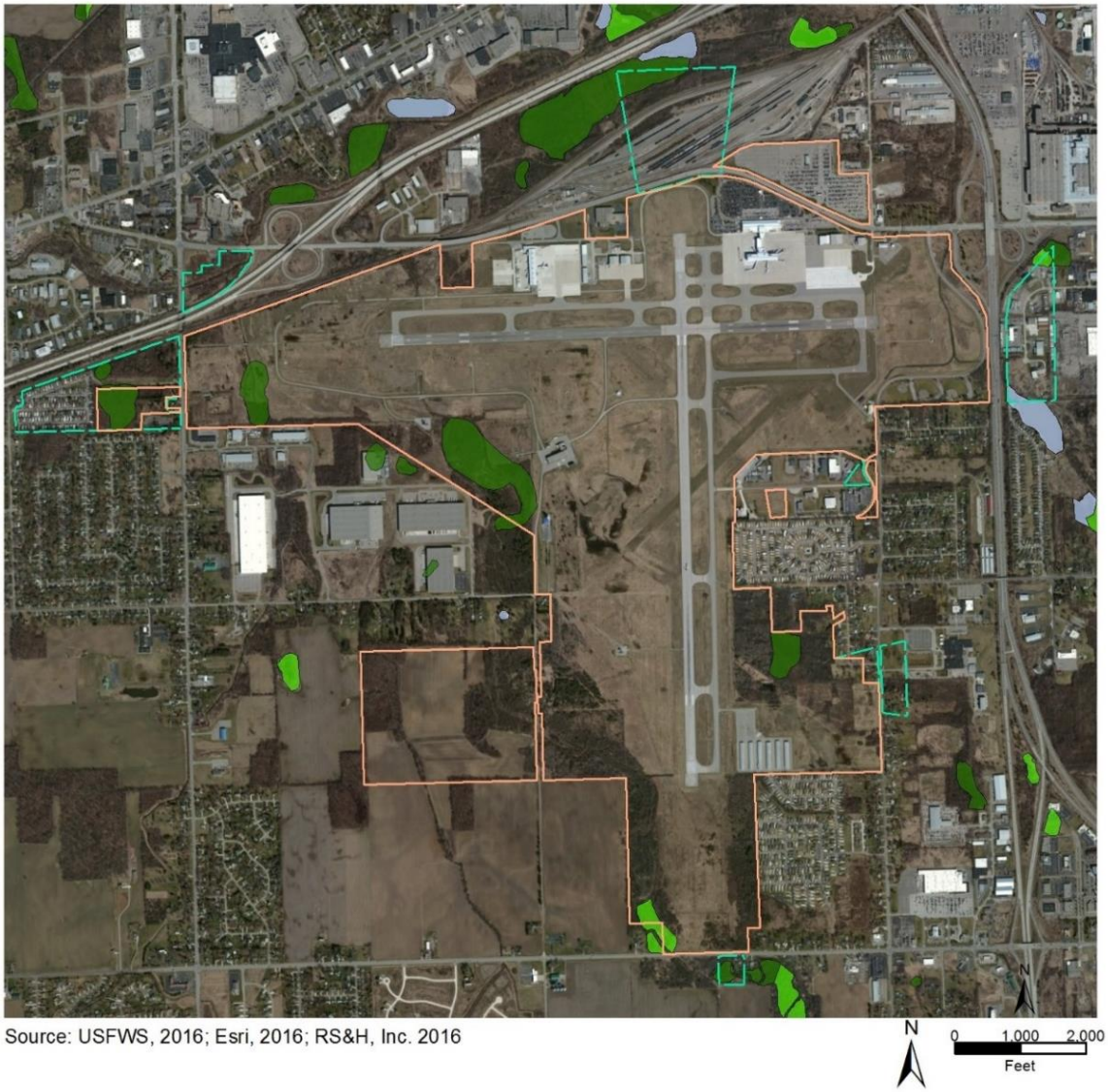
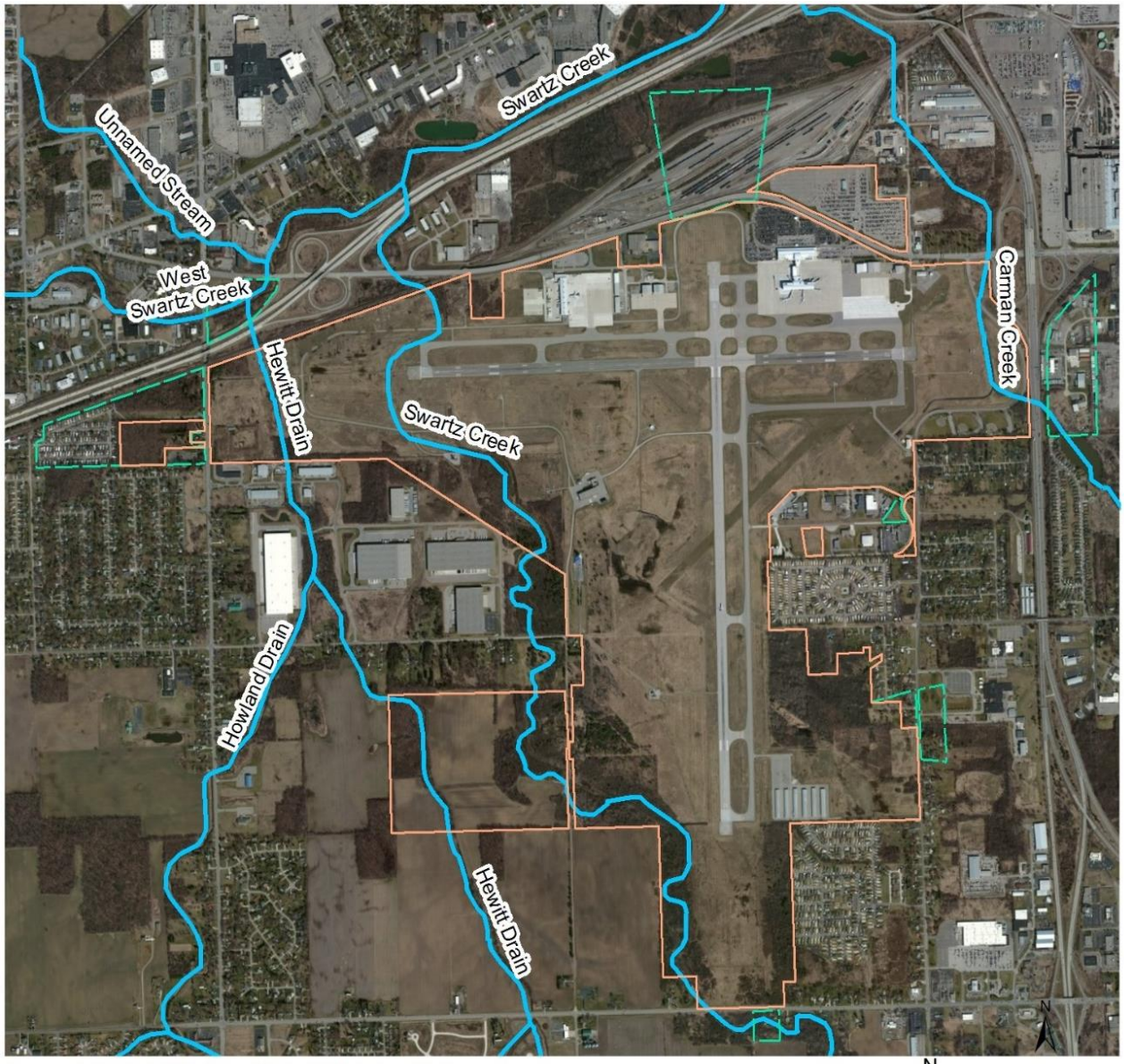


***EXHIBIT 1-15***
***FLOODPLAIN***


Source: FEMA, 2016; Esri, 2016; RS&H, Inc. 2016

***EXHIBIT 1-16***
***SURFACE WATERS***



CHAPTER 2

# AVIATION DEMAND FORECASTS

## 2.1 INTRODUCTION AND BACKGROUND

A critical element in the planning and development of airport facilities is knowing the level of passengers, aircraft movements and cargo volumes that can be expected during a prescribed planning time period. This chapter outlines the expected passenger, aircraft movements and air cargo volumes for a 20-year time horizon, as well as the methodology used to reach those conclusions. This chapter concludes with recommended passenger and operations forecasts that should be used to plan the requirements for future infrastructure and facilities.

Changes in passenger, cargo and aircraft movement volumes are known to be influenced by a variety of elements, including variations in population, labor force, per capita income, gross regional product, air fares, competition from other airports or modes of transportation, and a variety of other economic and non-economic factors, including airline business policies and local regulatory conditions.

The Federal Aviation Administration (FAA) annually prepares Terminal Area Forecast (TAF) for 264 FAA towered airports, 252 Federal contract tower airports, 31 terminal radar approach control facilities, and 2,818 non-towered airports. FNT is one of these airports. For the purposes of this master plan update, the baseline forecasts for passenger, total aircraft operations and based aircraft annual volumes that will be used in planning the various airport facilities will be based on the latest FAA TAF numbers.

In order to accommodate specific conditions that have transpired since the development of the TAF, this chapter also includes alternative forecast scenarios that consider recent market changes by Southwest Airlines, the entry of Allegiant Air into the Flint market, and expected operational changes by United Airlines, American Airlines, and Delta Air Lines. Alternative forecasts will only be used in considering how facilities are developed and planned into the future to allow sufficient flexibility in their development to accommodate the potential future demand growth forecasted in the TAF.

## 2.2 HISTORICAL AVIATION ACTIVITY

As shown in *Table 2-1*, FNT was the third-busiest commercial airport in the State of Michigan and was ranked 127$^{th}$ among all commercial airports in the US in terms of enplaned passengers, according to FAA's air traffic data for FY 2014.

***TABLE 2-1***
***MAJOR COMMERCIAL AIRPORTS IN MICHIGAN***

| Rank | Loc ID | City | Airport Name | Hub Size | CY 14 Enplanements | CY 13 Enplanements | Change % |
|---|---|---|---|---|---|---|---|
| *17* | DTW | Detroit | Detroit Metropolitan Wayne County | Large | 15,775,941 | 15,683,523 | 0.59 |
| *81* | GRR | Grand Rapids | Gerald R. Ford International | Small | 1,174,821 | 1,123,257 | 4.59 |
| *127* | FNT | Flint | Bishop International | Small | 421,129 | 398,132 | 5.78 |
| *184* | LAN | Clinton Township | Capital Region International | Non-Hub | 202,118 | 216,925 | -6.83 |
| *185* | TVC | Traverse City | Cherry Capital | Non-Hub | 196,451 | 189,644 | 3.59 |
| *209* | AZO | Kalamazoo | Kalamazoo / Battle Creek International | Non-Hub | 134,832 | 129,211 | 4.35 |
| *213* | MBS | Saginaw | MBS International | Non-Hub | 122,918 | 120,689 | 1.85 |
| *294* | SAW | Gwinn | Sawyer International | Non-Hub | 41,681 | 42,335 | -1.54 |
| *323* | PLN | Pellston | Pellston Regional | Non-Hub | 28,168 | 27,281 | 3.25 |
| *335* | CMX | Hancock | Houghton County Memorial | Non-Hub | 23,843 | 25,312 | -5.80 |
| *345* | CIU | Sault Ste. Marie | Chippewa County International | Non-Hub | 21,385 | 21,827 | -2.03 |
| *359* | ESC | Escambia | Delta County | Non-Hub | 17,946 | 15,110 | 18.77 |
| *365* | MKG | Muskegon | Muskegon County | Non-Hub | 15,847 | 18,020 | -12.06 |
| *379* | APN | Alpena | Alpena County Regional | Non-Hub | 12,809 | 15,914 | -19.51 |
| *381* | IMT | Iron Mountain | Ford | Non-Hub | 12,504 | 11,271 | 10.94 |

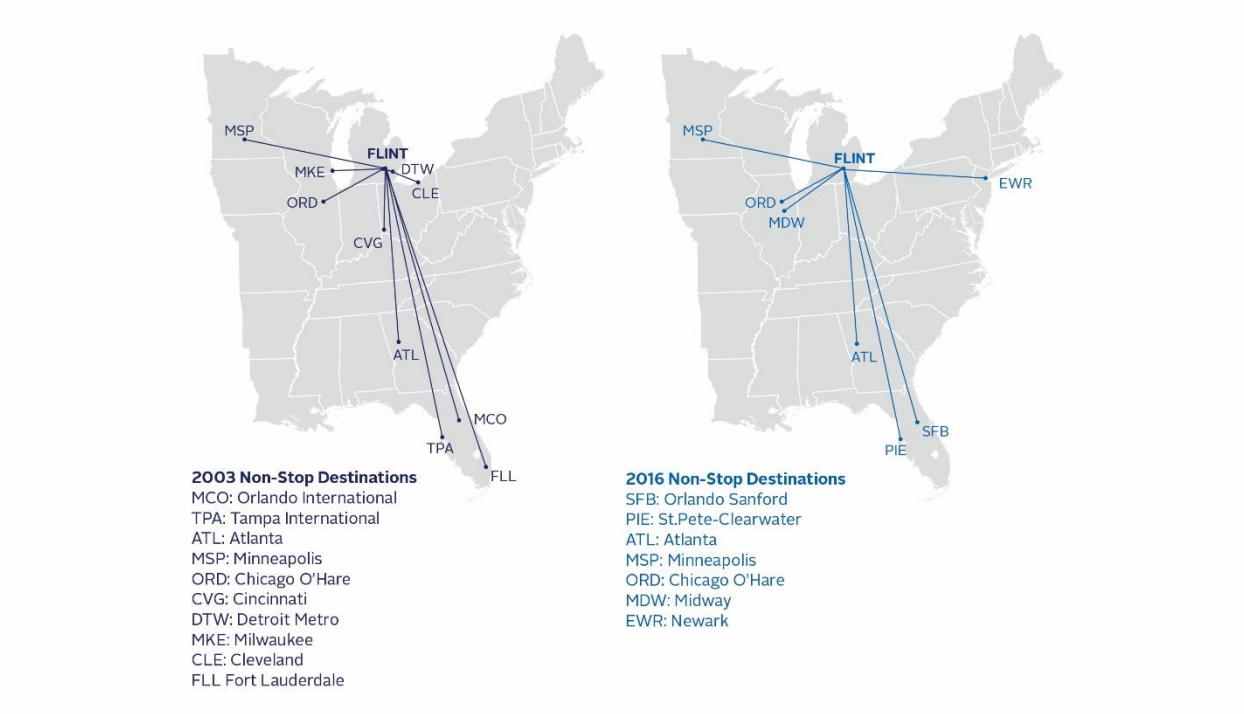
Source: FAA 2014

### 2.2.1 Passenger Traffic

Passenger volumes at FNT have been trending downward since 2004, when enplanements peaked at 601,369 passengers. Since 2004, the Airport has lost over 30.2 percent of its annual enplaned passengers, which can be attributed to various factors, including a weak Flint economy. The regional economic challenges, primarily caused by the closing of auto plants and the reduction of workforce by General Motors and Ford, has caused a reduction in the city's labor force, total personal income and per capita income. Losses can also be attributed to the consolidation in the airlines that serve the airport and changes in airline business policies.

A decade ago, the Airport had six mainline airlines serving 10 non-stop destinations, while today the Airport has five airlines serving six non-stop destinations. *Exhibit 2-1* shows a 2003 versus 2015 comparison of the non-stop destinations from FNT.

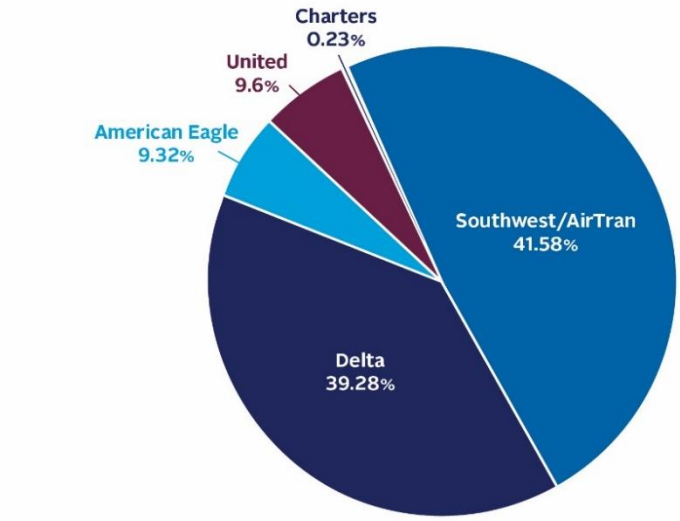
***EXHIBIT 2-1***
***COMPARISON OF NON-STOP DESTINATIONS (2003-2016)***




Source: Bishop International Airport

*Exhibit 2-2* shows the share of the passenger market at FNT for 2015 among the principal airlines that operate at the Airport. These four airlines control nearly 100 percent of the scheduled passenger traffic at the Airport. This chart will change considerably in 2016, with the reduction in flights by Southwest (from nine to six) and the entrance of Allegiant into the FNT market in April 2016 with non-stop service to Orlando Sanford International Airport (SFB) and St. Pete-Clearwater International Airport (PIE).

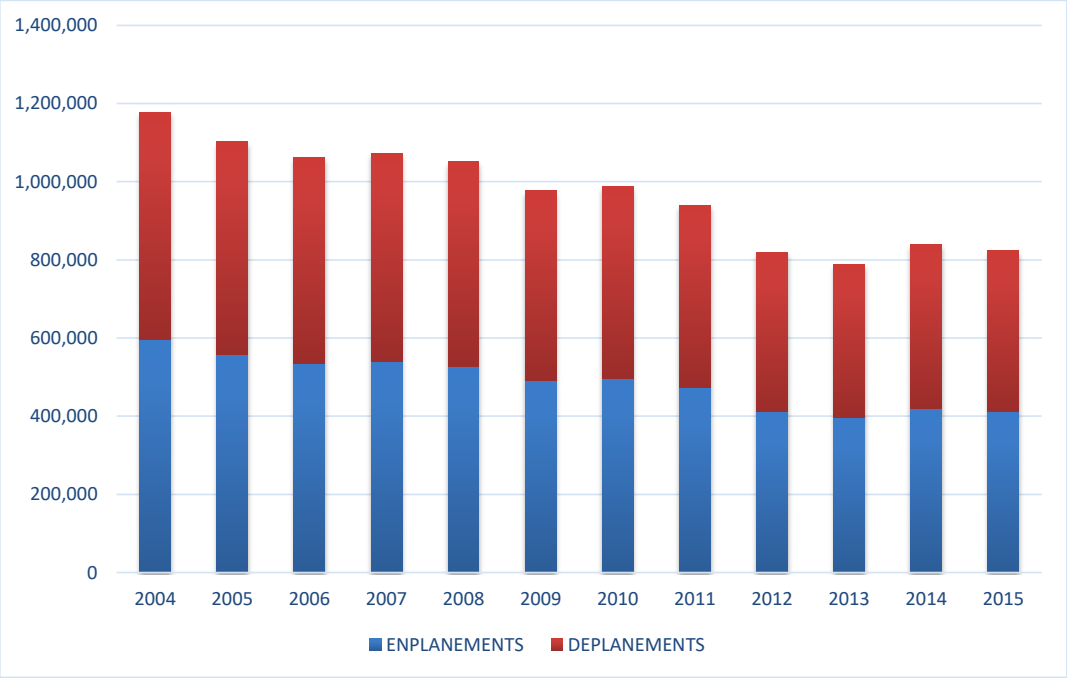
***EXHIBIT 2-2***
***PASSENGER MARKET SHARE (2015)***




Source: Bishop International Airport

*Exhibit 2-3* shows the variation in passenger volumes since 2004 for both enplaned and deplaned passengers at FNT.

***EXHIBIT 2-3***
***ANNUAL PASSENGER VOLUMES (2004-2015)***



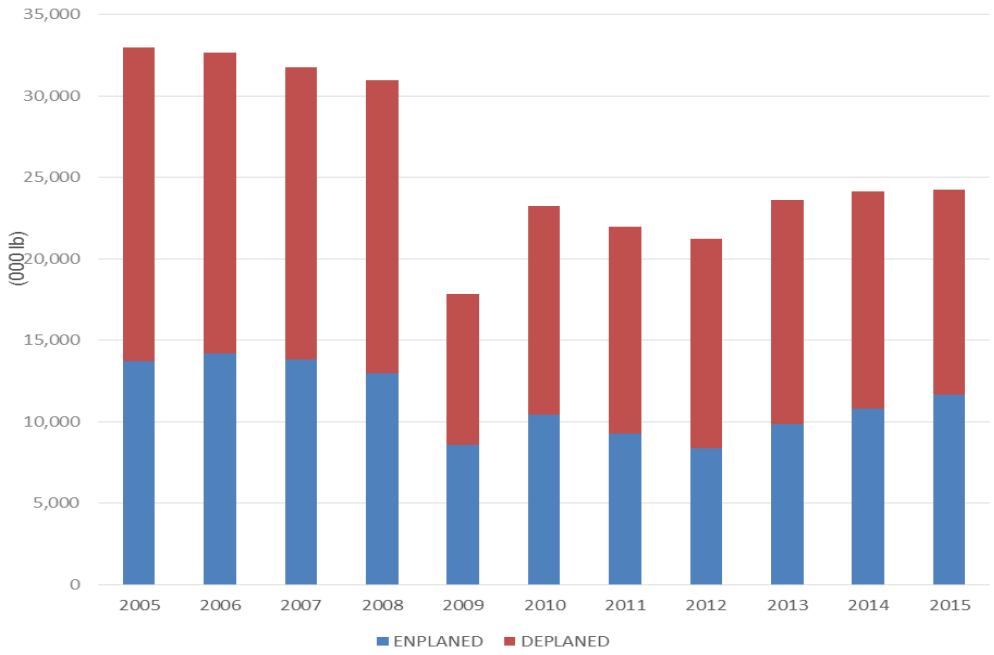

Source: Bishop International Airport

## 2.2.2 Air Cargo Traffic

Air cargo has been an important operation at FNT since early 1990. The Airport reached its largest air cargo volumes in the late 1990s with the entrance of major express carrier operators Airborne Express, Emery Air and Federal Express serving the automotive parts supply industry. As with the airline industry, air cargo operators have also consolidated. Airborne Express and Emery Air were absorbed by DHL and UPS, respectively. DHL and UPS do not operate at FNT. Federal Express is the major air cargo operator, moving over 95 percent of the Airport's enplaned cargo and over 97.5 percent of its deplaned cargo.

Air cargo volumes at FNT have declined since 2005, with the sharpest decline in 2009. Since then air cargo volumes have recovered somewhat. In 2015 volumes were 35.9 percent higher than 2009 volumes, though 36 percent lower than in 2005. Enplaned cargo volumes have had a smaller decline than deplaned cargo, showing only an 18 percent decline since 2005, while deplaned cargo volumes have declined by over 36.7 percent. Combined, these trends mean that enplaned cargo now constitutes more than 48 percent of total cargo, up from 41.4 percent in 2005. *Exhibit 2-4* below shows the volume of enplaned and deplaned cargo through the Airport.

***EXHIBIT 2-4***
***ENPLANED AND DEPLANED CARGO (2005-2015)***

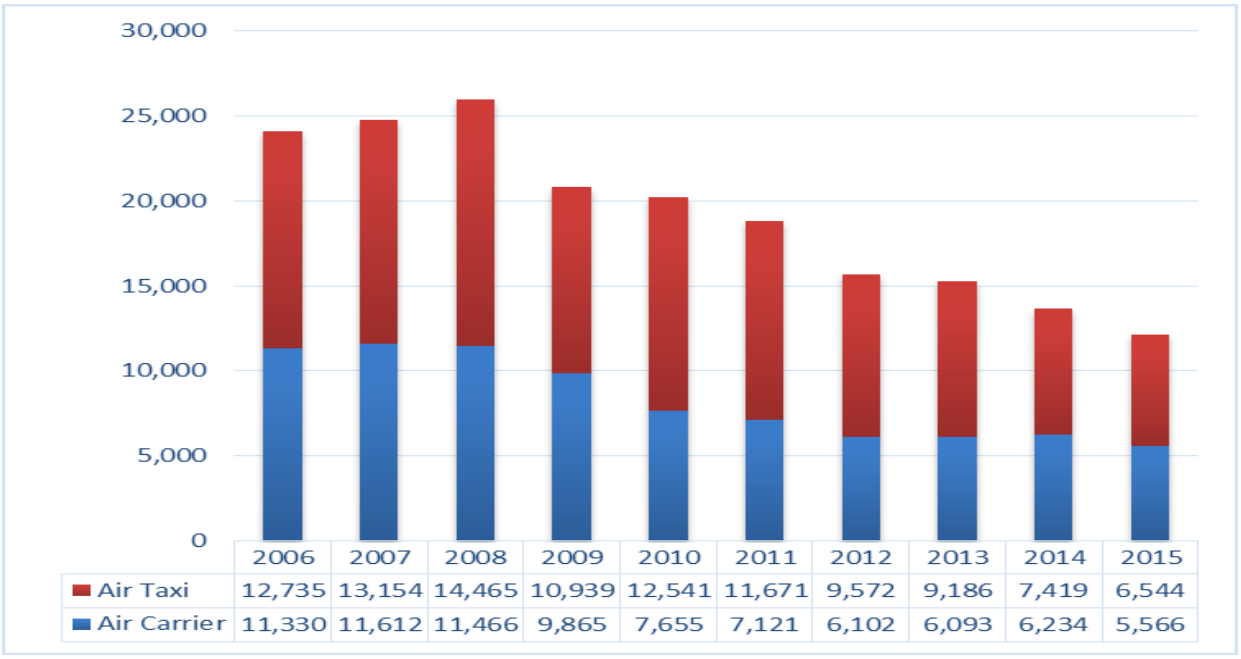



Source: Bishop International Airport

## 2.2.3 Aircraft Movements

Aircraft movements for both air carrier and air taxi operations have also declined since 2009 with a loss of over 41.8 percent. *Exhibit 2-5* shows a breakdown of these operations between 2006 and 2015.

***EXHIBIT 2-5***
***AIR CARRIER AND AIR TAXI MOVEMENTS (2006-2015)***

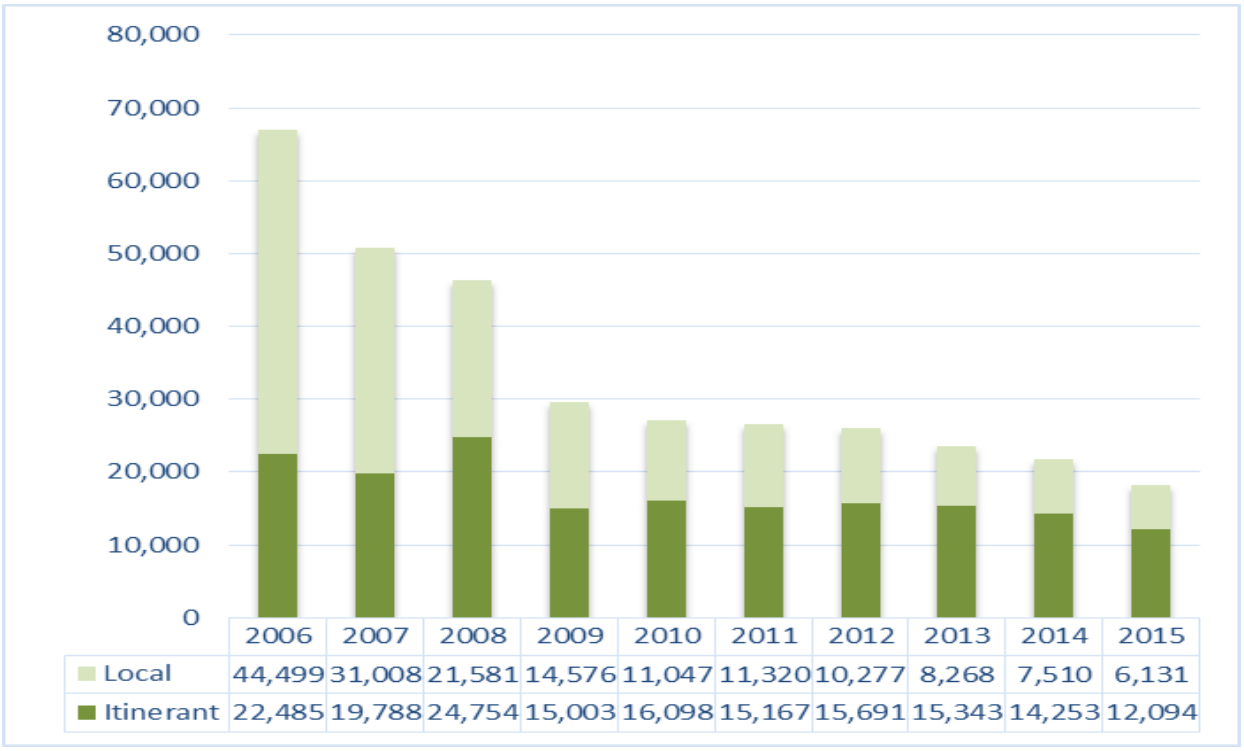



| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Air Taxi | 12,735 | 13,154 | 14,465 | 10,939 | 12,541 | 11,671 | 9,572 | 9,186 | 7,419 | 6,544 |
| Air Carrier | 11,330 | 11,612 | 11,466 | 9,865 | 7,655 | 7,121 | 6,102 | 6,093 | 6,234 | 5,566 |

Source: Bishop International Airport Statistics and for Year 2008 FAA TAF Report, 2015

General aviation traffic at the Airport has also declined in the past six years. Local operations have dropped by 57.9 percent since 2009 while itinerant operations have declined by 19.4 percent.

***EXHIBIT 2-6***
***GENERAL AVIATION OPERATIONS (2006-2015)***




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Local | 44,499 | 31,008 | 21,581 | 14,576 | 11,047 | 11,320 | 10,277 | 8,268 | 7,510 | 6,131 |
| Itinerant | 22,485 | 19,788 | 24,754 | 15,003 | 16,098 | 15,167 | 15,691 | 15,343 | 14,253 | 12,094 |

Source: Bishop International Airport Statistics and for Year 2008 FAA TAF Report, 2015

## 2.3 RELEVANT DEMOGRAPHIC, ECONOMIC AND GEOGRAPHIC ISSUES

Airport usage is directly related to the economic activity of a region. The following analysis outlines the economies of Flint as well as the catchment area for Bishop International Airport. These indexes generally provide an economic perspective relevant to changes in passenger and air cargo demand, as they generally have an influence on air traffic growth or decline.

### 2.3.1 Demographic Characteristics

*Table 2-2* presents a comparison of population growth in the state of Michigan with the entire United States. The U.S. Census Bureau estimates the state's population stopped declining in 2011 and has slightly increased in the past two years. The air service area – also called catchment area – for FNT includes all of Genesee County. In addition, Oakland County can also be considered part of the catchment area because of the Airport's convenient location.

Oakland County, located primarily southeast of Flint, includes a number of areas that serve as bedroom communities to Flint. Although airline service out of FNT is not as diverse as that out of Detroit Metro, some Oakland County residents choose to fly out of Bishop because it is closer to their work, FNT's smaller size makes it more convenient, or other factors. Many prefer the convenience of a smaller airport or the shorter total trip time FNT offers over Detroit Metro.

As shown in *Exhibit 2-7*, population in Genesee County has been slowly declining at about 0.67 percent per year for the past 10 years, while population at neighboring Oakland County has been growing at 0.31

percent during the same period and 0.66 percent in the past five years. The sum of the population of both counties has stayed at around 1.65 million during the last 10 years, faring better than the rest of the state. Today Oakland County has the highest population growth rate in Michigan, a state where the annual growth rate has averaged -0.18 percent since 2004, when the state population peaked.

***TABLE 2-2***
***ESTIMATED POPULATION AND POPULATION SHARE FOR MICHIGAN (2000-2013)***

| | Estimated Population | | | Change from Prior Period | |
|---|---|---|---|---|---|
| Year | United States | Michigan | Michigan as % of U.S. | U.S. (± %) | Michigan (± %) |
| 2000 | 281,162,411 | 9,952,450 | 3.5 | | |
| 2001 | 284,968,955 | 9,991,120 | 3.5 | +1.0% | +0.4% |
| 2002 | 287,625,193 | 10,015,710 | 3.5 | +0.9% | +0.2% |
| 2003 | 290,107,933 | 10,041,152 | 3.5 | +0.9% | +0.3% |
| 2004 | 292,805,298 | 10,055,315 | 3.4 | +0.9% | +0.1% |
| 2005 | 295,516,599 | 10,051,137 | 3.4 | +0.9% | -0.0% |
| 2006 | 298,379,912 | 10,036,081 | 3.4 | +1.0% | -0.1% |
| 2007 | 301,231,207 | 10,001,284 | 3.3 | +1.0% | -0.3% |
| 2008 | 304,093,966 | 9,946,889 | 3.27 | +1.0% | -0.5% |
| 2009 | 306,771,529 | 9,901,591 | 3.23 | +0.9% | -0.5% |
| 2010 | 309,326,295 | 9,876,149 | 3.19 | +0.8% | -0.3% |
| 2011 | 311,582,564 | 9,874,589 | 3.17 | +0.7% | -0.0% |
| 2012 | 313,873,685 | 9,882,519 | 3.15 | +0.7% | +0.1% |
| 2013 | 316,128,839 | 9,895,622 | 3.13 | +0.7% | +0.04% |

Source: United States Census Bureau

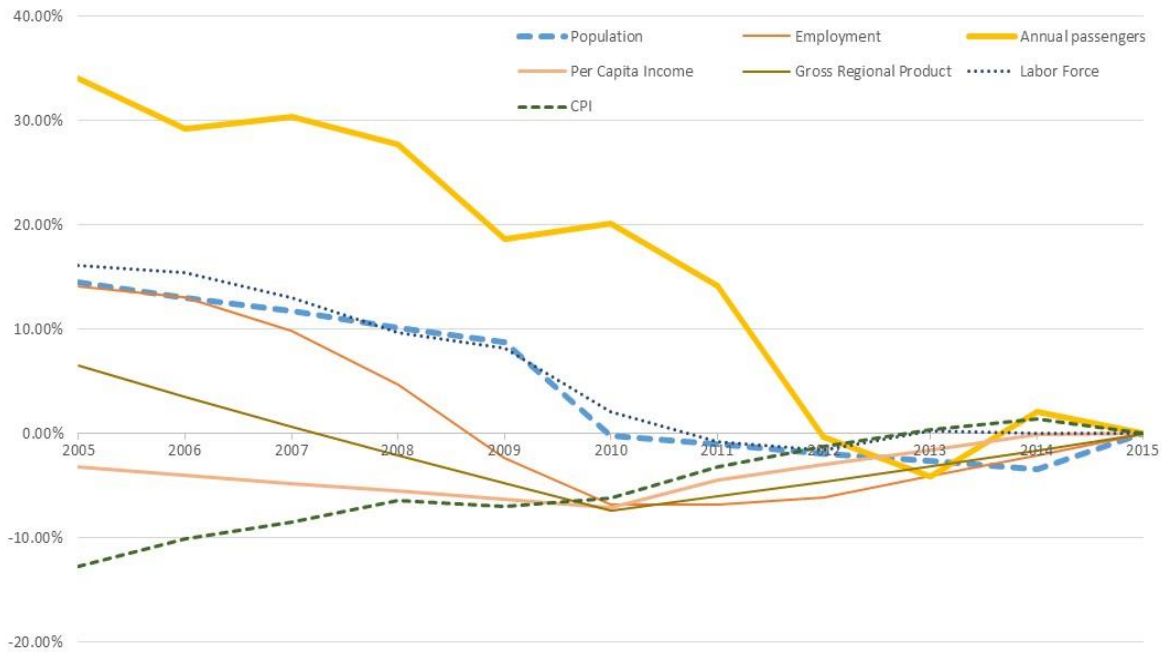
### 2.3.2 Economic Characteristics

*Exhibit 2-7* and *Exhibit 2-8* represent the variation in key relevant economic index values from 2005 through 2015 for the city of Flint, as well as the change in annual passenger and cargo volumes at FNT, using 2015 as the index benchmark. The variation in economic indexes shown in *Exhibit 2-7* includes changes in:

- Population
- Labor force
- Employment
- Per capita income
- Consumer Price Index (CPI)
- Gross regional product
- Passenger volume at FNT

As observed in this exhibit, changes in annual passenger volumes at FNT have closely followed the decline in population and labor force though the variations in passengers have been of higher magnitude. Key economic indexes regularly associated with passenger growth such as per capita income, CPI and gross regional product have been recovering since 2010, paving the way for strengthening passenger growth.

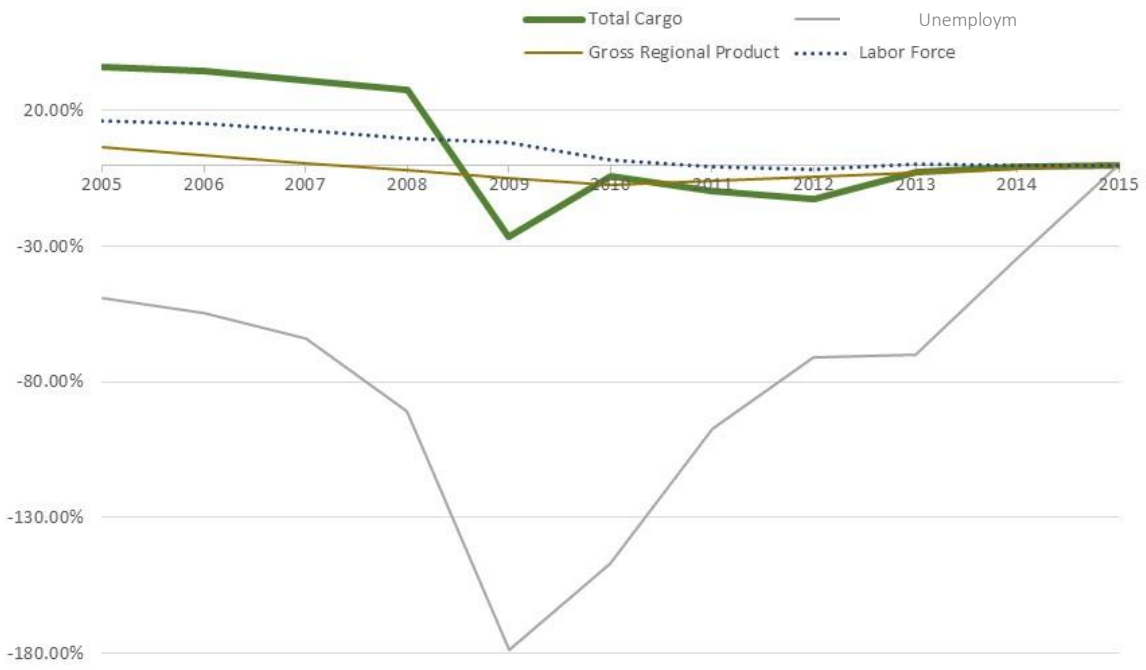
***EXHIBIT 2-7***
***COMPARISON OF KEY ECONOMIC INDEXES AND ANNUAL PASSENGER VOLUMES (2005-2015)***




Source: Woods and Poole

*Exhibit 2-8* compares the variation in annual air cargo volumes at FNT with changes in unemployment, labor force and gross regional product when compared to 2015 values. From the graph, it is evident that air cargo volumes follow similar variation trends to unemployment, which for proper representation in the graph are shown as "negative" unemployment.

***EXHIBIT 2-8***
***COMPARISON OF KEY ECONOMIC INDEXES AND ANNUAL AIR CARGO VOLUMES (2005-2015)***




Source: Woods and Poole

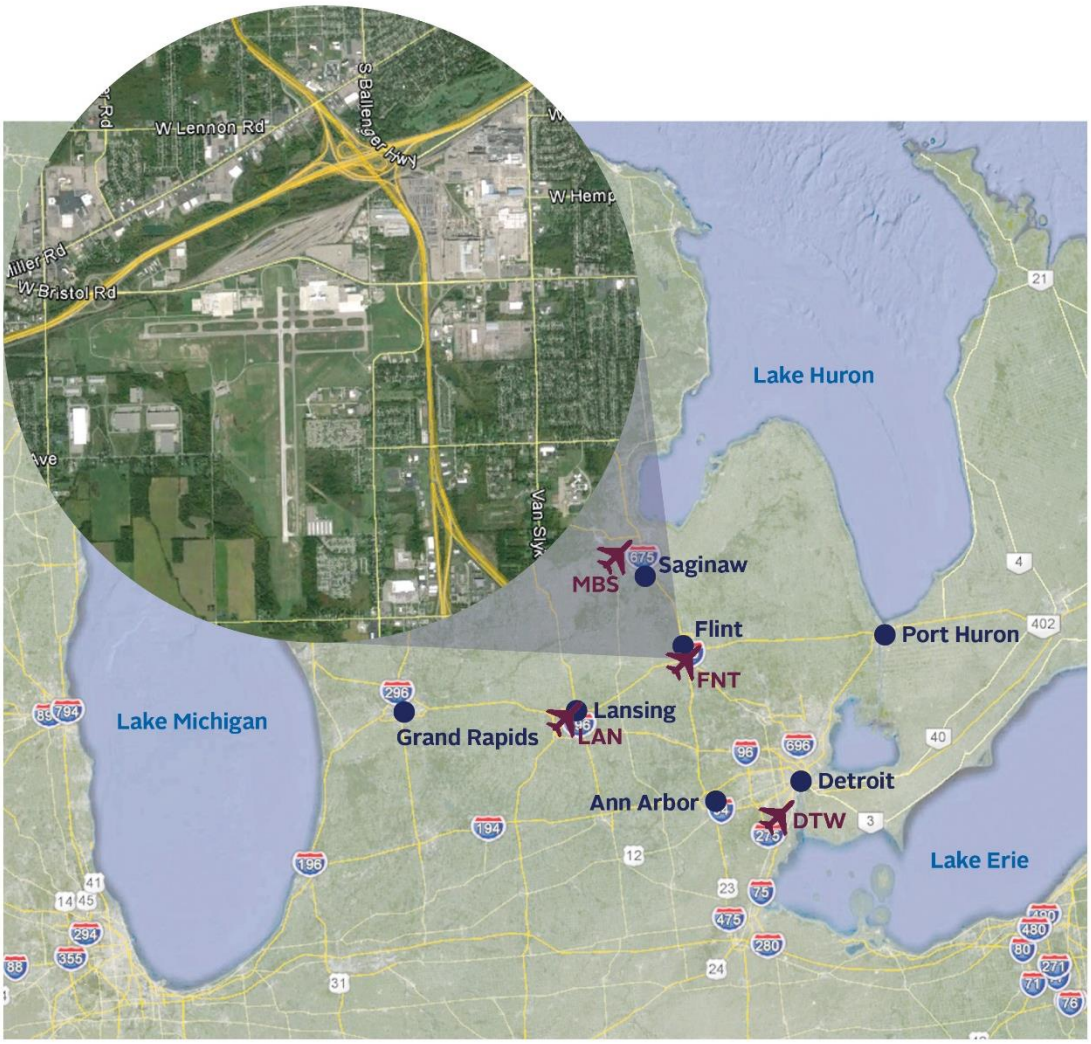
Genessee County constitutes core of FNT's market, but Oakland County is an important secondary air service area for FNT. The Airport's convenient location on the I-75 corridor means many air travelers from Oakland County can access FNT as easily as the much larger Detroit Metropolitan Wayne County Airport. Recent air service improvements and the Airport's convenient modern facilities make FNT an attractive alternative to Detroit Metro for many Oakland County air travelers.

Oakland County is populous; about 12.5 percent of Michigan's population resides in Oakland County, compared with approximately 4.1 percent in Genesee County. Oakland County is also more affluent. Oakland County's PCPI is approximately 41 percent greater than the state average and approximately 71 percent greater than that of Genesee County.

### 2.3.3 Use of Nearby Airports

FNT is strategically located at the intersection of Interstates 75 and 69, and US Highway 23, three major highways that cross the state north-south and east-west. FNT is centrally located among seven of the eight most populated cities in the state. This gives travelers a number of options in choosing other airports, with the large airport in Detroit constituting the most competitive alternative.

***EXHIBIT 2-9***
***VICINITY MAP***




Source: RS&H, Inc. 2016

The presence of a Delta Air Lines hub in Detroit can be a source of passenger diversion for the Airport. Passenger preference for non-stop service and perceived higher airfares to fly from FNT may encourage some passengers to drive to Detroit. Countering that tendency are factors such as the added expense of higher automobile parking rates at Detroit and the convenience and modern terminal facilities available at FNT. The closer parking, shorter security lines, and reduced walk from curbfront to gate all work in FNT's favor.

However, the disadvantage of air service from FNT is the necessity to make a connection. The Airport appears to be less impacted by this situation than many other similarly situated airports (operating in the shadow of a major airline hub) throughout the United States. This is attributed to the high quality and convenience of the terminal at FNT as well as the availability of air service by a number of different carriers, including low-fare carriers.

Airfares are important in determining the use of a hub airport versus a spoke airport, and competition has a significant influence on airfares. The competitive environment at FNT helps hold fares down, and the Airport's success in retaining service by low-cost carriers will have a significant impact on future fare levels. Changes in competitive forces such as airline bankruptcies, mergers, and acquisitions could significantly influence, positively or negatively, airline traffic at the Airport.

## 2.4 FORECASTS OF AVIATION ACTIVITY

Following are the proposed forecasts of aviation activity for the next 20 years to be used as the basis for this Master Plan. It has been agreed with the Airport to use FAA's most recent 2015 TAF values for passenger enplanements, total aircraft movements and based aircraft future activity volumes, while air cargo volumes and all cargo aircraft operations forecasts will be established using a combination of trend value and comparative economic regression analysis.

### 2.4.1 2015 FAA Enplaned Passenger Forecasts

FAA's Terminal Area Forecast (TAF) for enplaned passengers at FNT for the 2015 to 2035 forecast period is provided in *Exhibit 2-10*. As observed, the TAF shows a slight decline in air carrier enplanements for 2015 but a 1.48 percent annual growth rate increase until 2035. FAA is forecasting commuter aircraft to show an average annual increase of 0.88 percent. Total annual enplaned passengers are expected to grow at an annual average of 1.37 percent from 2015 to 2035.

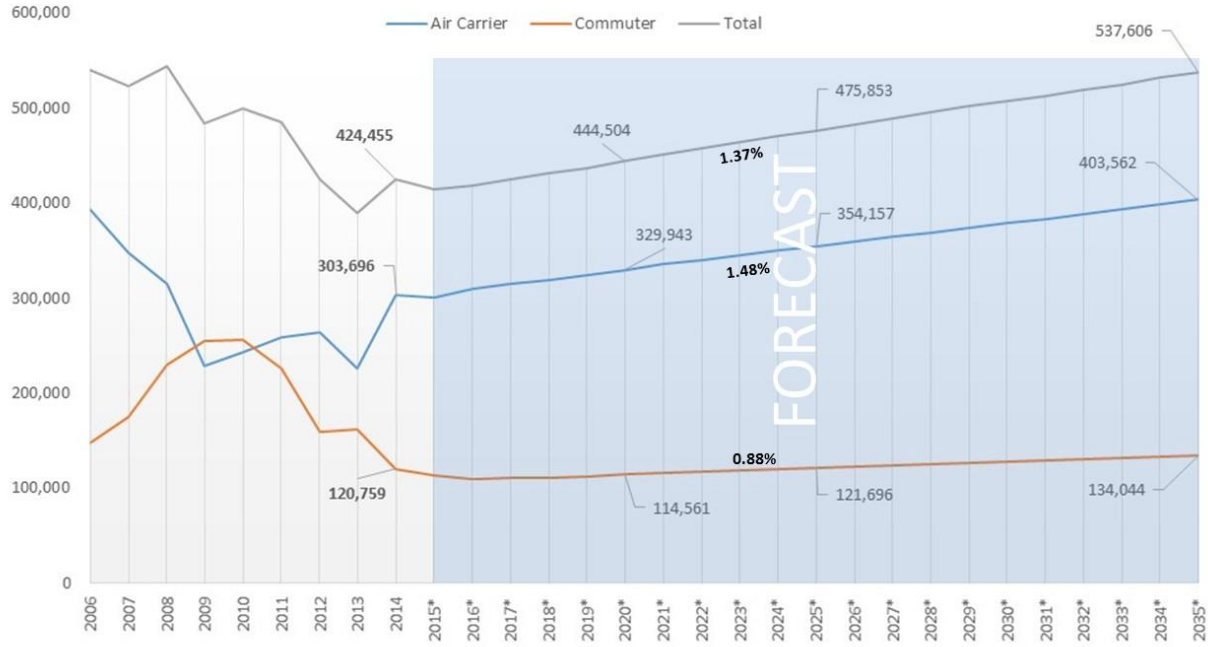
*Table 2-3* summarizes the volume of annual passenger enplanements from FAA's 2015 TAF report.

***TABLE 2-3***
***ANNUAL ENPLANEMENT FORECAST***

| | ***Annual Passenger Enplanements*** | | |
|---|---|---|---|
| **Forecast Year** | **Air Carrier** | **Air Taxi** | **Total** |
| 2015 | 301,120 | 113,594 | 414,714 |
| 2020 | 329,943 | 114,561 | 444,504 |
| 2025 | 354,157 | 121,696 | 475,853 |
| 2035 | 403,562 | 134,044 | 537,606 |

Source: FAA TAF Report, 2015

***EXHIBIT 2-10***
***ENPLANED PASSENGER TAF (2006 - 2035)***

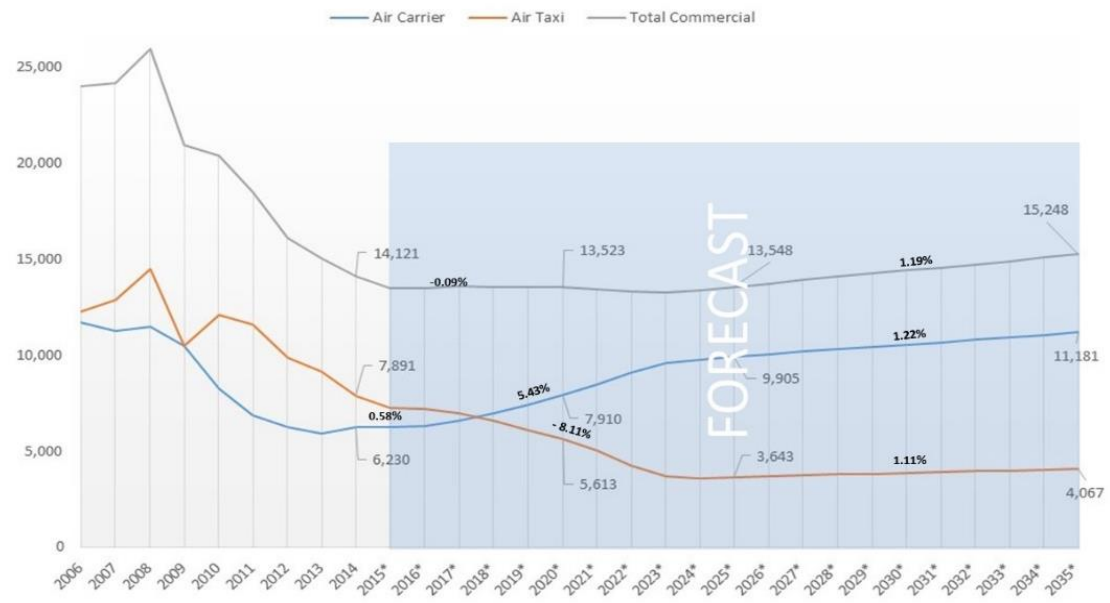



Source: FAA 2015 TAF Report

## 2.4.2 Commercial Aircraft Operations Forecasts

As shown in *Exhibit 2-11* forecast figures for air carrier operations show healthy annual growth of 5.43 percent between 2016 and 2023, after which growth slows to an annual growth rate of 1.22 percent until 2035. For commuter operations, the TAF shows an average annual decline of 8.11 percent until 2023 and a reversal to a growth rate of 1.11 percent from 2024 to 2035. FAA forecasts for total commercial operations, the sum of air carrier and commuter operations show a slight decline of 0.09 percent annually until 2023 and an increase of 1.19 percent after 2024.

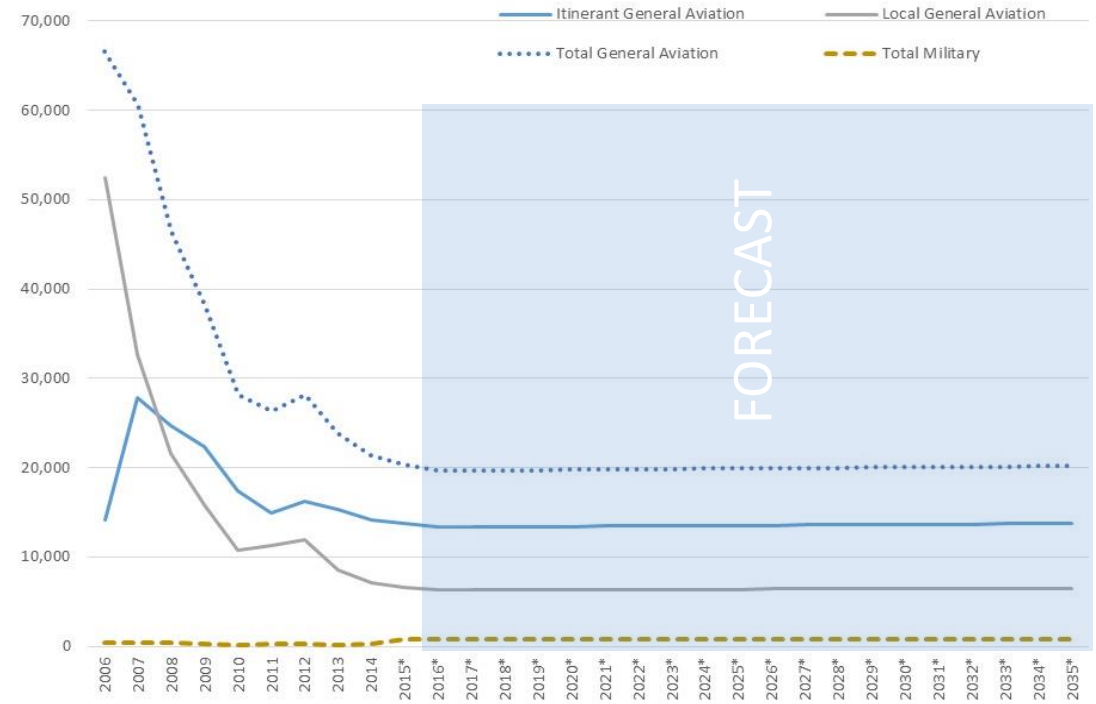
***EXHIBIT 2-11***
***FAA TAF COMMERCIAL OPERATIONS (2006 - 2035)***




Source: FAA 2015 TAF Report

*Exhibit 2-12* shows general aviation and military operations at FNT have had a very sharp decline since 2006. However, FAA is showing a modest 0.14 percent annual increase in general aviation operations for the next 20 years and no increase in military operations for the same period.

***EXHIBIT 2-12***
***FAA TAF GENERAL AVIATION AND MILITARY OPERATIONS (2006 - 2015)***




Source: FAA 2015 TAF Report

*Table 2-4* summarizes annual aircraft operations forecasts from FAA's 2015 TAF report for air carrier and commuter aircraft for the five-, 10- and 20-year planning horizon.

***TABLE 2-4***
***ANNUAL COMMERCIAL AIRCRAFT MOVEMENT FORECAST***

| | Aircraft Movements | | |
|---|---|---|---|
| **Forecast Year** | **Air Carrier** | **Air Taxi & Commuter** | **Total** |
| 2015 | 6,229 | 7,269 | 13,498 |
| 2020 | 7,910 | 5,613 | 13,523 |
| 2025 | 9,905 | 3,643 | 13,548 |
| 2035 | 11,181 | 4,067 | 15,248 |

Source: FAA 2015 TAF Report

## 2.4.3 Air Cargo Forecasts

### Annual Cargo Volumes Forecasts

As discussed earlier, air cargo has been an important service at FNT. Even though current air cargo volumes are lower than their peak in 2005, FNT is still the third busiest air cargo airport in the State behind Detroit Metro (DTW) and Gerald R Ford International Airport (GRR) in Grand Rapids. *Exhibit 2-13* compares the variation in annual air cargo volumes from 2005 to 2015 for all three airports, using 2015 values as a benchmark. As shown, all three airports experienced substantial losses in cargo volume in 2009, with FNT showing the greatest decrease and GRR the smallest.

A review at historic trends for the past 10 years clearly shows how the recession of 2008 and 2009 impacted cargo traffic at FNT, DTW and GRR. Between 2010 and 2015, GRR's annual air cargo grew at an average annual compound growth rate (ACGR) of 0.72 percent, while FNT's annual compounded growth rate was 0.82 percent. Both FNT and GRR have been growing at similar annual growth rates since 2013 at 1.26 percent and 1.36 percent, respectively while cargo volumes at DTW have steadily declined since 2012, mainly a product of the Delta/Northwest merger. This assessment would indicate that the nature of air cargo traffic through both FNT and GRR is similar, as both have a major all-cargo carrier controlling a large volume of their cargo throughput. Both show positive growth rates since 2009 with variations that tend to reflect the strengths and weaknesses of the economy of the state as a whole.

***EXHIBIT 2-13***
***VARIATION OF ANNUAL CARGO VOLUMES BETWEEN FNT, GRR, AND DTW***


Source: DTW, GRR and Bishop International Airport Statistics

Aircraft manufacturer Boeing in its most recent market analysis for air cargo[33] has forecasted that air cargo within the U.S.will grow at a 2.1 percent annual compounded growth rate between 2013 and 2033.

Three separate air cargo forecast scenarios for a 20-year planning period were developed for FNT, considering different growth rates that reflect low, medium and high expectations of growth in the air cargo market at the Airport. The low-growth scenario assumes that air cargo volumes will grow at 0.86 percent, the same historic growth rate for cargo at FNT between 2010 and 2015. A medium growth scenario, also considered the most probable scenario, assumes air cargo volumes will grow at an annual growth rate of 1.26 percent, the same annual growth rate FNT experienced since 2013. The high growth scenario assumes future air cargo volumes will grow at an annual growth rate of the 2.1 percent, the same growth rate estimated by Boeing.

*Table 2-5* summaries the expected annual cargo volumes for the forecast period considering the three proposed growth scenarios.

[33] Boeing Air Cargo Forecast 2014-2015 Report

***TABLE 2-5***
***AIR CARGO FORECAST SCENARIOS***

| | Total Cargo Volumes (000 lbs.) | | |
|---|---|---|---|
| **Planning Year** | **Low** | **Most Probable** | **High** |
| 2015* | 24,233 | 24,233 | 24,233 |
| 2020 | 25,700 | 26,200 | 27,200 |
| 2025 | 27,200 | 28,200 | 30,400 |
| 2030 | 30,200 | 32,300 | 37,900 |

* Actual Values from Airport's 2015 Statistics
Source: Bishop International Airport Statistics and RS&H, Inc., 2016 Estimates

## Air Cargo Operations

The primary cargo operator at FNT is FedEx, which operates daily flights five days a week and an occasional second daily flight with either a B-757F or an Airbus A310-200F aircraft. In previous years FedEx operated B-727-200 and A-300-600F, but since 2014 it has mainly operated with the B-757F and the A-310-200F. Additionally CSA Air also operates cargo flights at FNT that provide feeder services to Federal Express, using Cessna 208B Caravan aircraft.

*Table 2-6* shows the number of all cargo aircraft by type of aircraft that operated at FNT between 2011 and 2015.

***TABLE 2-6***
***ALL CARGO OPERATIONS AT FNT (2011-2015)***

| Year | B-727-200 | B-757F | A-310-200F | A-300-600 | Cessna C-208B | Total Operations |
|---|---|---|---|---|---|---|
| 2011 | 4 | 28 | 486 | 14 | 754 | 1,286 |
| 2012 | 2 | 364 | 158 | 8 | 758 | 1,290 |
| 2013 | 0 | 8 | 386 | 132 | 746 | 1,272 |
| 2014 | 0 | 318 | 286 | 66 | 814 | 1,484 |
| 2015 | 0 | 956 | 2 | 2 | 786 | 1,746 |

Source: FAA ACAIS CY 2011 to CY 2015

FedEx shifted its operation to make main use of its B-757F in 2015, which has lower payload capacity than the A310-200F, thus increasing the number of annual all cargo operations at FNT. In 2016, the A310-200F again became the primary aircraft servicing FNT, and that is expected to continue. FedEx has publicly announced plans to acquire a large number of Boeing 767-300F aircraft through 2023. It is expected that Federal Express will continue to operate the A310-200F until the early 2020s, at which time the 767-300F is anticipated to serve FNT.

Due to uncertainties surrounding FedEx's future fleet plans for service at FNT, the A310-200F is carried forward to forecast operations through the medium term. The Boeing 767-300F will be incorporated as the ultimate critical aircraft for air cargo operations. *Table 2-7* presents the air cargo operations forecasts for the five-, 10- and 20-year planning horizon.

***TABLE 2-7***
***ALL CARGO OPERATIONS FORECAST***

| Year | Total Operations |
|---|---|
| 2015* | 1,746 |
| 2020 | 1,520 |
| 2025 | 1,611 |
| 2035 | 1,784 |

* Actual Values from Airport's 2015 Statistics
Source: Bishop International Airport Statistics and RS&H, Inc., 2016 Estimates

### 2.4.4 General Aviation and Military Operations Forecasts

*Table 2-8* presents the aircraft movements for general aviation and military aircraft forecasts for years 2020, 2025 and 2035 from FAA's most recent TAF report for both itinerant and local general aviation and military operations. The TAF does not anticipate significant changes in the number of these operations.

***TABLE 2-8***
***ANNUAL GENERAL AVIATION AND MILITARY OPERATIONS FORECAST***

| | *Itinerant Operations* | | | *Local Operations* | | |
|---|---|---|---|---|---|---|
| **Planning Year** | **General Aviation** | **Military** | **Total** | **Civil** | **Military** | **Total** |
| 2015 | 13,777 | 759 | 14,536 | 6,583 | 80 | 6,663 |
| 2020 | 13,411 | 759 | 14,170 | 6,354 | 80 | 6,434 |
| 2025 | 13,521 | 759 | 14,280 | 6,384 | 80 | 6,464 |
| 2035 | 13,741 | 759 | 14,500 | 6,444 | 80 | 6,524 |

Source: FAA 2015 TAF Report

### 2.4.5 Based Aircraft Forecasts

According to FAA most recent statistics in form 5010-1 FNT serves as the home to 91 general aviation aircraft, which are housed in hangars located at the airport's general aviation facilities. *Table 2-9* presents a breakdown of these aircraft by aircraft grouping.

***TABLE 2-9***
***2015 BASED AIRCRAFT***

| *Aircraft Type* | *Number* |
|---|---|
| Single Engine | 72 |
| Multi-Engine | 17 |
| Jet | 2 |
| Total | 91 |

Source: FAA Form 5010-1

The following table presents the forecast of based aircraft according to FAA 2015 TAF report.

***TABLE 2-10***
***FORECAST OF BASED AIRCRAFT***

| *Planning Year* | *Based Aircraft* |
|---|---|
| *2015** | 91 |
| *2020* | 101 |
| *2025* | 107 |
| *2035* | 117 |

*FAA Form 5010-1
Source: FAA 2015 TAF Report

## 2.5 ALTERNATIVE AVIATION FORECASTS

Alternative forecasts to those prepared by the FAA for enplaned passengers and commercial aircraft operations were prepared in an effort to evaluate the potential variation in traffic volumes that might be expected under different scenarios, including the entrance of a new carrier, the opening of new routes, an increase in flight frequencies, or changes to the aircraft fleet mix at FNT. FNT recently lost direct service to a number of destinations after Southwest Airlines decided to consolidate all of its flights serving FNT through its Chicago Midway Airport hub. Two of the five direct destinations ended by Southwest are now being served by the new entry airline, Allegiant, through its service to Orlando Sanford International Airport and St. Pete-Clearwater International Airport. The three other lost destinations – BWI, LAS and RSW – are now served by Southwest via connections through MDW.

The alternative scenario forecasts were prepared based on consultation with Airport staff and its air service marketing consultant, and considers a variety of potential scenarios that could influence passenger growth at FNT. The seven scenarios are:

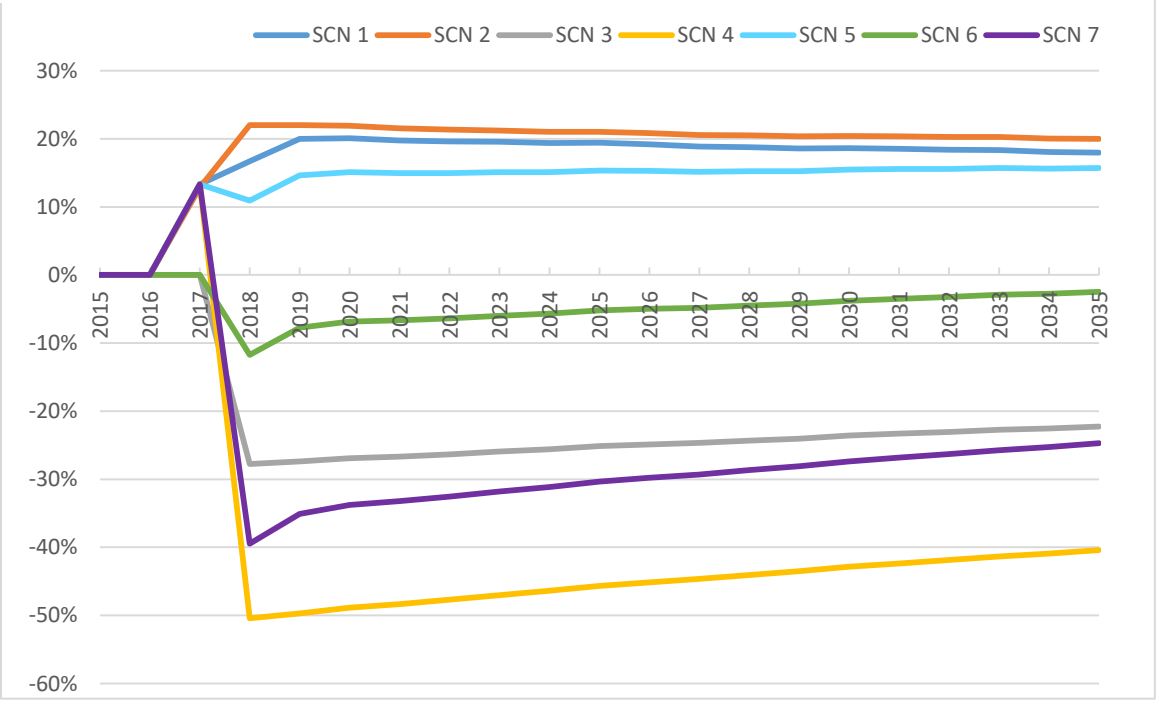
- **Scenario 1 - Expansion of Leisure Market**: Under this scenario, Allegiant would gradually increase its four weekly flights to eight in 2017 and then to 12 starting in 2018. During the peak leisure-travel months of March and April, those 12 weekly flights would increase to 18. All other current flights, aircraft size and destinations would remain the same as forecasted in the TAF for the 2019 to 2035 period.
- **Scenario 2 – Legacy Carriers American Airlines and United Airlines Expand**: Under this scenario, after 2018 American would add one daily flight to another hub using a 70-seat aircraft and would increase seating capacity from 50 to 70 on all flights to ORD. United would add a daily flight to EWR using a 70-seat aircraft and would increase current seating capacity from 50 to 70 on all flights to ORD.
- **Scenario 3 – Loss of Southwest**: Under this scenario, FNT would lose all service currently provided to MDW by Southwest after 2018.
- **Scenario 4 – Loss of Delta Air Lines**: Under this scenario, FNT would lose all service currently provided by Delta to both ATL and MSP after 2018.
- **Scenario 5 – Sum of Scenarios 1, 2, and 3**: Under this scenario, it has been assumed that additional flights and frequencies by Allegiant and aircraft "up-gauging" and new routes by American and United as described in Scenarios 1 and 2 above occur at the same time as FNT loses service by Southwest (Scenario 3).
- **Scenario 6 - Sum of Scenarios 1, 2, and 4**: Under this scenario it has been assumed that additional flights and frequencies by Allegiant and aircraft "up-gauging" and new routes by American and United as described in Scenarios 1 and 2 above occur at the same time as FNT loses service by Delta (Scenario 4).

» **Scenario 7 – Sum of Scenarios 1, 2, 3 and 4**: Under this scenario it has been assumed that additional flights and frequencies by Allegiant and aircraft "up-gauging" and new routes by American and United, as described in Scenarios 1 and 2 above, occur at the same time as FNT loses service by Southwest (Scenario 3) and by Delta (Scenario 4).

*Exhibit 2-14* presents the results of the above seven scenarios shown as a percentage increase or decrease in the enplaned annual passenger volumes for a 20-year planning horizon. As observed under Scenario 1 enplaned passenger volumes would be approximately 20 percent higher than the TAF forecasts. The loss of all of Southwest's service (Scenario 3) would represent 50 percent fewer enplaned passengers in 2018 and 40 percent fewer in 2035, compared to the TAF. The loss of service by Delta Air Lines in 2018 (Scenario 4) would represent 28 percent and 22.5 percent fewer enplaned passengers when compared to TAF's 2018 and 2035 respective volumes. The loss of Southwest service combined with new routes by Allegiant, American and United, plus the "up-gauging" of aircraft by AA and UA (Scenario 5) shows enplaned volumes to be about 19 percent higher than 2018 TAF numbers and about 15 percent higher than TAF volumes by 2035. The loss of service by Delta Air Lines combined with new routes by Allegiant, American, and United, plus the "up-gauging" of aircraft by American and United (Scenario 6) shows enplaned volumes to be about 11 percent less than 2018 TAF numbers and about 2.5 percent lower than TAF numbers in 2035.

From the above analysis, it can be concluded that the loss of Delta service would have serious negative implications in passenger traffic volumes at FNT that would not be mitigated with the addition of the proposed new flights by Allegiant, American and United Airlines.

***EXHIBIT 2-14***
***ENPLANED PASSENGERS VARIATION FROM FAA TAF BY ALTERNATIVE SCENARIO FORECAST***




Source: RS&H Inc., 2016

## 2.6 DERIVATIVE FORECASTS

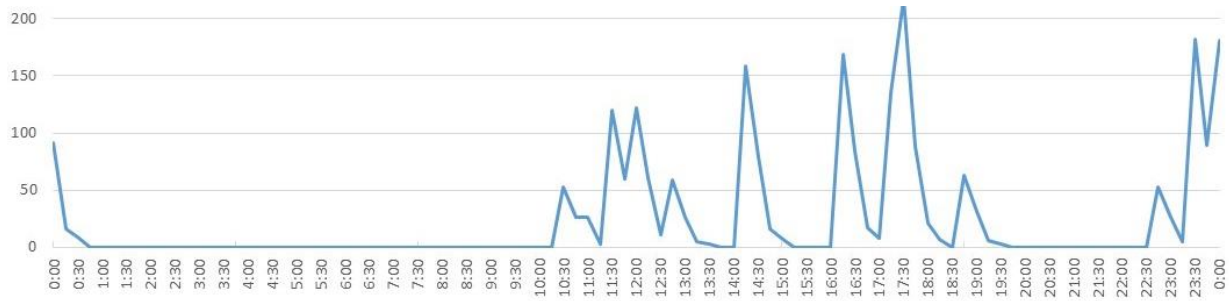
### 2.6.1 Design Hour Passengers and Design Day

Design hour passenger, otherwise known as peak hours passengers, is a key element in the planning and design of the passenger terminal building and other associated facilities. The design hour measures the largest number of enplaned and deplaned passengers during an elapsed hour of a typically busy day, also known as the design day.

*Exhibit 2-15*, *Exhibit 2-16*, and *Exhibit 2-17* present arriving, departing, and combined arriving and departing passenger flows through the passenger terminal in 15-minute increments, using the Airport's April 2016 flight schedule and common arriving and departing passenger patterns for airports similar to FNT. As observed in these figures, the flow patterns are common among airports similar to FNT, with high departure numbers in the early morning and the highest arrival numbers in the early evening. Combined arrival and departure peaks typically also occur in the late afternoon. At FNT, arriving passenger peaks occur at around 5:30 pm with about 218 passengers, while the largest number of departing passengers at around 5:45 am, with of approximately 304 passengers. The largest number of combined arriving and departing passengers happens at 5:30 pm with approximately 460 passengers.

