CAPITAL REGION
AIRPORT
AUTHORITY

CAPITAL CITY AIRPORT MASTER PLAN UPDATE

Prepared for
Capital Region Airport Authority

Final Report
December 2006

RS&H Team

The preparation of this document was financed in part through a grant from the Federal Aviation Administration (FAA). The contents of this report reflect the views of the Capital Region Airport Authority and the consultants, Reynolds, Smith and Hills, Inc., and do not necessarily reflect the 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 herein nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws.

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Master Plan Summary

Study Purpose

The Airport Master Plan is the Capital Region Airport Authority's strategy for the future development of the Airport. The master plan represents a combination of technical analyses completed to identify the future needs of the Airport, and the strategic vision of the Authority. Prior to the start of the Master Plan Update, the Authority commissioned a Strategic Plan for the Airport. The strategic plan identified four goals for the Airport:

- Retain and expand scheduled passenger air service
- Increase charter passenger services and activities
- Increase the number of based corporate and general aviation aircraft and related activity
- Increase the amount of cargo tonnage processed

In addition to the Strategic Plan, specific issues addressed in this Master Plan include runway length and configuration, terminal requirements, and access to the Airport.

The Airport Master Planning process first develops a forecast of aviation activity at the Airport for a 20-year planning period. Based on the forecast, facility improvements needed to accommodate the forecast demand are identified. Development alternatives for the facility improvements, based on the forecast and the Authority's Strategic Plan, are created and a thorough analysis results in selection of a preferred alternative. The selection of a preferred alternative includes consideration of potential environmental impacts. The final step of the plan includes identifying funding sources and obligations necessary to implement the plan.

Existing Conditions and Forecast

The Capital City Airport is located adjacent to the City of Lansing, the state capital of Michigan. The Airport is one of 14 commercial service airports in the State and is ranked fourth in terms of annual passengers. The Airport is situated within the Tri-County area of Clinton County, Ingham County, and Eaton County. The Airport sits on approximately 2,000 acres situated about four miles northwest of the Lansing central business district.

There are three runways at the Airport: two parallel runways, generally oriented in an east-west direction, and a third crosswind runway, oriented in a northeast-southwest direction. There is a network of taxiways that provide access to and from the runways. The passenger terminal building was initially constructed at its present location in 1959, and incrementally expanded on several occasions. The passenger terminal building now provides a total of 164,995 square feet of space, plus a temporary grade level boarding area constructed to serve commuter aircraft.

The general aviation facilities at the Airport are primarily located southeast and southwest of the passenger terminal. Air cargo facilities are located east of the terminal.

Primary access to the Airport is via North Grand River Avenue, from either I-69/1-96 to the west or the Lansing central business district to the southeast. Access is also provided from I-69 to the north, via Airport Road and DeWitt Road.

The forecast of aviation activity considers four main aircraft groups: air carrier (including freight carriers), air taxi (or regional airlines), general aviation, and military. For this master plan, the forecast is defined in terms of planning activity levels (PALs). The PALs allow monitoring of actual activity growth following completion of the plan. As the growth is monitored, the Airport will be able to determine which PAL most-closely projects the actual growth, and the implementation of associated facility requirements can be planned accordingly. The forecast for Capital City Airport, summarized in Table 1, shows a 3.4 percent average annual growth rate for passenger enplanements over the 20-year planning period. However, the aircraft used for passenger service will transition to fewer air carrier aircraft and more regional aircraft. The forecast also shows a moderate annual growth in operations by general aviation aircraft.

Table 1
FORECAST SUMMARY

Description	Actual 2003 (E)	Planning Activity Level 1	2	3	Average Annual Growth 2003-2023
Year					
Lower		2012	2017	2028	
Preferred		2008	2013	2023	
Upper		2007	2011	2019	
ENPLANEMENTS					
Lower Range	271,161	384,500	420,900	493,800	3.0%
Preferred Methodology	271,161	415,400	451,300	527,300	3.4%
Upper Range	271,161	427,900	472,200	560,800	3.7%
Air Carrier	141,260	216,400	225,700	253,100	3.0%
Commuter	129,901	199,000	225,600	274,200	3.8%
Peak Hour	161	176	269	314	3.4%
OPERATIONS					
Air Carrier	12,142	10,900	11,200	11,800	-0.1%
Commuter	17,218	36,300	39,200	43,100	4.7%
General Aviation					
Local	27,755	26,200	27,600	30,500	0.5%
Itinerant	31,727	36,300	38,100	42,100	1.4%
Military	3,579	4,000	4,000	4,000	0.6%
Annual Operations	92,421	113,700	120,100	131,500	1.8%
BASED AIRCRAFT	100	113	117	128	1.2%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc.(Projected)

Facility Requirements

The facilities requirements are used to analyze the ability of the current facilities at Capital City Airport to accommodate the forecast aviation demand. The facility requirements analysis identified the following primary future facility deficiencies based on the forecast activity:

- Passenger Terminal - The service level of the existing terminal will reach unacceptable levels near the mid-point of the 20-year planning period, and the terminal will require significant modification or replacement.
- Air Cargo – Growth will require additional aircraft parking apron and package sort facilities.
- On-Airport Access - Vehicle traffic and congestion in the terminal area will reach unacceptable levels approximately five to 10 years through the planning period. Additional curbfront capacity will be needed.
- Off-Airport Access - The primary access to the Airport is currently via North Grand River Avenue. Growth in airport vehicle traffic and non-Airport traffic using the road will ultimately result in unacceptable congestion.
- General Aviation – Continued growth in general aviation activity will require additional t-hangars and conventional hangars. Additional apron space will be needed for itinerant aircraft parking.
- Runways – An immediate need for a 1,250-foot extension to the primary runway is identified. Also, near the end of the planning period, the total aircraft activity and associated airfield capacity reaches levels that warrant planning for additional capacity.

Preferred Development Alternative

Airport and regional development alternatives needed to accommodate the facility requirements and Authority's strategic vision were developed and analyzed. Highlights of the preferred development alternative include the following:

- Develop a new passenger terminal complex located north of Runway 10R/28L and east of Runway 6/24, in the area of DeWitt Road and State Road.
- The primary passenger access routes to the Airport should be redefined with the Lansing central business district utilizing local arterial roads, and all other surrounding regions utilizing I-69, via DeWitt Road, and an upgraded State Road.
- Access routes to general aviation and cargo facilities at the Airport should be redefined utilizing I-69, via Airport Road.
- Extend Runway 10R-28L to 8,500 feet.
- Provide additional long-term parking for the existing passenger terminal.
- Plan for the ultimate construction of a new air carrier Runway 10L-28R on the north portion of the airport, allowing independent parallel runway operations.
- Plan for the extension and upgrade of Runway 6-24 to an air carrier runway.

- Provide designated areas for cargo facility expansion consistent with the Authority's strategic plan.
- Continued development of existing general aviation areas in the southwest and southeast portions of the Airport.

Exhibit 1 shows the recommend Airport access plan based on the selected new terminal location.

Exhibit 1
PRIMARY AIRPORT ACCESS ROUTES

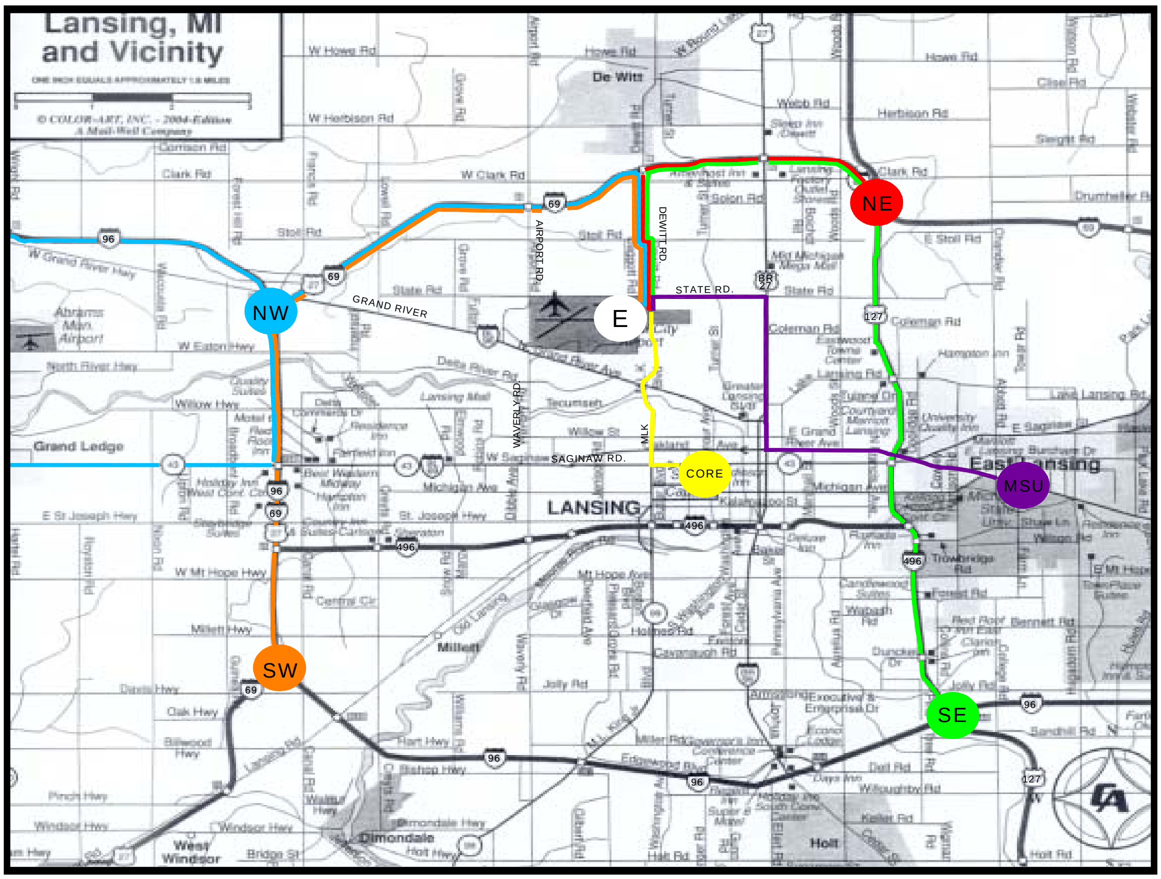
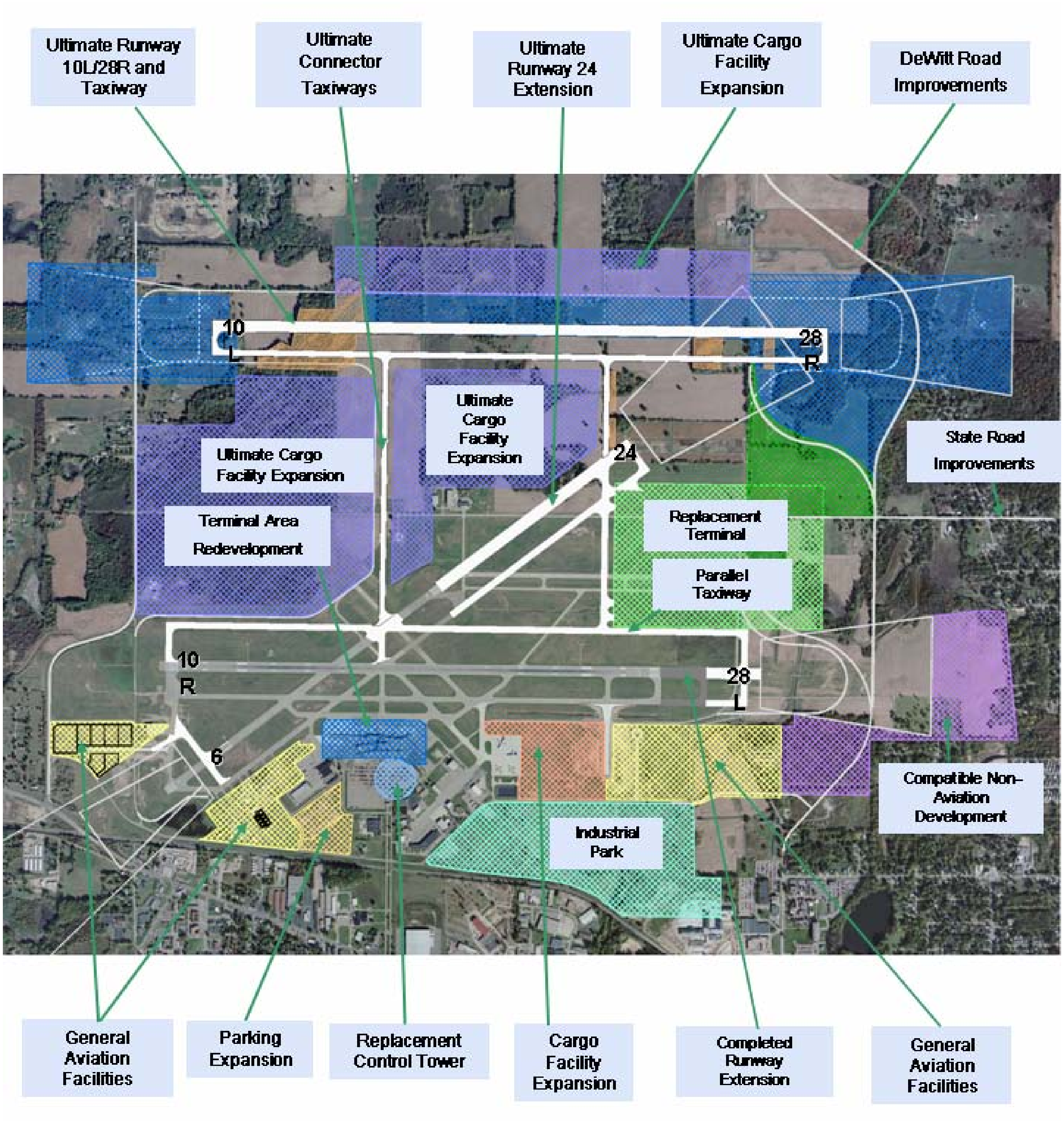


Exhibit 2 presents the selected overall development plan for the airport.

Exhibit 2
RECOMMENDED AIRPORT DEVELOPMENT



Environmental Considerations

The environmental overview within the master plan serves two purposes. The first is to identify areas of potential environmental concern to be considered during the defining and evaluating of the Airport development alternatives. For example a number of wetland areas are identified, primarily north and west of the current airfield. In addition, noise sensitive areas in the Airport vicinity are identified and considered.

The second purpose of the environmental overview is to identify potential environmental factors that need to be considered during the implementation of the development plan. A small number of environmental consequences have been identified in relation to the proposed short-term and long-term projects at Capital City Airport. The possible impacts to the Airport and its surrounding area are based strictly on consultant observation; correspondence with Federal, State and local environmental and planning agencies; and other available data. These include:

- Noise and air pollution from dust and diesel fumes during construction; all possible short term impacts should be localized in the immediate vicinity of the Airport and minimal impact should occur on off-airport properties.
- Potential wetland impacts dependent on selected location and size of specific facility development; demand will dictate the need for facility improvements, at which time the magnitude of the impact will need to be determined.

Implementation

The implementation plan consists of a project phasing plan and a financial plan. The phasing plan identifies a likely time frame for facility development. The time frames are identified as short-term, long-term, or ultimate. Short-term refers to facilities for which there is a current demand and implementation should begin immediately. Long-term refers to facilities for which demand will likely occur beyond five years to the end of the 20-year planning period. The ultimate facilities are those for which a demand is not foreseen in the planning period, but could materialize with demand change, or likely will materialize beyond the planning period.

Short Term Phase

- Runway 10R-28L extension
- Existing terminal improvements
- Additional long-term parking
- Additional employee parking
- Additional rental car storage
- T-hangar and conventional hangars
- General aviation apron
- Access taxilane
- Air cargo sort facility expansion and apron expansion
- Fuel storage capacity

Long-Term Phase

- New terminal development
- T-hangar and conventional hangars
- Air cargo sort facility expansion and apron expansion
- Fuel storage capacity
- Airport traffic control tower

Ultimate Phase

- New air carrier Runway 10L-28R and/or extended Runway 6-24

The financial plan describes the cost burdens the Authority may incur while maintaining the ability to generate sufficient revenues in the future to cover operations and existing debt service obligations. The Authority's financial structure and historical revenues and expenses were examined to project future revenues and expenses. In addition, historical funding sources for Capital City Airport and other airport projects were analyzed to identify likely funding sources for the 20-year capital improvement program defined by this master plan. Based on these analyses, the potential funding sources are as follows:

- FAA $243.3 million
- MDOT $15.1 million
- Third Party $3.4 million
- Local $46.8 million

The local share of the project funding assumes the Authority will need to issue debt in FY 2011 to complete construction of the replacement terminal.

CHAPTER 1
INVENTORY

1.1 Introduction

The inventory chapter is a collection of data pertaining to the present day condition of Capital City Airport and the area it serves. The inventory includes data pertaining to items such as airport location, airport access, navigation and airspace, area meteorological conditions, airport tenants, airport services, and runway and taxiway facilities. The material collected and identified in this chapter provides essential background information and updates the information provided in the last master planning effort. A glossary of terms is provided in **Appendix A**.

1.2 Background

Background information regarding Capital City Airport is provided in the following sections. The history section provides a brief overview from the original dedication of the Airport through the present day conditions by highlighting key events in the historical record. The Airport setting section provides geographic and meteorological data for the Airport and the surrounding area. Finally, the role discussion provides an overview of the Airport's placement in the national system of airports and a generalized description of the size and level of air service provided.

1.2.1 History

Lansing's first official airport was founded on a 300-acre site northwest of the City of Lansing. A joint effort began in 1927 to develop the Airport's first facilities. The Chamber of Commerce provided funds for the establishment of a city hangar. Soon afterwards, the Michigan Highway Department graded and leveled land for the Airport and the Consumers Power Company built a tower for the airport beacon. The Board of Water and Light and area construction companies donated additional lighting and building materials. The Airport was officially opened on July 14, 1928 in a two-day celebration that attracted over 70,000 people.

Transamerican Airlines began airmail service on July 17, 1928 and Kohler Airlines began passenger service on September 1, 1929. In 1934, Pennsylvania Airlines and Transport, Inc. absorbed Kohler Airlines and began providing airmail and passenger service to Detroit, Muskegon, Grand Rapids, and across Lake Michigan.

Passenger demand for air service grew so much that by 1959 the current airport terminal building was constructed to replace the original terminal building built in 1940. The terminal building was initially built to accommodate three airlines, a restaurant, and a gift shop. In addition, the terminal building housed the FAA Air Traffic Control Tower, the offices of the Michigan Aeronautics Division, the National Weather Service, and a flight service station.

In 1970 the State of Michigan passed Public Act Number 73, which provided for the creation of airport authorities within certain limitations of state-owned airports. Following the passage of Public Act Number 73, ownership and authority of the Airport passed to the Capital Region Airport Authority. In 1977, Mason Jewett Field, a general aviation facility located approximately 12 miles southeast of the City of Lansing, was also added to the Authority's jurisdiction.

Steady development of the Airport continued with the construction of a new aircraft rescue and fire fighting (ARFF) building in 1972. During the following years, terminal building expansion and runway pavement rehabilitation projects were undertaken. In 1973, the first airport surveillance radar was installed and an airport master plan was conducted in 1975. The instrument landing system and approach lighting system for Runway 10R was commissioned in 1977.

In 1980, the Airport constructed a new 5,300 square foot fire station and purchased a new firefighting vehicle. The air carrier terminal apron was reconstructed in 1982 and renovation of airline space was undertaken for Piedmont Airlines. In 1986, a new 10,000 square foot automated flight service station was constructed southeast of the terminal parking lot to provide flight services on a statewide basis. As part of the continuous planning process, an airport master plan update was completed in 1987.