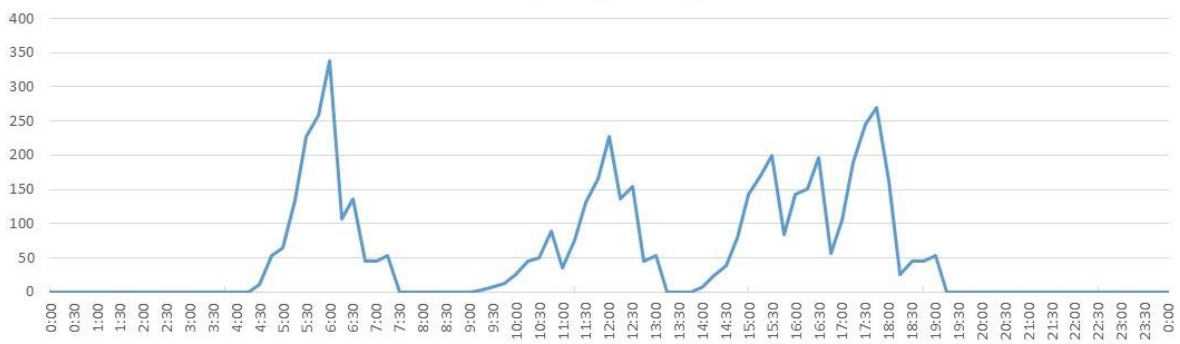
Average daily total passengers in 2015 were 2,254, but if computed from April's flight schedule this number would be approximately 2,208 passengers, which reflects the reduction in daily flights by Southwest and the new flights by Allegiant. The peak of combined arriving and departing passengers is 20.8 percent of the average day and 17.4 percent of the busiest day of the week based on April's flight schedule. The peak of arriving passengers represents 19.8 percent of the average day arrivals and 16.6 percent of the busiest day arrivals of the week based on April's flight arrivals schedule. The peak of departing passengers represents 27.6 percent of the average day enplanements and 23.0 percent of the busiest day enplanements of the week.

***EXHIBIT 2-15***
***ARRIVING PASSENGER FLOW***




Source: Bishop International Airport April 2016 Flight Schedule

***EXHIBIT 2-16***
***DEPARTING PASSENGER FLOW***

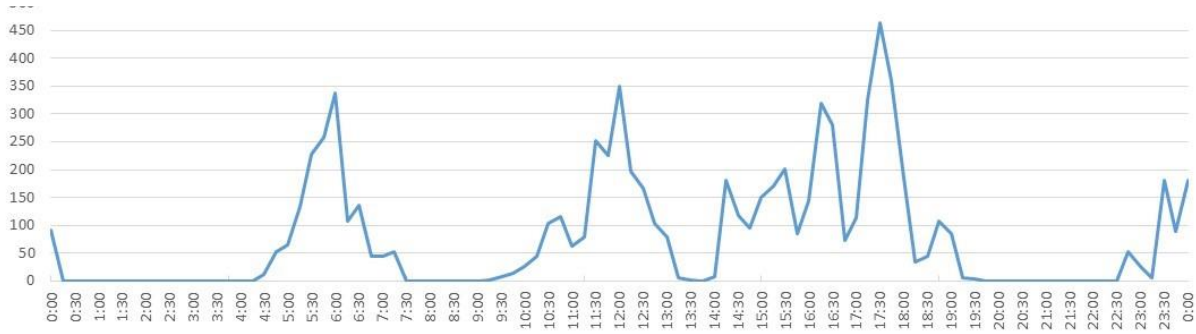



Source: Bishop International Airport April 2016 Flight Schedule

Historically March has been the busiest month of the year. March passengers volumes are 9.5 percent, 9.6 percent and 9.4 percent of the total annual maximum, average and minimum passenger volumes respectively for the 2009 to 2015 period of analysis.

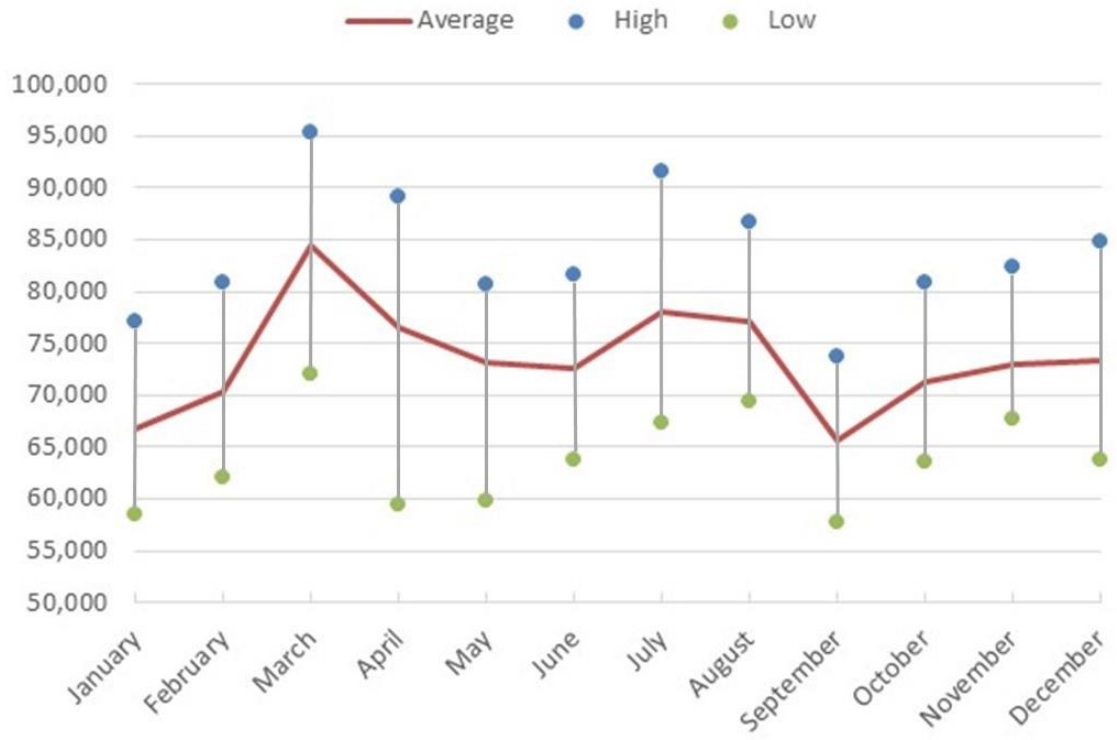
In reviewing values from the previous Master Plan, which considered historic values between 1993 and 2003 (excluding 2001) March passenger volumes were also the highest monthly figures and represented 9.1 percent the average total annual passenger volumes, slightly lower than the 9.6 percent for the 2009 to 2015 period described above.

***EXHIBIT 2-17***
***COMBINED ARRIVING AND DEPARTING PASSENGER FLOWS***




Source: Bishop International Airport April 2016 Flight Schedule

***EXHIBIT 2-18***
***MONTHLY TOTAL PASSENGER VOLUMES (2009-2015)***




Source: Bishop International Airport

***TABLE 2-11***
***PERCENT MONTHLY SHARE OF ANNUAL PASSENGER VOLUMES (2009-2015)***

| *Month* | *High (%)* | *Average (%)* | *Low (%)* |
|---|---|---|---|
| January | 7.7 | 7.6 | 7.7 |
| February | 8.0 | 8.0 | 8.1 |
| **March** | **9.5** | **9.6** | **9.4** |
| April | 8.9 | 8.7 | 7.8 |
| May | 8.0 | 8.3 | 7.8 |
| June | 8.1 | 8.2 | 8.3 |
| July | 9.1 | 8.8 | 8.8 |
| August | 8.6 | 8.7 | 9.1 |
| September | 7.3 | 7.4 | 7.6 |
| October | 8.1 | 8.1 | 8.3 |
| November | 8.2 | 8.3 | 8.9 |
| December | 8.4 | 8.3 | 8.3 |

Source: Bishop International Airport

Creating a correctly sized facility means designing it to accommodate anticipated heavy demand, without building so large a facility that it is only occasionally used at capacity. Typically that means designing to the design day and design hour based on the passenger volumes associated with the busiest month of the year. Considering current and previous trends, it is projected that the busiest month at FNT will continue

to be March, moving an average of 9.5 percent of total annual passenger volume. The design day was computed as the average daily volume of the busiest month. The design hour for departing passengers is 23.0 percent of the design day enplaned passengers. For arriving passengers, the design hour was computed as 16.6 percent of the design day arriving passengers and the combined arriving and departing design hour will be 18.5 percent of the design day passenger volumes for the 20-year planning period. *Table 2-12* below summarizes the results for the design day and design hour volumes for a 20-year planning horizon, considering the annual forecast passenger values presented in Section 3.4 of this chapter.

***TABLE 2-12***
***DESIGN HOUR AND DESIGN DAY FORECASTS***

| *Description* | *2015** | *Planning Years* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| **Enplaned Passengers** | | | | |
| Annual Volume | 411,459 | 444,504 | 475,853 | 537,606 |
| Design Day | 1,261 | 1,362 | 1,458 | 1,648 |
| Design Hour | 304 | 313 | 335 | 379 |
| **Deplaned Passengers** | | | | |
| Annual Volume | 411,145 | 444,504 | 475,853 | 537,606 |
| Design Day | 1,260 | 1,362 | 1,458 | 1,648 |
| Design Hour | 218 | 226 | 242 | 273 |
| **Combined (Enplaned and Deplaned) Passengers** | | | | |
| Annual Volume | 822,604 | 889,008 | 951,706 | 1,075,212 |
| Design Day | 2,521 | 2,724 | 2,917 | 3,295 |
| Design Hour | 460 | 504 | 540 | 610 |

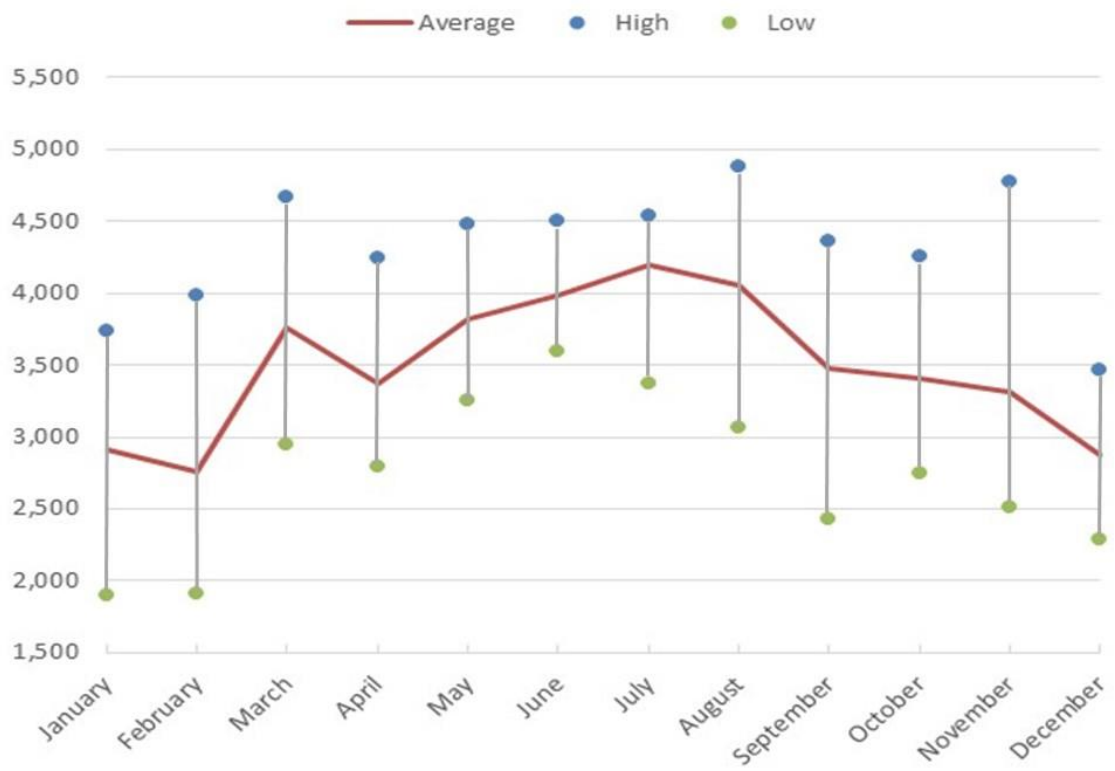
* Actual values
Source: Bishop International Airport Statistics, FAA 2015 TAF Report and RS&H Inc., 2016

### 2.6.2 Peak Hour Operations

*Exhibit 2-19* and *Exhibit 2-20* present the variation in total monthly aircraft operations and commercial operations for the 2009 to 2015 period. *Table 2-13* and *Table 2-14* show the percentage of total operations that occur in any given month for the average, high and low monthly volumes for total and commercial operations at FNT. The largest number of monthly average operations occur during the summer months, with July showing the highest average peak, while the months of July and August both show the highest peak for monthly commercial operations.

*Exhibit 2-21* shows daily passenger gate usage based on the April 2016 flight schedule. This takes into account the loss of Southwest flights and the addition of Allegiant flights. Peak gate usage is driven by overnight parking, between 11:54 pm and 6:00 am, with five gates occupied. During the day, maximum gate usage is two. Based on the April 2016 flight schedule, peak daily commercial operations represent 3.65 percent of monthly operations.

***EXHIBIT 2-19***
***VARIATION OF MONTHLY TOTAL OPERATIONS (2009-2015)***



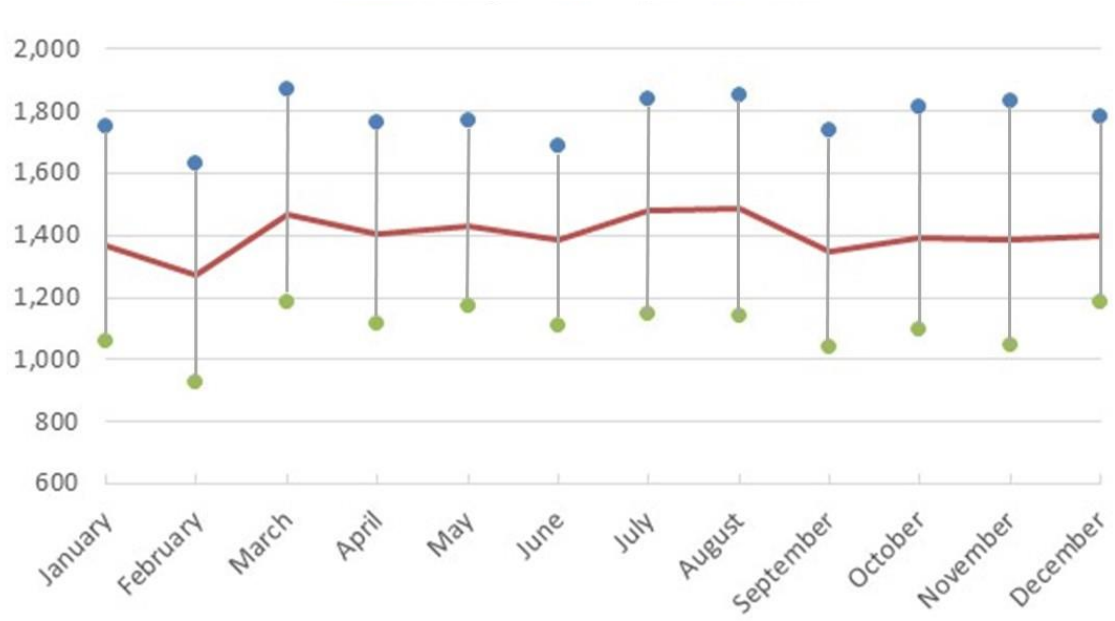

Source: Bishop International Airport 2009-2015

***TABLE 2-13***
***MONTHLY SHARE OF TOTAL AIRCRAFT OPERATIONS (2009-2015)***

| ***Month*** | ***High*** *(%)* | ***Average*** *(%)* | ***Low*** *(%)* |
|---|---|---|---|
| January | 7.2 | 7.0 | 5.8 |
| February | 7.7 | 6.6 | 5.8 |
| **March** | 9.0 | 9.0 | 9.0 |
| April | 8.2 | 8.0 | 8.5 |
| May | 8.6 | 9.1 | 9.9 |
| June | 8.7 | 9.5 | **11.0** |
| July | 8.8 | **10.0** | 10.3 |
| August | **9.4** | 9.7 | 9.3 |
| September | 8.4 | 8.3 | 7.4 |
| October | 8.2 | 8.1 | 8.4 |
| November | 9.2 | 7.9 | 7.6 |
| December | 6.7 | 6.9 | 7.0 |

Source: Bishop International Airport 2009-2015 Statistics

***EXHIBIT 2-20***
***VARIATION OF MONTHLY COMMERCIAL OPERATIONS (2009-2015)***



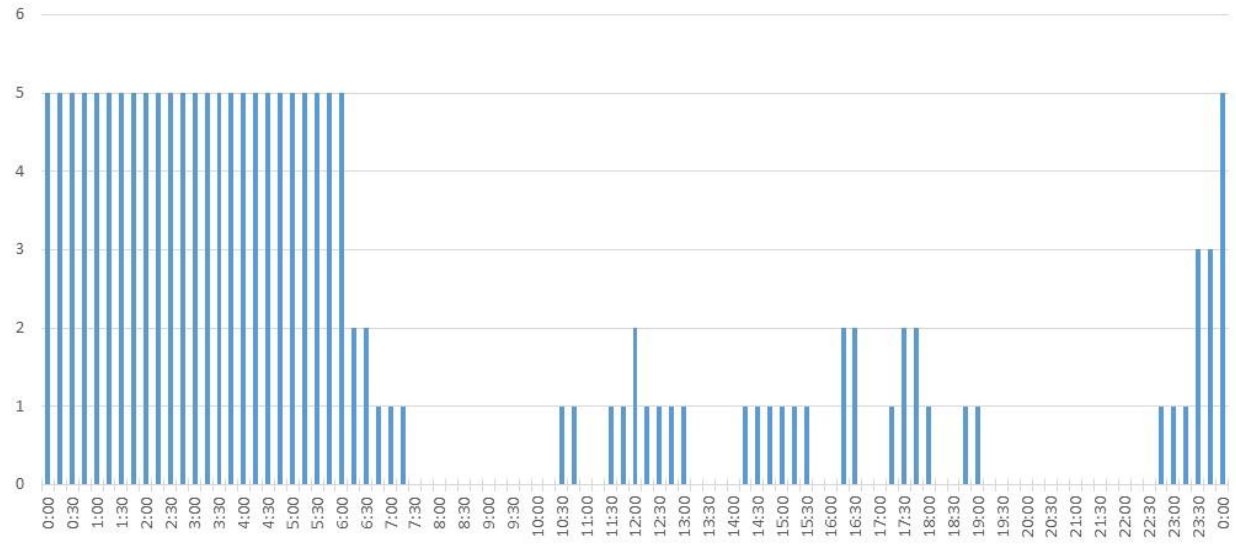

Source: Bishop International Airport 2009-2015 Statistics

***TABLE 2-14***
***MONTHLY SHARE OF COMMERCIAL AIRCRAFT OPERATIONS (2009-2015)***

| *Month* | *High (%)* | *Average (%)* | *Low (%)* |
|---|---|---|---|
| January | 8.4 | 8.1 | 7.9 |
| February | 7.8 | 7.6 | 6.9 |
| **March** | **9.0** | 8.7 | **8.9** |
| April | 8.5 | 8.4 | 8.4 |
| May | 8.5 | 8.5 | 8.8 |
| June | 8.1 | 8.3 | 8.3 |
| July | 8.8 | 8.8 | 8.6 |
| August | 8.9 | **8.8** | 8.6 |
| September | 8.4 | 8.0 | 7.8 |
| October | 8.7 | 8.3 | 8.2 |
| November | 8.8 | 8.2 | 7.9 |
| December | 8.6 | 8.3 | 8.9 |

Source: Source: Bishop International Airport 2009-2015 Statistics

***EXHIBIT 2-21***
***GATE USAGE APRIL 2016 FLIGHT SCHEDULE***




Source: Bishop International Airport Commercial Passenger April 2016 Flight Schedule

*Table 2-15* presents the future demand for operations based on the analysis outlined above and the FAA TAF.

***TABLE 2-15***
***AIRCRAFT OPERATIONS ACTIVITY LEVEL FORECASTS***

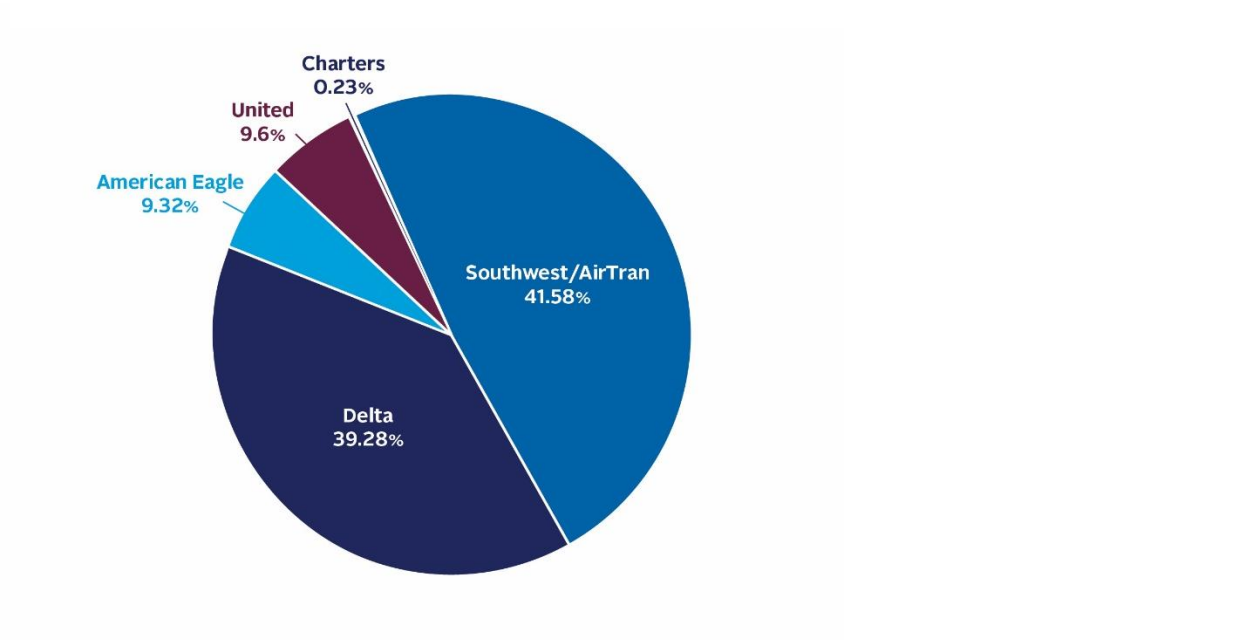
| *Description* | *2015** | *Planning Years* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| Total Operations | | | | |
| Annual Operations | 33,503 | 34,127 | 34,292 | 36,272 |
| Peak Month | 3,637 | 3,410 | 3,426 | 3,624 |
| Average Day | 122 | 110 | 111 | 117 |
| Commercial Operations | | | | |
| Annual Commercial Operations | 13,332 | 13,523 | 13,548 | 15,248 |
| Annual Air Carrier Operations | 6,166 | 7,910 | 9,905 | 11,181 |
| Annual Commuter Operations | 7,166 | 5,613 | 3,643 | 4,067 |
| Peak Month | 1,222 | 1,195 | 1,197 | 1,347 |
| Average Day | 40 | 39 | 39 | 44 |
| Peak Hour | | | | |
| Arrivals | 4 | 4 | 4 | 5 |
| Departures | 4 | 4 | 4 | 5 |
| Arrival & Departures | 5 | 5 | 5 | 8 |

* Actual values from Airport's 2015 Statistics and RS&H, Inc. 2016 Estimates
Source: Bishop International Airport 2015 Statistics and FAA 2015 TAF Report and RS&H Inc. 2016

### 2.6.3 Airline Breakdown Passengers and Operations

*Exhibit 2-22* depicts the passenger market share at FNT among the four major airlines in 2015. With the reduction in Southwest operations at FNT, it is expected that for 2016 Southwest's market share will be considerably smaller. Some of the market share lost by Southwest will be taken by Allegiant, with Delta, American and United posting market share gains.

***EXHIBIT 2-22***
***SHARE OF ENPLANED PASSENGERS BY AIR CARRIER (2015)***




Source: Bishop International Airport 2015 Statistics

*Table 2-16* presents the forecast breakdown of enplaned passengers and aircraft operations by airline for the 20-year planning horizon.

***TABLE 2-16***
***FORECAST OF ENPLANED PASSENGER AND COMMERCIAL AIRCRAFT OPERATIONS BY AIRLINE***

| *Description* | *2015** | *Planning Years* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| **Enplaned Passengers** | **411,459** | **444,504** | **475,853** | **537,606** |
| Southwest | 171,062 | 128,906 | 137,997 | 150,530 |
| American Airlines | 38,342 | 53,340 | 57,102 | 64,513 |
| United Airlines | 161,609 | 133,351 | 142,756 | 150,530 |
| Delta Air Lines | 39,498 | 53,340 | 57,102 | 64,513 |
| Allegiant Airlines | | 22,225 | 23,793 | 26,880 |
| New Carrier | | 52,229 | 55,913 | 79,297 |
| Charter | 948 | 1,111 | 1,190 | 1,344 |
| **Commercial Operations** | **13,332** | **13,523** | **13,548** | **15,248** |
| Southwest | | 2,470 | 2,508 | 2,736 |
| American Airlines | | 2,032 | 1,990 | 2,170 |
| United Airlines | | 5,082 | 4,976 | 5,060 |
| Delta Air Lines | | 1,152 | 1,216 | 1,358 |
| Allegiant Airlines | | 595 | 694 | 782 |
| New Carrier | | 2,150 | 2,120 | 3,092 |
| Charter | | 42 | 44 | 50 |

* Actual values
Source: Bishop International Airport, FAA 2015 TAF and RS&H Inc. 2016

### 2.6.4 Critical Aircraft

*Table 2-17* shows aircraft types currently flown by the major passenger and cargo carriers operating at FNT. It is anticipated that within the 20-year planning period most of these aircraft will change. Among the anticipated changes, Federal Express will change from the Airbus A310-200F to the Boeing 767-300F in the next 10 years. It is also anticipated that Envoy Air (operating as American Eagle), Express Jet (operating as United), and Skywest (operating as Delta) will upgrade their regional jets to the Embraer E-170, the CRJ900 and other 70 seat regional jets. In addition, Delta plans to replace its fleet of McDonnell Douglas MD-88 with the Boeing 737-800 and -900.

***TABLE 2-17***
***EXISTING AIRCRAFT FLEET BY MAJOR AIR CARRIER***

| Air Carrier | Aircraft | AAC-ADG-TDG |
|---|---|---|
| Southwest | B-737-700 | C-III-3 |
| Delta Air Lines | MD-88 | D-III-4 |
| Delta Air Lines | CRJ-200 | C-II-2 |
| American Eagle | ERJ-145 | C-II-3 |
| United Air Lines | ERJ-145 | C-II-3 |
| United Air Lines | ERJ-135 | C-II-3 |
| Allegiant | MD-83 | D-III-4 |
| Allegiant | A-319 | C-III-3 |
| FedEx | A-310-200F | C-IV-5 |
| Sun Country | B-737-800 | D-III-3 |

Source: FAA AC 150/5300-13, Bishop International Airport April 2016 Flight Schedule

FedEx operates its A-310-200F on weekdays year round, which accounts for just over 500 annual operations which FAA considers "Substantial Use" in defining an airport's critical aircraft. It is thus anticipated that the critical aircraft at FNT will be the A310-200F from FedEx for the next five to 10 years, after which the critical aircraft will be the B-767-300F, which as previously mentioned is expected to replace the A-310-200F.

## 2.7 FLEET MIX FOR NOISE LEVEL ANALYSIS

*Table 2-18* summarizes the current daily fleet mix of jet aircraft operating at FNT and their time schedule according to the April 2016 flight schedule. *Table 2-19* summarizes current and the expected fleet mix for the 10-year planning horizon that will be used for the noise model analysis.

***TABLE 2-18***
***CURRENT FLIGHT SCHEDULE BY MAJOR AIR CARRIER***

| Carrier | Aircraft | Arrival Times | Departure Times |
|---|---|---|---|
| Southwest | B-737-700 | 23:45 | 6:35 |
| Southwest | B-737-700 | 11:55 | 12:30 |
| Southwest | B-737-700 | 16:00 | 16:30 |
| Delta | MD-88 | 23:25 | 6:00 |
| Delta | MD-88 | 11:20 | 12:00 |
| Delta | MD-88 | 17:11 | 17:51 |
| Delta | CRJ-200 | 22:38 | 7:25 |
| Delta | CRJ-200 | 12:36 | 13:01 |
| American | ERJ-145 | 23:54 | 6:00 |
| American | ERJ-145 | 10:30 | 10:59 |
| American | ERJ-145 | 18:44 | 19:11 |
| United | ERJ-145 | 23:20 | 6:10 |
| United | ERJ-135 | 16:02 | 16:32 |
| Allegiant | MD-83 | 14:01 | 15:42 |
| Allegiant | A-319 | 17:25 | 18:05 |
| FedEx | A-310-200F | 5:56 | 22:11 |
| Sun Country | B-737-800 | 16:52 | 17:50 |

Source: RS&H Inc. 2016

***TABLE 2-19***
***AIRPORT FLEET MIX (2015 AND 2025)***

| | 2015 | | | 2025 | | |
|---|---|---|---|---|---|---|
| **Aircraft** | **Day** | **Night** | **Total** | **Day** | **Night** | **Total** |
| B-737-700 | 5 | 1 | 6 | 7 | 1 | 8 |
| MD-88 | 3 | 1 | 4 | - | - | - |
| CRJ-200 | 5 | 1 | 6 | - | - | - |
| ERJ-145 | 6 | 2 | 8 | - | - | - |
| ERJ-135 | 4 | - | 4 | - | - | - |
| MD-83 | 2 | - | 2 | - | - | - |
| A-319 | - | - | - | 4 | | 4 |
| B-757F | 2 | 2 | 4 | - | - | - |
| A-310-200F | - | - | - | 3 | 3 | 6 |
| B-737-800 | 2 | | 2 | 3 | 1 | 4 |
| CSC-100 | - | - | - | 6 | 1 | 7 |
| EMB-175 | - | - | - | 4 | 3 | 7 |
| A-320 | - | - | - | 2 | - | 2 |
| Cessna 208B | 3 | - | 3 | 4 | - | 4 |
| Single Engine | 41 | - | 41 | 42 | - | 42 |
| Twin Engine | 12 | - | 12 | 12 | - | 12 |
| Jet | 2 | - | 2 | 2 | - | 2 |
| **Total** | **87** | **7** | **94** | **89** | **9** | **98** |

Source: Bishop International Airport April 2016 Flight Schedule and RS&H Inc. 2016

## 2.8 SUMMARY OF AVIATION DEMAND FORECASTS

*Tables 2-20* through *2-24* summarize the forecast activity levels for passengers, aircraft movements, air cargo and based aircraft for the five-, 10-, and 20-year planning horizons.

***TABLE 2-20***
***PASSENGER FORECASTS***

| Description | 2015* | Planning Years | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| **Enplaned Passengers** | | | | |
| Annual Volume | 411,459 | 444,504 | 475,853 | 537,606 |
| ACGR (%) | | 1.56 | 1.37 | 1.23 |
| Design Day | 1,261 | 1,362 | 1,458 | 1,648 |
| Design Hour | 304 | 313 | 335 | 379 |
| **Deplaned Passengers** | | | | |
| Annual Volume | 411,145 | 444,504 | 475,853 | 537,606 |
| ACGR (%) | | 1.57 | 1.37 | 1.23 |
| Design Day | 1,260 | 1,362 | 1,458 | 1,648 |
| Design Hour | 218 | 226 | 242 | 273 |
| **Combined (Enplaned and Deplaned)** | | | | |
| Annual Volume | 822,604 | 889,008 | 951,706 | 1,075,212 |
| ACGR (%) | | 1.56 | 1.37 | 1.23 |
| Design Day | 2,521 | 2,724 | 2,917 | 3,295 |
| Design Hour | 460 | 504 | 540 | 610 |

*Actual values
Source: Bishop International Airport Statistics, FAA 2015 TAF Report and RS&H Inc. 2016

***TABLE 2-21***
***AIR CARGO FORECASTS***

| Description | 2015 | Planning Years | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| Annual Cargo Volume (000 lbs.) | 24,233 | 25,700 | 27,200 | 30,200 |
| ACGR (%) | | 1.18 | 1.14 | 1.05 |
| Annual All Cargo Operations | 1,746 | 1,809 | 1,818 | 1,875 |
| ACGR (%) | | 0.71 | 0.10 | 0.31 |

Source: Bishop International Airport 2015 Statistics and RS&H Inc. 2016

***TABLE 2-22***
***AIRCRAFT OPERATIONS FORECASTS***

| *Description* | *2015** | *Planning Years* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| **Total Operations** | | | | |
| Annual Operations | 33,503 | 34,127 | 34,292 | 36,272 |
| ACGR | | | | |
| Peak Month | 3,637 | 3,410 | 3,426 | 3,624 |
| Average Day | 122 | 110 | 111 | 117 |
| Peak Hour | | | | |
| **Commercial Operations** | | | | |
| Annual Commercial Operations | 13,332 | 13,523 | 13,548 | 15,248 |
| ACGR (%) | | 0.37 | 0.10 | 0.56 |
| Annual Air Carrier Operations | 6,166 | 7,910 | 9,905 | 11,181 |
| ACGR (%) | | 5.11 | 4.6 | 1.22 |
| Annual Commuter Operations | 7,166 | 5,613 | 3,643 | 4,067 |
| ACGR (%) | | -4.77 | -8.28 | 1.11 |
| **Peak Month** | 1,222 | 1,195 | 1,197 | 1,347 |
| **Average Day** | 40 | 39 | 39 | 44 |
| **Peak Hour** | | | | |
| Arrivals | 4 | 4 | 4 | 5 |
| Departures | 4 | 4 | 4 | 5 |
| Arrival & Departures | 5 | 5 | 5 | 8 |

Actual values
Source: Bishop International Airport 2015 Statistics FAA 2015 TAF Report and RS&H Inc. 2016

***TABLE 2-23***
***GENERAL AVIATION AND MILITARY OPERATIONS FORECASTS***

| *Description* | *2015** | *Planning Year* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| Itinerant General Aviation | 12,915 | 13,411 | 13,521 | 13,741 |
| ACGR (%) | | 0.76 | 0.16 | 0.16 |
| Itinerant Military | 799 | 759 | 759 | 759 |
| Local Civil Operations | 6,321 | 6,354 | 6,384 | 6,444 |
| ACGR (%) | | 0.10 | 0.09 | 0.09 |
| Local Military | 136 | 80 | 80 | 80 |

* Actual values
Source: Bishop International Airport 2015 Statistics FAA 2015 TAF Report and RS&H Inc. 2016

***TABLE 2-24***
***BASED AIRCRAFT FORECASTS***

| *Description* | *2015** | *Planning Year* | | |
|---|---|---|---|---|
| | | 2020 | 2025 | 2035 |
| *Based Aircraft* | 91 | 101 | 107 | 117 |
| ACGR (%) | | 2.11 | 1.16 | 0.90 |

Source: 2015 FAA Form 5010-1 and 2020, 2025 and 2035 FAA 2015 TAF Report

CHAPTER 3

# FACILITY REQUIREMENTS

## 3.1 INTRODUCTION

The purpose of the facility requirements analyses is to determine what additional facilities will be required to accommodate forecast activity. This task begins with an assessment of the ability of existing facilities to meet current and future demand. The existing conditions described in Chapter 1, *Inventory of Existing Conditions,* and the current and future demand described in Chapter 2, *Forecast*, were used as the basis for these analyses.

Chapter 2, *Forecast*, reported the current and forecast demand based on four increments within the 20-year planning horizon – existing (2015), five-year (2020), 10-year (2025), and 20-year (2035). These four increments are referred to as planning activity levels. The facility requirements are reported in the sections below by planning activity level. This allows the reader to easily see how forecast demand for each planning activity correlates to the space required to meet the demand.

## 3.2 AIRFIELD AND AIRSPACE REQUIREMENTS

This section describes the requirements for all major elements of the airport airside. The airfield and airspace facilities and functions evaluated are as follows:

- Airfield demand / capacity
- Runways
- Airfield hot spots
- Taxiways and taxilanes
- Electronic and visual navigational aids
- Airside perimeter road

### 3.2.1 Critical Aircraft

The critical aircraft (also referred to as the design aircraft) are used to define required facilities at many airside facilities of an airport. The critical aircraft is defined as the most demanding aircraft with at least 500 annual operations that operates, or is expected to operate, at an airport according to FAA Advisory Circular 150/5070-6B – Change 2, *Airport Master Plans*. FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*, indicates the critical aircraft may be a single aircraft or composite of several different aircraft composed of the most demanding characteristics of each.

The critical aircraft for FNT are described in *Table 2-17* in Chapter 2, *Forecast*. Key physical and performance characteristics for the critical aircraft are shown in *Table 3-1* below. It is important to note that larger aircraft may operate at the Airport during each planning activity level, but are not considered critical aircraft for facility planning purposes unless the aircraft meets the substantial use threshold (i.e., 500 annual itinerant operations).

The critical aircraft are classified into one of three use types – cargo, passenger, or general aviation – based on prime user and operational type at FNT. General aviation (GA) is further broken down into two classifications – small GA and corporate GA. Aircraft Approach Category (AAC) is a classification of aircraft based on a reference landing speed. Airplane Design Group (ADG) is a classification of aircraft based on wingspan and tail height. Taxiway Design Group (TDG) is a classification of airplanes based on outer to outer Main Gear Width and Cockpit to Main Gear distance. Each of these classification types are used to determine required airside design standards.

The cargo critical aircraft represent the critical aircraft for the Airport as a whole because they are most dimensionally demanding. The Airbus A300-600 aircraft was identified as the critical aircraft for 2015 for the airfield and cargo facilities.

The Boeing 737-800 and MD-83/-88 aircraft are the largest commercial passenger aircraft forecast to operate at the Airport through 2025. The MD-83/-88 aircraft will be phased out of the fleet later in the planning horizon. The Boeing 737-900ER is forecast to enter the market towards the end of the planning horizon and is therefore identified as the critical aircraft in 2035 because of its more demanding takeoff performance characteristics. Additionally, ADG-III aircraft is the largest aircraft type that can be accommodated at most terminal parking positions[34].

For small general aviation, twin-engine aircraft will meet the substantial use threshold and therefore considered critical aircraft. The Piper PA-34 Seneca was identified as the representative aircraft for the small general aviation class. For corporate general aviation, jet aircraft meet the substantial use threshold and therefore considered critical aircraft. The Gulfstream G550 was identified as the representative aircraft for the jet class.

***TABLE 3-1***
***CRITICAL AIRCRAFT***

| Planning Year | Aircraft | Use Type | Aircraft Approach Category | Airplane Design Group | Taxiway Design Group |
|---|---|---|---|---|---|
| 2015 | Piper PA34 | Small GA | A | I | 1A |
| | Gulfstream G550 | Corporate GA | C | III | 3 |
| | Boeing 737-800 | Passenger | D | III | 3 |
| | MD-83/-88 | Passenger | D | III | 4 |
| | Airbus A300-600 | Cargo | C | IV | 5 |
| 2020 | Piper PA34 | Small GA | A | I | 1A |
| | Gulfstream G550 | Corporate GA | C | III | 3 |
| | Boeing 737-800 | Passenger | D | III | 3 |
| | MD-83/-88 | Passenger | D | III | 4 |
| | Airbus A310-200F | Cargo | C | IV | 5 |
| 2025 | Piper PA34 | Small GA | A | I | 1A |
| | Gulfstream G550 | Corporate GA | C | III | 3 |
| | Boeing 737-800 | Passenger | D | III | 3 |
| | MD-83/-88 | Passenger | D | III | 4 |
| | Boeing 767-300F | Cargo | D | IV | 5 |
| 2035 | Piper PA34 | Small GA | A | I | 1A |
| | Gulfstream G550 | Corporate GA | C | III | 3 |
| | Boeing 737-900ER | Passenger | D | III | 3 |
| | Boeing 767-300F | Cargo | D | IV | 5 |

Source: RS&H, 2016

[34] Gate 3B can accommodate the Boeing 757-200 but FNT is not forecast to have B757 passenger service within the planning horizon.

## 3.2.2 Runway Requirements

### Runway Demand/Capacity

Airfield demand/capacity analyses help determine the number of aircraft that can be accommodated on an airport's existing runway system. An airfield demand/capacity analysis was completed to update the results of the similar analysis completed as part of the 2006 Master Plan. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, was used as the primary resource to complete this analysis.

The Airport fleet mix composition is one of the key components required to determine the runway demand/capacity. There are four aircraft classes defined based on maximum certified takeoff weight and number of engines. These characteristics correlate to the wake turbulence classification air traffic control uses for in-trail aircraft separation to mitigate wake turbulence impacts. The characteristics of the four aircraft classifications are described in *Table 3-2*.

The aircraft mix – a key component in the analysis – is the relative percentage of operations conducted by each of the four classes or aircraft. FNT operations were categorized into the aircraft classes based on the defining characteristics. The fleet mix composition is described in *Table 3-3*.

***TABLE 3-2***
***AIRCRAFT CLASSIFICATIONS***

| Aircraft Class | Maximum Certified Takeoff Weight (lbs.) | Number of Engines | Wake Turbulence Classification |
|---|---|---|---|
| A | 12,500 or less | Single | Small |
| B | 12,500 or less | Multi | Small |
| C | 12,500 to 300,000 | Multi | Large |
| D | Over 300,000 | Multi | Heavy |

Source: FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, Table 1-1

***TABLE 3-3***
***PERCENTAGE OF FLEET MIX COMPOSITION***

| Aircraft Class | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|
| A+B | 51.4% | 51.9% | 52.0% | 49.9% |
| C | 47.3% | 46.8% | 45.4% | 47.5% |
| D | 1.3% | 1.3% | 2.7% | 2.6% |

Source: RS&H, 2016

The aircraft mix index is a mathematical expression that is used to describe the amount of the fleet mix that is classified as Class C or Class D. The mix index is calculated as the percentage of Class C aircraft plus three times the percentage of Class D aircraft. The resulting mix index ranges from 51 percent to 55 percent throughout the planning horizon. The mix index is described in *Table 3-4*. The resulting mix index is higher than those expressed in the analysis completed as part of the 2006 Master Plan.

The airfield demand/capacity analysis assumes that annual operations are composed of 50 percent arrivals and up to 20 percent touch and go operations. The analysis also considered the Airport's airfield configuration with two intersecting runways, each having a full-length parallel taxiway with several exit points.

Based on these inputs the Airport's Annual Service Volume was determined. Annual Service Volume represents a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use configuration, aircraft mix index, and weather conditions that would be encountered over a year's time at the Airport. Runway use configuration Number 9 in Figure 2-1 in the Advisory Circular is representative of the FNT airfield layout that is comprised of two intersecting runways. Comparison of the mix index to the runway use configuration results in a determined Annual Service Volume of 215,000 annual operations.

Hourly capacities were also determined for operations during Visual Flight Rule conditions (VFR) and Instrument Flight Rule (IFR) conditions. VFR conditions occur whenever the cloud ceiling is at least 1,000 feet above ground level and the visibility is at least three statute miles. IFR conditions occur whenever the reported cloud ceiling and visibility fall below VFR conditions. Hourly IFR capacities are lower than VFR capacities because higher aircraft separation minimums associated with IFR reduce the airfield capacity. The demand/capacity analysis results show that the VFR capacity is 77 operations per hour and the IFR capacity is 56 operations per hour based on the airfield layout and the mix index.

Demand/capacity analysis results are used to determine if additional airfield capacity is required to accommodate forecast demand. Capacity enhancing airfield infrastructure is justified if demand/capacity ratio (forecast annual operations compared to Annual Service Volume) reaches 60 percent. The analysis results indicate that the existing airfield infrastructure is sufficient; no additional airfield capacity is needed to accommodate existing or future demand. The airfield is expected to operate well below its maximum capacity level for the foreseeable future. The runway demand capacity analysis results are described in *Table 3-4*.

***TABLE 3-4***
***RUNWAY DEMAND/CAPACITY***

| | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|
| Mix Index | 51% | 51% | 53% | 55% |
| VFR Hourly Capacity | 77 | 77 | 77 | 77 |
| IFR Hourly Capacity | 56 | 56 | 56 | 56 |
| Annual Service Volume | 215,000 | 215,000 | 215,000 | 215,000 |
| Forecast Annual Operations | 33,503 | 34,127 | 34,292 | 36,272 |
| Demand/Capacity | 16% | 16% | 16% | 17% |

Source: RS&H, 2016

### Third Runway Evaluation

The current Airport Layout Plan (ALP) for FNT includes a new parallel general aviation runway, Runway 9R-27L. The 2012 FNT ALP depicts the new runway intersecting Runway 18-36, near the approach end of Runway 36. The 2006 Master Plan indicated that the proposed runway was intended to replace the lost capacity from the closure of Runway 5-23 to support airfield safety and operational efficiency. The intent was to locate the new runway proximate to the southern general aviation facilities to support efficient land use and airfield circulation. The proposed parallel general aviation runway will not be required within the planning horizon for the following reasons.

First, the airfield demand/capacity analysis results, as described in *Table 3-4*, indicates that a new runway is not required to meet forecast demand within the planning horizon. The existing intersecting runway configuration has adequate capacity through the planning period and beyond.

Second, the need for a parallel general aviation runway would be primarily to serve smaller recreational activity. This type of activity has been in decline both locally and nationally for the past several years, and is only projected to have slight growth into the future. Since the completion of the 2006 Master Plan, aviation activity at FNT has declined. General aviation traffic at FNT declined in the past six years. Local operations have dropped by 57.9 percent since 2009 while itinerant operations have declined by 19.4 percent as described in Chapter 2, *Forecast*. Looking ahead, general aviation as a whole is forecast to experience only slight growth. Nationwide, the active general aviation fleet is projected to increase at an average annual rate of 0.2 percent through 2036 according to 2016 FAA Aerospace Forecast. General aviation activity, measured in hours flown, is projected to increase by an average of 1.2 percent per year through 2036. This includes a 0.6 percent average annual decrease for fixed-wing piston aircraft and 3.1 percent average annual increase for jet aircraft.

One reason to consider keeping the parallel general aviation runway would be to ensure the region has adequate capacity in the event that general aviation airports in the region close due to financial and/or development pressures. To address this potential scenario, an analysis was completed to explore the hypothetical scenario of airport closures and to see if the FNT runway system would have the capacity to accommodate additional regional demand. To test the scenario it was assumed that FNT would absorb all displaced general aviation demand currently occurring at the nearby airports.

The scenario analysis included seven general aviation airports within 20 nautical miles of FNT. The analysis considered the current local and itinerant operations as reported in the FAA Form 5010, *Airport Master Record*. The general aviation airports considered in this analysis are described in *Table 3-5*.

***TABLE 3-5***
***NEARBY GENERAL AVIATION AIRPORTS***

| Name | FAA ID | Distance (nm) | Local GA Ops | Itinerant GA Ops |
|---|---|---|---|---|
| Dalton Airport | 3DA | 6 | 7,000 | 6,000 |
| Waite Field | 29M | 9 | 50 | 50 |
| Athelone Williams Memorial Airport | 6G0 | 10 | 75 | 75 |
| Price's Airport | 9G2 | 10 | 1,500 | 1,200 |
| Alkay Airport | 51G | 11 | 0 | 50 |
| Millstream Airpark | 56M | 13 | 50 | 50 |
| Owosso Community Airport | RNP | 17 | 11,500 | 10,500 |

Note: nm = nautical mile.
Source: FAA Form 5010, *Airport Master Record*, 2016

The general aviation operations at the seven general aviation airports was added to the forecast activity for FNT. The hypothetical scenario analysis included the airfield demand/capacity analysis as described in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*.

The analysis results show that increasing the general aviation activity at FNT reduces the mix index to 32 percent for 2015, relative to the demand/capacity analysis using the forecast demand. The hypothetical scenario analysis results also show that the annual service volume is reduced to 200,000 operations. The results indicate that the airfield demand/capacity ratio would reach 37 percent by the end of the planning period. Capacity enhancing airfield infrastructure is justified if the demand/capacity ratio reaches 60 percent. Therefore, the existing airfield configuration is sufficient to accommodate the additional demand associated

with the regional airport closure scenario. The runway demand/capacity analysis results for the hypothetical scenario are described in *Table 3-6*.

In the long-term (beyond the 20-year planning horizon), the proposed parallel general aviation runway may be required to satisfy increased demand for runway capacity. Therefore, it is recommended that the Airport keep the proposed parallel general aviation runway on the ALP to maintain the flexibility to construct the additional runway capacity should the demand materialize. The goal is to help protect against encroachment of non-compatible, off-airport land uses that would preclude the Airport from constructing the runway in the future, should the need arise. Future Airport Master Plans should reevaluate the need for the third runway.

***TABLE 3-6***
***RUNWAY DEMAND/CAPACTY – HYPOTHETICAL SCENARIO***

| | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|
| Mix Index | 32% | 32% | 33% | 35% |
| VFR Hourly Capacity | 77 | 77 | 77 | 77 |
| IFR Hourly Capacity | 56 | 56 | 56 | 56 |
| Annual Service Volume | 200,000 | 200,000 | 200,000 | 200,000 |
| Forecast Annual Operations | 71,603 | 72,227 | 72,392 | 74,372 |
| Demand Capacity | 36% | 36% | 36% | 37% |

Source: RS&H, 2016

### Runway Orientation

Runway orientation is largely a factor of the prevailing wind direction at the Airport. A wind analysis is performed in order to determine the required number, orientation, and layout of runways at an airport. A wind rose analysis was conducted for the Airport to determine wind coverage for aircraft on both runways using the FAA Wind Analysis Program.

Ten-year historical weather data was collected from the National Oceanic and Atmospheric Administration (NOAA) records of the Airport's ASOS on site and obtained through the FAA Airport GIS "portal", and was used to evaluate the runway layout. The data included information for all weather conditions, VFR conditions, and IFR conditions.

The analysis results indicate that during all-weather, IFR, and VFR observations both Runway 9-27 and Runway 18-36 provide more than 99 percent wind coverage for the allowable crosswind component of 20 knots for the existing and projected fleet mix. Based on the results of the wind analysis, it can be concluded that the Bishop Airport runway orientation is adequate. The wind coverage is described in *Table 3-7*.

***TABLE 3-7***
***CROSSWIND COMPONENT (RWY 9-27 AND RWY 18-36)***

| Meteorological Condition | 10.5 knots | 13 knots | 16 knots | 20 knots |
|---|---|---|---|---|
| All Weather | 98.82% | 99.72% | 99.97% | 100.0% |
| IFR Coverage | 98.58% | 99.68% | 99.94% | 99.99% |
| VFR Coverage | 98.87% | 99.78% | 99.98% | 100.0% |

Source: NOAA, 2016; RS&H, 2016

### Runway Length

The runway length requirement analysis was conducted using methodology from FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*. The runway length analysis was evaluated for several aircraft because runway length requirements do not always correlate with aircraft size.

The Advisory Circular indicates that the recommended runway length is determined according to the performance of individual aircraft when critical design aircraft are classified as regional jets or large aircraft with maximum certified takeoff weight (MTOW) greater than 60,000 pounds. Therefore, manufacturer performance specifications were used to determine recommended runway lengths for each of the critical design aircraft at FNT. Runway length calculations were completed for takeoff and landing for each of the critical aircraft.

Takeoff length calculations considered haul length in the analysis. Haul lengths were set based on existing city pairs and new destinations likely to be served within the planning horizon. Haul lengths less than the aircraft's payload break point requires analysis based on an estimated takeoff weight; the Advisory Circular indicates that MTOW cannot be used in these cases. Therefore, operating takeoff weights were estimated based on haul length and payload-range charts provided in the airframe manufacturers' airplane planning manuals. The landing length was calculated based on the aircraft landing on a wet or contaminated runway surface at the operating landing weight. Operating landing weight represented the aircraft's maximum landing weight, except in cases where landing weight was limited by the operating takeoff weight. Other analysis considerations included the Airport's density altitude[35], longitudinal runway grade, and mean maximum temperature of the hottest month in Flint.

The analysis found that the required runway length is 8,000 feet, based on the takeoff length required for the Boeing 737-800 to fly to destinations in Nevada, including Las Vegas and Bullhead City. The Boeing 737-800 is expected to operate at the Airport through the planning horizon. The longest runway at the Airport is Runway 18-36, which has a length of 7,849 feet. Therefore, the existing runways do not accommodate the demand for runway length. The runway length requirements are described in *Table 3-8*.

***TABLE 3-8***
***RUNWAY LENGTH REQUIREMENTS***

| | Boeing 737 | Boeing MD-83 | Airbus A300 | Boeing 737 | Boeing 757F | Airbus A310 | Boeing 767 |
|---|---|---|---|---|---|---|---|
| City Pair | IFP / LAS | PIE | MEM | ATL | MEM | MEM | MEM |
| Airline | Sun Country | Allegiant | FedEx | Delta | FedEx | FedEx | FedEx |
| Longest Route (nm) | 1,500 | 900 | 550 | 550 | 550 | 550 | 550 |
| Takeoff Weight (lbs.) | 167,000 | 134,000 | 302,100 | 165,000 | 208,700 | 257,500 | 321,400 |
| Landing Weight (lbs.) | 146,300 | 134,000 | 302,100 | 157,300 | 208,716 | 257,500 | 321,400 |
| Takeoff Length (ft.) | 8,000 | 5,800 | 5,400 | 7,800 | 5,200 | 4,800 | 5,900 |
| Landing Length (ft.) | 6,800 | 5,700 | 5,200 | 6,600 | 6,000 | 5,400 | 6,500 |

Source; RS&H, 2016
Notes: 1 - Distance based on Great Circle Mapper; PIE - St. Petersburg, FL; IFP - Bullhead City, AZ; LAS - Las Vegas, NV; MEM - Memphis, TN; ATL - Atlanta, GA

[35] Density altitude is pressure altitude corrected for temperature. A higher density altitude results in increased runway requirements.

### Runway Design Standards

The runway design standards are defined by FAA regulations and best planning practices to optimize airfield safety. FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design* is the primary tool that FAA uses to define runway design standards. The current and future runway design standards at FNT are based on AAC-D and ADG-IV aircraft.

Nearly all existing runway design components meet FAA design standards. Of note are the Runway Safety Areas (RSA). The RSA for both runways meet FAA standard as defined in the Advisory Circular. The following discussion focuses on the non-standard runway design conditions.

Evaluation of the design standards for FNT runways identified non-standard Runway Object Free Area (ROFA) and shoulder conditions. The ROFA is a rectangular area centered about the runway centerline. The ROFA clearing standard requires clearing the ROFA of aboveground objects protruding above the nearest point of the RSA. The ROFA for ADG-IV runways is 800 feet wide and extends 1,000 feet beyond each runway endpoint.

The Runway 18 ROFA length is impacted by 29 feet by a portion of the airside perimeter road. Therefore, the ROFA length extends 971 beyond the Runway 18 end; FAA standard is 1,000 feet. The road in and of itself does not result in a non-standard condition; however, vehicles traveling on the airside perimeter road do.

The Runway 9-27 ROFA is impacted in three locations by navigational equipment. The Runway 9-27 ROFA width is impacted by the Runway 9 and Runway 27 glideslope antennas and associated equipment shelters. The glideslope antennas and associated equipment shelters are located 396 feet south of the runway centerline. Therefore, the ROFA width is 796 feet; FAA standard is 800 feet. The Runway 27 ROFA length is impacted by the Runway 27 localizer equipment shelter. The localizer equipment shelter is located 990 feet east of the runway endpoint. Therefore, the ROFA length is 990 feet. The glideslopes, equipment shelters, and airside perimeter road should be relocated outside the ROFA to meet design standards.

Neither Runway 9-27 nor Runway 18-36 has paved shoulders; however, FAA standards require paved shoulders for runways accommodating ADG-IV and larger aircraft. Shoulders are designed to prevent erosion and support the occasional passage of aircraft, maintenance equipment, and emergency vehicles.

All other components of the design criteria for both runways are standard.

The Runway Protection Zones (RPZ) are trapezoidal areas located at the end of each runway intended to enhance the protection of people and property on the ground by limiting incompatible land use. The RPZs at FNT are standard based on current FAA designed standards; therefore, no changes are required. FAA's Interim Guidance Memorandum dated September 27, 2012 describes actions that must be met when RPZs are modified or when land uses within RPZs are modified. Therefore, should the FNT RPZs be modified during the planning horizon, adherence to the Memorandum actions (i.e., evaluation of incompatible land uses within the RPZs) would be required. Revised FAA guidance pertaining to existing RPZ conditions is expected to be released within the planning horizon; however, the extent of changes, if any, to RPZ standards are unknown at this point.

Runway design characteristics for Runway 9-27 are summarized in *Table 3-9* and design characteristics for Runway 18-36 are summarized in *Table 3-10*. The nonstandard runway conditions are depicted in *Exhibit 3-1*.

***TABLE 3-9***
***RUNWAY 9-27 DESIGN STANDARDS***

| Design Component | Runway 9-27 FAA Standard (ft.) | Standard Met (✓) |
|---|---|---|
| Runway Width | 150 | ✓ |
| Paved Shoulder Width | 25 | X |
| Blast Pad Width | 200 | ✓ |
| Blast Pad Length | 200 | ✓ |
| Crosswind Component | 20 knots | ✓ |
| RSA Length Beyond Departure End | 1,000 | ✓ |
| RSA Length Prior to Threshold | 600 | ✓ |
| RSA Width | 500 | ✓ |
| ROFA Length Beyond Departure End | 1,000 | X |
| ROFA Length Prior to Threshold | 600 | ✓ |
| ROFA Width | 800 | X |
| ROFZ Length | 200 | ✓ |
| ROFZ Width | 400 | ✓ |

| Design Component | Runway 9 End FAA Standard (ft.) | Runway 9 End Standard Met (✓) | Runway 27 End FAA Standard (ft.) | Runway 27 End Standard Met (✓) |
|---|---|---|---|---|
| POFZ Length | 200 | ✓ | 200 | ✓ |
| POFZ Width | 800 | ✓ | 800 | ✓ |
| Approach RPZ Length | 2,500 | ✓ | 2,500 | ✓ |
| Approach RPZ Inner Width | 1,000 | ✓ | 1,000 | ✓ |
| Approach RPZ Outer Width | 1,750 | ✓ | 1,750 | ✓ |
| Departure RPZ Length | 1,700 | ✓ | 1,700 | ✓ |
| Departure RPZ Inner Width | 500 | ✓ | 500 | ✓ |
| Departure RPZ Outer Width | 1,010 | ✓ | 1,010 | ✓ |
| Runway Centerline to Parallel Runway Centerline | N/A | N/A | N/A | N/A |
| Runway Centerline Holding Position | 250 | ✓ | 250 | ✓ |
| Runway Centerline to Parallel Taxiway Centerline | 400 | ✓ | 400 | ✓ |
| Runway Centerline to Aircraft Parking Area | 500 | ✓ | 500 | ✓ |
| Runway Centerline to Helipad | N/A | N/A | N/A | N/A |

Source: FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*; RS&H, 2016

***TABLE 3-10***
***RUNWAY 18-36 DESIGN STANDARDS***

| Design Component | Runway 18-36 FAA Standard (ft.) | Standard Met (✓) |
|---|---|---|
| Runway Width | 150 | ✓ |
| Paved Shoulder Width | 25 | X |
| Blast Pad Width | 200 | ✓ |
| Blast Pad Length | 200 | ✓ |
| Crosswind Component | 20 knots | ✓ |
| RSA Length Beyond Departure End | 1,000 | ✓ |
| RSA Length Prior to Threshold | 600 | ✓ |
| RSA Width | 500 | ✓ |
| ROFA Length Beyond Departure End | 1,000 | X |
| ROFA Length Prior to Threshold | 600 | ✓ |
| ROFA Width | 800 | ✓ |
| ROFZ Length | 200 | ✓ |
| ROFZ Width | 400 | ✓ |

| Design Component | Runway 18 End FAA Standard (ft.) | Runway 18 End Standard Met (✓) | Runway 36 End FAA Standard (ft.) | Runway 36 End Standard Met (✓) |
|---|---|---|---|---|
| POFZ Length | N/A | N/A | N/A | N/A |
| POFZ Width | N/A | N/A | N/A | N/A |
| Approach RPZ Length | 1,700 | ✓ | 1,700 | ✓ |
| Approach RPZ Inner Width | 500 | ✓ | 500 | ✓ |
| Approach RPZ Outer Width | 1,010 | ✓ | 1,010 | ✓ |
| Departure RPZ Length | 1,700 | ✓ | 1,700 | ✓ |
| Departure RPZ Inner Width | 500 | ✓ | 500 | ✓ |
| Departure RPZ Outer Width | 1,010 | ✓ | 1,010 | ✓ |
| Runway Centerline to Parallel Runway Centerline | N/A | N/A | N/A | N/A |
| Runway Centerline Holding Position | 250 | ✓ | 250 | ✓ |
| Runway Centerline to Parallel Taxiway Centerline | 400 | ✓ | 400 | ✓ |
| Runway Centerline to Aircraft Parking Area | 500 | ✓ | 500 | ✓ |
| Runway Centerline to Helipad | N/A | N/A | N/A | N/A |

Source: FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*; RS&H, 2016

***EXHIBIT 3-1***
***NONSTANDARD RUNWAY DESIGN STANDARDS***


Source: Google Earth Imagery, 2016, RS&H, 2016

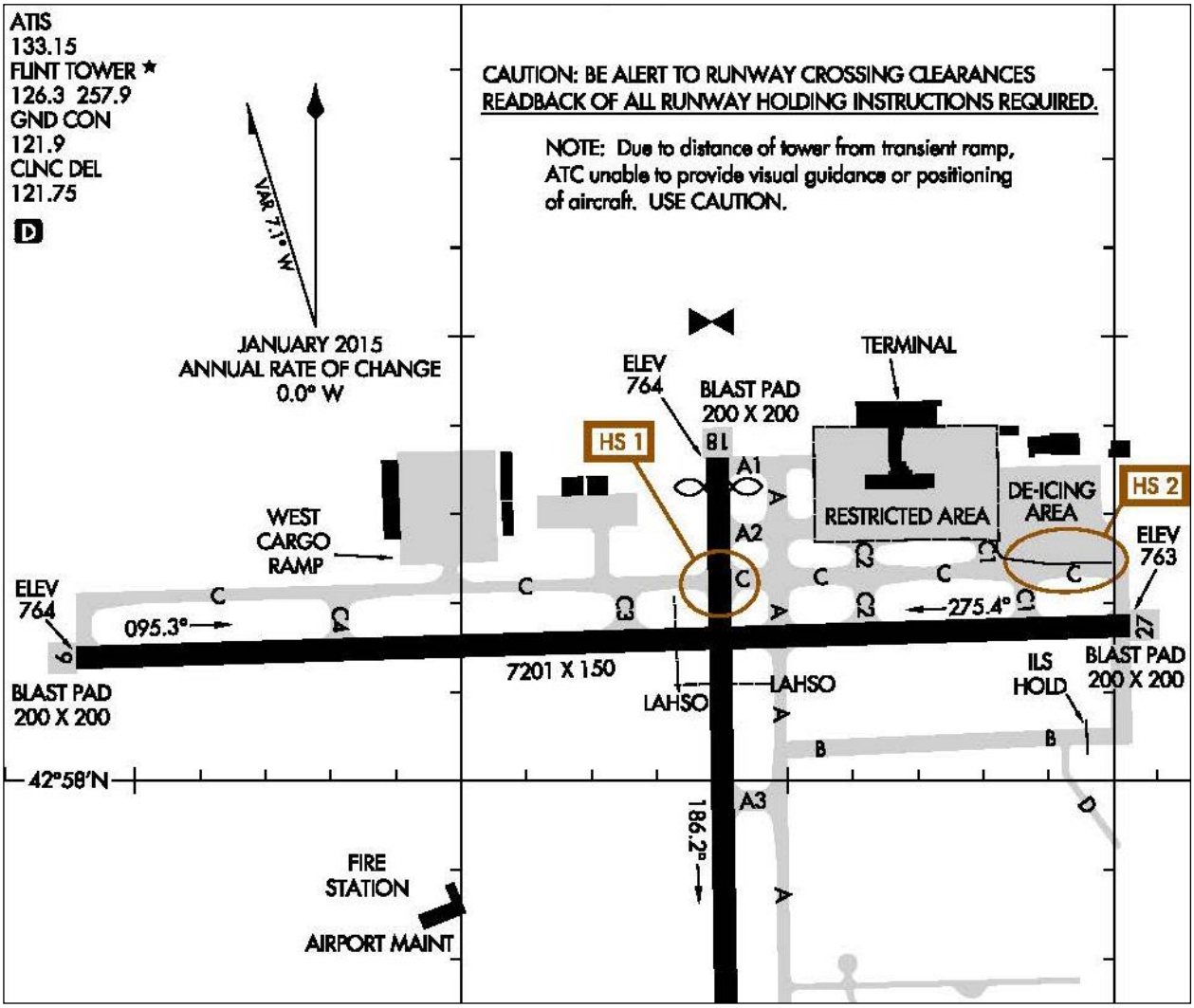
## 3.2.3 Airfield Hot Spots

A hot spot is defined as a location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary. Typically, it is a complex or confusing taxiway/taxiway or taxiway/runway intersection.

The two designated FNT airfield hot spots are depicted in *Exhibit 3-2*. Hot Spot 1 is located at the intersection of Taxiway C and Runway 18-36. The FAA Hot Spot description notes that aircraft should manage taxi speed and be prepared to hold short of Runway 18-36. Caution in this area is required. Hot Spot 2 is located at the deicing pad, proximate to Taxiway C and Runway 9-27. The FAA Hot Spot description notes that aircraft exiting the deicing pad are on Taxiway C and in close proximity to Runway 9–27. Caution in this area is required.

FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*, states that redesign of hot spots should be a priority when the associated runway or taxiway is subject to reconstruction or rehabilitation. The Airport has taken steps to resolve Hot Spot 1 with the recent installation of Runway Guard Lights on Taxiway C, on either side of Runway 18-36. The FAA is monitoring this action to determine if it sufficiently addresses the hot spot concern. Hot Spot 2 should be resolved by redesigning the interface between the deicing pad and Taxiway C when that pavement area is subject to reconstruction or rehabilitation.

***EXHIBIT 3-2***
***AIRFIELD HOT SPOTS***




Source: FAA Airport Diagram, 2016

### 3.2.4 Taxiway and Taxilane Requirements

#### Taxiway and Taxilane Design Standards

The taxiway and taxilane design standards are defined by FAA regulations and best planning practices to enhance airfield safety. FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design* is the primary tool that FAA uses to define taxiway and taxilane design standards. The Airbus A310-200F is the largest critical aircraft that operated at FNT in 2015 that satisfies the substantial use threshold. The Boeing 767-300F is forecast to be the largest critical aircraft operating at FNT starting in 2025. Therefore, the current and future taxiway and taxilane design standards at FNT are based on dimensional standards associated with ADG-IV and TDG 5 classifications. This applies to all taxiways and the taxilanes serving the passenger terminal.

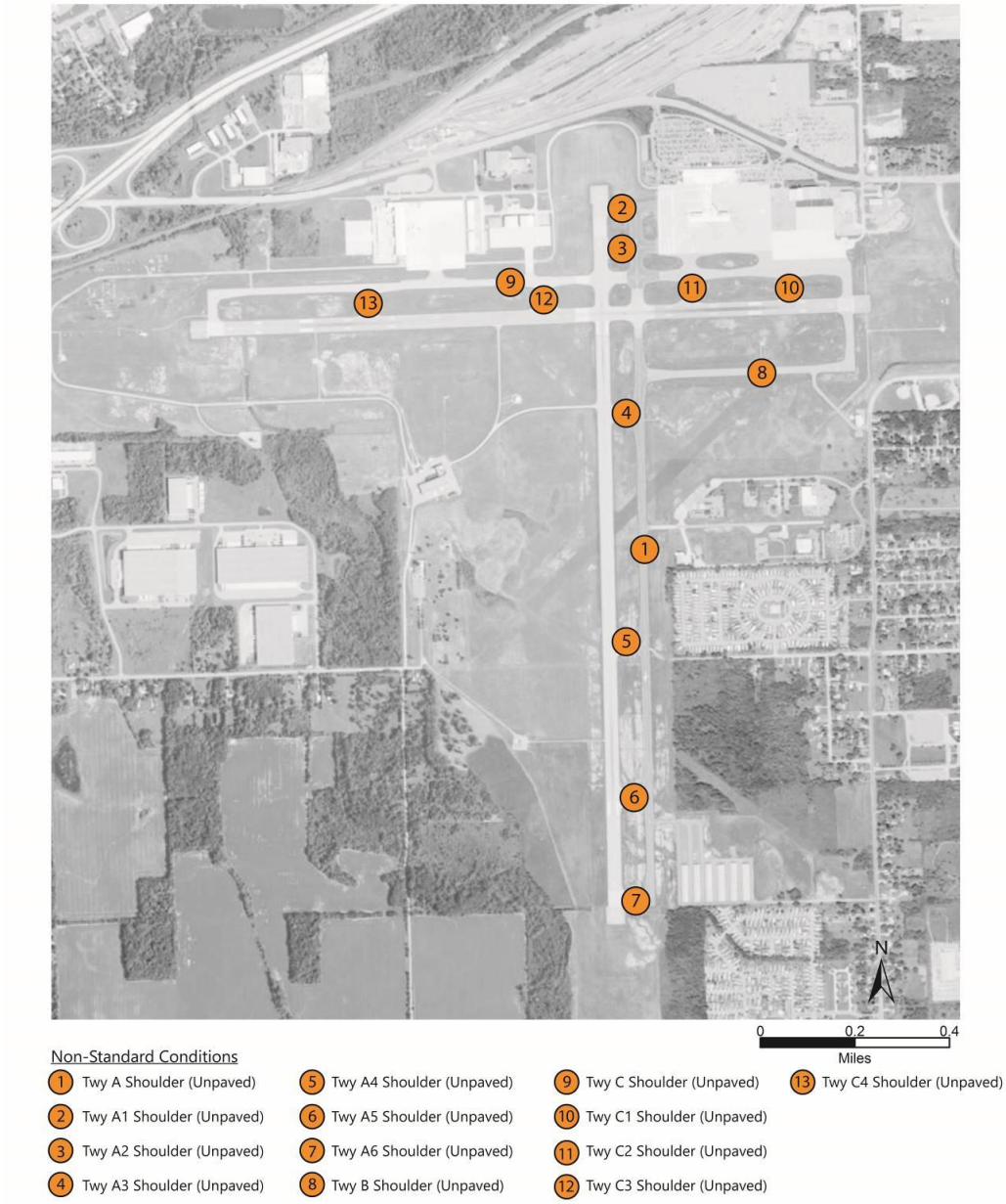
Taxilane D and Taxilane E only serve small general aviation aircraft. The Piper PA34 is the critical aircraft operating on these taxilanes. Therefore, the design standards for Taxilane D and Taxilane E are based on dimensional standards associated with ADG-I and TDG-1A.

Evaluation of the design standards for FNT taxiways and taxilanes identified that shoulders are non-standard for all taxiways at the Airport. Currently, taxiways at FNT do not have paved shoulders. However, FAA standards require paved shoulders for all taxiways accommodating ADG-IV and higher to prevent erosion and support the occasional passage of aircraft, maintenance equipment, and emergency vehicles. The FAA standard shoulder width for TDG-5 taxiways is 30 feet. The Airport has plans to add paved shoulders to these taxiways as each taxiway is programmed for rehabilitation.

The shoulder standards are different for Taxilane D or Taxilane E. These taxilanes are designed only to accommodate ADG-II aircraft. FAA standards recommend turf, aggregate-turf, soil cement, lime or bituminous stabilized soil are adjacent to paved surfaces accommodating ADG-I and ADG-II aircraft. Therefore, no change is required for Taxilane D or Taxilane E shoulders.

All other components of the design criteria for the taxiways and taxilanes are standard. Nonstandard taxiway conditions are depicted in *Exhibit 3-3*.

***EXHIBIT 3-3***
***NONSTANDARD TAXIWAY DESIGN STANDARDS***




Source: Google Earth Imagery, 2016, RS&H, 2016

## Taxiway and Taxilane Design Principles

Taxiway and taxilane best practices are based on FAA guidance and best planning practices to enhance overall airfield safety. The FNT taxiways and taxilanes were evaluated based on six best practice design principles as described in FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*:

- Three-Node Concept
- Expansive Pavement Avoidance
- Runway Crossings Limitations
- High Energy Intersection Avoidance
- Perpendicular Runway Crossings
- Direct Access Avoidance

The following is a description of the High Energy Intersection Avoidance and Direct Access Avoidance principles. The FNT taxiways and taxilanes satisfy the remaining design principles.

The High Energy Intersection Avoidance principle is intended to restrict runway crossings in the middle third of the runway. The middle third of the runway is known as the "high energy" area where aircraft on the runway have the least ability to maneuver to avoid a collision. Taxiway intersections should be limited to the outer thirds of the runway. This principle only applies to taxiway crossings and does not apply to intersections used only for taxiway exits. Taxiway A crosses Runway 9-27 within the middle third; however, Taxiway A is the sole full-length parallel taxiway for Runway 18-36. Therefore, Taxiway A is acceptable. All FNT taxiways and taxilanes satisfy this design principle; no changes are required.

The Direct Access Avoidance principle is intended to reduce runway incursions. FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*, indicates that taxiways should not lead directly from an apron to a runway without requiring a turn. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway but instead accidently enters a runway. Taxiway A1, Taxiway A2, Taxiway C, Taxiway C1, and Taxiway C2 do not adhere to this design principle. Taxiway A1 and Taxiway A2 provide direct access from the passenger terminal apron to Runway 18-36. Taxiway C and Taxiway C1 provide direct access from the deicing area to Runway 9-27. This configuration results in Hot Spot 2. Taxiway C2 provides direct access from the passenger terminal apron to Runway 9-27. The Airport has plans to realign Taxiway C1 and Taxiway C2 in the near-term to support this initiative and enhance pilot situational awareness. The remaining FNT taxiways and taxilanes satisfy this design principle; no changes are required.

Taxiway and taxilane design principles are described in *Table 3-11*.

***TABLE 3-11***
***TAXIWAY AND TAXILANE DESIGN PRINCIPLES***

| | Three-Node Concept | Expansive Pavement Avoidance | Runway Crossing Limitations | High Energy Intersection Avoidance | Perpendicular Runway Crossings | Direct Access Avoidance |
|---|---|---|---|---|---|---|
| Taxiway A | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway A1 | ✓ | ✓ | ✓ | ✓ | ✓ | X |
| Taxiway A2 | ✓ | ✓ | ✓ | ✓ | ✓ | X |
| Taxiway A3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway A4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway A5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway A6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway B | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway C | ✓ | ✓ | ✓ | ✓ | ✓ | X |
| Taxiway C1 | ✓ | ✓ | ✓ | ✓ | ✓ | X |
| Taxiway C2 | ✓ | ✓ | ✓ | ✓ | ✓ | X |
| Taxiway C3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxiway C4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Taxilane D | ✓ | ✓ | N/A | N/A | ✓ | ✓ |
| Taxilane E | ✓ | ✓ | N/A | N/A | ✓ | ✓ |

Source: FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*; RS&H, 2016

### 3.2.5 Electronic and Visual Navigational Aids

Airport NAVAID provide pilots and air traffic controllers with information to assist during takeoff, landing, and surface movement on runways and taxiways, and safely guide aircraft within the terminal airspace. NAVAID systems can be visual or instrument-based.

#### Electronic Navigational Aids

The following is a description of the requirements associated with each major electronic navigational aid.

An ASOS is a set of meteorological recording instruments that provide airport weather conditions to pilots and air traffic controllers. ASOS equipment must be located at least 500 feet from objects that may affect its ability to accurately observe and record meteorological conditions. No objects are located within the 500-foot critical area. The FNT ASOS meets FAA siting criteria and is properly located; no changes are required or recommended.

A VORTAC gives pilots a direct indication of bearing and distance relative to the facility. VORTAC antennas provide aeronautical guidance information for civil use while the Tactical Air Navigation system provides supplementary navigational information to military users. The FNT VORTAC provides navigational guidance for two instrument approach procedures at FNT. FAA Order 6820.10, *VOR, VOR/DME, and VORTAC Siting Criteria*, indicates that obstructions are generally disallowed within 1,000 feet of VORTAC antenna. Additionally, VORTAC must not be located closer than 500 feet to the centerline of any runway or 250 feet to the centerline of a taxiway. The Order recommends that VORTAC antennas are sited adjacent to the runway intersections to provide approach guidance to the ends of both runways. The FNT ASOS is located

approximately 800 feet west of the VORTAC antenna and the tallest ASOS sensor has a top elevation of 802 feet above mean sea level; however, the ASOS equipment is acceptable within the VORTAC critical area given distance and height of the ASOS equipment[36]. The FNT VORTAC meets FAA siting criteria and is properly located; no changes are required or recommended.

Runway Visual Range (RVR) equipment measures visibility in the runway environ and transmits the information to air traffic users. RVRs support increased landing capability and support ILS capable runways. CAT-I runways do not require RVR equipment but may be supported by a touchdown RVR. Runway 9 is equipped with a touchdown RVR sensor that is located adjacent to the Runway 9 glideslope.

An Airport Surveillance Radar (ASR) is a rotating antenna sail that allows aircraft to be detected by air traffic controllers within the terminal approach area during night operations or inclement weather conditions. FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*, indicates that ASR antennas should be located at least 1,500 feet from buildings or objects that might cause signal reflections. Several buildings and forested areas are located within the 1,500-foot critical area. However, the Airport's ASR-11 is elevated such that buildings and objects do not impact line-of-sight clearance. The FNT ASR-11 meets FAA siting criteria and is properly located; no changes are required or recommended. The Airport should continue to monitor tree growth to ensure that tree growth does not affect ASR signal integrity in the future.

A non-directional beacon (NDB) provides lateral guidance for instrument approaches. The Howell NDB (OZW) used for FNT approaches is located off-airport and beyond the jurisdictional control of the Airport. The Howell NDB (OZW) is located at Livingston County Spencer J. Hardy Airport in Howell, Michigan approximately 23 nautical miles southwest of FNT.

An ILS provides pilots with electronic guidance for lateral alignment with the runway and vertical alignment with proper descent gradient, allowing the pilot to approach the airport in poor weather until the airport is in sight. An ILS consists of two components – a glideslope that provides vertical guidance and a localizer that provides lateral guidance. Both ends of Runway 9-27 are equipped with an ILS. The glideslope antennas and associated equipment shelters for Runway 9 and Runway 27, and the Runway 27 localizer equipment shelter result in non-standard runway conditions, as described in Section 0. The remaining components of the Runway 9-27 ILS (i.e., Runway 9 localizer array and associated equipment shelter and the Runway 27 localizer array) are properly located; no changes are required or recommended.

The ILS for Runway 9 and Runway 27 provide Category (CAT) I precision instrument approach for landing aircraft. The Runway 9 ILS and Runway 27 ILS both provide instrument guidance to a visibility minimum of ½ statute mile and ceiling height of 200 feet above ground level (AGL). An analysis was completed to evaluate weather conditions from 2006 to 2016. The analysis results indicate that visibility or cloud cover elevation was less than the CAT I ILS minima less than 1 percent of the time during the 10-year period. The analysis results conclude that FNT experienced CAT II meteorological conditions[37] 0.88 percent of the time and CAT III meteorological conditions[38] 0.10 percent of the time during the 10-year period. Therefore, the existing CAT I ILS capability is sufficient.

Although the incidents of CAT II/III conditions are very low at FNT, the average timing of low ceiling/low visibility was evaluated to determine if there are any extraordinary impacts to operations. Analysis of meteorological conditions from 2006 to 2016 indicate that CAT II conditions most often occur in the

[36] FAA Order 6820.10, *VOR, VOR/DME, and VORTAC Siting Criteria*, indicates that structures of "negligible metallic content" may be located within the VORTAC critical area if the structures does not extend more than 2.5 degrees above the horizontal plane from the VORTAC site

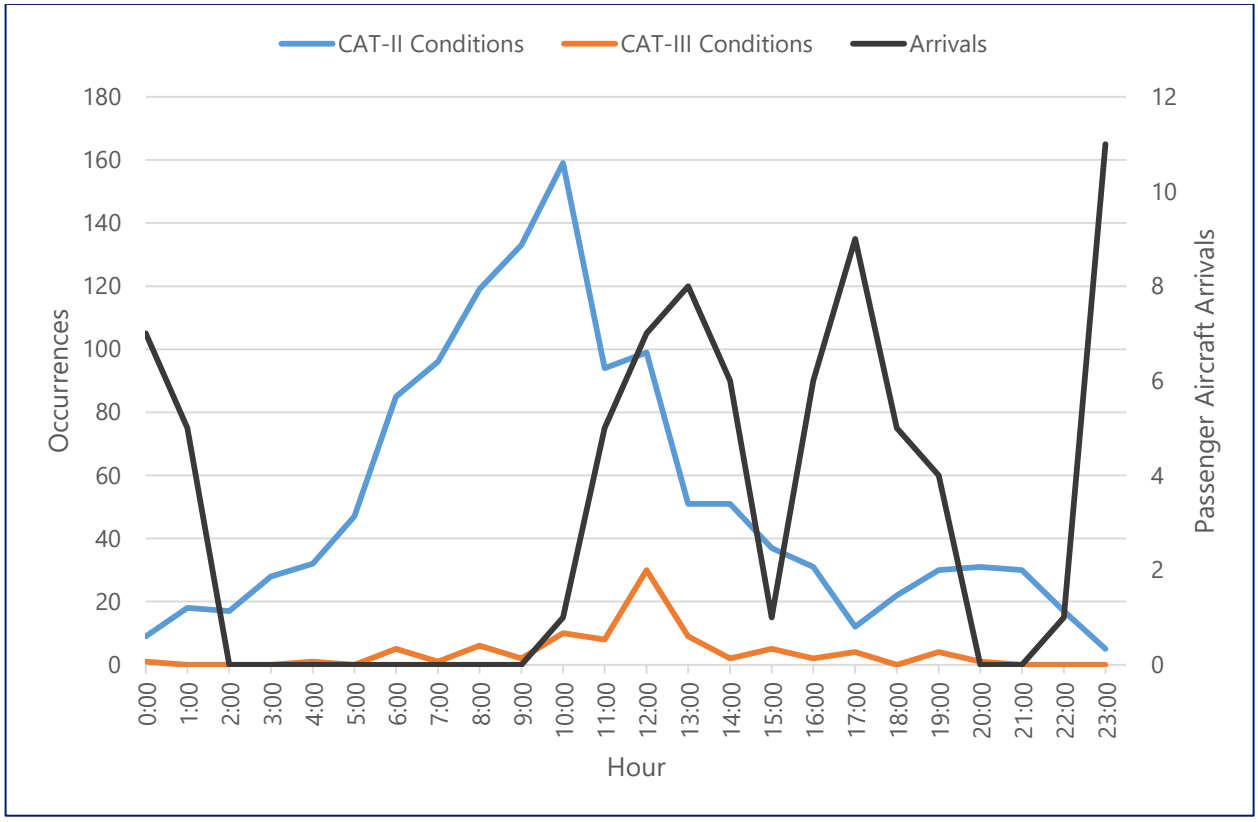
[37] CAT-II conditions minima occur when visibility is between 1,200-2,400 feet or when the cloud ceiling is between 100-200 feet AGL.

[38] CAT-III conditions minima occur when visibility is less than 1,200 feet or when the cloud ceiling is less than 100 feet AGL.

morning between 7:00 and 13:00. CAT III conditions most often occur around midday between 11:00 and 14:00. The passenger aircraft arrivals peak occurs from 16:00 to 18:00 and from 23:00 to 1:00. The coincidence of CAT II/III meteorological conditions and passenger aircraft arrivals are depicted in *Exhibit 3-4*.

Weather conditions that deteriorate beyond the CAT I conditions may require arriving aircraft to divert to other airports. As indicated in *Exhibit 3-4*, the average time of day occurrence of CAT-II/-III conditions generally do not correspond to peak arrival periods throughout the day. It appears that the actual number of operations impact by low visibility/low ceiling conditions will be very low on an annual basis. Even so, the Airport desires to be an all-weather airport, and as such, should provide the ability to upgrade to a CAT-II/-III approach in the future should airlines demand that capability.

***EXHIBIT 3-4***
***COINCIDENCE OF CAT II AND CAT III CONDITIONS AND PASSENGER ARRIVALS***




Source: NOAA, 2016; FNT Commercial Passenger Flight Schedule, April 2016; RS&H, 2016

RNAV instrument approaches are available for approaches to all four runway ends. These approach procedures do not use dedicated ground-based NAVAID equipment, but rather are Global Positioning System (GPS)-based instrument approach procedures. All four RNAV procedures supports vertical guidance with Localizer Performance with Vertical Guidance (LPV) and Lateral Navigation/Vertical Navigation (LNAV/VNAV). The RNAV procedures supports FAA's NextGen Performance Based Navigation (PBN) initiative. The RNAV procedures are sufficient to support existing and future instrument approach capability for FNT.

### Visual Navigational Aids

A MALSR is a 2,400-foot medium intensity approach light system with sequenced flashing runway alignment indicator lights. It is an approach light system approved for CAT-I precision approaches. Runway 9 and Runway 27 are each equipped with MALSR systems. Both MALSR systems are properly located and provide the sufficient visual capability for the ILS instrument approaches. No changes are required or recommended.

A Visual Approach Slope Indicator (VASI) is a light array positioned beside the runway that provides a visual indication of an aircraft's vertical position relative to the designated visual glide path for the runway. Runway 27, Runway 18, and Runway 36 are equipped with VASI systems. All are sufficiently located. Runway 9 is not equipped with visual vertical guidance equipment.

However, VASI systems are now obsolete. Precision Approach Path Indicators (PAPI) have superseded VASI systems. PAPI systems provide superior visual guidance to landing aircraft. The FAA plans to install a PAPI system for Runway 9 and replace the existing VASI systems with PAPI systems at FNT in 2017.

High intensity runway lights (HIRL) are runway edge lights that are used to outline the edges of runways during periods of darkness or low visibility conditions. Runway 9-27 and Runway 18-36 are equipped with HIRL. HIRL are required for precision instrument runways, such as Runway 9-27. HIRL are not required for non-precision instrument runways, such as Runway 18-36, but provide enhanced capability. The HIRL are sufficient; no changes are required or recommended.

Airport rotating beacons indicate the location of an airport by projecting beams of light spaced 180 degrees apart. Airport rotating beacons are required for any airport with runway edge lights. The FNT rotating beacon is located east of the Runway 36 end, approximately 2,800 feet of the runway. The FNT rotating beacon is properly located; no changes are required or recommended.

## 3.2.6 Airside Perimeter Road

An airside perimeter road is a vehicle service road that provides safe and efficient circulation around the airport airside for airport personnel.

FAA Advisory Circular 150/5300-13A – Change 1, *Airport Design*, indicates that proper layout of service roads on an airfield contributes to airport safety and the reduction in runway incursions. The FAA recommends that the entire RSA and RPZ be accessible to rescue and fire-fighting vehicles such that no part of the RSA or RPZ is more than 330 feet from either an all-weather road or a paved operational surface. Additionally, paved roadways are recommended to prevent vehicle tires from tracking foreign object debris (FOD) onto runways and taxiways, which presents a safety hazard. The existing FNT service road network does not satisfy this FAA recommendation because the service road does not connect to the Runway 36 RSA and RPZ. This area is only accessible by public roadway or by traversing through the grass infield area.

Efficient access to the perimeter fence allows for airport operation personnel to quickly respond to any security related incidents near the perimeter fence. Additionally, airport maintenance personnel should be able to easily access the entirety of the airfield to support the efficient maintenance of the grounds and equipment around the Airport. The perimeter fence and airfield area on the south and east sides of the Airport are not accessible via the existing FNT perimeter road network. These areas are only accessible via public roadway, traversing through grass infield areas, or by driving on taxiways. The FAA discourages vehicle activity on taxiways because it increases risk of runway incursions and conflicts between vehicles and aircraft. Code of Federal Regulations 14 Title Part 139 requires that airports implement safeguards to

prevent inadvertent entry to the movement area by unauthorized vehicles. Extension of the airside perimeter road would support this requirement.

The existing FNT airside perimeter road terminates south of the field maintenance facility (on the west side) and at the passenger terminal apron (on the north and east side). In addition, a partial airside perimeter road connects the Runway 27 blast pad to the Runway 27 localizer equipment shelter, and Taxilane D. The east and south side of the Airport is not accessible by the airside perimeter roadway network.

It is recommended that the airside perimeter road be extended. The extension of the airside perimeter service road would primarily serve rescue, operation, and airport maintenance functions. Appendix P in the FAA Order 5100.38D, *Airport Improvement Program Handbook*, indicates that service roads are eligible for Airport Improvement Program (AIP) funding if they are necessary for ARFF access to a runway safety area. Service roads necessary for airport operation and maintenance are also eligible for AIP funding.

There is limited airside vehicle circulation between the northern portion of the airfield (e.g., passenger terminal, fixed base operator, and cargo complex) to the southern portion of the airfield (e.g., general aviation T-hangars). This is a result of the construction of the airside perimeter road around the west end of Runway 9-27 and the addition of the self-service fueling in the south general aviation area in the early 2000's which reduced vehicle traffic on the airfield. Therefore, the Airport should complete this project when able because it is not deemed a high priority project.

## 3.3 PASSENGER TERMINAL REQUIREMENTS

The passenger terminal building was examined to determine alterations that may be required during the planning period. In addition, the building was inspected to determine major building systems that may need replacement in the short and medium term. The results of that inspection are found in APPENDIX A. The passenger terminal building requirements were determined for each major functional area. The functional areas evaluated are as follows:

- Airline ticketing
- Checked bag screening and make up
- Passenger security screening checkpoint
- Holdroom
- Bag claim

This does not represent an exhaustive list of areas within a terminal building, but rather it represents key areas where space requirements analyses is most important.

The analyses considered recent terminal building enhancements in determination of space requirements during the planning horizon. Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*, was the primary resource used to determine the passenger terminal requirements.

### 3.3.1 Terminal Level of Service

Level of Service (LOS) is a concept that describes and measures the quality of service for a particular facility with given conditions.

The LOS concept was originally applied to traffic engineering but was adapted to airport terminal design. The Airport Council International (ACI) and the International Air Transport Association (IATA)

recognizes the LOS concept as an industry standard metric and updated the designation definitions. LOS uses a six-level scale (A-F) ranging from excellent to system breakdown.

ACRP Report 25 notes that LOS C is typically recommended as a design objective for the design hour because it denotes good service at a reasonable cost. Alternatively, LOS A implies an open-ended upper boundary that reflects a high LOS, but inefficient utilization. The terminal LOS designations are described in *Table 3-12*.

***TABLE 3-12***
***TERMINAL LEVEL OF SERVICE DESIGNATIONS***

| LOS Designation | Condition Description |
|---|---|
| A | EXCELLENT – condition of free flow; no delays; excellent level of comfort |
| B | HIGH – condition of stable flow; very few delays; high level of comfort |
| C | GOOD – condition of stable flow; acceptable brief delays; good level of comfort |
| D | ADEQUATE – condition of unstable flow; acceptable delays for short periods of time; adequate level of comfort |
| E | INADEQUATE – condition of unstable flow; unacceptable delays; inadequate level of comfort |
| F | UNACCEPTABLE – condition of cross flows; system breakdown and unacceptable delays; unacceptable level of comfort |

Source: ACI/IATA *Guidelines for Airport Capacity/Demand Management*, 1996

### 3.3.2 Airline Ticketing

Airline ticketing is the area where passengers check-in, obtain boarding documentation, and check bags. It includes airline ticket counters, self-service kiosks, queue area, and airline ticket offices. The required airline ticketing area was calculated by determining the required number of check-in positions.

The analysis methodology determines the peak hour originating passengers departing during the peak 30 minutes, based on the departing passenger arrivals distribution. That number is split into the two main areas of check-in (staffed ticket counter and self-service kiosk). Curbside check-in at FNT is minimal, and therefore was not considered in this analysis. Then the 30-minute model is run for each area; and the totals are summed to determine the total airline ticketing area.

The planning factors and assumptions used in the analysis methodology are as follows:

- 50 percent of departing passengers use ticket counters
- 30 percent of departing passengers use self-service kiosks
- 20 percent of departing passengers do not use airline ticketing facilities (e.g., use of mobile device or print-at-home boarding pass)
- 50 percent of peak hour passengers are in peak 30-minute period

These planning factors were selected based on professional judgement and industry standard as described in the ACRP Report. The analysis methodology assumed that all enplaning passengers are originating and there are no transfers.

The analysis considers that 19 out of the 35 staffed ticket counter stations are leased by airlines. The staffed ticket counter methodology included consideration of nominal processing time of three minutes based on professional judgement. A desired maximum wait time of 15 minutes was set based on industry standard. The goal was to achieve LOS C for the queue area. The self-service kiosks methodology included consideration of a nominal processing time of two minutes based on professional judgement.

Portions of unleased airline ticket counters and queue areas are used for the checked bag screening function. Therefore, this area is not included in the airline ticketing requirements analysis.

The analysis results conclude that the existing ticketing facilities are sufficient to accommodate existing and future demand throughout the planning horizon. The ticket counter meets LOS A space requirements based on the existing space. The airline ticketing area requirements are described in *Table 3-13*.

***TABLE 3-13***
***AIRLINE TICKETING REQUIREMENTS***

| | Existing[1] | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Peak Hour Departing Passengers | - | 304 | 313 | 335 | 379 |
| Ticket Counters | - | 6 | 6 | 6 | 7 |
| Self-Serve Kiosks | - | 3 | 3 | 3 | 4 |
| Airline Ticket Counter Office Space (sf) | - | 2,600 | 2,600 | 2,600 | 2,600 |
| Ticket Counter Area (sf) | - | 1,300 | 1,300 | 1,300 | 1,300 |
| Active Check In Zone Area (sf) | - | 1,300 | 1,300 | 1,300 | 1,300 |
| Counter Queue (sf) | - | 2,200 | 2,200 | 2,200 | 2,200 |
| Kiosk Area (sf) | - | 250 | 250 | 250 | 300 |
| Cross Circulation (sf) | - | 2,800 | 2,800 | 2,800 | 2,850 |
| Total Check-in/Ticketing Area (sf) | 11,800 | 10,400 | 10,400 | 10,400 | 10,550 |
| Ticketing Area Surplus (Deficit) (sf) | - | 1,400 | 1,400 | 1,400 | 1,250 |

Notes: 1 – Does not include unleased space that is currently used for checked bag screening. Values may not sum due to rounding.
sf = square feet
Source: RS&H, 2016

### 3.3.3 Checked Bag Screening and Make Up

The checked bag screening area is where Transportation Security Administration (TSA) officials screen checked bags prior to being loaded onto aircraft. The checked bag make up area is the area in which bags are segregated into different areas based on outbound flight information. This make up area is also where airline personnel collect checked bags to be loaded onto outbound flights.

All checked bags are subject to screening for explosives and undergo up to three levels of screening. Checked bag screening requirements are largely dependent on the number of explosive detection system devices required to accommodate the forecast peak hour demand. FNT makes use of stand-alone Electronic Detection System (EDS) units located in the airline check-in lobby to perform Level 1 screening. These systems are capable of automatically detecting explosives and providing three-dimensional views of bag contents. However, the FNT stand-alone systems are manually loaded and unloaded by screeners and are not incorporated into an in-line conveyor system. The EDS manufacturer specifications indicate a maximum throughput of 226 bags per hour per machine. However, the ACRP Report estimates that a stand-alone EDS unit typically processes between 100 and 200 bags per hour in real-world conditions. Therefore, a processing rate of 200 bags per hour per machine was used in the analysis. The analysis assumed that 75

percent of bags would clear inspection and 25 percent of bags would alarm in Level 1 and undergo Level 2 screening.

Bags that trigger the EDS alarm undergo Level 2 screening. Level 2 screening requires screeners to evaluate images captured by the EDS machines to inspect the checked bags. Throughput for Level 2 screening is estimated at 120 bags per hour. The analysis assumed that 80 percent of bags would clear inspection and 20 percent of bags would undergo Level 3 screening.

Oversize bags that cannot fit in the EDS machine and bags that cannot be resolved in Level 2 screening undergo Level 3 screening. FNT has Explosive Trace Detection (ETD) machines located behind the airline ticket counters to perform Level 3 screening. Level 3 screening is performed manually and involves opening the bag and using the ETD technology. The TSA suggests using the throughput rate of 24 bags per hour for ETD machines.

The processing rate and estimated peak hour demand is used to determine the number of EDS and ETD machines required. After determining an estimate for unit quantities, unit space estimates are applied to determine the space necessary in the lobby for the units and personnel to operate and function efficiently.

An area of 640 square feet was included in the analysis to accommodate each EDS machine for screener circulation and to allow bags to queue before being screened. This metric is based on existing allocation for two of the four EDS machines. FNT checked bag screeners confirmed that the existing space allocation is sufficient. An area of 100 square feet was included in the analysis to accommodate each ETD machine as recommended by the ACRP report.

The analysis concluded that the existing checked bag screening area is sufficient to accommodate the forecast demand for checked bag screening. The analysis results indicate that FNT has sufficient number of EDS and ETD machines to accommodate demand throughout the planning horizon. The checked bag screening requirements are described in *Table 3-14*.

Bag make up at FNT includes manual make up units on which bags are loaded after progressing through the checked bag screening process. The size of the bag make up area was determined based on the total Equivalent Aircraft[39] (EQA) factor and peak period staged departure flights.

The ACRP Report states that while most terminal facilities are a function of peak hour passenger volumes, some terminal facilities are more closely related to the capacity of the aircraft. For example, the total number of bag carts staged in a bag make up area at any one time are generally based on the size of the departing aircraft. Thus, the EQA is a better representative indicator of demand for this facility. The analysis methodology also considered the number of departing aircraft staged during the peak departure period. Departing passenger arrival time distributions for domestic flights are typically two hours before schedule departure time. Therefore, a two-hour peak departure period was used in this analysis. Two staged bag carts were allocated per EQA factor and a 600-square-foot area was allocated per bag cart. The analysis also considered an additional 15 percent space allowance for bag cart train circulation in the make up area.

The analysis concluded that the existing checked bag make up area is sufficient to accommodate the demand throughout the planning horizon. The checked bag make up requirements are described in *Table 3-14*.

[39] EQA is a terminal planning concept that determines terminal capacity of a gate. EQA normalizes each gate based on seating capacity of the aircraft that can be accommodated.

***TABLE 3-14***
***CHECKED BAG SCREENING AND MAKE UP REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Peak Hour Departing Passengers | | 304 | 313 | 335 | 379 |
| Peak Period[1] Staged Departure Flights | - | 5 | 5 | 5 | 6 |
| Bag Screening Area (sf) | 3,500 | 2,050 | 2,050 | 2,050 | 2,100 |
| Bag Screening EDS Machines | 4 | 3 | 3 | 3 | 3 |
| Bag Screening ETD Machines | 4 | 1 | 1 | 1 | 1 |
| Bag Screening Area Surplus (Deficit) (sf) | - | 1,450 | 1,450 | 1,450 | 1,400 |
| Bag Make Up Area (sf) | 9,950 | 5,800 | 5,800 | 5,800 | 7,200 |
| Bag Make Up Area Surplus (Deficit) (sf) | - | 4,150 | 4,150 | 4,150 | 2,750 |

Notes: 1 – Within 2-hour staging period. Values may not sum due to rounding. sf = square feet
Source: RS&H, 2016

### 3.3.4 Passenger Security Screening Checkpoint

The passenger security screening checkpoint is the area where TSA officials screen passengers. The passenger security screening checkpoint separates the public portion of the terminal building and the sterile area. The passenger security screening checkpoint consists of multiples lanes, screening equipment, and queue areas.

The analysis methodology considers the passenger processing rates through the checkpoint. Processing rate is one of the most significant factors that influences checkpoint size requirements. Processing rates for security screening checkpoints have been observed to vary significantly at different sized airports, with rates ranging from 100 passengers per hour per lane to over 200 passengers per hour per lane. A processing rate of 125 passengers per hour per lane was used in this analysis based on observations at similarly sized airports. The size of the passenger queue area prior to the inspection lanes was determined by the number of passengers anticipated to be in the queue at peak times.

The analysis concluded that three lanes are required to accommodate the existing and future passenger security checkpoint demand. TSA currently operates three checkpoint lanes; however, the current checkpoint area can accommodate a fourth lane, if necessary. No additional space is needed to accommodate the checkpoint throughout the planning horizon. The passenger security screening checkpoint requirements are described in *Table 3-15*.

***TABLE 3-15***
***PASSENGER SECURITY SCREENING CHECKPOINT REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Total Peak 30-min Security Traffic | - | 140 | 144 | 154 | 174 |
| Number of Screening Lanes | 3 | 3 | 3 | 3 | 3 |
| Security Queue Area (sf) | - | 810 | 810 | 810 | 810 |
| Total Checkpoint Area ~tables, equipment, search area (sf) | - | 5,150 | 5,150 | 5,150 | 5,150 |
| Total Security Screening Area (sf) | 9,300 | 5,950 | 5,950 | 5,950 | 5,950 |
| Security Screening Area Surplus (Deficit) (sf) | - | 3,350 | 3,350 | 3,350 | 3,350 |

Notes: Values may not sum due to rounding. sf = square feet
Source: RS&H, 2016

### 3.3.5 Holdroom

The holdroom area is the area where passengers congregate on the sterile side of the terminal to await aircraft boarding. These areas include seating area, standing area, an airline boarding podium, and queue area.

Holdroom sizing is typically based on the average seating capacity of the largest aircraft expected to use each gate. Holdrooms for FNT are sized for LOS B. LOS parameters are derived from generally accepted industry practices and are a combination of the following three factors:

- Aircraft load factor
- Percentage of passengers to be seated in the holdroom versus standing
- Area per seated and standing passenger

The design aircraft is the B737-800 for the near- and medium-term planning horizon (2015-2025). The design aircraft changes to the B737-900ER at the end of the planning horizon (2035). The analysis methodology assumed that the design aircraft load factor was 85 percent throughout the planning horizon. This is based on professional judgement. Additional planning factors used in the analysis are as follows:

- 80 percent of passengers in the holdroom are seated
- 20 percent of passengers in the holdroom are standing
- 15 square feet is allocated for each seated passenger
- 10 square feet is allocated for each standing passenger

These planning factors were determined based on industry standard planning factors as described in the ACRP Report and professional judgement.

Observation of the terminal holdroom indicates that the holdroom space is not fully utilized. The analysis confirmed the observation and concluded that the existing holdroom area has sufficient space to accommodate the demand throughout the planning horizon. The analysis concluded that legacy carriers generally have multiple daily departures from each gate and holdroom while low cost carriers may average less than one departure per day depending on time of year. Each carrier operating at FNT leases holdroom space and has preferential-use rights to that space despite the difference in utilization rates. As a result, most holdroom space at FNT is leased but not fully utilized by all airlines. Observational analysis also determined that the holdrooms have unconventional layouts, resulting in space inefficiencies. The holdrooms could be reconfigured to create efficient layouts that encompass only the space required for the planning activity levels and allow for more efficient utilization by airlines. The holdroom requirements are described in *Table 3-16*.

***TABLE 3-16***
***HOLDROOM REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| # of Seats on Design Aircraft | - | 160 | 160 | 160 | 180 |
| Seated and Standing Area (sf) | - | 2,000 | 2,000 | 2,000 | 2,250 |
| Boarding Podium and Queue Area (sf) | - | 2,100 | 2,100 | 2,100 | 2,100 |
| Area Required per Holdroom (sf) | - | 4,100 | 4,100 | 4,100 | 4,350 |
| Total Holdroom Area (sf) | 36,400 | 24,550 | 24,550 | 24,550 | 26,050 |
| Total Holdroom Area Surplus (Deficit) (sf) | - | 11,900 | 11,900 | 11,900 | 10,400 |

Notes: Values may not sum due to rounding. sf = square feet
Source: RS&H, 2016

### 3.3.6 Bag Claim

The bag claim area is the area in which bag claim devices are located. The bag claim devices circulate checked bags that are removed from inbound flights so arriving passengers may claim them. The requirements for the bag claim area is represented by overall frontage demand (in linear feet) for the total bag claim device required to process peak hour arriving flights.

The analysis methodology was based on the peak hour terminating passengers for each planning activity level, the concentration of these arriving passengers within a 20-minute time period, and the anticipated ratio of checked bags per passenger. The number of peak hour deplaned passengers was used for the peak hour terminating passengers metric as the analysis assumed that all deplaning passengers are terminating and there are no transfers. Additional planning factors used in the analysis are as follows:

- 50 percent of deplaning peak hour passengers are in the peak 20-minute period
- 75 percent of passengers checked bags
- 1.3 passengers in average traveling party

The analysis concluded that the existing bag claim area is sufficient to accommodate forecast demand. No additional space is required. The results are anecdotally confirmed as the bag claim area was expanded in 2004 and 2005 when passenger volumes exceeded existing and forecast demand levels. The bag claim requirements are described in *Table 3-17*.

***TABLE 3-17***
***BAG CLAIM REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Peak Hour Deplaning Passengers | - | 218 | 226 | 242 | 273 |
| Total Claim Frontage (ft.) | 375 | 200 | 200 | 225 | 250 |
| Claim Frontage Surplus (Deficit) (ft.) | - | 175 | 175 | 150 | 125 |

Note: Values may not sum due to rounding
Source: RS&H, 2016

## 3.4 LANDSIDE ACCESS, CIRCULATION, AND PARKING REQUIREMENTS

This section describes the requirements for the landside facilities at the Airport. The landside facilities evaluated are as follows:

- Terminal curbside
- Vehicle parking facilities
- Rental car facilities

### 3.4.1 Terminal Curbside

The curbside area was divided into two areas, based on use. The departure curbside is defined as the west side of curb and the arrivals curbside is defined as the east side of curb, segregated by the central pedestrian crosswalk. The analysis methodology assumed that arrival and departure peak hours occur at the same time. The methodology also assumed that use of the right travel lane (adjacent to the curb front lane) could be used for passenger loading and unloading when the curb front lane along terminal curbside is full. A 1.5x factor was applied to the existing curb length to calculate the effective curb length.

The departure curbside has designated stalls for the Economy Parking shuttle bus. The remaining curbside is used for private vehicle drop-off. Areas used for crosswalks and "No Parking" areas were excluded from the existing curbside area calculations.

The arrival curbside has designated stalls for taxicabs and the Economy Parking shuttle bus. The remaining curbside is used for private vehicle pick-up. Areas used for crosswalks and designated Police stall were excluded from the existing curbside area calculations.

Estimating passenger mode splits is integral to calculating curbside requirements. The mode splits were estimated based on observations and public parking lot utilization:

- 25 percent of passengers use private vehicle drop-off/pick-up
- 32 percent of passengers use Short-/Long-Term Parking
- 31 percent of passengers use the Economy Parking shuttle
- 7 percent of passengers use rental car
- 5 percent of passengers use taxicabs

Peak hour vehicle volumes were calculated based on the planning factor that the average traveling party size is 1.3 passengers. This planning factor is based on professional judgement and observations at similarly sized airports. The analysis assumed that there is a one party per vehicle except for shuttle to Economy Lot, in which case the analysis assumed nine parties per vehicle based on vehicle seating capacity and professional judgement.

These factors were applied to peak hour enplaned and deplaned passenger counts. The analysis assumed all enplaning passengers are originating and all deplaning passengers are terminating.

Vehicle dwell times were considered in the analysis to account for the duration of time each vehicle type would occupy the curbside area. Dwell times were based on industry standard as defined in Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. The dwell times planning factors used in the analysis are as follows:

- Departures
  - Three minutes for private vehicles

    - Three minutes for Economy Parking shuttle bus
    - Two minutes for taxicab
- Arrivals
    - Four minutes for private vehicle
    - Four minutes for Economy Parking shuttle bus
    - Three minutes for taxicab

The required stall counts were calculated based on dwell time and peak hour vehicle volume. The Poisson distribution was applied to the stall count calculation to attribute a probability of a number of stalls required accommodate the peak hour demand by vehicle type.

Vehicle stall lengths were then attributed to peak hour vehicle volumes based on industry standard as defined in FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. The vehicle stall length planning factors used in the analysis are as follows:

- 25 feet for private vehicle
- 25 feet for taxicab
- 30 feet for Economy Parking shuttle bus

The required curb length was calculated for each vehicle type based on the vehicle stall length and required stall counts. The total required curb length was then compared to the effective curb length capacity to determine the demand capacity ratio. The demand capacity ratio is compared to the Level of Service (LOS) designations.

LOS is the concept that describes and measures the quality of service for a particular facility with given conditions. The Highway Capacity Manual provides LOS metrics for use in measuring congestion on roadways. These metrics were applied for use in the evaluation of the FNT curbsides, as is common practice in the airport industry. The LOS designations are described in *Table 3-18*.

***TABLE 3-18***
***LANDSIDE LEVEL OF SERVICE DESIGNATIONS***

| LOS Designation | Demand / Capacity Ratio | Condition Description |
|---|---|---|
| A | 0.00 – 0.60 | EXCELLENT – Free flow, light volumes |
| B | 0.61 – 0.70 | VERY GOOD – Free to stable flow, light to moderate volumes |
| C | 0.71 - 0.80 | GOOD – Stable flow, moderate volumes, freedom to maneuver noticeably restricted |
| D | 0.81 – 0.90 | FAIR – Approaches unstable flow, moderate to heavy volumes, limited freedom to maneuver |
| E | 0.91 – 0.99 | POOR – Extremely unstable flow, heavy volumes, maneuverability and psychological comfort extremely poor |
| F | ≥ 1.00 | FAILURE – Forced or breakdown conditions, slow speeds, tremendous delays with continuously increasing queue lengths |

Source: Highway Capacity Manual, 2000.

LOS C curb length capacity is calculated based on the goal of achieving LOS C metrics. LOS E and F typically represents unacceptable conditions for patrons. The demand capacity ratio reflects the proportion of required curbside to the LOS C curbside length.

The analysis concluded that the departure curb currently operates at LOS C and will remain at LOS C throughout the planning horizon, which is within the acceptable range. The arrivals curb currently operates at LOS B and will reach LOS C at the end of the planning horizon. Therefore, the existing terminal curbside is sufficient to accommodate the existing and future peak hour demand. The terminal curbside analysis results are depicted in *Table 3-19*.

***TABLE 3-19***
***TERMINAL CURBSIDE REQUIREMENTS***

| | Exist. Dep. | Exist. Arr. | 2015 Dep. | 2015 Arr. | 2020 Dep. | 2020 Arr. | 2025 Dep. | 2025 Arr. | 2035 Dep. | 2035 Arr. |
|---|---|---|---|---|---|---|---|---|---|---|
| Stalls | - | - | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 11 |
| Curb Length (ft.) | 305 | 310 | 260 | 260 | 260 | 260 | 260 | 260 | 285 | 285 |
| Effective Curb Length Capacity | - | - | 366 | 370 | 366 | 370 | 366 | 370 | 366 | 370 |
| Demand / Capacity Ratio | - | - | 0.71 | 0.70 | 0.71 | 0.70 | 0.71 | 0.70 | 0.78 | 0.77 |
| Peak Hour Level of Service | - | - | C | B | C | B | C | B | C | C |

Source: RS&H, 2016

## 3.4.2 Vehicle Parking Facilities

This section describes the vehicle parking facilities for the terminal landside area. Vehicle parking requirements are separated into public parking and terminal employee parking.

### Public Parking

Public parking includes Short-Term, Long-Term, and Economy lot areas. Public parking is largely used by travelers and meeters/greeters/well-wishers.

Parking transaction and duration of stay data was acquired from SP Plus for March 2016. March represents the peak month for passenger activity as described in Chapter 2, *Forecast*.

Average day peak month transaction counts for each parking lot were calculated using the March transaction data and dividing by 31 days. This represents the average day peak month transaction counts for the base year (2015). The compound annual growth rate for average day peak month enplanements was applied to the base year transactions to calculate transaction counts for each planning activity level.

The average duration was calculated using the average ticket values for the month and parking rates for each parking lot. The calculated average parking duration for each lot are as follows:

- Short-Term Lot – 0.12 days (approximately 3 hours)
- Long-Term Lot – 4.38 days
- Economy Lot – 5.37 days

The required stall count was calculated using the average day peak month transaction counts and the average parking duration. The calculated base year parking demand was confirmed anecdotally based on occupancy observations conducted using Google Earth aerial imagery dated June 23, 2016. Further, conversations with Airport SP Plus staff generally confirmed that the observed occupancy trends corresponded to the base year stall requirements.

The cell phone parking lot was excluded from this analysis because it operates in a different way from other public parking areas. Demand for cell phone lot parking is largely a function of curbside activity (i.e., enforcement of curbside dwell times and curbside congestion). Cell phone lot demand is also based on user knowledge of the cell phone lot, which is influenced by wayfinding signage on the on-Airport circulation roads and Airport advertising efforts (e.g., on the Airport website).

The analysis results conclude that the overall public parking supply is adequate to accommodate the existing and future demand. However, demand for Long-Term Parking currently exceeds capacity. There is disproportionate demand for Long-Term Parking that leads to undersupply for Long-Term parking while Short-Term and Economy Parking are underutilized. Airport staff may consider adjusting rates for the public parking lots to better balance demand with the space allocations of the existing parking lots. The public parking requirements are described in *Table 3-20*.

***TABLE 3-20***
***PUBLIC PARKING REQUIREMENTS***

| | | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|---|
| Short-Term Parking | Stalls | 195 | 45 | 50 | 60 | 80 |
| | Stall Surplus (Deficit) | - | 150 | 145 | 135 | 115 |
| Long-Term Parking | Stalls | 780 | 1,025 | 1,150 | 1,290 | 1,550 |
| | Stall Surplus (Deficit) | - | (245) | (375) | (515) | (775) |
| Economy Parking | Stalls | 3,200 | 395 | 420 | 450 | 515 |
| | Stall Surplus (Deficit) | - | 2,805 | 2,780 | 2,750 | 2,685 |
| Public Parking Total | Total Stall Count | 4,170 | 1,460 | 1,620 | 1,800 | 2,145 |
| | Total Stall Surplus (Deficit) | - | 2,710 | 2,555 | 2,375 | 2,030 |

Note: Values may not sum due to rounding
Source: RS&H, 2016

### Terminal Employee Parking

Employees working in and around the terminal area primarily use the terminal employee parking lot.

Estimation of the existing employee parking demand is based on an observation conducted using Google Earth aerial imagery dated June 23, 2016. This is assumed to represent an average day in June; however, March is the peak month for passenger activity. Therefore, monthly passenger activity

proportional ratios were used to adjust the June parking lot count to March to get the average day peak month parking lot utilization.

The adjusted average day peak month employee lot demand was used as the base. The demand for the other planning activity levels was calculated using the average day peak month enplanement compound annual growth rates.

The analysis concluded that there are sufficient stalls to accommodate existing and forecast demand for employee parking. The employee parking lot requirements are described in *Table 3-21*.

***TABLE 3-21***
***TERMINAL EMPLOYEE PARKING REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Stalls | 220 | 135 | 145 | 165 | 215 |
| Stalls Surplus (Deficit) | - | 85 | 75 | 55 | 5 |

Note: Values may not sum due to rounding
Source: RS&H, 2016

### 3.4.3 Rental Car Facilities

This section describes the rental car facility requirements. The rental car areas evaluated include the ready/return area and service center area.

#### Rental Car Ready/Return Area

The ready/return parking lot is used by rental car operators to park vehicles that are ready to be rented and it is used by rental car customers to return vehicles at the end of their rental period. Estimation of the existing ready/return area parking demand and calculation of the adjusted average day peak month ready/return parking stall demand was based on the same method used to determine the public parking requirements.

This average day peak month utilization was compared to peak hour passenger counts to establish a stalls-per-peak-hour-passenger ratio, which was then used to determine the vehicle stall demand for each planning activity level.

The analysis concluded that there are sufficient stalls to accommodate existing and future demand for the rental car ready/return operation. The rental car requirements are described in *Table 3-22*.

#### Rental Car Service Center Area

The rental car service center area is used by rental car operators to clean, fuel, and service rental car vehicles after customers return them. Based on interviews with rental car companies, the analysis methodology assumed the existing space allocated for the rental car service center facility is adequate today. The analysis also assumed that rental car operators accommodate additional vehicle storage demand off-airport, as necessary. The existing ratio of rental car ready return area to service center area was calculated. The existing ratio was applied to each planning activity level to determine the space required for the service center.

The analysis concluded that there is sufficient space to accommodate existing and future demand for rental car quick turnaround area. The Airport may decide to implement a Consolidated Rental Car facility

(CONRAC) in the future to optimize the ready/return process for rental car operators. The rental car requirements are described in *Table 3-22*.

***TABLE 3-22***
***RENTAL CAR REQUIREMENTS***

| | | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|---|
| Ready/Return Area | Stall Count | 330 | 225 | 235 | 250 | 280 |
| | Stall Surplus (Deficit) | - | 105 | 95 | 80 | 50 |
| Service Center Area | Area (sf) | 85,300 | 64,500 | 66,800 | 71,400 | 80,600 |
| | Area Surplus (Deficit) (sf) | - | 20,800 | 18,500 | 13,900 | 4,800 |

Source: RS&H, 2016
Note: Values may not sum due to rounding

## 3.5 AIR CARGO REQUIREMENTS

This section describes the requirements for the air cargo facility. Requirements were calculated for the air cargo building, airside, and landside.

### 3.5.1 Air Cargo Building

The air cargo building analysis used the low cargo growth forecast scenario as described in *Table 2-21* in Chapter 2, *Forecast*. The cargo forecast growth rate (0.86 percent annual growth rate) reflects the historic growth rate for cargo between 2010 and 2015.

The air cargo building analysis used the area per annual ton ratio methodology. This methodology referenced the air cargo building industry standard planning factor – one-square-foot/annual metric ton of cargo. This ratio is characteristic of facilities that are well utilized and allows for the possibility that some near-term expansion may be required. ACRP Report 143, *Guidebook for Air Cargo Facility Planning and Development*, indicates that 1.2 square feet/annual metric ton is the cargo building space needed to accommodate forecast demand for domestic integrated express cargo operations.

Historic cargo figures for FNT reflect that the cargo throughput ratio for 2011 to 2014 ranged from 4.82 to 6.0 square feet/annual metric ton of cargo, with an average of 5.46 square feet/annual metric ton. This indicates significant surplus space and underutilized building area. This metric was calculated just for the portion of the air cargo facility occupied by FedEx. It does not account for other unused cargo building areas. The analysis considered the following industry standard planning factors:

- 1.2 square feet/annual metric ton of cargo for the warehouse and office area
- 1,500 square feet of warehouse and office space/door for total truck dock area

The total truck dock area is composed of landside truck dock area and airside truck dock area. Landside truck dock space accounted for a 25 percent share and airside truck dock space accounted for a 75 percent share.

The analysis concluded that the existing building area is sufficient to accommodate existing and future demand. The surplus and deficit was calculated based only on the existing used space; the vacant building area was not considered. There is unused space to accommodate entirely new cargo operators on the east side of the cargo complex. The cargo building requirements are described in *Table 3-23*.

***TABLE 3-23***
***CARGO BUILDING AREA REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Annual Cargo Volume (lbs.) | - | 24,233,000 | 25,700,000 | 27,200,000 | 30,200,000 |
| Annual Cargo Volume (metric tons) | - | 11,000 | 11,650 | 12,350 | 13,700 |
| Warehouse/Office Space (sf) | - | 13,200 | 14,000 | 14,800 | 16,450 |
| Number of Landside Truck Docks | - | 2 | 2 | 2 | 3 |
| Number of Airside Truck Docks | - | 7 | 7 | 7 | 8 |
| Total Cargo Building Space (sf) | 66,000 | 13,200 | 14,000 | 14,800 | 16,450 |

Notes: sf = square feet. Values may not sum due to rounding.
Source: RS&H, 2016

### 3.5.2 Air Cargo Airside

The air cargo airside was calculated primarily based on the peak hour air cargo aircraft demand. The forecast peak cargo aircraft demand is shown in *Table 3-24*. These are the aircraft projected to simultaneously occupy the air cargo apron during peak periods for each planning activity level. Five different cargo aircraft types are expected to operate at FNT through the planning horizon: Cessna 208B Caravan, Boeing 757F, Airbus A300-600, Airbus A310-200F, and Boeing 767-300F.

***TABLE 3-24***
***PEAK CARGO AIRCRAFT DEMAND***

| Planning Year | Operator | Aircraft | Aircraft Count |
|---|---|---|---|
| 2015 | FedEx | A300-600 | 1 |
| | FedEx | B757F | 1 |
| | CSA Air | Cessna 208B Caravan | 2 |
| 2020 | FedEx | A310-200F | 1 |
| | FedEx | B757F | 1 |
| | CSA Air | Cessna 208B Caravan | 2 |
| 2025 | FedEx | B767-300F | 1 |
| | FedEx | A310-200F | 1 |
| | CSA Air | Cessna 208B Caravan | 2 |
| 2035 | FedEx | B767-300F | 1 |
| | FedEx | A310-200F | 1 |
| | CSA Air | Cessna 208B Caravan | 2 |

Source: RS&H, 2016

Aircraft areas were then attributed to the aircraft count based on aircraft dimension. Industry standard space buffers were included in the space calculations based on the ACRP Report values. The aircraft parking position buffer factors used in the analysis are as follows:

- 25 feet for wingtip to wingtip/object separation
- 25 feet for turboprop nose to structure separation
- 55 feet for jet nose to structure separation
- 75 feet for jet tail to taxilane edge separation

The aircraft parking position buffers provide sufficient space for parking aircraft adjacent to one another, aircraft servicing, cargo loading, and tug circulation around aircraft. The buffers assume cargo loading via aircraft side door, not nose loading. The apron space required for each aircraft type is described in *Table 3-25*.

***TABLE 3-25***
***CARGO AIRCRAFT PARKING AREAS***

| Aircraft | Airplane Design Group | Wingspan (ft.) | Length (ft.) | Apron Area (sy) |
|---|---|---|---|---|
| Cessna 208B Caravan | II | 52 | 42 | 600 |
| Boeing 757F | IV | 125 | 155 | 4,800 |
| Airbus A300-600 | IV | 147 | 177 | 5,900 |
| Airbus A310-200F | IV | 144 | 153 | 5,400 |
| Boeing 767-300F | IV | 156 | 180 | 6,300 |

Notes: ft. = feet. sy = square yards.
Source: RS&H, 2016

The existing air cargo apron area consists of three jet aircraft parking positions and a turboprop aircraft parking area. The three jet aircraft parking positions are numbered from South to North, with Position 1 closest to Taxiway C and Position 3 closest to West Bristol Road.

Each jet aircraft parking position was evaluated to determine the largest aircraft that can park at each position in consideration of the ACRP buffer factors. Position 1 and Position 2 can accommodate aircraft with wingspans up to 147 feet. Position 3 can accommodate aircraft with wingspans up to 93 feet based on current apron markings. However, larger aircraft can be accommodated at Position 3 if the apron is restriped and the cargo containers that are stored at the north end of the apron are relocated.

The turboprop aircraft parking area are located south of Position 1. The turboprop aircraft parking area accommodates three Cessna C208 Caravan aircraft. The aircraft parking positions are depicted in *Exhibit 3-5*.

The cargo apron requirements also included space allocation for Ground Support Equipment (GSE) storage. The GSE area-planning factor used in the analysis is 1.95 square feet/annual metric ton of cargo. This planning factor is based on industry standard and described in the ACRP Report.

The analysis concluded that the existing jet positions can accommodate two A310 aircraft at adjacent positions with the 25-foot wingtip buffer recommended in the ACRP Report. There is sufficient space to restripe the apron to provide three ADG-IV parking positions in the future.

The existing apron area is sufficient to accommodate existing and future demand. The surplus and deficit was calculated based only on existing used space. There is unused apron space available on the east side of the cargo complex to accommodate new cargo operators.

The North-South apron taxilane is designed for ADG-IV aircraft, which is sufficient to accommodate the existing and future demand. The cargo airside requirements are described in *Table 3-26*.

***EXHIBIT 3-5***
***AIR CARGO APRON PARKING POSITIONS***


Source: Google Earth Imagery, 2016.
RS&H, 2016.

***TABLE 3-26***
***CARGO APRON AREA REQUIREMENT***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Cessna 208B Caravan | - | 1,150 | 1,150 | 1,150 | 1,150 |
| Boeing 757F | - | 4,750 | 4,750 | 0 | 0 |
| Airbus A310-200F | - | 0 | 5,300 | 5,300 | 5,300 |
| Airbus A300-600 | - | 5,850 | 0 | 0 | 0 |
| Boeing 767-300F | - | 0 | 0 | 6,250 | 6,250 |
| Total Aircraft Area (sy) | - | 11,750 | 11,200 | 12,700 | 12,700 |
| GSE Storage Space (sy) | - | 2,400 | 2,500 | 2,700 | 2,950 |
| Total Apron Area (sy) | 18,750 | 14,150 | 13,700 | 15,400 | 15,650 |
| Surplus (Deficit) | - | 4,600 | 5,050 | 3,350 | 3,100 |

Source: RS&H, 2016
Notes: Values may not sum due to rounding. GSE = ground support equipment, sf = square feet, sy = square yards.

### 3.5.3 Air Cargo Landside

The air cargo landside requirements considered space for vehicle parking and truck parking.

Employees and air cargo customers use the vehicle parking area. The vehicle parking area planning factors used in the analysis are as follows:

- Four employee parking stalls per 1,000 square feet of warehouse and office space
- One customer parking stalls per 1,000 square feet of warehouse and office space

The planning factors are based on industry standard as described in Airports Council International - North America (ACI-NA) Air Cargo Guide. ACI-NA defines a range of employee parking spaces from two to eight employee parking stalls per 1,000 square feet of warehouse and office space. Four was selected for use in the analysis based on professional judgement.

Box trucks and tractor-trailers picking-up and dropping-off cargo use the truck parking area. The truck parking area-planning factor used in the analysis is 1.8 square feet of truck parking/square foot of warehouse and office. This planning factor is based on industry standard as described in the ACRP Report.

The analysis results conclude that there are sufficient vehicle parking stalls to accommodate existing and future demand. Additionally, there is sufficient truck parking area to accommodate existing and future demand. There is unused space to accommodate new cargo operators on the east side of the cargo complex. The air cargo landside requirements are described in *Table 3-27*.

***TABLE 3-27***
***AIR CARGO LANDSIDE REQUIREMENT***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Vehicle Parking Spaces[1] | 212 | 65 | 70 | 75 | 80 |
| Vehicle Space Surplus (Deficit) | - | 147 | 142 | 137 | 132 |
| Truck Parking Area (sf) | 127,350 | 23,750 | 25,200 | 26,650 | 29,600 |
| Truck Parking Area Surplus (Deficit) (sf) | - | 103,600 | 102,150 | 100,700 | 97,750 |

Notes: 1 – Sum of employee and customer vehicle parking. Values may not sum due to rounding.
Source: RS&H, 2016

## 3.6 GENERAL AVIATION REQUIREMENTS

This section describes the requirements for general aviation facilities at the Airport. The analysis methodology used based aircraft forecast and general aviation operational forecast to determine the existing and future requirements. Future based aircraft demand splits were determined based on applying the existing based aircraft type splits. The future based aircraft demand splits for each planning activity level are described in *Table 3-28*.

***TABLE 3-28***
***BASED AIRCRAFT***

| | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|
| Single Engine (Small GA) | 72 | 80 | 85 | 93 |
| Multi Engine (Small GA) | 17 | 19 | 20 | 22 |
| Jet (Corporate GA) | 2 | 2 | 2 | 3 |
| Total GA Aircraft | 91 | 101 | 107 | 117 |

Source: RS&H, 2016

There are four general aviation aircraft storage areas at the Airport: tie-downs, T-hangars, fixed base operator (FBO) apron, and conventional hangars. Considerations were made based on observation and professional judgement as to how each area was used to store aircraft.

Tie-down apron areas generally accommodate small general aviation aircraft. The existing tie-down apron area is located east of the Runway 36 end and accessed by Taxilane E. T-hangars also accommodate small general aviation aircraft. The existing T-hangars are located east of the Runway 36 end and accessed by Taxilane E. FBO apron areas accommodate small and large general aviation aircraft. The existing FBO apron area is located west of the Runway 18 end and accessed by Taxiway C. Conventional hangars accommodate small and large general aviation aircraft. Existing conventional hangar facilities include the FBO hangars and the private/corporate hangar buildings located northeast of Taxilane D.

Approximately 29 percent of T-hangars are vacant and an estimated 34 percent of conventional hangar space is unoccupied. Overall, it was assumed that aircraft owners generally preferred to store their aircraft indoors (relative to other airports in the nation) because of the harsh winter climate in Michigan. It is also assumed that there is a positive correlation between the financial worth of the aircraft of likelihood of indoor storage. For example, it is assumed that based jet aircraft are highly likely to be stored indoors because they are high-valued assets. Alternatively, single-engine aircraft are slightly less likely to be stored indoors because the value of the aircraft is not as high.

### 3.6.1 Based Aircraft Considerations

Of privately owned single-engine aircraft, 95 percent was assumed to be stored at the south general aviation area, with 90 percent stored in T-hangars and 5 percent stored on the apron in the tie-down area. These percentages were based on occupancy rates at the Airport during March 2016. It is assumed that remaining 5 percent of the based single-engine aircraft park in conventional hangars – the FBO hangar or private/corporate conventional hangars.

For multi-engine piston aircraft, the March 2016 occupancy data shows that 82 percent are stored in T-hangars. The analysis assumed that 5 percent of the based multi-engine aircraft park on the FBO apron and the remaining 13 percent of multi-engine aircraft are stored in conventional hangars – the FBO hangar or private/corporate conventional hangars. The analysis also assumed that all based jet aircraft are stored in either the FBO hangar or private/corporate conventional hangars. The based aircraft parking allocation splits are summarized in *Table 3-29*.

***TABLE 3-29***
***BASED AIRCRAFT PARKING ALLOCATION SPLITS***

| Aircraft Type | Tie-down | T Hangar | FBO Apron | Box Hangar |
|---|---|---|---|---|
| Single-Engine Aircraft | 5% | 90% | 0% | 5% |
| Multi-Engine Aircraft | 0% | 82% | 5% | 13% |
| Jet Aircraft | 0% | 0% | 0% | 100% |

Source: RS&H, 2016

## 3.6.2 Transient Aircraft Considerations

Based on observations and professional judgement, the analysis considered that transient aircraft are only parked at the FBO apron and hangar. In general, the purpose of a FBO is to serve transient aircraft, crew, and passengers. This consideration is representative of common practice in the aviation industry. Transient aircraft activity is comprised of recreational and corporate general aviation uses.

The analysis assumed that half of the transient aircraft are parked on the apron and half are parked in the hangar. The transient aircraft count is based on transient aircraft operations that are calculated from the forecast of aviation demand. Transient aircraft operations were calculated based on the assumption that transient operations represented 30 percent of total general aviation itinerant operations – this is based on professional judgement.

## 3.6.3 General Aviation Airside

### FBO Apron

The FBO apron is primarily used by based corporate aircraft, flight school aircraft, and transient aircraft. The number of based aircraft allocated to the FBO apron for each planning activity level is based on splits described in *Table 3-29*. The FBO apron analysis assumed that 50 percent of transient aircraft park on the FBO apron.

The analysis methodology calculated the number of based aircraft and transient aircraft for each planning activity level. Aircraft areas were then correlated to the aircraft count based on critical aircraft as described in *Table 3-1*. The aircraft area planning factors used in the analysis are as follows:

- 167 square yards for based single- and multi-engine aircraft
- 1,225 square yards for based jet aircraft
- 519 square yards for transient general aviation aircraft

The planning factors used for multi-engine aircraft are based on critical aircraft dimensions including buffer space for 10-foot wingtip separation and 10-foot buffer fore and aft of the aircraft. The planning factor used for transient general aviation aircraft is based on an average space required for the different general aviation aircraft types. A 15 percent circulation factor was added to the total FBO apron area to account for circulation of aircraft into and out of the parking positions. An additional 10 percent circulation factor was added to the FBO apron area to account for movement of aircraft into and out of the FBO hangar. This was added because of the apron's adjacency to the FBO hangar. These circulation area-planning factors are based on industry standard.

The analysis results conclude that there is sufficient space to accommodate existing and future demand for FBO apron aircraft storage. FBO apron aircraft storage requirements are described in *Table 3-30*.

***TABLE 3-30***
***FBO APRON REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Based Aircraft | | | | | |
| Single-Engine Aircraft Count | - | 0 | 0 | 0 | 0 |
| Single-Engine Aircraft Area (sy) | - | 0 | 0 | 0 | 0 |
| Multi-Engine Aircraft Count | - | 1 | 1 | 1 | 1 |
| Multi-Engine Aircraft Area (sy) | - | 170 | 170 | 170 | 170 |
| Jet Aircraft Count | - | 0 | 0 | 0 | 0 |
| Jet Aircraft Area (sy) | - | 0 | 0 | 0 | 0 |
| Total Based Aircraft Area incl. Circulation (sy) | - | 210 | 210 | 210 | 210 |
| Transient Aircraft | | | | | |
| Transient Aircraft Count | - | 11 | 11 | 11 | 11 |
| Transient Aircraft Area incl. Circulation (sy) | - | 7,150 | 7,150 | 7,150 | 7,150 |
| Total FBO Apron Area (sy) | 16,820 | 7,360 | 7,360 | 7,360 | 7,360 |
| Total FBO Apron Area Surplus (Deficit) (sy) | - | 9,460 | 9,460 | 9,460 | 9,460 |

Notes: Values may not sum due to rounding. sy = square yard
Source: RS&H, 2016

### Tie-Down Apron

The tie-down apron is located adjacent to the T-hangars. The tie-down apron is primarily used by based, small general aviation aircraft. Based aircraft allocated to the tie-down apron for each planning year is based on the splits described in *Table 3-29*.

The analysis methodology calculated the number of based aircraft for each planning activity level. Aircraft areas were then correlated to the aircraft count based on standard aircraft areas. The aircraft area-planning factor used in the analysis is 167 square yards for based single- and multi-engine aircraft. This planning factor is based on critical aircraft as described in *Table 3-1*. A 15 percent apron circulation factor was added to the total tie-down apron area to account for circulation of aircraft into and out of the parking positions. This circulation area-planning factor is based on industry standard.

The analysis concluded that there is sufficient space to accommodate existing and future demand for tie-down aircraft storage. Tie-down storage requirements are described in *Table 3-31*.

***TABLE 3-31***
***TIE-DOWN APRON REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Single-Engine Aircraft Count | - | 4 | 4 | 4 | 5 |
| Single-Engine Aircraft Area (sy) | - | 670 | 670 | 710 | 780 |
| Multi-Engine Aircraft Count | - | 0 | 0 | 0 | 0 |
| Multi-Engine Aircraft Area (sy) | - | 0 | 0 | 0 | 0 |
| Jet Aircraft Count | - | 0 | 0 | 0 | 0 |
| Jet Aircraft Area (sy) | - | 0 | 0 | 0 | 0 |
| Total Area (sy) | 1,730 | 780 | 780 | 820 | 900 |
| Total Area Surplus (Deficit) (sy) | - | 950 | 950 | 910 | 830 |

Notes: Values may not sum due to rounding. sy = square yards.
Source: RS&H, 2016

## 3.6.4 General Aviation Buildings

### Conventional Hangars

Conventional hangars are primarily used by based multi-engine and jet aircraft owners as well as transient aircraft. The number of based aircraft allocated to conventional hangars for each planning year is based on splits described in *Table 3-29*. The conventional hangar analysis assumed that 50 percent of transient aircraft park in the FBO hangar.

The analysis methodology calculated the number of based aircraft and transient aircraft for each planning activity level. Aircraft areas were then attributed to the aircraft count based on critical aircraft as described in *Table 3-1*. The aircraft area planning factors used in the analysis are as follows:

- 1,500 square feet for based multi-engine aircraft
- 11,025 square feet for based jet aircraft
- 4,675 square feet for transient general aviation aircraft

The planning factors used for multi-engine aircraft are based on critical aircraft dimensions including buffer space for 10-foot wingtip separation and 10-foot buffer fore and aft of the aircraft. The planning factor used for transient general aviation aircraft is based on an average space required for the different general aviation aircraft types.

The analysis concluded that there is sufficient conventional hangar space to accommodate demand for based and transient aircraft throughout the planning horizon. This trend is confirmed as current conventional occupancy is estimated at 66 percent. Conventional hangar space requirements are described in *Table 3-32*.

***TABLE 3-32***
***CONVENTIONAL HANGAR REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Based Aircraft | | | | | |
| Single-Engine Aircraft Count | - | 4 | 4 | 4 | 5 |
| Single-Engine Aircraft Area (sf) | - | 6,000 | 6,000 | 6,000 | 7,500 |
| Multi-Engine Aircraft Count | - | 2 | 2 | 3 | 3 |
| Multi-Engine Aircraft Area (sf) | - | 3,000 | 3,000 | 4,500 | 4,500 |
| Jet Aircraft Count | - | 2 | 2 | 2 | 3 |
| Jet Aircraft Area (sf) | - | 22,050 | 22,050 | 22,050 | 33,075 |
| Total Based Aircraft Area (sf) | - | 31,050 | 31,050 | 32,550 | 45,080 |
| Transient Aircraft | | | | | |
| Transient Aircraft Count | - | 8 | 8 | 8 | 8 |
| Transient Aircraft Area (sf) | - | 37,400 | 37,400 | 37,400 | 37,400 |
| Total FBO Building Area (sf) | 98,490 | 68,450 | 68,450 | 69,950 | 82,480 |
| Total FBO Building Area Surplus (Deficit) (sf) | - | 30,040 | 30,040 | 28,540 | 16,010 |

Notes: Values may not sum due to rounding. Sf = square feet.
Source: RS&H, 2016

### T-Hangars

T-hangars are primarily used by based, small general aviation aircraft. Based aircraft allocated in T-hangars for each planning year is based on splits described in *Table 3-29*. The analysis methodology calculated the number of based aircraft for each planning activity level.

The number of based aircraft allocated to the T-hangar units were summed. T-hangar unit area was then attributed to the total unit count based on existing T-hangar space allocation. The existing planning ratio of T-hangar building space to aircraft is approximately 1,220 square feet/T-hangar.

The analysis results conclude that there are sufficient T-hangar units and space to accommodate demand throughout the planning horizon. This trend is confirmed as current T-hangar occupancy is approximately 71 percent. T-hangar aircraft storage requirements are described in *Table 3-33*.

***TABLE 3-33***
***T-HANGAR REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Single-Engine Aircraft Units | - | 65 | 72 | 76 | 83 |
| Multi-Engine Aircraft Units | - | 14 | 15 | 16 | 18 |
| Jet Aircraft Units | - | 0 | 0 | 0 | 0 |
| Total Units | 111 | 79 | 87 | 92 | 101 |
| Total Units Surplus (Deficit) | - | 32 | 24 | 19 | 10 |
| Total Area (sf) | 144,490 | 95,930 | 105,650 | 111,720 | 122,650 |
| Total Area Surplus (Deficit) | - | 48,560 | 38,840 | 32,770 | 21,840 |

Notes: Values may not sum due to rounding. Sf = square feet
Source: RS&H, 2016

### Aircraft Maintenance

Aircraft maintenance activities at the Airport are currently performed primarily by a single tenant. The required aircraft maintenance area was determined based on calculating the ratio of peak month general aviation operations to the aircraft maintenance hangar area in 2012. Base year for aircraft maintenance was 2012 because it represents the highest general aviation demand at FNT within a five-year period prior to 2015. In 2012, the Airport accommodated 28,110 general aviation operations.

The analysis results conclude that there is sufficient space to accommodate demand for aircraft maintenance throughout the planning horizon. Aircraft maintenance area requirements are described in *Table 3-34*.

***TABLE 3-34***
***AIRCRAFT MAINTENANCE HANGAR***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Hangar Area (sf) | 7,850 | 5,380 | 5,520 | 5,560 | 5,640 |
| Hangar Area Surplus (Deficit) (sf) | - | 2,470 | 2,330 | 2,290 | 2,210 |

Note: sf = square feet
Source: RS&H, 2016

## 3.6.5 General Aviation Landside

### FBO Landside Area

The only noteworthy landside area associated with general aviation facilities at FNT is the FBO landside area. The analysis is based on the ratio of observed parking lot utilization rate existing to existing FBO building space. The planning factor was applied to the required FBO building area for each planning activity level to determine the required parking space count.

The analysis results conclude that there is sufficient landside area available to accommodate vehicle parking demand throughout the planning horizon. The FBO landside area requirements are described in *Table 3-35*.

***TABLE 3-35***
***FBO LANDSIDE REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| Parking Space Count | 88 | 35 | 35 | 35 | 45 |
| Parking Space Count Surplus (Deficit) | - | 53 | 53 | 53 | 43 |

Note: sf = square feet
Source: RS&H, 2016

## 3.7 SUPPORT FACILITIES REQUIREMENTS

This section describes the requirements for the support facilities at the Airport. The support facilities evaluated are as follows:

- Aircraft Rescue and Firefighting (ARFF)
- Aircraft fuel storage
- Airport Maintenance Department facility
- Airport Traffic Control Tower (ATCT)

### 3.7.1 Aircraft Rescue and Firefighting

The Aircraft Rescue and Firefighting (ARFF) facilities are required based on Code of Federal Regulations Title 14 Part 139. This section evaluates the ARFF Index and ARFF station requirements.

#### Index Determination

ARFF Index is determined based on length of air carrier aircraft and the average daily departures of air carrier aircraft. ARFF Index classifications and requirements are described in *Table 3-36*.

The analysis methodology considers the longest air carrier aircraft with an average of five or more daily departures that operates at an airport. When a single air carrier aircraft does not satisfy the daily departure requirement, Part 139.315 indicates that a composite of air carrier aircraft in a single Index group serving that airport can be used. In this case, the Index required for the airport will be the next lower Index group than the Index group prescribed for the longest aircraft.

For FNT, no single air carrier aircraft satisfies the daily departure requirement at FNT throughout the planning horizon. However, four air carrier aircraft in Index C (MD-83, MD-88, B737-800, and B757F) collectively account for an average of six daily departures. The fleet mix changes toward the end of the planning horizon (2025) such that two air carrier aircraft in Index C (B737-800 and A310-200F) are forecast to collectively account for at least five daily departures. Therefore, the Airport's existing and future ARFF Index is B, per Part 139.315.

The ARFF Index B vehicle requirements are described in Part 139.317. A single vehicle or two vehicles can be used to satisfy the Index B requirements. If one vehicle is used, it must be capable of carrying 1,500 gallons of water (with the commensurate quantity of foam production material) and 500 pounds of chemical (halon 1211, clean agent, or sodium-based chemical). If two vehicles are used, they must be capable of carrying the combined total of 1,500 gallons of water with at least one vehicle carrying 500 pounds of chemical (halon 1211, clean agent, or sodium-based chemical) or 450 pounds of potassium-based dry chemical and 100 gallons of water (with the commensurate quantity of foam production material). The existing FNT ARFF vehicle inventory satisfies Index B requirements.

The Index B response time requirements are described in Part 139.319. At least one vehicle must reach the midpoint of the farthest runway serving air carrier aircraft from the station and begin the application of extinguishing agent within 3 minutes of the alarm. A second required vehicle must reach the midpoint of the farthest runway serving air carrier aircraft from the station and begin the application of extinguishing agent within 4 minutes of the alarm. The FNT ARFF station location satisfies Index B requirements.

***TABLE 3-36***
***ARFF INDEX REQUIREMENTS***

| ARFF Index | Aircraft Length (ft.) | Min. ARFF Vehicles | Example Aircraft |
|---|---|---|---|
| A | <90 | 1 | CRJ-200 |
| B | 90 - <126 | 1-2 | B737-700 |
| C | 126 - <159 | 2-3 | B757-200 |
| D | 159 - <200 | 3 | A300 |
| E | >200 | 3 | B777 |

Source: Code of Federal Regulations Title 14 Part 139

### ARFF Station Requirements

ARFF station requirements were evaluated to determine if sufficient space exists to support the mission of the ARFF.

The building size requirements were determined in consideration of Index B requirements. The analysis considerations included a need for three vehicle bays sized to accommodate Oshkosh Strikers (or similarly sized vehicles) with recommended buffers. The Oshkosh Striker was considered the design vehicle since it exists in the current ARFF equipment fleet. The analysis considered that a maximum of three firefighters would be on shift (two to three ARFF personnel are scheduled per shift) and that there are 10 total firefighters on staff.

The analysis was completed using space allocations recommended by the FAA in FAA Advisory Circular 150/5210-15A, *Aircraft Rescue and Firefighting Station Building Design*. The analysis considered the four general building areas: vehicle bay, support area, administration area, and crew quarters. The vehicle bay area accommodates the apparatus bay, vehicle support room, and workshop. The support area accommodates foam agent recharge functions, gear storage / wash / drying room, first aid and medical storage, chemical agent storage, and a watch room. The administration area accommodates offices, file storage, and conference room. The crew quarters area accommodates sleeping areas, lounge areas, an exercise area, kitchen / dining areas, and training areas. Space required for each area was estimated based on guidance from the FAA Advisory Circular.

The FNT ARFF does not operate "overnight" shifts. Therefore, the existing ARFF facility does not include dormitory accommodations and sleeping areas. However, dormitory accommodations and sleeping areas were included in the analysis to provide the Airport with long-term flexibility should the Airport wish to upgrade to a 24-hour operation in the future.

The analysis results conclude that there is insufficient building space to accommodate existing and future demand for ARFF station. The ARFF station requirements are described in *Table 3-37*.

***TABLE 3-37***
***ARFF STATION REQUIREMENTS***

| Building Area | Existing Space (sf) | Required Space (sf) |
|---|---|---|
| Apparatus Bay | 2,600 | 2,800 |
| Support | 700 | 1,400 |
| Administration | 200 | 1,000 |
| Crew Quarters | 500 | 2,200 |
| Circulation / Utilities | 600 | 1,000 |
| Total Space | 4,600 | 8,400 |
| Space Surplus (Deficit) | - | (3,800) |

Notes: Values may not sum due to rounding. sf = square feet
Source: RS&H, 2016

## 3.7.2 Aircraft Fuel Storage

This section describes the aircraft fuel storage requirements for the Airport.

### Fuel Truck Storage Area

Aircraft fuel at FNT is delivered to aircraft via fuel truck. There is no in-ground, fuel pit and pipeline system. Therefore, sufficient fuel truck storage areas are required.