Between 1988 and 1990, several airfield and landside projects were accomplished. Runway 10R/28L and several taxiway pavements were rehabilitated and Runway 14/32 was decommissioned and became Taxiway F. During this same period, perimeter deer fencing was installed and a new fuel farm was constructed. To accommodate the initiation of service by Continental Airlines, temporary ticket counter, baggage makeup, and airline offices were set up in the terminal building. In 1990, the Airport conducted a Federal Aviation Regulation (FAR) Part 150 Noise Compatibility Study.

Another major terminal building expansion and renovation was conducted in 1992. This project added 50,000 square feet to the terminal building and renovated an additional 110,000 square feet. An airport master plan and environmental study were commenced in 1993 for future airport projects. Also in 1993, the public parking lot was reconstructed and a new ASR-9 facility was installed.

In 2001, improvements to the terminal building were undertaken to provide additional terminal area and increase the baggage facilities. This continued work on the passenger terminal building will provide for needed upgrades and capacity improvements. When the work is completed, the terminal will increase by 10,570 feet. Most recently, in 2003, new boilers were installed for the terminal building.

An existing airport aerial photo is provided in **Exhibit 1-1**.

1.2.2 Setting

Capital City Airport is one of 14 commercial service airports in the State of Michigan and is ranked fourth in terms of annual enplanements. The State's busiest airport, Detroit Metropolitan, is located approximately 90 miles east of Lansing.

The Lansing area, located in south central Clinton County, is approximately 75 miles southwest of Saginaw Bay and approximately 82 miles west of Lake Michigan. The terrain is relatively flat with soils varying from clay to loam. Much of the land located north of the Airport is currently undeveloped or used for agricultural purposes, and a public golf course and cemetery are located west of the Airport. The land to the east and southeast of the Airport includes residential and business development. In addition, a commercial service corridor and further residential development is located directly south of the Airport.

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Exhibit 1-1
EXISTING AIRPORT LAYOUT

1.2.2.1 Location

Lansing is the state capital of Michigan. The Tri-County area includes Clinton County, Ingham County, and Eaton County. Capital City Airport consists of approximately 2,000 acres situated approximately four miles north of the Lansing Central Business District, see **Exhibit 1-2**. As shown in **Exhibit 1-3**, Lansing is located within the south central area of Michigan's Lower Peninsula and is approximately 90 miles west of the City of Detroit. Lansing is situated within a three-county standard metropolitan statistical area.

Exhibit 1-2
VICINITY MAP

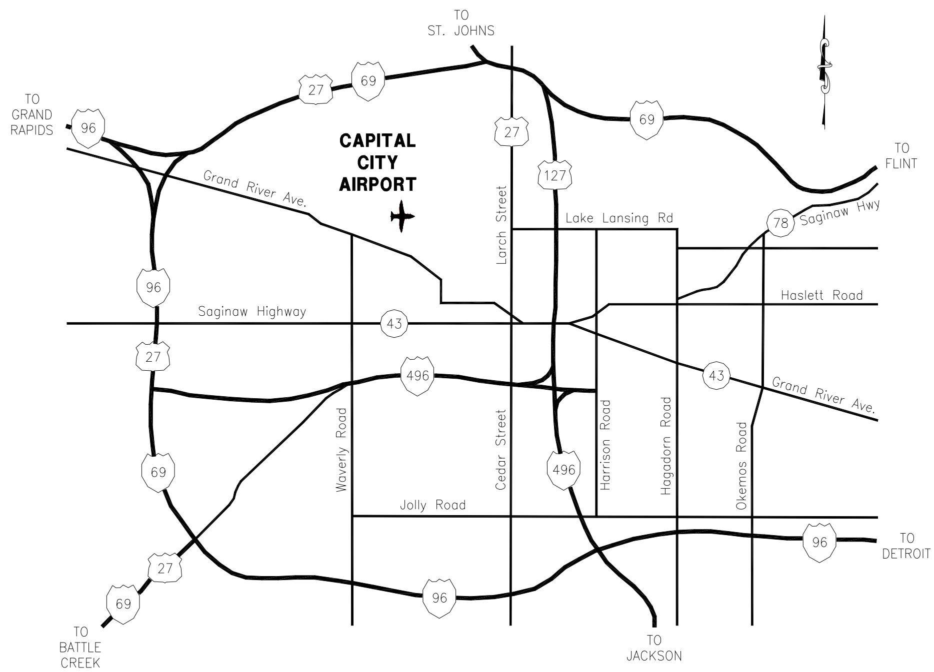


Exhibit 1-3
REGIONAL MAP

1.2.2.2 Community Economic Overview

The area governed by the Tri-County Regional Planning Commission comprises the economic base of the Airport. Established in July of 1956, the political and business leadership in the greater Lansing region recognized the need for the area community leaders to come together and form an organization to serve the inter-jurisdictional area. This three-county region is made up of 78 separate units of government; including 27 cities and villages and 48 townships. In analyzing the economic viability of an area it is important to look at the population, per capita personal income, and the occupational composition. In assessing the Tri-County Region, data collected from the Tri-County Regional Planning Commission was utilized.

The last official population count for the Tri-County Region occurred in the 2000 Census. At that time population in the region was 447,728. The Tri-County Regional Planning Commission then projected this forecast and estimated the 2002 regional population to be 453,620. This equates to an approximate annual growth rate of 0.65 percent.

Per capita personal income is a measure of the wealth of an area's population as well as an indicator of the economic health of that region. Per capita personal income is determined by dividing the total personal income of residents by the total population of the area. Regional economic data indicated that the average per capita personal income for the Tri-County region in 2002 was $27,217. Of the three counties located within the Tri-County Regional Planning Commission, Eaton County has the lowest per capita personal income, while Clinton County has the highest. All three counties are slightly below the state average of $29,629.

The economy of the Lansing area is diversified among several of the major occupational categories. Located within a one day drive of nearly half of the country's population and purchasing power, some of the country's largest manufacturing, warehousing, and distribution companies have established base operations in the Lansing area. Hence, the Tri-County Region is a professional and sales driven area with just under 35 percent of the employed population occupied in management and professional related occupations and an additional 27 percent of occupations are sales and office oriented. The remaining 38 percent are employed in service, agricultural, construction, or production and transportation occupations. The region is a major part of the Midwest manufacturing belt, with the bulk of activity centered in transportation products. The Tri-County Region's employment reflects the concentration on transportation products in that nearly 17 percent of its employed population is working in the transportation services or manufacturing industry.

1.2.2.3 Ownership and Management

Ownership and operation of Capital City Airport is the responsibility of the Capital Region Airport Authority. Created in 1970, the Authority is comprised of a six-member Board of Directors. Three of the members are appointed by the Mayor of the City of Lansing and confirmed by the City Council, the remaining three members are appointed by the Ingham County Board of Commissioners. An executive director, with the assistance of two deputy executive directors and three departmental directors, oversees the daily operations and management of the Airport.

1.2.2.4 Meteorological Conditions

A review of prevailing meteorological conditions to assist in the evaluation of aircraft performance characteristics is fundamental to an airport master plan. Temperature, the amount of precipitation, winds, visibility, and cloud ceiling heights are generally the elements used to summarize an area's climate for airport planning purposes.

The continental type of climate of the Lansing area is characterized by larger temperature fluctuations than areas at the same latitude near the Great Lakes, which have more moderate temperatures. However, the area seldom experiences prolonged periods of hot, humid weather in the summer or extreme cold during the winter. Diminished wind speeds or winds that do not traverse large unfrozen lakes often produce clearing skies and the colder temperatures expected at continental locations.

The average annual temperature in Clinton County is 47.1^{o} Fahrenheit. Moderately warm temperatures dominate summers with July having the average highest temperature at 70.7 degrees. The highest temperature on record was 100 degrees in August of 1964. The last annual freeze typically occurs in May and the first annual freeze occurs around October. January has the lowest average temperature at 21.5 degrees. The lowest temperature on record was 25 degrees below zero in January of 1967.

Precipitation is well distributed throughout the year with the crop season, April through September, receiving an average of 17.31 inches or 59 percent of the average annual total. Summer precipitation comes mainly in the form of afternoon showers and thundershowers. The wettest month is June with an average of 3.50 inches of rainfall, while the driest month is February with an average of 1.55 inches. Average seasonal snowfall is 51.7 inches.

Prevailing winds in the Lansing area are southwesterly, averaging ten miles per hour. The strongest one-minute wind speed, 63 miles per hour, was recorded in June of 1963. As a result of the prevailing southwesterly winds, the Lansing area does experience some lake effect. However, this is minimal and essentially limited to increased cloudiness during the late fall and early winter.

1.2.3 Role

Determination of an airport's classification and role is a function of the Federal Aviation Administration (FAA) and is used in the process of assembling the National Plan of Integrated Airport Systems (NPIAS) and determining airport project funding levels.

1.2.3.1 Airport NPIAS Classification

An airport must be included in the NPIAS to be eligible for funding under the Airport Improvement Program (AIP). The NPIAS is prepared by the FAA every two years and identifies public-use airports considered necessary to provide a safe, efficient, and integrated system of airports to meet the needs of civil aviation, national defense, and the United States Postal Service. It also takes into consideration the relationship of each airport to the rest of the transportation system in a particular area, the forecast of technological developments in aeronautics, and the development forecast in other modes of transportation. A detailed description of the NPIAS can be found in Appendix B.

Capital City Airport is listed in the NPIAS as a primary commercial service airport. This descriptor identifies the Airport as one that enplanes more than 10,000 annual passengers.

1.2.3.2 Adjacent Airports and Services

An important part of conducting an inventory at an airport is the examination of neighboring airports and the services they offer. This may include both public and private use airports that may have an impact on the airspace surrounding Capital City Airport.

General aviation airports that are open to the public and are located within 50 statute miles of Capital City Airport are identified in **Table 1-1**. In addition to those airports, there are also 12 private airports located in the vicinity of Capital City Airport that are not available for public use. Commercial service airports located in Michigan are identified in **Table 1-2**. These airports play an important role in identifying the service area for the Airport and competition offered by airports with similar services. The locations of the cities or towns associated with the airports found in **Table 1-2** and the commercial service airports located in the upper peninsula of Michigan are depicted in **Exhibit 1-4**.

Table 1-1
SURROUNDING GENERAL AVIATION AIRPORTS AND ASSOCIATED SERVICES

Airport	City	Runways	Pavement	Instrument Approaches	Services		Based A/C	Ann Ops
					Fuel	Maint.		
Abrams Municipal	Grand Ledge	9/27 – 3,200 x 75 18/36 – 2,580 x 120	Asphalt Turf	None	100 LL	Yes	145	87,965
Bean Blossom	New Lothrop	3/21 – 1,900 x 80	Turf	None	None	No	0	8,760
Fitch Beach	Charlotte	2/20 – 3,500 x 75 14/32 – 2,318 x 100	Concrete Turf	None	100 LL	Yes	39	10,585
Forest Hill	Westphalia	9/27 – 2,070 x 80 18/36 – 1,900 x 80	Turf Turf	None	None	No	1	9,125
Gratiot Community	Alma	9/27 – 5,000 x 75 18/36 – 3,200 x 75	Asphalt Asphalt	ADF	100 LL	Yes	39	8,215
Jackson County	Jackson	6/24 – 5,344 x 150 14/32 – 3,501 x 100	Asphalt Asphalt	ILS	100 LL Jet A	Yes	105	63,145
Livingston County	Howell	13/31 – 4,300 x 75	Asphalt	None	100 LL Jet A	Yes	137	63,875
Maidens	Williamston	9/27 – 2,300 x 70	Turf	None	None	No	3	9,125
Maple Grove	Fowlerville	9/27 – 3,050 x 110 18/36 – 2,000 x 113	Turf Turf	None	100 LL	Yes	9	16,425
Mason Jewett	Mason	9/27 – 4,000 x 75	Asphalt	None	100 LL Jet A	Yes	75	18,250
Mayes	Carson City	10/28 – 2,300 x 100 18/36 – 2,200 x 100	Turf Turf	None	None	No	6	17,520
Howard Nixon Memorial	Chesaning	9/27 – 2,800 x 150 18/36 – 2,200 x 150	Turf Turf	None	None	No	22	8,030
Owosso Community	Owosso	10/28 – 3,800 x 75 18/36 – 2,575 x 260 6/24 – 2,470 x 130	Asphalt Turf Turf	None	100 LL	Yes	58	23,725
Randolph's Landing Area	St. Johns	5/23 – 2,175 x 100	Turf	None	None	No	1	9,125
Richmond Field	Gregory	18/36 – 2,450 x 100	Turf	None	None	No	27	32,485
Schiffer Acres	St. Johns	7/25 – 3,425 x 120	Turf	None	None	Yes	11	13,505
Skyway Estates	Eaton Rapids	8/26 – 2,653 x 100	Turf	None	None	No	18	33,580
Tripp Creek	St. Johns	9/27 – 2,491 x 50	Turf	None	None	Yes	3	17,520
Wend Valley	Charlotte	18/36 – 1,800 x 100	Turf	None	None	No	5	12,045

Source: Detroit Aeronautical Sectional Chart and FAA Airport Database

Table 1-2
MICHIGAN COMMERCIAL SERVICE AIRPORTS AND ASSOCIATED SERVICES

Airport	City	Runways	Pavement	Instrument Approaches	Services Fuel	Services Maint.	Based A/C	Ann Ops
Alpena County	Alpena	1/19 – 9,001 x 150 7/25 – 5,031 x 100	Concrete Concrete	ILS None	100 LL	Yes	42	22,264
Bishop Int'l	Flint	18/36 – 7,848 x 150 9/27 – 7,199 x 150 5/23 – 4,291 x 150	Asphalt, PFC Asphalt, PFC Asphalt	None ILS None	100 LL Jet A	Yes	150	135,226
Capital City	Lansing	10R/28L – 7,251 x 150 6/24 – 5,001 x 120 10L/28R – 3,601 x 75	Asphalt Asphalt Asphalt	ILS None None	100 LL Jet A	Yes	112	100,403
Cherry Capital	Traverse City	10/28 – 6,501 x 150 18/36 – 5,107 x 150	Asphalt Asphalt, PFC	ILS None	100 LL Jet A	Yes	101	111,009
Chippewa County Int'l	Sault Ste Marie	16/34 – 7,201 x 200 9/27 – 5,000 x 75	Concrete Asphalt	ILS None	100 LL Jet A	No	22	35,273
Detroit Metro	Detroit	4R/22L – 12,001 x 200 3R/21L – 10,000 x 150 4L/22R – 10,000 c 150 9L/27R – 8,700 x 200 3L/21R – 8,500 x 200 9R/27L – 8,500 x 150	Concrete Concrete Concrete Asphalt Asphalt Concrete	ILS ILS ILS ILS None ILS	100 LL Jet A	Yes	71	540,996
Ford	Iron Mountain	1/19 – 6,500 x 150 13/31 – 3,812 x 75	Asphalt Asphalt	ILS None	100 LL Jet A	Yes	22	8,224
Houghton County Memorial	Hancock	13/31 – 6,501 x 150 7/25 – 5,196 x 100	Asphalt Asphalt	ILS None	100 LL Jet A	Yes	19	16,628
Kalamazoo County	Kalamazoo	17/35 – 6,500 x 150 5/23 – 3,436 x 100 9/27 – 2,820 x 60	Asphalt Asphalt Asphalt	ILS None None	100 LL Jet A	Yes	111	95,201
Gerald R. Ford	Grand Rapids	8R/26L – 10,000 x 150 17/35 – 8,501 x 150 8L/26R – 5,000 x 100	Concrete Concrete Concrete	ILS ILS None	100 LL Jet A	Yes	132	127,903
MBS Int'l	Saginaw	5/23 – 8,002 x 150 14/32 – 6,400 x 150	Asphalt Asphalt	ILS None	100 LL Jet A	Yes	26	65,389
Muskegon County	Muskegon	6/24 – 6,501 x 150 14/32 – 5,001 x 150 18/36 – 3,200 x 100	Asphalt, PFC Asphalt, PFC Asphalt, PFC	ILS ILS None	100 LL Jet A	Yes	126	82,317
Pellston Regional	Pellston	14/32 – 6,512 x 150 5/23 – 5,395 x 150	Asphalt Asphalt	ILS None	100 LL Jet A	Yes	30	20,134
Sawyer Int'l	Gwinn	1/19 – 12,370 x 150	Asphalt	ILS	100 LL Jet A	Yes	44	45,880

Source: Detroit Aeronautical Sectional Chart and FAA Airport Database

Exhibit 1-4
MICHIGAN CITIES WITH COMMERCIAL SERVICE AIRPORTS

1.2.3.3 Aviation Activity Overview

The Airport is served by seven airlines, including Comair, Midwest Connection, United Express, US Airways Express, Continental Connection, Allegiant Air, and Northwest Airlink. Combined, these airlines offer non-stop commercial service to eight cities throughout the United States. Service is offered to one or more of each airline's hubs. The commercial service destinations are shown in **Exhibit 1-5**.

Exhibit 1-5
COMMERCIAL SERVICE DESTINATIONS

An overview of aviation activity at Capital City Airport is summarized in this chapter in terms of annual passenger enplanements, annual cargo tonnage, aircraft operations, and based aircraft. Chapter 2, Forecast of Aviation Demand, provides a comprehensive view of Capital City Airport's aviation activity.

Capital City Airport accommodated 260,190 passenger enplanements in 2002, making the 149th busiest of 549 commercial service airports in the United States[1]. This number is approximately the same as the previous year (265,199) and the enplaned passenger count for 2003 (260,600).

Air cargo at the Airport is the total annual weight of express packages, mail, and other airfreight that is shipped to or from the Airport via a commercial passenger or dedicated air cargo aircraft. In 2003, an estimated 49,548,300 pounds of air cargo was processed at the Airport. As with passenger enplanements, the year-to-year volume of cargo at Capital City Airport has been relatively flat for the past several years, reflective of national economic conditions and the effects of the terrorist's attacks of September 11, 2001. These circumstances are discussed in greater detail in Chapter 2.

[1] Ranking based on Federal Aviation Administration records.

In 2002, the Airport accommodated 93,628 total aircraft operations. This included 28,589 local operations and 65,039 itinerant operations. Scheduled air carrier and air taxi comprised just over 30 percent of the total traffic at 28,636 operations. The military conducted 3,974 annual operations. Itinerant and local general aviation aircraft conducted the remaining 61,018 operations.

As of early November 2003, the Airport has 100 based aircraft. This includes 59 single-engine, 32 multi-engine, and six jet aircraft. In addition, the National Guard currently has one based military aircraft and the Aeronautics Division of the Michigan State Police has two based helicopters.

1.2.4 Prior and Ongoing Studies

The following list provides a summary of prior and ongoing studies conducted for Capital City Airport.

- **Pavement Management Program** – In May of 1987 Aviation Planning Associates, Inc, in conjunction with Peckham Engineering, Inc., prepared a Pavement Management Program for the Airport. This study was initiated in order to identify the investment dollars it would take to improve and/or maintain desirable levels of overall airfield pavement conditions thereby assuring safe aircraft travel. The current Pavement Management Plan will replace the 1987 study.