FAA Advisory Circular 150/5210-20, *Ground Vehicle Operations on Airports*, was used as the primary resource for this analysis. The Advisory Circular indicates that no fuel truck shall be brought into, stored, or parked within 50 feet of a building. Additionally, fuel trucks must not be parked within 10 feet from other vehicles.

The analysis concluded that the fuel truck storage area is properly located. Currently, fuel trucks are parked west of the FBO hangar building. Fuel truck parking stalls are marked with 10-foot gaps between them. The closest fuel truck stall is located 50 feet west of the nearest hangar building. This is compliant, as designed.

### Fuel Storage

Aircraft fuel storage requirements were evaluated to determine if sufficient storage exists to accommodate forecast demand. The fuel storage area analysis considers the different fuel types used by different aircraft types. The fuel storage area analysis assumes the following:

- All commercial operations (i.e., passenger and cargo) use Jet A fuel
- 85 percent of general aviation operations use Avgas
- 15 percent of general aviation operations use Jet A
- All military operations use Jet A

The analysis methodology included an analysis of fuel sale data from 2010-2015. The analysis compared monthly fuel consumption to monthly operations. Average day peak month fuel consumption ratios were calculated for the different operational types. Each operational type has different operational characteristics, making it important to calculate ratios for each type that affects fuel use ratios. Air carrier operations are itinerant operations, oftentimes with medium- to long-range haul lengths. General aviation and military operations using Jet A are commonly itinerant with medium-range haul lengths. General

aviation operations using Avgas are commonly local operations or itinerant operations with short-range haul lengths.

Average day peak month fuel consumption ratios were applied to average day operations, as described in *Table 2-22*. The same fuel use ratio of operations from 2015 was used to calculate fuel use for the planning horizon. The 2015 ratio was used because it is the most up-to-date information. Historic ratios were not used because older use ratios are affected by older fleet mixes. Newer commercial service aircraft tend to be more fuel-efficient than older aircraft that likely operated in higher quantities. Additionally, older usage rates reflect out-of-date city pairs and haul lengths.

The analysis considered the assumption that five days of Jet A fuel storage capacity is required. Based on historic average day peak month usage from 2010 to 2014, the existing capacity of Jet A fuel would last an average of 5.1 days and as short as 4.5 days in 2011.

The analysis assumed that 14 days of Avgas fuel storage capacity is required. Based on historic average day peak month usage from 2010 to 2014, the existing capacity of Avgas fuel would last an average of 83.1 days and as short as 67.1 days in 2011.

The analysis results conclude that Jet A fuel storage is sufficient to accommodate near-term demand. Additional fuel storage capacity is required to accommodate demand near end of the planning horizon (2035). Existing Avgas fuel storage is sufficient for existing and future demand. No additional Avgas capacity is required within the planning horizon. Jet A fuel storage requirements are described in *Table 3-38*. Avgas fuel storage requirements are described in *Table 3-39*.

***TABLE 3-38***
***JET A FUEL STORAGE REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| ADPM Commercial Jet A Operations | - | 40 | 39 | 39 | 44 |
| Use Ratio (gallons/operation) | - | 398 | 398 | 398 | 398 |
| Average Day Peak Month Demand (gallons) | - | 16,147 | 15,523 | 15,523 | 17,513 |
| | | | | | |
| ADPM GA/Military Jet A Operations | - | 15 | 13 | 13 | 14 |
| Use Ratio (gallons/operation) | - | 71 | 71 | 71 | 71 |
| Average Day Peak Month Demand (gallons) | - | 966 | 934 | 947 | 960 |
| | | | | | |
| Total Jet A Fuel Capacity (days) | - | 5 | 5 | 5 | 5 |
| Total Jet A Storage[1] (gallons) | 88,000 | 85,600 | 82,300 | 82,300 | 92,400 |
| Total Jet A Storage Surplus (deficit) (gallons) | - | 2,400 | 5,700 | 5,700 | (4,400) |

Notes: 1 – Requirement is for 5-day supply. ADPM = Average Day Peak Month. Values may not sum due to rounding.
Source: RS&H, 2016

***TABLE 3-39***
***100LL AVGAS FUEL STORAGE REQUIREMENTS***

| | Existing | 2015 | 2020 | 2025 | 2035 |
|---|---|---|---|---|---|
| ADPM Avgas Operations | - | 67 | 58 | 59 | 59 |
| Use Ratio (gallons/operation) | - | 4 | 4 | 4 | 4 |
| Average Day Peak Month Demand (gallons) | - | 202 | 231 | 235 | 238 |
| Total Avgas Fuel Capacity (days) | - | 89.2 | 77.8 | 76.7 | 75.6 |
| Total Avgas Storage[1] (gallons) | 18,000 | 2,800 | 3,200 | 3,300 | 3,300 |
| Total Avgas Storage Surplus (deficit) (gallons) | - | 15,200 | 14,800 | 14,700 | 14,700 |

Notes: 1 – Requirement is for 14-day supply. ADPM = Average Day Peak Month. Values may not sum due to rounding.
Source: RS&H, 2016

### 3.7.3 Airport Maintenance Department Facility

This section describes the requirements for the Airport Maintenance Department Facility. The Airport Maintenance Department is responsible for maintaining the airfield, terminal building, T-hangars, and landside facilities. Therefore, the Airport Maintenance Department facility needs to accommodate all vehicles and equipment. Storage space required to support the airfield and landside snow removal function (e.g., snow removal equipment, sand storage) represents the largest portion of space in the building. Therefore, snow removal equipment (SRE) requirement is the focus of this analysis.

FAA Advisory Circular 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, was used as the primary resource for this analysis. The Advisory Circular identified the method for estimating building size requirements based on airport size and SRE vehicle fleet.

Airport Size is a metric identified in the Advisory Circular and refers to a classification of airports according to the total paved runway area that will be cleared of snow, ice, and/or slush. Taxiways and aprons are not considered in this calculation. The FNT Airport Size is Very Large Airport because Runway 9-27 exceeds 1,000,000 square feet of total paved area. The total paved area is used to determine the required size of the building. The building includes four general areas – Vehicle/Equipment Storage Areas, De-/Anti-Icing Material Storage Area, Crew Support Area, and Miscellaneous/Building Utilities areas.

The Vehicle/Equipment Storage Area is composed of the area of the building used for parking and circulation of SRE vehicles as well as vehicle circulation space. It also accounts for storage for equipment parts, accessories, and related materials. The De-/Anti-Icing Material Storage Area includes the building area used to store fluid/dry de/anti-icers and/or sand. The Crew Support Area is used to accommodate maintenance and support of equipment, administrative space, and employee areas. The employee area includes kitchen/dining, training/conference room, and restrooms. The Miscellaneous/Building Utilities Area accommodate building utilities such as HVAC and emergency power generation, storage of recycled oil and used anti-freeze, as well as large tools/equipment such as hydraulic lift, vacuum pumps, and air compressor.

The primary factor driving the size of the Airport Maintenance Department Facility is the quantity and size of SRE equipment required to serve the needs of the Airport. The primary factor driving the quantity and size of SRE equipment is the amount of airfield pavement area required to be cleared of snow, ice, and slush (as indicated in the Advisory Circular). The Airport Maintenance Department Facility size is not based on forecast aviation demand. As such, future requirements of the Airport Maintenance Department Facility are primarily based on the future airfield layout and total pavement area. This, however, will not be identified until the completion of the Alternatives Evaluation process and the selection of the preferred alternative.

The building size analysis was completed for two SRE vehicle accommodation scenarios – the existing fleet of conventional SRE versus a potential fleet of high-speed multi-task equipment (MTE). MTE are built with the capability to perform three integrated functions, namely snowplowing, brooming, and airblasting at a speed of at least 30 mph. The benefit of MTE is that one MTE vehicle can replace the need for multiple conventional SRE vehicles. However, MTE vehicles are larger than conventional SRE vehicles. As such, MTE vehicles require a larger building. FNT Airport staff has indicated that the acquisition of MTE vehicles is under consideration. Therefore, an analysis was undertaken to determine how much space would be required to accommodate MTE vehicles. The scenario evaluated building requirements to accommodate a proposed fleet of MTE vehicles if they were acquired by the Airport to replace the existing fleet of conventional SRE vehicles.

The existing vehicle count was based on the existing SRE vehicle fleet as identified in *Table 1-14* in Chapter 1, *Inventory of Existing Conditions*. The MTE vehicle count was calculated assuming a one-to-one ratio requirement for MTE to high-speed rotary plow. It is assumed that each MTE would also perform the function of the other SRE vehicles (e.g., snow plows, runway brooms, solid material spreader). MTE count was correlated to high-speed rotary plows because high-speed rotary plows (also known as blowers) are considered to be the most integral vehicle in an airport's SRE fleet[40].

The recommended number of high-speed rotary plows were determined based on the methodology in FAA Advisory Circular 150/5220-20A, *Airport Snow and Ice Control Equipment*. The analysis steps are as follows:

1. Determine total critical paved areas (i.e., Priority 1) as determined based on Advisory Circular 150/5200-30C, *Airport Winter Safety and Operations* methodology.
2. Calculate airfield clearance time for Priority 1 paved areas to be cleared for a range of annual airplane operations. The intent is to ensure that Airport has sufficient snow removal and ice control equipment to clear 1 inch of snow weighing up to 25 lbs. /$ft^3$ from Priority 1 areas.
3. Use this to identify equipment that should be acquired.
4. Determine facility requirement needed to accommodate these facilities. The analysis determined that four Class IV high-speed rotary plows would be needed to achieve the desired snow removal rate. Inputs and outputs of Advisory Circular 150/5200-30C, *Airport Winter Safety and Operations*, analysis are described in *Table 3-40*.

The analysis assumed an additional three MTE vehicles would be needed to provide redundancy for vehicle maintenance and downtime as well as to provide a high Level of Service for the Airport's snow removal capability.

Vehicle dimensions from an industry leading SRE manufacturer were used to calculate vehicle storage area requirements. Additional space was allocated to account for Equipment Safety Zones for each vehicle. This factor accounts for buffer spaces around each vehicle.

[40] High-speed rotary plows are capable of casting higher volumes of snow than snowplows. Increased use of high-speed rotary plows may result in reduced need for total SRE vehicles because of efficiency gains.

***TABLE 3-40***
***HIGH-SPEED ROTARY PLOW ANALYSIS FACTORS***

| Analysis Factor | Metric |
|---|---|
| Priority 1 Area (sf) | 3,878,000 |
| Annual Operations | 33,503 |
| Clearance Time | 1 hour |
| Desired Snow Removal Rate (tons/hour) | 11,500 |
| Minimum Casting Distance (ft.) | 100 |
| Rotary Plow Class | IV |
| Removal Rate per Vehicle (tons/hour) | 3,000 |
| Number of Rotary Plows Required | 4 |
| Total Snow Removal Rate (tons/hour) | 12,000 |

Source: RS&H, 2016.
Note: sf = square feet

The analysis considered a center-aisle building design for vehicle access and circulation. This configuration is defined as a design where vehicle parking stalls straddle a center driveway that extends the length of the SRE building. Large doors are located on either end of the driveway to allow vehicle ingress and egress. This reflects the existing building layout. The advantage is that it is an efficient layout for medium- to large-sized vehicle fleet. The planning factor to estimate the amount of space needed to accommodate the center-aisle layout is based on the ratio of vehicle parking to aisle dimensions in the existing building. This planning factor and methodology is sensitive to vehicle size and aisle-dimensions required to accommodate vehicle circulation in the building.

The aforementioned Advisory Circulars provide tools to calculate space recommendations for SRE equipment and functions. The FNT Airport Maintenance Department Facility also accommodates vehicles and equipment to support the maintenance of the terminal building, T-hangars, and grass areas. Therefore, an additional space factor was included in the analysis to accommodate the existing grass cutting equipment and ancillary equipment to ensure sufficient space is incorporated in the analysis to reflect the needs of the FNT Airport Maintenance Department.

FAA Advisory Circular 150/5220-18A, Buil*dings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials,* identified typical space accommodations for Crew Support and Miscellaneous/Building Utilities Areas. Component sizes for each area of the building is based on Airport Size for planning purposes. Note that the actual layout and space allocation would be determined during the design of actual facility.

The calculated area required for each of the four building areas were summed and compared to the existing Airport Maintenance Department Facility. The analysis found that the existing facility is sufficient to accommodate current demand for vehicles. This is confirmed based on the analysis methodology as defined in the Advisory Circular. Airport staff also anecdotally confirmed that there is sufficient space to meet existing needs. However, there is insufficient building space to accommodate MTE vehicles. Reconfiguration of the building may also be necessary to accommodate the larger MTE vehicles. Airport Maintenance Facility requirements – the accommodation of the existing SRE vehicle fleet and a proposed MTE vehicle fleet – are described in *Table 3-41*.

***TABLE 3-41***
***AIRPORT MAINTENANCE DEPARTMENT FACILITY***

| Building Area | Existing | Existing Vehicle Fleet | MTE Vehicle Fleet |
|---|---|---|---|
| Vehicle/Equipment Storage Area (sf) | - | 17,700 | 23,000 |
| De-/Anti-Icing Material Storage Area (sf) | - | 3,700 | 3,700 |
| Crew Support Area (sf) | - | 7,700 | 7,700 |
| Miscellaneous/Building Utilities Area (sf) | - | 00 | 800 |
| Total Area[1] (sf) | 32,700 | 29,900 | 35,200 |
| Total Area Surplus (Deficit) (sf) | - | 2,800 | (2,500) |

Notes: 1 – Existing area include sand storage building. sf = square feet. Values may not sum due to rounding.
Source: RS&H, 2016

### 3.7.4 Airport Traffic Control Tower

This section describes the requirements for the Airport Traffic Control Tower (ATCT). FAA Order 6480.4B, *Airport Traffic Control Tower Siting Process*, provides guidance on ATCT evaluation of tower siting. The Order indicates that ATCTs shall be sited to meet thresholds associated with three visibility performance requirements: unobstructed view, object discrimination, and line of sight angle of incidence requirements.

Unobstructed view requirements indicate that visibility from the ATCT cab shall allow an unobstructed view of all controlled movement areas of an airport, including all runways, taxiways, and air traffic near the airport. An analysis was completed to evaluate the line of sight visibility to each runway end at FNT from the existing ATCT. The line of sight analysis evaluated four key points – the four runway ends. The analysis considered the distance from ATCT the runway ends and runway endpoint elevations.

Object discrimination requirements indicate that visibility from the ATCT cab shall support surface object visibility at critical airport locations. The purpose is to assess controllers' probability of detection and recognition of objects on the airport surface in consideration of observation range, tower height, atmospheric conditions, and surface conditions.

Object discrimination is defined by the ability for a controller to detect, recognize, or identify an object on the airport surface from the tower cab. Detection is defined as the ability to notice the presence of an object on the airport surface without regard to the class, type, or model. Recognition is defined as the ability to discriminate a class of objects (e.g., single engine general aviation aircraft). Identification is defined as the ability to specify the object (e.g., Cessna 172). Each of these is measured by the probability the object will be detected, recognized, and/or identified given the analysis parameters.

Line of sight angle of incidence requirements indicate that visibility from the ATCT cab shall support requirements for viewing objects on the airport movement areas and non-movement areas. The purpose is to assess a controller's viewing perspective of the airport surface key points.

The analysis was conducted for five key sites on the airport surface: each runway endpoint, the passenger terminal apron (defined by the southwest corner), and the FBO apron (defined by the northern terminus of the taxiway centerline marking). Note that the terminal and FBO apron areas are outside the air traffic control movement area, which signifies areas not typically controlled by the ATCT. However, clear visibility of these areas are important to support the safe operation of the airfield. Horizontal distance from the tower and site elevation was considered for each site. The FAA Airport Traffic Control Visibility Analysis Tool (ATCVAT) was used to perform analyses for object discrimination and line of sight angle of incidence

in concurrence with FAA Order 6480-4B, *Airport Traffic Control Tower Siting Process*. The ATCT visibility performance analysis criteria is described in *Table 3-42*.

***TABLE 3-42***
***ATCT VISIBILITY PERFORMANCE ANALYSIS CRITERIA***

| Analysis | Criteria Threshold |
|---|---|
| Object Discrimination - Detection | ≥ 95.5% |
| Object Discrimination - Recognition | ≥ 11.5% |
| Object Discrimination - Identification | ≥ 0.91% |
| Line of Sight Angle of Incidence | ≥ 0.80° |

Source: FAA Order 6480-4B, Airport Traffic Control Tower Siting Process
Note: Unobstructed View criteria is not quantitatively measured and therefore is excluded from the table

The analyses results conclude that the existing ATCT is sufficient to meet the needs of the Airport. The analysis determined that controllers have an unobstructed view of each runway end and passenger terminal apron from the tower cab. No line of sight shadows were identified to obstruct visibility of the movement areas. Additionally, visibility from the tower cab allows objects to be detected, recognized, and identified at each of the key site. The analysis also determined that the tower cab allows for sufficient viewing perspective angles to each key site as measured by the line of sight angle of incidence. The ATCT visibility performance analysis results are described in *Table 3-43*.

***TABLE 3-43***
***ATCT VISIBILITY PERFORMANCE ANALYSIS RESULTS***

| Visibility Performance Criteria | | Rwy 9 End | Rwy 27 End | Rwy 18 End | Rwy 36 End | Terminal Apron | FBO Apron |
|---|---|---|---|---|---|---|---|
| Unobstructed View | Criteria Met (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Object Discrimination - Detection | Tower Results | 99.90% | 99.70% | 99.70% | 99.20% | 99.70% | 99.90% |
| | Criteria Met (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Object Discrimination - Recognition | Tower Results | 83.40% | 63.70% | 66.50% | 41.00% | 67.20% | 79.50% |
| | Criteria Met (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Object Discrimination - Identification | Tower Results | 27.31% | 11.56% | 12.92% | 4.90% | 13.27% | 22.37% |
| | Criteria Met (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Line of Sight Angle of Incidence | Tower Results | 1.82° | 1.43° | 1.46° | 0.98° | 1.48° | 1.70° |
| | Criteria Met (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Source: RS&H, 2016

Further analysis will be required to ensure that the existing ATCT will remain sufficient given airfield changes that may be proposed in the Identification and Evaluation of Alternatives process. Line of sight obstructions caused by proposed development should also be considered in the selection of the preferred airport development alternative. This analysis will occur as part of the Identification and Evaluation of Alternatives portion of the study.

CHAPTER 4

# IDENTIFICATION AND EVALUATION OF ALTERNATIVES

## 4.1 OVERVIEW

The purpose of the identification and evaluation of concepts is to create a plan to meet the demands delineated in Chapter 3, *Facility Requirements*. Concepts in this chapter were developed based on airport development issues, facility requirements, and FAA design standards. These concepts address the demands for public and non-public functions of the Airport, including the passenger terminal area and supporting facilities such as airport maintenance and Aircraft Rescue and Fire Fighting (ARFF). Concepts addressing requirements for additional facilities identified in the Facility Requirements chapter were designed to ensure safe, efficient, and cost-effective development of the Airport. Although the concept plans are designed to meet demand during the 20-year period addressed in the FAA-approved forecast of aeronautical demand, they also provide growth opportunities beyond the planning period. The following topics are addressed in this chapter:

- Land Use Map Update
- Identification and Evaluation of Concepts
- Options for Potential Land Use Development
- Non-Aeronautical Land-Use Areas

### 4.1.1 Summary of Development Issues

The airport master planning process includes data collection, interviews with airport staff and tenants, and technical analysis. As outlined in the Facility Requirements chapter, a variety of facilities were determined to be in need of expansion, relocation, renovation or replacement. Though most of these issues are not safety concerns, they do enable future growth, improve operational functions, and optimize the use of Airport property. The following development issues discussed within this chapter are:

- Land use areas should be rationalized and consolidated to better address future demand
- Circulation to and from the Economy Lot should be addressed
- The Rental Car Service Center Facility should be updated and relocated
- Space for a potential Maintenance, Repair, and Overhaul (MRO) facility should be identified
- Space for a potential second FBO should be identified
- Parcels of land for non-aeronautical development should be identified

### 4.1.2 Purpose of Concepts

The concepts presented in this chapter are divided into two parts. The first is to ensure the selected concepts fit the long-term vision of Airport staff with respect to the growth and operation of the Airport. The second is to ensure facilities – especially those controlled by tenants – develop in ways that are compatible with adjacent facilities and with the overall operation of the Airport. Those facilities where the Airport has primary responsibility for development were analyzed in a manner in which concepts were evaluated and a preferred concept was selected. For development areas where other parties would take primary responsibility for development, such as a MRO facility, only layout options are presented so that site development and infrastructure improvements common to all potential layouts could be identified.

The concepts are presented in such a way that each meets the facility requirements as identified earlier in the Airport Master Plan process. Input from Airport staff and stakeholders is used to reject some concepts, refine some concepts, and ultimately select the preferred avenue for Airport development.

In addition, the systematic development and selection of specific concepts allows for the orderly programming of individual projects, including enabling projects that may be required, such as utilities, roadways and other infrastructure. This ensures the Airport is prepared to take advantage of compatible future development, even if that development differs somewhat from what is currently anticipated.

## 4.2 LAND USE MAP UPDATE

To meet current and future demand for development, property areas have been consolidated and changed to reflect their highest and best use. The new Land Use Map takes into account airfield changes that have occurred since the last Airport Master Plan and considers the potential relocation of the existing FBO, the potential entry of an MRO operator, and identifies a potential non-aeronautical land use development area (see *Exhibit 4-1*).

To assist with describing the land use areas of the Airport, it has been divided into four separate quadrants based on the runway intersection: Northwest, Northeast, Southeast, and Southwest. In discussion with the TAC and Airport staff, it was determined that in order to better rationalize land use at the Airport, different general land uses would be allocated as such:

- Northwest: Cargo and aviation-related development
- Northeast: Passenger terminal and related support facilities
- Southeast: General Aviation and aviation-related development
- Southwest: Airport Support Facilities

The potential for non-aeronautical development exists in all quadrants. All areas designated for Airfield use includes all runway and taxiway safety areas as well as a full perimeter vehicle service road.

### 4.2.1 Northwest Quadrant

The Northwest Quadrant is dedicated to cargo and aeronautical development, with a portion of the property classified as a buffer due to its previous use as a landfill site. The buffer area begins at Swartz Creek and proceeds west to the property line. The FBO area could be redeveloped as cargo or other aviation-related development such as an MRO facility. In the next 20 years, there are no plans to relocate the FBO due to its decent condition and lack of expected demand, however relocation of the FBO could be considered when the facility reaches the end of its useful life or when the current FBO wants to expand its operation.

Potential layouts for the Northwest Quadrant for both cargo and MRO development are provided in Section 4.4.

### 4.2.2 Northeast Quadrant

The Northeast Quadrant will consist of the Passenger Terminal Area, non-aeronautical and airfield development. The facility requirements determined that the Passenger Terminal could accommodate a doubling of passenger traffic before expansion is needed. In addition, there is sufficient area to double the size of the Passenger Terminal to the east. It was determined that even with a long-term doubling of the Passenger Terminal, all the land area in the Northeast Quadrant would not be needed for terminal facilities.

As such it is recommended that a portion of the Quadrant on the east side be reserved for non-aeronautical development.

Two areas were identified and proposed for non-aeronautical use. One location is an undeveloped property east of the Rental Car Facility. The second location takes a portion of the Economy Lot on the east side and repurposes for non-aeronautical use. Both of these properties are ideal for non-aeronautical development due to the proximity to West Bristol Road, Interstate 75, and Interstate 69.

Concepts for expanding the Airport's landside including access, parking, and rental cars are provided in Section 4.3. Concepts addressing potential non-aeronautical development are presented in Section 4.5

### 4.2.3 Southeast Quadrant

It is recommended that the north end of the Southeast Quadrant be developed as a FBO facility and/or corporate hangars. The south end of the Quadrant should remain as an area for smaller general aviation aircraft. The airport property between the two general aviation areas is reserved for aviation-related development including additional general aviation facilities and/or an MRO facility.

One consideration for the Airport in this area is land acquisition. It is recommended that the Airport purchase several adjacent businesses and residential properties located west of Torrey Road for long-term developmental potential. However, none of these properties are needed for immediate development and should only be purchased as they are made available. These areas will allow for additional corporate aviation, aeronautical, and non-aeronautical development.

A portion of the Southeast Quadrant will be preserved for a long-term general aviation Runway 9R-27L. This runway is depicted on the current ALP. The continued need to preserve land for this runway will be reevaluated in the next master planning process.

Concept facility layouts for general aviation and MRO are provided in Section 4.4.

### 4.2.4 Southwest Quadrant

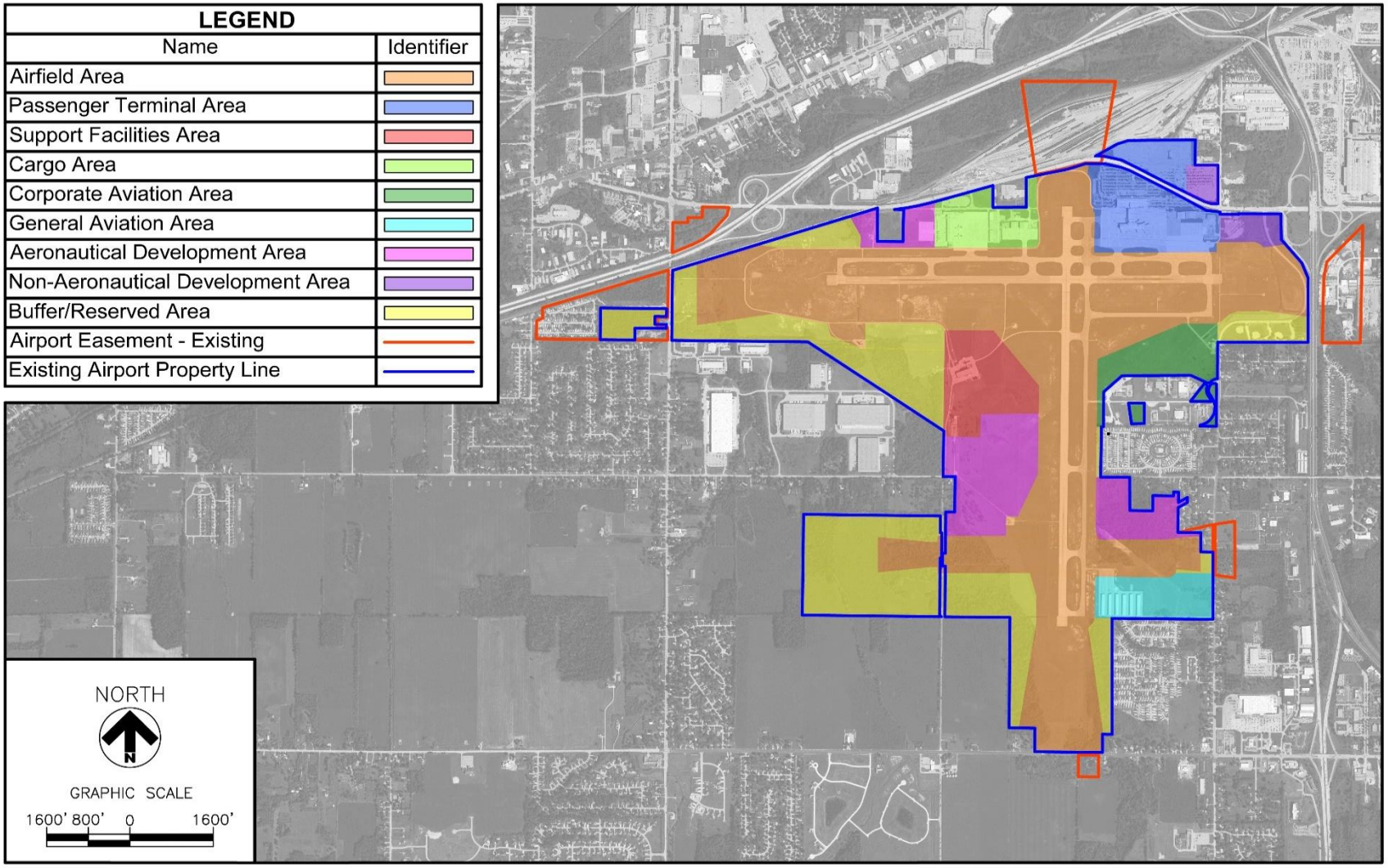
The Southwest Quadrant will include the airfield for both the current runway as well as the future general aviation runway, airport support facilities such as the ARFF Station and the Airport Maintenance Facility as well as the Air Traffic Control Tower (ATCT).

The long-term potential use of the reserve/buffer area should be reevaluated in the next master planning cycle. If there appears to be no need for the land as aeronautical use, then the area could potentially be used for non-aeronautical development.

A portion of the property south of the ATCT is designated for aeronautical development. However, a line-of-sight analysis determined that building heights within this area may be limited due to potential conflict between the ATCT and the future general aviation runway and associated taxiways. When development does occur, road access would likely need to be improved.

Concepts for ARFF and Airport Maintenance Facilities are provided in Section 4.3. Concept facility layouts for general aviation and MRO are provided in Section 4.4.

***EXHIBIT 4-1***
***2017 ULTIMATE LAND USE MAP***




Source: RS&H 2017

## 4.3 IDENTIFICATION AND EVALUATION OF ALTERNATIVES

The Identification and Evaluation of Alternatives section presents various solutions to the deficiencies found in Chapter 3, as well as a process to assess their relative merits. The purpose of the concept development and evaluation process is to identify a single preferred concept to depict on the future Airport Layout Plan for FAA review, and to integrate that plan in the Airport Capital Improvement Program.

### 4.3.1 Landside Development Options

This section evaluates concepts for the landside facilities in the Passenger Terminal Area. These concepts were developed to address operational safety concerns, facility needs, and landside functions such as passenger parking, rental car lots, and airport circulation. The passenger terminal was found to meet the needs of the Airport through this 20-year planning period and will not be addressed.

Though the airport does not need a parking garage at this time, the Airport may pursue this to enhance customer service level at Bishop International Airport. A parking structure area is depicted on each concept. Size, layout, parking stalls, and number of levels for a parking structure have not been evaluated.

The total number of existing parking spaces meets the anticipated demand throughout the planning period. The Long-Term Lot operates at or near capacity, while the Short-Term and Economy Lots are underutilized. One potential solution is to consolidate the Short-term and Long-term lots and have one price point. Another solution to better utilize the Short-term and Economy Lots is to adjust the parking rates.

The Economy Parking Lot has excess capacity for well beyond the 20-year planning period. As such, each concept depicts the east side of the Economy Parking Lot repurposed for non-aeronautical use. Having a frontage to West Bristol Road and adjacent to other businesses, this location could be suitable for a distribution facility, warehousing, office complex, or other uses.

One area of concern identified by Airport staff is the shuttle operation between the Economy Lot and terminal. The point where the shuttles cross Bristol Road and where they enter the terminal area results in a circuitous routing, making the operation somewhat inefficient. In addition, there are times when passengers do not wait for a shuttle and cross West Bristol Road on foot. This creates a safety concern for the passengers. As such, the concepts present a range of development options to address these issues.

#### Landside Area – Option 1

The first concept is a minimalistic approach to address the deficiencies the Landside Area is experiencing. The following sections can be seen graphically summarized following the narrative (see *Exhibit 4-2*).

**Roadway/Parking Lots**

This concept does not include any modification to West Bristol Road. To enhance safety, this concept includes the construction of a covered pedestrian bridge. Although the Economy Lot is currently served by a shuttle bus, the pedestrian bridge would improve level of service by allowing passengers to safely traverse West Bristol Road and continue along dedicated walkways until reaching the terminal.

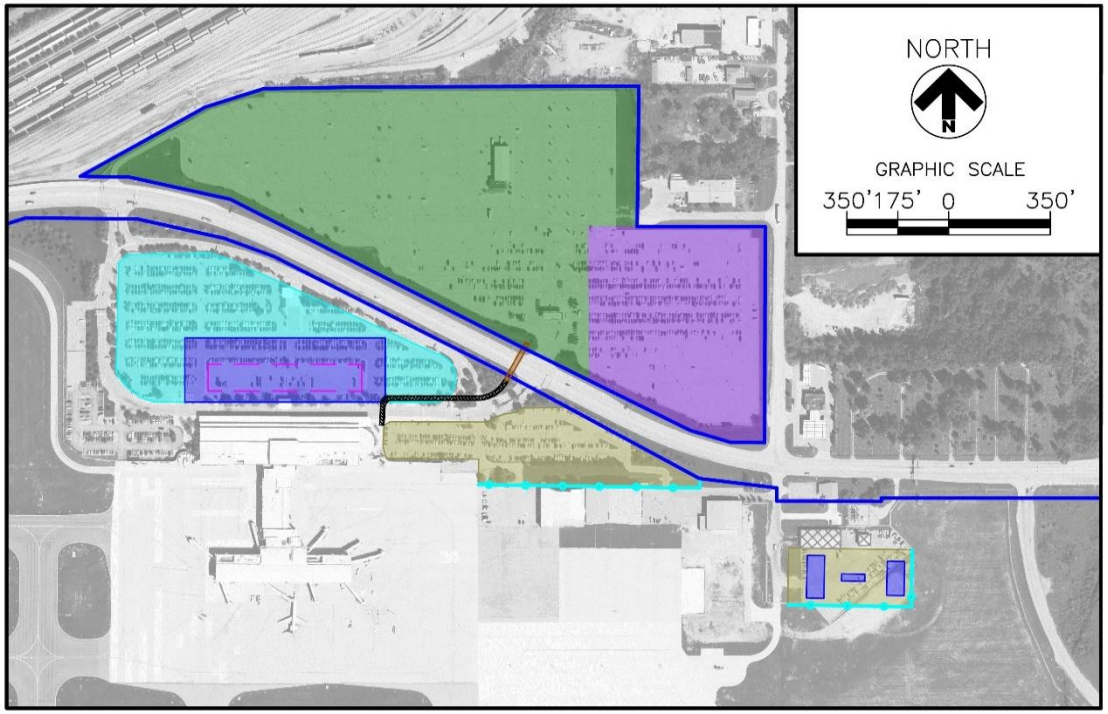
**Rental Car Facilities**

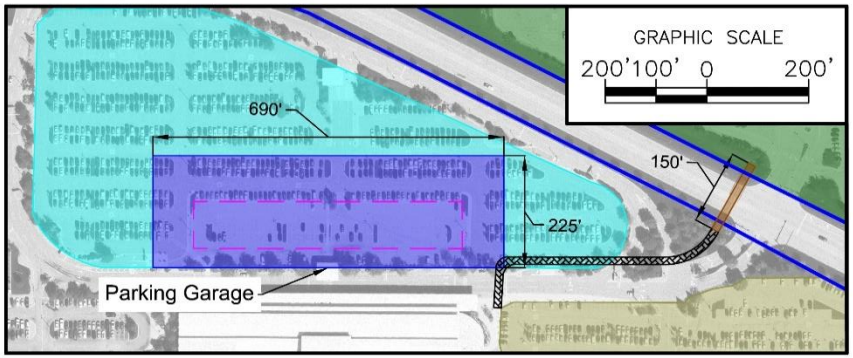
This concept includes redevelopment of the rental car service facility within the current location. The rental car tenants' Service Center Facility concept was developed to replace an aging facility and to create a more operationally efficient service area that meets the needs of the rental car agencies. In this concept, the proposed Service Center Facility is shown at the same location but separated into three distinct facilities: fuel pumps and vacuums, car wash, and service and light maintenance. This provides the rental car agencies more flexibility for servicing and preparing their vehicles more efficiently.

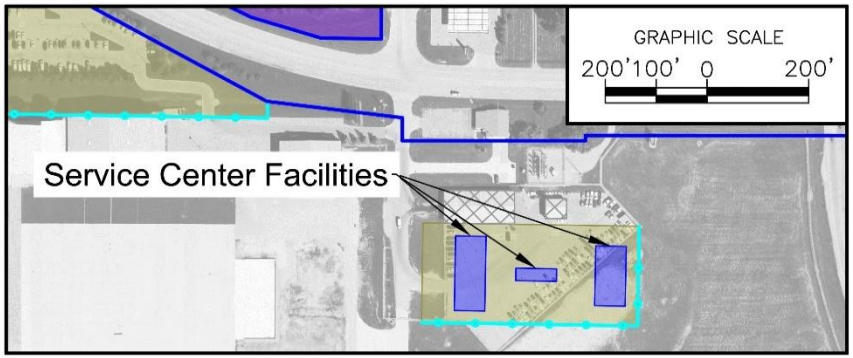
***EXHIBIT 4-2***
***LANDSIDE – OPTION 1***

| DATA | |
|---|---|
| Name | Stall Count |
| Economy Parking Lot | 2,100 |
| Long Term Parking Lot | 780 |
| Short Term | 195 |
| Rental Car Area | 330 |
| Parking Garage (Proposed) | 310/floor |

| LEGEND | |
|---|---|
| Name | Identifier |
| Economy Parking Lot | |
| Long Term Parking Lot | |
| Rental Car Area | |
| Non-Aeronautical Development Area | |
| Proposed Facilities | |
| Pedestrian Bridge & Sidewalk | |
| Demolition | |
| Short Term Parking Lot | |
| Airport Property Line | |
| Security Fence | |




Source: RS&H 2017

### Landside Area – Option 2

The second concept retains the proposed Parking Garage and adds concepts for West Bristol Road, the Parking Lots, Rental Car Facilities. The following sections can be seen graphically summarized following the narrative section (see *Exhibit 4-3*).

**Roadway/Parking Lots**

This concept incorporates a grade change to allow the Economy and Long-term Lots to be connected. This concept identifies a 3 percent grade to the road allowing construction of an underpass for passengers and the airport shuttle bus to access the passenger terminal without needing to cross West Bristol Road. It is anticipated that the existing property boundaries will not be impacted if this concept is pursued. This would require coordination with Michigan Department of Transportation (MDOT) and the Genessee County Road Commission (GCRC).

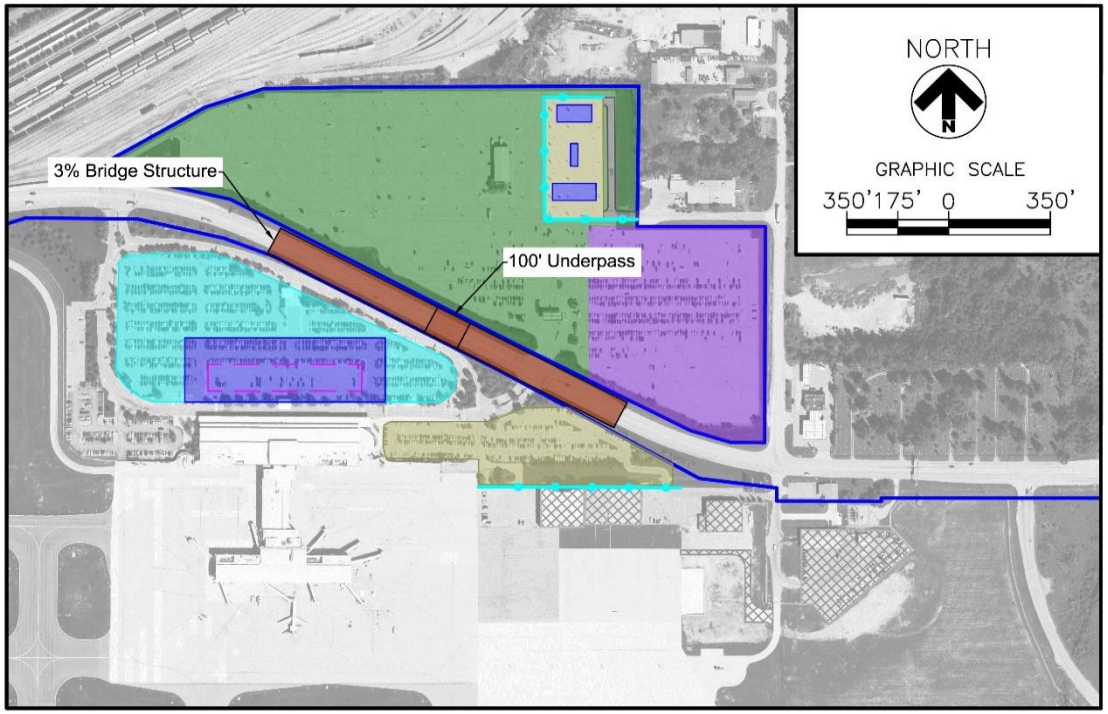
**Rental Car Service Facility**

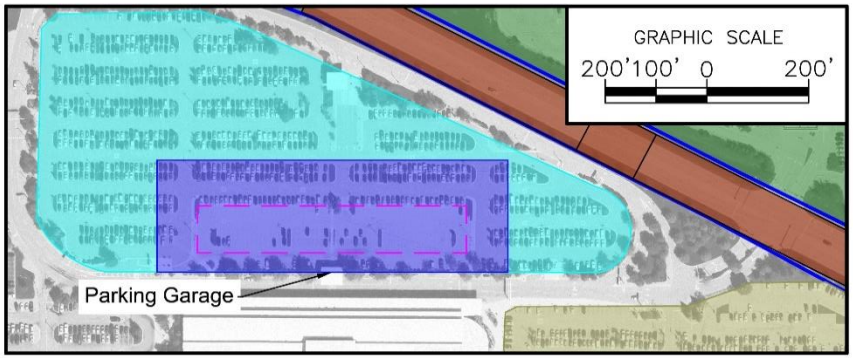
This concept recommends development of a new rental car service area in a portion of the Economy Lot. The rental car facility is relocated to the northeast corner of the Economy Parking lot. Much of the space in the Economy Lot is underutilized and repurposing a portion of the lot would locate the new Rental Car Service Center Facility to an area where it will not impinge on future aeronautical development. This concept of the Service Center Facility also separates the existing facility into three distinct buildings to better facilitate the servicing of vehicles in a timely manner.

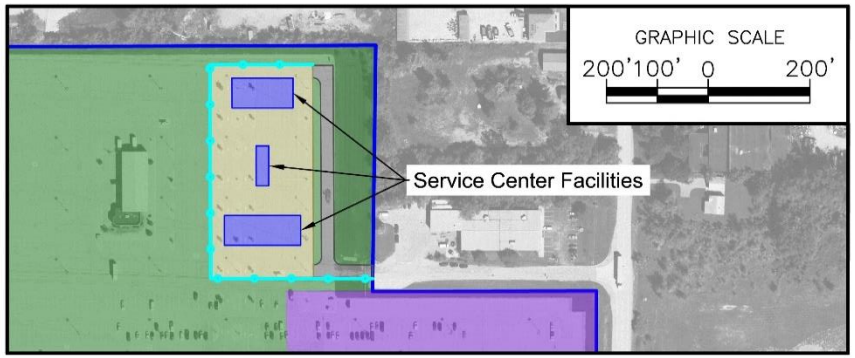
***EXHIBIT 4-3***
***LANDSIDE – OPTION 2***

| DATA | |
|---|---|
| Name | Stall Count |
| Economy Parking Lot | 1,850 |
| Long Term Parking Lot | 780 |
| Short Term | 195 |
| Rental Car Area | 330 |
| Parking Garage (Proposed) | 310/floor |

| LEGEND | |
|---|---|
| Name | Identifier |
| Economy Parking Lot | |
| Long Term Parking Lot | |
| Rental Car Area | |
| Non-Aeronautical Development Area | |
| Proposed Facilities | |
| Pedestrian Bridge & Sidewalk | |
| Demolition | |
| Short Term Parking Lot | |
| Airport Property Line | |
| Security Fence | |




Source: RS&H 2017

### Landside Area – Option 3

The third concept includes the proposed Parking Garage concept, while also proposing concepts for West Bristol Road, the Parking Lots, Rental Car Facilities. The following sections can be seen graphically summarized following the narrative section (see *Exhibit 4-4*).

**Roadways/Parking Lots**

West Bristol Road currently divides the property, and this concept examines relocating the road as far north as possible, while still meeting parameters for its anticipated average daily traffic (ADT) and design speed of 45 MPH. This relocation would allow most of the terminal area to be located south of West Bristol Road, minimizing conflicts between Airport and roadway traffic.

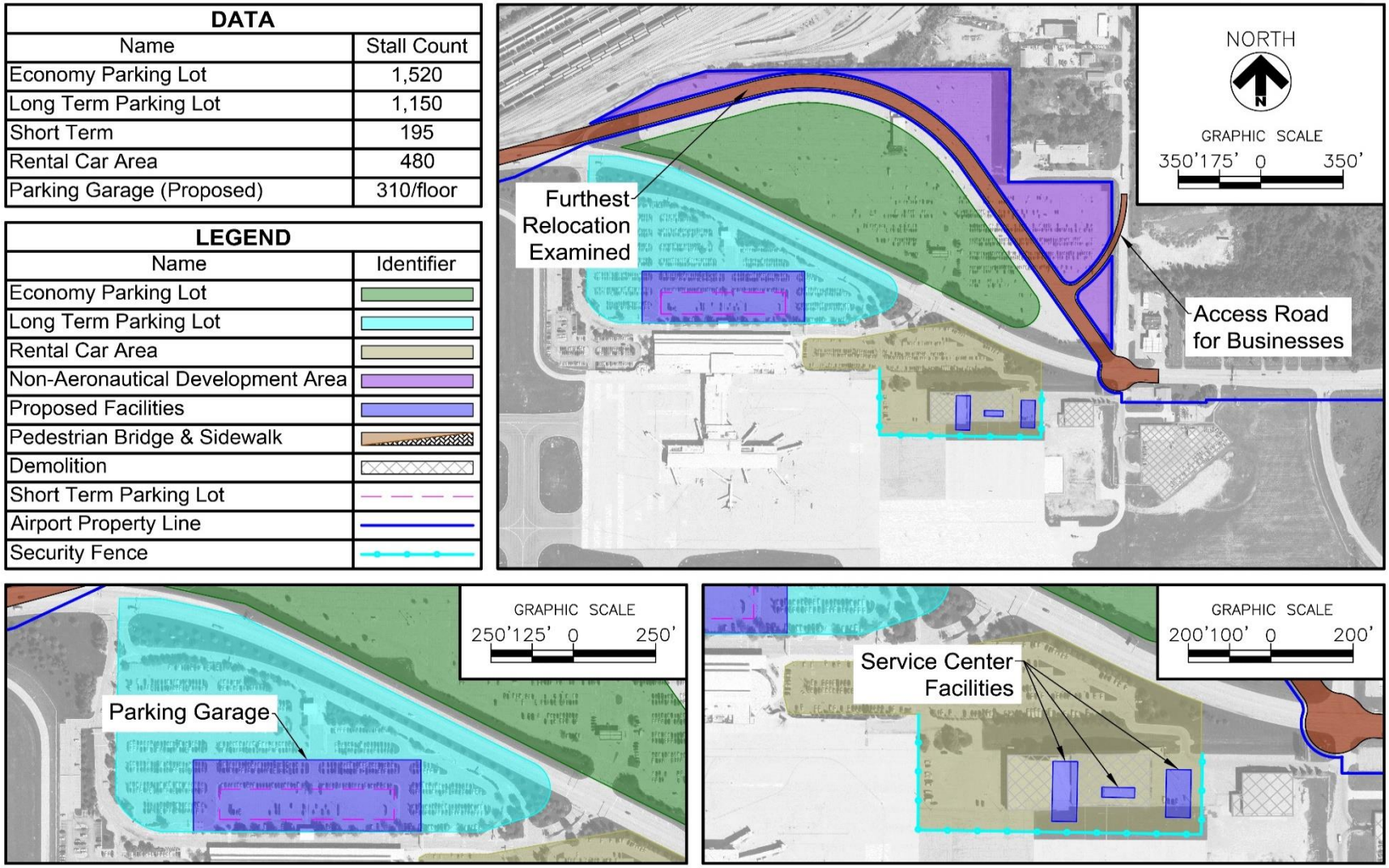
**Rental Car Facilities**

This concept includes relocating the rental service facilities to a location adjacent to the terminal. This is the only concept that would result in a consolidated rental car layout. The third concept proposes relocating the Rental Car Service Center Facility just south of the existing Ready/Return Lot, consolidating the circulation of rental car vehicles to within one area of the overall terminal area. This consolidation would also improve the safety of operations within the terminal area. Demolition of the three general aviation hangars would be required in this concept.

***EXHIBIT 4-4***
***LANDSIDE – OPTION 3***

| DATA | |
|---|---|
| Name | Stall Count |
| Economy Parking Lot | 1,520 |
| Long Term Parking Lot | 1,150 |
| Short Term | 195 |
| Rental Car Area | 480 |
| Parking Garage (Proposed) | 310/floor |

| LEGEND | |
|---|---|
| Name | Identifier |
| Economy Parking Lot | |
| Long Term Parking Lot | |
| Rental Car Area | |
| Non-Aeronautical Development Area | |
| Proposed Facilities | |
| Pedestrian Bridge & Sidewalk | |
| Demolition | |
| Short Term Parking Lot | |
| Airport Property Line | |
| Security Fence | |




Source: RS&H 2017

### 4.3.2 Cost of Landside Development Options

To ensure that fiscally responsible options are developed, an order of magnitude cost for roadway, parking lots, and rental car facility development are presented below. These development cost are used to evaluate and program the selected options into the airport's capital improvement schedule.

#### Option 1 Order of Magnitude Cost

Landside Area – Option 1, as shown in *Exhibit 4-2*, proposes a pedestrian bridge that crosses over West Bristol Road to allow a safer concept for pedestrian traffic and the overhaul of the Rental Car Service Area within its existing location to address all current structural and safety issues and concerns. The Order of Magnitude cost for each project in Option 1 are: $1,500,000 for the pedestrian bridge over West Bristol Road, $8,000,000 for the Rental Car Service Facility, $100,000 for hangar demolition, and $50,000 for the Short-Term Lot to be included into the Long-Term Lot.

#### Option 2 Order of Magnitude Cost

Landside Area – Option 2, as shown in *Exhibit 4-3*, proposes a 3 percent grade raise to West Bristol Road to allow for the construction of an underpass for on-airport circulation and the relocation of the Rental Car Service Center Facility to the northeast corner of the Economy Parking Lot. The Order of Magnitude cost for each project in Option 2 are: $10,000,000 for the roadway improvement, $9,000,000 for the Rental Car Service Facility, $100,000 for hangar demolition, and $200,000 for parking lot modifications.

#### Option 3 Order of Magnitude Cost

Landside Area – Option 3, as shown in *Exhibit 4-4*. West Bristol Road is relocated to the north which allows most of the terminal area to be located south of West Bristol Road and the relocation of the Rental Car Service Center Facility closer to the Passenger Terminal and just south of the Ready/Return Lot. The Order of Magnitude cost for each project in Option 3 are: $10,000,000 for the roadway improvement, $8,500,000 for the Rental Car Service Facility, $100,000 for hangar demolition, and $4,000,000 for parking lot modifications.

### 4.3.3 Evaluation and Selection of Landside Development Options

The concepts evaluation process assists in selecting a recommended Airport development plan among several potential development concepts that will adequately address the future requirements and the needs of FNT throughout the planning horizon. This is achieved through a set of unique evaluation criteria developed for FNT that follows the guidelines of AC 150/5070-6B Change 2, *Airport Master Plans*.

Each section was scored independently with specific evaluation criteria elements in the following categories:

- Safety
- Efficiency
- Fiscal Responsibility
- Environmental Awareness
- Implementation

Two important parameters establish the process used in evaluating the potential development options for the Airport. First, goal statements indicate what the Airport should aim for as part of the overall Master Plan Update. Second, objectives identified as evaluation criteria better define the goals. The criteria were written in the form of a question to aid in the evaluation process for each concept.

To select the best development concepts for the Landside Area, two separate evaluations were created. The first evaluation process conducted addresses West Bristol Road and the Parking Lots. The second evaluation process conducted addresses the Rental Car Service Center Facility. The sections below go into further detail for each. Following the evaluations, selected recommendations are summarized.

### Evaluation Process of Landside Options

In the Evaluation of Landside Development Options, focus is placed on the Economy Parking Lot, Long-Term Parking Lot, and West Bristol Road as the primary elements of development for each concept.

Each landside concept consists of a modification to West Bristol Road, the Economy Parking Lot, Long-Term Parking Lots, or a combination of both. Landside Area – Option 1, does not modify West Bristol Road and yet consolidates the Short-Term and Long-Term Parking Lots to address underutilization and parking demand. Although Option 1 does not modify West Bristol Road, a covered pedestrian bridge connecting from the Economy Lot and crossing over West Bristol Road will improve pedestrian safety and passenger level of service. Comparable to Option 1, Landside Area – Option 2, includes no change in alignment to West Bristol Road, however, it connects the Economy and Long-Term parking lots by raising West Bristol Road with a 3 percent grade to allow for an underpass improving pedestrian and vehicular safety. Landside Area – Option 3, enhances both the Economy and Long-Term Parking Lots by relocating West Bristol Road to the north and moving the Economy Lot south of it.

Passengers crossing West Bristol Road and the related safety issues was discussed at a meeting of the Technical Advisory Committee. If further examination of the situation reveals that not many people actually cross the road on foot, then development of a pedestrian overpass may not be cost effective. If the construction of the bridge is deemed unnecessary, developing a dedicated pedestrian crosswalk with improved safety lights and reflectors, push-button activators, and an improved walking path may be sufficient. Though this does not address all of the parking issues the Airport is experiencing, it is recommended they pursue an operational adjustment, such as a change in pricing for both the Long-Term and Economy Lot to correct the imbalanced use of their parking lots. Shifting some spaces from the Short-Term Lot to the Long-Term Lot would help ease this pressure as well.

The goals and objectives were developed to best evaluate each concept with respect to the vision of the Airport staff and stakeholders. The goals and objectives lead to the evaluation criteria as follows:

- ***Safety Goal***: Does the concept maintain and / or enhance the safe operation of the FNT Passenger Terminal Area?
  - *Criteria 1*: Does the concept address pedestrian safety?
  - *Criteria 2*: Does the concept address vehicular safety?

- ***Efficiency Goal***: Does the concept maintain and / or enhance the efficient operation of FNT?
  - *Criteria 1:* Does the concept maintain or enhance the accessibility to the passenger terminal area?
  - *Criteria 2*: Potential to enhance Passenger Service Level?

- ***Fiscal Responsibility Goal***: Can the concept be fiscally obtained?
  - *Criteria 1*: Cost of Construction?
  - *Criteria 2*: Can the concept receive local, state, or federal highway funds?
  - *Criteria 3*: Can the concept be funded by AIP funds, PFCs, or CFCs?
- ***Environmental Awareness Goal***: Does the concept minimize impacts to environmentally sensitive areas?
  - *Criteria 1*: Does the concept minimize impacts to natural habitats?
  - *Criteria 2*: Does the concept require additional technical analysis?
- ***Implementation Goal***: Does the concept minimize impacts to overall airport functionality?
  - *Criteria 1*: Is the proposed concept easy to implement?
  - *Criteria 2*: Does the concept impact surrounding properties?

***EXHIBIT 4-5***
***ROADWAYS/PARKING LOT EVALUATION MATRIX***

| | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| ***SAFETY GOAL*** *- Maintains and / or enhances the safe operation of FNT Landside Area* | | | |
| Criteria 1: Pedestrian Safety | 3 | 2 | 3 |
| Criteria 2: Vehicular Safety | 1 | 2 | 3 |
| ***Subtotal*** | **4** | **4** | **6** |
| ***EFFICIENCY GOAL*** *- Maintains and / or enhances the efficient operation of FNT Landside Area* | | | |
| Criteria 1: Maintains or Enhances Accessibility to Terminal Area | 2 | 2 | 3 |
| Criteria 2: Potential to Enhance Passenger Service Level | 2 | 2 | 3 |
| ***Subtotal*** | **4** | **4** | **6** |
| ***FISCAL RESPONSIBILITY*** *- Can the Concept be Fiscally Attained* | | | |
| Criteria 1: Cost of Construction | 3 | 1 | 1 |
| Criteria 2: Receive local, state, or federal highway funds | 1 | 1 | 1 |
| Criteria 3: Receive AIP funds, PFCs, or CFCs | 1 | 1 | 1 |
| ***Subtotal*** | **5** | **3** | **3** |
| ***ENVIRONMENTAL AWARENESS GOAL*** *- Minimizes impacts to environmentally sensitive areas* | | | |
| Criteria 1: Minimize Impacts on Natural Habitats | 3 | 2 | 1 |
| Criteria 2: Require Additional Technical Analysis | 3 | 3 | 3 |
| ***Subtotal*** | **6** | **5** | **4** |
| ***IMPLEMENTATION GOAL*** *- Minimize impacts to overall airport functionality* | | | |
| Criteria 1: Easy to Implement | 3 | 1 | 2 |
| Criteria 2: Impacts Surrounding Properties | 3 | 2 | 1 |
| ***Subtotal*** | **6** | **3** | **3** |
| | | | |
| ***TOTAL*** | ***25*** | ***19*** | ***22*** |

As seen in the *Roadways/Parking Lot Evaluation Matrix*, Option 1 scored the best overall. Option 1 would be easiest to implement and would minimally impact the natural environment and current airport

activities. However, the Economy/Long-Term Parking Lots and West Bristol Road are not effectively addressed in Option 1. Option 2 and 3 would have operational advantages but less likely to receive sufficient funding to offset the cost. Although it is the costliest and most difficult to implement, Option 3 would be the most operationally efficient and safe option for the Economy /Long-Term Lots and West Bristol Road. It is recommended the Airport pursues the construction of the pedestrian bridge from Option 1 as a less costly measure to improve passenger safety and service levels.

### Evaluation Process of Rental Car Service Center Facility Options

This section specifically evaluates the Rental Car Service Facility as the primary element of development for each concept.

Each concept redevelops, demolishes, or relocates the rental car service facility. Landside Area Option 1, renovates the rental car service area where it currently exists. Alternatively, Landside Area Option 2 recommends development of a new rental car service area located in the northeast corner of the Economy Lot. Separating the existing facility from its current location, Option 2 will also result in having three facilities which provide more flexibility for servicing as seen in Option 1. Landside Area Option 3 relocates the rental car service facility and consolidates rental car activity to within one area.

The goals and objectives were developed to best evaluate each concept with respect to the Airport Staff and stakeholders interest in the future development of the Airport. The goals and objectives / evaluation criteria for the FNT Master Plan Update are as follows:

- ***Safety Goal***: Does the concept maintain and / or enhance the safe operation of the FNT Passenger Terminal Area?
  - *Criteria 1:* Does the concept address pedestrian safety?
  - *Criteria 2:* Does the concept address vehicular safety?
- ***Efficiency Goal***: Does the concept maintain and / or enhance the efficient operation of FNT?
  - *Criteria 1*: Does the concept maintain or enhance the operational use of the rental car facilities?
  - *Criteria 2*: Potential to enhance Passenger Service Level?
- ***Fiscal Responsibility Goal***: Can the concept be fiscally obtained?
  - *Criteria 1:* Cost of Construction?
  - *Criteria 2*: Can the concept be funded by AIP funds, PFCs, or CFCs?
- ***Environmental Awareness Goal***: Does the concept minimize impacts to the environmentally sensitive areas
  - *Criteria 1:* Does the concept minimize impacts to natural habitats?
  - *Criteria 2:* Does the concept require additional technical analysis?
- ***Implementation Goal***: Does the concept minimize impacts to overall airport functionality?
  - *Criteria 1:* Is the proposed concept easy to implement?
  - *Criteria 2:* Does the concept impact surrounding properties?

***EXHIBIT 4-6***
***RENTAL CAR SERVICE CENTER FACILITY EVALUATION MATRIX***

| | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| ***SAFETY GOAL*** *- Maintains and / or enhances the safe operation of FNT Landside Area* | | | |
| Criteria 1: Pedestrian Safety | 2 | 2 | 3 |
| Criteria 2: Vehicular Safety | 1 | 1 | 3 |
| ***Subtotal*** | **3** | **3** | **6** |
| ***EFFICIENCY GOAL*** *- Maintains and / or enhances the efficient operation of FNT Landside Area* | | | |
| Criteria 1: Maintain or Enhances Operational Use of Rental Car Facilities | 1 | 1 | 3 |
| Criteria 2: Potential to Enhance Passenger Service Level | 2 | 1 | 3 |
| ***Subtotal*** | **3** | **2** | **6** |
| ***FISCAL RESPONSIBILITY*** *- Can the Concept be Fiscally Attained* | | | |
| Criteria 1: Cost of Construction | 3 | 1 | 2 |
| Criteria 2: Receive AIP funds, PFCs, or CFCs | 2 | 2 | 2 |
| ***Subtotal*** | **5** | **3** | **4** |
| ***ENVIRONMENTAL AWARENESS GOAL*** *- Minimizes impacts to environmentally sensitive areas* | | | |
| Criteria 1: Minimize Impacts to Natural Habitats | 3 | 2 | 3 |
| Criteria 2: Require Additional Technical Analysis | 3 | 3 | 3 |
| ***Subtotal*** | **6** | **5** | **6** |
| ***IMPLEMENTATION GOAL*** *- Minimize impacts to overall airport functionality* | | | |
| Criteria 1: Easy to Implement | 2 | 3 | 2 |
| Criteria 2: Impacts Surrounding Properties | 3 | 2 | 3 |
| ***Subtotal*** | **5** | **5** | **5** |
| | | | |
| ***TOTAL*** | ***22*** | ***18*** | ***27*** |

As seen in the *Rental Car Service Center Facility Evaluation Matrix*, Option 3 scored the best overall. Option 1 seeks to construct a new rental car service facility while Option 2 and 3 relocates it to new sites. However, Option 2 appears to provide the least operational benefit while being the costliest. Distinct from Option 1 and 2, Option 3 consolidates the facilities to the south of the Ready/Return Lot. Though all would entail the demolition of the existing Rental Car Service Center Facilities, Option 3 would also require the demolition of the existing hangars located in conjunction with the commercial apron. The rental car agencies will gain the most operational efficiencies and safety for passenger by implementing Option 3 into their development schedule. Therefore, it is recommended the Airport pursue Option 3 and relocate the Rental Car Service Facility closer to the Passenger Terminal, just south of the existing Ready/Return Lot.

### Summary of Recommended Concepts for Development

As the evaluation matrices demonstrate, each of the three development concepts outlined above carry with them certain strengths and weaknesses.

The roadway/parking lot configuration described in Option 1 – incorporating a covered pedestrian walkway over West Bristol Road and rebalancing the Short-Term and Long-Term Parking Lots by moving the curb boundaries – represents the preferred development based on the evaluation criteria.

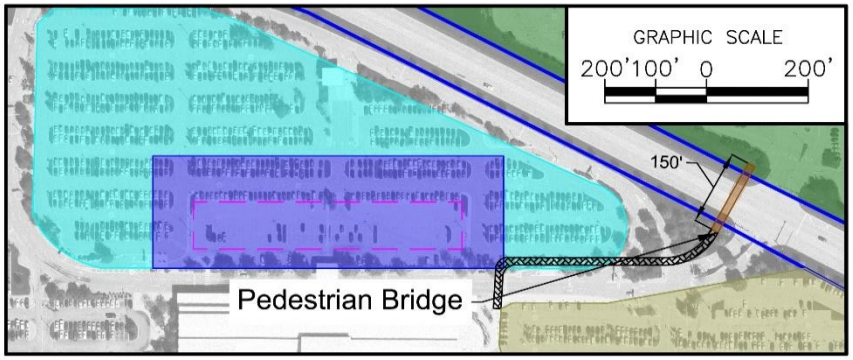
The Rental Car Facilities, however, are better served by Option 3. This configuration – consolidating the rental car layout to a location adjacent to the Passenger Terminal – represents the most efficient and cost-effective solution among the three developed.

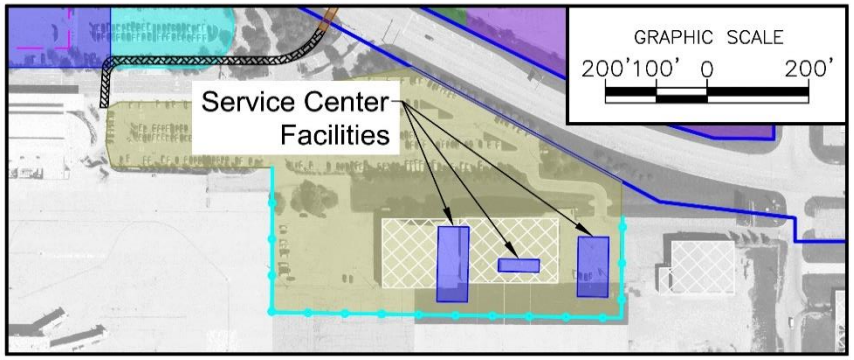
Therefore, the recommended Landside Development layout would combine the roadway/parking lot configuration from Option 1 with the Rental Car Facilities configuration from Option 3. The recommended development concept is shown in *Exhibit 4-7*.

***EXHIBIT 4-7***
***RECOMMENDED OPTIONS FOR DEVELOPMENT***

| DATA | |
|---|---|
| Name | Stall Count |
| Economy Parking Lot | 2,100 |
| Long Term Parking Lot | 780 |
| Short Term | 195 |
| Rental Car Area | 480 |
| Parking Garage (Proposed) | 310/floor |

| LEGEND | |
|---|---|
| Name | Identifier |
| Economy Parking Lot | |
| Long Term Parking Lot | |
| Rental Car Area | |
| Non-Aeronautical Development Area | |
| Proposed Facilities | |
| Pedestrian Bridge & Sidewalk | |
| Demolition | |
| Short Term Parking Lot | |
| Airport Property Line | |
| Security Fence | |


Source: RS&H 2017

### 4.3.4 Airport Support Facility Development Options

This section reviews the concepts developed for the Airport Supporting Facilities. These concepts address the deficiencies found in the *Facility Requirements* Chapter pertaining to the Aircraft Rescue and Fire Fighting (ARFF) Station and Airport Maintenance and Snow Removal Equipment Facility.

The Airport is considering replacing a portion of their SRE fleet with Multi Task Equipment (MTE) Vehicles (see *Exhibit 4-8*). MTEs are capable of plowing, brooming, and blowing snow off the airfield pavements while applying deicing solution. Each MTE acquired can potentially replace two pieces of conventional equipment. Due to the age of the existing facility and the airport's goal to attain MTEs, a concept proposes renovating the existing facility and another concept proposes constructing a new facility.

***EXHIBIT 4-8***
***MB-5 MULTI TASK EQUIPMENT VEHICLES***

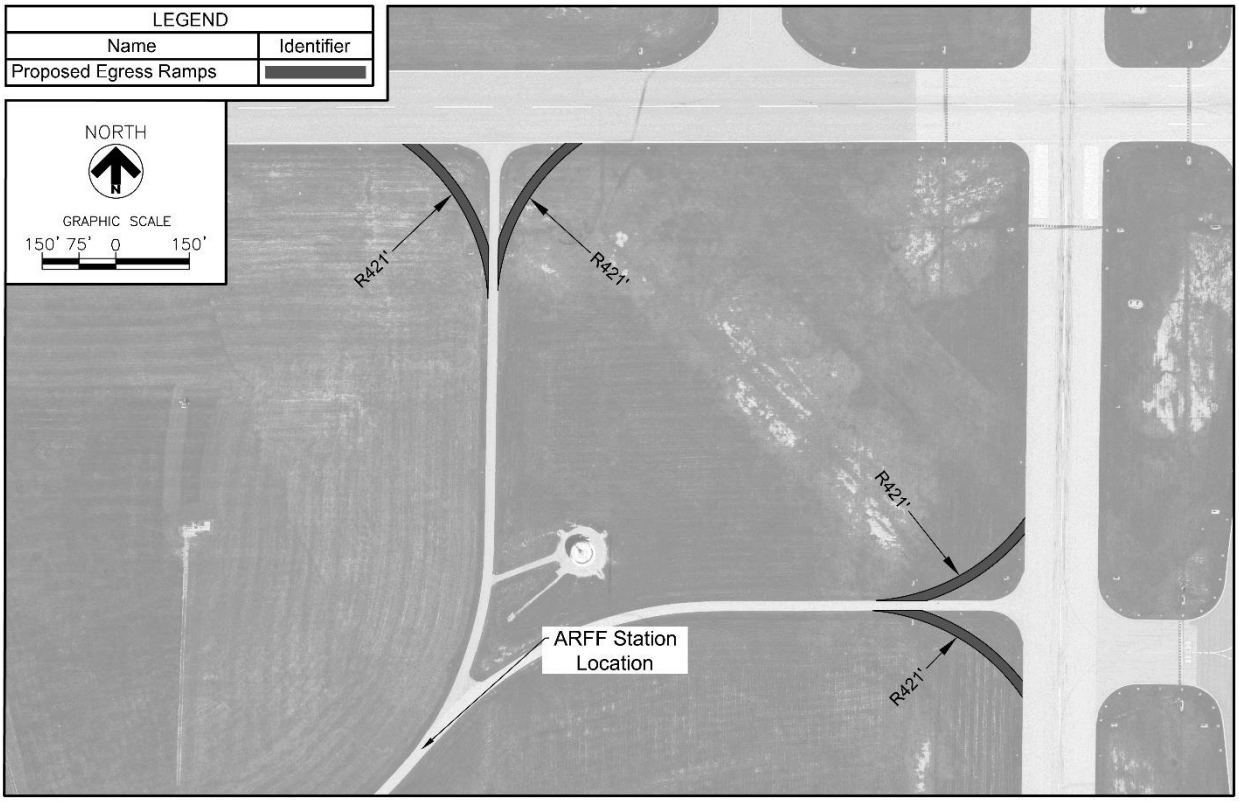
Source: M-B Companies 2017

#### Aircraft Rescue and Fire Fighting Facility

The Airport combines ARFF and operations responsibilities with the same staff. Due to these overlapping responsibilities, their facilities must be capable of addressing each of their functional needs. Currently, their existing facility is too small. They need a dedicated meeting and training room, additional administrative offices, an appropriately sized day room, and an appropriately sized exercise room. The existing facility was not built to meet the needs for ARFF personnel and has aged to the point of nearing its useful life. A new ARFF and Operations Station should be constructed to better meet their needs and the needs of their equipment and storage of consumable materials. Therefore, a new 8,700 square-foot facility is depicted in each concept. Though not required, this concept assumes that 1,800 square feet of administrative and crew areas would be built on a second floor allowing for an observation room. The entire facility can be built as a single floor. The final configuration of the facility will be finalized during the design of the structure. The proposed location makes use of existing pavement and helps minimize extensive site development, such as connecting the structure to utilities and grading. Each concept shows a different re-alignment of the vehicle service road to facilitate response during an emergency event. Emergency egress turns are proposed for access to each runway, thus allowing ARFF vehicles to execute a turn while at high

speed during an emergency. The proposed radius of the egress ramps would allow ARFF apparatus to negotiate the turn at approximately 45 miles per hour (see *Exhibit 4-9*).

***EXHIBIT 4-9***
***EMERGENCY EGRESS RAMPS***




Source: RS&H 2017

### Airport Maintenance and Snow Removal Equipment Facility – Option 1

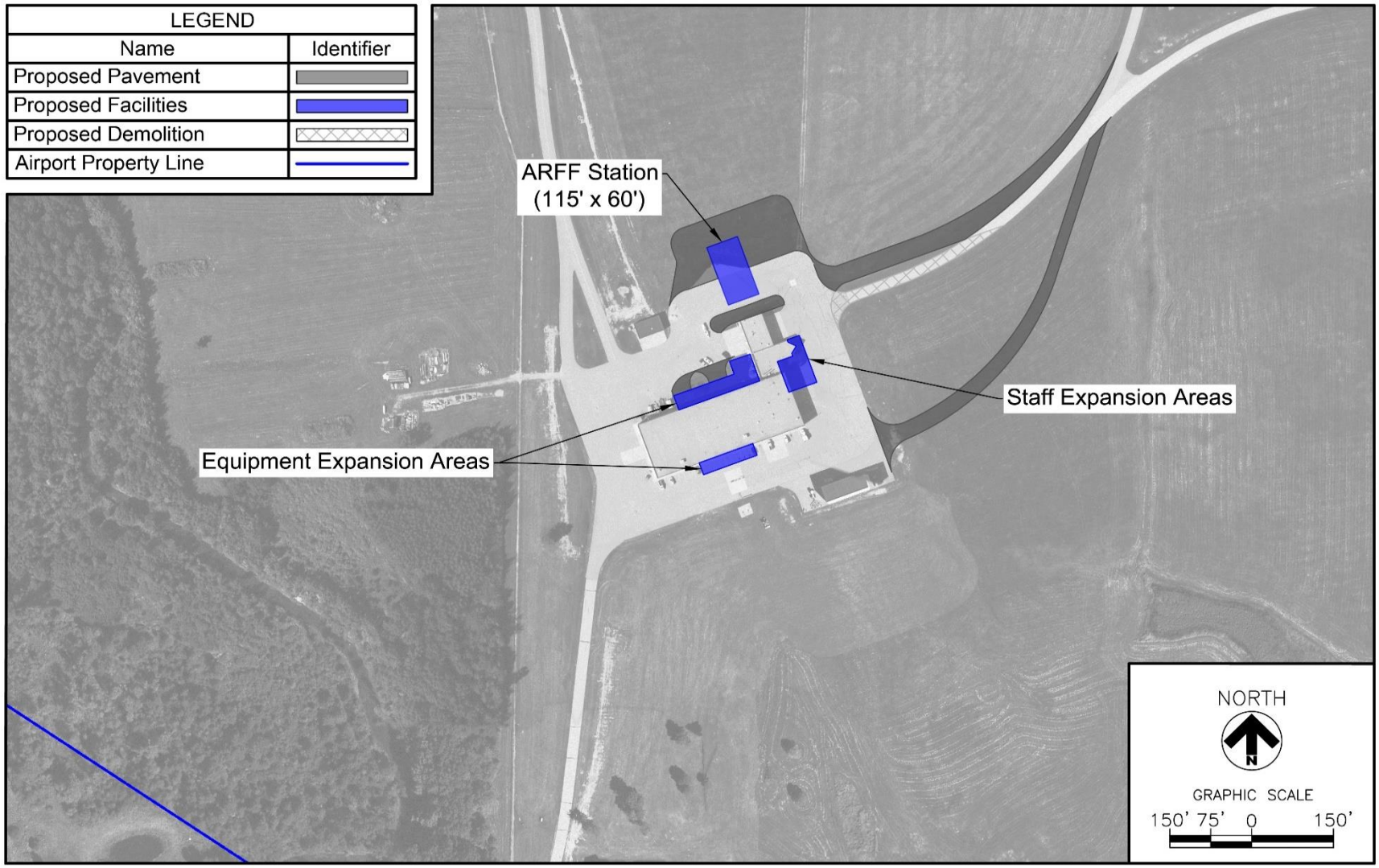
The first concept considers using the existing facility by renovating portions of it and constructing additions to meet the needs for both the staff and their equipment (see *Exhibit 4-10*). This concept shows expanded areas for their equipment to accommodate the potential acquisition of four new MTE vehicles along with additional storage space. The concept proposes the construction of 15,000 square feet of additional space to be added. The concept also considers the renovation of the entire 36,000-square-foot facility. The center of the facility currently housing most of their administrative and crew areas will be expanded in both directions. Most of the spaces to be renovated will become dedicated storage and maintenance space, such as welding and work benches. Many of the new additions could be for administrative and crew areas, such as a manager and supervisor's desk, a snow crew bunk area, kitchen, training and meeting room, and appropriately sized lockers, restrooms, and shower stalls. The final configuration and additional spaces will be finalized in the design of the structure. Considering the age of the facility, it is recommended a structural analysis be conducted.

### Airport Maintenance and Snow Removal Equipment Facility – Option 2

The second concept considers a new facility (see *Exhibit 4-11*). It is anticipated that an area of the facility will be used for airport maintenance vehicles and summer equipment, such as tractors, standard mowers, and hand tools. The other area of the facility will be a heated workspace and bays that would allow for the storage of MTEs, trucks, front end loaders, attachments, and other miscellaneous equipment, materials, and tools for winter operations. Areas for the maintenance of their summer and winter equipment was also calculated, with the possibility of up to three maintenance bays being anticipated for this facility.

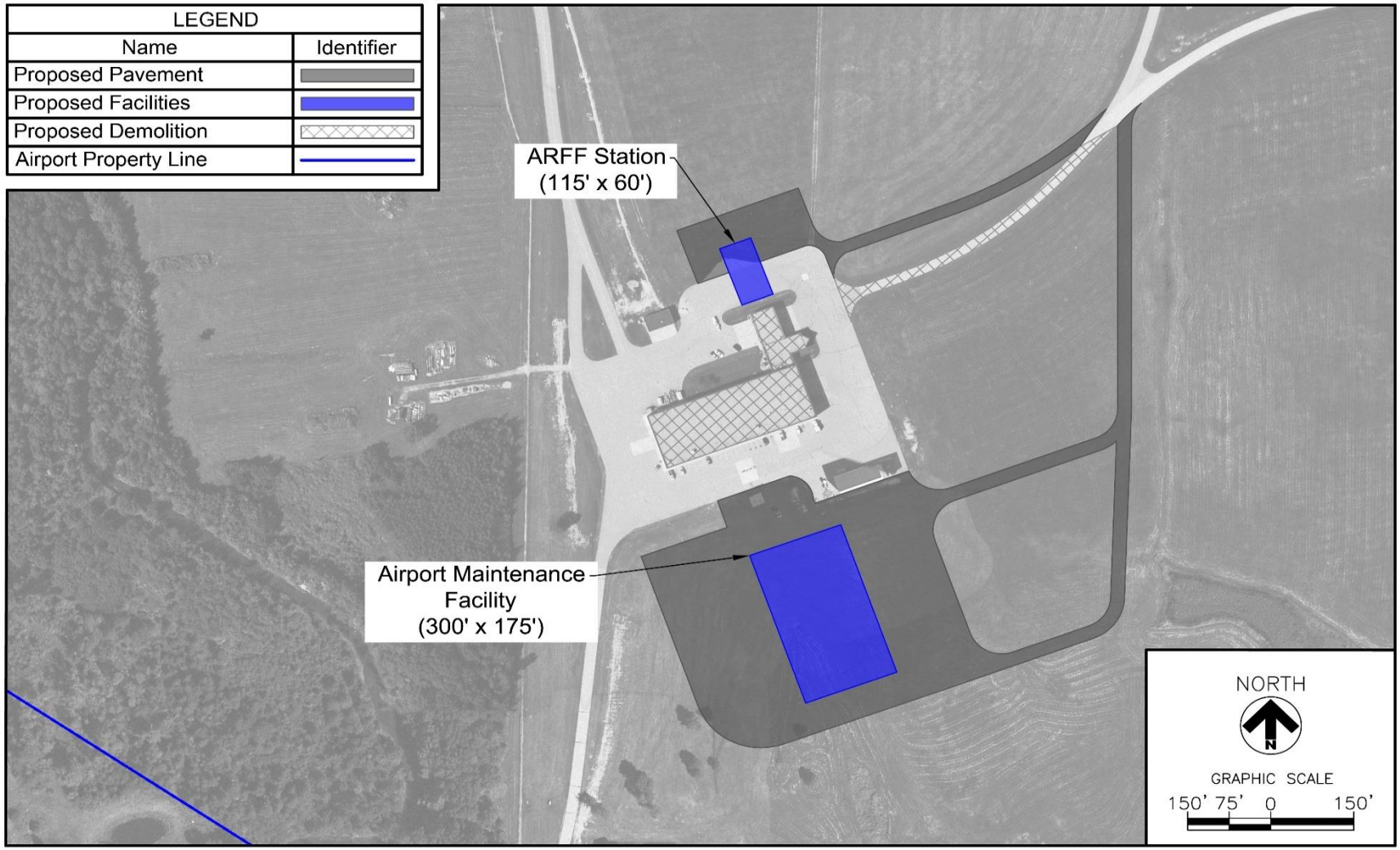
The size of this facility was conceptualized using AC 150/5220-18A along with their existing staffing levels and equipment. With respect to their existing equipment, this concept also takes into account the potential acquisition of four MTEs, which each MTE would replace two of their existing snow removal equipment. The final approximated size of this facility was found to be 52,500 square feet. Depending on the final design and layout of the facility, the square footage could change.

***EXHIBIT 4-10***
***SUPPORT FACILITIES – OPTION 1***




Source: RS&H 2017

***EXHIBIT 4-11***
***SUPPORT FACILITIES – OPTION 2***




Source: RS&H 2017

### 4.3.5 Cost of Airport Support Facility Development Options

To ensure that a fiscally responsible concept is developed, an order of magnitude cost for each facility was prepared. These development cost are used to evaluate and program them into the development schedule of the airport.

#### Option 1 Order of Magnitude Cost – Renovation of Existing Facility

Option 1 presented a renovation and expansion of the existing support facility, as shown in *Exhibit 4-10*. With the renovation of the entire 36,000 square-foot facility and the addition of 15,000 square feet, the order of magnitude cost for this concept is $9,500,000. The pavement and roads associated to this concept is estimated to cost approximately $1,500,000.

#### Option 2 Order of Magnitude Cost – Construction of a New Facility

Option 2 presented a newly constructed support facility, as shown in *Exhibit 4-11*. The new building will be constructed to contain airport maintenance, vehicle service bays, administrative offices, as well as summer and winter equipment storage. The final size of the facility is approximated to be 52,500 square feet. This concept meets all facility requirements and the operational effectiveness of maintenance personnel. The order of magnitude cost for this concept is $19,000,000. The pavement and roads associated to this concept is estimated to cost approximately $4,500,000.

#### ARFF Station Order of Magnitude Cost

The ARFF and Operations Station is in need of replacement to properly meet the staff's functional uses, equipment, and storage of consumable materials. The order of magnitude cost for a new facility is $4,000,000.

### 4.3.6 Evaluation and Selection of Airport Support Facility Development Options

The Airport Maintenance Facility concepts were evaluated by qualitative and quantitative analysis. Specific criteria used to evaluate the concepts and their effectiveness in meeting the needs for the Airport Support Facilities included:

- ***Capability* Goal**: Does the concept maintain and / or enhance the operational use of the Airport Maintenance Facility?
  - *Criteria 1:* Does the concept meet the needs for maintenance equipment?
  - *Criteria 2:* Does the concept meet the needs of maintenance staff?
- ***Fiscal Responsibility Goal***: Can the concept be fiscally obtained?
  - *Criteria 1:* Cost of construction?
  - *Criteria 2:* Is there reasonable expectation that the facility could be funded through FAA and MDOT funding?
- ***Environmental Awareness* Goal**: Does the concept minimize impacts to environmentally sensitive areas?
  - *Criteria 1:* Does the concept minimize impacts to natural habitats?
  - *Criteria 2:* Does the concept require additional technical analysis?
- ***Implementation* Goal**: Does the concept minimize impacts to overall airport functionality?
  - *Criteria 1:* Is the proposed concept easy to implement?
  - *Criteria 2:* Does the concept impact airport activity?

### Evaluation Results

Each potential concept was carefully reviewed in accordance with the evaluation criteria established. An interactive matrix was created to capture each goal and individual objectives were identified to facilitate the ranking of the potential concepts based on their strengths and weaknesses and were scored accordingly (see *Exhibit 4-12*).

***EXHIBIT 4-12***
***SUPPORT FACILITIES EVALUATION***

| | Option 1 | Option 2 |
|---|---|---|
| ***CAPABILITY GOAL*** *- Maintains and / or enhances the operational use of the Airport Maintenance Facility* | | |
| Criteria 1: Needs for Maintenance Equipment | 2 | 3 |
| Criteria 2: Needs of Maintenance Staff | 3 | 3 |
| ***Subtotal*** | **5** | **6** |
| ***FISCAL RESPONSIBILITY*** *- Can the Concept be Fiscally Attained* | | |
| Criteria 1: Cost of Construction | 2 | 1 |
| Criteria 2: Potential to Receive FAA or MDOT Funding | 2 | 1 |
| ***Subtotal*** | **4** | **2** |
| ***ENVIRONMENTAL AWARENESS GOAL*** *- Minimizes impacts to environmentally sensitive areas* | | |
| Criteria 1: Minimize Natural Habit Impacts | 3 | 2 |
| Criteria 2: May Not Require Additional Technical Analysis | 3 | 3 |
| ***Subtotal*** | **6** | **5** |
| ***IMPLEMENTATION GOAL*** *- Minimize impacts to overall airport functionality* | | |
| Criteria 1: Easy to Implement | 1 | 2 |
| Criteria 2: Minimal Impacts to Airport Activity | 3 | 2 |
| ***Subtotal*** | **4** | **4** |
| ***TOTAL*** | ***19*** | ***17*** |

### Recommendation

It is recommended that the airport pursues Option 1 and renovates and expands the facility to appropriately meet the needs of their staff and equipment. Considering the age of the facility, before any construction begins, a thorough structural analysis of the existing facility should be completed. With the potential acquisition of MTEs, it would benefit the airport's operational activity to have the facility prepared sufficiently before they are acquired. Considering the potential impact this renovation may have on staffing, it is important that appropriate phasing of the project occurs to have those impacts minimized. Considering that this concept includes the renovation of the existing ARFF and Operations facilities, it is necessary that a new ARFF and Operations facility is completed before this project commences.

## 4.4 OPTIONS FOR POTENTIAL SITE DEVELOPMENT

Sites designated for tenant development are generally conceptualized, because the use, orientation, and final construction of the property will ultimately be determined by tenants that lease the property. These options coincide with the designated development sites anticipated to be used around the Airport. In the Land Use Map Update Section, two sites were identified for general aeronautical development, one site was identified for corporate aviation development and one site was identified for general aviation

development. Another site was identified for non-aeronautical development and will be analyzed later within this chapter. These options are strictly preliminary and will show potential development to assist the airport with future planning for airside and landside access as well as siting for utilities.

### 4.4.1 Aeronautical Development Options

Aeronautical development concepts were created to show each site's potential use. These concepts propose options for Cargo and MRO facilities. Each site is large enough to accommodate each type of facility; therefore options for each facility type are shown at each site. Depending on the needs of the tenant, each site could be developed without the need for adjacent property acquisition.

At this time, FNT has sufficient surplus to expand its cargo operations within facilities that currently exist through this planning period. However, if a new entrant comes to FNT and would prefer the development of their own facility, the options developed show potential configurations at each site. A 20,000 square-foot facility is shown within each development option, though larger or smaller facilities can be constructed at each site depending on the tenants need. The concept is designed to accommodate two 767-300F side-by-side, along with accompanying ground support equipment (GSE).

A Maintenance, Repair, and Overhaul (MRO) facility could come to any airport as aviation changes and grows. The MRO concepts look at both development sites to show options of potential development and layouts for these facilities. Though an MRO facility could require the same amount of space as a cargo facility, the characteristics necessary for them to operate can be vastly different depending on the services they provide. The options that were developed for an MRO facility depict a 100,000 square-foot and 65,000 square-foot facility, with corresponding vehicle parking area, apron area, ground support and maintenance equipment storage, and fire suppression systems.

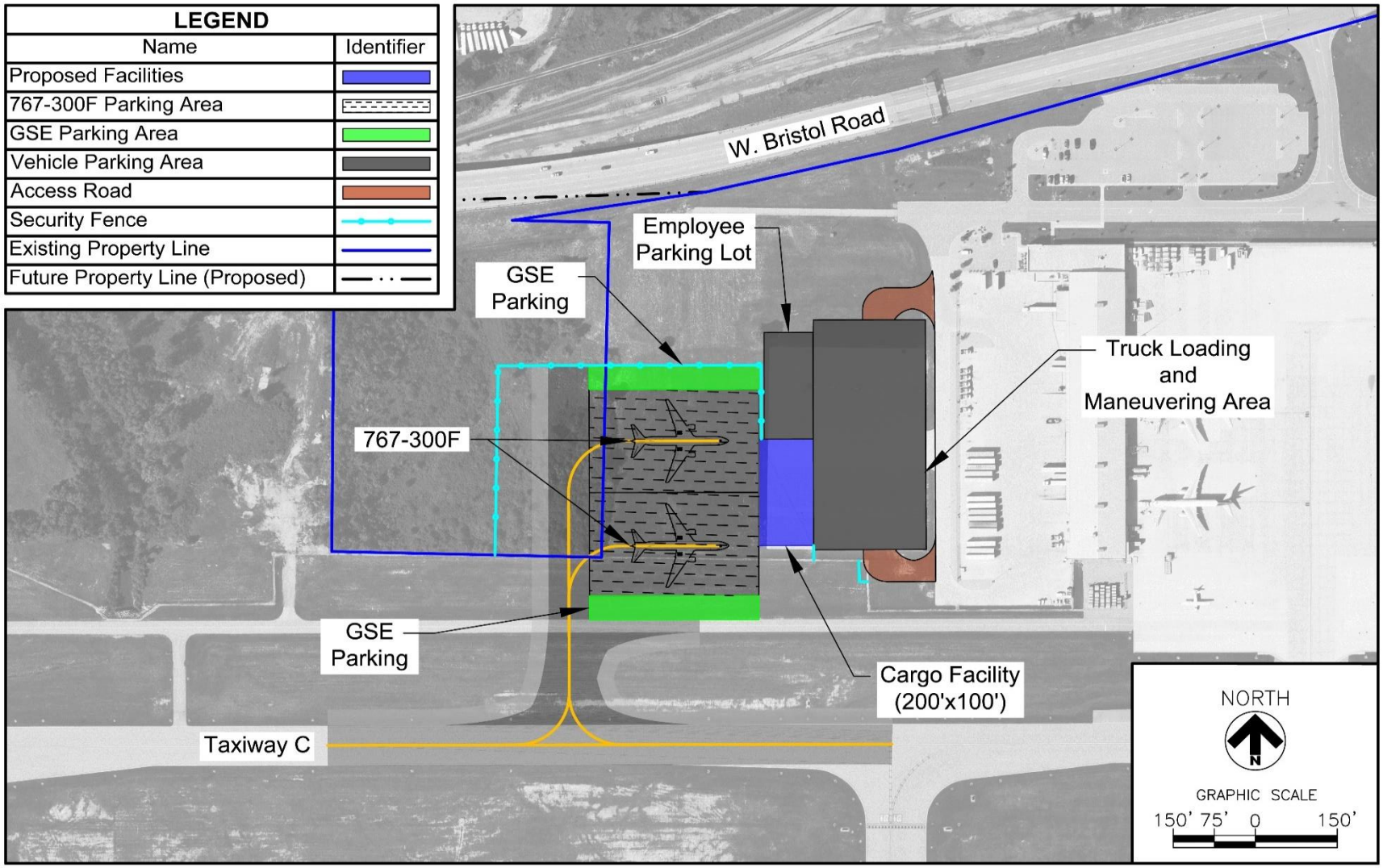
#### Northwest Cargo Development Option 1

The first option proposes a facility oriented north-to-south (see *Exhibit 4-13*), which would allow for maximized use of the property. This would require the acquisition of adjacent property and the development of two vehicle access roads. The layout follows the existing cargo building orientation. Only one taxilane would be needed to serve this apron in the future. A mirrored facility could fit on the west side of the proposed taxilane.

#### Northwest Cargo Development Option 2

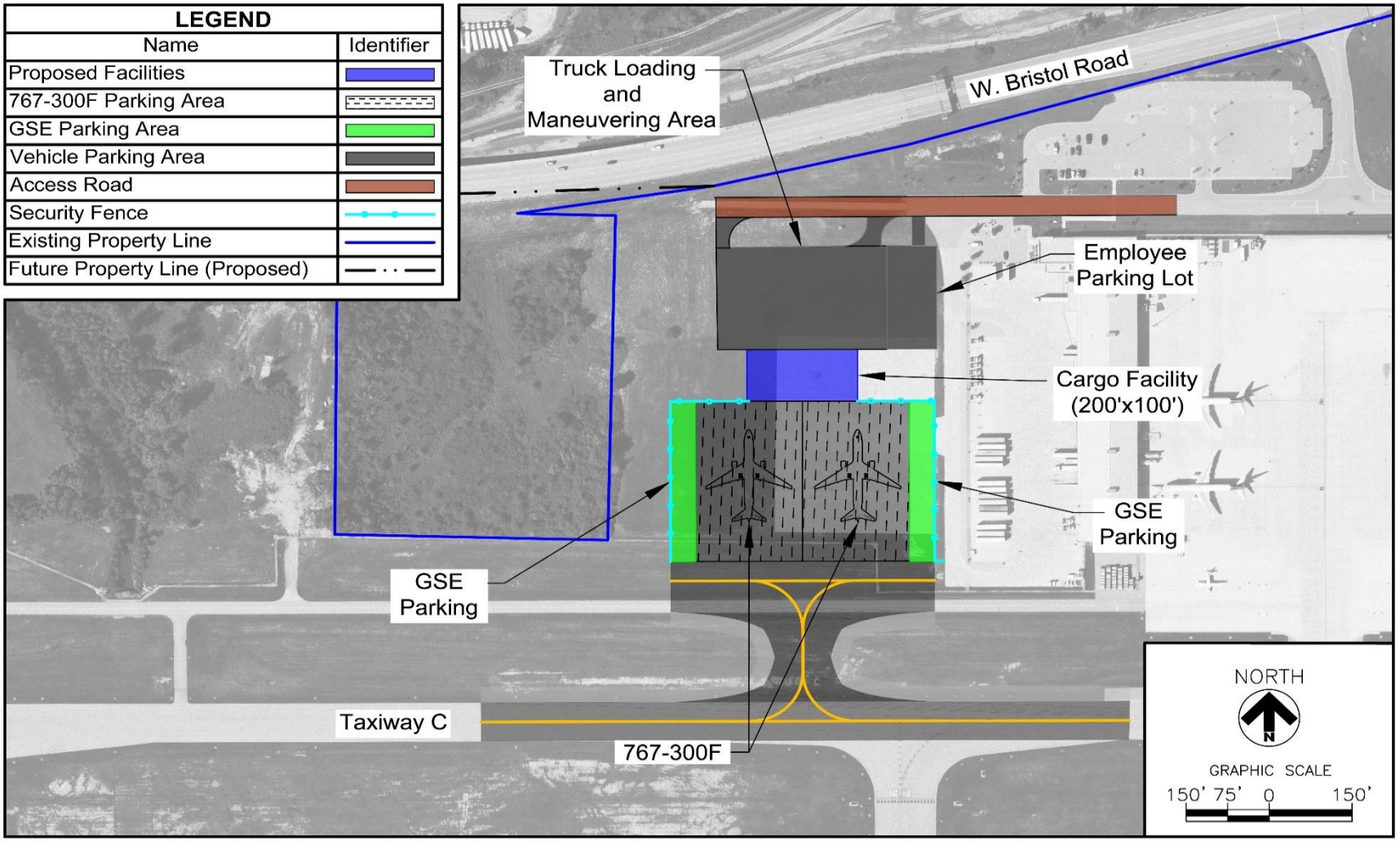
Option 2 proposes a facility oriented east-to-west (see *Exhibit 4-14*), which would allow the same size facility shown in Option 1 to be developed without the need to acquire the adjacent property. This orientation would only need the development of one vehicle access road. If future expansion with this facility is deemed necessary, acquisition of the adjacent property would be needed. This option may require two connectors from the apron to the taxiway for improved aircraft circulation for future development.

***EXHIBIT 4-13***
***NORTHWEST CARGO DEVELOPMENT – OPTION 1***




Source: RS&H 2017

***EXHIBIT 4-14***
***NORTHWEST CARGO DEVELOPMENT – OPTION 2***




Source: RS&H 2017

### Northwest MRO Development Option 1

This option considers a possible MRO facility being developed adjacent to the existing cargo facilities (see *Exhibit 4-15*). It proposes a 100,000 square-foot facility, along with a fire suppression system, large apron for storage of aircraft, office areas, ground support equipment storage, and employee parking and truck delivery areas. A jet blast fence should be considered since a portion of the apron will be adjacent to the truck loading area at the existing cargo facility. A facility of this size would allow for two B737s or A320s or up to six regional jet aircraft to be serviced within the structure at any one time, depending on its final configuration and functions served.

### Northwest MRO Development Option 2

This option considers a possible MRO facility that can be retained within the existing property of the airport (see *Exhibit 4-16*). It proposes a 65,000 square-foot facility* with accompanying facilities to meet its operational needs. A facility of this size would allow for one B737 or A320 or up to three regional jet aircraft to be serviced within the structure at any one time, depending on its final configuration and functions served.

### Southeast MRO Development Option 1

This MRO option depicts a facility located just north of the Future general aviation runway and east of Runway 18-36 (see *Exhibit 4-17*). The option sites a 100,000 square-foot facility. A facility of this size would require the acquisition of property to meet the needs for other elements of the facilities such as the fire suppression system, apron area for aircraft storage, office areas, ground support equipment storage area, and employee parking and truck delivery areas. Jet blast fencing may be considered depending on possible impacts to adjacent facilities and properties.

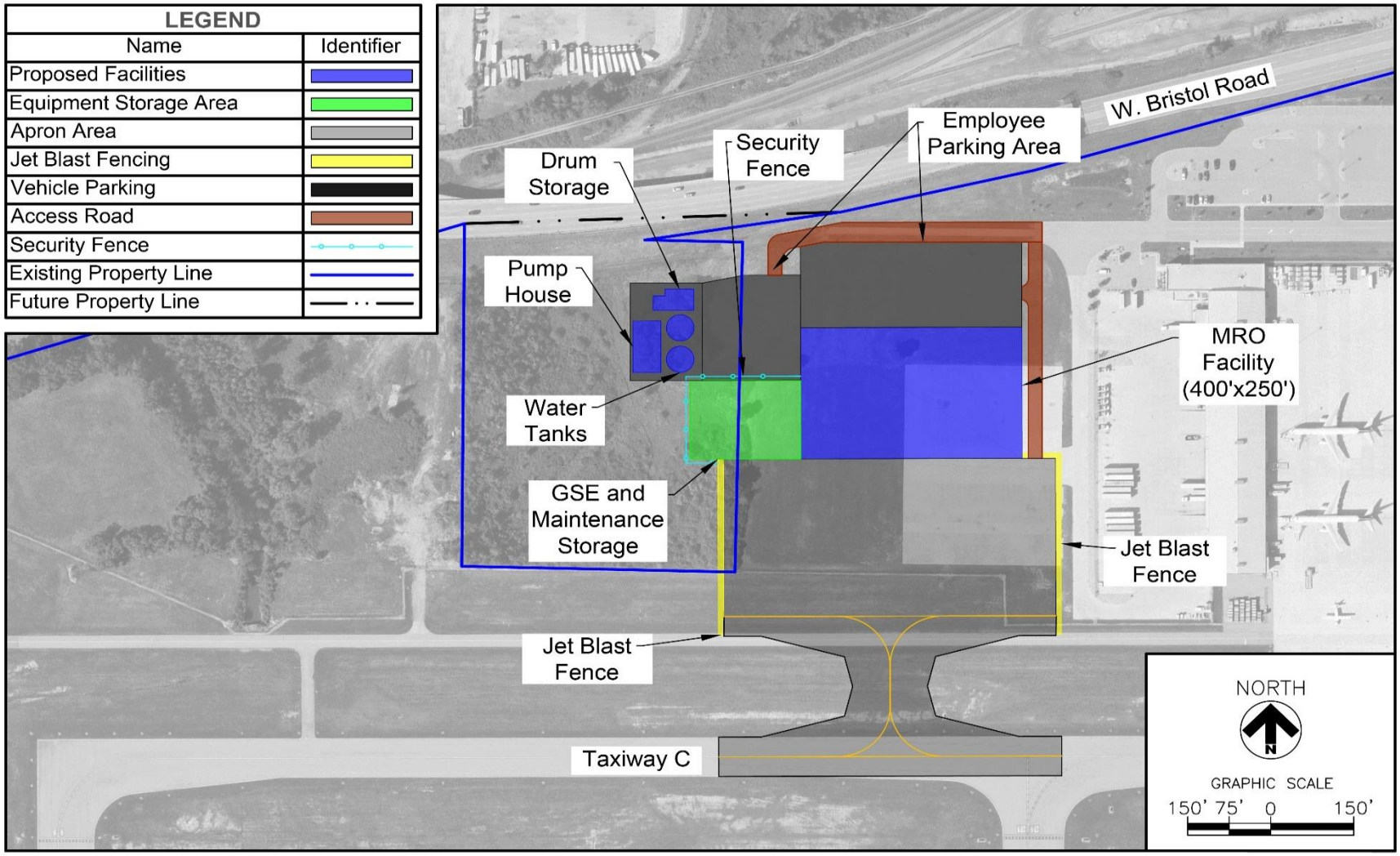
### Southeast MRO Development Option 2

Similar to the previous option explored in the Northwest Aeronautical Development Area, this option shows a 65,000 square-foot facility being retained within airport property while still meeting the functional needs for the facility (see *Exhibit 4-18*).

### Southwest MRO Development Concept

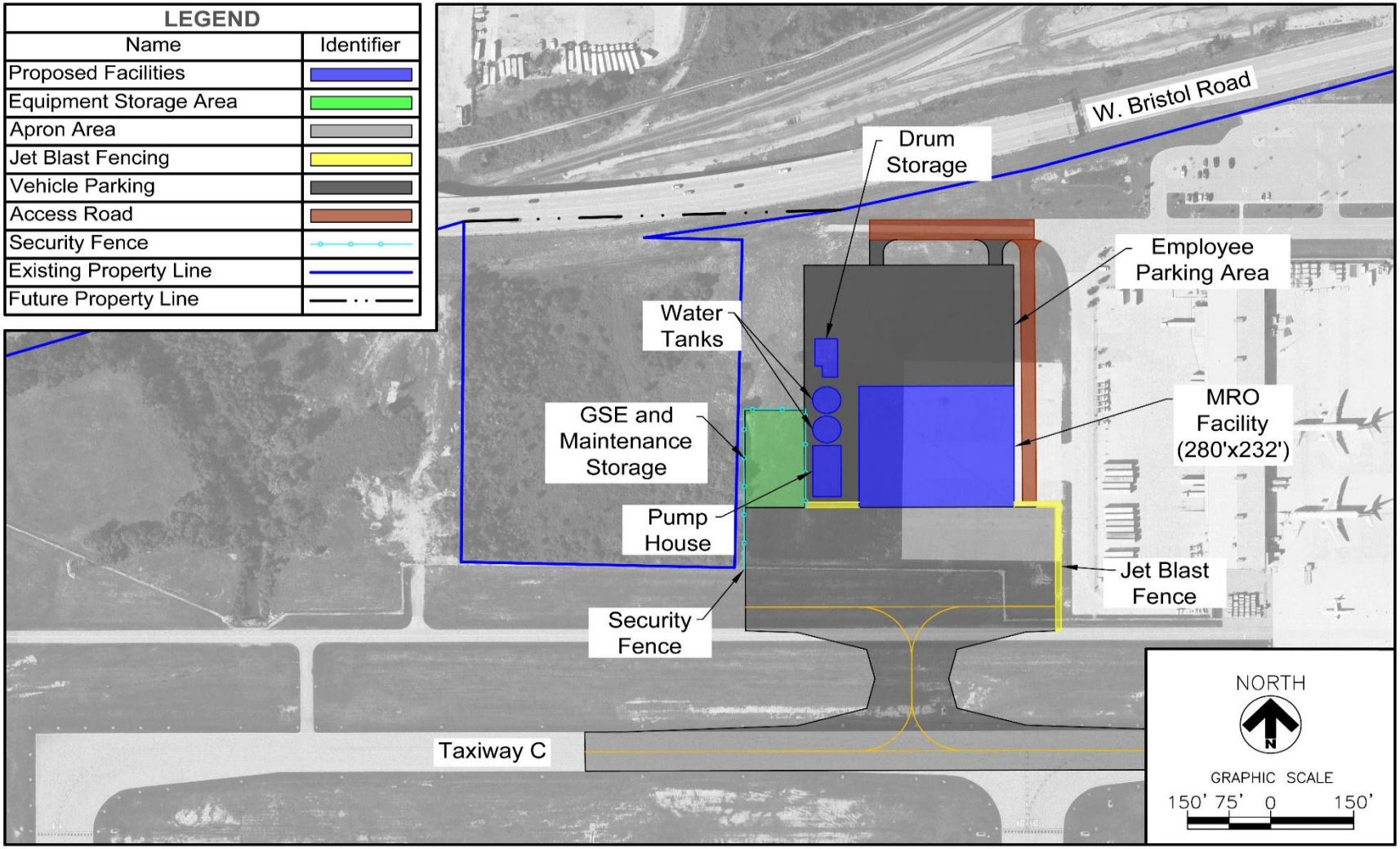
This MRO option depicts a facility located south of the Air Traffic Control Tower (ATCT) (see *Exhibit 4-19*). As earlier described, this area south of the tower would need to be developed under scrutiny with respect to the ATCT line-of-sight requirements. This development option shows a 100,000 square-foot facility entering this area with complimentary facilities, vehicle parking and aircraft apron space. For the structure to not impede on the ATCT line-of-sight requirements, it would be limited to a height of no more than 35 feet. This would restrict MRO activity at this site to service aircraft no larger than regional jets and business jets, such as CRJ 1000 and Gulfstream G550. For an MRO to service an aircraft with a tail height of 30 feet or higher, such as a Boeing 737 or Airbus A320, the other two sites previously mentioned must be considered.

***EXHIBIT 4-15***
***NORTHWEST MRO DEVELOPMENT – OPTION 1***



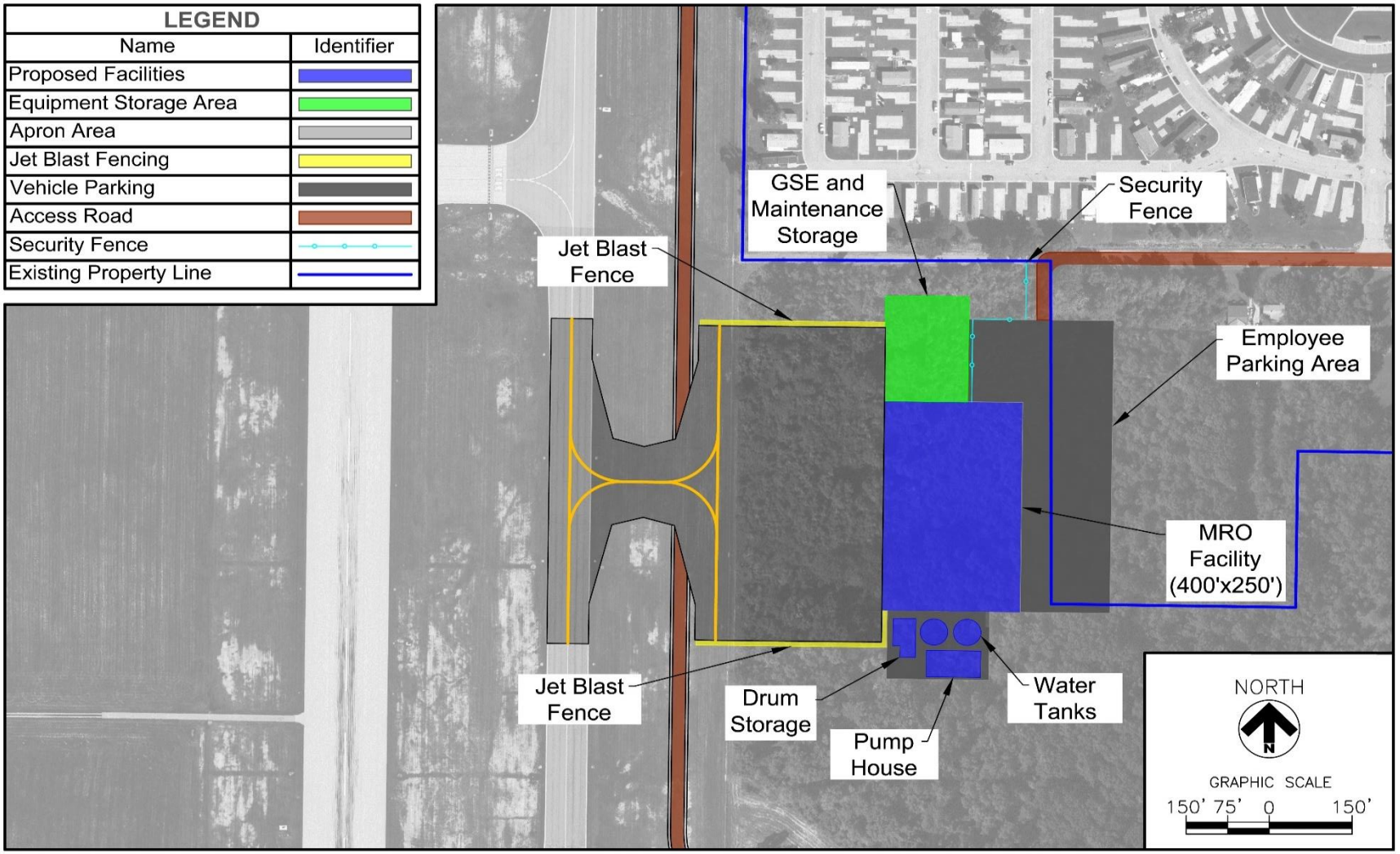

Source: RS&H 2017

***EXHIBIT 4-16***
***NORTHWEST MRO DEVELOPMENT – OPTION 2***



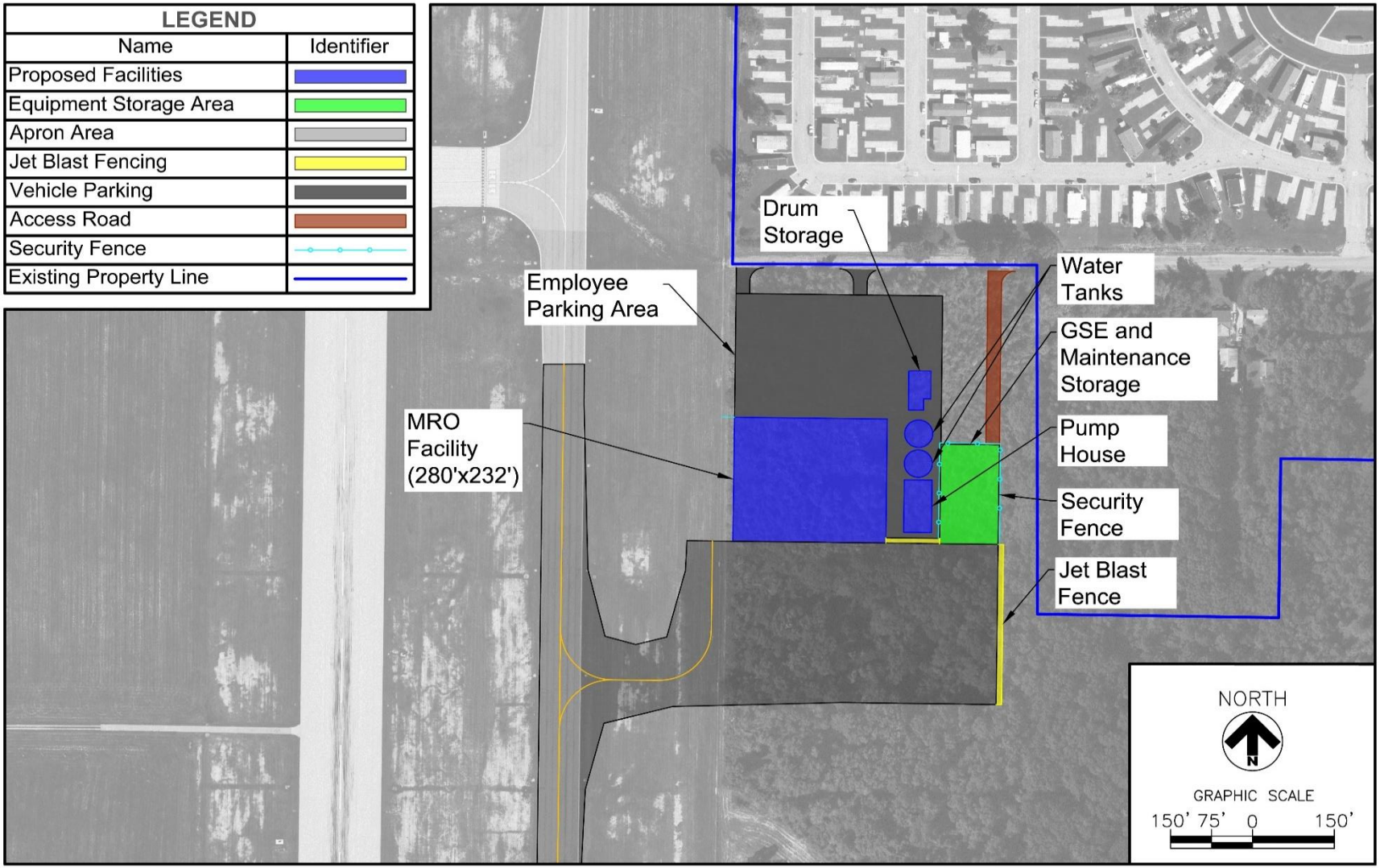

Source: RS&H 2017

***EXHIBIT 4-17***
***SOUTHEAST MRO DEVELOPMENT – OPTION 1***



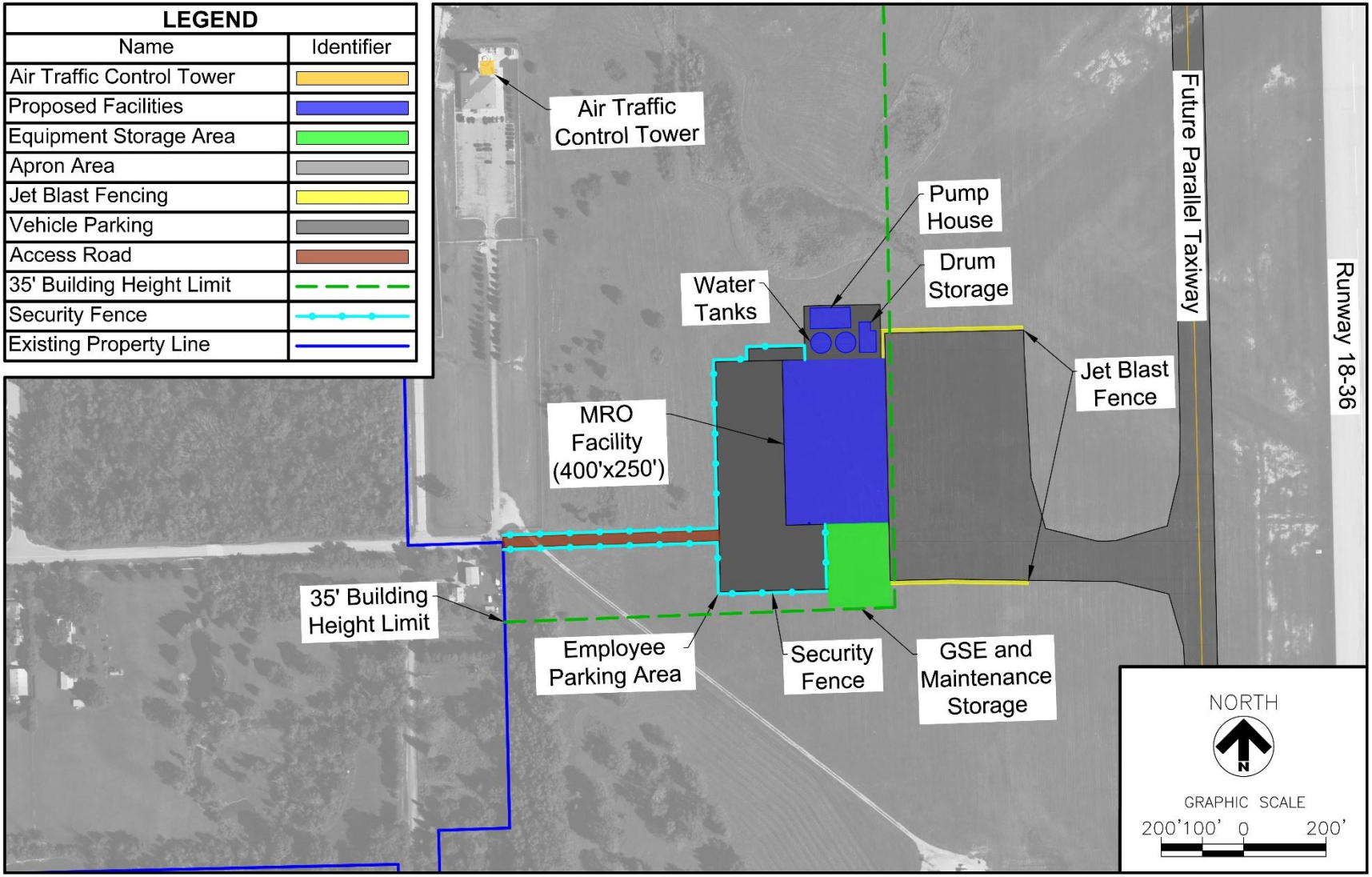

Source: RS&H 2017

***EXHIBIT 4-18***
***SOUTHEAST MRO DEVELOPMENT – OPTION 2***




Source: RS&H 2017

***EXHIBIT 4-19***
***SOUTHWEST MRO DEVELOPMENT CONCEPT***




Source: RS&H 2017

### 4.4.2 Corporate Aviation Development Options

Two options were developed to facilitate the growth and development of Corporate Aviation. In each option, the introduction of a dedicated Corporate FBO is anticipated, along with the construction of new box hangars capable of housing small and medium business jets. The allocation of space and final construction will change the number of aircraft that can be parked on the apron at any one time.

It is assumed that the Coporate FBO would continue providing fueling services for the commercial services operators as well as providing services to local and transient business aircraft. The services provided should anticipate up to ADG III size aircraft.

During the initial analysis, it was found that this development area has the potential to obstruct the line of sight from the ATCT to Taxiway B. It is important to account for this siting requirement when planning structures and aircraft parking. Both options were developed while using the ATCT line-of-sight to Taxiway B as a limitation for this property.

#### Option 1

The first option for the development of the corporate aviation area looks at making two separate areas, one dedicated to FBO operations and another dedicated to tenants with privately owned hangars (see *Exhibit 4-20*). This concept does not look to relocate the McClellan and Cardinal Aviation hangars but would consider relocating their taxilane to keep their activities separate. The ACRP Report 113 *Guidebook on General Aviation Facility Planning* was referenced to conceptualize a 3,000-square-foot FBO terminal building. Two additional hangars were sized with being capable of storing one G550 and two Citation 560s. One is anticipated to be used for storage of aircraft and the other for maintenance. The apron is constructed to allow circulation of ADG III aircraft with designated parking spaces for ADG I, II, and III size aircraft.

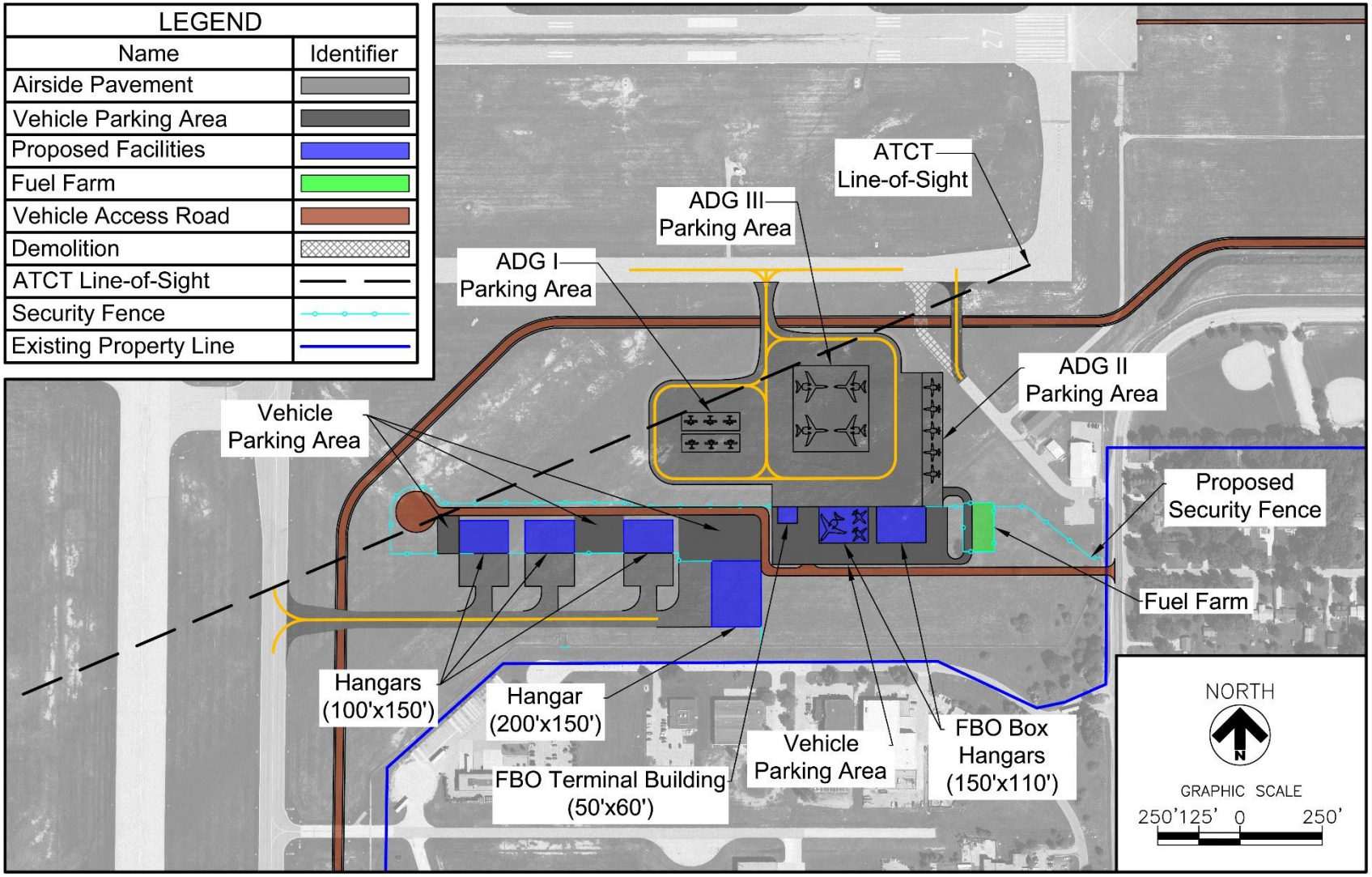
The separate private hangar area would allow for approximately four hangars, depending on the final size and orientation of the buildings. Fewer, larger hangars or more, smaller hangars could be constructed to meet the needs of future tenants.

#### Option 2

The second option proposes a consolidated apron where the corporate box hangars share ramp space with the FBO (see *Exhibit 4-21*). This option could be seen as more beneficial for private aircraft owners who may need to service and fuel their vehicle from time to time using services provided by the FBO. The FBO would also have the opportunity to construct additional hangar spaces. This option also considers the possibility of relocating the existing structures of McClellan and Cardinal Aviation located within this area to the east side of the proposed corporate apron.

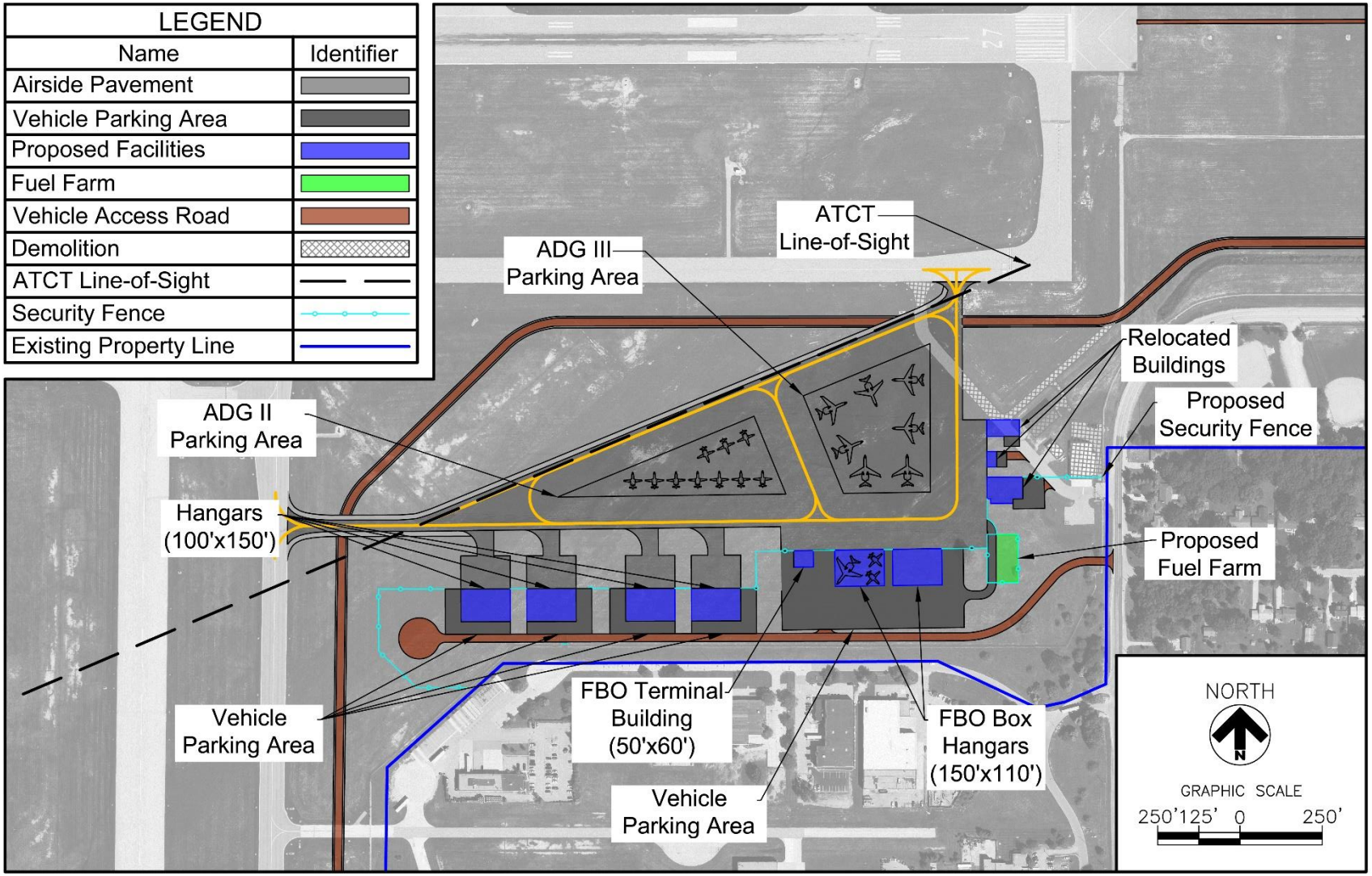
Private hangars would depend on the tenant's interest in size and orientation of their hangar. This option shows the potential for constructing four hangars.

***EXHIBIT 4-20***
***CORPORATE FBO – OPTION 1***




Source: RS&H 2017

***EXHIBIT 4-21***
***CORPORATE FBO – OPTION 2***



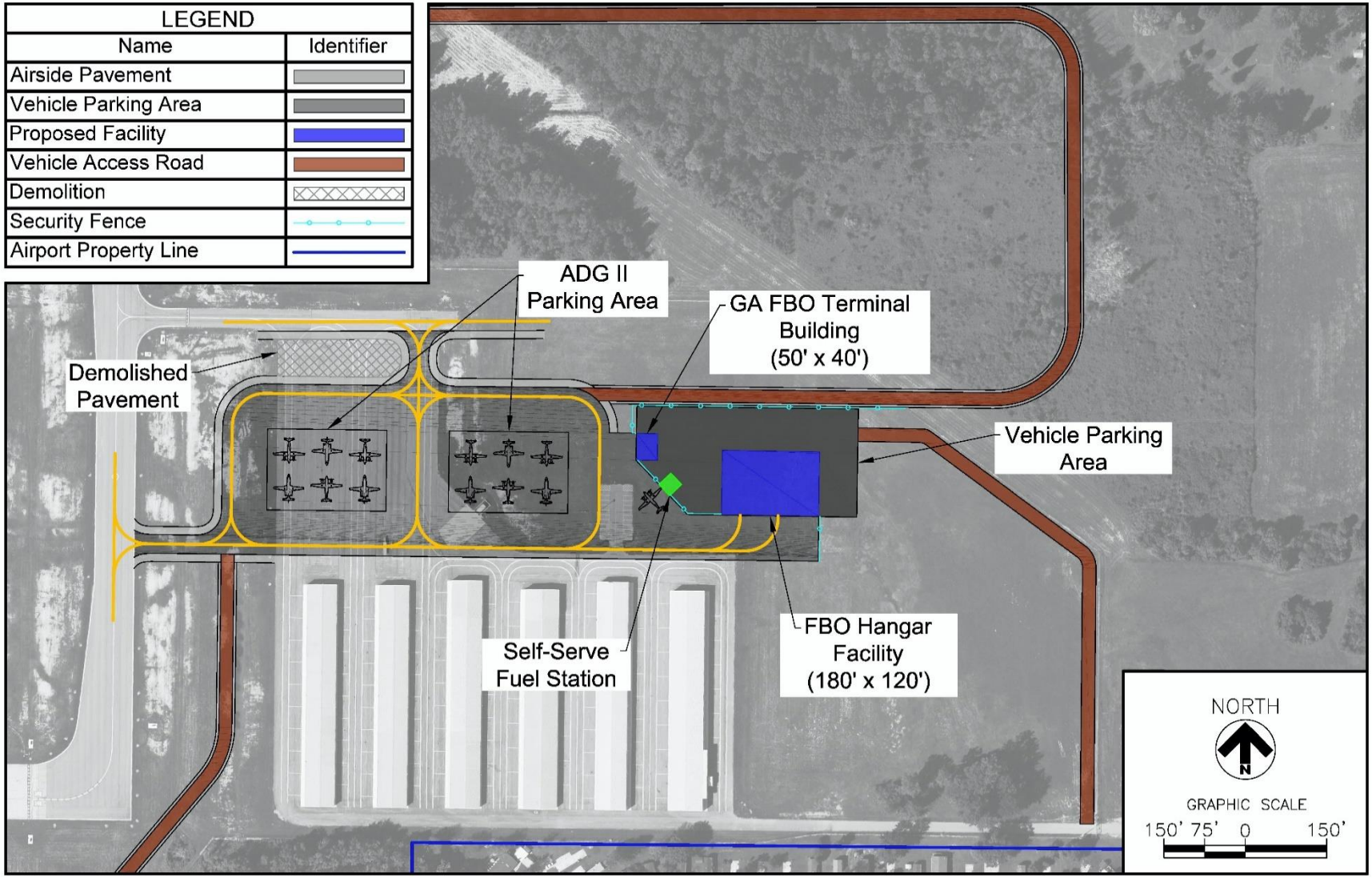

Source: RS&H 2017

### 4.4.3 General Aviation Development Option

When considering the development of a General Aviation Area, the two elements to consider are growth of hangars to accommodate demand and the expansion or entry of an FBO to provide services. Considering that there is a General Aviation runway currently planned for in close proximity to these hangars, it would be prudent to also plan on the possible entry of another, smaller FBO to be co-located within the General Aviation Development Area. This FBO would most likely provide services more specific to based aircraft operators and some services to transient aircraft up to ADG II.

The concept developed for the General Aviation area shows the entry of a new FBO along with an expanded apron to allow for the circulation and parking of ADG II aircraft (see *Exhibit 4-22*). It is anticipated that the future general aviation FBO would have a dedicated terminal building and a hangar facility for the storage and maintenance of aircraft. The existing self-serve fuel station would need to be relocated to allow for the expansion of apron. A vehicle service road is also shown to account for the construction of the future crosswind runway. This concept does not show potential growth of the T-hangars at this time, since they are at approximately 60 percent capacity with no wait list. If T-Hangar expansion were to continue, there is still development space east of the existing facilities.

***EXHIBIT 4-22***
***GENERAL AVIATION FBO OPTION***




Source: RS&H 2017

### 4.4.4 Conclusion of Development Options

This section of the chapter reviewed several potential options of aeronautical development at the airport. Though these options will not be reviewed further, they demonstrated that varying tenants can be accommodated at several locations and still have appropriate airfield access. The sites identified above should be reviewed further for utilities and have them available from roadways until a potential tenant determines the sites use and final layout. The airport should further coordinate with the City to ensure no conflicts arise from planned development near the airport.

## 4.5 NON-AERONAUTICAL LAND-USE AREAS

The FAA requires specific conditions and details for a federally funded airport to have non-aeronautical land uses specific to sites on airport property[41]. First, an airport sponsor must express that all aeronautical uses that currently exist, or are forecast to exist, can be accommodated. The FAA requires knowledge and concurrence of the non-aeronautical land uses and the sites at which they are planned for to be depicted on an airport's ALP and Exhibit A property map. The FAA must consent that these uses on airport's property are permissible. In addition, all non-aeronautical leases should have fair market value (FMV) rents obtained by the airport, and provisions within them to revert the site back to aeronautical uses if it is needed for those purposes.

This Master Plan Update has identified two sites on Airport property that has the potential for future non-aeronautical uses. The Airport staff will coordinate with the FAA to release the land for non-aeronautical development, if so desired in the future.

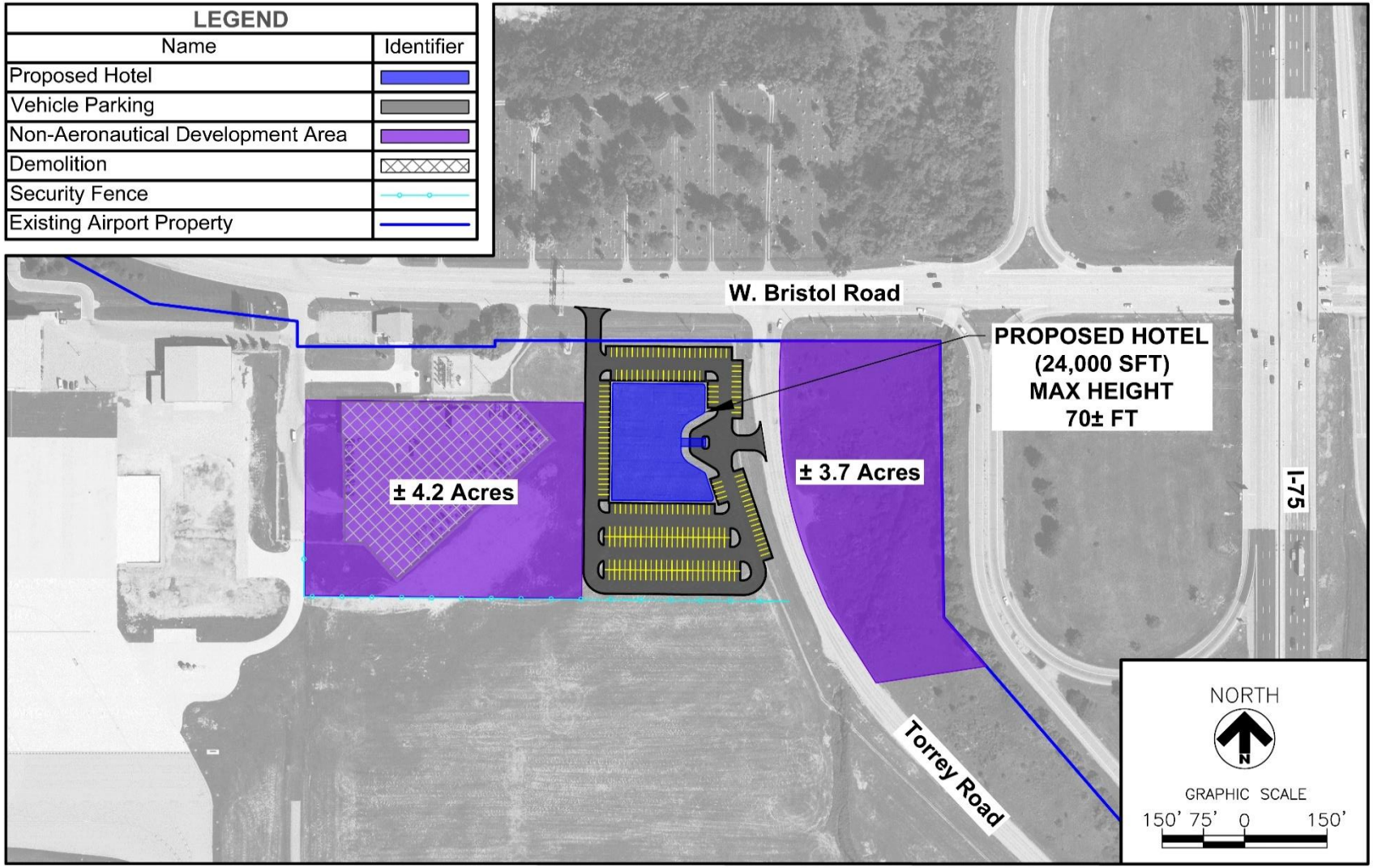
The first site was identified east of the terminal building, south of West Bristol Road, and west of Interstate 75. This site totals approximately 15.7 acres and is divided on the eastern portion by Torrey Road with a north-south orientation. A Northeast Engineering Study was conducted in 2011 that identified several development options within this property of the airport. One of the non-aeronautical development options that came from this study is a hotel standing approximately 70-feet tall, being limited by Part 77 surfaces (see *Exhibit 4-23*). This location would be ideal due to its accessibility, proximal location, and adjacency to the terminal. Airport users could access the hotel easily by foot if proper pedestrian bridges, walkways, or other safety features were added. Airport lodging on-site is growing in the industry. Lodging on-site could become very enticing to passengers, especially in cases where weather may be inclement causing cancelations, when passengers are forced to depart from the origin at an undesired time due to an early morning departure, or when airline crew are in need of short-term lodging for work schedules. Because these situations and others exist, an on-site hotel is likely to become a regularly used amenity, producing a steady flow of Airport revenue. Studies should also be conducted to compare existing hotel usage and rates both near the Airport and in the central business district of the city. If this site is used for the conceptualized hotel, it will leave 7.8 acres of property that can be developed into other non-aeronautical uses, such as gas stations, office buildings, or other businesses.

The second site, located on the east end of the Economy Parking Lot north of West Bristol Road, is approximately 8.5 acres (see *Exhibit 4-24*). This site can be repurposed for warehousing, an industrial complex, office complex, or to establish a Free Trade Zone (FTZ) in close proximity to the airport.

The Airport will need to work with the City of Flint, Flint Township, and the Flint & Genesee Chamber of Commerce for alignment with their long term planning efforts and strategies.

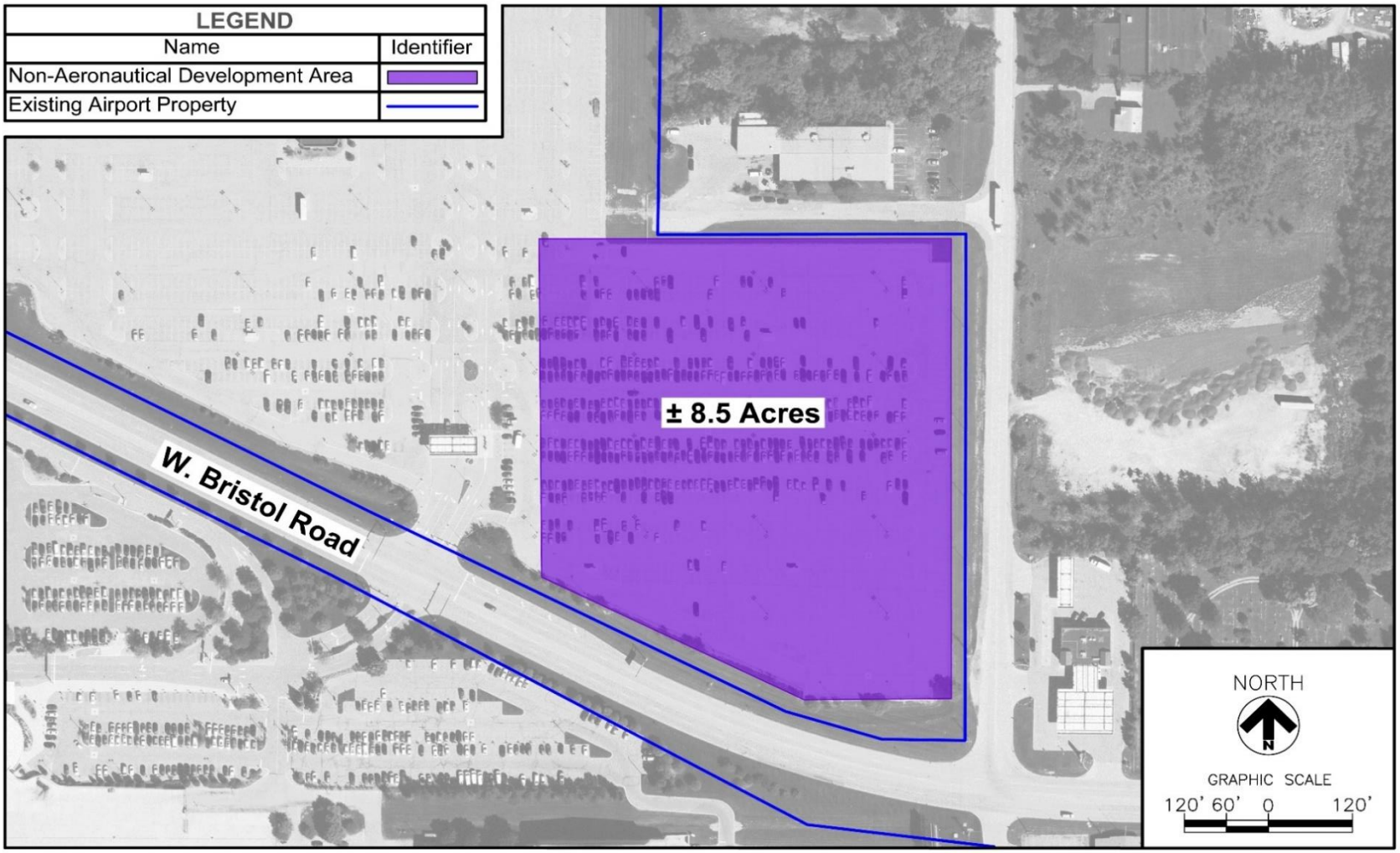
[41] Taken from FAA's Airport Land Use Obligations and Best Practices. Retrieved online at: http://www.aci-na.org/sites/default/files/p5_garrison.pdf

***EXHIBIT 4-23***
***NORTHEAST NON-AERONAUTICAL DEVELOPMENT SITE***




Source: RS&H 2017

***EXHIBIT 4-24***
***ECONOMY PARKING LOT NON-AERONAUTICAL DEVELOPMENT SITE***




Source: RS&H 2017

CHAPTER 5

# ENVIRONMENTAL OVERVIEW

## 5.1 INTRODUCTION

This chapter analyzes the potential environmental impacts of the Airport's preferred development plan, along with environmental impact categories identified in Federal Aviation Administration (FAA) Orders 1050.1F, *Environmental Impacts: Policies and Procedures*, and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*.

*Table 5-1* lists the projects outlined in the Airport's preferred development plan (listed by individual project) and environmental resource categories, and indicates if there is the potential for a project to affect an environmental category. The following subsections describe the potential environmental effects of the Airport's preferred plan as a whole, along with suggested NEPA documentation for each project, and a cost estimate of the recommended NEPA documentation. As *Table 5-1* shows, none of the development projects has the potential to affect Climate; Coastal Resources; Department of Transportation, Section 4(f) resources; Farmlands; and Historical, Architectural, Archeological, and Cultural resources. Therefore, those environmental resource categories are not discussed further. Additionally, the in-line baggage system project would have no potential effects to any of the environmental resource categories. Therefore, this project is not discussed further.

It is important to note that the environmental analysis included in this section is not in and of itself a NEPA document (e.g., Categorical Exclusion, Environmental Assessment, or Environmental Impact Statement).

## 5.2 AIR QUALITY

Genesee County is an attainment area for all criteria air pollutants having a National Ambient Air Quality Standard (NAQQS).[42]

Construction associated with the preferred development plan would temporarily increase construction emissions in the area. Emissions would occur from particulate dust emissions (resulting from disturbing land, demolition of existing buildings, motor vehicles accessing the site and traversing disturbed grounds) and direct emissions (resulting from construction and demolition equipment).

The amount of construction emissions would vary by project, and could be spread out by phasing projects over time.

## 5.3 BIOLOGICAL RESOURCES

Biological resources include terrestrial and aquatic plant and animal species; game and non-game species; special status species; and environmentally sensitive or critical habitats.

The following development projects have the potential to affect biological resources at the Airport:

- Perimeter Road
- Runway 18-36 Extension, including new pavement construction, runway lights, navigational aids (NAVAIDs), and Taxiway A connector
- Corporate Aviation Access Road
- Wetland Mitigation

[42] USEPA. (2018, January 1). Michigan Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Retrieved February 2018, from USEPA Air Quality: https://www3.epa.gov/airquality/greenbook/anayo_mi.html.