- **FAR Part 150 Noise Compatibility Study** – In April of 1992 The LPA Group, in association with Harris, Miller, Miller and Hanson, Inc., Young Environmental Sciences, Inc., and Community Awareness Services, Inc., prepared a FAR Part 150 Airport Noise Compatibility Study for the Airport. The purpose of this study was to provide the Airport Authority with a comprehensive noise plan in accordance with FAR Part 150. The goal of this study was to enact all viable options to minimize aircraft noise exposure on developed areas within the airport vicinity and to establish provisions for ensuring that existing and future land uses in the affected areas would be compatible with the level of anticipated noise exposure. The current FAR Part 150 Noise Compatibility Study Update will replace the 1992 study.

- **Environmental Assessment** – In October of 1998 Landrum & Brown, Inc. prepared an environmental assessment for the Airport. The purpose of this study was to evaluate the environmental impact of the proposed development plan for the Airport. The development included a crosswind runway capable of accommodating existing and forecast larger aircraft types during times when the primary runway was closed, sufficient general aviation runway facilities to accommodate all single and light multi-engine aircraft, enhancement of the operational safety and efficiency for current and future aircraft users, and enhancement of the Airport's ability to provide dependable air transportation services that would enhance the region's ability to attract future corporate, manufacturing, and industry users.

- **Airport Master Plan** – In May of 1995 Coffman Associates, Inc. and R.W. Armstrong prepared a Master Plan Update for the Airport. The current Master Plan Update replaces the 1995 study.

- **Runway Safety Area Study** – A study is currently underway that will evaluate the existing runway safety areas, assess deficiencies from Federal Aviation Administration standards, and evaluate potential airfield modifications to correct identified deficiencies. A runway safety area is a defined surface (dimensions are dependent upon the design aircraft for the runway) surrounding the runway that is prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway surface.

1.3 Airfield

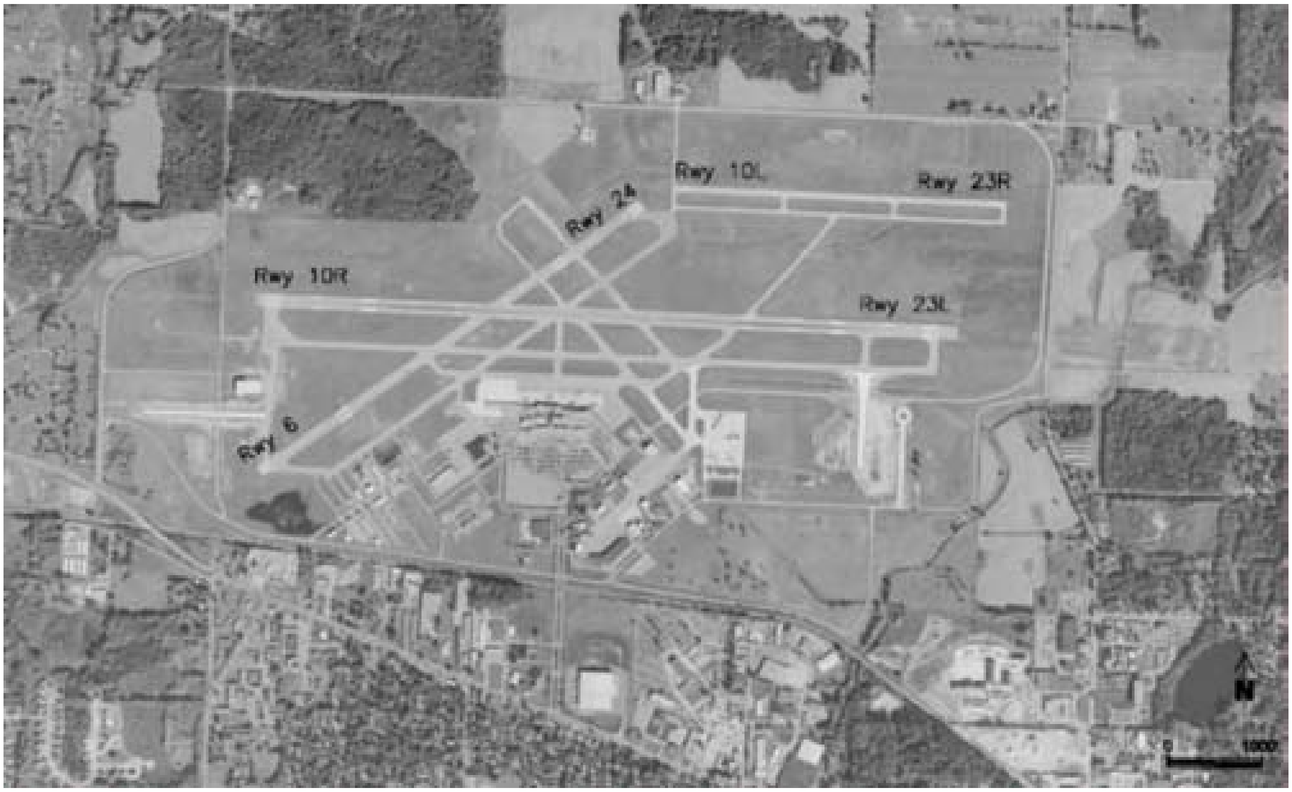
The airfield facilities at the Airport include the runways, taxiways, airfield lighting, visual aids, and navigational aids. These items are identified in **Table 1-3** and the runways are identified in **Exhibit 1-6**.

Table 1-3
AIRFIELD DATA TABLE

Item	Runway					
	10R	**28L**	**6**	**24**	**10L**	**28R**
Runway Length	7,251'		5,001'		3,601'	
Threshold Displacement	-	-	-	-	-	-
Effective Takeoff Length	7,251'	7,251'	5,001'	5,001'	3,601'	3,601'
Effective Landing Length	7,251'	7,251'	5,001'	5,001'	3,601'	3,601'
Runway Width	150'		120'		75'	
Runway Gradient	0.138%		0.219%		0.138%	
Pavement Type	Asphalt		Asphalt/Concrete		Asphalt	
Pavement Strength						
Single Wheel Gear	100,000 lbs		45,000 lbs		12,000 lbs	
Dual Wheel Gear	175,000 lbs		65,000 lbs		-	
Dual Wheel Tandem Gear	300,000 lbs		100,000 lbs		-	
Runway lighting	HIRL		MIRL		MIRL	
Runway Marking	Precision	Precision	Non-Precision	Non-Precision	Visual	Visual
Visual Aids	MALSR	MALSR	VASI-4, REIL	VASI-4, REIL	-	-
Aircraft Approach Cat. / Airplane Design Group	D-IV		C-III		B-I	
Approach Ratio	50:1		34:1		20:1	
Runway Protection Zone	1,000' x 1,750' x 2,500'		500' x 1,010' x 1,700'		250' x 450' x 1,000'	

Source: FAA Airport Database

Exhibit 1-6
AIRSIDE FACILITIES



1.3.1 Runways

The runway configuration consists of the number and orientation of runways. The number of runways provided at an airport depends largely on the volume of traffic; while the orientation of the runways depends almost entirely on the direction of the prevailing wind patterns in the area, the size and shape of the area available for development, and land use or airspace restrictions in the vicinity of the airport. In general, the runway and connecting taxiways should be arranged to provide adequate separation between aircraft in the traffic pattern, cause the least interference and delay in taxiing, landing, and takeoff operations, and provide the shortest taxi distance from the terminal area to the runway ends.

The runway configuration at Capital City Airport consists of two parallel runways, generally oriented in an east-west direction, and a third crosswind runway, oriented in a northeast-southwest direction.

Runway 10R/28L is the Airport's primary runway and measures 7,251 feet in length and 150 feet in width. Runway 10R/28L is composed of grooved asphalt and is equipped with a high intensity runway light (HIRL) system with precision instrument markings. In FAA Form 5010-1, the pavement strength is currently listed at 100,000 pounds single-wheel gear (SWG), 175,000 pounds dual-wheel gear (DWG), and 300,000 dual wheel tandem gear (DWTG).

Runway 10L/28R runs parallel to the Airport's primary runway and measures 3,601 feet in length and 75 feet in width. Runway 10L/28R is composed of asphalt and is equipped with a medium intensity runway light (MIRL) system with basic runway markings. Primarily used by smaller aircraft, the pavement strength is currently listed at 12,000 pounds SWG.

Runway 6/24 is a secondary runway and measures 5,001 feet in length and 150 feet in width. Runway 6/24 is composed of a mixture of grooved asphalt and concrete. The runway is equipped with MIRL and has non-precision instrument markings on each end. The pavement strength is listed at 45,000 pounds SWG, 65,000 pounds DWG, and 100,000 pounds DWTG. Runway 6/24 intersects the western end of Runway 10R/28L but ends prior to intersecting Runway 10L/28R.

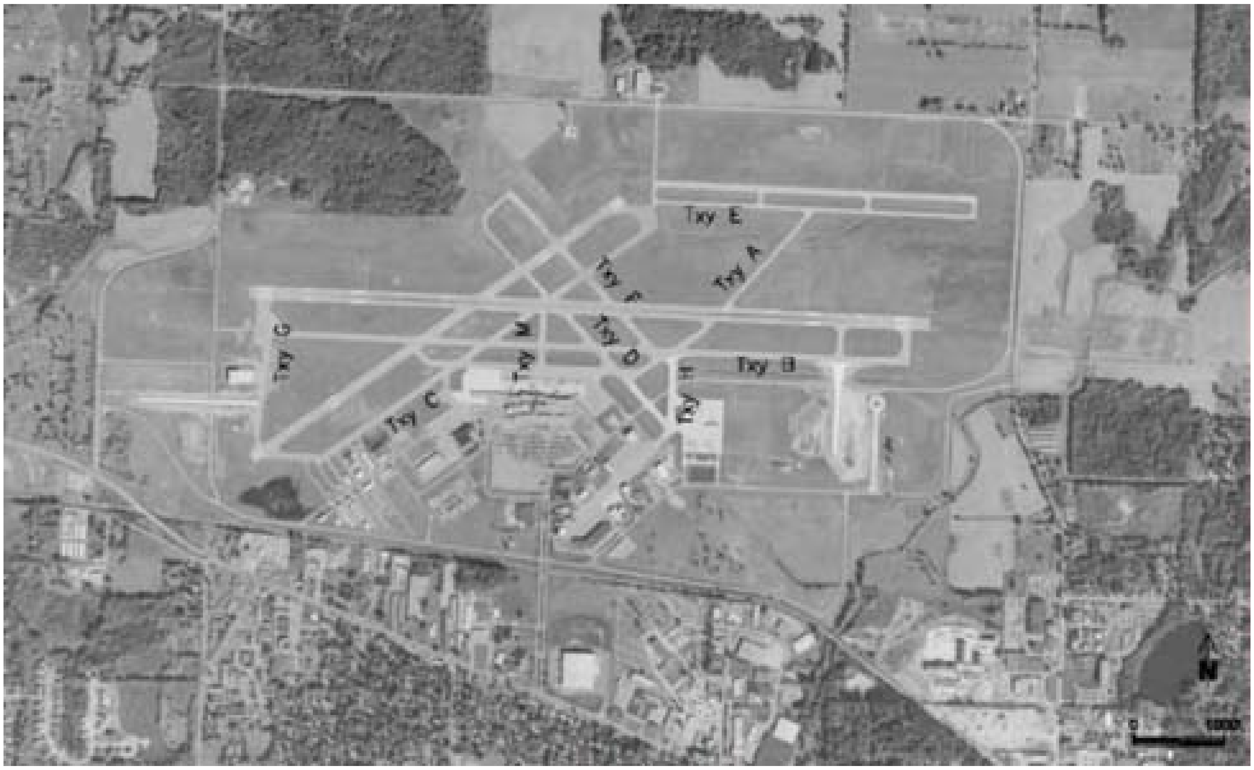
1.3.2 Taxiways

The primary function of a taxiway system is to provide access between runways and the terminal area. The taxiways should be located so that aircraft exiting the runway will have minimal interference with aircraft entering the runway or remaining in the traffic pattern. Taxiways expedite aircraft departures from the runway and increase operational safety and efficiency. Taxiway details are summarized in **Table 1-4** and shown graphically in **Exhibit 1-7**.

Table 1-4
AIRPORT TAXIWAYS

Taxiway Designation	Width	Lighting	Pavement
A	40'	MITL	Asphalt
B	75'	MITL	Asphalt
C	75'	MITL	Asphalt
D	75'	MITL	Asphalt
E	40'	MITL	Asphalt
F	75'	MITL	Asphalt
G	West ramp	None	Asphalt
H	75'	MITL	Asphalt
M	75'	MITL	Asphalt

Exhibit 1-7
AIRPORT TAXIWAYS



1.3.3 Visual Aids

Visual aids are a necessary component to facilitate an airport's flight operations and enhance safety during periods of inclement weather and darkness by providing visual guidance to pilots in the air and on the ground. Additional information regarding visual aids can be found in Appendix C. Visual aids at the Airport include an airport beacon, runway end identifier lights (REIL), threshold lights, an approach lighting system, visual approach slope indicator (VASI), and the runway edge lights and markings previously identified.

The airport beacon at Capital City Airport consists of alternating white and green lights that identify the Airport as a civilian land airport. It is located adjacent to the aircraft rescue and fire fighting (ARFF) facility on the north side of State Road. Airport beacons are used to guide pilots to lighted airports and are normally operated from dusk until dawn. If the beacon is on during other hours it typically indicates the airport is operating under instrument flight rules.

Capital City Airport has REILs installed on the thresholds of Runways 6 and Runway 24. REILs consist of high intensity white strobe lights placed on each side of the runway to enable rapid and positive identification of the runway threshold. REILs are typically installed on runways where an approach lighting system is not available.

Each end of Runway 10R/28L is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). Approach lighting systems are a configuration of signal lights starting at the landing threshold and extending into the approach area to provide transition from instrument flight to visual flight for landing. Approach lights can also provide additional visual guidance for nighttime approaches under visual flight rules.

VASIs are installed on Runway 6 and Runway 24. VASIs provide pilots with visual guidance information during landing. The VASI system at the Airport consists of four bars that appear to project a red or white light indicating the vertical position of the aircraft in reference to the approach path to the runway.

Runway edge lights consist of a single row of lights bordering each side of the runway and can be classified according to three intensity levels. HIRL are the brightest runway lights available. MIRL and low intensity runway lights (LIRL) are, as their names indicate, lower in intensity. As previously identified, Capital City Airport has a combination of HIRL and MIRL lighting systems.

Runway markings vary depending on whether the runway is used exclusively for visual flight rule operations (VFR) or instrument flight rule (IFR) operations. A visual runway, such as Runway 10L/28R, is typically marked with the runway designator numbers and a dashed white centerline. Threshold and aiming point markings are added to a visual runway to complete non-precision instrument markings, such as Runway 6/24. A precision instrument runway, such as Runway 10R/28L, further includes touchdown zone markings.

1.3.4 <u>Navigational Aids (NAVAIDs)</u>

Navigational aids, commonly referred to as NAVAIDs, assist the pilot with en route navigation and approaches into and out of airports. These aids consist of both ground-based electronic systems and a space-based radio system. Additional information pertaining to NAVAIDs can be found in Appendix C. There are currently four types of navigational aids used at the Airport: a very high frequency omni-directional range (VOR), a non-directional radio beacon (NDB), an instrument landing system (ILS), and the global positioning satellite system (GPS).

The primary NAVAID located in the vicinity is the Lansing VORTAC, located 5.4 nautical miles southwest of the Airport operating on a frequency of 110.8 megahertz (MHz). VOR stations transmit radio beams, commonly referred to as radials, outward in every direction to provide horizontal line of sight guidance for aircraft. The tactical navigation (TAC) component of the VORTAC is a military system located in conjunction with a VOR that allows civilians access to the distance guidance information. The Lansing VORTAC provides en route navigation for aircraft destined for other terminal areas and also serves as the initial approach fix for the VOR Runway 6 instrument approach and provides guidance for the VOR approach to Runway 24 at the Airport.

A secondary NAVAID, the Artda NDB, is located 3.4 nautical miles east of the Airport. Artda NDB operates on a frequency of 206 kilohertz and transmits a continuous two-letter identifier code, LA, in International Morse Code. The use of automatic direction finder (ADF) equipment on an aircraft to receive the transmitted NDB signals allows the pilot to navigate without line of sight limitations. The Artda NDB serves as the initial approach fix and final approach fix for the NDB Runway 28L approach and also serves as the compass locator and outer marker for the ILS on Runway 28L.

The ILS is the third NAVAID at the Airport and is located on each end of Runway 10R/28L. The ILS is a precision approach navigational aid that provides highly accurate course and distance guidance information the runway. The Lansing VORTAC serves as the outer marker for the ILS approach to Runway 10R while the Artda NDB serves the ILS approach to Runway 28L. The two key components of the ILS are the localizer, providing horizontal guidance, and the glideslope, providing vertical guidance.

The final NAVAID used for navigation near Capital City Airport is GPS. GPS is a space-based radio positioning, navigation, and time-transfer station developed and maintained by the Department of Defense (DOD). GPS, at any one time, utilizes three of the 24 strategically placed satellites to calculate the aircraft's position and, from there, determine the distance, bearing, and estimated time en route to the next waypoint. GPS can be used in conjunction with or in place of the VOR Runway 6, VOR Runway 24, and NDB Runway 28L instrument approaches at the Airport.

1.3.5 Aeronautical Environment

Capital City Airport operates within the aeronautical environment associated with the local, regional, and national system of airports. The aeronautical environment includes the surrounding airspace and the type of aeronautical activity that takes place within the airspace, including arrival and departure procedures.

1.3.5.1 National Airspace Environment

The national airspace system consists of various classifications of airspace that are regulated by the FAA. Airspace classification is necessary to ensure the safety of all aircraft utilizing the facilities during periods of inclement weather, with the primary function of airspace classification being the separation of aircraft operating under instrument flight rules (IFR) from aircraft operating under visual flight rules (VFR).

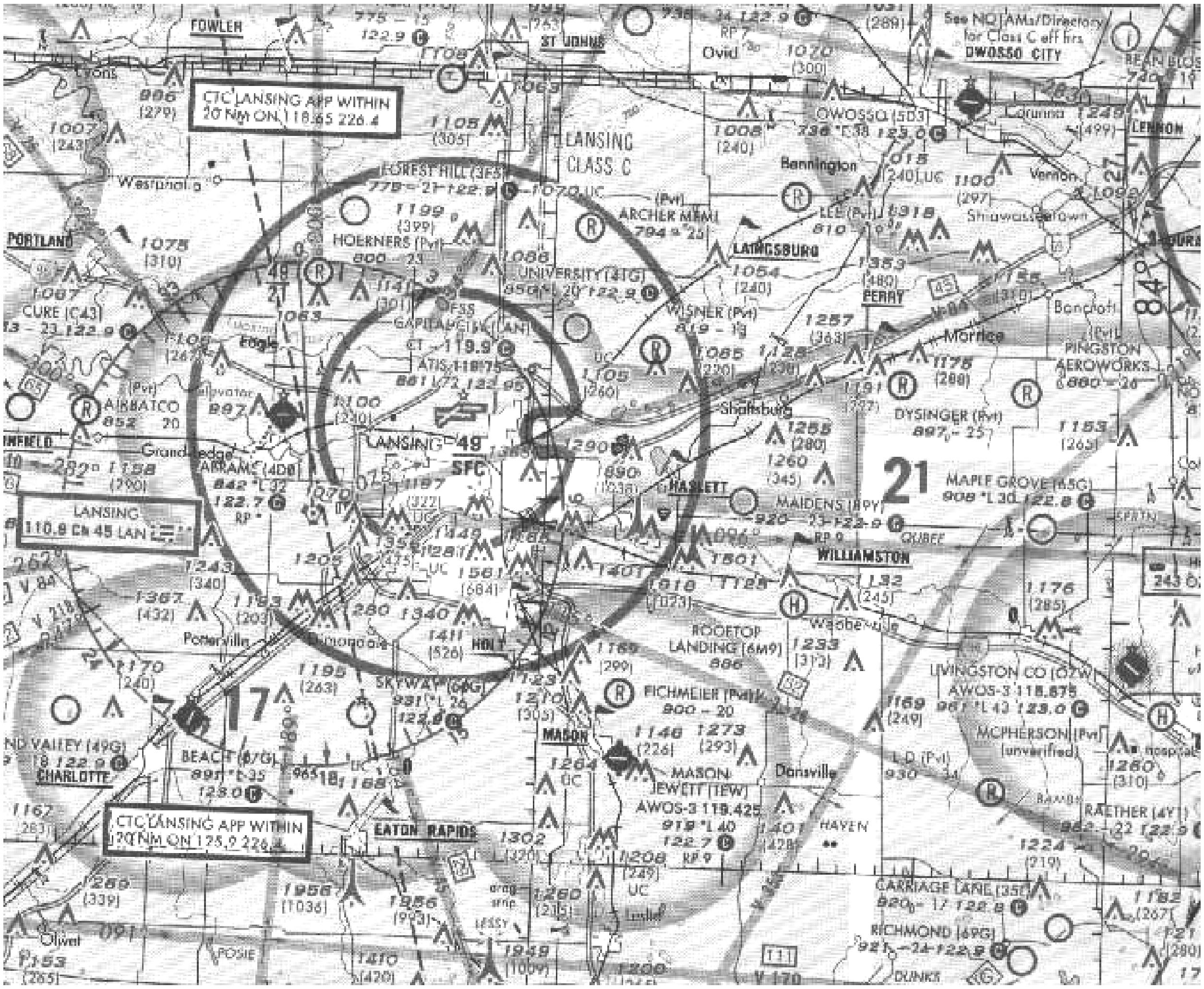
Pilots flying in controlled airspace are subject to air traffic control (ATC) requirements and must either follow VFR or IFR regulations. These regulations, which include combinations of operating rules, aircraft equipment, and pilot certification, vary depending on the class of airspace and are described in Federal Aviation Regulation (FAR) Part 71, *Designations of Class A, Class B, Class C, Class D, and Class E Airspace Areas, Airways, Routes, and Reporting Points*, and FAR Part 91, *General Operating and Flight Rules*. Each of the classes of airspace can be classified as controlled, uncontrolled, special use, or other airspace. A detailed description of the National Airspace Environment is provided in Appendix D.

1.3.5.2 Airport Airspace Environment

Airspace associated with Capital City Airport is depicted on the Detroit Sectional Aeronautical Chart, which is used for the purposes of VFR navigation. **Exhibit 1-8** depicts the portion of the Detroit Sectional that includes Capital City Airport and the surrounding airspace.

The airspace immediately surrounding the Airport is designated Class C airspace, which is comprised of two areas. The first area extends from the surface up to and including 4,900 feet mean sea level (MSL) in a five nautical mile radius surrounding the airport. The second area begins at 2,100 feet MSL and extends to 4,900 feet MSL in a 10 nautical mile radius surrounding the Airport. Aircraft desiring to operate within Class C airspace must establish and maintain two-way radio communications with ATC prior to entering Class C airspace. The closest airspace designated Class B is associated with Detroit Metropolitan Airport and begins approximately 76 statute miles southeast of the Airport. For additional information on the various classes of airspace see Appendix D.

Exhibit 1-8
DETROIT SECTIONAL



Source: U.S. DOT and Federal Aviation Administration

The aeronautical environment in the immediate vicinity of the Airport includes several areas designated Class D airspace. In addition, there are 12 victor airways utilizing the Lansing VORTAC and numerous other victor airways located in the vicinity of the Airport.

1.3.5.3 Instrument Approaches

IFR procedures into terminal areas typically consist of one or a combination of instrument procedures. Instrument procedures associated with an airport can include standard terminal arrivals (STAR), standard instrument departures (SID), or instrument approach procedures. These approach procedures are classified as visual, non-precision, or precision approaches, with the latter two classified as instrument approaches. Visual approaches require that sight contact be maintained at all times with the runway facilities and other aircraft in the vicinity of the airport. Often these approaches are unmonitored and demand pilot proficiency in see-and-avoid procedures. Non-precision and precision instrument approaches are controlled approaches and are monitored by the local air traffic jurisdiction. Non-precision approaches differ from precision approaches in that they only provide horizontal guidance, while precision instrument approaches provide both horizontal and vertical guidance information. With the addition of vertical guidance information, precision approaches enable aircraft operations in lower visibility and cloud heights.

The Airport is served by a variety of published instrument approaches utilizing visual, non-precision, and precision approach technology. These instrument approach procedures are identified in **Table 1-5**.

Table 1-5
PUBLISHED INSTRUMENT APPROACHES

Runway	Approach	NAVAID Facility or Waypoint	Approach Technology	Inbound Heading (degrees)
10R	ILS	Localizer I-CPQ	Precision	096
28L	ILS	Localizer I-LAN	Precision	276
6	VOR / GPS	Lansing	Non-Precision	057
24	VOR / GPS	Lansing	Non-Precision	276
28L	NDB / GPS	ARTDA NDB	Non-Precision	276

Source: U.S. Terminal Procedures, U.S. Government Flight Information Publication

1.3.5.4 National Air Traffic Control System

The FAA is responsible for providing a safe, secure, and efficient global aviation system. To fulfill this responsibility the Air Traffic Services Division of the FAA oversees the control and supervision of activity within the National Airspace System to provide air traffic control. The Air Traffic Services operational responsibilities include assurance of aircraft separation, air traffic management, dissemination of aviation information, management and maintenance of airways and NAVAID facilities, approach to landing procedures, and aircraft search and rescue.

Control within the National Airspace System is maintained by incorporating a network of air traffic control facilities, which include flight service stations (FSS), air traffic control towers (ATCT), terminal radar approach control (TRACON), and air route traffic control centers. FSS and ATCT are primarily involved with the coordination of air traffic operations within the terminal environment, TRACON facilities coordinate air traffic in the approach and departure segments of flight, and air route traffic control centers coordinate air traffic operations within the en route segment. More detailed information regarding the National Air Traffic Control System can be found in Appendix E.

1.3.5.5 Airport Air Traffic Control

The Lansing Automated FSS (AFSS) is currently the only station located in the State of Michigan. Relocated to just south of the main terminal apron, the Lansing AFSS opened on December 3, 1986, after the FAA initiated a nation-wide consolidation of FSS. The station provides weather briefings for pilots in the lower peninsula of Michigan. Each position within the station has a weather terminal that allows access to all the information necessary to complete a briefing, record VFR and IFR flight plans, and obtain weather graphics for current meteorological conditions.

The federally run Lansing ATCT employs controllers who fulfill the air traffic control functions of ground control, tower control, and updating the automated terminal information service (ATIS). The ATCT operates 24 hours per day to control the movements of all aircraft within a five-mile radius of Capital City Airport up to an altitude of 2,500 feet AGL. Additionally, these controllers are responsible for directing aircraft on the ground, relaying clearances to pilots, and maintaining the Airport's ATIS.

A TRACON facility is contained within the Lansing ATCT. TRACON controllers use radar to provide service to aircraft within approximately 20-miles north, east, and west of the Airport. To the south, the TRACON boundary extends to approximately 45 miles. Aircraft are controlled by TRACON at altitude of up to 8,000 feet.

Control of en route traffic in the airspace surrounding the Airport and above 8,000 feet is the responsibility of either Cleveland or Chicago air route traffic control center. Air route traffic control centers are established primarily to provide air traffic service to aircraft operating under IFR on flight plans within controlled airspace, including airways and jet routes, and principally during the en route phase of flight. The boundary between the two air route traffic control centers is located approximately 18 miles west of Capital City Airport.

1.4 Commercial Passenger Facilities

Commercial passenger facilities consist of the terminal building, terminal apron, and terminal curbfront. These areas are specifically designed to serve passengers utilizing the commercial airline services at the Airport.

1.4.1 Passenger Terminal Buildings

The passenger terminal building was initially constructed at its present location in 1959 and incrementally expanded on several occasions. The passenger terminal building now provides a total of 164,995 square feet of space, of which 64.1 percent is located on the first floor of the building. In addition to this area, a temporary grade level boarding area was constructed to serve commuter aircraft but is not currently in use. This structure is not heated nor finished and its square footage is excluded form the building square footages provided in this section.

The terminal building is predominantly a single level facility. A limited second level is provided for aircraft boarding and a third level holds the airport administration facilities as well as function space for air traffic control and the terminal radar approach control. The ATCT cab is located on the fourth level.

The passenger terminal building provides both boarding areas and related spaces that can hold up to eight jet aircraft. Five passenger loading bridges are provided, three of which are configured to serve two aircraft parking positions. An area on the first floor is provided for boarding commuter aircraft. These aircraft parking positions use the same apron area as the second level boarding gates and, therefore, can only be used for either commuter or jet aircraft. The temporary boarding area provides an opportunity for accommodating two to three additional regional jet aircraft.

The terminal building space outlined in the following sections has been categorized by function and the square footage has been defined. This information is further analyzed in the facilities capacity and level of service analysis in Chapter 3. In addition, key parameters of the existing terminal building are addressed.

Exhibits 1-9 through Exhibit 1-11 illustrate the functional space use for the first, second, and third levels of the terminal building, respectively. The major functional areas summarized in **Table 1-6**.

Exhibit 1-9
FIRST FLOOR FUNCTIONAL SPACE

Exhibit 1-10
SECOND FLOOR FUNCTIONAL SPACE

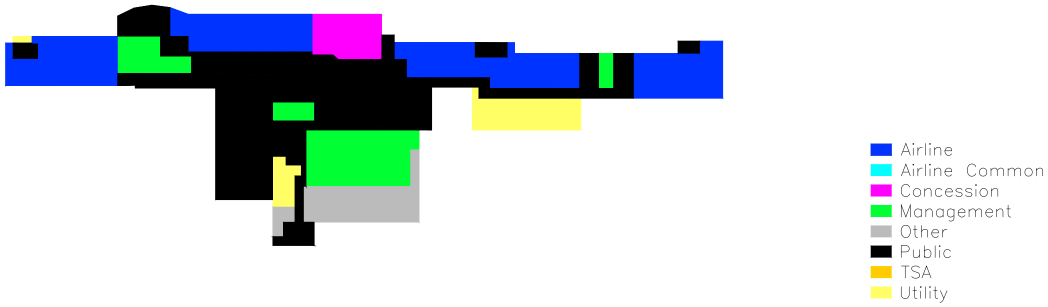


Exhibit 1-11
THIRD FLOOR FUNCTIONAL SPACE

Table 1-6
TERMINAL BUILDING FUNCTIONAL SPACE

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Airline	23,468	15,153	0	38,621	23.1%
Airline Common	21,049	0	0	21,049	12.6%
Public	32,019	12,211	1,123	45,353	27.2%
Concession	9,308	2,238	0	11,546	6.9%
Management	8,906	1,426	10,002	20,334	12.2%
Utility	6,981	4,507	1,783	13,271	7.9%
Government	2,865	11,428	0	14,293	8.6%
Other Tenant	2,528	0	0	2,528	1.5%
Total	107,124	46,963	12,908	166,995	100.0%
Percent	64.1%	28.1%	7.7%	100.0%	

As shown, 64.1 percent of the total terminal space is provided on the first level. Airline space, which includes dedicated and common use spaces, represents the largest space category at 35.7 percent of the total space. Public space is the second largest functional area totaling 27.2 percent of the total terminal building space. Overall, the distribution of space among the key functional space categories is generally consistent with a passenger terminal of this size.

1.4.1.1 Airline Space

Airline space includes both the space classified as "airline", which represents dedicated spaces occupied or leased to an airline, as well as the "airline common" space, which represents areas that are leased but shared amongst all of the airlines on a non-dedicated basis. Airline space represents 35.7 percent of the total passenger terminal space. All of the available space is currently leased.

The airline space is composed of several critical sub-categories and sub-functions. Assessment of these individual areas is important in assessing the proportion of the passenger terminal facilities among related functions such as ticket counters and gates, ticket counters and outbound baggage areas, and hold rooms and gates**. Table 1-7** summarizes the sub-categories for airline space.

Table 1-7
AIRLINE SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Ticketing					
Counter	2,533	0	0	2,533	4.2%
Queuing	5,111	0	0	5,111	8.6%
ATO	19,182	0	0	19,182	32.1%
Corridor	170	0	0	170	0.3%
Inbound Baggage	3,350	0	0	3,350	5.6%
Outbound Baggage	6,494	0	0	6,494	10.9%
Baggage Claim	4,442	0	0	4,442	7.4%
Operations	1,832	0	0	1,832	3.1%
Hold Room Secure	0	15,153	0	15,153	25.4%
Other	1,403	0	0	1,403	2.4%
Total	44,517	15,153	0	59,670	100.0%
Percent	74.6%	25.4%	0.0%	100.0%	

As shown, the majority of the dedicated airline space is located on the first level. The departure lounges are classified as dedicated versus common space because of the static nature of the current airline gate assignments. The lease provision permits Capital Region Airport Authority to assign other airlines to any gate under certain conditions.

A total ticket counter length of 223 linear feet is available, which provides 42 positions. The ticket area provides seven modules that include 32 linear feet of ticket counter, associated queuing area, airline ticket office, and baggage make-up. These modules facilitate the allocation of ticket areas to airlines using the passenger terminal. Each of the modules is approximately equal in size and functionality, each providing six ticket positions with the exception of the eastern most module that has more airline ticket office area than the other modules.

Baggage security screening is located in the ticket queuing area. Mobile explosive trace detection equipment is used to meet the baggage screening requirements now mandated by the FAA Transportation Security Administration that requires 100 percent of checked baggage to be screened for explosives. The outbound baggage make-up areas are located immediately behind the airline ticket offices. Linear, flat-plate belts transfer baggage from the ticket counter to the make-up area associated with each module. The area defined as outbound baggage area includes the baggage belt area as well as the area used for cart staging. A large area immediately adjacent to the cart staging areas is available for tug and cart access and egress to and from the individual module baggage make-up areas and the aircraft ramp. This area, referred to as a tug drive, is available on a common basis to all airlines. The inbound area for the baggage claim units is an enclosed area that provides airside tug and cart access to the claim devices. Each claim unit has 30 linear feet of exposed claim device for off loading bags from carts to the units.

Operations spaces are typically airline dedicated spaces used for functions such as aircraft load control, flight planning, crew lounges, ramp employee locker rooms, limited aircraft maintenance, and related space. Dedicated operations spaces at Capital City Airport are very limited. The airline ticket offices are used for this function, as well as the ticketing support and station administration. This in part reflects a growing trend at many small airports where airlines now cross-utilize ramp, ticketing, and administrative staff as a cost reduction measure.

In the baggage claim area, two flat-plate, t-shaped baggage claim units are provided. Each provides about 90 linear feet of claim frontage. The claim units are separated by 45 feet (center to center). Tug and cart access to the baggage claim area from the aircraft apron is circuitous. The location and presence of the temporary concourse requires that the tugs and carts drive around the west end of the facility.

The hold rooms are located on the second level of the terminal and are secure spaces. The hold rooms are generally located adjacent to the aircraft gate access doors. There are five hold room areas serving as many as eight aircraft accessible by the five passenger loading bridges. A portion of one hold room is used as support space for the ground level gates used to board commuter aircraft. The lower level gate access corridor is considered public space since it is not leased to the airlines. Each of the five hold rooms has a different area and there is no readily apparent relationship to the aircraft sizes that can or do operate from the associated gates.

1.4.1.2 Public Space

Public space is distributed throughout the passenger terminal building to serve passenger flows through the building. Public space is typically non-leased space, the cost of which is borne by the airport operator. **Table 1-8** provides a summary of public space available by general sub-categories, location, and function.

Table 1-8
PUBLIC SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Lobbies					
Ticket	7,699	0	0	7,699	17.0%
Central	4,314	0	0	4,314	9.5%
Baggage	1,634	0	0	1,634	3.6%
Administration	253	367	367	987	2.2%
Vestibules	2,122	0	0	2,122	4.7%
Restrooms	2,277	2,443	0	4,720	10.4%
Corridors					
Non-secure	4,400	0	0	4,400	9.7%
Secure	5,698	7,067	0	12,765	28.1%
Vertical Circulation	1,427	510	0	1,937	4.3%
Exit Stairs	1,667	1,824	756	4,247	9.4%
Other	528	0	0	528	1.2%
Total	32,019	12,211	1,123	45,353	100.0%
Percent	70.6%	26.9%	2.5%	100.0%	

1.4.1.3 Concessions

Concession space includes food and beverage, retail, rental car, general-purpose meeting spaces, and other tenant space. The majority of concession space is located in non-secure areas on the first level. Concessions located in the secure area on the second level include a single food and beverage area. There is no retail located on the second floor. **Table 1-9** summarizes the square footage associated with various concession functions.

Table 1-9
CONCESSION SPACE DISTRIBUTION

Functional Category	Allocated Space (SF) First	Second	Third	Total	Percent of Total
Food and Beverage					
Seating	1,639	2,238	0	3,877	33.6%
Kitchen	1,016	0	0	1,016	8.8%
Serving	766	0	0	766	6.6%
Storage	729	0	0	729	6.3%
Office	124	0	0	124	1.1%
Meeting	2,372	0	0	2,372	20.5%
Employee	212	0	0	212	1.8%
News and Gift					
Sales	782	0	0	782	6.8%
Storage	141	0	0	141	1.2%
Rental Car	914	0	0	914	7.9%
Other	613	0	0	613	5.3%
Total	9,308	2,238	0	11,546	100.0%
Percent	80.6%	19.4%	0.0%	100.0%	

The first level of the terminal building provides a large food and beverage area. Kitchen facilities are included in this space that support both the first and the second level food and beverage areas. The first floor food and beverage area is centrally located to the primary terminal entrance and the central lobby connecting ticketing, passenger screening, and the baggage claim area. The food and beverage concessionaire also operates a large space for meetings and banquets in a non-secure area that is not located in a high traffic area.

The retail space is located adjacent to the central area of the first level and provides a limited offering of books, magazines, and snacks.

There are four rental car companies operating at the Airport and include: Hertz, Avis, National, and Budget. Small transaction counters with a back office are provided for each of the four rental car companies. The counters are located immediately adjacent to the baggage claim devices and the ready car pick-up and return lot is located immediately west of the baggage claim area.

1.4.1.4 Management

Management space includes those areas used by airport management to operate the terminal, including: administrative offices, employee spaces, storage, trade shops, and some public service areas. **Table 1-10** provides a summary of the distribution of space.

Table 1-10
MANAGEMENT SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Security	2,242	0	0	2,242	11.0%
Information	144	0	0	144	0.7%
Conference Room	869	0	0	869	4.3%
Storage	58	0	20	78	0.4%
Operations	1,600	0	0	1,600	7.9%
Employee	1,027	0	0	1,027	5.1%
Trade Shop	1,494	0	0	1,494	7.3%
Janitor	279	0	417	696	3.4%
Other Offices	222	0	0	222	1.1%
Truck Dock and Access	755	0	0	755	3.7%
Trash	216	0	0	216	1.1%
Administration	0	0	9,565	9,565	47.0%
Business Center	0	1,426	0	1,426	7.0%
Total	8,906	1,426	10,002	20,334	100.0%
Percent	43.8%	7.0%	49.2%	100.0%	

1.4.1.5 Utility

Utility space includes heating, ventilation, and air conditioning systems in the building as well as spaces dedicated to electrical, communications, and other mechanical and equipment spaces. **Table 1-11** provides a summary of the allocated square feet.