***TABLE 5-1***
***POTENTIAL ENVIRONMENTAL IMPACTS OVERVIEW***

| Development Project | Environmental Category* | | | | | | | | Potential NEPA Documentation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Air Quality (Construction Emissions only) | Biological Resources | Hazardous Materials, Solid Waste, and Pollution Prevention | Land Use | Noise and Noise-Compatible Land Use | Socioeconomics, Environmental Justice, and Children's Health and Safety Risks | Visual Effects | Water Resources | CATEX | EA | EIS |
| Pedestrian Bridge and Sidewalk | Y | N | Y | N | N | Y | Y | N | Y | N | N |
| Rental Car Service Center and Parking Lot Expansion | Y | N | Y | N | N | Y | Y | Y | Y | N | N |
| Terminal Maintenance Facility | Y | N | Y | N | N | Y | Y | N | Y | N | N |
| In-Line Baggage System | N | N | N | N | N | Y | N | N | Y | N | N |
| Taxiway C West Rehab and Shoulders | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| Runway 9-27 Rehab and Shoulders | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| New Avigation Easements and Obstruction Removal | Y | Y | Y | Y | N | Y | Y | Y | Y | N | N |
| Taxiway A Geometric Improvements | Y | N | Y | N | N | Y | N | N | Y | N | N |
| Perimeter Road | Y | Y | Y | N | N | Y | N | Y | N | Y | N |
| Taxiway B Rehab and Shoulders | Y | N | Y | N | N | Y | N | N | Y | N | N |
| Taxiway A Rehab and Shoulders | Y | N | Y | N | N | Y | N | N | Y | N | N |
| Runway 18-36 Rehab and Shoulders | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| Runway 18-36 Extension | Y | N | Y | N | Y | Y | Y | Y | N | Y | N |
| New Pavement Construction | Y | N | Y | N | N | Y | N | Y | N | Y | N |
| Runway Lights | N | N | N | N | N | Y | Y | N | N | Y | N |
| NAVAIDS | Y | N | N | N | N | N | N | N | N | Y | N |
| Taxiway A Connector | Y | N | Y | N | N | Y | N | Y | N | Y | N |
| Runway 9 ALSF-2/CAT II/III | N | N | N | N | N | Y | Y | N | Y | N | N |
| Security Fence Improvements | Y | N | N | N | N | N | N | Y | Y | N | N |
| Storm Sewer Rehab | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| Corporate Aviation Taxilane | Y | N | Y | N | N | Y | N | Y | N | Y | N |
| Corporate Aviation Access Road | Y | Y | Y | N | N | Y | Y | Y | N | | N |
| Corporate Hangar Replacement | Y | N | Y | N | N | Y | N | Y | N | | N |
| New Conventional Hangar | Y | N | Y | N | N | Y | Y | Y | N | | N |
| New Apron | Y | N | Y | N | N | Y | N | Y | N | | N |
| New Vehicle Parking Lot | Y | N | Y | N | N | Y | N | Y | N | | N |
| Jet A Fuel Expansion | Y | N | Y | N | N | Y | N | N | Y | N | N |
| New ARFF and Ops Station | Y | N | Y | N | N | Y | Y | Y | Y | N | N |
| Renovation of Maintenance Facility | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| Emergency Response Ramps | Y | N | Y | N | N | Y | N | Y | Y | N | N |
| Wildlife Hazard Mitigation | Y | Y | Y | N | N | Y | N | Y | Y | N | N |

*Climate; Coastal Resources; Department of Transportation Act, Section 4(f); Farmlands; and Historical, Architectural, Archeological, and Cultural Resources categories are not included because there are no potential environmental impacts
Source: RS&H, Inc. 2017

The construction of the preferred development plan would include land disturbing activities at the Airport. The projects listed above would require the removal of vegetation during the construction process, which has the potential to impact habitat utilized by threatened or endangered species. The extension of Runway 18-36 would require the installation of NAVAIDs, which would require underground cabling to connect to a power source. This would have a potential direct effect on plant communities and on species that utilize this habitat. Although there is the potential for federal and state listed species to occur in the area of the Airport, the existing characteristics of these areas (paved, mowed and maintained grass) do not provide suitable habitat.

## 5.4 HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

The construction of the preferred development plan would increase the use of hazardous materials commonly used in construction and generation of construction waste. This waste would be managed and disposed of in accordance with applicable regulations. With regard to solid waste, the preferred development plan would require the clearing and grubbing of land.

Additionally, expansion of the Jet A fuel storage would increase the amount of hazardous waste stored at the Airport. The existing Storm Water Pollution Protection Plan (SWPPP) and Spill Prevention, Control and Countermeasure (SPCC) Plan would need to be updated accordingly.

## 5.5 NOISE AND NOISE-COMPATIBLE LAND USE

The construction of the preferred development plan has the potential to increase aviation noise with the southerly extension of Runway 18-36. A new runway threshold to the south would allow aircraft arriving on Runway 36 to land earlier. The new approach of aircraft to Runway 36 has the potential to change noise effects to residential and commercial properties located directly south and southeast of the Runway 36 end. This change is not expected to be significant, nor result in incompatible land uses.

## 5.6 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S HEALTH AND SAFETY

The construction of the preferred development plan would not require the relocation of businesses and/or residences, alteration of surface transportation patterns, the division or disruption of established communities, or the disruption of orderly planned development. Construction of any of the projects may cause the short-term employment of local construction contractors and could be considered a positive effect.

## 5.7 VISUAL EFFECTS

The construction of the preferred development plan would result in new structures and roadways being built on Airport property. This would result in a change in the visual properties of the Airport. However, this change is compatible with the existing Airport environment and is not likely to be considered significant to off-Airport residents.

## 5.8 WATER RESOURCES

Water resources are considered wetlands, floodplains, surface waters, and groundwater. The construction of the preferred development plan has the potential to impact water resources, specifically wetlands, and potential stormwater runoff to surface waters on Airport property.

### 5.8.1 Wetlands

Currently, there are two areas of land on Airport property, about 10 acres total, that are a wildlife attractant and exhibit wetland characteristics. The preferred development plan requires filling of this land to reduce a wildlife attractant at the Airport. The Airport would need to consult with the U.S. Army Corps of Engineers (USACE) to confirm the existence of wetlands through a delineation process. Once wetlands have been confirmed on Airport property, the Airport would need to consult with the USACE to take the appropriate steps to mitigate for those filled wetlands.

### 5.8.2 Stormwater Runoff and Surface Waters Impacts

The preferred development plan would increase the amount of impervious surface at the Airport, which would increase stormwater runoff. Stormwater runoff could affect surface waters at the Airport, particularly Swartz Creek, which is listed as an impaired stream for polychlorinated biphenyl.[43]

## 5.9 NEPA DOCUMENTATION

The following subsections describe the types of NEPA documentation that are required for Federal actions undertaken at an airport, along with a cost estimate of each documentation type. There are three levels of NEPA review: Categorical Exclusion (CATEX), Environmental Assessment (EA), and an Environmental Impact Statement (EIS).

### 5.9.1 Categorical Exclusion (CATEX)

A CATEX refers to a category of actions that do not individually or cumulatively have a significant effect on the human environment, and for which, neither an EA or an EIS is required. FAA Order 1050.1F describes actions that normally do not individually or cumulatively have a significant effect on the human environment. These actions are described under one of the following categories:

- Administrative/General: Actions that are administrative or general in nature
- Certification: Actions concerning issuance of certificates or compliance with certification programs
- Equipment and Instrumentation: Actions involving installation, repair, or upgrade of equipment or instruments necessary for operations and safety
- Facility Siting, Construction, and Maintenance: Actions involving acquisition, repair, replacement, maintenance, or upgrading of grounds, infrastructure, buildings, structures, or facilities that generally are minor in nature
- Procedural: Actions involving establishment, modification, or application of airspace and air traffic procedures

[43] USEPA. (2017, December 14). *Waterbody Quality Assessment Report*. Retrieved December 2017, from USEPA: https://ofmpub.epa.gov/waters10/attains_waterbody.control?p_list_id=MI040802040305-01&p_report_type=T&p_cycle=2008.

- Regulatory: Actions involving establishment of, compliance with, or exemptions to, regulatory programs or requirements[44]

FAA ARP Standard Operating Procedure (SOP) 5.1, effective June 2, 2017, describes two levels of information and documentation required for projects eligible for a CATEX: [45]

- Simple Written Record CATEX
- Documented CATEX

For a simple written record CATEX, the project must meet the definition of a CATEX as described in FAA Order 1050.1F, paragraphs 5-6.1 through 5-6.6 and the project must not involve extraordinary circumstances, as described in FAA Order 1050.1F, paragraph 5-2. For a documented CATEX, the project must have actions where there is greater potential for extraordinary circumstances or other reasons that warrant additional CATEX documentation in accordance with FAA Order 5050.4B, paragraph 607b as well as Order 1050.1F, paragraph 5-3b, a Documented CATEX.

Most of the projects encompassed in the preferred development plan will likely fall under a CATEX, and can be excluded as facility siting, construction, and maintenance actions.

### Potential CATEX Projects under the Preferred Development Plan

Listed below are the projects under the preferred development plan that are eligible for categorical exclusion under FAA Order 1050.1F:

- Pedestrian Bridge and Sidewalk
- Rental Car Service Center and Parking Lot Expansion
- Terminal Maintenance Facility
- In-Line Baggage
- Taxiway C West Rehab and Shoulders
- Perimeter Road
- Taxiway B Rehab and Shoulders
- Taxiway A Rehab and Shoulders
- Runway 18-36 Rehab and Shoulders
- Runway 9 ALSF-2/CAT II/III
- Security Fence Improvements
- Storm Sewer Rehab
- New Avigation Easements and Obstruction Removal
- Corporate Aviation Taxilane
- Corporate Aviation Access Road
- Corporate Hangar Replacement
    - New Conventional Hangar

[44] FAA. (2015, July 16). Order 1050.1F, *Environmental Impacts: Policies and Procedures.* Retrieved December 2017, from FAA: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/.

[45] FAA. (2017, June 2). ARP SOP 5.1, *CATEX Determinations*. Retrieved December 2017, from FAA: https://www.faa.gov/airports/resources/sops/media/arp-SOP-510-catex.pdf.

- New Apron
- New Vehicle Parking Lot

- Jet A Fuel Expansion
- New ARFF and Ops Station
- Renovation of Maintenance Facility
- Emergency response ramps
- Wildlife Hazard Mitigation

**Cost Estimates of a CATEX**

The cost of a CATEX varies depending on many factors, including but not limited to: the type of CATEX document being completed, whether the project involves any special purpose laws (i.e. wetlands or floodplains), and how many/what environmental categories have the potential to be effected. The range of costs that could be associated with a CATEX are as follows:

- Simple Written Record CATEX: $5,000-$10,000
- Documented CATEX: $8,000-$15,000

It is important to note that these cost range estimates vary on a case-by-case basis and are highly dependent on the environmental categories potentially effected by a project.

### 5.9.2 Environmental Assessment (EA)

An EA is conducted to determine whether a proposed action has the potential to significantly affect the human environment. An EA must be prepared when the proposed action does not normally require an environmental impact statement (EIS) and:

- Does not fall within the scope of a CATEX (see FAA Order 1050.1F Paragraph 5-6, The Federal Aviation Administration's Categorical Exclusions); or
- Falls within the scope of a CATEX, but there are one or more extraordinary circumstances (see FAA Order 1050.1F Paragraph 5-2, Extraordinary Circumstances).

An EA or EIS may be required if an action involves extraordinary circumstances. An extraordinary circumstance occurs when an action that is normally categorically excluded has the potential to have a significant environmental impact that requires further analysis. The FAA lists proposed actions where an ordinary circumstance exists, which includes, but is not limited to: an adverse effect on cultural resources protected under the National Historic Preservation Act of 1966, as amended, 45 U.S.C. §300101 et seq; an impact on properties protected under Section 4(f); and an impact on natural, ecological, or scenic resources of Federal, state, tribal, or local significance (e.g., federally listed or proposed endangered, threatened, or candidate species, or designated or proposed critical habitat under the Endangered Species Act, 16 U.S.C. §§ 1531-1544). [46]

There are varying levels of EA documentation, depending on the level of potential environmental effects of a proposed action. These documents are:

- Focused/Short Form EA
- Full EA

[46] FAA. (2015, July 16). Order 1050.1F, *Environmental Impacts: Policies and Procedures.* Retrieved December 2017, from FAA: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/.

A Focused/Short Form EA is normally a form disseminated by the local FAA Airports District Office (ADO) to address a proposed action that may not be CATEX action, but is also not likely to involve extraordinary circumstances. A Full EA is the proper NEPA documentation for a proposed action that has the potential to have extraordinary circumstances that can be mitigated. The local FAA ADO will determine which type of EA is the proper NEPA documentation.

#### Potential EA Projects under the Preferred Development Plan

The Runway 18-36 extension project would require the preparation of an EA as part of the NEPA process. Runway extensions are listed as an example of actions requiring an EA in FAA Order 1050.1F. The FAA ADO will determine which type of EA (focused/short or full) is the proper NEPA documentation when this project is ripe for a decision.

#### Cost Estimates of an EA

The cost of an EA varies depending on many factors, including but not limited to: the type of EA document being completed, whether the project involves any special purpose laws (i.e. wetlands or floodplains), and how many projects are being completed under one document. The range of costs that could be associated with an EA are as follows:

- Short Form EA: $50,000-$150,000
- Full EA: $150,000-$500,000+

It is important to note that these cost range estimates vary on a case-by-case basis and are highly dependent on the environmental categories potentially effected by a project.

### 5.9.3 Environmental Impact Statement (EIS)

Under NEPA, the FAA must prepare an EIS for actions significantly affecting the quality of the human environment. An EIS is a detailed written statement required under Section 102(2)C of NEPA when one or more environmental impacts would be significant and mitigation measures cannot reduce the impact(s) below significant levels.[47]

None of the projects under the preferred development plan are likely to require an EIS as part of the NEPA process.

[47] FAA. (2015, July 16). Order 1050.1F, *Environmental Impacts: Policies and Procedures.* Retrieved December 2017, from FAA: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/.

CHAPTER 6

# IMPLEMENTATION PLAN AND FINANCING PROGRAM

## 6.1 INTRODUCTION

This section provides a detailed description of the airports' proposed 20-Year development plan including budgetary costs of all projects, and advances a financial program for the funding of these projects through a thorough analysis of various funding sources including FAA AIP grants, passenger facility charges (PFC), customer facility charges (CFC), State grants, funds from the Bishop International Airport Authority (the Authority), private and other funding sources.

## 6.2 AIRPORT DEVELOPMENT PLAN

*Chapter 3, Facility Requirements* addresses the ability of the existing facility to accommodate the forecast demand. At a minimum, runways and taxiways must be constructed or modified to have the proper length and geometries to meet FAA recommended standards to safely accommodate the design aircraft. The size, location, and rate of development for these facilities (runways, taxiways, aprons, aircraft storage, and other) are dependent upon the airport operators' demand-driven needs.

In *Chapter 4, Identification and Evaluation of Alternatives*, concepts for future development were presented to address deficiencies found in *Chapter 3*. These concepts include recommendations for the landside, airside, and airport support facilities. Input from the Technical Advisory Committee was received, with preferred concepts programmed into the Implementation Plan for future development. Alternative site development options were also explored; however, these concepts were created to present options for future use of airport property and will not be a part of the Implementation Plan at this time.

The projects in the CIP are included in one of five main project types. These include:

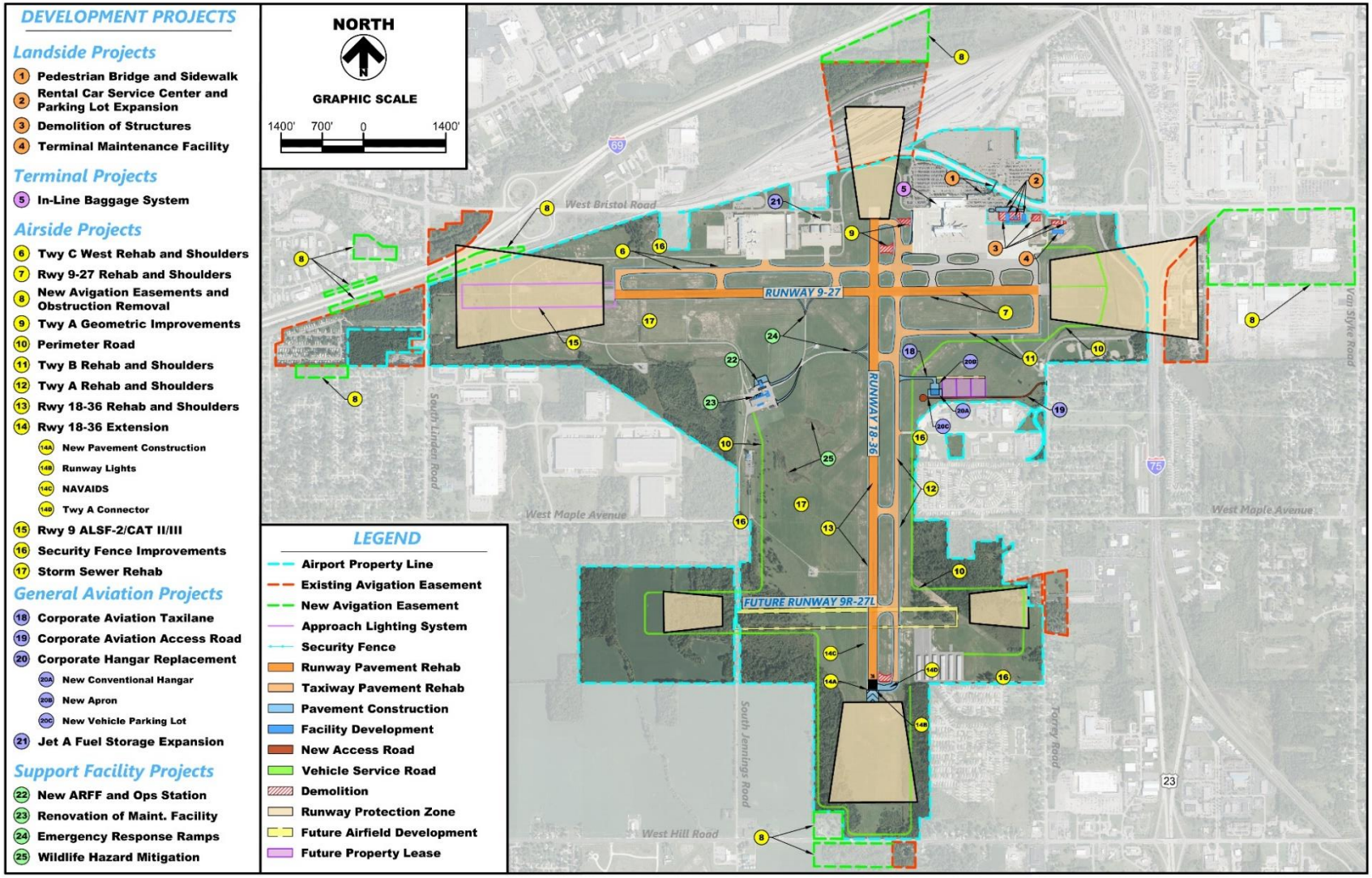
- **On-going Pavement Rehabilitation**: These projects include the rehabilitation of the airfield pavements and also include appropriate reconfiguration of the taxiway system to address runway incursion intersections, the redesign of intersecting taxiways to appropriate fillets, and the addition of taxiway shoulders.
- **Upgrade and Expansion of the Rental Car Facility**: This includes the construction and upgrade of the Airport's rental car service facilities while providing for the opportunity to accommodate multiple corporate aviation tenants. This program includes several enabling projects including the relocation of the corporate hangar from the Passenger Terminal Apron Area to a new Corporate Aviation Development Area, the demolition of the three existing hangars east of the terminal building, the consolidation and expansion of the rental car facilities adjacent to the terminal building, and the demolition of the existing rental car service buildings.
- **Upgrade and Expansion of the Airport Support Facilities**: These projects focus on expanding the operational capabilities of the Airport. It includes the construction of a new ARFF and Operations Station, the expansion and renovation of the existing maintenance facility, and the construction of a new maintenance facility near the terminal for terminal maintenance functions.
- **Safety Improvements**: This includes various safety improvements including a new pedestrian walkway over W. Bristol Road and completion of the airfield perimeter road.
- **Capacity Improvements**: To meet long-term demand, this project type includes development of an in-line baggage screening system and an extension to Runway 36.

To depict the development of these five components, *Exhibit 6-1* shows a comprehensive overview of the programmed development at Bishop International Airport. *Exhibit 6-2* and *Exhibit 6-3* show the development of the passenger terminal area and the baggage belt system, respectively.

Planning-level cost estimates are provided for each project. Planning-level is defined for this purpose as an order of magnitude cost estimate that considers gross areas multiplied by a realistic unit cost factor. In addition, a contingency factor is applied. This contingency factor is added to account for the projected increase in project costs over time, inflation, and for the variables in the design of facilities that come with detail design. Including a design fee to engineer and manage construction, these contingency amounts are typically 20 percent, depending on the project magnitude and mobilization requirements. The intent is to budget to develop an effective planning tool that identifies sufficient funding for each project of the program and to be realistically viable.

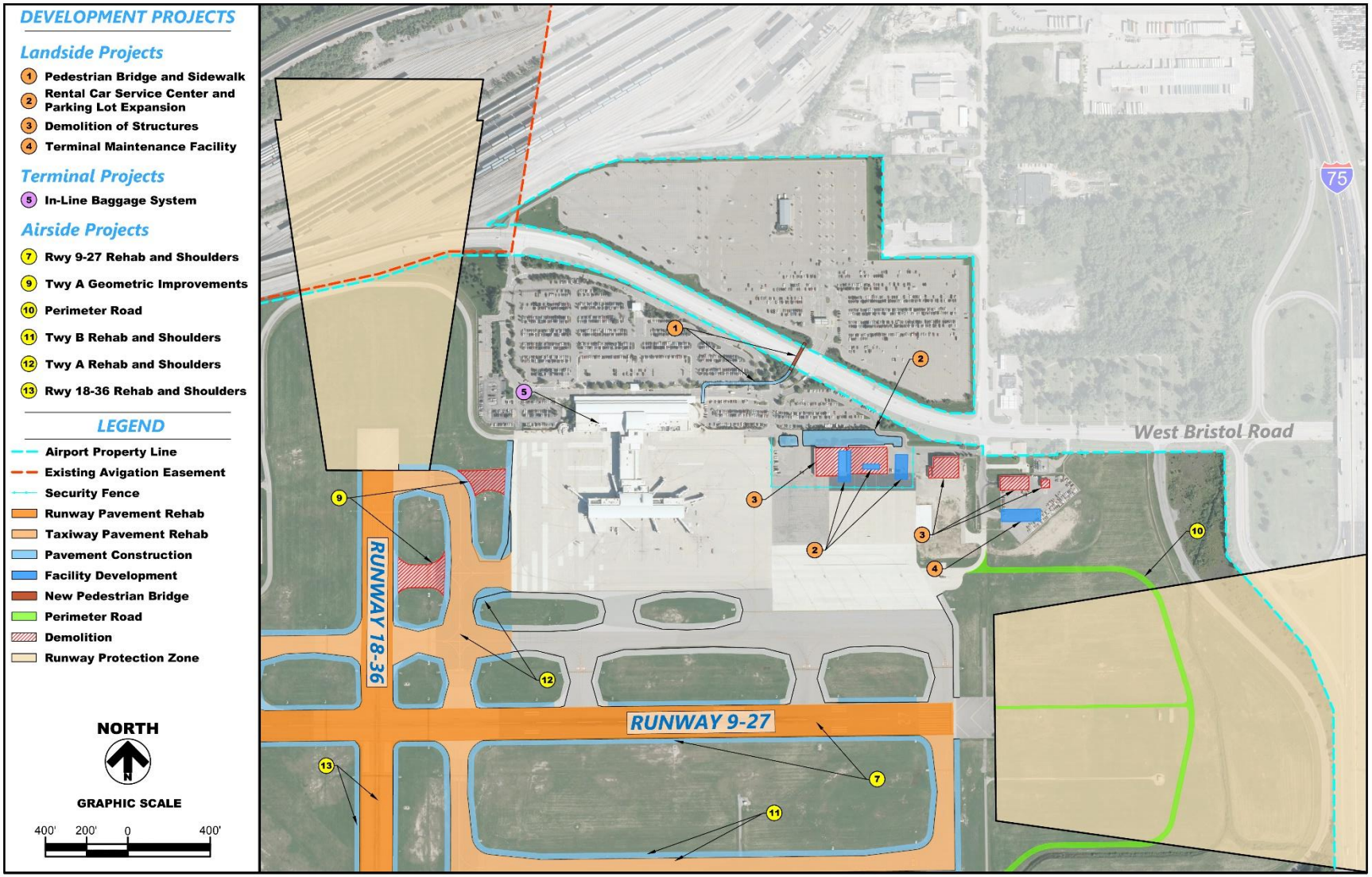
Recommended preferred alternatives from *Chapter 4, Identification and Evaluation of Alternatives* are included in the CIP and will be summarized in this chapter. Items such as the Environmental Documentation are included in the CIP but not evaluated in detail. These items are included to allow for an accurate 20-year program such that these regulatory documents are completed in a timely basis and in advance of the need to design and construct the facility. The costs associated with these projects are high level and will require a scoping process with the FAA when they are needed.

***EXHIBIT 6-1***
***AIRPORT DEVELOPMENT PROJECTS***



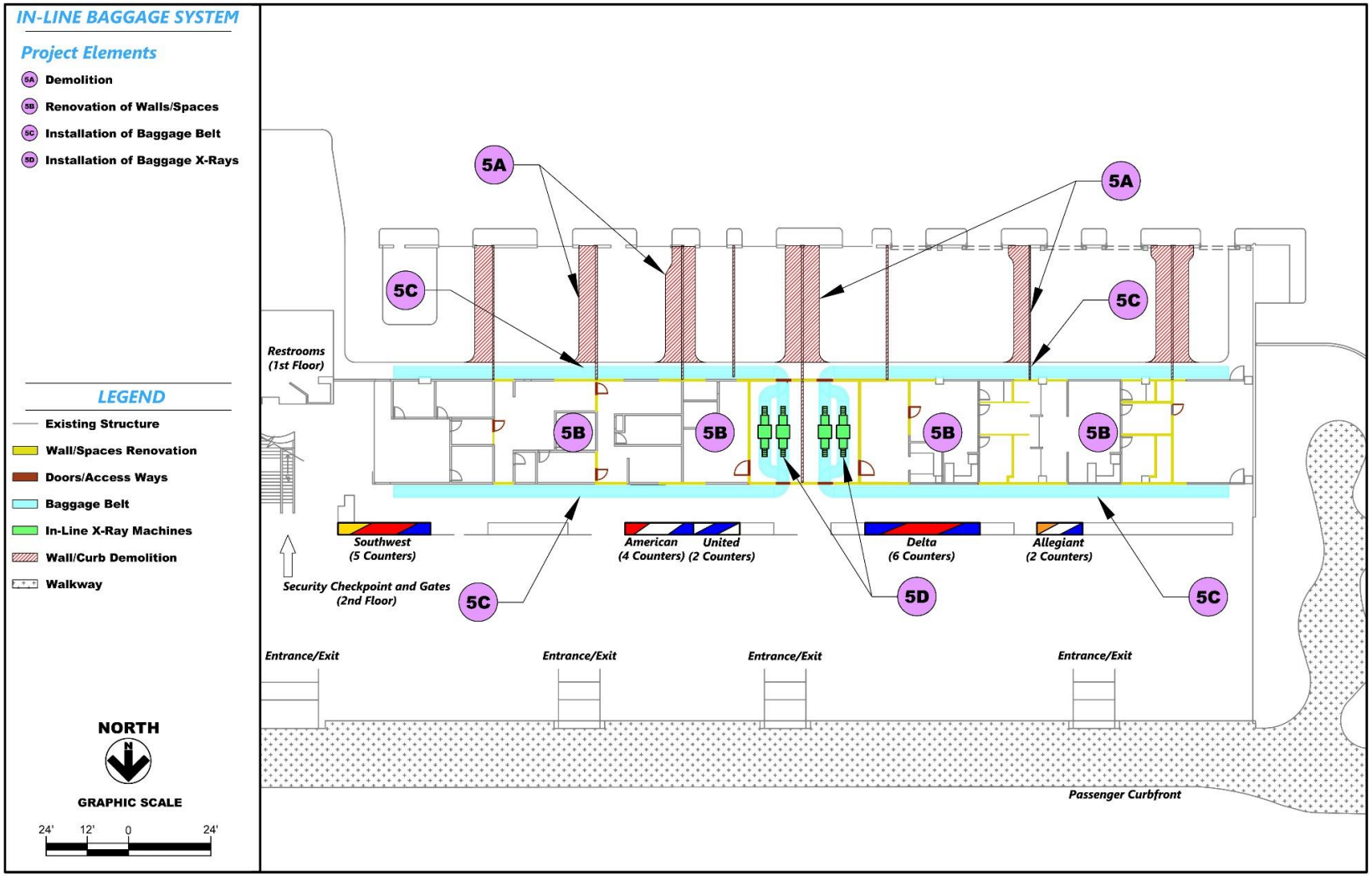

Source: RS&H, 2016

***EXHIBIT 6-2***
***PASSENGER TERMINAL DEVELOPMENT PROJECTS***




Source: RS&H, 2016

***EXHIBIT 6-3***
***IN-LINE BAGGAGE BELT SYSTEM CONCEPT***




Source: RS&H, 2016

## 6.3 IMPLEMENTATION PROCESS

To implement each capital project, a number of specific steps are necessary, many beginning up to four years before the facility is needed. This time is necessary in order to coordinate the funding, environmental documentation, and design, as well as complete the actual construction. Below is the sequence of events necessary to complete a complex airport project per FAA guidance.

***Typical Steps Four Years Prior To Construction***

- Identify the project in the approved Airport Layout Plan
- Validate project justification and funding eligibility
- Determine probable level of environmental review (If an environmental impact statement is required, planning may need to begin much earlier)
- Identify if flight procedure modifications will be required
- Coordinate with local officials and airport users

***Typical Steps Three Years Prior To Construction***

- Identify funding sources
- Determine if a Benefit/Cost Analysis is necessary
- Determine if a reimbursable agreement is necessary for affected NAVAIDs
- Begin purchase or assembly of all necessary land for the project

***Typical Steps Two Years Prior To Construction***

- Refine project scope
- Solicit professional design services
- Prepare preliminary design, site plan, and cost estimates
- Initiate reimbursable agreements and coordinate any NAVAID requirements with the FAA
- Submit requests for new/modified flight procedures with the FAA
- Submit a request for airspace review of projects under non-rulemaking authority (NRA)
- Begin Benefit/Cost Analysis if determined to be necessary
- Submit environmental assessment or categorical exclusion documentation for FAA review and funding.
- Coordinate with local officials and airport users on refined project scope and schedule

***Typical Steps One Year Prior To Construction***

- Complete airspace study
- Complete significant environmental documentation
- Complete 90 percent design, plans, and specifications after FAA environmental findings are made
- Execute reimbursable agreements to support NAVAIDs, if relevant
- Prepare and coordinate Construction Safety Phasing Plan

- Secure all necessary local funding
- Secure environmental and other necessary permits
- Submit Benefit/Cost Analysis
- Coordinate Safety Risk Management Panel with FAA-ATO or FAA-ARP, as necessary
- Finalize construction bidding, grant application, and acceptance schedules

***Year of Construction***

- Complete 100 percent design, plans, and specifications
- Complete FAA environmental documentation for current fiscal year
- Advertise and secure bids according to acceptance schedules
- Accept federal grants
- Coordinate with local officials and airport users on the progress and schedule
- Issue notice-to-proceed
- Monitor environmental mitigation requirements during construction

***After Construction***

- Submit final report and close any accepted federal grants
- Monitor environmental mitigation measures
- Update Airport Layout Plan drawing set

## 6.4 DEVELOPMENT PHASING

This section presents the three phases of the Master Plan Update's CIP. The phases are represented by the 5-year short-term, the 10-year intermediate-term, and the 20-year long-term. For purposes of the Master Plan Update, the ACIP has been broken into 5-year and 10-year segments incorporating the ACIP which the Airport prepares annually.

It is important to note that only the projects identified in the Master Plan Update will be described in this document in detail. The only exception will be rehabilitation projects of the airfield, since construction of shoulders and fillets will coincide with their timeline. Any project identified by FNT for the ACIP from several years ago now being implemented will not be specifically mentioned. However, they are included in the overall Master Plan Update CIP since those projects need to be reflected in the financial feasibility analysis as well.

Planning-level cost estimates are provided for each project and have been developed in the same manner as those developed for the ACIP. The intent is to budget sufficient funding for each project of the program and to evaluate the financial feasibility of each project within the constraints of the FAA grant and local share limits.

These identified capital improvement projects are programmed over the course of the 20-year planning horizon to facilitate systematic development of the Airport. The appropriate time for development should be reviewed periodically and adjusted to account for changing circumstances.

In addition, the construction of the new parallel runway, Runway 9R-27L, has carried over from previous master planning efforts and is not anticipated to be justified within this 20-year planning framework.

### 6.4.1 Short-Term Development Projects

Short-Term (Federal Fiscal Year) 2017-2020 capital improvements include those development items that are expected to begin within the next 3-5 years (see *Exhibit 6-4*). Each project within the short-term is summarized below by providing a description, need, and estimated cost. Its location on the airport is indicated by the circled number, which is depicted in *Exhibit 6-4*. Environment analysis and approval will need to be completed in accordance with applicable Federal rules and regulations to allow for timely project completion.

The implementation of these projects will need to be closely coordinated with FAA because AIP funding and environmental documentation may be required. As each project is discussed further, the Airport should consider the typical procurement and execution responsibilities discussed in the previous section.

#### Taxiway C West Rehabilitation and Shoulders (6)

*Description*- This project will rehabilitate the deteriorating pavement on the west end of Taxiway C, reconstruct connectors to new FAA fillet design, and construct new shoulders to improve safety during aircraft taxiing operations.

*Need*- Taxiway C is the parallel taxiway north of Runway 9-27. It is typical that pavement be rehabilitated once it has reached a level of deterioration to prolong its life before it requires full reconstruction. During rehabilitation, the taxiway will be updated to the new FAA geometry and safety standards. This includes constructing the connectors to TDG 5 fillets and constructing 30-foot wide shoulders on each side of the taxiway. This project will improve safety during taxiing operations of aircraft and ensure the airport is complying with FAA grant assurance agreements.

*Costs*- This project is estimated to cost $5.6 million.

#### Runway 9-27 Rehabilitation and Shoulders (7)

*Description*- This project will rehabilitate the pavement of the runway while constructing 25-foot wide shoulders.

*Need*- Runway 9-27 is considered to be the primary runway for Bishop International Airport and is capable of receiving aircraft during CAT I weather conditions. It is also a grant assurance of the airport to maintain existing pavement that had federal dollars used in its construction.

*Costs*- This project is estimated to cost $8.5 million.

### New Avigation Easements and Obstruction Removal 8

*Description*- This project includes the acquisition of easements for the purpose of obstruction removal. This project includes both easement acquisition and removal of obstructions.

*Need*- Easements assist the Airport in controlling property within its vicinity to protect both the flight path of aircraft and to allow for the retention of existing precision and non-precision approaches. If obstructions remain unaddressed within these approaches, the approaches may have their minima raised or even have the approach removed altogether, thus reducing or removing the opportunity for aircraft to land during adverse weather conditions.

*Costs*- This project is estimated to cost $0.8 million.

### Taxiway A Geometric Improvements 9

*Description*- This project involves the demolition of two sections of taxiway connectors going from the commercial apron to Runway 18-36. The connectors are located along Taxiway A.

*Need*- This project involves improving pilot awareness and aircraft taxiing safety while reducing the potential for runway incursion. Since the last master plan study, the FAA has made direct access from an apron to a runway a safety concern and has since implemented a national program to identify and remove these potential aircraft movements.

*Costs*- This project is estimated to cost $2.5 million.

### Perimeter Road 15

*Description*- This project includes completing a full vehicle perimeter road around the runway/taxiway system.

*Need*- The airport currently has a perimeter road in the northwest quadrant, going west from the north end of Runway 18-36, running along the north side of Taxiway C and then around the west end of Runway 9-27 and connecting to the airport maintenance facility. This project will construct a new perimeter road around the rest of the airport, to the east, south and remaining west side of within the airport property. This will improve vehicle movement for emergency and maintenance purposes while also eliminating the need for Airport and FBO vehicles to cross Runway 18-36 to get to the east side of the airport.

*Costs*- This project is estimated to cost $7.7 million.

### Security Fence Improvements 16

*Description*- This project is to identify locations where security fence can be improved and reconditioned to ensure the safety and security of aircraft activity within the airport.

*Need*- Portions of the airports security and wildlife fence has been identified to be in either poor condition or do not meet standards for a proper security or wildlife fence. These sections of the airport fence will be improved to appropriate security and wildlife standards.

*Costs*- This project is estimated to cost $2.7 million.

### Storm Sewer Rehabilitation - Study (17)

*Description*- During this initial period of the project, a study will be conducted to analyze and determine the condition of the overall storm sewer system of the airport. Civil work is anticipated to be conducted following the conclusion of this study with some design potentially beginning within this planning period. This study will include refined order of magnitude cost estimates based on the findings of the study.

*Need*- Portions of the airport's drainage system have been identified as nearing its useful life with elements of the system showing signs of deterioration. Portions of the system will be rehabilitated, reconstructed, or replaced, depending on the final recommendation of the study.

*Costs*- Within this planning period, this phase of the project is estimated to cost $0.8 million.

### Corporate Aviation Taxilane (18)

*Description*- Partial construction of the taxilane providing access to the new Corporate General Aviation Area in the Southeast Quadrant of the Airport.

*Need*- To allow for the replacement of the existing corporate hangar located within the commercial apron area, the corporate aviation development area would need to begin development and have airfield access to the airfield. This project will provide that access to the new tenant while allowing for future expansion for new tenants.

*Costs*- This project is estimated to cost $1.0 million.

### Corporate Aviation Access Road & Utilities (19)

*Description*- Construction of a public vehicle road and utility line connections to the corporate aviation development area.

*Need*- To allow for access and development of the replacement corporate hangar from the commercial apron area, a new road and utility lines for the facility would need to be constructed. The road and utilities will also be usable to any additional tenants within the corporate aviation development area.

*Costs*- This project is estimated to cost $2.0 million.

### New Corporate Conventional Hangar (20A)

*Description*- Construction of a new corporate conventional hangar to replace the existing hangar. The existing hangar will be demolished to make room for the construction of a new rental car service center.

*Need*- To allow for the relocation of the tenant, an in-kind conventional hangar must be constructed before the tenant can relocate. This will allow for property to become available to allow for the expansion and consolidation of rental car services and facilities.

*Costs*- This project is estimated to cost $2.4 million.

### Corporate Apron (20B)

*Description*- This project includes a new apron in front of the new corporate conventional hangar.

*Need*- This project would provide an in-kind apron space to allow the tenant to have room to maneuver their aircraft in and out of the hangar when needed.

*Costs*- This project is estimated to cost $0.5 million.

### New Corporate Vehicle Parking Lot (20C)

*Description*- Vehicle parking lot associated with the relocated conventional hangar.

*Need*- This project would provide for an in-kind replacement of the existing vehicle parking lot of the existing conventional hangar that will be demolished.

*Costs*- This project is estimated to cost $0.1 million.

### New ARFF and Ops Station 22

*Description*- Construction of a new ARFF and Ops Station built to current FAA standards. This new construction will allow for the proper storage of vehicle, equipment, and extinguishing agents. The new facility will also provide appropriate spaces for the staff to maintain their readiness and improve their operational effectiveness.

*Need*- The existing facility no longer meets FAA standards for ARFF operations. The existing ARFF and operations spaces will be repurposed to expand the airport maintenance activities. Before these spaces can be renovated into their new purposes, the construction of the new ARFF and Ops station must be completed and fully under use. Once that is completed, the expansion and renovation of these spaces can commence.

*Costs*- This project is estimated to cost $4.0 million.

### Emergency Response Ramps 24

*Description*- Ramps will be constructed off the existing vehicle service road leading to both Runway 9-27 and 18-36.

*Need*- These ramps will allow for responding ARFF vehicles to maintain a speed of approximately 45 MPH while in a turn. Since the existing vehicle roads are perpendicular to the runways, the responding ARFF vehicles will have to decelerate extensively before making the turn. These ramps will allow for the ARFF vehicle to maintain a high portion of their speed while turning towards the direction of the incident, reducing response time and improving the safety of the ARFF responders during an emergency event.

*Costs*- This project is estimated to cost $0.4 million.

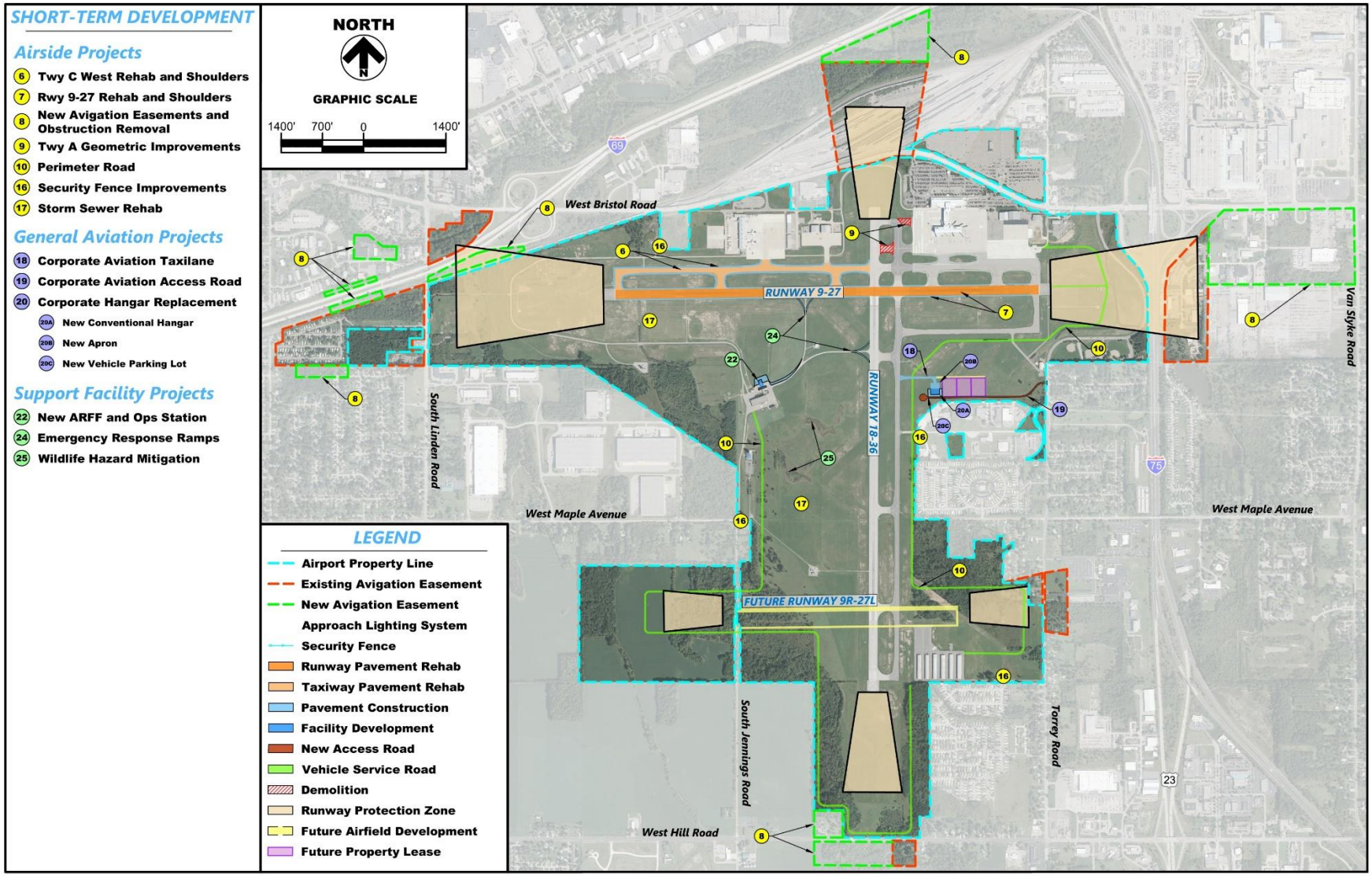
### Wildlife Hazard Mitigation 25

*Description*- Two wildlife attractant sites located west of Runway 18-36 will have an environmental study conducted and then removed pending the environmental findings and recommendations.

*Need*- To improve safety of aircraft operations, removing the wildlife attractant is necessary. Considering the location of these two sites to be adjacent to one of the runways, this could cause a potentially dangerous situation while an aircraft is conducting take-off or landing operations.

*Costs*- This project is estimated to cost $0.5 million.

***EXHIBIT 6-4***
***SHORT-TERM DEVELOPMENT PROJECTS***




Source: RS&H, 2016

### 6.4.2 Intermediate-Term Development Projects

Intermediate-term development improvements (see *Exhibit 6-5*) include projects that are warranted within the second five-year planning period (2021-2025). Environmental analysis and approval (if necessary) will need to be completed in accordance with applicable Federal rules and regulations to allow for timely project completion.

At this six to ten-year point in the Airport CIP, projects are focused on runway and apron rehabilitation, demolition and renovation of existing facilities, and construction of new facilities.

#### Demolition of Structures 3

*Description*- This project involves the removal of the three hangars and rental car service center facilities located east of the commercial terminal.

*Need*- The location of these hangars will be redeveloped into the new Rental Car Service Center and the Terminal Maintenance facility. Demolition of these structures must be completed before the new facilities can be constructed.

*Costs*- This project is estimated to cost $0.3 million.

#### Rental Car Service Center and Pavement 2

*Description*- This project will involve the construction of a new Rental Car Service Center comprising of a pump and vacuum station, carwash facility, and storage and light maintenance facility. The pavement south of the existing rental car parking lot will be expanded to allow for storage of additional inventory of vehicles.

*Need*- The existing rental car service center is aging and deteriorating. The existing facility must also be brought to local fire codes, removing the fueling pump from within an enclosed space and to a separate, open facility.

*Costs*- This project is estimated to cost $8.8 million.

#### Taxiway B Rehabilitation and Shoulders 11

*Description*- This project will rehabilitate the deteriorating pavement of Taxiway B, reconstruct connectors to new FAA fillet design, and construct new shoulders to improve safety during aircraft taxiing operations.

*Need*- Taxiway B is the partial parallel taxiway south of Runway 9-27. It is typical that pavement be rehabilitated once it has reached a level of deterioration to prolong its life before it requires full reconstruction. During rehabilitation, the taxiway will be updated to the new FAA geometry and safety standards. This include constructing the connectors to TDG 5 fillets and constructing 30-foot shoulders on each side of the taxiway. This project will improve safety during taxiing operations of aircraft and ensure the airport is complying with FAA grant assurance agreements.

*Costs*- This project is estimated to cost $3.5 million.

### Storm Sewer Rehabilitation – Phase 1 (17)

*Description*- During this phase of the project, some of the areas identified in the earlier study will be addressed. Anticipated construction projects could be the insertion of new lining to restore the integrity of the drainage system or the construction and installation of new drainage pipes. The work is dependent on the final recommendation of the study that was conducted previously.

*Need*- Portions of the airports drainage system has been identified as nearing its useful life with elements showing signs of deterioration. Portions of the system will be rehabilitated, reconstructed, or replaced, depending on the final recommendation of the study.

*Costs*- Within this planning period, this phase of the project is estimated to cost $7.2 million.

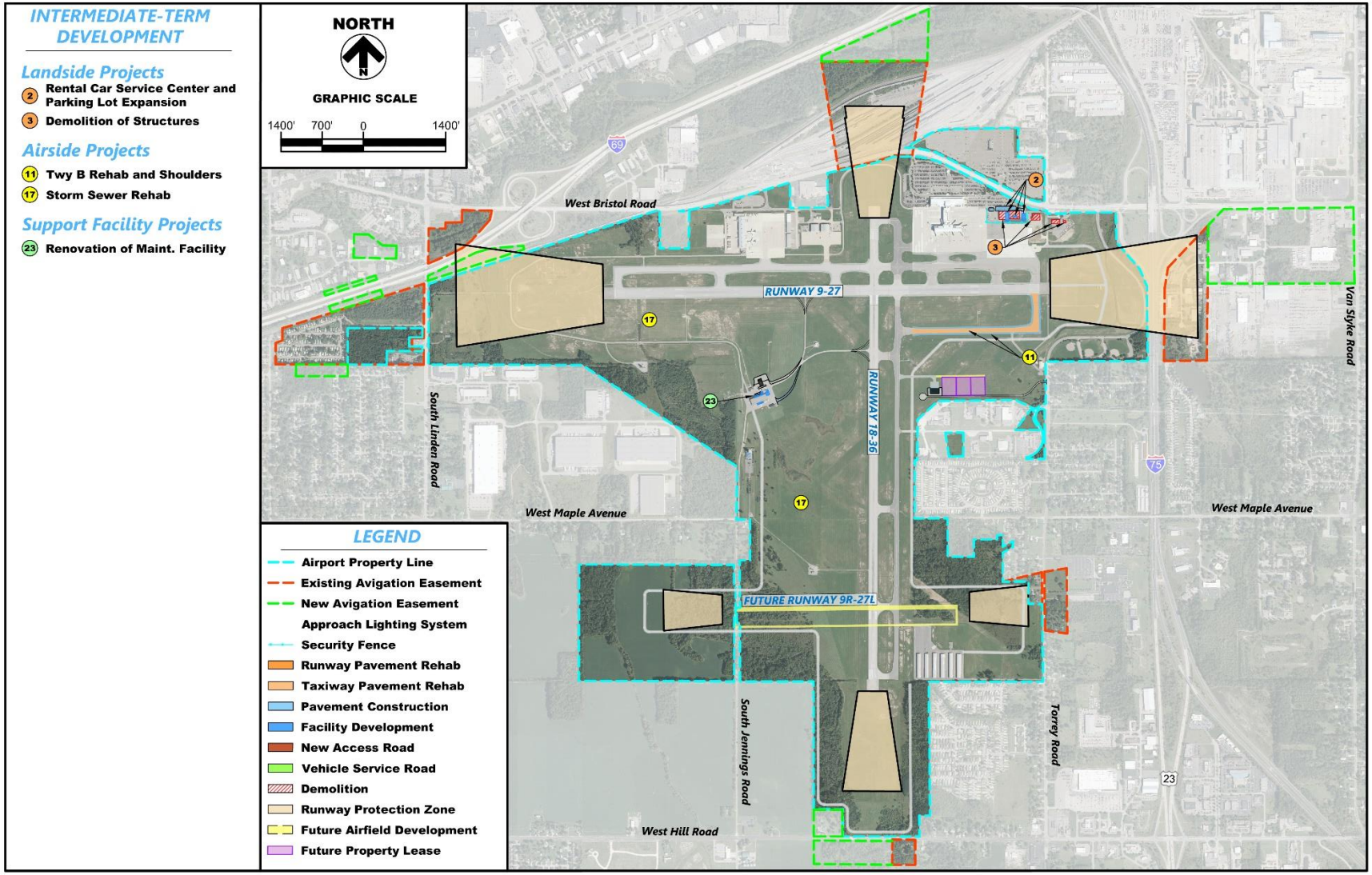
### Renovation of Maintenance Facility (23)

*Description*- Renovation of the existing maintenance facility is needed to expand storage and administrative spaces for the staff to maintain operational effectiveness of their vehicles and equipment. The new expansion will also be designed to include space for storing Multi-Task Equipment (MTE) snow vehicles. New expansions to the existing facility are anticipated and will be done concurrently when renovation phases can be combined.

*Need*- The airport maintenance facility does not provide the proper space for storage of parts, equipment, and consumable products nor does it provide proper spacing for staff such as appropriately sized maintenance bays, administrative spaces, and crew rest areas to maintain staff on-site for 24-hour snow operations. The airport is anticipated to change a portion of the snow equipment fleet to multi-tasking snow removal equipment, which would require changing the parking spaces of the existing airport maintenance facility.

*Costs*- This project is estimated to cost $9.5 million.

***EXHIBIT 6-5***
***INTERMEDIATE-TERM DEVELOPMENT PROJECTS***




Source: RS&H, 2016

### 6.4.3 Long-Term Development Projects

Long-term development improvements (see *Exhibit 6-6*) are primarily those projects that are warranted more so by priority than by demand over the second ten years of the planning horizon (2026–2035).

Long-term development projects at FNT can be grouped in six categories – passenger terminal area improvements; runway construction and rehabilitation; taxiway pavement rehabilitation and standards; airfield lighting/NAVAIDs; fuel storage expansion; and continued storm sewer improvements.

**Pedestrian Bridge and Sidewalk** (1)

*Description*- Construction of a new enclosed bridge over West Bristol Road for pedestrians and an improved walkway from the end of the bridge to the front of the terminal.

*Need*- Some passengers leaving from Bishop International Airport that utilize the economy parking lot tend to cross West Bristol Road by foot. There is currently no designed cross-walk for them to safely cross. It has been determined that the safest manner to address this it to have a bridge cross over from the economy lot to the south side of West Bristol Road. An improved walkway with proper lighting and signage would then be constructed to improve visibility of the walkway for both pedestrians and motorists.

*Costs*- This project is estimated to cost $1.5 million.

**Terminal Maintenance Facility** (4)

*Description*- The construction of an independent maintenance facility located in close proximity to the passenger terminal to allow for the storage of parts and equipment specific to terminal maintenance activity.

*Need*- The airport staff currently does not have storage within the passenger terminal area and may need to leave this area of the airport to retrieve appropriate supplies for repairs that may need to be completed quickly. A closer location would assist in completing these activities in a timely manner and provides additional storage of vehicle and equipment for terminal maintenance.

*Costs*- This project is estimated to cost $1.5 million.

**In-Line Baggage System** (5)

*Description*- Relocates the TSA baggage scanners from the front of the ticketing desk to a secured area of the terminal building and constructs a baggage handling system to automate the processing of checked baggage before being carted off to their aircraft.

*Need*- The airport's existing baggage handling system is labor intensive, requiring several TSA officers to scan each bag in front of the ticketing area and then loading them to the appropriate bag belts. Though the area is well monitored with TSA agents at each device, it is not as secure as being in another area of the terminal with no public access. This will also free up space for portions of the ticketing area to be used for other carriers.

*Costs*- This project is estimated to cost $2.0 million.

### Taxiway A Rehabilitation and Shoulders 12

*Description*- This project will rehabilitate the deteriorating pavement of Taxiway A, reconstruct connectors to new FAA fillet design, and construct new shoulders to improve safety during aircraft taxiing operations.

*Need*- Taxiway A is the parallel taxiway east of Runway 18-36. It is typical that pavement be rehabilitated once it has reached a level of deterioration to prolong its life before it requires full reconstruction. During rehabilitation, the taxiway will be updated to the new FAA geometry and safety standards. This includes constructing the connectors to TDG 5 fillets and constructing 30-foot shoulders on each side of the taxiway. This project will improve safety during taxiing operations of aircraft and ensure the airport is complying with FAA grant assurance agreements.

*Costs*- This project is estimated to cost $8.0 million.

### Runway 18-36 Rehabilitation and Shoulders 13

*Description*- This project will rehabilitate the pavement of the runway while constructing 25-foot wide shoulders.

*Need*- Runway 18-36 improves the use of the airport by providing another direction where aircraft can take-off and land when winds change and provides the longest length for takeoff and landing operations. Maintaining the runway is necessary to ensure that it can be used in the event Runway 9-27 becomes unavailable due to weather conditions, maintenance, or emergencies. It is also a grant assurance of the airport to maintain existing pavement that had federal dollars used in its construction.

*Costs*- This project is estimated to cost $10.5 million.

### Runway 18-36 Extension 14

*Description*- This project would extend Runway 18-36 to a full 8,000 feet, extend Taxiway A, reconstruct the taxiway connector, and relocate associated NAVAIDs and airfield lighting.

*Need*- The airport is planning on providing for destinations further then the markets currently served. When an aircraft needs to fly further, depending on the fleet of aircraft, this may require an extension of an existing runway. It was determined in the Facility Requirements chapter that a runway should be extended to 8,000 feet to allow for a B737-800 to fly from Flint, MI to Las Vegas, Nevada.

*Costs*- This project is estimated to cost $2.5 million.

### Runway 9 ALSF-2/CAT II/III 15

*Description*- Installation of Approach Lighting System with Sequenced Flashers II (ALSF-2) and improving the precision approach system to CAT II or III minima.

*Need*- The airport seeks to improve its capability of accepting arriving aircraft during extreme adverse weather conditions reducing the chance that they will be diverted to another airport.

*Costs*- This project is estimated to cost $7.0 million.

**Storm Sewer Rehabilitation – Phase 2** 17

*Description*- During this phase of the project, remaining construction projects that have not been completed during the intermediate planning period will be completed during this time frame.

*Need*- Portions of the airports drainage system has been identified as nearing its useful life with elements showing signs of deterioration. Portions of the system will be rehabilitated, reconstructed, or replaced, depending the final recommendation of the study.

*Costs*- Within this planning period, this phase project is estimated to cost $8.0 million.

**Jet A Fuel Storage Expansion** 21

*Description*- The addition of new Jet A fuel storage at the existing fuel farm.

*Need*- In the Facility Requirement chapter, the airport was projected to have a deficit in fuel storage space to meet 5-days of Jet A fuel demand. The installation of one new Jet A fuel storage container would be sufficient to meet this growing demand.

*Costs*- This project is estimated to cost $0.1 million.

### 6.4.4 Development Beyond the 20-Year Time Frame

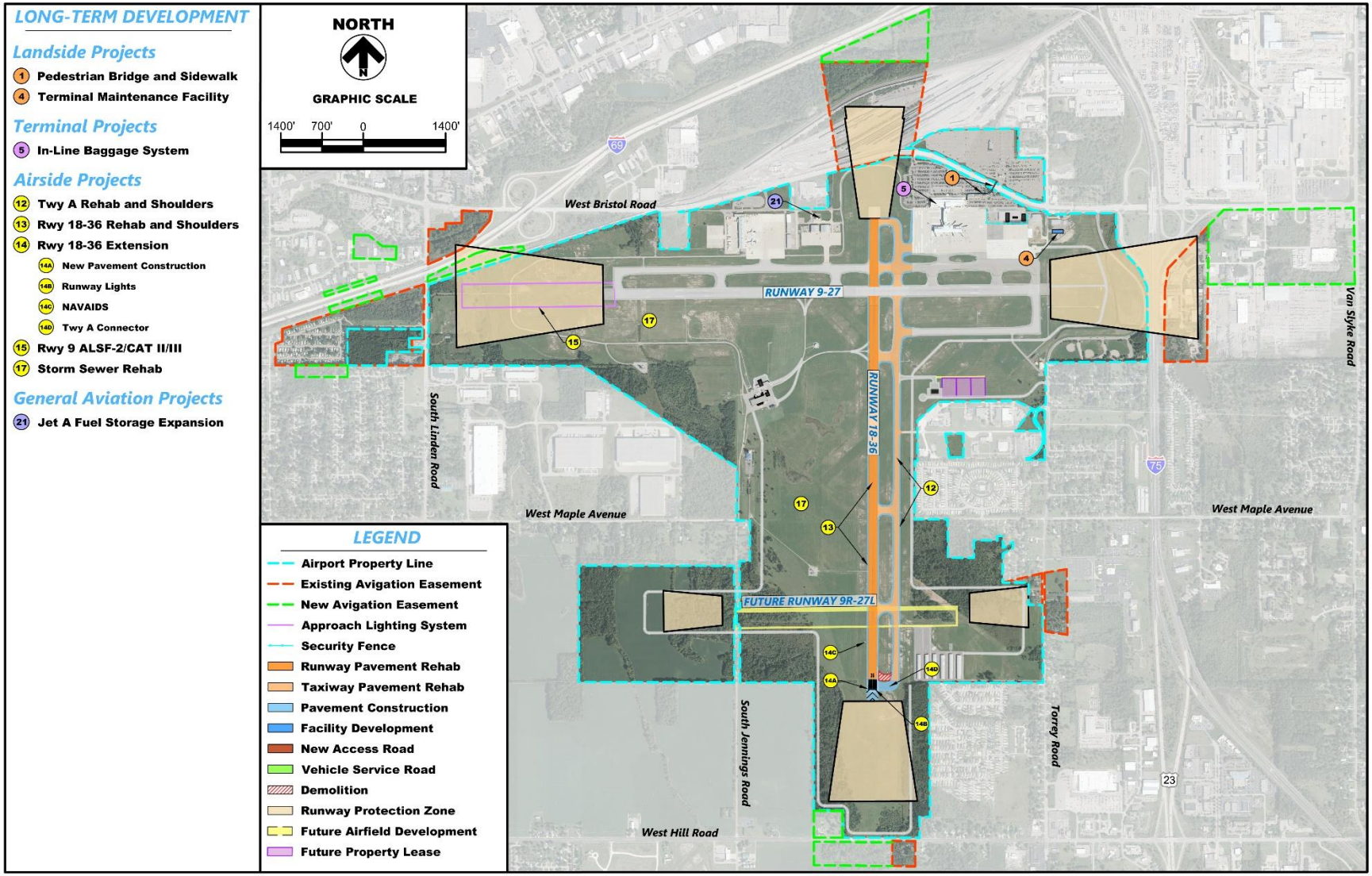
**New Parallel Runway 10R-28L**

*Description*- This project would involve the construction of a new runway 3,800 feet with a width of 75 feet.

*Need*- The construction of a new parallel runway was identified in the previous master plan study. The airport will still preserve for the potential construction of this runway, with a thorough review to be conducted in the next master plan study.

*Costs*- The project was estimated to cost $7.7 million in 2010.

***EXHIBIT 6-6***
***LONG-TERM DEVELOPMENT PROJECTS***




Source: RS&H, 2016

## 6.5 FINANCIAL PROGRAM

As previously described the recommended 20-Year CIP includes a variety of projects that are required at FNT to meet future traffic demand requirements, for rehabilitation of aged infrastructure that is nearing its useful life cycle, projects to meet FAA requirements and projects to increase airport revenues and reduce operating expenses.

The following sections of this chapter look into relevant financial issues of the Authority that are associated with how the projects in the CIP can be funded. The result of this work will produce a financial program that will allow for the implementation of the proposed 20-Year CIP maximizing the use of different funding sources including FAA's AIP grants, passenger facility charges (PFC), customer facility charges (CFC), State funds, Authority funds, private and other funding sources.

### 6.5.1 Financial Performance and Capacity Analysis

In the following section an analysis of the Authority's historic financial performance and capacity to fund its contributions to the proposed CIP described in Section 6.2 is conducted. The main objective of the analysis, is to evaluate the Authority's financial performance for the past ten years in an effort to be able to later forecast its future financial capacity to fund the proposed CIP.

The financial analysis is based on the Authority's financial statements between 2007 and 2016. A summary of these statement is presented in *Table 6-1* below.

#### Operating Revenues

The Authority's operating revenues are generated from two main sources: aeronautical related revenues and non-aeronautical related revenues. In 2016 aeronautical revenues accounted for 27.5 percent of the Authority's total operating revenues and the balance or 72.5 percent came from non-aeronautical revenues.

Aeronautical revenues are generated from airline passenger revenues including landing fees paid by all air carriers that operate at FNT, terminal rents charged to air carries for office space, ticket counters and preferential space they request, for the joint use of areas such as baggage claim and makeup areas, holding rooms and bag storage areas. In addition to airline passenger revenues aeronautical revenues also include non-passenger aeronautical revenues from rental of hangars and air cargo areas, revenue from Fixed Base Operators (FBO), fuel sales and reimbursement of security costs. As seen in *Exhibit 6-7* cargo and hangar rentals have been the largest source of aeronautical revenues since 2009, followed by terminal rents and landing fees. Despite a 3.4 percent annual decline in the number of enplaned passengers at FNT between 2007 and 2016, overall aeronautical revenues have experienced an annual compounded growth rate (ACGR) of 1.6 percent during the same period.

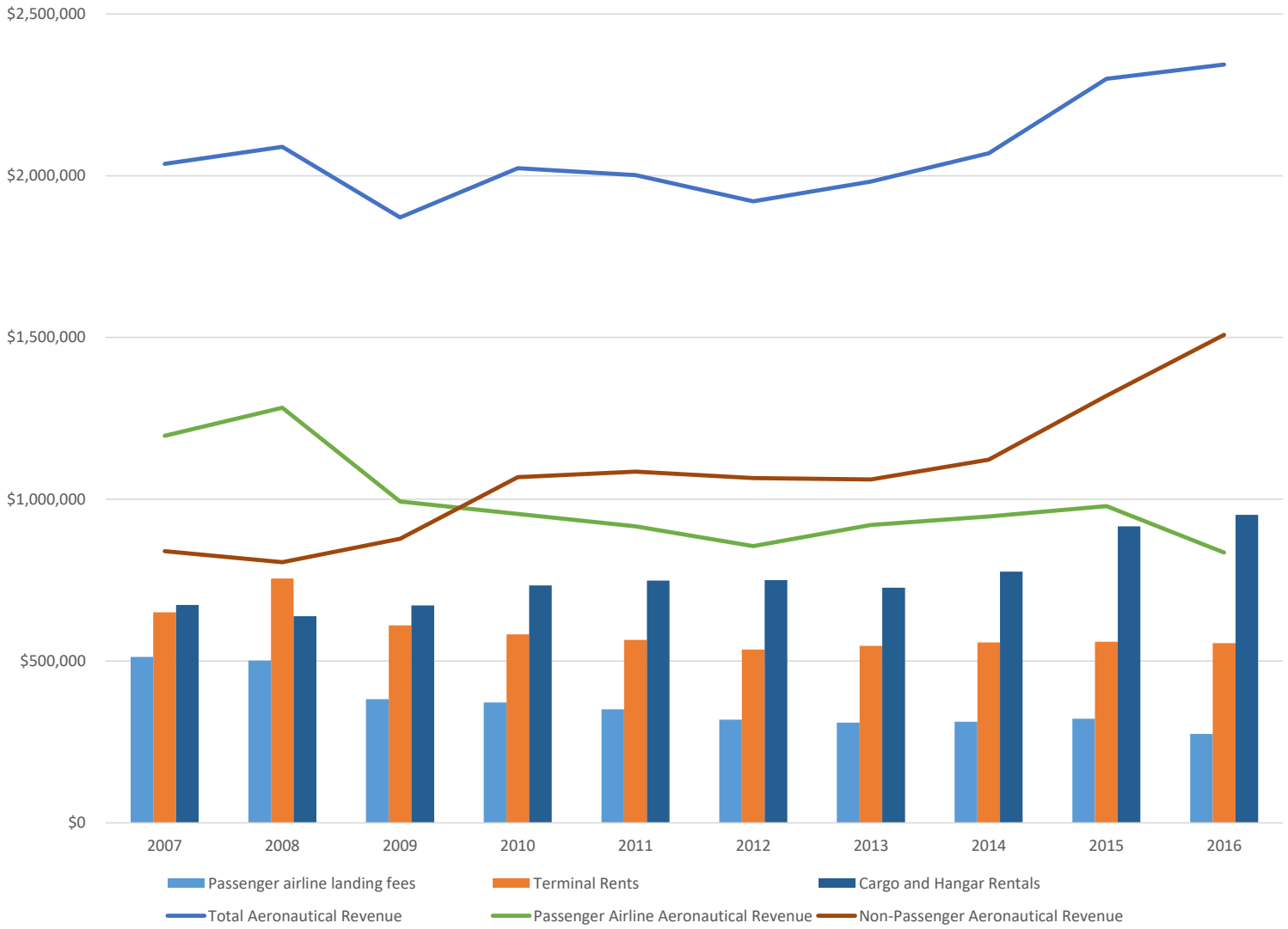
Non-aeronautical revenues are comprised of revenues from car parking, rental cars, food and beverage and retail areas in the terminal building, and leases from lands and non-terminal facilities owned by the Airport. The largest source of non-aeronautical revenues since 2007 has been parking, followed by revenues from rental car operations and terminal services and other revenues. In 2016 parking and rental car accounted for 70.8 percent and 23.5 percent of all non-aeronautical revenues at FNT. *Exhibit 6-8* shows non-aeronautical revenues between 2007 and 2016. These revenues have grown at an ACGR of 0.58 percent during this period.