Table 1-11
UTILITY SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Mechanical	3,135	3,314	749	7,198	54.2%
Electrical	2,735	856	571	4,162	31.4%
Communications	376	138	285	799	6.0%
Elevator	188	178	178	544	4.1%
Vents/Chases	153	21	0	174	1.3%
Corridors	256	0	0	256	1.9%
Miscellaneous	138	0	0	138	1.0%
Total	6,981	4,507	1,783	13,271	100.0%
Percent	52.6%	34.0%	13.4%	100.0%	

1.4.1.6 Government

Government space includes those areas provided for federal agencies at Capital City Airport. These agencies include the Transportation Security Administration and the Federal Aviation Administration. **Table 1-12** summarizes the use of government space.

Table 1-12
GOVERNMENT SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
TSA					
Passenger Screening	1,793	0	0	1,793	12.5%
Employee Areas	910	0	0	910	6.4%
Storage	162	0	0	162	1.1%
FAA					
TRACON	0	0	11,428	11,428	80.0%
Total	2,865	0	11,428	14,293	100.0%
Percent	20.0%	0.0%	80.0%	100.0%	

All of the Transportation Security Administration space is located on the first floor of the passenger terminal building. The majority of the area is dedicated to passenger screening. However, certain areas of the ticket counter queuing area are dedicated to baggage screening using explosive trace detection equipment. These spaces are included in the queuing space total. The existing passenger screening are provides two screening modules that include magnetometer, x-ray, prescreening tables, and secondary screening areas. The queuing area for the two screening units is configured in a bank queue configuration that serves both units.

1.4.1.7 Other

The other spaces in the terminal building include those spaces allocated to non-traditional terminal functions. Currently the Airport leases space to the United States Post Office and an airline that uses the area for cargo operations. These areas are uniquely suited to these users for their intended purposes and provide non-secure vehicle access. **Table 1-13** summarizes the allocation of space.

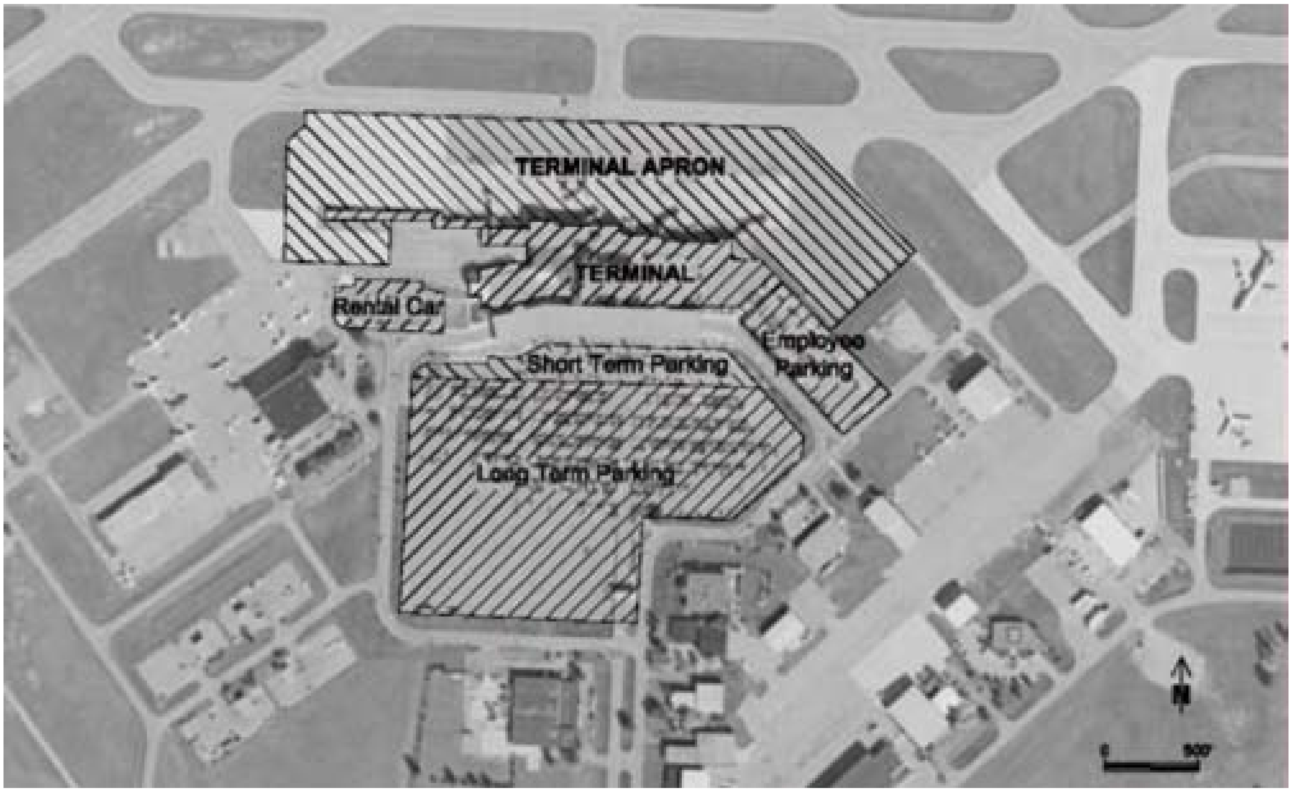
Table 1-13
OTHER SPACE DISTRIBUTION

Functional Category	Allocated Space (SF)				Percent of Total
	First	Second	Third	Total	
Freight					
Office	275	0	0	275	10.9%
Make-Up	976	0	0	976	38.6%
Post Office					
Office	183	0	0	183	7.2%
Make-Up	1,094	0	0	1,094	43.3%
Total	2,528	0	0	2,528	100.0%
Percent	100.0%	0.0%	0.0%	100.0%	

1.4.2 Passenger Terminal Aprons

The passenger terminal apron is located just south of the mid-point of Runway 10R/28L as shown in **Exhibit 1-12**. The apron consists of approximately 40,000 square yards of apron space. The dimension of the aircraft-parking apron is approximately 1,400 feet by 200 feet wide. The apron provides parking positions for four jet aircraft and five commuter aircraft. There is space provided at each end of the terminal apron for additional aircraft parking.

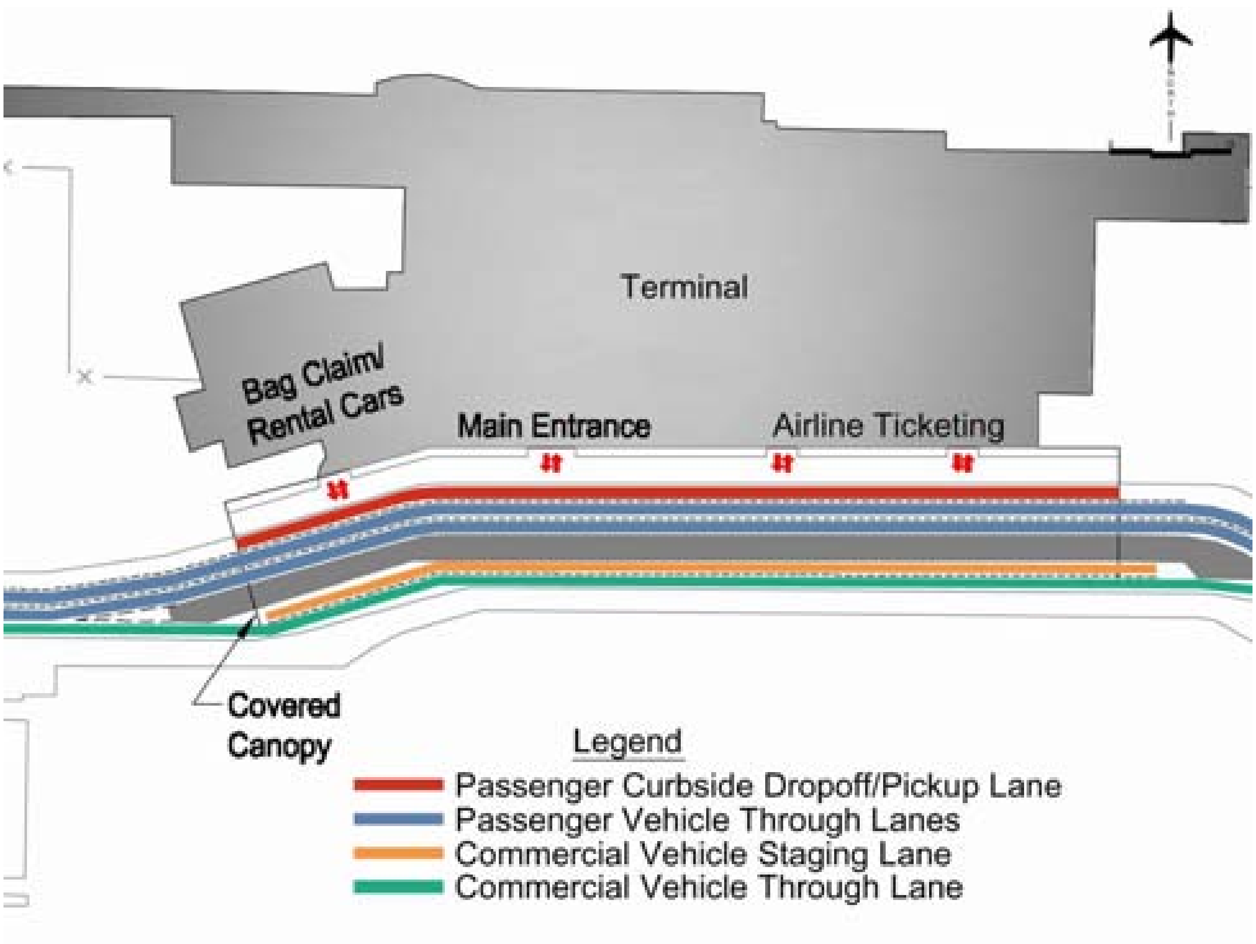
Exhibit 1-12
PASSENGER TERMINAL APRON



1.4.3 Passenger Terminal Curbfront

For the purpose of promoting passengers' smooth transition between the air transportation environment and ground transportation environment a passenger terminal curbfront is provided and presented graphically in **Exhibit 1-13**. The main airport access road splits into two functional roads immediately prior to reaching the passenger terminal building. A median curb separates these two roadways.

Exhibit 1-13
PASSENGER TERMINAL CURBFRONT



1.4.3.1 Public Curb

In front of the terminal building, the roadway provides a lane devoted to passenger drop-off and pick-up and a through-lane. The enplaning and deplaning curb runs alongside the nearly 700-foot frontage of the terminal building. The enplaning curb serves departing passengers and has two primary doors providing access from the enplaning curb to the airline ticket counters. The deplaning curb serves the arriving passengers and has one primary exit from the baggage claim and rental car counter area to the deplaning curb. In addition, the main lobby doorway also serves as a second entrance for both enplaning and deplaning passengers.

1.4.3.2 Commercial Vehicle Curb

Commercial vehicles provide additional modes of transportation to Capital City Airport for arriving or departing passengers. To facilitate ground transportation access by commercial operators, a commercial vehicle curb is provided on the outside median of the passenger terminal curbfront. The 580-foot long commercial vehicle curb provides standing space for taxis, city and charter buses, delivery vehicles, and shuttle vehicles. There is no additional staging area for taxis or buses provided at the Airport.

1.5 General Aviation Facilities

Capital City Airport is a full service airport providing facilities for the general aviation sector as well as the commercial passenger sector. The general aviation facilities at the Airport are primarily located in two areas and consist of apron space, various buildings and hangars, and public parking lots. One area is located southwest of the terminal passenger apron and an additional area is located to the southeast of the passenger terminal building. Each of these areas is identified in **Exhibit 1-14**. **Table 1-14** provides a complete listing of the general aviation facilities located at the Airport.

Exhibit 1-14
GENERAL AVIATION AREA

Table 1-14
GENERAL AVIATION BUILDING INVENTORY

Tenant	Type	Location	Square Feet	Lease	
				Effective	Expiration
Air AZ, Inc.	Hangar	3515 W Hangar Dr	20,389	06/01/88	04/30/03
American Systems, Inc.	Hangar	3517 W Hangar Dr	5,628	09/01/86	08/31/36
CRS Realty	FBO	3121 W Circle Dr	270,763	09/10/03	08/31/33
Norma Clark	T-hangar	3420 W Hangar Dr	21,720	12/28/63	12/27/13
Larry Fowler	Hangar	3439 W Hangar Dr	7,852	06/01/88	05/31/38
Jackson National Life	Hangar	2718 E Circle Dr	78,988	07/01/01	06/30/51
Jackson National Life	Hangar	2718 E Circle Dr	36,000	05/05/83	05/04/33
Kindlund Construction	T-hangar	3506 W Hangar Dr	6,500	07/01/90	06/30/19
Kindlund	Hangar	3525 W Hangar Dr	9,576	05/01/86	04/30/36
King Trout, Inc.	Hangar	3309 W Hangar Dr	9,360	10/01/86	09/30/36
Lansing Community College	Flight school	3410 W Hangar Dr	154,770	10/01/85	09/30/35
LCC-Aero Services	Hangar	3400 W Hangar Dr	16,440	10/03/74	10/02/24
DJV Properties, LLC	T-hangar	3317 W Hangar Dr	31,800	05/01/88	04/30/38
Donald Quigley	Hangar	3407 W Hangar Dr	4,320	07/01/87	06/30/37
Michelle Sanchez	Land	North Airport	2 acres	10/01/98	09/30/03
John Wagner	Hangar	3512 W Service Dr	7,719	09/01/85	08/31/35
Story Car Leasing	Office building	3850 CC Blvd	16,850	10/24/67	10/24/17
Superior Aviation, Inc.	FBO	2618 E Circle Dr	115,000	10/01/88	09/30/38
John Zumbrink	T-hangar	3430 W Hangar Dr	6,000	01/01/90	12/31/19

Source: Capital Region Airport Authority

1.5.1 <u>Fixed Base Operators</u>

A fixed base operator (FBO) is typically a private enterprise that leases land from the airport sponsor on which to provide services to based and transient aircraft. The extent of the services provided varies from airport to airport; however, these services frequently include aircraft fueling, major and minor maintenance and repair, aircraft rental and/or charter services, flight instruction, pilot lounge and flight planning facilities, and aircraft tie down and/or hangar storage.

Lansing Jet Center provides FBO services at Capital City Airport. They operate on a continuous 24 hour a day basis and currently provide fueling, deicing, catering, scheduled avionics repair, and light line maintenance services. Their facilities are located immediately southwest of the passenger terminal building and consist of a main office building, two large box hangars, and five t-hangars.

1.5.2 <u>Hangars</u>

Hangar facilities at the Airport consist of ten box hangars and four t-hangars. The box hangars vary in size, ownership, and location. Two private individuals and two business entities own the t-hangars. The t-hangars are located west of the passenger terminal building.

1.5.2.1 <u>Based Aircraft Storage</u>

Based aircraft storage is accommodated through a variety of privately owned hangars. These hangars are primarily located to the immediate east or west of the passenger terminal building.

1.5.3 <u>General Aviation Aprons</u>

General aviation aprons provide area for based aircraft storage, transient aircraft storage, and FBO operations. The only general aviation entity currently leasing apron space from the Airport

Authority is Superior Aviation, Inc. Superior Aviation provides charter and cargo services and currently leases 20,000 square feet of ramp space immediately adjacent to their building facilities, see **Table 1-15**.

Table 1-15
GENERAL AVIATION APRON INVENTORY

Tenant	Type	Location	Sq. Ft.	Lease	
				Effective	Expiration
Superior Aviation, Inc.	Charter	Ramp Area	20,000	08/19/93	09/30/38

Source: Capital Region Airport Authority

There is an additional apron located southeast of the passenger terminal apron that accommodates Michigan Department of Transportation State Police and the National Guard. This apron consists of approximately 20,000 square yards and also provides access to the flight service station.

1.5.3.1 Transient Parking

Located southwest of the passenger terminal apron is an aircraft-parking apron that is utilized by the fixed base operator. This apron consists of approximately 20,000 square feet and is used almost exclusively as a tie down area for transient aircraft.

1.6 Support Facilities

The support facilities at an airport provide services that are needed to sustain day-to-day operations. Support facilities at Capital City Airport include:

- Rental car facilities
- Aircraft rescue and fire fighting (ARFF)
- Airport maintenance
- Cargo facilities
- Airport fuel facilities
- Utilities

1.6.1 Rental Car Facilities

Capital City Airport currently has four rental car companies located on airport property and provides counter space in the passenger terminal on the ground level adjacent to the baggage claim area. The four on-airport rental car companies include: Avis, Budget, Hertz, and National. Rental car patrons pick up and return their vehicle to a ready/return parking lot located west of the rental counters and baggage claim area. Each rental car company has additional rental car storage, building space, and wash facilities located further west of the passenger terminal.

Two additional rental car companies, Enterprise and Thrifty, are located off-airport. Shuttle bus service is provided to these facilities with pick-up on the commercial vehicle curb.

1.6.2 Aircraft Rescue and Fire Fighting (ARFF)

The purpose of an aircraft rescue and fire fighting (ARFF) facility is to save lives by maximizing emergency response and intervention during an airport crisis. The ARFF crew conducts fire fighting rescue operations and fire prevention services. More specifically, the ARFF provides emergency assistance; inspection of fuel farms, fuel trucks, and commercial sites; compliance with FAA standards on safety, equipment, and training; and is the medical first responder for an airport.

The ARFF facility at Capital City Airport is located on the north end of the airfield, adjacent to airport maintenance. The staff includes approximately 25 employees, including rescue and fire fighting personnel and operations staff. Several fire fighters are also trained as public safety officers and serve dual roles. The ARFF facility, built in 1982, is approximately 7,500 square feet and consists of sleeping facilities, a kitchen, and three rescue-truck garage bays. Access to the ARFF facility is provided for authorized personnel by electronic card access through Airport Gate 10, located on the northeast corner of the airfield at the intersection of Dewitt Road and an abandoned state road. Gate 10 has security cameras and is monitored at all times.

1.6.3 Airport Maintenance

Capital City Airport owns and operates a variety of maintenance equipment needed for snow removal, ground maintenance, pavement and facilities maintenance, and general repairs. The main storage area for maintenance equipment is located on the north side of the airfield, adjacent to the ARFF facility. Storage of the smaller size maintenance equipment is located under the passenger terminal.

1.6.4 Cargo Facilities

Completed in 1991, the Capital City Airport air cargo facilities are located on the eastern end of the airfield. United Parcel Service (UPS) occupies 12,500 square feet of building space, which includes a sorting facility. The airfield apron dedicated to cargo is nearly 15,000 square yards. Superior Aviation is a contractor to UPS and serves as a feeder airline to smaller service areas.

Landside access and parking for truck deliveries is provided on the south side of the cargo facility. A gravel overflow truck parking lot is also available during the peak season.

1.6.5 Airport Fuels

The Airport currently provides aviation gasoline, jet fuel, automotive gasoline, and diesel fuel. Storage consists of both above ground and underground storage tanks located in three distinct fuel farm locations identified in **Exhibit 1-15.** Additional information concerning the type of fuel tank, capacity, drainage, and other delivery details is provided on **Table 1-16**.

Exhibit 1-15
FUEL FARM LOCATIONS

1.6.5.1 Fuel Storage

Area A is located east of the passenger terminal building and just south of the cargo ramp. Three single-walled steel underground storage tanks and two double-walled steel above ground storage tanks contain 20,000 gallons each of aviation gasoline. The secondary containment system consists of depressed, curbed concrete pavement at the filling area. The area is drained into a catch basin that empties into the oil/water separator. Delivery to the tanks and to aircraft is via tank trucks. The tanks are privately owned and maintained under permit from Capital Region Airport Authority.