***TABLE 6-1***
***SUMMARY OF FINANCIAL STATEMENTS 2007-2016***

| Item | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016* | ACGR 2010 to 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Operating Revenue** | | | | | | | | | | | | | |
| Parking lot fees | 2,112,673 | 2,460,076 | 2,715,612 | 2,886,086 | 2,811,063 | 4,040,814 | 3,963,399 | 4,315,706 | 4,167,690 | 4,498,154 | 4,530,261 | 4,330,778 | **1.2%** |
| Rental of facilities | 3,871,931 | 4,283,192 | 4,486,130 | 4,449,484 | 3,818,020 | 2,966,446 | 2,979,670 | 2,965,689 | 3,099,641 | 3,337,665 | 3,697,451 | 3,699,343 | **3.7%** |
| Landing fees | 537,419 | 489,954 | 513,018 | 501,433 | 426,399 | 427,472 | 400,496 | 360,168 | 359,509 | 368,299 | 391,239 | 334,112 | **-4.0%** |
| Fuel flowage fees | 20,845 | 17,602 | 16,284 | 11,804 | 8,572 | 8,524 | 9,718 | 8,794 | 8,879 | 11,184 | 11,970 | 13,811 | **8.4%** |
| TSA Reimbursement | | | | | | 147,492 | 122,230 | 100,268 | 87,600 | 87,420 | 87,460 | 87,870 | **-8.3%** |
| Other | | | | | | 105,017 | 87,030 | 80,436 | 185,696 | 36,042 | 40,847 | 59,786 | **-9.0%** |
| **Total** | **6,542,868** | **7,250,824** | **7,731,044** | **7,848,807** | **7,064,054** | **7,695,765** | **7,562,543** | **7,831,061** | **7,909,015** | **8,338,764** | **8,759,228** | **8,525,700** | **1.7%** |
| ***Operating Revenue per Enplaned Pax*** | **$11.71** | **$13.53** | **$14.33** | **$14.87** | **$14.38** | **$15.48** | **$15.98** | **$19.02** | **$19.92** | **$19.87** | **$21.29** | **$21.42** | **5.6%** |
| **Operating Expenses** | | | | | | | | | | | | | |
| Salaries, wages, benefits | 3,254,717 | 3,401,569 | 3,647,665 | 3,848,014 | 3,988,165 | 4,214,988 | 4,289,073 | 4,457,032 | 4,438,462 | 4,649,033 | 4,561,514 | 4,870,589 | **2.4%** |
| Marketing/Publice Relations | 888,781 | 880,258 | 977,437 | 966,683 | 940,798 | 786,697 | 830,423 | 748,396 | 1,039,592 | 863,720 | 778,568 | 947,185 | **3.1%** |
| Parking Services | | | | | | 1,092,904 | 1,171,980 | 1,108,332 | 1,186,361 | 1,301,535 | 1,247,173 | 1,100,184 | **0.1%** |
| Contractual Services | 1,548,891 | 2,140,377 | 2,238,676 | 2,256,355 | 2,407,624 | 1,359,804 | 1,268,715 | 965,710 | 1,188,777 | 1,149,487 | 1,210,982 | 1,403,645 | **0.5%** |
| Utilities | 669,502 | 789,263 | 860,869 | 877,370 | 971,369 | 1,054,126 | 1,100,076 | 1,165,347 | 1,227,677 | 1,229,893 | 1,162,532 | 1,055,175 | **0.0%** |
| Repairs and maintenance | 516,832 | 569,740 | 596,669 | 593,965 | 603,009 | 330,359 | 324,550 | 271,340 | 322,393 | 297,681 | 331,545 | 332,181 | **0.1%** |
| Supplies | | | | | | 246,571 | 319,103 | 304,140 | 301,869 | 343,792 | 256,385 | 259,816 | **0.9%** |
| Insurance | 280,210 | 297,718 | 303,344 | 286,975 | 300,185 | 246,168 | 243,372 | 258,099 | 258,194 | 265,073 | 269,662 | 244,320 | **-0.1%** |
| Other | | | | | | 33,310 | 39,702 | 48,250 | 56,801 | 75,824 | 87,288 | 102,864 | **20.7%** |
| Depreciation | 2,410,964 | 2,658,779 | 2,881,463 | 2,880,072 | 3,351,361 | 3,574,133 | 3,605,025 | 3,365,642 | 3,464,243 | 8,250,836 | 8,307,072 | 7,956,030 | **14.3%** |
| **Total** | **9,569,897** | **10,737,704** | **11,506,123** | **11,709,434** | **12,562,511** | **12,939,060** | **13,192,019** | **12,692,288** | **13,484,369** | **18,426,874** | **18,212,721** | **18,271,989** | **5.9%** |
| ***Operating Revenue per Enplaned Pax (without depreciation)*** | **$12.81** | **$15.08** | **$15.99** | **$16.73** | **$18.76** | **$18.83** | **$20.26** | **$22.66** | **$25.23** | **$24.24** | **$24.07** | **$25.92** | **5.5%** |
| ***Operating Income (Loss)*** | (3,027,029) | (3,486,880) | (3,775,079) | (3,860,627) | (5,498,457) | (5,243,295) | (5,629,476) | (4,861,227) | (5,575,354) | (10,088,110) | (9,453,493) | (9,746,289) | **10.9%** |
| **Non Operating Revenue (Expense)** | | | | | | | | | | | | | |
| Property taxes | 4,892,602 | 5,012,589 | 5,396,441 | 5,590,508 | 5,598,262 | 5,338,072 | 4,653,473 | 4,357,119 | 4,018,584 | 3,938,149 | 3,941,376 | 4,034,284 | **-4.6%** |
| State Revenue | | | | | | | | | | | | 104,947 | |
| Passenger facility charge | 2,371,013 | 2,324,000 | 2,200,240 | 2,147,563 | 2,070,214 | 2,136,403 | 1,938,861 | 1,728,222 | 1,716,638 | 1,743,582 | 1,681,649 | 1,592,552 | **-4.8%** |
| Investment income | 506,588 | 649,396 | 1,179,316 | 790,305 | 97,838 | 73,287 | 30,117 | 26,712 | 11,160 | 16,760 | 18,463 | 74,374 | **0.2%** |
| Interest expense | (1,225,228) | (1,523,998) | (1,474,569) | (1,422,422) | (1,367,787) | (1,471,621) | (982,609) | (925,474) | (875,848) | (823,404) | (765,302) | (700,336) | **-11.6%** |
| Amoritization of prepaid bond insurance | (25,889) | (27,430) | (28,960) | (30,271) | (31,910) | (71,375) | (49,874) | (45,471) | (18,654) | (19,144) | (19,629) | (20,090) | **-19.0%** |
| Gain on sale of assets | | | | | | | | | | | 28,912 | 11,041 | |
| **Total** | **6,519,086** | **6,434,557** | **7,272,468** | **7,075,683** | **6,366,617** | **6,004,766** | **5,589,968** | **5,141,108** | **4,851,880** | **4,855,943** | **4,885,469** | **5,096,772** | **-2.7%** |
| **Income (Loss) Before Capital Contributions & Depreciation** | 5,903,021 | 5,606,456 | 6,378,852 | 6,095,128 | 4,219,521 | 4,335,604 | 3,565,517 | 3,645,523 | 2,740,769 | 3,018,669 | 3,739,048 | 3,306,513 | **-4.4%** |
| **Capital Grants** | | | | | | | | | | | | | |
| Federal Grants[1] | 4,382,880 | 4,927,803 | 3,218,686 | 5,606,259 | 9,743,353 | 4,554,250 | 3,371,084 | 3,970,975 | 3,150,059 | 959,155 | 4,955,175 | 68,592 | |
| State Grants | 94,504 | 4,148,366 | 84,777 | 147,532 | 256,404 | 119,849 | 88,713 | 220,609 | 701,291 | 54,342 | 275,288 | 3,811 | |
| Local Grants | | 2,500,000 | 2,500,000 | 2,500,000 | | 1,000,000 | | | | | | | |
| **Total** | 4,477,384 | 11,576,169 | 5,803,463 | 8,253,791 | 9,999,757 | 5,674,099 | 3,459,797 | 4,191,584 | 3,851,350 | 1,013,497 | 5,230,463 | 72,403 | |

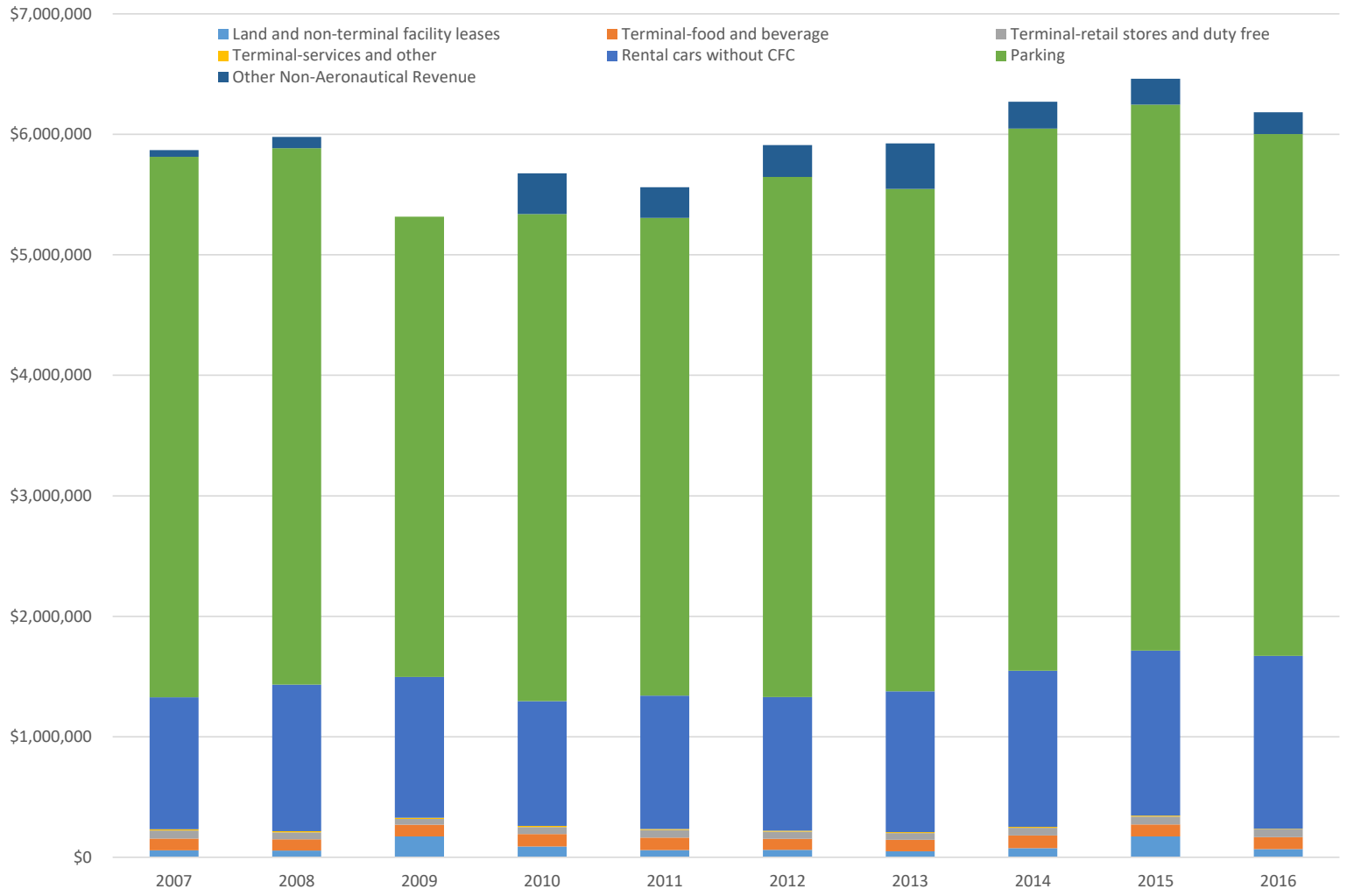
Source: Bishop International Airport Authority Financial Statements

***EXHIBIT 6-7***
***MAJOR AND TOTAL AERONAUTICAL REVENUES 2007 TO 2016***




Source: Bishop International Airport Authority – RS&H Analysis

***EXHIBIT 6-8***
***NON-AERONAUTICAL REVENUES 2007 TO 2016***



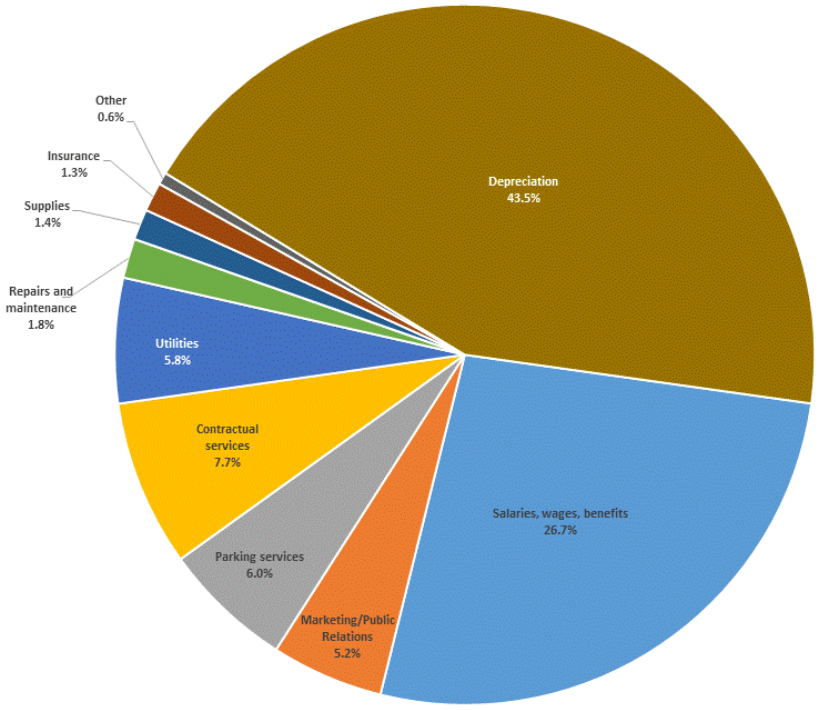

Source: Bishop International Airport Authority – RS&H Analysis

## Operating Expenses

Operating expenses are all expenses associated with the operation of the airport. In 2016 depreciation was the largest operating expense accounting for 43.5 percent of the total operating expenses. Salaries, wages and benefits followed at 26.7 percent and contractual services and parking services followed at 7.7 and 6.0 percent respectively. *Exhibit 6-9* presents a breakdown of the 2016 operating expenses.

*Exhibit 6-10* shows the variation of operating expenses between 2007 and 2016. Overall operating expenses have increased at an ACGR of 6.1 percent though this increase has been heavily impacted by changes in federally mandated accounting practices beginning in 2014[48] on how depreciation is presented in financial statements. Operating expenses without depreciation increased at an ACGR of 3.4 percent between 2007 and 2016.

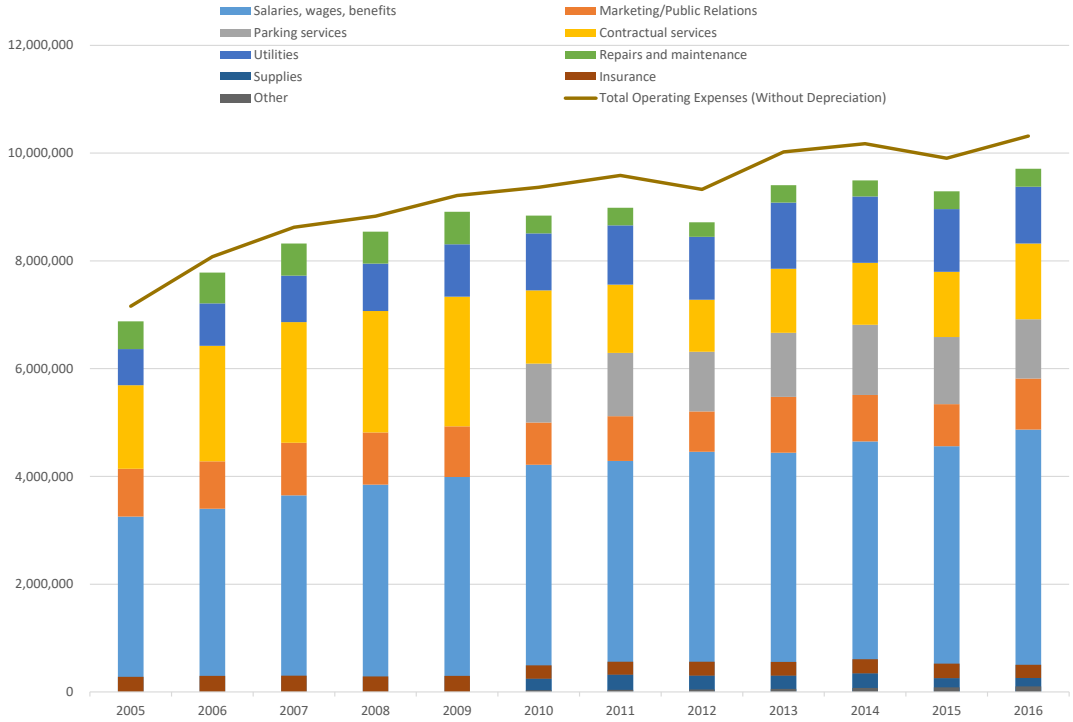
***EXHIBIT 6-9***
***BREAKDOWN OF OPERATING EXPENSES FOR 2016***




Source: Bishop International Airport Authority 2016 Financial Statements – RS&H Analysis

[48] New Governmental Accounting Standards Board (GASB) requirements on financial reporting

***EXHIBIT 6-10***
***OPERATING EXPENSES 2007 TO 2016***



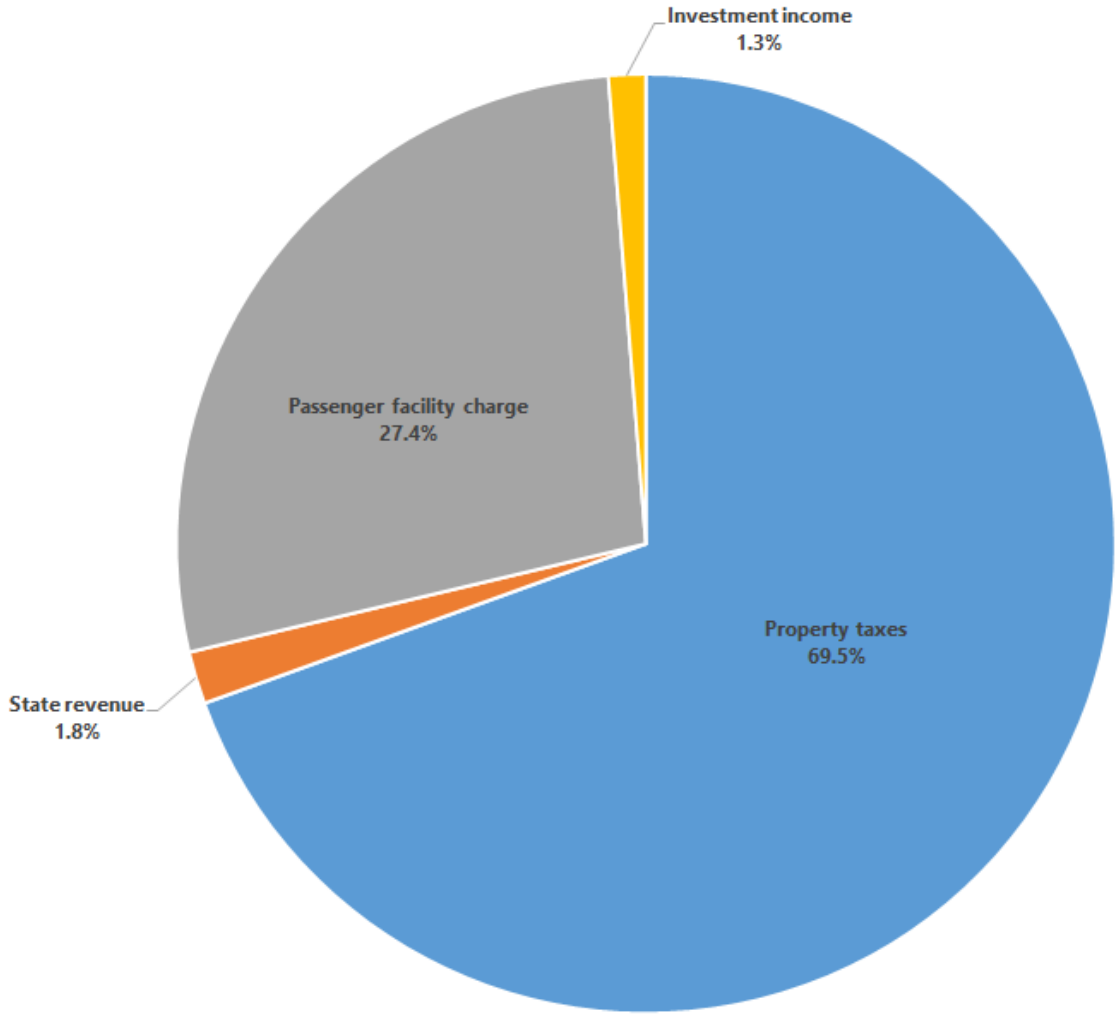

Source: Bishop International Airport Authority 2016 Financial Statements – RS&H Analysis

## Non-Operating Revenues and Expenses

Non-operating revenues and expenses are those revenues and expenses that come from sources not directly related to the operation of the airport. Non-operating revenues include revenue provided by the State to the airport, property taxes, investment income, gain on the sale of assets and passenger facility charges. These revenues generally have restrictions on how and where they can be used for airport operations and development expenses. Non-operating expenses also include interest expenses and amortization of prepaid bond insurance.

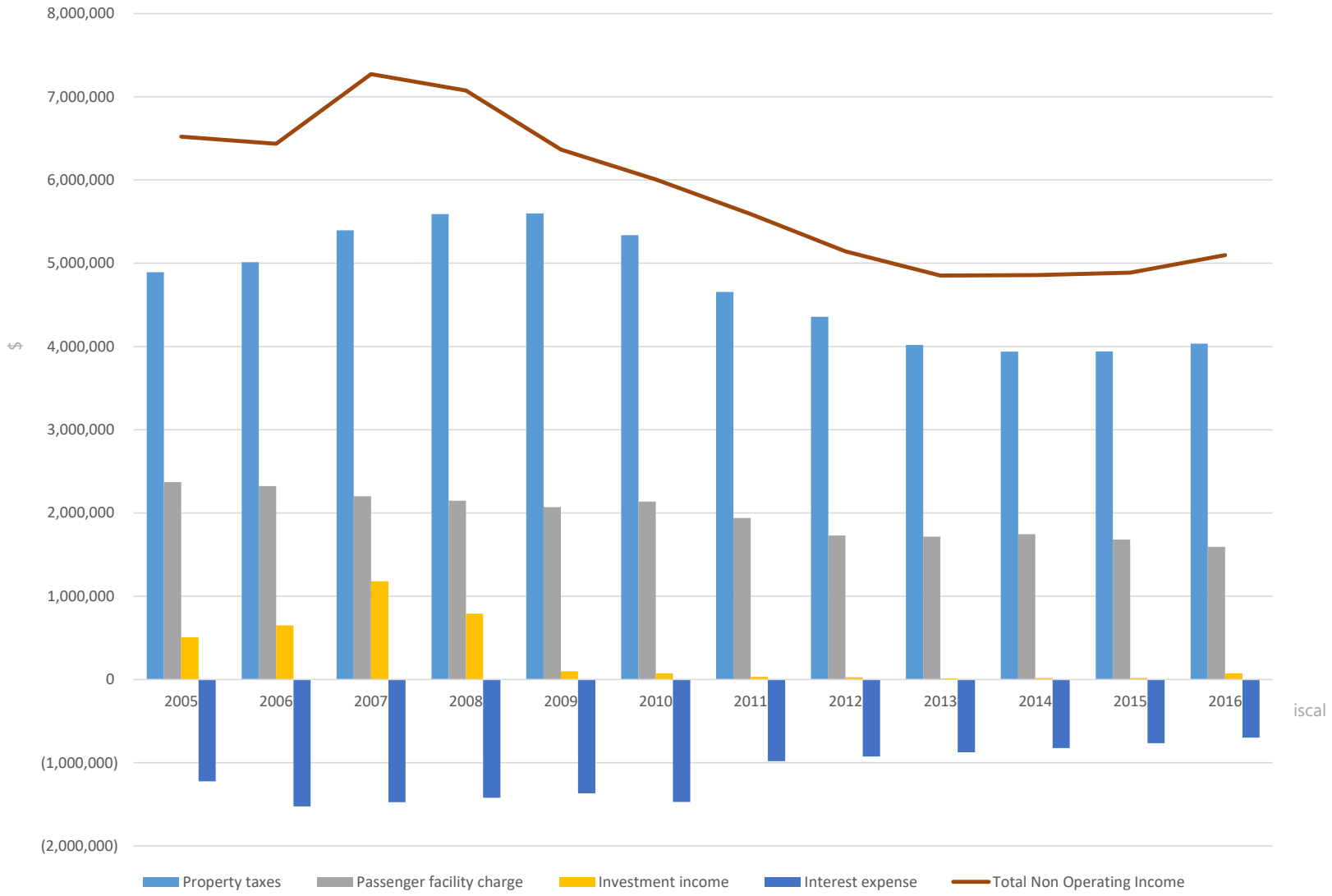
*Exhibit 6-11* presents a breakdown by percentage of the main contributors to non-operating revenues for 2016. As observed, property taxes and passenger facility charges account for 69.5 and 27.4 percent of the non-operating revenues respectively. *Exhibit 6-12* shows non-operating revenues and expenses between 2007 and 2016. Property tax revenues, the largest contributor to non-operating revenue, decreased at an ACGR of 1.7 percent, while Passenger Facility Charges (PFC) have decreased at an ACGR of 3.6 percent during the same period. Overall total non-operating revenues have decreased at ACGR of 2.1 percent and non-operating expenses have also decreased at an ACGR of 4.9 percent between 2007 and 2016. Overall non-operating income (total non-operating revenues minus total non-operating expenses) decreased at ACGR of 2.2 percent between 2007 and 2016.

***EXHIBIT 6-11***
***BREAKDOWN OF NON-OPERATING REVENUES 2016***




Source: Bishop International Airport Authority 2016 Financial Statements – RS&H Analysis

***EXHIBIT 6-12***
***MAIN NON-OPERATING REVENUES AND EXPENSES 2007 TO 2016***




Source: Bishop International Airport Authority 2016 Financial Statements – RS&H Analysis

### 6.5.2 Airport Funding Sources

Funding for the airport's capital development program typically comes from external sources including federal, state, local, and private funding and internal airport funds including the issuance of short and long-term debt that is guaranteed by airport revenues. When identifying potential funding sources, it is critical to examine each project element to determine its eligibility for each program or funding source. The following sections describe primary external funding sources which may be available to provide the necessary capital for the preferred 20-year CIP.

**Federal Funding Sources**

Federal funding sources include the FAA-managed Airport Improvement Program which provides grants for the planning and development of projects at public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS) and meet specific project eligibility requirements. Funds obligated for the AIP are drawn from the Airport and Airway Trust Fund (Trust Fund), which is supported by user fees, fuel taxes, and other similar revenue sources. Trust Fund revenue resources are shown in *Table 6-2*.

***TABLE 6-2***
***AIRPORT AND AIRWAY TRUST FUND TAX REVENUE SOURCES***

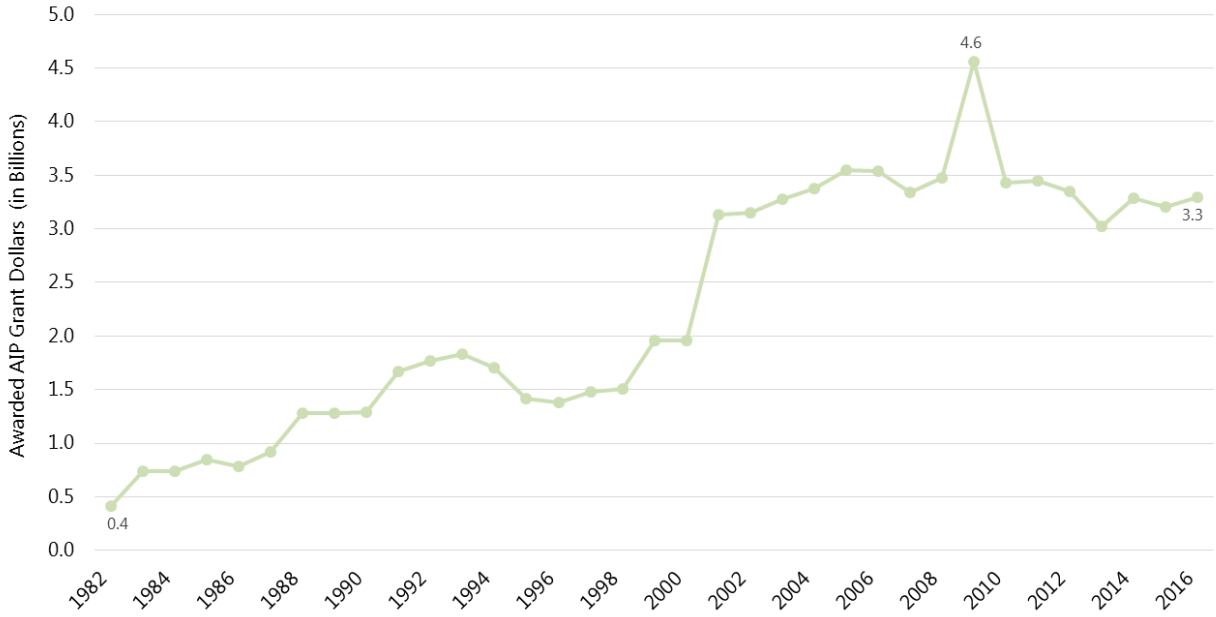
| Tax or Fee | |
|---|---|
| Passenger ticket tax | 7.5% |
| Flight segment tax (CY 2017)[1] | $4.10 |
| Cargo waybill tax | 6.25% |
| General aviation gasoline tax[2] | 19.4 cents/gallon |
| General aviation jet fuel tax (kerosene) | 21.9 cents/gallon |
| Commercial jet fuel tax (kerosene) | 4.4 cents/gallon |
| International arrival/departure tax | $18.00 |
| Tax on transportation between continental U.S. and Alaska/Hawaii | $9.00 |
| Fractional ownership surtax on general aviation jet fuel | 14.1 cents/gallon |

Notes: [1]Rate as indexed annually by the Consumer Price Index beginning January 1, 2002. Passenger Facility Charges currently capped at $4.50. [2]Does not include 0.1 cent/gallon tax for Leaking Underground Storage Tank Trust Fund.

Source: Congressional Research Service, *the Airport and Airway Trust Fund: An Overview*, January 31, 2017

The majority of Trust Fund revenues are supported by a tax on commercial passenger ticket sales which are paid by users of commercial airlines. As a result, the amount of aviation taxes generated in a given year to support the Trust Fund is dependent upon the national level of commercial aviation activity and total revenues generated from these activates. Historic annual AIP grant award totals to all airports in the system can be seen in *Exhibit 6-13*.

***EXHIBIT 6-13***
***HISTORIC TOTAL FEDERAL AIP GRANT AWARDS***




Source: Federal Aviation Administration Grant History Database, Retrieved August 2017

AIP entitlement grants are offered annually based on the airport's number of passenger enplanements and the amount of enplaned cargo (by weight). AIP discretionary grants are offered competitively depending on the availability of funds and through the FAA's assessment of need and priority via the National Priority System (NPS). When the AIP has more than $3.2 billion available in a FFY, additional discretionary funding may be available. Large and medium primary hub airports can receive 75-80 percent of eligible project costs and small primary, reliever, and general aviation airports can receive 90-95 percent of eligible costs. Bishop Airport is classified as a small hub commercial service with Federal AIP project funding eligibility of 90 percent. FAA Order 5100.38D, *Airport Improvement Program Handbook* details the grant process, project eligibility, allowable costs, and other information relevant to grant acceptance. Under the AIP, FNT has three potential avenues for receiving federal AIP grant funding:

- Passenger Entitlement
- Discretionary[49]
- Cargo Entitlement

[49] The Small Airport Fund is also available to FNT, however, this is not an actual set-aside fund. It is merely a calculation to ensure a required level of discretionary funding is used for small airports. For airports collecting PFC's, 87.5% of passenger entitlement funds are required to be reduced from large and medium hub airports. This is used to calculate the fund and, of this, 1/7 is committed to small hub airports as discretionary funding.

### Passenger Entitlement Funding

One of the most common types of federal funding for airports is passenger entitlement grants funded through the AIP, which is administered by the FAA. The amount of the grant is determined by the number of enplaning passengers in a given year. Under the program, FNT is defined as a "Primary Airport", having 10,000 or more enplanements and is therefore entitled to receive an annual funding of either $650,000-$22,000,000, or $1,000,000-$26,000,000, dependent upon the available AIP funds in the FY. If total AIP funds allocated by Congress are above $3.2 billion, the latter applies and, if less, the former. AIP Entitlement funds for FNT cover 90 percent of total eligible project costs and require a 10 percent local match. *Table 6-3* shows the apportionments by enplaned passengers under the two previously discussed AIP availability scenarios.

***TABLE 6-3***
***PASSENGER ENPLANEMENT ENTITLEMENT FUNDS CALCULATIONS***

| Passenger Enplanements | AIP Fund Calculation if less than $3.2B Available ($ per passenger) | AIP Fund Calculation if more than $3.2B Available ($ per passenger) |
|---|---|---|
| First 50,000 | $7.80 | $15.60 |
| Next 50,000 | $5.20 | $10.40 |
| Next 400,000 | $2.60 | $5.20 |
| Next 500,000 | $0.65 | $1.30 |
| Over 1,000,000 | $0.50 | $1.00 |

Source: FAA Order 5100.38D, *Airport Improvement Program Handbook*, Table 4-1 (September 30, 2014)

### Cargo Service Entitlement Grants

While originally designed to provide a source of reliable funding for commercial service airports providing passenger service, the AIP also provides entitlement funding airports that move air cargo. According to FAA Order 5100.38D, *Airport Improvement Program Handbook*, airports that move more than one million pounds of landed weight annually can use this type of entitlements.

Per FAA Order 5100.38D, cargo entitlement funding is 3.5 percent of total AIP available for grants. These grants are divided on a pro-rata basis according to the airport's share of total U.S. landed cargo weight. If available AIP funds are less than $3.2 billion, no more than 8 percent of the total cargo entitlement may be apportioned to any one airport. FNT currently handles over 24.5 million pounds of air cargo per year making it eligible to receive this funding

### Discretionary Grants

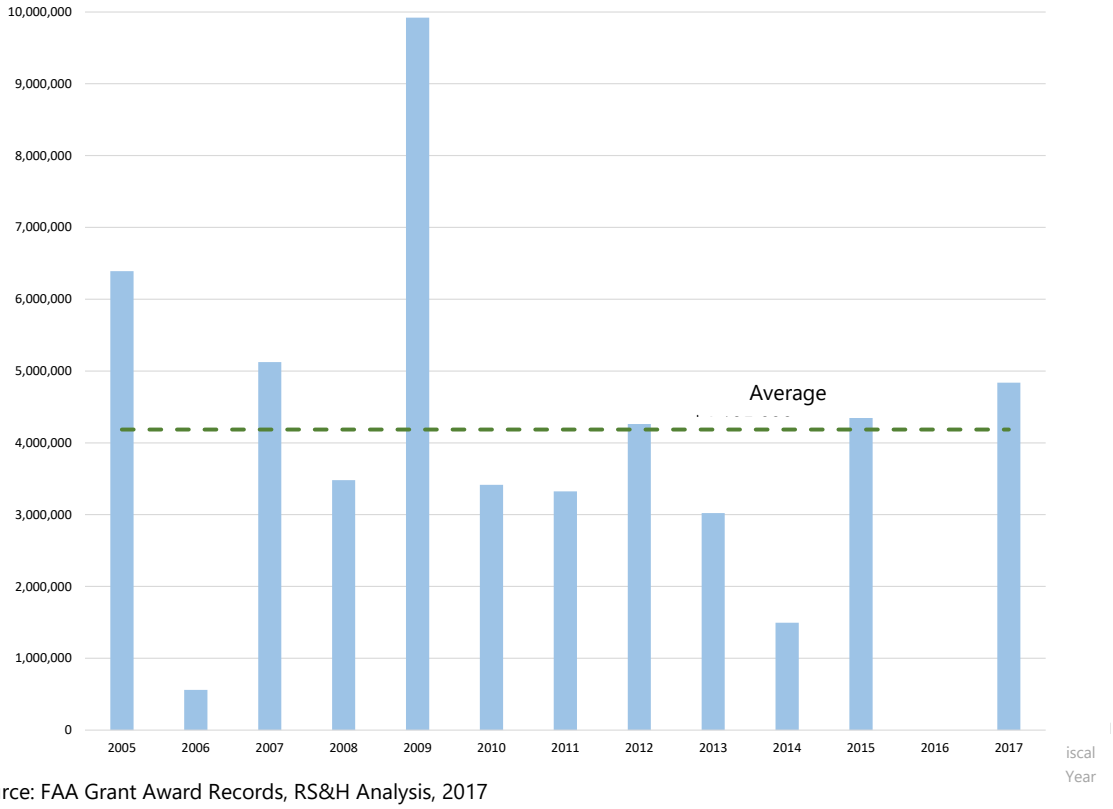
Discretionary grants are based upon commitments to certain eligible development projects at the option of the FAA. Discretionary grants are available for use by most types of public use airports, including FNT. Discretionary grant funding is made up of two classes of funding: set-aside funds and the remaining funds. The set-aside funds are allocated for noise compatibility and military airport programs, as well as certain set-aside funding for airport types. Many factors will affect the amount of discretionary funding available in a given year. The remaining discretionary grant funds are distributed to airports based on a priority system for projects that enhance safety, improve security, meet standards, and add capacity, in that

order. The FAA has established the NPS to assist in deciding how to allocate AIP discretionary grants according to these priorities.

### Total AIP Funds Received by FNT

*Exhibit 6-14* shows the historic AIP grant award amounts for FNT from Federal Fiscal Years (FFY) 2005 to 2017 and a line showing the average amount of grants received since 2005. Years with large grant awards correlate with discretionary funding allocations for large projects at FNT.

***EXHIBIT 6-14***
***TOTAL AIP GRANTS FY 2005 TO 2017***




Source: FAA Grant Award Records, RS&H Analysis, 2017

*Table 6-4* shows a list of AIP grant amounts awarded to FNT since 2005 and their use. FNT has used 66.4 percent of these grants on airfield related eligible projects, 31.8 percent on terminal related projects and 1.8 percent on land acquisition.

***TABLE 6-4***
***USE OF AIP GRANTS AT FNT***

| Grant Number | Use | Amount | FFY |
|---|---|---|---|
| 38 | Improve Terminal Building | $289,750 | 2005 |
| 39 | Improve Terminal Building | $6,101,850 | 2005 |
| 40 | Expand Apron | $346,750 | 2006 |
| 41 | Install Airfield Guidance Signs, Light Obstructions, Remove Obstructions | $213,091 | 2006 |
| 42 | Expand Apron | $2,623,510 | 2007 |
| 43 | Construct Apron | $2,500,000 | 2007 |
| 44 | Acquire Land for Development, Construct Sand and Chemical Storage Building, Construct Taxiway, Expand Apron | $2,576,029 | 2008 |
| 45 | Acquire Land for Development | $903,719 | 2008 |
| 46 | Construct Taxiway | $4,565,767 | 2009 |
| 47 | Rehabilitate Apron | $3,505,537 | 2009 |
| 48 | Rehabilitate Apron | $1,848,902 | 2009 |
| 49 | Expand Terminal | $3,415,159 | 2010 |
| 50 | Expand Terminal | $3,324,818 | 2011 |
| 51 | Expand Terminal | $2,819,237 | 2012 |
| 52 | Rehabilitate Apron | $1,441,766 | 2012 |
| 53 | Acquire Snow Removal Equipment, Rehabilitate Taxiway, Rehabilitate Taxiway Lighting | $3,022,666 | 2013 |
| 54 | Acquire Aircraft Rescue & Fire Fighting Vehicle, Conduct Miscellaneous Study, Construct Deicing Containment Facility, Install Runway Incursion Marking (14 CFR Part 139), Rehabilitate Runway - 18/36, Rehabilitate Runway Lighting - 18/36 | $1,496,604 | 2014 |
| 55 | Install Runway Incursion Marking (14 CFR Part 139), Rehabilitate Runway - 18/36, Rehabilitate Runway Lighting - 18/36, Remove Obstructions | $4,387,392 | 2015 |
| 56 | Construct Taxiway, Install Runway Incursion Marking, Rehabilitate Taxiway, Rehabilitate Taxiway Lighting, Remove Obstructions | $4,838,646 | 2017 |
| | **Total** | **$50,221,193** | |
| | **Average** | **$4,185,099** | |

Source: FAA Grant Award Records, RS&H Analysis, 2017

### Passenger Facility Charges

The Passenger Facility Charges (PFC) Program is available to fund certain qualified capital development projects at publicly controlled commercial passenger service airports. This program allows FAA approved airports the ability to collect PFC's of up to $4.50 per enplaned passenger. PFC's are capped at a maximum of $4.50 per flight segment with a maximum of two PFC's charged on a one-way trip, or four PFC's charged on a round trip, for a maximum total of $18.00. Projects must be FAA-approved to qualify for using these

funds. Eligible projects include those which enhance safety, security, or capacity; reduce noise; or increase air carrier competition.

PFCs are collected by air carriers when tickets are sold and are then later remitted to the airport, less a handling fee negotiated with the airlines per collected PFC. FNT was first approved for application to impose and collect PFC's beginning June 1, 2001. Since then, the airport has received approval from the FAA for one more PFC application, the last of which (PFC#2) is presently collecting at a $4.50 rate with an approved expiration date of August 1, 2020. The airport has received approval to collect and use a total of $42,304,023 in PFC funds since its first application. As of December 31, 2016, Bishop Airport has used $35,586,116 of the approved PFC collection amount. The remaining $6,717,907 are committed to pay interest on bonds and for the latest expansion of the passenger terminal. It should be noted that Congressional action currently under review[50] could raise the PFC rate cap, therefore creating the potential for additional available funding for qualifying projects.

*Table 6-5* shows the approved amounts of PFC funds by eligible project at FNT. Over 95 percent of all PFC approved funds have been used on terminal related projects and on the payment of interest on bonds issued to cover terminal projects. The remaining 5 percent of authorized PFCs have been used on airfield and landside related projects.

***TABLE 6-5***
***USE OF PFC FUNDS AT FNT***

| Project | PFC Project Number | PFC Approved Amount |
|---|---|---|
| Acquisition in Bristol Road Right of Way | 01-001 | $880,502 |
| East air carrier apron | 01-002 | $351,710 |
| Interest on Bonds | 01-003 | $15,044,478 |
| Terminal Access Roadway Phase I and II | 01-004 | $125,659 |
| Terminal Construction | 01-005 | $13,989,477 |
| Terminal Security System | 01-006 | $52,652 |
| Sand Storage Building | 02-001 | $54,904 |
| Removal of Runway 5/23 | 02-002 | $10,271 |
| Taxiway B Construction | 02-003 | $124,877 |
| Air cargo apron rehabilitation & Conversion | 02-004 | $155,275 |
| Terminal Improvements | 02-005 | $630,400 |
| Terminal Expansion | 02-006 | $9,017,621 |
| Acquisition and installation of passenger | 02-007 | $1,786,098 |
| Terminal apron rehabilitation | 02-008 | $80,099 |
| **Total Approved PFC** | | **$42,304,023** |

Source: FAA 2017 List of Approved Application and Bishop International Airport Authority

### Customer Contract Fees

The Authority has implemented for over ten years a Customer Contract Fee program which at other airports in the country is referred to as a Customer Facility Charges (CFC) program. The CCF is another

[50] As of December 13, 2017, Congress is still reviewing whether to approve an increase in PFC collection limits.

source of revenues to the Authority that are limited to the funding of rental car facilities, associated infrastructure and their operating costs. The CCF is a charge paid by rental car customers per car rental contract for a vehicle that has been rented at the Airport. Unlike PFC's, CCF's do not require approval from the FAA or any other Federal agency. CCFs are negotiated and implemented contractually between the Authority and the rental car companies and are collected under specific terms including how funds can be used. CCF revenue is limited to funding rental car facilities and associated infrastructure and the Authority's rental car related operating and maintenance expenses. The Authority has implemented a $3.00 CCF per car rental contract regardless of the number of days cars are rented. *Table 6-6* shows annual revenues amounts collected by the Authority from CCFs between fiscal 2008 and 2017.

***TABLE 6-6***
***ANNUAL CUSTOMER CONTRACT FEES***

| Year | CCF |
|---|---|
| 2008 | $182,328 |
| 2009 | $148,029 |
| 2010 | $137,997 |
| 2011 | $149,235 |
| 2012 | $153,558 |
| 2013 | $156,024 |
| 2014 | $169,462 |
| 2015 | $186,756 |
| 2016 | $188,454 |
| 2017 | $202,875 |

Source: Bishop International Airport Authority

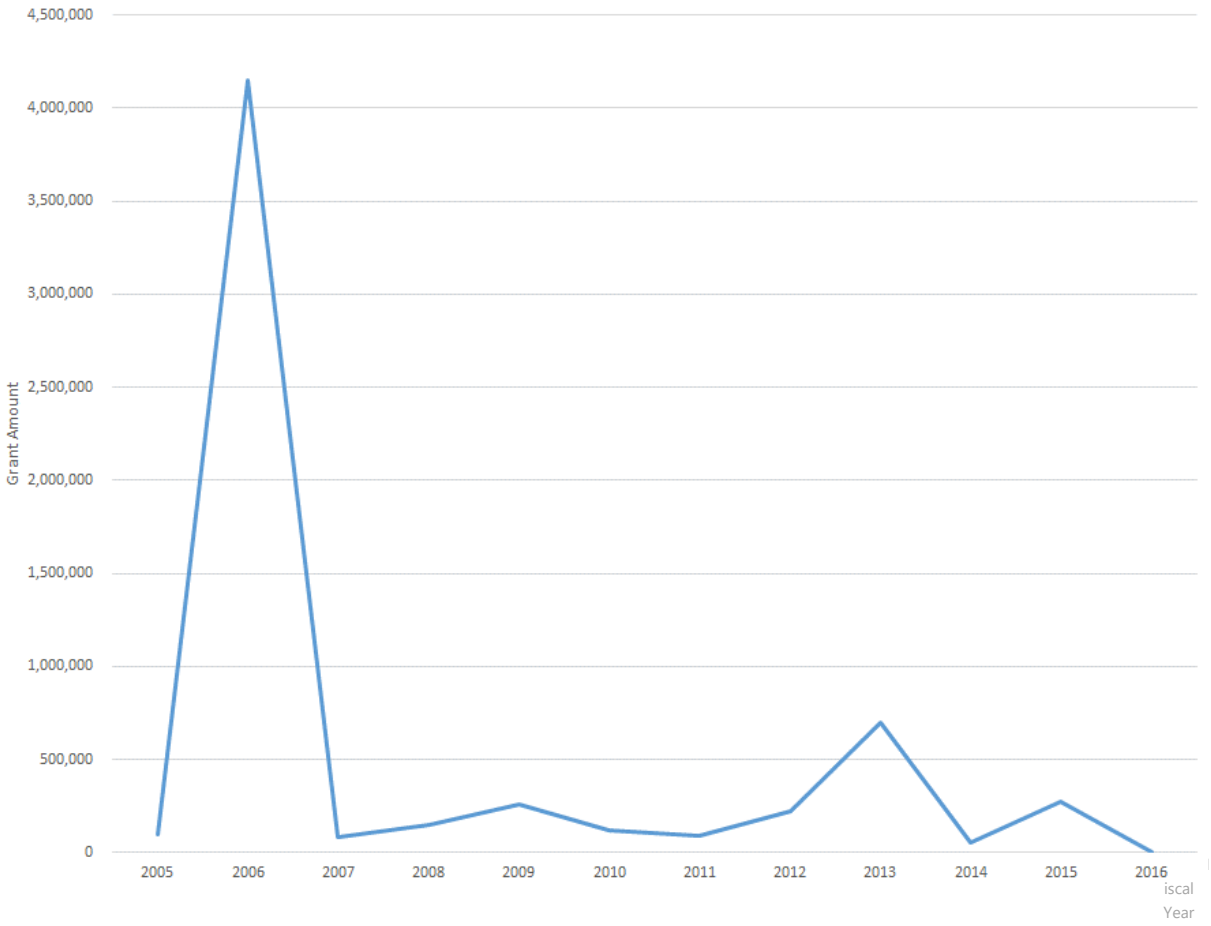
## State and Local Funding Sources

### State Funding Sources

State funding for various project types has been provided to airports throughout Michigan by the Office of Aeronautics which is part of the Michigan Department of Transportation. Michigan is one of the few states in the country that pays upfront invoices submitted on federally funded projects before being reimbursed by the Federal Government. A recent change in policy will require the Office of Aeronautics to pay up to the last 10 percent of the federal share of federally funded projects for primary airports. Once 90 percent of the federally funded portion of a project is paid invoices on the remaining 10 percent of the federal share of a project will be paid by the airport sponsor and not by the State. Additionally, airport sponsors and the State are still responsible for the ten percent match of the federally funded project portion.

*Exhibit 6-15* shows the total annual grant amounts provide by the State for infrastructure projects at FNT between 2005 and 2016. Excluding the out of the ordinary grant provided by the State in 2006 for expansion of the passenger terminal, State funding has averaged just over $200,000 annually.

***EXHIBIT 6-15***
***STATE GRANTS 2005 TO 2016***




Source: Bishop International Airport Authority

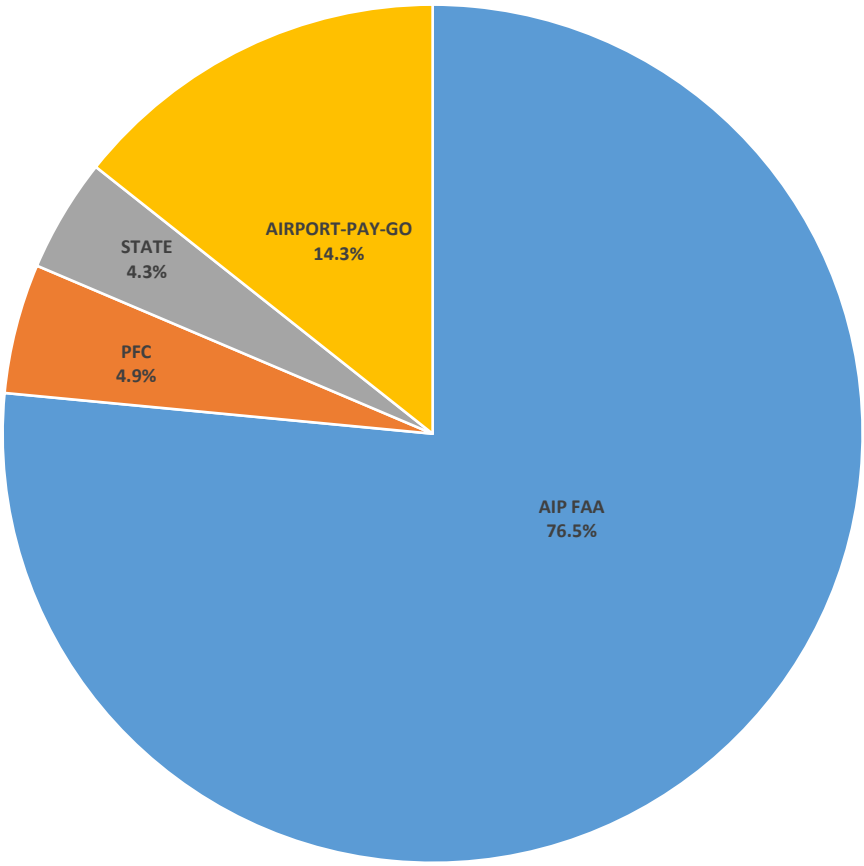
**Local Funding Sources**

The airport occasionally receives contributions in the form of grants from local sources for capital development projects, with the Charles Stewart Mott Foundation being the main contributor. From the early 1980's the Foundation has provided occasional grants to FNT. Between 2006 and 2010 the Foundation provided $8.5 million to assist in the funding of the airport's intermodal center that houses major air cargo facilities.

**Total Airport Grants and Share**

*Exhibit 6-16* shows a breakdown of funding for completed capital projects between 2009 and 2016. As observed AIP grants are by far the largest source of funding of capital projects at FNT with over 76.5 percent. Airport has contributed from its own funds to 14.3 percent of capital projects.

***EXHIBIT 6-16***
***BREAKDOWN OF FUNDING SOURCES OF CAPITAL PROJECTS (2009-2016)***




Source: Bishop International Airport Authority FAA CATS Report Form 127 RS&H Analysis

## Issuance of Public (Authority) Debt

Proceeds from the issuance of General Airport Revenue Bonds (GARB) and other types of municipal bonds are a common source of funding for airport sponsors in the United States. To obtain the funds, airports seek access to the capital markets on reasonable terms for short-, mid-, and long-term financing needs. The most commonly used financing instruments to fund major airport capital development programs are tax-exempt General Obligation Bonds and General Airport Revenue Bonds.

Throughout its existence the Bishop International Airport Authority has issued long-term debt in the form of bonds for the funding of capital projects. In 2010 the Authority issued the following bonds:

- Series 2010-A Limited Tax General Obligation Refunding Bonds - These bonds were issued in the amount of $10,910,000, for the purpose of refunding outstanding 1999-A Limited Tax General Obligation Refunding Bonds. Final payment on these bonds is due in December 2023. The 1999-A bonds were issued in 1999 to refund bonds that were issued in 1991, 1992 and 1995 which were used for the construction of FNT's original passenger terminal and for the construction of T-Hangars.

- Series 2010-B Airport Revenue Refunding Bonds - These bonds were issued in the amount of $7,560,000, for the purpose of refunding the Authority's outstanding 1999-B Airport Revenue Bonds. Final payment on these bonds was due in December 2017. The 1999B Bonds which were issued to add on to the terminal on the airside (east end) and to acquire land for the economy lot.

- 2003A Bonds were issued in 2003, in the amount of $9,150,000, for the purpose of paying and reimbursing the Authority for part of the cost to expand the landside terminal ticket counter area; acquire land to enlarge the economy lot, to improve existing airport parking and paying the cost of issuing the bonds. Final payment is due in December 2023.

*Table 6-7* shows outstanding balances on these bonds and their rating as of December, 2016. *Table 6-8* shows the annual payment requirements of principal and interest (excluding amortization of issuance and other originations costs) on these bonds.

***TABLE 6-7***
***OUTSTANDING LONG-TERM DEBT***

| Bond | Final Maturity | Original Issuance Amount | Principal Balance 12/31/2016 | Rating |
|---|---|---|---|---|
| 2010A- Limited Tax General Obligation Refunding Bonds | 12/1/2023 | $10,910,000 | $9,895,000 | Moody's A1 |
| 2010B Airport Refunding Revenue Bonds | 12/1/2017 | $7,560,000 | $860,000 | Moody's Baa3 |
| 2003A Airport Revenue Bonds | 12/1/2023 | $9,150,000 | $4,325,000 | Moody's Baa3 S&P Bbb+ |
| **Total** | | | $15,080,000 | |

Source: Bishop International Airport Authority 2016 Financial Statements

***TABLE 6-8***
***ANNUAL PAYMENT REQUIREMENTS OF AIRPORT BACKED BONDS***

| Year | Principal | Interest | Total |
|---|---|---|---|
| 2017 | $1,930,000 | $581,971 | $2,511,971 |
| 2018 | $2,000,000 | $513,036 | $2,513,036 |
| 2019 | $2,070,000 | $444,434 | $2,514,434 |
| 2020 | $2,145,000 | $370,825 | $2,515,825 |
| 2021 | $2,225,000 | $290,283 | $2,515,283 |
| 2022-2023 | $4,710,000 | $315,508 | $5,025,508 |
| Total Debt Payments | $15,080,000 | $2,516,057 | $17,596,057 |

Source: Bishop International Airport Authority 2016 Financial Statements

### 6.5.3 Capital investment Plan Funding Outlook

Potential funding sources available to the Authority for the funding of the proposed 20-year CIP at FNT include FAA AIP entitlement and possible discretionary grants, PFCs, CFCs, State contributions, airport revenues, local grants and third party private investment. Considering the history of funding of CIP projects at FNT it is expected that a majority of funding will be provided from AIP entitlement and AIP discretionary funds, followed by PFCs, airport revenues, and State funding.

#### AIP Passenger Entitlement Funding Outlook

For the purpose of determining passenger entitlement grants apportioned in 2018, the FAA uses the number of enplaned passengers at each airport in calendar year 2016. FNT enplaned 398,058 passengers in CY 2016 and therefore can budget for $2,849,902 in AIP passenger entitlement grants for Federal Fiscal Year 2018. Total projected AIP passenger entitlements during the short-term development period (2018-2022) reaches approximately $15 million[51] and over $65 million[6] for the entire 20-year planning period, based on the passenger forecast provided in *Chapter 2, Aviation Demand Forecast*. Projects within the CIP which are eligible (in some cases only partially eligible) for AIP Passenger Entitlement funding include those focused on airfield maintenance and improvements, terminal area apron development, environmental reviews, and airport planning studies. Equipment used for Airport Rescue and Fire Fighting (ARFF), deicing, and aircraft navigation is also eligible for AIP passenger entitlement funding. Details on specific CIP projects will be provided later in this chapter.

#### AIP Discretionary Funding Outlook

The potential of receiving discretionary funding is determined by the FAA through a system which ranks airport CIP projects according to need based on criteria which focus on enhancing safety, improving security, meeting FAA design standards, and adding needed capacity. Between the years of 2007 and 2017, FNT was successful in securing only $807,000 of discretionary funding. Based on FAA's criteria associated with discretionary funding allocation and the type of projects considered in the current CIP update for FNT, $11,357,628 in discretionary funding has been programmed into the Bishop Airport CIP over the entire 20-year planning period. $5,582,628 of this is expected to come during the short-term development phase to be used for the rehabilitation of Runway 9-27 and its shoulders.

#### Passenger Facility Charge Funding Outlook

Considering passenger demand forecasts for the 20-year planning period, at a $4.50 PFC, a payment of $0.11 per collected PFC and a historic 95 percentage factor of enplaned passengers paying PFC the Airport has the potential to collect approximately $34.5 million over the 20-Year planning period. PFC funding is expected to be primarily used to fund eligible portions of major terminal and airfield improvements included in the CIP over the planning period.

#### Customer Contract Fee Funding Outlook

Customer Contract Fees (CCFs) have been collected for over ten years at FNT and are currently collected at a rate of $3.00 per rental contract. As shown previously in *Table 6-6* total CCFs collections for FY 16 and FY 17 were $188,454 and $202,875 respectively. At a $3-dollar CCF these amounts would account

[51] Projected AIP Passenger Entitlement grant assumes the AIP program continues to be funded at the $3.2 billion level or above and no legislative actions occur which alter federal funding levels.

for 62,818 and 67,625 rental contracts for FY 16 and FY17 respectively. CCF revenues to the Authority have been increasing at ACGR of 5.7 percent since 2010 despite a decline of 2.2 percent in enplaned passengers for the same period. If CCFs are projected at the same ACGR that has been experienced since 2010 the Authority would have the potential to collect $7,602,580 through the 20-Year planning period which wouldn't be sufficient to pay for expected rental car improvements included in the 20-Year CIP.

Other airports of similar size and nature to FNT have developed their CCF programs considering a charge not based on a per rental car contract basis but on a per rental car transaction day basis. Approximately 86 percent of airports in the United States that have a CFC program use this approach to collect CFCs. *Table 6-9* shows the daily CFC at various airports throughout the country of similar size and type as FNT.

***TABLE 6-9***
***DAILY CFC AT VARIOUS AIRPORTS PER TRANSACTION DAY***

| GRR | DET | EUG | LBB | BIL | ELP | DAY | LEX | AMA | PIE | TOL | RIC | MDT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $3.00 | $1.00 | $3.00 | $3.50 | $3.00 | $3.50 | $4.50 | $2.50 | $3.00 | $4.00 | $2.00 | $3.00 | $3.75 |
| **Average** | **$3.06** | | | | | | | | | | | |

Source: Avis.com and RS&H Analysis

If the Authority would opt to change its CCF program, to a program that is more in line with the one adopted by other airports of its size it would be able to pay for the proposed rental car facility improvements proposed in the 20-Year CIP. For this the Authority would collect from the rental car company a CFC based not on a per rental car contract but on the number of rental car days at $2.90 per rental car day without having to issue debt. This amount is comparable to the CFC of most of the airports in Table 6-9. Under this premise and considering that at FNT the average number of rental days per contract is 4, cumulative revenues from the CFC would be approximately $8.8 million by year 2026 which is the year proposed in the CIP for the development of the new rental car facilities.

### State Funding

As previously discussed the State through the Office of Aeronautics provides a portion of the required matching funds for federally funded projects. For the past 10 years the State has provided an average of 5 percent of the federal funds provided by the FAA for AIP eligible projects. It is estimated that the State will continue to contribute the same percentage of federal project to FNT CIP.

### Third Party Funding Outlook

Third party funding from private donations, investors and developers is another source of funding for airport related infrastructure projects. Caution should be taken when using this funding source to avoid agreements which infringe upon the airports grants assurance requirements. Despite the important contributions to various essential infrastructure projects at FNT from the Charles Stewart Mott Foundation for various airport infrastructure projects no grants from the Foundation were considered for the funding of the proposed 20-Year CIP.

Third party investments for the development of corporate hangars and associated infrastructure should be considered as a potential funding option for these type of commercial developments.

## Other Potential Funding Sources

Funding for specific and specialized equipment to be used for security functions of passengers and baggage at FNT is available from the Department of Homeland Security (DHS). It is expected that FNT may receive federal funding through the DHS for a portions of a future in-line baggage system.

## Summary of Future Potential Funding Sources

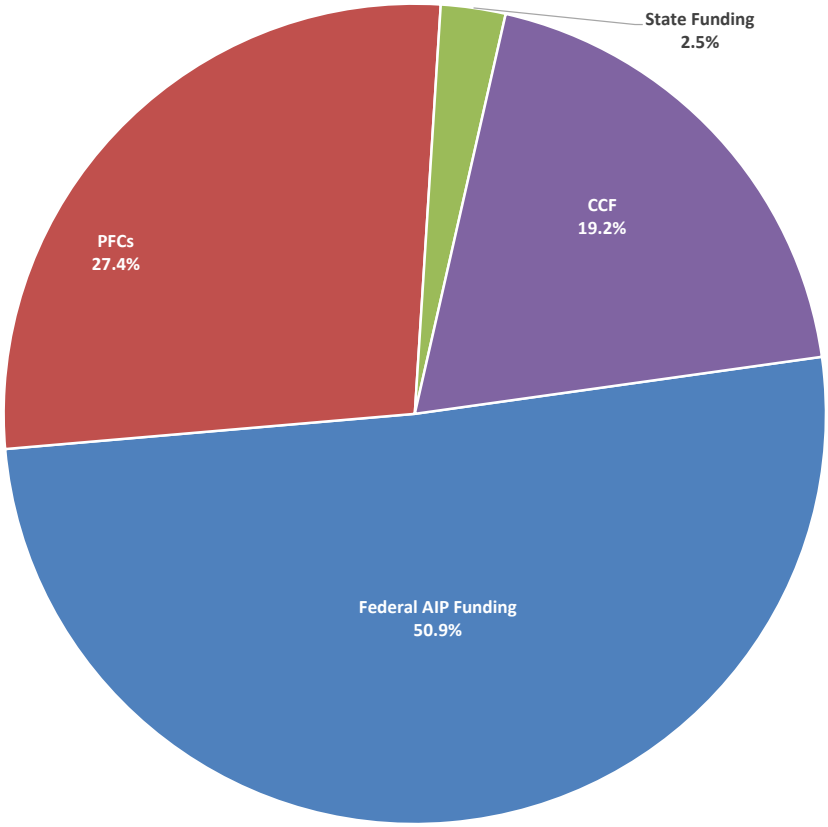
*Table 6-10* summarizes the potential funding amounts from the various sources previously described. *Exhibit 6-17* shows the potential share of available funds for the implementation of the airport's CIP for the 20-year planning period.

***TABLE 6-10***
***HISTORIC AND PROBABLE AIP, PFC, CCF AND STATE CAPITAL FUNDS***

| | Year[1] | Planning Year | Passenger Enplanements | Federal AIP Funding | | | State and Local Funding | | Customer Contract Fees (CCF) | Total Funds Available |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Passenger Entitlement | Discretionary | Total AIP 2 | Passenger Facility Charge (PFC)3 | State Funding | | |
| Actual | 2007 | | 539,387 | $5,803,463 | $0 | $5,803,463 | $2,200,240 | $84,777 | | $8,088,480 |
| | 2008 | | 527,809 | $8,253,791 | $0 | $8,253,791 | $2,147,563 | $147,532 | $182,328 | $10,731,214 |
| | 2009 | | 491,100 | $9,999,757 | $0 | $9,999,757 | $2,070,214 | $256,404 | $148,029 | $12,474,404 |
| | 2010 | | 497,297 | $4,867,099 | $807,000 | $5,674,099 | $2,136,403 | $119,849 | $137,997 | $8,068,348 |
| | 2011 | | 473,213 | $3,459,797 | $0 | $3,459,797 | $1,938,861 | $88,713 | $149,235 | $5,636,606 |
| | 2012 | | 411,676 | $4,191,584 | $0 | $4,191,584 | $1,728,222 | $220,609 | $153,558 | $6,293,973 |
| | 2013 | | 397,088 | $3,853,350 | $0 | $3,853,350 | $1,716,638 | $701,291 | $156,024 | $6,427,303 |
| | 2014 | | 419,758 | $1,013,497 | $0 | $1,013,497 | $1,743,582 | $54,342 | $169,462 | $2,980,883 |
| | 2015 | | 411,459 | $5,230,463 | $0 | $5,230,463 | $1,681,649 | $275,288 | $186,756 | $7,374,156 |
| | 2016 | | 398,058 | $72,403 | $0 | $72,403 | $1,592,552 | $3,811 | $188,454 | $1,857,220 |
| | | | | | | | | | | |
| Projected | 2017 | | 425,101 | $2,919,587 | $0 | $2,919,587 | $1,772,884 | $145,979 | $202,875 | $5,041,325 |
| | 2018 | 1 | 430,955 | $2,849,902 | $0 | $2,849,902 | $1,797,298 | $142,495 | $214,357 | $5,004,052 |
| | 2019 | 2 | 437,104 | $2,990,525 | $5,582,628 | $8,573,153 | $1,822,942 | $428,658 | $845,556 | $11,670,309 |
| | 2020 | 3 | 444,504 | $3,020,966 | $0 | $3,020,966 | $1,853,804 | $151,048 | $893,409 | $5,919,227 |
| | 2021 | 4 | 451,313 | $3,052,941 | $0 | $3,052,941 | $1,882,201 | $152,647 | $943,972 | $6,031,761 |
| | 2022 | 5 | 457,594 | $3,091,421 | $0 | $3,091,421 | $1,908,396 | $154,571 | $997,395 | $6,151,783 |
| | 2023 | 6 | 563,632 | $3,126,828 | $0 | $3,126,828 | $1,933,577 | $156,341 | $1,053,843 | $6,270,589 |
| | 2024 | 7 | 470,121 | $3,159,489 | $0 | $3,159,489 | $1,960,640 | $157,974 | $1,113,485 | $6,391,588 |
| | 2025 | 8 | 475,853 | $3,190,886 | $0 | $3,190,886 | $1,984,545 | $159,544 | $1,176,502 | $6,511,477 |
| | 2026 | 9 | 482,236 | $3,224,629 | $0 | $3,224,629 | $2,011,165 | $161,231 | $1,243,086 | $6,640,111 |
| | 2027 | 10 | 488,987 | $3,254,436 | $0 | $3,254,436 | $2,039,320 | $162,722 | $1,313,438 | $6,769,916 |
| | 2028 | 11 | 494,990 | $3,287,452 | $0 | $3,287,452 | $2,064,356 | $164,381 | $1,387,771 | $6,903,960 |
| | 2029 | 12 | 501,433 | $3,322,732 | $0 | $3,322,732 | $2,091,226 | $166,137 | $1,466,312 | $7,046,407 |
| | 2030 | 13 | 506,981 | $3,353,948 | $0 | $3,353,948 | $2,114,364 | $167,697 | $1,549,297 | $7,185,306 |
| | 2031 | 14 | 512,820 | $3,387,452 | $0 | $3,387,452 | $2,138,716 | $169,373 | $1,636,979 | $7,332,520 |
| | 2032 | 15 | 518,939 | $3,389,100 | $5,775,000 | $9,164,100 | $2,164,235 | $458,205 | $1,729,623 | $13,516,163 |
| | 2033 | 16 | 524,655 | $3,396,700 | $0 | $3,396,700 | $2,188,074 | $169,835 | $1,827,511 | $7,582,120 |
| | 2034 | 17 | 531,568 | $3,404,700 | $0 | $3,404,700 | $2,216,904 | $170,235 | $1,930,938 | $7,722,777 |
| | 2035 | 18 | 537,606 | $3,412,100 | $0 | $3,412,100 | $2,242,086 | $170,605 | $2,040,219 | $7,865,010 |
| | 2036 | 19 | 543,955 | $3,421,100 | $0 | $3,421,100 | $2,268,564 | $171,055 | $2,155,684 | $8,016,403 |
| | 2037 | 20 | 550,441 | $3,428,900 | $0 | $3,428,900 | $2,295,614 | $171,445 | $2,277,684 | $8,173,643 |
| | | | **Totals** | $67,685,794 | $11,357,628 | $79,043,422 | $42,750,911 | $3,952,178 | $27,999,936[4] | $153,746,447 |

Source: RS&H Analysis, 2018

***EXHIBIT 6-17***
***SHARE OF POTENTIAL AVAILABLE AIP, PFC, CCF, AND STAFF FUNDS***




Source: RS&H Computation

## Future Operating Income and Capital Contribution from the Authority

### Future Operating Income

Aside from the potential funding sources for capital projects described previously, FNT is required to operate in a self-sufficient manner, meaning no City of Flint general funds are used to cover airport operating expenses.

Airport operational expenses are paid from aeronautical and non-aeronautical related revenues. Aeronautical revenues are derived from user fees (such as aircraft landings, commercial passengers, and terminal concessionary, etc.), revenue from on-airport land leases, aviation fuel flowage fees, facility rentals, and other miscellaneous activities specifically related to aviation. In addition to using operating revenue to cover operating expenses, FNT has the ability to transfer excess operating revenues into the capital fund at the end of each fiscal year. This money can then be used to fund necessary capital improvement projects.

In 2016, aeronautical related revenue made up approximately 27.5 percent of total airport revenues. Aeronautical revenues include activities such as landing fees, terminal space rent, and general aviation related fees. Non-aeronautical Airport revenue streams made up 72.5 percent of revenues, drawn from activities such as parking and ground transportation, rental car activity (excluding CFCs), terminal retail, land leases, property taxes and other miscellaneous activities.

A review of the Authority's Financial Statements for Fiscal Years 2005 to 2016 shows stable growth of operating revenues at an annual compounded growth rate (ACGR) 2.2 percent which is lower than the ACGR of operating expenses that grew at an ACGR of 3.4 percent, excluding depreciation. A closer analysis of operating revenues and expenses since 2010 shows operating revenue growth slightly outpaced operating expense growth despite a 24.6 percent drop in passenger traffic. Revenues from auto parking and the rental of facilities which account for 94.2 percent of operating revenues grew between 2010 and 2016 at an ACGR of 1.2 and 3.7 percent respectively. Salaries, wages and benefits, which represents 47.2 percent of operating revenues (excluding depreciation expenses) grew at an ACGR of 2.4 percent for the same period. Other major contributors to operating expenses including external contractual services and utilities that represent 34.5 percent of operating expenses[7] grew at an ACGR of less than 0.3 percent.

*Table 6-11* presents a breakdown of airport future expected operating revenues and expenses for FY 2017 to FY 2022 and actual values for 2016. As previously discussed major operating revenues and expenses have had moderately stable growth patterns for the past six years and, as such, have been forecasted until FY 2022. Total operating revenues have been forecasted to grow at a compounded annual growth rate (CAGR) of 1.7 percent while expenses are projected at 1.6 percent growth. Both growth rates are similar to those experienced by the airport for the past six years.

Average income before contributions to capital projects and accounting for depreciation, between 2017 and 2022, is estimated to be over $3 million, despite a moderate decline of -2.6 percent ACGR for the same period.

***TABLE 6-11***
***2016 TO 2022 OPERATING REVENUES AND EXPENSES***

| Item | 2016* | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | ACGR 2016 to 2022 |
|---|---|---|---|---|---|---|---|---|
| **Operating Revenue** | | | | | | | | |
| Parking lot fees | $4,330,778 | $4,374,086 | $4,417,827 | $4,462,005 | $4,506,625 | $4,551,691 | $4,597,208 | **1.0%** |
| Rental of facilities | $3,699,343 | $3,810,323 | $3,924,633 | $4,042,372 | $4,163,643 | $4,288,552 | $4,417,209 | **3.0%** |
| Landing fees | $334,112 | $334,112 | $334,112 | $334,112 | $334,112 | $334,112 | $334,112 | **0.0%** |
| Fuel flowage fees | $13,811 | $14,156 | $14,510 | $14,873 | $15,245 | $15,626 | $16,017 | **2.5%** |
| TSA Reimbursement | $87,870 | $87,870 | $87,870 | $87,870 | $87,870 | $87,870 | $87,870 | **0.0%** |
| Other | $59,786 | $59,786 | $59,786 | $59,786 | $59,786 | $59,786 | $59,786 | **0.0%** |
| **Total** | **$8,525,700** | **$8,680,333** | **$8,838,738** | **$9,001,018** | **$9,167,281** | **$9,337,637** | **$9,512,202** | **1.8%** |
| ***Operating Revenue per Enplaned Pax*** | **$21.42** | **$20.42** | **$20.51** | **$20.59** | **$20.62** | **$20.69** | **$20.79** | **0.4%** |
| **Operating Expenses** | | | | | | | | |
| Salaries, wages, benefits | $4,870,589 | $4,987,483 | $5,107,183 | $5,229,755 | $5,355,269 | $5,483,796 | $5,615,407 | **2.4%** |
| Marketing/Publice Relations | $947,185 | $975,601 | $1,004,869 | $1,035,015 | $1,066,065 | $1,098,047 | $1,130,988 | **3.0%** |
| Parking Services | $1,100,184 | $1,101,834 | $1,103,487 | $1,105,142 | $1,106,800 | $1,108,460 | $1,110,123 | **0.2%** |
| Contractual Services | $1,403,645 | $1,410,663 | $1,417,717 | $1,424,805 | $1,431,929 | $1,439,089 | $1,446,284 | **0.5%** |
| Utilities | $1,055,175 | $1,056,230 | $1,057,286 | $1,058,344 | $1,059,402 | $1,060,461 | $1,061,522 | **0.1%** |
| Repairs and maintenance | $332,181 | $332,513 | $332,846 | $333,179 | $333,512 | $333,845 | $334,179 | **0.1%** |
| Supplies | $259,816 | $261,115 | $262,421 | $263,733 | $265,051 | $266,377 | $267,709 | **0.5%** |
| Insurance | $244,320 | $244,320 | $244,320 | $244,320 | $244,320 | $244,320 | $244,320 | **0.0%** |
| Other | $102,864 | $108,007 | $113,408 | $119,078 | $125,032 | $131,283 | $137,848 | **5.0%** |
| Depreciation | $7,956,030 | $7,916,250 | $7,876,669 | $7,837,285 | $7,798,099 | $7,759,108 | $7,720,313 | **-0.5%** |
| **Total** | **$18,271,989** | **$18,394,016** | **$18,520,206** | **$18,650,656** | **$18,785,479** | **$18,924,786** | **$19,068,693** | **0.7%** |
| ***Operating Revenue per Enplaned Pax (without depreciation)*** | **$12.81** | **$15.08** | **$15.99** | **$16.73** | **$18.76** | **$18.83** | **$20.26** | **0.1%** |
| ***Operating Income (Loss)*** | -$9,746,289 | -$9,713,683 | -$9,681,468 | -$9,649,638 | -$9,618,198 | -$9,587,149 | -$9,556,491 | **10.9%** |
| **Non Operating Revenue (Expense)** | | | | | | | | |
| Property taxes | $4,034,284 | $3,953,598 | $3,874,526 | $3,797,036 | $3,721,095 | $3,646,673 | $3,573,740 | **-2.0%** |
| State Revenue | $104,947 | $104,947 | $104,947 | $104,947 | $104,947 | $104,947 | $104,947 | **0.0%** |
| Passenger facility charge | $1,592,552 | $1,528,850 | $1,467,696 | $1,408,988 | $1,352,629 | $1,298,523 | $1,246,582 | **-4.0%** |
| Investment income | $74,374 | $74,374 | $74,374 | $74,374 | $74,374 | $74,374 | $74,374 | **0.0%** |
| Interest expense | -$700,336 | -$619,797 | -$548,521 | -$485,441 | -$429,615 | -$380,209 | -$336,485 | **-11.5%** |
| Amoritization of prepaid bond insurance | -$20,090 | -$16,273 | -$13,181 | -$10,677 | -$8,648 | -$7,005 | -$5,674 | **-19.0%** |
| Gain on sale of assets | $11,041 | $11,041 | $11,041 | $11,041 | $11,041 | $11,041 | $11,041 | **0.0%** |
| **Total** | **$5,096,772** | **$5,036,740** | **$4,970,882** | **$4,900,268** | **$4,825,823** | **$4,748,344** | **$4,668,525** | **-1.5%** |
| **Income (Loss) Before Capital Contributions & Depreciation** | $3,306,513 | $3,239,307 | $3,166,085 | $3,087,916 | $6,005,723 | $2,920,303 | $2,932,347 | **-2.6%** |

Sources: Annual Financial Reports (CAFR) FY 2013-2016. RS&H Analysis, 2017

## Capital Contribution from the Authority

As discussed in previous sections of this chapter the Airport Authority has been a major contributor to the development of capital projects first by providing for the past eight years 14.6 percent of the funding for all capital projects at FNT. This included the required five percent match to federally funded projects but also for funding non-AIP or PFC eligible projects. Based on data from 2007 to 2016 the Airport Authority has contributed an average of approximately $720,000 annually for capital project development. Considering the future available income for capital development discussed above it is assumed that the Authority will be able to increase its contribution to the implementation of the CIP annually especially considering the type of projects that have been included in the CIP that are not AIP or PFC eligible. Maximum available contributions from the Authority for the 20-year CIP have been estimated at $20.8 million.

## Funding of the Airports Capital Investment Plan

*Table 6-12* shows the proposed funding plan for the recommend twenty-year Capital investment Plan presented at the beginning of this chapter. Funding for each project has been established based on project

priorities including their need based on mandated FAA or other federal or state requirements, AIP and PFC eligibility and needs of FNT to maintain operations and traffic growth.