Area B is located adjacent to Area A and consists of nine plastic and eight steel above ground storage tanks. All of the plastic tanks hold either propylene glycol or ethylene glycol solution. One of the plastic tanks holds 4,000 gallons, three have a capacity of 2,000 gallons, two have a capacity of 1,500 gallons, and two hold 275 gallons. Five of the steel tanks hold 500 gallons each of automotive gasoline, two steel tanks hold 1,000 gallons of automotive gasoline, and one steel tank holds 500 gallons of diesel fuel. The secondary containment system consists of curbed concrete pavement for the entire area. The area is also drained into a catch basin that empties into the oil/water separator. Delivery to the tanks and vehicles is via tank trucks. The tanks are privately owned and maintained under permit from Capital Region Airport Authority.

Area C is located north of Runway 10L-28R and consists of three 5,000 gallon underground storage tanks. One tanks holds automotive gasoline and the other tanks holds diesel fuel. The secondary containment system consists of concrete pavement at the filling area and area drainage flows into the adjacent grass area. Similar to Area A and Area B, Area C fuel is delivered to the tanks via tank trucks. However, fuel is dispensed to vehicles directly through dispensing hoses. Capital Region Airport Authority is responsible for the maintenance of this area.

Table 1-16
FUEL STORAGE INVENTORY

Location & Material	Number & Capacity	Storage Container	Area Drainage	Delivery to Storage	Delivery to Point of Use	Maintenance Responsibility
Area A						
Av Gas	3 – 20,000 gal	Single-walled steel UST	Catch basin	Tank trucks	Tank trucks	Respective company or airline
Jet Fuel	2 – 20,000 gal	Double-walled steel AST	Catch basin	Tank trucks	Tank trucks	Respective company or airline
Area B						
Propylene or Ethylene Glycol[1]	1 – 4,000 gal 3 – 2,000 gal 2 – 1,500 gal 1 – 275 gal	Plastic AST	Catch basin	Tank trucks	Tank trucks	Respective company or airline
Auto Gas	2 – 1,000 gal 5 – 500 gal	Steel AST	Catch basin	Tank trucks	Tank trucks	Respective company or airline
Diesel Fuel	1 – 500 gal	Steel AST	Catch basin	Tank trucks	Tank trucks	Respective company or airline
Area C						
Auto Gas	1 – 5,000 gal	Single-walled steel UST	Adjacent grass area	Tank trucks	Dispensing hose direct to vehicle	CRAA
Diesel Fuel	2 – 5,000 gal	Single-walled steel UST	Adjacent grass area	Tank trucks	Dispensing hose direct to vehicle	CRAA

UST – Underground Storage Tank
AST – Above Ground Storage Tank
1 Each AST contains either propylene glycol or ethylene glycol solution, not both.

Source: Capital City Airport Storm Water Pollution Prevention Plan

There are other privately owned fuel storage tanks located on airport property. Misconduct related to tank spillage, resultant storm water impact, or other operations conducted by individuals in Areas A, B, or the privately owned fuel tank locations are the responsibility of the respective company or airline leasing the area. **Table 1-17** provides a list of the private operators and information concerning the types and capacities of containers used.

Table 1-17
PRIVATELY OWNED AND OPERATED FUEL TANKS

Owner/Operator	Number & Capacity	Storage Container
Lansing Jet Center		
Aviation Gasoline	1 – 15,000 gal	Lined, single-walled, steel UST
Jet Fuel	2 – 20,000 gal 3 – 20,000 gal	Above-ground storage tank Underground storage tank
Federal Government		
Diesel Fuel	1 – 1,000 gal 1 – 3,000 gal	Underground storage tank Above-ground storage tank
Michigan State Police		
Automobile Gasoline	1 – 6,000 gal	Single-walled, steel underground storage tank[1]
Diesel Fuel	1 – 12,000 gal	Single-walled, steel underground storage tank[1]

[1] An impervious liner was placed in the tank pit prior to tank installation and backfilling.

1.6.6 Utilities

The availability of electric power, gas, water, and sewer lines to an airport must be considered in evaluating the existing utility conditions. The public water distribution and sanitary sewage system are significant governmental responsibilities and capital investments in a new or expanding area. Natural gas and electricity services are normally provided by the private sector in most areas.

1.6.6.1 Water and Sewer

The Lansing Board of Water and Light provides the water and sewer service to the commercial passenger terminal and general aviation facilities located on the southern end of Capital City Airport. An on-sight well and septic tank provide water and sewer service to the ARFF and maintenance facilities at Capital City Airport.

1.6.6.2 Gas and Electric

Consumers Energy provides gas and electric service to the Airport.

1.6.6.3 Storm Water Drainage

The facility Preventative Maintenance Program includes inspection of all equipment, storage vessels, and storm water control devices on a regular basis. Any conditions observed during the inspection that could cause discharges of significant materials to surface or storm water, will be corrected as part of the Preventative Maintenance Program.

1.7 Surface Access

Convenient, simple, and efficient access to the passenger terminal is an integral part of the airport system. It is necessary that surface access be easy to follow and find for originating and terminating passengers. The airport surface access system consists of the following segments:

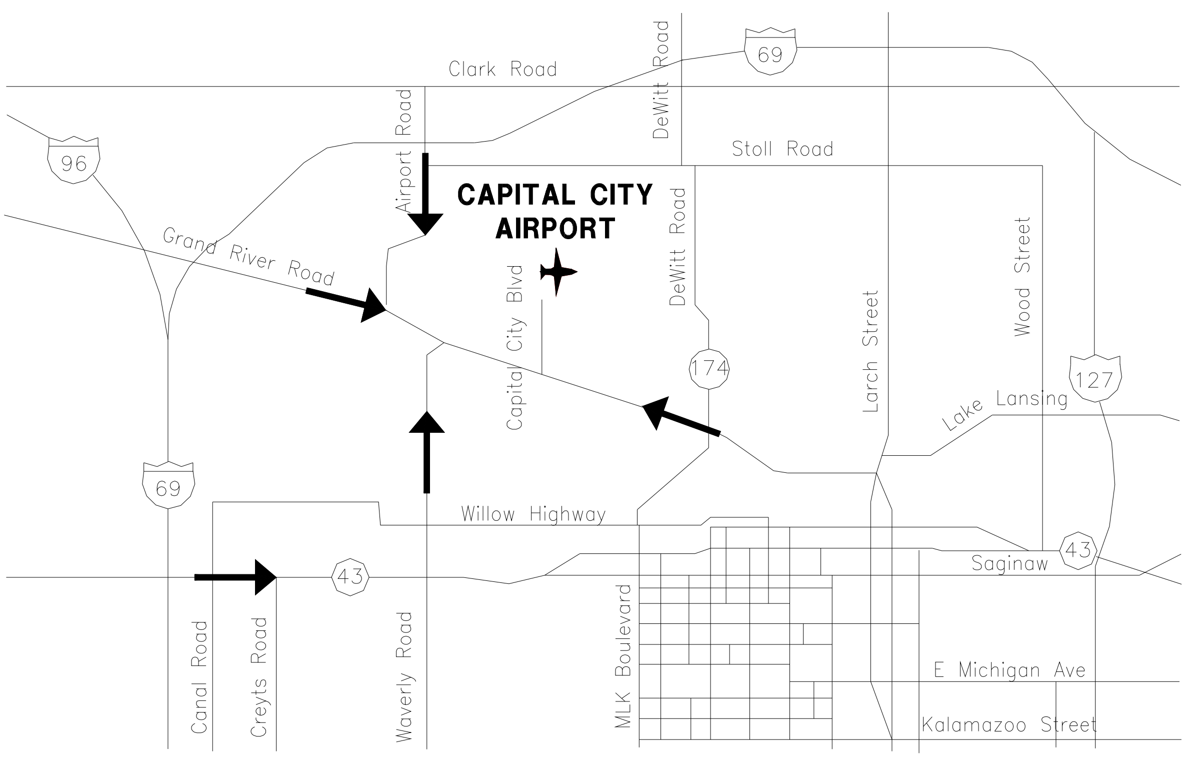
- Off-airport access roads
- On-airport access roads
- Parking facilities

1.7.1 Off Airport Access Roads

U.S. Interstate 69 provides access to Capital City Airport from the northeast and southwest. U.S. Interstate 96 provides access from the northwest and southeast. As shown in **Exhibit 1-16**, the two interstates intersect west of the Airport, in close proximity, enabling two nearby interchanges that provide sufficient access to the Airport access roadways. The two interchanges route traffic onto U.S. Interstate 96 Business Loop /Grand River Road and Airport Road. Capital City Boulevard, the main airport access roadway, stems off of U.S. Interstate 96 Business Loop/Grand River Road.

To the east, State Highway 17 and 127 provide a north-south connector route. From the State Capitol, in downtown Lansing, access is provided by Martin Luther King Boulevard.

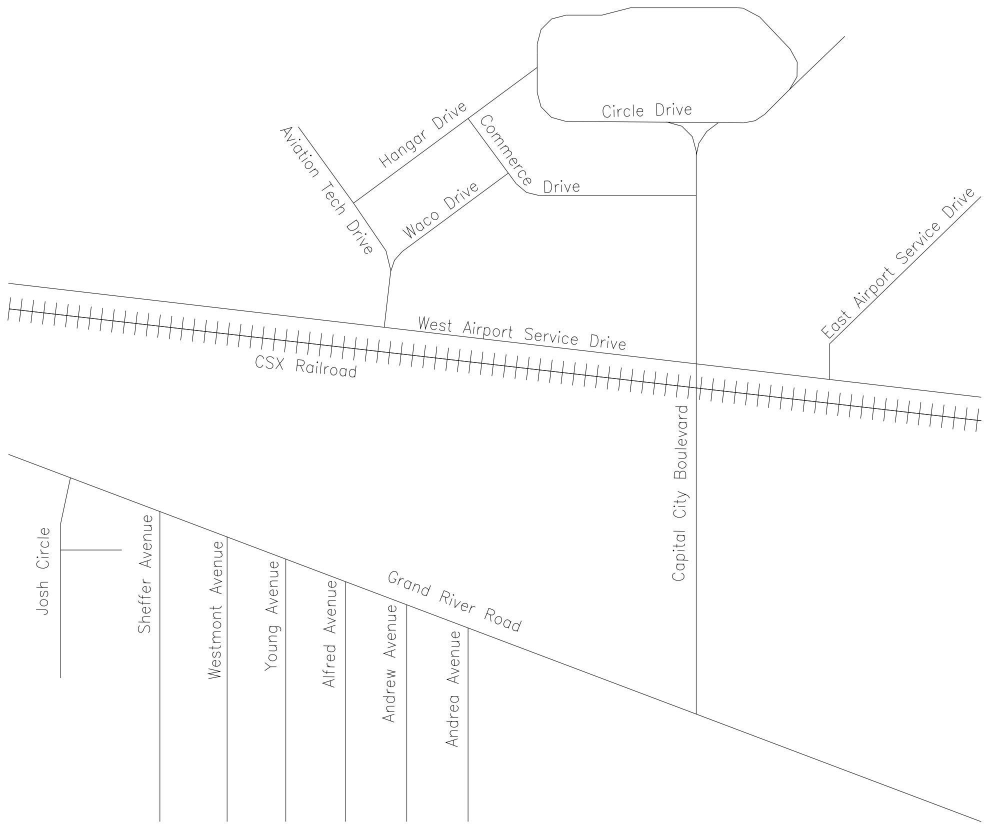
Exhibit 1-16
OFF-AIRPORT ACCESS ROADS



1.7.2 On Airport Access Roads

The principal access to the passenger terminal is provided from Capital City Boulevard, as shown in **Exhibit 1-17**. Capital City Boulevard connects at Grand River Road and extends north approximately three-quarters of a mile and connects to the terminal access roadway. Access to short-term, long-term, and employee parking is also provided from Capital City Boulevard prior to the terminal roadways.

Exhibit 1-17
ON-AIRPORT ACCESS ROADS



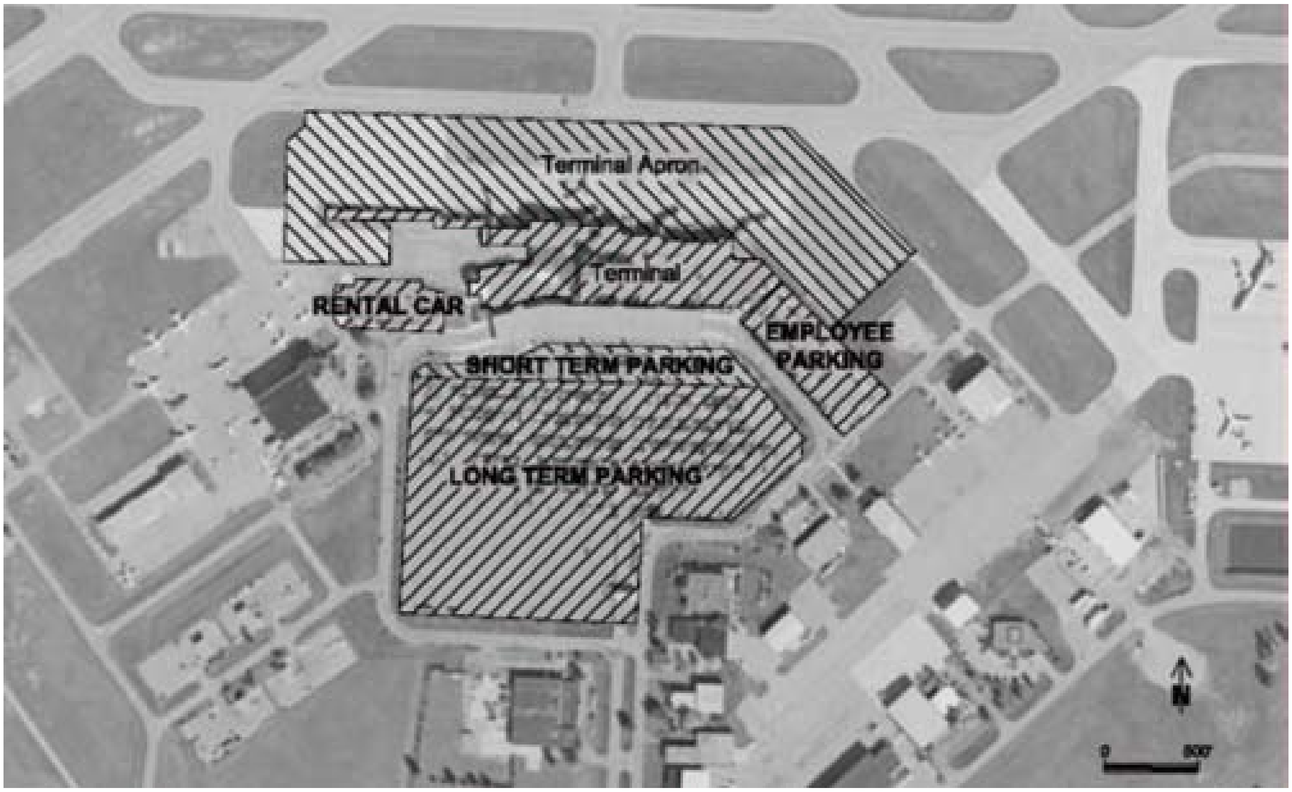
Currently, Capital City Boulevard is a four-lane access road with a landscaped median. As previously mentioned, prior to the intersection of Airport Access Drive, a CSX Railroad line crosses Capital City Boulevard at grade. Crossing gates were installed in 1993 and extend the entire roadway width to discourage vehicles from driving around the barrier. Approximately 25 trains operate on the tracks per day and frequently interfere with airport bound vehicles. Even though train delays are typically low, two to five minutes, there are instances when the railroad delays exceed 10 minutes. In these circumstances, the Airport sends public safety to assist with detours.

1.7.3 Parking Facilities

Vehicle parking at Capital City Airport has several different types of lots, depicted in **Exhibit 1-18**, including:

- Public parking, short and long-term
- Employee parking
- Rental car parking

Exhibit 1-18
VEHICLE PARKING



1.7.3.1 Public Parking

Public parking is provided in the short-term or long-term surface parking lots located inside the terminal access roadway. The surface parking lot was expanded in 1999 and includes a total of 1,842 spaces comprised of 164 short-term and 1,678 long-term spaces. The 2003 parking rates are $6.00 per day for long-term and $7.50 per day for short-term parking. Short-term parking is divided from long-term parking by a movable median. The median was moved after September 11 to comply with the FAA minimum 300-foot blast distance. Moving the barrier caused a loss of several parking spaces and the final parking capacity is 1,842 spaces. Passengers walk to the passenger terminal and access is provided by four painted walkways that lead to the passenger terminal entranceways. The maximum walk distance from long-term parking is 1,000 feet.

Vehicle access to the public parking lot is located by one entrance on the east side approaching the passenger terminal and another entrance on the west side of the parking lot. The east entrance has a total of four gates, two gates for long-term and two gates for short-term access. The west entrance includes one gate for short-term and one gate for long-term parking.

The exit lanes are located in the center of the lot and vehicles exit to the south. Vehicles exit directly onto Capital City Blvd or re-circulate to the passenger terminal. New toll technology was installed in 1999 that includes one automated lane that accepts credit card payment at the gate without personnel attendance. Two additional gates are available for egress with personnel assistance. The current parking operator is Standard Parking.

1.7.3.2 Employee Parking

Employee parking consists of approximately 100 spaces located to the east of the passenger terminal. Access is provided from the terminal access roadway with one entrance and one exit lane, located on the east section of the lot. Magnetic cards are necessary for entry, which are distributed by the Airport. Employees walk to the terminal from this location.

1.7.3.3 Rental Car Parking

Access to the rental car ready/return lot is located on the west side of the passenger terminal. One entrance and one exit lane is provided to hold vehicles for the four on-airport rental car companies: Avis, Budget, Hertz and National. Approximately 100 rental vehicles can be stored in this holding lot.

1.8 Regional Setting

The regional setting is defined by communities with issues, problems, or services that overlap or transcend their boundaries. The regional setting is sometimes dictated by sheer size or may also be determined by the proximity of communities to each other.

1.8.1 Political Boundaries

Often times a region is comprised of a central planning organization that is not affiliated with a single governing agency but performs planning functions for a region that contains many governmental jurisdictions. Regional planning organizations are usually independent commissions or councils of governments, with only limited authority, and are primarily advisory in nature.

Capital City Airport is located at the junction of three counties, including Ingham County, Clinton County, and Eaton County. These counties have formed the joint planning commission Tri-County Region Planning Commission.

The Tri-County Region Planning Commission was organized in July of 1956 to address the inter-jurisdictional problems associated with new growth at both the local and regional level. The area overseen by the Tri-County Regional Planning Commission consists of 78 separate units of governments. The Tri-County Regional Planning Commission was formed to coordinate the independent zoning and land use powers within these governments. With the formation of many special districts, including drainage districts, school districts, road commissions, health districts, soil conservation districts, transportation authorities, and sewer and water authorities, the Tri-County Region Planning Commission plays some role in managing and providing services for new development and growth.

The mission of the Commission is to “actively engage the citizens of the region to examine implications of regional land use and other growth trends on the region’s future and to formulate consensus on a shared vision of regional growth in order to assume improved future regional quality of life and economic competitiveness for our citizens and businesses”.

1.8.2 Land Use / Zoning

The Airport Authority adopted its first zoning ordinance in September of 1953. The most recent amendment to this ordinance was accepted on October 7, 1987. The principal objective of this ordinance is to provide additional safety and protection to the users of the Airport and to the people who live and work in its vicinity.

1.8.3 Transportation

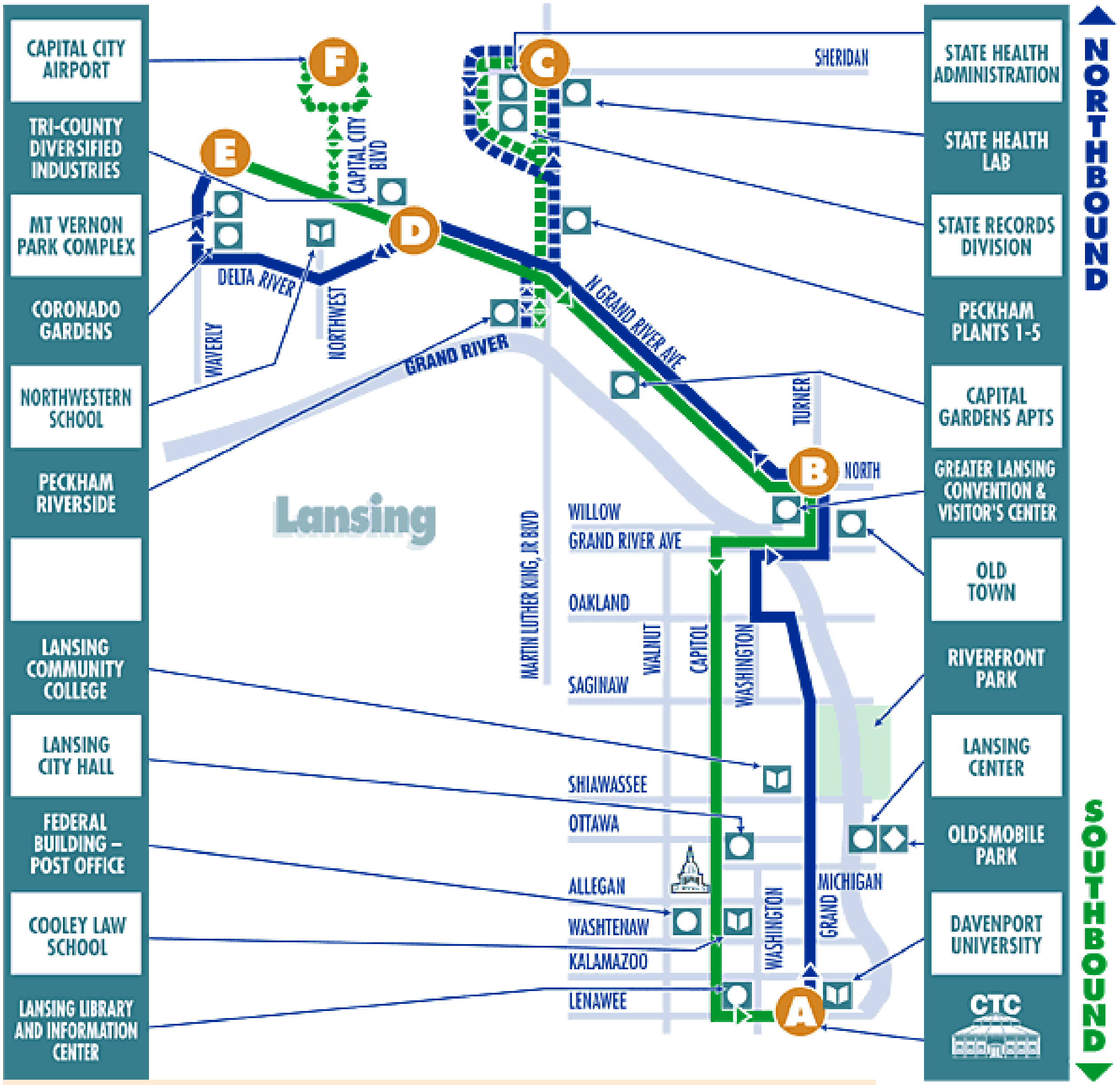
Public transportation in the Lansing area is available via bus. The Capital Area Transportation Authority governs the public bus transportation system in the Lansing area. This system consists of 22 lines, two of which service the Airport vicinity. **Exhibit 1-19** identifies the two lines servicing the Airport and the various locations also served by these bus lines. Access to the entire Capital Area Transportation Authority system can be obtained via these two lines.

1.9 Environmental Setting

FAA Order 5050.4B, *The Airport Environmental Handbook*, requires the evaluation of airport development projects as they related to specific environmental impact categories by outlining types of impacts and the thresholds at which the impacts are considered to be significant. For some impact categories this determination can be made through calculations, measurements, or observations, while for other impact categories this determination can be established through correspondences with appropriate federal, state, or local agencies. A complete evaluation of the impact categories identified in FAA Order 5050.4B is required during and environmental assessment or environmental impact statement.

The Airport environs have been reviewed for any potentially problematic environmental consequences that may result from airport development projects. The only known likely environmental impacts occurring on existing Airport property or in the immediate vicinity of the boundary of Airport property is the potential for wetland impacts. There are sporadic mapped wetlands located in the northeast corner of the Airport property and the potential exists for wetlands located east of the eastern Airport property border. A complete environmental overview is covered in a later chapter.

Exhibit 1-19
TRANSPORTATION SYSTEM



Legend — Time Points

Time Points	A – CATA
Transportation Center	
Northbound Bus Route	B – North & Turner
(Downtown Lansing to Airport)	C – Health Lab
Southbound Bus Route	D – Delta River & Grand
River	
(Airport to Downtown Lansing)	E – Grand River &
Waverly	

Source: Capital Area Transportation Authority

1.10 Business Aspects

Responsive airport master planning must examine the fiscal environment under which airport improvements may be undertaken. Key aspects of the fiscal environment are the airport's basic business model, operating revenues and expenses, and sources and uses of capital funds. The following sections summarize this information for Capital City Airport.

1.10.1 Business Operating Model Overview

The Capital Region Airport Authority owns and operates the Capital City Airport and Mason Jewett Field (a general aviation airport) located in Mason, Michigan. The Authority is organized under and exists pursuant to Act 73, Public Acts of Michigan of 1970, as amended. The Authority is authorized to, among many other things, issue self-liquidating revenue bonds, levy up to 0.75 mill (or $0.00075) on each dollar of the taxable value of Ingham County and a small portion with the City of Lansing in Eaton County, and enter into leases and contracts with tenants and users of the Airport.

The basic business model in place at the Airport relies on two principal sources of operating revenue: charges to airport tenants and users (in the form of rentals, fees, and charges) and local taxes (based on the tax levy). Principal capital project funding sources are federal grants in aid, passenger facility charges, and revenue bonds.

As part of the annual budget process, the Authority determines the amount of expected revenues from the airlines, other tenants of the two airports, other miscellaneous revenue sources, and the local tax revenues projected. The Authority also examines its projected operating and maintenance expenses, debt service for its outstanding bonds, and other expenses for the year. Each year's budget must have sufficient revenues (plus any surplus from a previous year) to cover all operating and debt service expenses for the budget year[2]. If the budget does not, the Authority must revise the budget to bring it into balance by raising fees and charges (within the context of the leases with the tenants of the two airports), cutting expenses, or increasing the tax levy (within the context of its taxing authority).

Exhibit 1-20 provides a summary of revenues and expenses for the Airport for fiscal year (FY) 2003. Capital grant funding is not addressed in this table but is examined in more detail in the next section.

Of the approximately $7.0 million in revenues for FY 2003, approximately 73.9 percent are associated with the passenger and cargo service at the Airport (terminal rentals, landing and apron fees, parking, and concessions), 17.5 percent are from various land rentals (including general aviation and non-terminal building air cargo rentals), and the remaining 9.6 percent are tax levy revenues. Note that the Authority could increase these revenues by increasing user fees and the tax levy (currently set at 0.15 of the 0.75 mill limit). However, current revenues are sufficient to address both operating expenses and capital needs.

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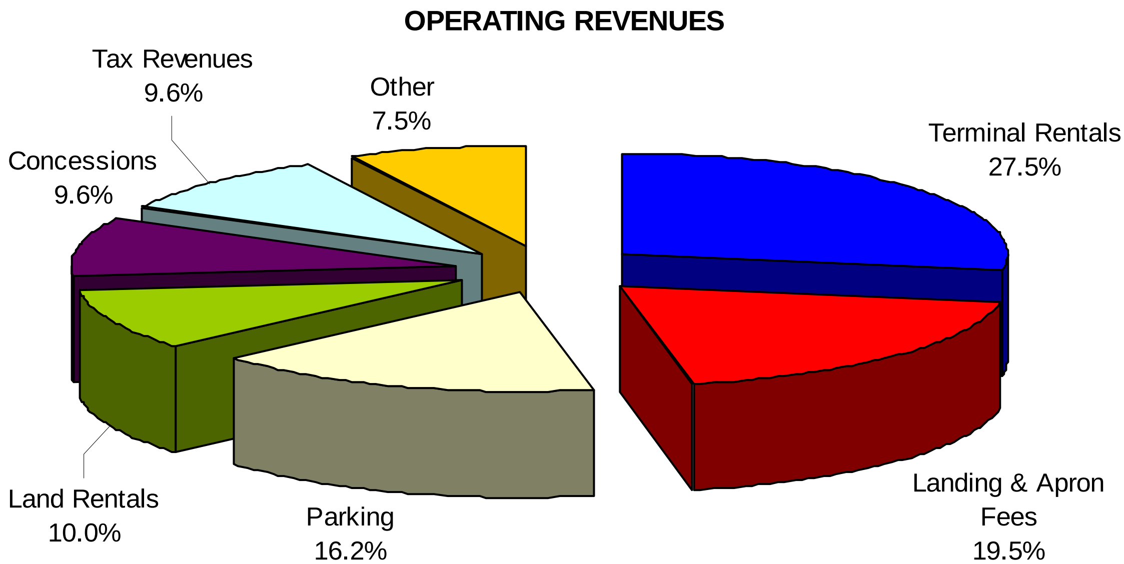
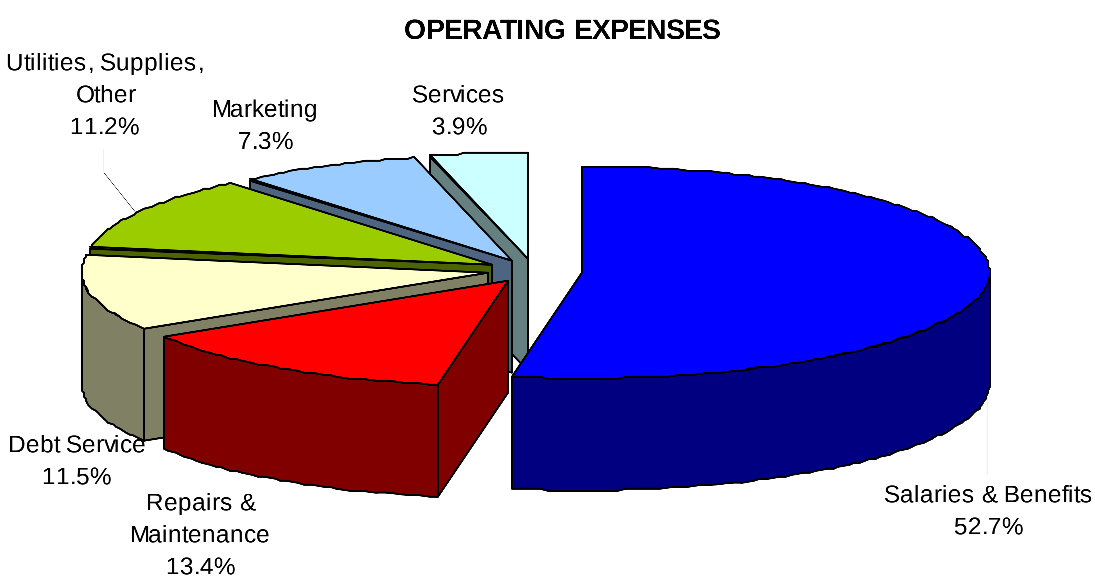
[2] In addition to any balanced budget requirements associated with the Capital Region Airport Authority's charter, state law, and prudent fiscal management, Section 604 of the Bond Resolution for its outstanding revenue bonds requires the Authority to set, charge, and collect rates, fees, rentals, and charges to ensure sufficient revenues to cover all costs of operating the airports and to pay all debt service. For a
[2] detailed description of the exact wording of this requirement, see the *Capital Region Airport Authority Airport Revenue Refunding Bonds, Official Statement*, March 15, 2002.

Operating expenses and debt service on the outstanding $16.055 million in bonds totaled approximately $6.9 million in FY 2003. As is typical of most airports similar to Capital City Airport, most of the operating expenses are people costs (approximately 52.7 percent). Other costs to operate the Airport (repairs and maintenance, utilities, supplies and other; and services) make up approximately 28.5 percent of the expenses. Debt service on the Authority's outstanding airport revenue bonds accounts for 11.5 percent of the total and various airport-marketing costs make up the balance of the operating and debt service expenses.

Note that these revenue and expense figures do not include passenger facility charge revenues, the FAA's airport improvement program (AIP) grant-in-aid revenues, or capital expenditures.

Exhibit 1-20
SUMMARY OF REVENUES AND EXPENSES – FY 2003





Source: CRAA Un-audited Financial Statements for FY 2003 ended June 30, 2003.

1.10.2 Sources and Uses of Capital Funds

The financial plan for the capital improvements at an airport requires a detailed analysis of projected traffic, costs, and revenues. The capital costs of a project at Capital City Airport are recovered partially through revenues from the airlines, concessionaires, other airport tenants, and the tax levy as well as passenger facility charges, AIP, other federal and state grants-in-aid, and airport revenue bond proceeds.

The financial feasibility of the capital improvements is largely determined by the magnitude and reasonableness of the charges and rents paid by airport users and tenants and the necessary tax levy. Subsequent chapters of the master plan address these issues.

Table 1-18 identifies the capital improvement projects currently identified in the federal airport capital improvement program for the Airport. These projects have been estimated in terms of the approximate year and total cost associated with the project.

Table 1-18
AIRPORT CAPITAL IMPROVEMENT PROGRAM (ACIP) FY04 – FY08

No.	Year	Description	Total Cost	Remarks
1	2004	Security upgrade – Phase II	$2,183,573	Security access control
2	2004	West Concourse Upgrade – Phase I	$ 545,600	Replace temporary facility
3	2004	Extend Rwy 28L – 750' / EA	$4,750,000	Provide runway for current operator
4	2004	Part 150 Noise & Pavement Plan	$ 399,250	Plan updates
5	2005	Interior Access Road – Rwy 6 to West Ramp / RSA Imp	$ 684,000	Access around Runway 6 end / RSA Improvements
6	2005	Land Reimburse (church)	$ 325,720	Approach to Runway 24
7	2005	West Concourse - Phase II	$4,846,825	Replace temporary facility
8	2005	Mill / Resurface Txy A and Ramp	$ 599,100	Severe cracking
9	2005	Rehab / Expand East Ramp	$2,859,500	Severe cracking / parking
10	2006	Expand Baggage Claim – Phase II	$5,685,000	Expand building for 3rd baggage belt and rental cars
11	2006	RSA Improve	$2,000,000	Meet standards
12	2006	Fence Property	$ 235,500	Secure approaches
13	2008	Freight Ramp Expand – Phase I	$3,750,000	Eliminate congestion on southeast ramp

Source: Capital Region Airport Authority

CHAPTER 2
FORECAST OF AVIATION DEMAND

Forecasts of aviation demand at the Capital City Airport (the Airport) are presented in this chapter for the 20-year planning period (2004-2023). Forecasts of aviation demand provide a basis for determining the type, size, and timing of aviation facility development. Consequently, the forecasts influence virtually all phases of the planning process.

Forecasting future activity involves both analytical techniques and subjective considerations. Regardless of the methodology used, assumptions must be made about how internal and external forces might change in the future. Factors that can influence aviation activity levels include regulatory policy on the local and national level, technological innovations, aviation industry trends, and local fluctuations in population and employment. The objective of forecasting is to develop a realistic measure of the potential for these changes so their effect can be estimated in a rational manner and preparations can be made to smoothly and cost-effectively accommodate their impact on airport facilities.

The development of forecasts of aviation demand for the Capital City Airport is presented in the following sections of this chapter:

- Historical Activity Review
- Factors Affecting Future Aviation Demand
- Forecast of Annual Enplaned Passengers
- Forecast of Enplaned Cargo
- Forecasts of Annual Aircraft Operations
- Based Aircraft Forecast
- Annual Instrument Approaches
- Comparisons with Other Forecast Efforts
- Design Day/Design Hour Activity Forecasts
- Summary of Forecasts

The forecasts presented herein provide five, 10, and 20-year estimates of future aviation activity levels at the Airport. The association of activity levels with specific time frames is necessary in order to develop a schedule of improvement needs and assess the ability of the Airport to finance the recommended development plan. It is important, however, to view the projections independent of specific years, and consider the projections to be planning activity levels, which identify trigger points for future airport facilities. If actual growth occurs faster than anticipated, the implementation schedule should be reassessed and accelerated as necessary. Similarly, slower than projected growth may warrant deferment of planned improvements to a later date. Actual activity growth should be frequently compared to projected growth so schedule corrections can be identified and implemented.

2.1 Historical Activity Review

This section presents a general overview of Michigan commercial service airports followed by a brief review of long-term historical trends in various elements of aviation activity at the Capital City Airport. Elements reviewed include airlines serving the Airport, annual enplaned passengers, annual aircraft operations, and annual air cargo.

2.1.1 Michigan Commercial Service Airports

The Capital City Airport is classified as a non-hub airport by the Federal Aviation Administration (FAA). The FAA's definition of a hub is not to be confused with the designation of a city/airport used by an airline where flights are concentrated in a hub-and-spoke operating concept. These definitions are important because federal AIP funding is dependent, in part, upon hub classification. The FAA hub classifications are based on the percentage of enplanements at an airport compared to the total number of enplanements in the United States. These percentages are as follows:

- Large Hub – Enplanes more that 1.0 percent of the nation's enplaned passengers
- Medium Hub – less than 1.0 percent but greater than 0.5 percent
- Small Hub – less than 0.5 percent but greater than 0.25 percent
- Non-Hub - less than 0.25 percent

As depicted in **Table 2-1,** there are 15 commercial service airports located in the state of Michigan. All are classified by the FAA as small-hubs and non-hubs except for Detroit Metropolitan Wayne County Airport (a large-hub).

In 2002, Capital City Airport was ranked the 149th busiest airport in the nation, 13th largest of the 259 non-hub airports. It is the fourth largest commercial service airport in Michigan.

Table 2-1
MICHIGAN AIRPORT RANKINGS

Hub Size	National Rank	Airport Code	Airport Name	City	CY 2002 Annual Enplanements
Large	10	DTW	Detroit Metropolitan Wayne County	Detroit	15,525,413
Small	86	GRR	Gerald R. Ford International	Grand Rapids	960,482
Non-hub	130	FNT	Bishop International	Flint	361,484
Non-hub	149	LAN	Capital City	Lansing	260,160
Non-hub	158	MBS	MBS International	Saginaw	236,620
Non-hub	160	AZO	Kalamazoo/Battle Creek Intl	Kalamazoo	233,554
Non-hub	172	TVC	Cherry Capital	Traverse City	197,366
Non-hub	245	DET	Sawyer International	Gwinn	54,882
Non-hub	278	MKG	Muskegon County	Muskegon	35,763
Non-hub	282	SAW	Pellston Regional Airport	Pellston	33,622
Non-hub	306	PLN	Houghton County Memorial	Hancock	27,300
Non-hub	347	CMX	Chippewa County International	Sault Ste Marie	15,639
Non-hub	393	APN	Alpena County Regional	Alpena	10,032
none	412	ESC	Delta County	Escanaba	8,070
none	427	IMT	Ford	Iron Mt./Kingsford	7,023

Source: FAA DOT/TSC CY2002 ACAIS Database

2.1.2 Airlines Serving the Airport

Air carrier, commuter, and dedicated cargo airlines that have operated at the Airport since calendar year 1994 are depicted in **Table 2-2.** As shown, the total number of airlines reached a peak in 1997 when nine different airlines provided air service to the Airport. The Airport enjoyed a strong presence of air carrier and commuter operators during this period. However, several commuter carriers ceased operating at the Airport during 2001 because of the national economic downturn, the events of September 11, and the general airline restructuring that occurred during this time as carriers struggled to remain solvent. Comair, Northwest, US Airways Express, United Express, and UPS have operated at the Airport in each year depicted in **Table 2-2**.