### CIP Impact to Airport and Airline Revenues

As previously discussed the funding of the proposed CIP has been structured to make maximum use of AIP, PFC, State and airport available sources. All proposed CIP projects in the 20-year plan can be paid without the issuance of log-term debt or the need to increase rates and charges.

### Cost-Per-Enplaned Passenger

Cost per Enplaned (CPE) passenger is the average cost paid by airlines to the airport for use of facilities such as the airfield and commercial terminal. CPE is an important indicator of an airport's financial performance in regard to providing services to airlines, and therefore passengers, at competitive costs. *Exhibit 6-18* shows a historic comparison of the CPE for FNT versus regional competition and out-of-region comparable airports. Gerald R. Ford International Airport (GRR), Capital Region International Airport (LAN), Peoria International Airport (PIA), Amarillo International Airport (AMA), Lubbock Preston Smith International Airport (LBB) and Eugene Mahlon Sweet Field Airport (EUG) were used because they had similar annual enplaned passenger counts for 2016 and each airport has experienced some level of growth from the previous year, similar to FNT.

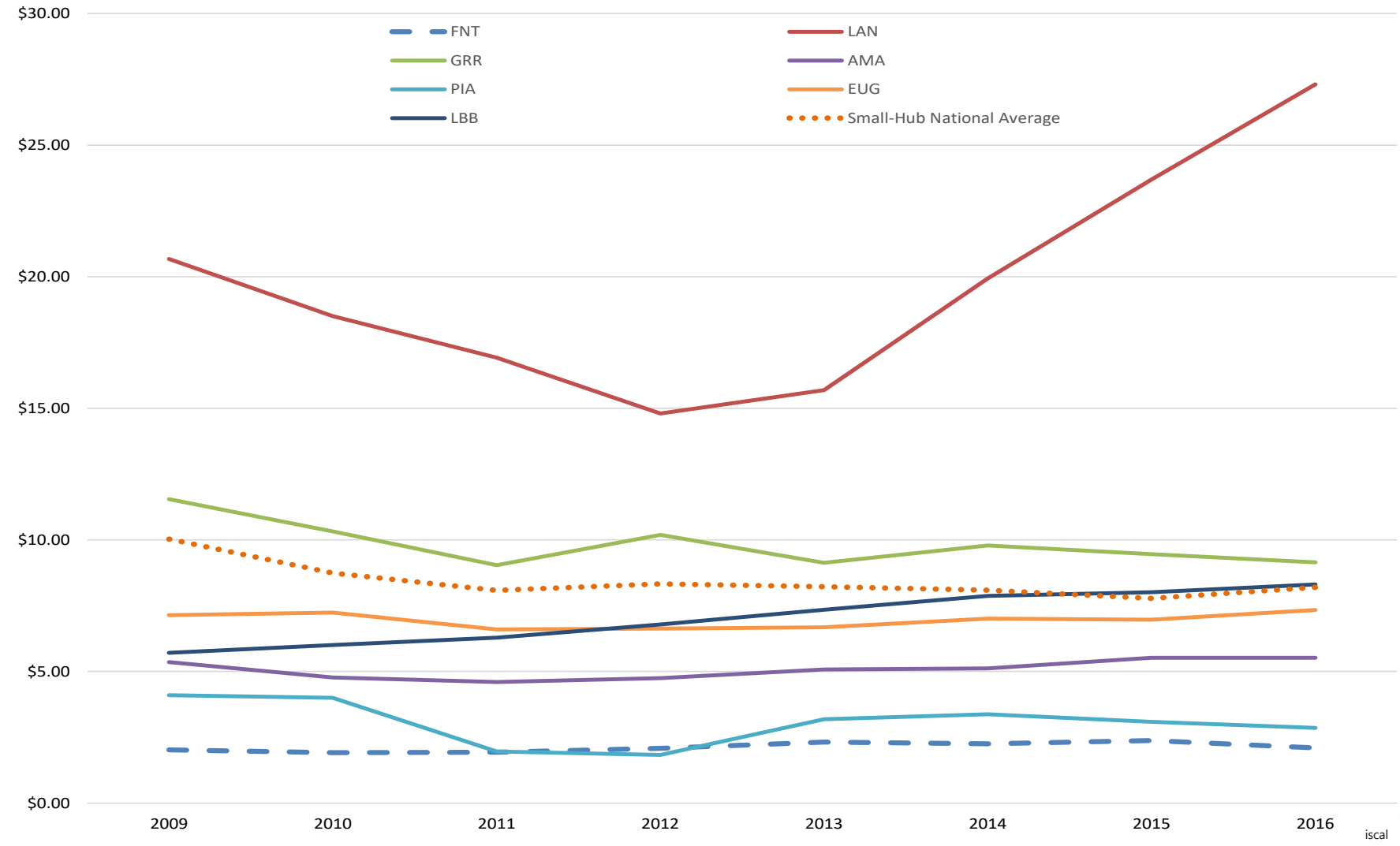
FNT's CPE has been fairly stable and stayed below $2.40 for the past eight years. This is by far the lowest CPE of all airports considered in this analysis and far much lower than the average for small hub airports throughout the country. FNT CPE is also considerably lower than its two State wide competing airports GRR and LAN. Having a low CPE allows FNT to be competitive among its neighbors in attracting new carriers and routes to the region.

***TABLE 6-12***
***SUMMARY OF CIP AND PROPOSED FUNDING SOURCES***

| Planning Year | Project | Total Project Cost1 | AIP Funds | | DHS Grants | PFC | CFC | Airport Pay-Go Funds | State Share | Third Party Private |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Entitlement | Discretionary | | | | | | |
| **Short-Term** | | | | | | | | | | |
| 1 | Twy C West Rehab and Shoulders | $5,600,000 | $5,040,000 | | | | | $280,000 | $280,000 | |
| 1 | Security Fence Phase 1 | $900,000 | | | | $900,000 | | | | |
| 1 | Wildlife Hazard Mitigation | $500,000 | $450,000 | | | | | $25,000 | $25,000 | |
| 2 | Rwy 9-27 Rehab and Shoulders | $8,500,000 | $2,067,372 | $5,582,625 | | $425,000 | | $0 | $425,000 | |
| 2 | Security Fence Phase 2 | $900,000 | | | | $900,000 | | | | |
| 3 | New Avigation Easements and Obstruction Removal | $800,000 | $720,000 | | | | | $40,000 | $40,000 | |
| 3 | Twy A Geometric Improvements | $2,500,000 | $2,250,000 | | | | | $125,000 | $125,000 | |
| 3 | Security Fence Phase 3 | $900,000 | | | | $900,000 | | | | |
| 3 | Corporate Area Environmental | $300,000 | | | | | | $300,000 | | |
| 4 | Perimeter Road Design | $700,000 | $630,000 | | | | | $35,000 | $35,000 | |
| 4 | Corporate Aviation Taxilane | $1,000,000 | | | | | | $1,000,000 | | |
| 4 | Corporate Aviation Access Road and Utilities | $1,700,000 | | | | | | $1,700,000 | | |
| 4 | New Corporate Conventional Hangar | $2,400,000 | | | | | | | | $2,400,000 |
| 4 | Corporate Apron | $500,000 | | | | | | $500,000 | | |
| 4 | New Corporate Vehicle Parking Lot | $100,000 | | | | | | $100,000 | | |
| 5 | Storm Sewer Rehab Phase 1 | $800,000 | $720,000 | | | $80,000 | | | | |
| 5 | Perimeter Road Construction | $7,000,000 | $6,300,000 | | | $350,000 | | | $350,000 | |
| 5 | New ARFF and Ops Station | $4,000,000 | $1,800,000 | | | $2,200,000 | | | | |
| 5 | Emergency Response Ramps | $400,000 | $360,000 | | | $40,000 | | | | |
| | **Total Short-Term** | **$39,500,000** | **$20,337,372** | **$5,582,625** | | **$5,795,000** | | **$4,105,000** | **$1,280,000** | **$2,400,000** |
| **Mid-Term** | | | | | | | | | | |
| 6 | Twy B Rehab and Shoulders | $3,500,000 | $3,500,000 | | | | | | | |
| 7 | Storm Sewer Rehab Phase 2 | $7,200,000 | $6,480,000 | | | $720,000 | | | | |
| 8 | Demolition of Structures | $250,000 | | | | | | $250,000 | | |
| 9 | Rental Cad Service Center and Pavement | $8,750,000 | | | | | $8,750,000 | | | |
| 10 | Renovation of Maintenance Facility | $9,500,000 | | | | | | $9,500,000 | | |
| | **Total Mid-Term** | **$29,200,000** | **$9,980,000** | | | **$720,000** | **$8,750,000** | **$9,750,000** | | |
| **Long-Term** | | | | | | | | | | |
| 11 | In-Line Baggage System | $2,000,000 | $500,000 | | $1,000,000 | $500,000 | | | | |
| 12 | Storm Sewer Rehab Phase 3 | $8,000,000 | $7,200,000 | | | $800,000 | | | | |
| 13 | Twy A Rehab and Shoulders | $8,000,000 | $7,200,000 | | | | | $400,000 | $400,000 | |
| 15 | Rwy 18-36 Rehab and Shoulders | $10,500,000 | $3,675,000 | $5,775,000 | | | | $525,000 | $525,000 | |
| 16 | Pedestrian Bridge and Sidewalk | $1,500,000 | | | | | | $1,500,000 | | |
| 17 | Terminal Maintenance Facility | $1,500,000 | | | | | | $1,500,000 | | |
| 18 | Rwy 18-36 Extension | $2,500,000 | $2,250,000 | | | | | $125,000 | $125,000 | |
| 19 | Rwy 9 ALSF-2/CAT II/III | $7,000,000 | $6,300,000 | | | | | $350,000 | $350,000 | |
| 20 | Jet A Fuel Storage Expansion | $100,000 | | | | | | $100,000 | | |
| | **Total Long-Term** | **$41,100,000** | **$27,125,000** | **$5,775,000** | **$1,000,000** | **$1,300,000** | | **$4,500,000** | **$1,400,000** | |
| | **Total (All Terms)** | **$109,800,000** | **$57,442,372** | **$11,357,625** | **$1,000,000** | **$7,815,000** | **$8,750,000** | **$18,355,000** | **$2,680,000** | **$2,400,000** |
| | Airport Theoretical Funding Capacity (2018 - 2037) | | **$67,685,968** | | | **$40,978,028** | **$28,782,155** | **$18,355,000** | | |

Source: RS&H Analysis, 2018

***EXHIBIT 6-18***
***ANNUAL CPE AT FNT AND RELEVANT AIRPORTS (2009 TO 2017)***




Source: FAA Form 127

### Estimated Project Revenues

The proposed 20-year CIP includes only a few projects that are expected to increase overall airport revenues. These include:

- New Corporate Conventional Hangar in 4th year of the planning period
- Corporate Apron in 4th year of the planning period
- Jet A Fuel Storage Expansion

Increase in general airport revenues will come from an increase in rentable space associated with the new corporate hangar and aircraft parking fees and additional sales of fuel associated with this operation.

### Impact of the CIP on Rates and Charges

The recommended funding plan for the proposed 20-year CIP relies primarily on the use of AIP, DHS and State grants, PFC revenue and CFCs. Authority contributions will be only 15.6 percent of the proposed CIP which is expected to be primarily funded from the Authority's operational income and property taxes. As previously discussed the Authority's contribution to the CIP between 2009 and 2016 was 14.6 percent, just one percent lower than the proposed contribution to the new CIP.

For many years, the Authority has maintained a policy of low rates and charges which is clearly evidenced in the low contribution of airline revenues to operational revenues (27.5 percent) and the very low cost per enplaned passenger discussed in *Cost Per Enplaned Passenger*. Considering the small contribution of airlines revenues to the Authority's finances and the Authority's policy to maintain low rates in charges, and the stable outlook of future income to the Authority, the proposed cost of CIP will not have an impact on rates and charges as long as air traffic volumes at FNT don't decline below approximately 283,000 annual enplanements in 2018 and traffic grows at FAA TAF rates and the airport receives the proposed AIP Discretionary grants shown in *Table 6-12*. If the airport does not receive the proposed AIP discretionary grants the annual passenger enplanement cannot fall below the 340,000-enplanement threshold. If the drop below these levels the amount of AIP grants and PFC revenues would not be sufficient to fund the proposed CIP. The Authority would then have to either issue long term debt backed by future PFC and Airport revenues or would be required to increase rates and charges.

### Cash Flow Sensitivity

The largest sources of revenue and cash to the airport comes from three main sources: parking lot fees, rental of facilities and property taxes. Of these three revenue sources property taxes is the only one that has decreased since 2010, though since 2013 revenues to the Authority have been stable with a slight increase. Considering the economic stability being experienced in the Flint region in the past years it is expected that property taxes revenues will continue to be stable with an increase at a very low rate, although any economic downturn could have a major negative impact in this revenue source. Parking lot revenue has had a slight increase since 2010 despite the decline in passenger traffic at FNT. Further declines in passenger traffic will negatively impact parking revenues with the added pressure to this revenue stream that is being experienced at airports around the country by an increase in the use by passengers of Transportation Network Companies (TNC) such as UBER and LYFT. Revenues from the rent of facilities is the revenue source that has grown the most at FNT since 2010 though growth slowed down since 2013. Revenues from rents are generally influenced by the economic stability of the region where airports are

located, by airport policies associated with the rental contracts and air traffic growth as it relates to the presence of air carriers at the Airport.

Since FNT primarily operates as an origin and destination airport it is expected that the loss of an existing carrier would primarily impact terminal rent revenues as it would be expected that the other air carriers operating at FNT would increase capacity and/or routes to serve the passengers previously served by the departing carrier.

### Opportunities for Revenue Enhancement

Opportunities for revenue enhancement come from a variety of options which are generally directly related to the type of customers that use the airport, the type of assets owned by the airport including available land and the airport's business model. Additionally, it has been proven that customer service also directly impacts revenues at airports. Knowing and understanding passenger and customer needs and interest allows any business to better serve its customers which translates into higher revenues.

As discussed in *Estimated Project Revenues* the implementation of a few projects included in the CIP could increase airport revenues. The airport should also consider the possibility of new charges for services provided at the airport. For example, this could include charging fees for commercial vehicles using airport premises such as UBER and LYFT and other TNCs.

The use of technology and availability of new services to better track passenger behavior and satisfaction are additional tools that are being used at airports in an effort to improve opportunities for additional sources and customer satisfaction which is proven to translate into higher revenues. This includes, for example, the use of technology to develop "smart" parking lots which reduce wayfinding for customers, makes better use of facilities and allows for an increase in fees.

Land is one of the largest airport assets and vacant land is often an undervalued and underutilized asset that still generates annual regular maintenance and security expenses to the Airport. Temporary lease of vacant lands that are not expected to be used on a short-term basis is allowed by the FAA and does not have a negative impact on grant assurances.

CHAPTER 7

# AIRPORT RECYCLING, REUSE, AND WASTE REDUCTION PLAN

## 7.1 INTRODUCTION

In September 2014, the Federal Aviation Administration (FAA) provided guidance for preparing airport recycling, reuse, and waste reduction plans as an element of a master plan or master plan update.[52] This guidance was in response to the *FAA Modernization and Reform Act* (FMRA) of 2012[53] that added a requirement for all master plans and master plan updates to include a plan for "recycling and minimizing the generation of airport solid waste" to be consistent with the local recycling laws.

This chapter reviews the Airport's existing solid waste generation and recycling activity and identifies opportunities to increase the Airport's recycling efforts. In reviewing the Airport's existing solid waste and recycling activity, an effort was made to

- Review the current waste management sources;
- Review local recycling programs and practices;
- Review the feasibility of recycling efforts at the Airport;
- Provide a summary of operations and maintenance requirements;
- Review waste hauler management contracts;
- Identify potential recycling opportunities for cost savings or revenue generation; and
- Identify a plan to minimize solid waste generation at the Airport.

## 7.2 CURRENT AIRPORT WASTE MANAGEMENT SOURCES

As described in *Chapter 1, Inventory of Existing Conditions, Environmental Overview*, the Citizen's Disposal, Inc. landfill is the closest landfill to the Airport (about two miles southeast of the Airport). Based on the most recent Michigan Department of Environmental Quality data, the Citizen's Disposal, Inc. landfill is not expected to reach capacity for 18 years under current operating conditions. As *Chapter 2, Aviation Demand Forecasts* describes, the Airport had 33,503 operations and 822,604 enplanements in 2015, and is forecast to have over 36,000 operations and over 1.0 million enplanements by the 2035 planning year. The forecasted increase in passengers will result in increased waste generation with the potential to be disposed at the Citizen's Disposal, Inc. landfill. However, through existing Airport recycling efforts and the potential for increased recycling efforts, the amount of municipal solid waste that has the potential to reach the Citizen's Disposal, Inc. landfill can be reduced. These actions can help extend the life expectancy of the landfill.

Waste management at an airport includes many components and can be complex. For instance, an airport has various tenants, agreements, differing operational requirements, and disposal processes that all contribute to the waste stream. According the FAA's September 2014 guidance, an airport's waste management is divided into three main areas:

[52] FAA Memorandum, Guidance on Airport Recycling, Reuse, and Waste Reductions Plans, Accessed: https://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf, Accessed September 2017.

[53] 49 United State Code (U.S.C.), §§ 132 and 133.

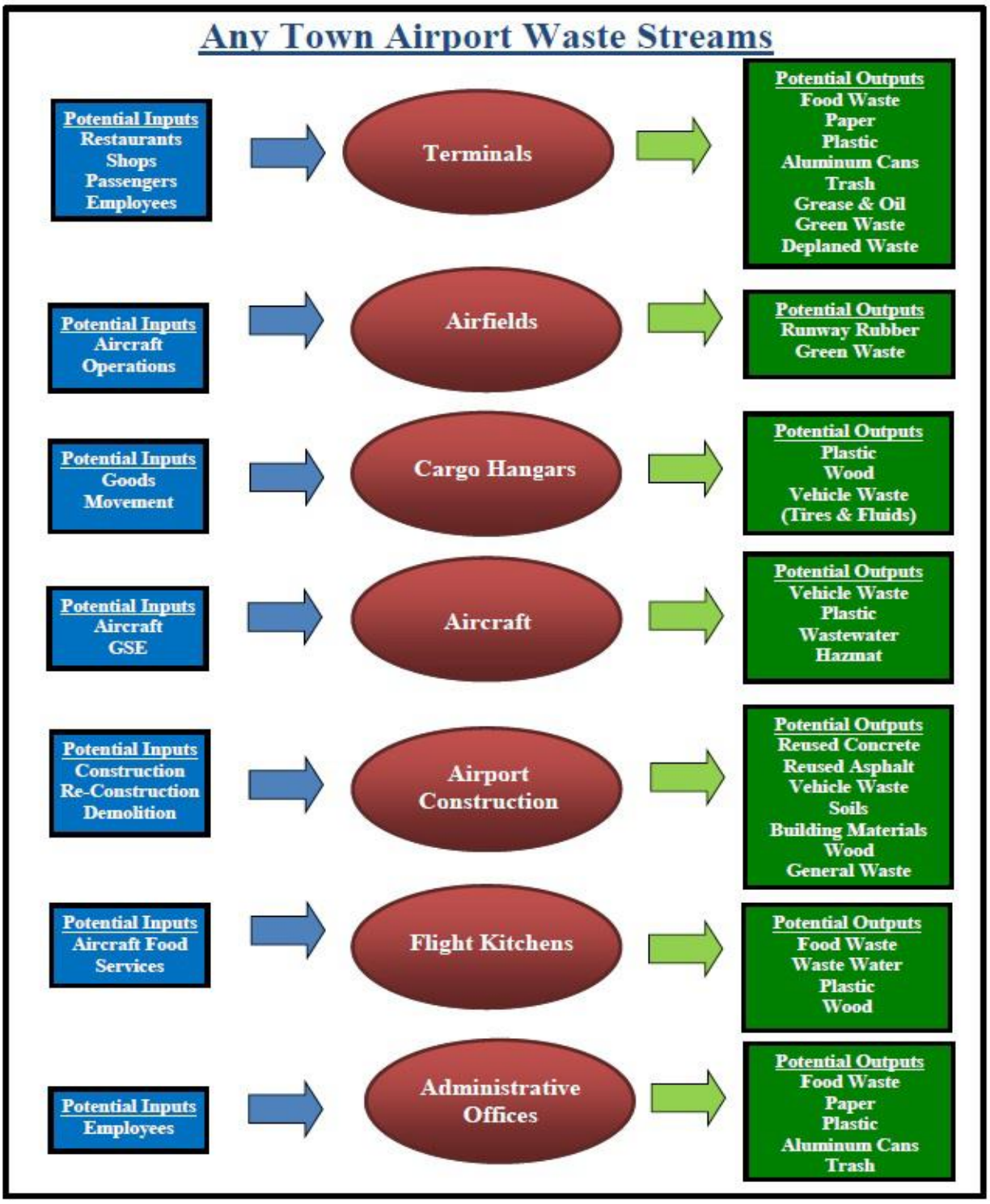
- Areas where an airport has direct control over the waste stream (e.g., public spaces, office space, main terminal, and airfield);
- Areas where an airport does not have direct control over the waste steam, but can influence waste management (e.g., tenants and aircraft deplaned waste); and
- Areas where an airport has no control over the waste stream (i.e., areas where the airport does not own or lease).

In addition, the FAA's 2013 Recycling Synthesis report54 identified seven main airport waste streams: terminals, airfields, cargo hangars, aircraft, airport construction, flight kitchens, and administrative offices (see *Exhibit 7-1*).

The main generators of waste at the Airport are its tenants, fixed based operator, passengers, and the airfield. The airfield generates waste typically during construction projects and waste materials can range from concrete or asphalt to old lighting and signage.

[54] Federal Aviation Administration, *Recycling, Reuse, and Waste Reduction at Airports – A Synthesis Document*. FAA Office of Airports. April 24, 2013.

***EXHIBIT 7-1***
***TYPICAL AIRPORT WASTE STREAMS***




Source: FAA, 2013 recycling synthesis document

## 7.3 LOCAL AND AIRPORT RECYCLING PROGRAMS

### 7.3.1 Genesee County Recycling Program

Genesee County (the County) has an established recycling program within their Metropolitan Planning Commission (GCMPC)[55] and updated its Solid Waste Management Plan in 2015[56] as required by the Natural Resources and Environmental Protection Act of 1994.[57] Within the Solid Waste Management Plan, the County identified four strategic goals, including reducing landfill waste by 15 percent.

Curbside recycling programs are not offered by the County, but other recycling services are provided. Genesee County Recycle Days allows the community two days a year where most types of recycling are collected at multiple locations in the County. Additionally, the County incorporates a mission of recycling education outreach. GCMPC staff engage in community presentations, with a focus towards third through sixth grade students in local schools.

Within the Genesee County Parks Department, a Keep Genesee County Beautiful program was established in 2004 with a vision of, "beautiful, clean and sustainable neighborhoods, parks and open spaces in Flint and Genesee County."[58] Initiatives undertaken by this program include coordination with companies to maintain a directory for year-round collection of recyclable materials, as well as providing recycling education.

### 7.3.2 City of Flint Recycling Program

In 2013, the City of Flint published its Master Plan including a goal to "balance and blend social, environmental, and economic needs." That same year, the City began contracting with Republic Services to provide trash, yard waste, and recycling collection.[59] Republic Services' single-stream recycling program allows for recycling by City residents and businesses through bi-weekly curb pick-up of the following materials:

- **Aluminum, Steel & Tin:** empty aerosol cans, metal & aluminum cans, aluminum foil, cookware.
- **Glass:** clear and colored food and beverage glass containers.
- **Plastic:** small household plastics such as milk jugs, water, detergent, and shampoo bottles, butter tubs, yogurt cups, plant flats, and other plastic containers stamped number 1-7.
- **Paper:** newspapers, office paper, junk mail, envelopes, magazines, catalogs, brown paper bags, cardboard, paper board boxes, phone books, pizza boxes.

Yard waste collection is available for compost from the second week of April until the last week of November. Other recyclable materials (e.g., motor oil, batteries, medical waste, hazardous materials, etc.)

[55] Genesee County Metropolitan Planning Commission. Accessed: http://gcmpc.org/environmental/, January 2018.
[56] Genesee County Metropolitan Planning Commission, *Genesee County Solid Waste Management Plan*, April 13, 2015. Accessed: http://www.gcmpc.org/wp-content/uploads/pdf/FINAL_Solid_Waste_Plan_Amendment.pdf, January 2018.
[57] Michigan Legislature, Natural Resources and Environmental Protection Act, Act 451 of 1994. Accessed: http://www.legislature.mi.gov/(S(vtfi4ab30cthcbgldnwsw35v))/mileg.aspx?page=GetObject&objectname=mcl-Act-451-of-1994, January 2018.
[58] Genesee County Parks, Keep Genesee County Beautiful. Accessed: http://geneseecountyparks.org/support/keep-genesee-beautiful/, January 2018.
[59] City of Flint, Public Works, Sanitation. Accessed: https://www.cityofflint.com/public-works/sanitation-2-2/, January 2018.

are not collected by Republic Services. However, several designated locations located throughout the City do accept these materials for recycling.

As a response to the influx of water bottles into the City of Flint, a Flint Water Bottle Recycling program was initiated in 2017[60]. Young's Environmental Cleanup and Schupan Recycling provide a total of six drop off locations throughout the City to recycle water bottles.

### 7.3.3 Airport Recycling Practices

The Airport does not have a formal recycling program in place at this time. Some Airport and tenant staff do informally engage in recycling for aspects of three out of the seven main waste streams identified in *Exhibit 7-1*; including terminals, airfields, and administrative offices. Each existing recycled material captured under this current, informal program is described in more detail below.

- **Cardboard and paper**. Receptacles for office paper are placed in Airport offices and collected for recycling. Airport maintenance staff collects cardboard and transports it in a pick-up truck to the local recycling drop-off location. Cardboard recycling is completed for vendor deliveries to Paradies Metro Ventures, which owns and operates the Michigan Marketplace gift shop within the Airport, and to Airport maintenance.
- **Batteries.** Airport maintenance staff internally collects and recycles used batteries.
- **Light bulbs**. Similar to the battery recycling, used light bulbs are recycled by Airport maintenance staff.

## 7.4 REVIEW OF WASTE HAULER CONTRACTS

The Airport contracts with Waste Management for waste hauling services. The Airport provided the November 2017 invoice as a representative of its monthly waste hauling invoicing. *Table 7-1* shows the monthly waste hauler fees broken out by location, along with the quantity and size dumpster at each location, and the frequency of pick-up service. This results in a total monthly charge for waste hauling of $2,434.34. The frequency of dumpster collection varies from six days a week for the terminal to every other week for the general aviation hangars. All dumpsters at these locations are property of Waste Management.

[60] City of Flint. Accessed: https://www.cityofflint.com/2016/01/31/flint-water-bottle-recycling-program/. January 2018.

***TABLE 7-1***
***MONTHLY WASTE HAULER FEE FOR NOVEMBER 2017***

| | Airport Passenger Terminal | Airport Air Field Maintenance Shop | General Aviation Hangars | Rental Car Facility |
|---|---|---|---|---|
| Cost | $2,102.03 | $89.01 | $77.83 | $165.47 |
| Dumpster Quantity and Size | 1 - 8-yard | 1 - 6-yard | 1 - 4-yard | 1 - 8-yard |
| Frequency of Service | 6 days per week | Weekly | Every other week | Weekly |

Source: FNT, 2017; RS&H, 2018

### 7.4.1 Recycling Feasibility at the Airport

There are currently no mandatory requirements for solid waste reduction in Genesee County or City of Flint. The Michigan Department of Environmental Quality does ban empty drums, liquid industrial waste, low-level radioactive waste, and regulated hazardous waste from landfills.

Despite the Airport not having a formal recycling program or plan in place, the Airport has stated a desire to develop a comprehensive recycling plan in the near-term. The current Airport contractor for solid waste, Waste Management, has the capability to provide single-stream recycling service. If the Airport were to implement one of the three waste assessment approaches shown in *Table 7-2*, the Airport will gain an understanding of the types and quantities of waste being generated at the Airport. This will ultimately lead to the Airport being able to identify opportunities to increase recycling efforts; however, the Airport is continually evaluating and considering new recycling opportunities.

***TABLE 7-2***
***WASTE ASSESSMENT APPROACHES[61]***

| Method | Advantages | Disadvantages |
|---|---|---|
| Hauler Records Examination | Provides for accurate data on the weight/volume of waste generated at the facility.<br><br>Usually requires less time and staff than does a facility walk-through or waste sort. | Might not provide accurate data if waste hauling records do not exist.<br><br>Does not provide data regarding specific waste materials.<br><br>Difficult to quantify if dumpster is shared. |
| Facility Walk-Through | Requires less time than a full waste sort.<br><br>Provides for qualitative data for waste generated.<br><br>Allows for interviews with facility staff. | Might not provide data regarding specific waste materials.<br><br>Requires multiple walk-throughs to obtain representative sample.<br><br>Might not provide for accurate quantities. |
| Waste Sort | Provides for quantitative data for specific types of waste generated.<br><br>Provides for estimates of waste generated for the whole facility. | Requires significant amount of time to conduct.<br><br>Requires significant amount of staff to conduct.<br><br>Requires multiple waste sorts to obtain representative sample. |

Source: EPA, 2013

## 7.5 SUMMARY OF OPERATION AND MAINTENANCE REQUIREMENTS

Although the Airport does not have a formal waste reduction program in place, a variety of materials are recycled at the Airport (see *Table 7-3*). Tracking data, such as quantities of materials recycled, was not readily available for review in this MPU.

***TABLE 7-3***
***RECYCLED MATERIALS BY RESPONSIBLE PARTY***

| Recycled Materials |
|---|
| **Airport-Controlled Facilities** |
| Cardboard and office paper |
| Batteries |
| Lightbulbs |
| **Tenants** |
| Paradies Metro Venture cardboard deliveries |

Source: FNT, 2017; RS&H, 2018.

[61] U.S. Environmental Protection Agency, *Business Guide for Reducing Solid Waste*. EPA/530-K-92-004. November 1993.

## 7.6 POTENTIAL FOR COST SAVINGS OR REVENUE GENERATION

As demonstrated in *Section 7.3*, the Airport has voluntarily adopted a few recycling practices of various recyclable materials. However, there are other voluntary practices that other airports have successfully implemented that the Airport could adopt to improve their existing waste management and reduce costs. A few of those practices include, but are not limited to the following:

- Implement a Food Donation Program that would include donating consumable food to local homeless shelters.
- Implement a Recycling Advertising Program for recycling bins located throughout the terminal that would educate and alert passengers on the proposed disposal of waste materials.
- Implement a Green Concessions Program that would encourage Airport concessionaires to use reusable, biodegradable, or paper bags instead of plastic bags, and to reduce the amount of non-biodegradable packaging.

Waste Management offers single-stream recycling services and can be made available to the Airport. The existing contract between Waste Management and the Airport will allow for single-stream recycling services, provided that no more than 5 percent of unacceptable materials are included. Provisions in the contract allow for the possibility for rebates to the Airport based on the current market value of recyclable materials.

## 7.7 PLAN TO MINIMIZE SOLID WASTE GENERATION

The Airport has expressed a strong interest in establishing a comprehensive recycling program to reduce the Airport waste stream by 5 to 10 percent within the first year of implementation. The Airport could implement the ten steps established by the FAA (see

*Table* 7-4) to create and implement a formal recycling program.

***TABLE 7-4***
***STEPS FOR CREATING AND IMPLEMENTING A RECYCLING PROGRAM***

| Ten Steps for Waste Reduction Programs | |
|---|---|
| 1. | Management Commitment |
| 2. | Program Leadership |
| 3. | Waste Identification |
| 4. | Waste Collection and Hauler |
| 5. | Waste Management Plan Development |
| 6. | Education and Outreach |
| 7. | Monitor and Refine Program |
| 8. | Performance Monitoring |
| 9. | Promote Success |
| 10. | Continuous Improvements |

Source: FAA, 2013

By implementing the ten steps in

*Table* 7-4, the Airport would be able to outline waste reduction and recycling policies, set goals, track and monitor progress, and improve upon the program. Outlining policies for a recycling program can be challenging because this often requires coordination and buy-in from all Airport stakeholders, which includes the public. Establishing a recycling coordinator who would oversee the stakeholder engagement can help encourage participation to ensure policies established for the recycling program are inclusive. Setting goals for a formal recycling program will require the Airport to conduct a waste assessment. This step is imperative to understand the types and quantities of waste being generated at the Airport. Once those types and quantities of waste are calculated, goals can be set to reduce those quantities. Goals should be realistic and achievable. However, as shown in *Table 7-1*, conducting a waste assessment can be labor and time intensive. Partnering with the County and/or the City to help conduct the waste assessment can alleviate some of the staffing pressures off of the Airport. There are a variety of tools that help track and monitor the progress or success of the program. For example, the USEPA has an online tool, the Waste Reduction Model (WARM) that allows businesses to quantify their greenhouse emissions and energy savings that are a direct result from implementing recycling practices. This allows helps the Airport to monitor goals that have been established and report back to stakeholders that are supporting the program. As the recycling program is being monitored and progress is tracked, refinements should be made to the program to allow for the Airport flexibility in achieving the goals to be defined in an effective recycling/waste reduction program. An Airport recycling coordinator can review the data and consider new waste management practices that can be adopted into the program for further waste reduction at the Airport.

The Airport recognizes there are other waste streams, which are at this point not included in the current voluntary recycling efforts, most notably solid and paper waste from other Airport tenants and the airlines.

To further facilitate recycling on Airport construction projects, language can be included in contract documents encouraging material reuse and recycling. The Airport will discuss possibilities of changing specifications to include a recycling component to encourage expanded contractor participation on a project-by-project basis.

## 7.8 CONCLUSION

The Airport currently has an undefined recycling program. By conducting a waste assessment and addressing the FAA's 10 steps listed in

*Table* 7-4*,* the Airport would be able to set goals, implement policies, and identify areas for increased recycling efforts that would allow the Airport to quantify cost savings and reduce its contribution to the local land*fill.*

CHAPTER 8

# AIRPORT LAYOUT PLAN NARRATIVE REPORT

## 8.1 EXECUTIVE SUMMARY

This Working Paper presents a narrative of the Airport Layout Plan (ALP) drawings for the Bishop International Airport, which illustrate the recommended and future facilities to be developed at the Airport as prescribed by the Master Plan Update. The last ALP produced for the Airport was approved in 2007. The Facility Requirements developed in Chapter 3 of this Master Plan Update, identify the need for the recommended improvements at FNT.

This narrative report serves as a summary highlighting the major facility recommendations depicted in the attached ALP. The short-term (0-5 years), intermediate-term (6-10 years), and long term (11+ years) proposed developments are listed in *Table 8-1* below along with their respective timeline and cost estimates. The guidelines and checklist established by the Federal Aviation Administration (FAA) Office of Airports Standard Operating Procedure No. 2.0, *Standard Procedure for FAA Review and Approval of Airport Layout Plans,* as well as the Advisory Circular 150/5070-6B, *Airport Master Plan* were utilized in drafting this narrative report.

## 8.2 AIRPORT LAYOUT PLAN PURPOSE

An ALP is a set of electronically generated drawing sheets that graphically depict the existing airport facilities, and the future airport improvements determined from the Aviation Demand Forecast analysis, the Facility Requirements, and the Identification and Evaluation of Alternatives chapters of this Airport Master Plan Update. The ALP drawing set requires approval from the Airport officials, the FAA Airport District Office (ADO), as well as other applicable FAA offices. As identified in the Advisory Circular 150/5070-6B, five primary functions define the purpose of the ALP and are as followed:

- An ALP set consists of a key public record of present and future aeronautical requirements at the Airport.
- An approved ALP set enables the Airport and the FAA to adequately plan for the future facilities to be developed at the Airport, while allowing the FAA to anticipate budgetary needs and to protect the surrounding airspace necessary for approach procedures or facility improvements.
- The ALP constitutes a blueprint for airport development in accordance with the Airport's expressed needs and vision.
- An approved ALP set is mandatory in order for the Airport to receive financial assistance under the Airport and Airway Improvement Act of 1982 (AIP), and to impose and use Passenger Facility Charges (PFC). Additionally, an approved ALP must be current and followed due to grant assurance requirements of the AIP and other airport development programs.
- The ALP consists of a working tool for the Airport Sponsor, Maintenance and Development Staff.

***TABLE 8-1***
***DEVELOPMENT AND IMPROVEMENTS SUMMARY***

| PROJECTS | SCHEDULE | COST ESTIMATES |
|---|---|---|
| **0 – 5 Years** | | |
| Twy C West Rehab and Shoulders | 1 | $5,600,000.00 |
| Security Fence Phase 1 | 1 | $900,000.00 |
| Wildlife Hazard Mitigation | 1 | $500,000.00 |
| Rwy 9-27 Rehab and Shoulders | 2 | $8,500,000.00 |
| Security Fence Phase 2 | 2 | $900,000.00 |
| New Avigation Easements and Obstruction Removal | 3 | $800,000.00 |
| Twy A Geometric Improvements | 3 | $2,500,000.00 |
| Security Fence Phase 3 | 3 | $900,000.00 |
| Corporate Aviation Environmental | 4 | $300,000.00 |
| Perimeter Road Design | 4 | $700,000.00 |
| Corporate Aviation Taxilane | 4 | $1,000,000.00 |
| Corporate Aviation Access Road and Utilities | 4 | $1,700,000.00 |
| New Corporate Conventional Hangar | 4 | $2,400,000.00 |
| Corporate Apron | 4 | $500,000.00 |
| New Corporate Vehicle Parking Lot | 4 | $100,000.00 |
| Storm Sewer Rehab Phase 1 | 5 | $800,000.00 |
| Perimeter Road Construction | 5 | $7,000,000.00 |
| New ARFF and Ops Station | 5 | $4,000,000.00 |
| Emergency Response Ramps | 5 | $400,000.00 |
| **6 – 10 Years** | | |
| Twy B Rehab and Shoulders | 6 | $3,500,000.00 |
| Storm Sewer Rehab Phase 2 | 7 | $7,200,000.00 |
| Demolition of Structures | 8 | $250,000.00 |
| Rental Car Service Center and Pavement | 9 | $8,750,000.00 |
| Renovation of Maintenance Facility | 10 | $9,500,000.00 |
| **11+ Years** | | |
| In-Line Baggage System | 11 | $25,000,000.00 |
| Storm Sewer Rehab Phase 3 | 12 | $8,000,000.00 |
| Twy A Rehab and Shoulders | 13 | $8,000,000.00 |
| Rwy 18-36 Rehab and Shoulders | 15 | $10,500,000.00 |
| Pedestrian Bridge and Sidewalk | 16 | $1,500,000.00 |
| Terminal Maintenance Facility | 17 | $1,500,000.00 |
| Rwy 18-36 Extension | 18 | $2,500,000.00 |
| Rwy ALSF-2/CAT II/III | 19 | $7,000,000.00 |
| Jet A Fuel Storage Expansion | 20 | $100,000.00 |

Source: RS&H, 2016

## 8.3 AIRPORT LAYOUT PLAN DRAWING SET

The ALP set provides a visual representation of the planned developments at the Airport throughout the 20-year planning timeframe. The drawings specifically detail boundaries and proposed additions to all areas owned or controlled by the Airport for related uses, the location and nature of all current and proposed structures, and the location of current and proposed non-aeronautical areas.

The appendix section of the final Master Plan Update report will include the complete ALP drawing set, which contains the following sheets produced electronically and in conformity with the FAA design and format standards:

- Sheet 1: Cover Sheet
- Sheet 2: Airport Data Sheet
- Sheet 3: Existing Facilities Layout
- Sheet 4: Airport Layout Plan
- Sheet 5: Terminal Area Plan
- Sheet 6: General Aviation Area Plan
- Sheet 7: Air Cargo Area Plan
- Sheet 8: Inner Approach Plan and Profile – Runway 9
- Sheet 9: Inner Approach Plan and Profile – Runway 9 Table
- Sheet 10: Inner Approach Plan and Profile – Runway 27
- Sheet 11: Inner Approach Plan and Profile – Runway 27 Table
- Sheet 12: Inner Approach Plan and Profile – Runway 18
- Sheet 13: Inner Approach Plan and Profile – Runway 36
- Sheet 14: Inner Approach Plan and Profile – Runway 9R
- Sheet 15: Inner Approach Plan and Profile – Runway 27L
- Sheet 16: Departure Surface – Runway 9-27
- Sheet 17: Departure Surface – Runway 18-36
- Sheet 18: Part 77 Airspace Drawing
- Sheet 19: Part 77 Airspace Drawing
- Sheet 20: On-Airport Land Use Plan
- Sheet 21: Airport Property Map
- Sheet 22: Airport Property Map Tables
- Sheet 23: Airport Boundary – Exhibit 'A' Property Inventory Maps
- Sheet 24: Airport Property Parcels – Exhibit 'A' Property Inventory Maps
- Sheet 25: Airport Easements – Exhibit 'A' Property Inventory Maps
- Sheet 26: Airport Easement and Title Detail – Exhibit 'A' Property Inventory Maps

The subsequent sections of this report highlight the contents of each drawing sheets of the Bishop International Airport ALP. The remaining paragraphs of the ALP Narrative are organized to feature the major changes which occurred since the last approved ALP as well as the future recommended development for the Airport.

### 8.3.1 Sheet 1 – Cover Sheet

The Cover sheet labels the Airport's name and a listing of the additional ALP drawing sheets attached in the set. Two inset maps showing the location and vicinity of the Airport are also included in the Title sheet along with a revision, and an approval signature block.

### 8.3.2 Sheet 2 – Airport Data Sheet

The Airport Data sheet shows critical information pertaining to the Airport's existing, future, and ultimate airfield dimension and overall conditions. The following is a listing of key features typically included in the Airport Data sheet:

- Airport Data Table
- Runway Data Table
- Taxiway Data Table
- Modification to Standards
- Declared Distance Table
- Survey Monuments
- Wind Rose Data

### 8.3.3 Sheet 3 – Existing Facilities Layout

The Existing Facility Layout Plan sheet shows, with limited amount of text and data, the existing airport facilities such as the runways and taxiways, the runway protection zones, the roadways, the NAVAIDs and critical areas, and the airport property boundary.

### 8.3.4 Sheet 4 – Airport Layout Plan

The overall development plan of the Airport, including existing, future, and ultimate facilities, is depicted in the Airport Layout Plan drawing. All the airfield design standards applicable to the Runway and Taxiway Safety Areas (RSA) (TSA), the Runway and Taxiway Object Free Areas (ROFA) (TOFA), the Runway Obstacle Free Zones (OFZ), the Runway Protection Zones (RPZ), the movement and non-movement areas, the airport property boundary and fence are illustrated in the Airport Layout Plan sheet. Additionally, this drawing helps visualize and delineate the land use to be reserved for future developments at the Airport.

The ALP sheet also includes the dimensional standards and information established by the FAA planning and design Advisory Circulars, upon which the recommended developments are to be designed.

### 8.3.5 Sheet 5 through 7 – Area Plans

Three plan drawings provide a large-scale view of the existing, future, and ultimate condition for the Terminal, General Aviation, and Air Cargo areas of the airport. These plans are used to show additional details and dimensions that otherwise could not have been shown on the Airport Layout Plan. Similar to the Airport Layout Plan, airfield design standards applicable to the Runway and Taxiway Safety Areas (RSA) (TSA), the Runway and Taxiway Object Free Areas (ROFA) (TOFA), the Runway Obstacle Free Zones (OFZ), the Runway Protection Zones (RPZ), the movement and non-movement areas, the airport property boundary and fence are illustrated with respect to each plan view area of focus.

The Terminal Area Plan presents the most changes for the future, depicting the construction of the pedestrian bridge for safer and more effective passenger conveyance and the construction of a new Rental Car Service Center to replace and relocate the aging facility.

### 8.3.6 Sheets 8 through 15 – Runway Inner Approach Surface

These sheets depict the Inner Portion of the Approach Surface of the four existing runways along with both ends of the planned parallel runway. All approach ends start at the end of the primary surface and extends upward and outward at a slope specific to their respective approach type. The slopes illustrated in the plan and profile view are:

- A 50:1 slope for Runway 9 and 27 on Sheet 8 and 10, respectively
- A 34:1 slope for Runway 18 and 36 on Sheet 12 and 13, respectively
- A 20:1 slope for Runway 9R and 27L on Sheet 14 and 15, respectively

The Precision Approach Path Indicator (PAPI) obstacle clearance slope and the Departure Surface slope are also depicted for existing runways while the Threshold Siting Surface slope (TSS) is depicted for all runways.

An Obstruction Table listing the obstacles, identified during the aerial photogrammetry and the obstruction analysis conducted as part of the Master Plan Update process, and their surface violations for the existing and the proposed extension is supplied in Sheet 9 for the Runway 9 end, Sheet 11 for the Runway 27 end, and at the bottom of Sheets 12, 13, 14 and 15 for Runway 18, 36, 9R, and 27L ends. Each obstruction was given a resolution depending on whether it is natural or man-made and if the man-made object is fixed-by-function with respect to its surface violation.

### 8.3.7 Sheets 16 and 17 – Departure Surface

These sheets depict the full length of the Departure Surface for the four existing runways. All surfaces start at the pavement edge of the runway ascend with a slope of 40:1. The planned parallel runway was not analyzed since Departure surfaces are applicable to instrument runways and not visual runways. Sheet 16 shows both ends of Runway 9-27 and Sheet 17 shows both ends of Runway 18-36. Both sheets list obstructions on the bottom half of each sheet.

### 8.3.8 Sheets 18 and 19 – FAR Part 77 Airspace Surface

The FAR Part 77 Airspace Surface drawings depict the future imaginary airspace surfaces for the Airport according to the criteria established by FAR Part 77 Objects Affecting Navigable Airspace. The surfaces set standards for determining obstacles to navigable airspace, help identify potential height obstructions, and allow the airport to exercise land use control when necessary in order to avoid penetrations to the surfaces.

Sheet 18 illustrates the full extent of the horizontal, conical, approach, and transitional surfaces in an isometric view, including the 50:1 precision approach surface for Runway 9 and Runway 27 ends. Sheet 19 displays in a plan view of the Airport to the extent of the Conical Surface.

An Obstruction Table listing the obstacles, identified during the aerial photogrammetry and the obstruction analysis conducted as part of the Master Plan Update process, and their surface violations for the existing and the proposed extension is supplied in Sheet 19. A recommended resolution, based on the individual type of obstruction is proposed in the table.

### 8.3.9 Sheet 20 – Airport Land Use

The Airport Land Use drawing depicts the current land-use for the areas inside and surrounding the airport property boundary and helps achieve land-use compatibility with the areas outside the airport boundary. The land use map used as an overlay provides the most current land uses and was produced through this Master Plan process. A major change compared to the previous land use map is the addition of Non-Aeronautical land. The surrounding land use around the airport range from agriculture use, industrial use, parks recreation and conservation use, to finally public institution use.

### 8.3.10 Sheets 21 and 22 – Airport Property Map and Exhibit A

The Airport Property Map and Exhibit A, illustrated in sheets 21 and 22, display the Airport property boundary and the airport property interests consistent with the existing and future Airport Layout Plan drawing. The sheets provide an inventory of dedicated airport property acquisitions including easements tracts, as well as all the most recent parcels acquired and / or disposed of since the last updated and submitted property map.

## 8.4 AIRPORT MODIFICATIONS AND DEVELOPMENT

This section highlights the key elements and modifications that have been made since the Airport's last ALP update. The modifications to the plan are based either on the Master Plan's analyses which identified a future need, a change in FAA design criteria, or a combination of both.

### 8.4.1 Decommissioning of Runway 5-23

Since the previous Master Plan, Runway 5-23 has been decommissioned and demolished. This runway is anticipated to be replaced by the construction of the future parallel runway, 9R-27L.

### 8.4.2 Construction of Taxiway B

This taxiway was conceptualized during the previous Master Plan process for the purpose of providing a Corporate Aviation Development Area. This land is still reserved for future Corporate Aviation development.

### 8.4.3 Construction of the Deicing Pad

The conceptualization, design, and construction of the deicing pad followed after the previous ALP. This pad was constructed to have four deicing stalls and an effluent catching system.

### 8.4.4 Construction of a New Cargo Facility

The construction of a new cargo facility was conceptualized during the previous Master Plan and ALP to make room for commercial activity growth. Once the construction was completed, FedEx transferred their operations from the east side of the Passenger Terminal Area to the new facility located just north of the Runway 9 end.

### 8.4.5 Geometric Correction of Taxiway C

Following the change in FAA standards for airfield geometries, connectors along both Taxiway C and Taxiway A were identified to present safety issues, providing direct access to the Runway 9-27 and Runway

18-36. In 2017, two connectors associated with Taxiway C were addressed with two more connectors along Taxiway A to be addressed in the short-term.

### 8.4.6 Terminal Security Checkpoint Expansion

In response to activity growth for the airport, the security checkpoint was expanded to improve the process for security. The walkway between the main terminal and the concourse was expanded to provide a larger security checkpoint.

### 8.4.7 Concourse Expansion

Similar to the expansion of the Security Checkpoint, the Concourse was expanded to provide for additional aircraft gates to accommodate growth.

## 8.5 FUTURE RECOMMENDED DEVELOPMENTS

Several projects aimed at resolving airfield geometries, replacing and expanding support facilities, and consolidating on-airport activities by relocating existing facilities are recommended as part of the Bishop International Master Plan Update. *Table 8-2* provides specific details pertaining to each recommended improvement and project. The Implementation Plan Chapter which also incorporates the Capital Improvement Plan for the suggested projects, lists in more detail the costs associated with each development, as well as the sequencing plan.

***TABLE 8-2***
***RECOMMENDED DEVELOPMENTS AND IMPROVEMENTS***

| PROJECTS | DESCRIPTION | PHASES |
|---|---|---|
| **Landside Projects** | | |
| **Pedestrian Bridge** | This project includes NEPA study and documentation, design, and construction of a Pedestrian Bridge across W. Bristol Road to improve passenger conveyance between the Economy Parking Lot and Terminal. | • Environmental<br>• Design<br>• Construction |
| **Rental Car Facility** | This project includes NEPA study and documentation, design, and construction of three buildings for fueling and vacuuming, car wash system, and a light maintenance and storage area to replace an aging facility. | • Environmental<br>• Design<br>• Construction |
| **Airside Projects** | | |
| **Runway 18-36 Extension** | This project includes NEPA study and documentation, design, and construction of 151 feet of the current runway to the south to accommodate the runway length required for the critical aircraft. Extension of Taxiway A is also incorporated in this project. | • Environmental<br>• Design<br>• Construction |
| **Runway Shoulders** | This project includes NEPA study and documentation, design, and construction of 25-foot-wide shoulders for the current runway system. | • Environmental<br>• Design<br>• Construction |
| **ALSF-2 on Runway 9 end** | This project includes NEPA study and documentation, design, and construction of a new Approach Lighting System with Sequenced Flashers II to obtain minimums below 1800 RVR. | • Environmental<br>• Design<br>• Construction |
| **Taxiway Shoulders** | This project includes NEPA study and documentation, design, and construction of 30-foot-wide shoulders for the current taxiway system. | • Environmental<br>• Design<br>• Construction |
| **Taxiway "Hot Spots"** | This project includes the partial demolition of Connector A1 and A2 to remove direct runway access from the Passenger Terminal Apron to the Runway 18 end. | • Environmental<br>• Advanced Planning<br>• Construction |

| PROJECTS | DESCRIPTION | PHASES |
|---|---|---|
| **Airside Projects (continued)** | | |
| **Easements and Obstructions Removal** | This project includes the negotiation of multiple easements in the vicinity of the airport. The primary purpose for these easements is to protect the precision and non-precision approaches of the Airport. Obstructions will be removed after the negotiations have been concluded and finalized. | • Parcel Identification<br>• Negotiation<br>• Obstruction Removal |
| **Perimeter Road** | This project includes the NEPA study and documentation, design, and construction of a full perimeter road. The new road will extend south from the Maintenance facility, around Runway 36 end, and then connect to the GA Apron. It will then continue north from the GA apron, run east of Taxiway A, around Runway 27 end and connect to the Passenger Terminal Apron. | • Environmental Advanced Planning<br>• Planning<br>• Construction |
| **Runway 9R-27L (Ultimate)** | Carried over from the previous Master Plan, this project includes the NEPA study and documentation, design, and construction of 3,800-foot-long and 75-foot-wide visual runway with a TDG 2 full parallel taxiway. | • Environmental Advanced Planning<br>• Advanced Planning<br>• Construction |
| **General Aviation Projects** | | |
| **Relocation of Corporate Hangar** | This project includes the NEPA study and documentation, design, and construction of a new Conventional Hangar. This project will include the construction of a Taxilane, apron area, parking lot, vehicle accessway, and utilities. | • Environmental<br>• Design<br>• Construction |
| **Support Facility Projects** | | |
| **ARFF and Operations Station** | This project includes the NEPA study and documentation, design, and construction of a new ARFF and Operations Station to replace an aging facility and meet FAA recommendations and requirements. | • Environmental<br>• Advanced Planning<br>• Construction |
| **Maintenance Facility Renovation** | This project includes the NEPA study and documentation, design, and renovation of the existing Maintenance Facility to prepare for the future acquisition of new equipment and meet FAA recommendations and requirements. | • Environmental<br>• Advanced Planning<br>• Renovation |

Source: RS&H 2016

## 8.6 AIRPORT LAYOUT PLAN DRAWING SET

The Airport Layout Plan drawing set that follows is a reduced-size version of the 24-inch by 36-inch drawings pending final review, approval, and signature by the FAA and the Michigan Department of Transportation, Office of Aeronautics. Although the ALP drawings must be officially approved by the Airport Board of Directors, the inserted ALP drawings are subject to revision until formally accepted by the agencies and may vary from the final ALP drawing set on file with the FAA and the Michigan Department of Transportation, Office of Aeronautics.

# APPENDIX A TERMINAL BUILDING SYSTEMS CONDITION ASSESSMENT

## A.1 Executive Summary

RS&H conducted a planning-level condition assessment of the Bishop International Airport terminal building on September 28-29, 2016. The purpose of the assessment was to inventory and review the condition of the existing terminal systems. These systems included HVAC, Electrical, Flooring and Finishes, Roof, Passenger Boarding Bridges, and Baggage Handling systems. This report gives a general assessment of the current conditions, recommendations for replacements and upgrades over the next 20 years, and includes high level budgetary cost estimates to implement these recommendations.

In general, the terminal building and systems are in very good to excellent condition. Some items are nearing the end of their recommended service life, and will need to be considered for short-term replacement. The exceptions to the overall "good condition" assessment were passenger boarding bridges 7, 8, 9, and 11, which are in fair to poor condition. It is recommended that bridges 7, 8, and 11 are replaced as soon as possible.

## A.2 Building Condition Assessment

### Flooring and Finishes (Interior and Exterior)

Current condition Assessment

Bishop International Airport, despite the unique roof geometry, is assembled from standard, high commercial-grade materials. The exterior of the building consists of a combination of exterior metal panel wall systems, curtainwall systems, and EIFS. The interior floor finishes include commercial-grade carpeting with limited use of tiles and other materials on the floors. Interior walls are generally painted gypsum wallboard with stainless steel used strategically at column bases, outside corners of walls, and in other high-impact locations. Ceiling finishes are primarily painted gypsum wallboard.

The flooring and finishes assessment was performed at a high level, generally by performing a visual observation of the following items:

- Carpeting in public areas
  - These finishes were found to be in good condition with some heavy wear in high-traffic areas. The carpet has a manufacturer's recommended lifespan of 5-7 years and has currently exceeded this timeframe.
- Tile flooring in public areas
  - Some limited chipping and cracking was found.
- Wall finishes in public areas
  - Minimal water intrusion damage found in limited areas.
- Ceiling finishes in public areas
  - Minimal water intrusion damage found in limited areas.
- Elevators and escalators in public areas
  - Heavy wear of finishes in elevator and escalators is noted.
- Baggage Conveyance

    - Departures conveyor belts show heavy wear and have demonstrated ongoing mechanical issues.
    - Arrivals baggage claim belts and carousels are in good aesthetic condition and appear to be in good functional condition.
- Toilet room finishes
    - Flooring and wall finishes show signs of heavy wear and a general "outdated" color and finish palette. Fixtures are older, higher water-usage models. Laminates and other finishes show signs of heavy usage.
- Perimeter glazing
    - No significant issues found in the glazing or supporting curtainwall frames. Vestibule automatic doors show signs of significant usage and wear.
- Exterior finishes
    - Exterior metal panel wall system and EIFS are found to be in good condition with minimal staining or damage.
- Signage and wayfinding
    - Signage and wayfinding in the terminal building are found to be in good condition.
    - Access roadway signage and parking lot signage are misconfigured.

The terminal was generally found to be in good condition.

Anticipated/Recommended Replacements & Upgrades (5-year)

- Replace carpeting
- Replace entry storefront (vestibule) doors
- Replace/upgrade finishes in toilet rooms
- Replace departures conveyor belts
- Replace access roadway signage and parking lot wayfinding signage

Anticipated/Recommended Replacements & Upgrades (5-10 year)

- Replace escalators
- Refurbish elevators

*TABLE A-1*
*BUDGET ESTIMATE FOR FLOORING AND FINISHES*

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 0-5 Years | Carpeting | $2,750,000 |
| | Entry Storefront | $1,100,000 |
| | Toilet Room Upgrades | $2,500,000 |
| | Departure Conveyor Belts Replacement | $750,000 |
| | Roadway Signage Upgrades | $650,000 |
| Phase 2: 5-10 Years | Replace Escalators | $500,000 |
| | Refurbish Elevators | $75,000 |

Source: RS&H, 2016

## Roofing

### Current condition Assessment

Bishop International Airport is composed of a series of overlapping, airfoil-shaped roof structures, sloped secondary roofs, and secondary flat roof sections. The airfoil-shaped roofs are primarily clad in standing-seam metal panels, with curved metal bullnose details and metal internal roof gutter drains. Flat roofs are single-ply PVC membrane.

The standing-seam metal roofs are in very good condition. The single-ply membrane is in good condition but has exceeded the manufacturer's recommended lifespan of 20 years in most areas. The roof gutters are in good condition, but in heavy snowfall instances accumulate above the gutter line and lead to water intrusion at high clerestory locations.

### Anticipated/Recommended Replacements & Upgrades

- Rebuild main roof gutters
  - Provide additional snow-melting or removal capability
- Replace roofing PVC membrane

*TABLE A-2*
*BUDGET ESTIMATE FOR ROOFING*

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 0-5 Years | Rebuild Gutters | $750,000 |
| | Replace PVC Roofing | $950,000 |

Source: RS&H, 2016

## Passenger Boarding Bridges

Bishop International Airport has an inventory of nine Passenger Boarding Bridges (PBB) of varying ages and condition. This assessment was performed at a high level, generally by performing a visual observation of the following items:

- General condition of the exterior metal structure.
- General condition of the exterior accessories, including:

- Canopy
- Cab doors
- Stairs and bag slide
- Lift column
- Tires
- Undermounted power cables

- General condition of the PBB-mounted auxiliary equipment, including:
  - Ground power unit, cabling, and cable hoist
  - Pre-conditioned air unit (PC Air) and air supply hoses
- General condition of the interior finishes.
  - Metal ceiling panels.
  - Laminated wall panels.
  - Floor finishes, carpet, and rubber flooring.
- General condition of the control panel in the Cab.

Each item observed was provided an assessment from the following options:

**Excellent** PBB is in "like-new" condition.

**Very Good** PBB shows minor wear; but is generally mechanically sound with finishes showing minimal wear. With proper maintenance, another 15-20 years of operation should be expected from the unit.

**Good** PBB is at the half-way point of its anticipated lifespan, with proper maintenance the unit can expect to operate for another 12-15 years.

**Fair** PBB is in need of an overhaul; Replacement of the PBB within 5 years should be considered.

**Poor** PBB has failed or is near failure. Consideration should be given to take the PBB out of s as soon as possible.

Note: PBBs, with proper and regular maintenance, typically have an operational lifespan of 25-30 years.

Anticipated/Recommended Replacements & Upgrades

This high-level assessment reached the following conclusions:

***TABLE A-3***
***PBB INVENTORY***

| Gate Number | PBB Serial Number | Year of Fabrication | Current Condition Assessment | Notes |
|---|---|---|---|---|
| 1 | 31574 | 2010 | Very Good | |
| 3 | 31997 | 2012 | Very Good | |
| 5 | 31998 | 2012 | Very Good | |
| 6 | 31575 | 2010 | Very Good | |
| 7 | 39196 | 1999 | Poor | Not In Operation |
| 8 | 39197 | 1999 | Poor | |
| 9 | 39198 | 1999 | Fair | |
| 10 | 31576 | 2010 | Excellent | Not In Operation |
| 11 | 39199 | 1999 | Poor | |

Source: RS&H, 2016

Based on this assessment, it is recommended that PBB's 7, 8, and 11 be replaced as soon as possible.

***TABLE A-4***
***BUDGET ESTIMATE FOR PBB***

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 0-5 Years | Replace PBB 7 | $750,000 |
| | Replace PBB 8 | $750,000 |
| | Replace PBB 9 | $750,000 |
| | Replace PBB 11 | $750,000 |

Source: RS&H, 2016

## A.3 Electrical Systems

The current electrical systems throughout the terminal consist of two unit substations, with associated distribution switchboards, panelboards, and transformers. These systems were installed as part of each airport expansion module to support the increased capacity needs for each module. These systems were originally installed in 1992, 1999, 2005, and 2011. Lighting was installed in each expansion and has similar ages.

### Electrical Distribution Systems

#### Current Condition Assessment

Currently there are two unit substations (MDP-1 and MDP-2) in the building that were installed in multiple different periods. The first substation MDP-1 in 1992 and the second substation MDP-2 in 2011. The associated distribution systems consist of distribution switchboard, panelboards, and transformers added in 1992, 1999, 2005, and 2011 all in very good condition and are in better than expected condition for their ages.

Anticipated/Recommended Replacements & upgrades

According to the Institute of Electrical and Electronics Engineers (IEEE) Standard 493 electrical distribution equipment, the life expectancy is 20 year for transformers, switchboards, panel boards and variable frequency drives. Recommended replacement is at 30 years for these items. Per UL 1008, transfer switch life expectancy is based on equipment size.

***TABLE A-5***
***ELECTRICAL EQUIPMENT INVENTORY***

| Equipment | Past life | 3 to 9 Years Remaining | 14 to 20 Years Remaining | 20+ Years Remaining |
|---|---|---|---|---|
| Panelboards | 46 | 29 | 30 | |
| Switchboards | | 1 | | |
| Substations | 1 | | 1 | |
| Transfer switches | | | | 2 |
| Transformers | 17 | 9 | 7 | |
| Generator | | | 1 | |
| Variable Frequency Drive | 3 | 13 | 2 | |

Source: RS&H, 2016

It is recommended that the electrical equipment exceeding the service life be replaced in the first phase. The equipment with 3-9 years remaining should be targeted for replacement in second phase, and replacement in the third phase for equipment with 14 to 23 year remaining life. When replacing transformers and drives these units should be specified as high efficiency units. Consideration should be given to evaluate the condition of existing feeders and these should be replaced when the associated equipment is replaced. Electrical equipment replacement is detailed below.

***TABLE A-6***
***BUDGET ESTIMATE FOR ELECTRICAL DISTRIBUTION EQUIPMENT***

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 5-10 Years | Replace MDP1, 17 transformers and 46 panelboards that are past their service life and VFDs for replaced AHU units. | $700,000 |
| Phase 2: 10-15 Years | Replace 9 transformers and 29 panelboards with 3 to 9 years remaining service life and VFDs for replaced AHU units. | $220,000 |
| Phase 3: 15-20 Years | Replace Emergency generator MDP2, 7 transformers, and 29 panelboards with 14-20 years remaining service life and VFDs for replaced AHU units. | $710,000 |
| Phase 4: 20+ Years | Replace transfer switches | $100,000 |

Source: RS&H, 2016

## Lighting Systems

### Current Condition Assessment

Currently the lighting system consists of fluorescent, high-pressure sodium, LED, incandescent and metal halide. The existing terminal landside lobby including, meter greeter area, ticketing, and baggage claim is illuminated using 250-watt metal halide fixtures that operates 24 hours per day. The existing terminal airside including hold rooms and concession space is illuminated using 250-watt metal halide fixtures that operate 24 hours per day. These rooms also include areas with fluorescent lighting fixtures. There is substantial glazing in both these areas. Retail spaces have a good amount of incandescent track lighting. Lighting controls are being updated and integrated into the Hubbell LX lighting control system. The apron lighting is currently high-pressure sodium and is in good condition. The parking lot lights are high-pressure sodium and are in poor condition due to corrosion. Some of the parking lot lights have poles that are integral to the fixture. The other exterior fixtures are a combination of metal halide and high pressure sodium. Some skylight areas have lighting fixtures that have been upgraded to LED. The office areas, security checkpoint, baggage handling, and equipment spaces are lit using fluorescent fixtures. The record drawings indicate some T12 lamp fixtures, of which a portion were indicated as updated to T5 or T8 in 2011. It is unclear if the others were changed out as part of owner performed energy modifications.

### Anticipated/Recommended Replacements & upgrades

The existing lighting system contains some fixtures with lower efficiency than are afforded by newer LED technology. The condition of parking lot lighting and some exterior lighting gives priority to these systems. There are some recommended modifications that are not required by physical condition of the equipment and systems, but are more focused on energy saving.

These energy-focused modifications would produce energy saving in two areas – cooling load reduction and lighting load reduction. There are controls changes that can be accomplished with minimum cost as well as others that require some investment. These modifications include scheduling of lights in hold rooms based on flight schedules, turning off lights after the last flight and on before the first flight of the day. The large amount glazing affords an opportunity to use daylight harvesting. In order to utilize daylight harvesting, the existing fixtures would need to be replaced with LED light fixtures with dimming drivers. Additionally, we recommend providing occupancy sensors with manual on and automatic off mode, vacancy sensing, in office and other spaces with casual use.

It is recommended that the lighting in the hold rooms and airside public areas be changed to LED fixtures with equivalent optical performance that can be dimmed. Daylight harvesting and time of day controls are recommended to provide energy savings. We recommend the use of high optical efficiency fixtures to optimize performance. Down lights and other fixtures in conference, rooms should be changed from fluorescent to LED with dimming controls.

The existing apron lighting is recommended to be replaced with LED floodlights. The advantages of LED over the current high-pressure sodium fixtures include the following:

1. Lower energy use
2. Full light output without delay
3. Potential for dimming when aircraft are not operating in the area

These could utilize existing poles and supports for mounting the new fixtures.

We recommend changing the controls of the UV grow lights and replacing with LED grow lamps in existing fixtures.

We recommend prioritizing the replacement of the terminal landside and parking lot lights since the parking lot fixtures and poles are deteriorating. In addition, there appears to be some remaining T12 fixtures and fluorescent exit signs in this area that should be replaced due to energy use and availability of lamps. We recommend the replacement and control upgrades for the airside portion of the terminal occur in Phase 2 since the amount of glazing affords potential savings with daylight harvesting. The transition area from landside to airside in the terminal, including the checkpoint, are recommended to be the last area to be updated.

There is a total potential minimum of $50,000 in utility rebates available for all of these modifications. These rebates are taken into account for the budgetary cost estimates.

***TABLE A-7***
***BUDGET ESTIMATE FOR ELECTRICAL LIGHTING SYSTEMS***

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 5-10 Years | Replace fixtures with LED in terminal landside, parking lot and update controls. (about 1,200 fixtures and 105kw reduction in load) | $560,000 |
| Phase 2: 10-15 Years | Replace fixtures with LED in terminal airside, apron lights and update controls in area. (about 760 fixtures and 75kw reduction in load) | $460,000 |
| Phase 3: 15-20 Years | Replace fixtures with LED in terminal airside to land side connector including checkpoint and update controls in area. (about 250 fixtures and 10kw reduction in load) | $180,000 |
| Phase 4: 20+ Years | Update controls to implement advanced control. | $50,000 |

Source: RS&H, 2016

## A.4 HVAC Systems

### Current Condition Assessment

The current HVAC systems throughout the terminal consist of multiple chilled water-cooling and hot water heating systems, with associated air handling units. These system modules were installed as part of each airport expansion module to support the increased capacity need for each module. These systems were originally installed in 1992, 1999, 2005, and 2011.

### Chilled Water Systems

Currently there are six different chillers in the building that were installed in multiple different periods: 1999, 2004, 2006, 2010, and 2011. These systems consist of air-cooled chillers, of various capacities, with

constant flow chilled water pumps. The chillers and chilled water pumps are all in very good condition and are in better than expected condition for their ages.

### Hot Water Heating Systems

The heating system for the airport consists of multiple hydronic heating systems installed in three different periods, 1999, 2004, 2012. The heating systems consist primarily of hydronic fire tube boilers with primary/secondary pumping systems. The boilers and pumps are in very good condition. The older systems are in better than expected condition for their age.

### Main Air Handling Units

The main air distribution systems consist of multiple variable air volume (VAV) delivery systems with VAV terminal units serving multiple temperature control zones throughout the terminal. The units were installed in five different phases in 1992, 1999, 2004, 2006, and 2012. The condition of the main air handlers is good to excellent. The air handlings units installed in the original construction phase are in better than expected condition for their age.

### Anticipated/Recommended Replacements & Upgrades

According to ASHRAE data, the median useful life of air handling equipment in HVAC systems is 25 years. Chillers and fire tube boilers typically have a recommended useful service life of 25 years. Centrifugal base mounted type pumps have an average service life of 20 years based on ASHRAE data. Because of the relatively short life span of the current terminal and recent expansion projects, the HVAC systems are all in very good condition and do not have any immediate requirements for repairs or replacements.

Over a 20-year planning life cycle, nearly all of the HVAC equipment systems will reach the end of their recommended service life, and thus should be planned for replacement during the planning timeframe. The scheduling of these replacements would generally follow the sequence of the original terminal construction and expansions. The equipment installed as part of the original terminal construction is currently at or nearing the end of its recommended useful service life. This equipment should be planned for replacement in the next 5-7 years.

In addition to replacing equipment at end of its life cycle, there are a few recommendations to improve system efficiency and lower operating costs. These recommendations include:

- Add variable flow pumping to chilled water systems.
- Add demand control ventilation strategies to air handling systems installed as part of the 1999 and 1992 construction projects.

The current chilled water systems are all constant flow rate systems. This type of operation does not allow the systems to take advantage of periods where the HVAC systems do not require full cooling capacity or full chilled water flow. The addition of variable frequency drives to the chilled water pumps and modification to the building control systems will allow the systems to operate at reduced power levels when outdoor conditions are favorable for reduced pumping capacity.

Demand Control ventilation (DCV) strategies monitor the levels of certain airborne contaminants, typically CO2, to determine levels of occupant density in a space or area. These strategies modulate the amount of ventilation air that is brought into the building based on the level or quantity of occupants in the space. By applying DCV to the air handling systems, the quantity of ventilation air that is brought into the building can be kept to the minimum required, instead of constantly providing "peak design" condition

ventilation airflows. Reducing the quantity of ventilation air that must be conditioned can greatly reduce operating costs of the systems.

***TABLE A-8***
***BUDGET ESTIMATE FOR HVAC SYSTEMS***

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 5-10 Years | Replace 1992 Vintage AHU's: AHU-1, AHU-2, AHU-4, AHU-5, AHU-6, AHU-8, AHU-9, AHU-10, AHU-11, AHU-12, AHU-13, and HV-1. Add Demand Control Ventilation Strategies to AHUs | $1,800,000 |
| Phase 2: 10-15 Years | Replace 1999 Vintage Equipment: AHU-14, AHU-15, AHU-16, AHU-17, AHU-18, AHU-19, Boilers B-4 & B-5 and Associated Pumps, Chiller CH-4 and Associated Pumps. Add Demand Control Ventilation Strategies to AHU's. Add Variable Frequency Drives and Controls to Chiller Pumps. | $2,000,000 |
| Phase 3: 15-20 Years | Replace 2004 & 2006 Vintage Equipment: AHU-20, AHU-21, AHU-22, AHU-23, Boilers B-1, B-2, B-3 and associated pumps, Chillers CH-1, CH-2, CH-5 and associated pumps. Add Variable Frequency Drives and Controls to Chilled Water Pumps. | $3,750,000 |
| Phase 4: 20 Years + | Replace 2010 and 2012 Vintage Equipment: AHU-3, AHU-7, AHU-24, AHU-25, AHU-26, AHU-27, Boilers B-6A, B-6B, and associated pumps, Chillers CH-3, CH-6 and associated pumps. Add Variable Frequency Drives and Controls to Chilled Water Pumps. | $2,700,000 |

Source: RS&H, 2016

## A.5 Fire Protection Systems

During the site visit, the airport staff identified an issue with the dry pipe sprinkler system that serves the landside canopy. There has been extensive corrosion of the fire sprinkler supply piping that causes the dry pipe system air compressor to operate on a near continuous basis. The piping in the canopy should be replaced within the next 5 years.

***TABLE A-9***
***BUDGET ESTIMATE FOR FIRE PROTECTION SYSTEMS***

| Phase/Period | Description | Budgetary Cost Estimate |
|---|---|---|
| Phase 1: 0-5 Years | Replace corroded dry pipe sprinkler system in landside canopy. | $1,800,000 |

Source: RS&H, 2016