Table 2-2
AIRLINES SERVING THE AIRPORT

	CY 1994	CY 1995	CY 1996	CY 1997	CY 1998	CY 1999	CY 2000	CY 2001	CY 2002	CY 2003
AIR CARRIER										
Allegient Airlines										X
American Trans Air			X	X	X	X	X			
Great American Airways		X	X	X						
Northwest Airlines	X	X	X	X	X	X	X	X	X	X
US Airways	X	X								
COMMUTER										
American Eagle	X	X	X	X	X	X	X			
Chicago Express (ATA Connection)				X	X	X	X			
Comair (Delta Connection)	X	X	X	X	X	X	X	X	X	X
Continental Express	X	X	X	X	X	X	X	X		X
Express 1/Pinnacle (Northwest Airlink)								X	X	X
Mesaba (Northwest Airlink)	X	X	X	X	X	X	X	X	X	X
Skyway (Midwest Express)										X
United Express	X	X	X	X	X	X	X	X	X	X
US Airways Express	X	X	X	X	X	X	X	X	X	X
CARGO										
United Parcel Service	X	X	X	X	X	X	X	X	X	X

Source: Capital Region Airport Authority.
Compiled by Reynolds, Smith and Hills, Inc.

2.1.3 Market Services

Since airline economic deregulation in 1978, most of the major airlines adopted a hub-and-spoke operating concept. A hub is a collecting point for traffic where passengers arrive on flights from multiple origination points, connect to other flights timed to provide multiple destination options, and depart again to their final destination. Capital City Airport is operated as a spoke airport with mainline and/or their commuter airlines feeding traffic to the airlines' respective hub airports.

The hub-and-spoke system is a means for a single flight from a spoke airport to have multiple one-stop markets through the hub airport. Principal hubs of the major airlines are shown in **Table 2-3**..

Table 2-3
PRIMARY DOMESTIC HUB AIRPORTS

Airline	Hub City
Airtran	Atlanta
Alaska	Seattle
American Trans Air	Chicago (Midway)
America West	Phoenix, Las Vegas
American	Dallas-Ft. Worth, Chicago (O'Hare), St. Louis
Continental	Houston, Newark, Cleveland
Delta	Atlanta, Cincinnati, Salt Lake City
Jet Blue	New York (JFK, LGB)
Midwest Express	Milwaukee
Northwest	Detroit, Minneapolis-St. Paul, Memphis
United	Chicago (O'Hare), Denver, San Francisco
US Airways	Pittsburgh, Philadelphia, Charlotte

Source: Reynolds, Smith and Hills, Inc.

As a spoke airport, the air service at Capital City Airport is focused on the hub airports of the major and regional airlines. Because the Capital City Airport is a relatively small market, flights to an airline hub provide multiple service destinations that could not be supported by the amount of locally generated traffic. Most spoke airports typically have service limited to hubs airports, except for some key recreational and/or seasonal services (such as Las Vegas and Orlando). Until November 2003, US Airways provided service to Pittsburgh and before 2001, American provided service to Chicago. The current markets served at the Airport fit this pattern of service:

- Northwest Airlines serves Detroit Metropolitan (DTW) and Minneapolis/St. Paul (MSP)
- United Express provides service to Chicago (ORD)
- Comair (Delta Commuter) provides service to Cincinnati (CVG)
- Continental Express provides service to Cleveland (CLE)
- Skyway Airlines (d/b/a Midwest Connect) provides service to Milwaukee (MKE)

This pattern of service reflects the industry trends in hub and spoke services and offers insight into potential future services. Specifically, airlines compete by offering hub services that are equal to or greater than those of other airline hubs, the object being to maximize the size of the hub by serving as many spoke markets as feasible. This implies that hub airlines not currently serving Capital City Airport are candidates for future services to assure the competitiveness of their hub.

In addition, airlines currently serving the Airport have a reasonable expectation of having services to multiple hubs so long as they can be served with an aircraft that suits the market in terms of size and range. Hubs located less than 750 to 1,000 miles from Capital City Airport are potential candidates for non-stop service with regional jets, and hubs located within 500 miles are potential candidates for regional jet or turboprop services. The introduction of regional jets into the airline fleets provides the opportunity for more distant hub services to small communities such as Lansing.

The key positive aspect of the hub-and-spoke concept for airports like Capital City Airport is numerous one-stop service destinations are available through the hub airports that would not be available on a non-stop basis. The negative impact is that passengers must make flight connections at the hub airport.

2.1.4 Market Share

The passenger market share for the airlines serving the Capital City Airport in 2002 and 2003 is presented in **Table 2-4**. As shown, Northwest Airlines has enplaned the largest percentage of the enplanements in both years.

Table 2-4
AIRLINE MARKET SHARE

Airline	CY 2002	Percent of Total	CY 2003	Percent of Total
Allegiant Air	--	--	11,514	4.2%
Continental Express	--	--	3,371	1.2%
Delta Connection	33,455	12.9%	33,903	12.5%
Nortwest Airlines	162,787	62.6%	164,633	60.7%
Skyway/Midwest	3,490	1.3%	3,673	1.4%
United Express	43,028	16.5%	45,424	16.8%
US Airways - PSA	17,430	6.7%	8,643	3.2%
	260,190	100.0%	271,161	100.0%

Source: Capital Region Airport Authority

2.1.5 Annual Enplaned Passengers

An extended history of passengers boarding commercial service aircraft at the Airport is presented in **Table 2-5.** This table segregates the enplanements into two categories; air carrier and commuter enplanements. The definition, as prepared by the FAA, is presented below:

- **Air Carrier Enplanements** - Domestic enplaned passengers (originations and connections) of U.S. commercial air carriers and international enplanements for both U.S. and foreign flag carriers submitted to the U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS) on Form 41, T-100 reports. Estimates include both scheduled and non-scheduled enplaned passengers.
- **Commuter Enplanements** - Enplanements on scheduled commuter or regional carriers as reported on DOT Form 298-C. Carriers reporting on Form 298-C operate at least five scheduled round trips per week and aircraft fleets consists primarily of aircraft with 60 or fewer seats.

This division was much easier a few years ago when the major air carriers operated jet aircraft and their feeder airlines operated commuter type (mainly turboprop aircraft) that fed into their system. Today, many commuter airlines operate regional jet aircraft that offer 50 seats (or more) that blur the lines of these two categories. The use of regional jet aircraft has allowed a much higher level of perceived quality of service to many communities, as passenger preferences for jet aircraft relative to props has been demonstrated.

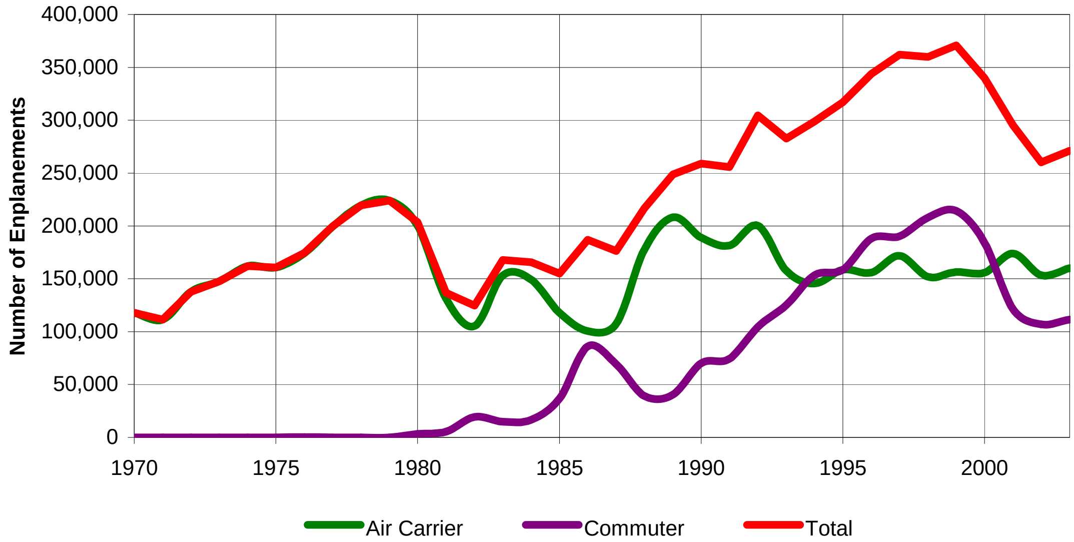
Enplanements at Capital City Airport have grown at an average annual growth rate of 1.8 percent over the last 27 years. However, this growth has not been steady, as total Airport enplanements have fluctuated from year to year.

In general terms, two cycles of growth and retraction are apparent. The first began in the early 1970s with growth through the late 1970s. The early 1980s were marked by a decline in total airport enplanements, marking the end of the first cycle. The next cycle of growth began in the mid-1980s and continued through 1999. However, this growth period of approximately 15 years ended around 1999/2000 as a number of national and regional economic and airline business factors impacted airport activity. There are early indicators – improving economy, cessation of the decline in total annual enplanements, and airline interest in resuming/increasing service to the Airport -- that the end of the second growth/retraction cycle is at hand.

Commuter enplanements have grown significantly at the Airport since 1976 and enjoyed significant growth in their market share beginning in 1994. The market share increased from 44.3 percent in 1993 to 57.8 percent in 1999 when commuter enplanements were at the highest level posted in the last 25 years.

The history of enplanements at the Capital City Airport has been affected by events unrelated to passenger demand for air service from the Lansing market area. The most significant of these is the presence of the Northwest Airlines hub in Detroit. This will be discussed in more detail in Section 2.2.

Table 2-5
HISTORICAL ENPLANEMENTS



	Commercial Service					Annual
		Market		Market		Increase
Year	Air Carrier	Share	Commuter	Share	Total	(Decrease)
1976	174,193	99.9%	178	0.1%	174,372	
1981	131,431	96.1%	5,365	3.9%	136,797	-4.7%
1986	100,649	53.9%	86,134	46.1%	186,784	6.4%
1991	181,292	70.9%	74,332	29.1%	255,625	6.5%
1992	200,139	65.7%	104,322	34.3%	304,462	19.1%
1993	157,501	55.7%	125,203	44.3%	282,705	-7.1%
1994	145,523	48.7%	153,483	51.3%	299,006	5.8%
1995	158,513	50.0%	158,434	50.0%	316,948	6.0%
1996	155,779	45.3%	188,114	54.7%	343,893	8.5%
1997	171,903	47.5%	190,114	52.5%	362,017	5.3%
1998	151,786	42.2%	208,043	57.8%	359,829	-0.6%
1999	156,347	42.2%	214,359	57.8%	370,706	3.0%
2000	155,923	45.9%	183,989	54.1%	339,912	-8.3%
2001	173,830	58.9%	121,509	41.1%	295,340	-13.1%
2002(E)	153,440	59.0%	106,750	41.0%	260,190	-11.9%
2003(E)	159,900	59.0%	111,300	41.0%	271,161	4.2%
Average Annual Growth						
1976 - 2003					1.6%	

Source: Terminal Area Forecast (TAF) 2002 and 2003 Air Carrier/Commuter shares estimated.
Compiled by Reynolds, Smith and Hills, Inc.

2.1.6 Annual Aircraft Operations

An aircraft operation is defined as either a takeoff or a landing. **Table 2-6** presents a 27-year history of the annual aircraft operations recorded at the Airport in four categories: air carrier, commuter/air taxi ("commuter"), general aviation, and military. An air carrier operation represents either a takeoff or a landing of a commercial aircraft with seating capacity of more than 60 seats. Commuter operations represent scheduled commercial flights for aircraft with 60 or fewer seats and include air taxi operations, which are nonscheduled flights or for-hire flights of aircraft with 60 or fewer seats.

Air carrier operations were at their highest annual level at more than 16,000 annual operations over 25 years ago. Operations have been generally declining each year until 1996 when these operations reached their lowest level, decreasing to nearly 6,900 annual operations. Since then, air carrier operations have increased steadily each year, increasing to more than 12,100 operations in 2003, representing an average annual growth rate of 8.5 percent from 1996 through 2003.

Commuter operations have grown considerably since 1976, increasing from approximately 6,600 to a peak of more than 34,700 operations in 1999, representing an average annual growth rate of 7.8 percent. These operations began to decline in 2001 as the airlines operating this type of aircraft began pulling out of the Lansing market and has reached their lowest level in more than 10 years. Overall, these operations have grown by 3.6 percent from 1976 through 2003.

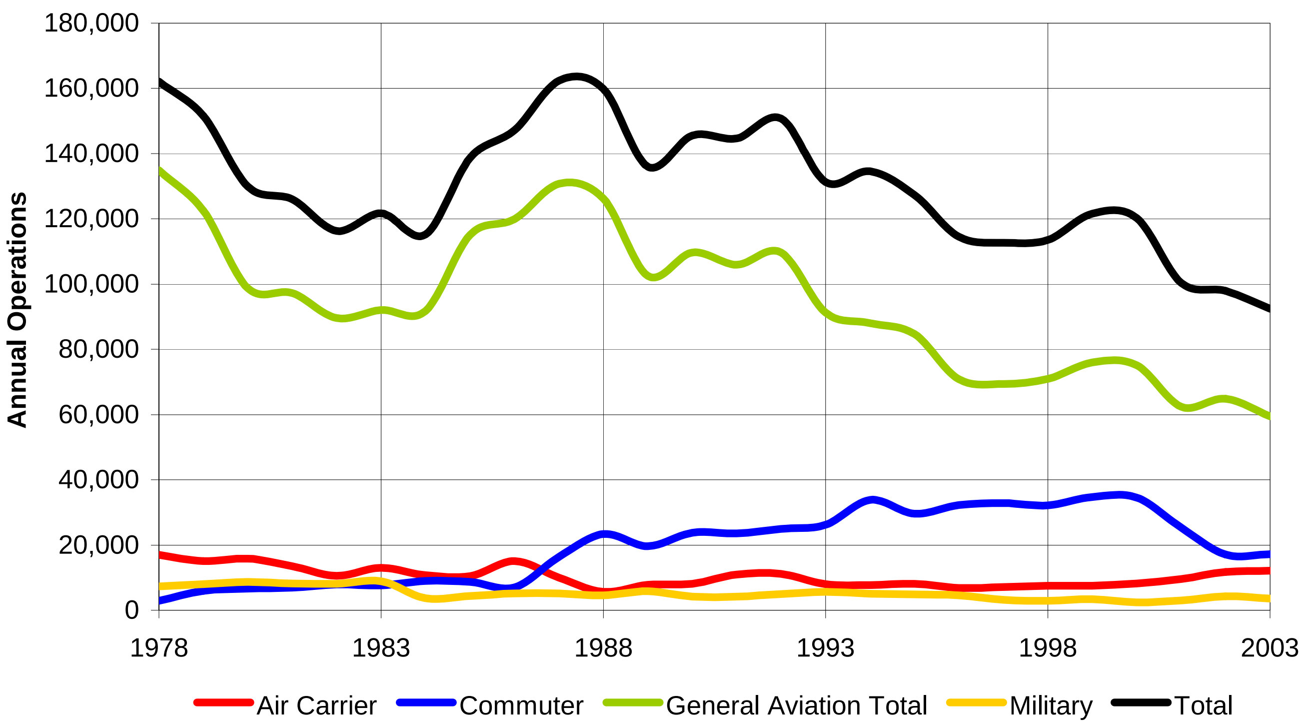
The change in air carrier versus commuter operations is not necessarily a negative factor in the service trend. The changes made in fleet size have contributed to this transition as airlines assign the most economical aircraft to the market. Since 1978, most of the major airlines have accomplished this by transitioning the services to their affiliated or code share partners that operate smaller aircraft than those of the mainline carrier. Early on, these commuter aircraft were 19 seat prop aircraft. These aircraft transitioned to 30 seat turboprop aircraft. The 30 seat turboprop aircraft appear to be in transition to the 50 seat regional jet aircraft now appearing in the commuter fleet. These changes have permitted an increase in the number of seats at the Airport with fewer flights.

General aviation operations represent all civil aviation aircraft takeoffs and landings not classified as commercial (air carrier or commuter) or military. As shown in Table 2-6, these operations have generally declined steadily since 1978, consistent with the national decline in general aviation operations.

Military aircraft operations have ranged between a peak of more than 8,200 in 1985 to a low of approximately 2,400 operations in 2000.

Total operations at the Airport have decreased at an average annual rate of 2.4 percent over the last 27 years, with most of the change attributable to the decline in general aviation activity.

Table 2-6
HISTORICAL OPERATIONS



Year	Commercial		General Aviation			Military			Total	Annual Increase (Decrease)
	Air Carrier	Commuter	Itinerant	Local	Total	Itinerant	Local	Total		
1976	16,017	6,622	78,413	74,340	152,753	980	1,657	2,637	178,029	
1981	13,460	6,990	53,186	44,098	97,284	1,460	6,804	8,264	125,998	-6.7%
1986	15,018	7,086	55,293	64,679	119,972	1,719	3,447	5,166	147,242	3.2%
1991	10,925	23,594	48,341	57,618	105,959	1,611	2,580	4,191	144,669	-0.4%
1992	11,132	24,970	48,093	61,548	109,641	1,572	3,460	5,032	150,775	4.2%
1993	8,067	26,208	36,834	54,466	91,300	1,386	4,331	5,717	131,292	-12.9%
1994	7,697	33,821	38,211	49,818	88,029	1,407	3,686	5,093	134,640	2.6%
1995	8,148	29,630	38,664	46,056	84,720	1,890	3,008	4,898	127,396	-5.4%
1996	6,851	32,302	41,043	29,739	70,782	2,194	2,403	4,597	114,532	-10.1%
1997	7,133	32,896	38,651	30,747	69,398	1,656	1,587	3,243	112,670	-1.6%
1998	7,491	32,204	41,381	29,514	70,895	1,311	1,665	2,976	113,566	0.8%
1999	7,511	34,732	42,235	33,740	75,975	1,675	1,706	3,381	121,599	7.1%
2000	8,194	34,514	44,106	31,017	75,123	1,357	1,040	2,397	120,228	-1.1%
2001	9,592	25,356	36,579	25,850	62,429	1,974	1,052	3,026	100,403	-16.5%
2002	11,740	17,117	36,585	28,230	64,815	2,240	2,022	4,262	97,934	-2.5%
2003(E)	12,142	17,218	31,727	27,755	59,482	1,683	1,896	3,579	92,421	-5.6%
Avg Annual Growth										
1976 - 2003	-1.0%	3.6%	-3.3%	-3.6%	-3.4%	2.0%	0.5%	1.1%	-2.4%	

Source: Terminal Area Forecast 2002 and 2003 Air Carrier/Commuter shares estimated

2.1.7 Total Air Cargo

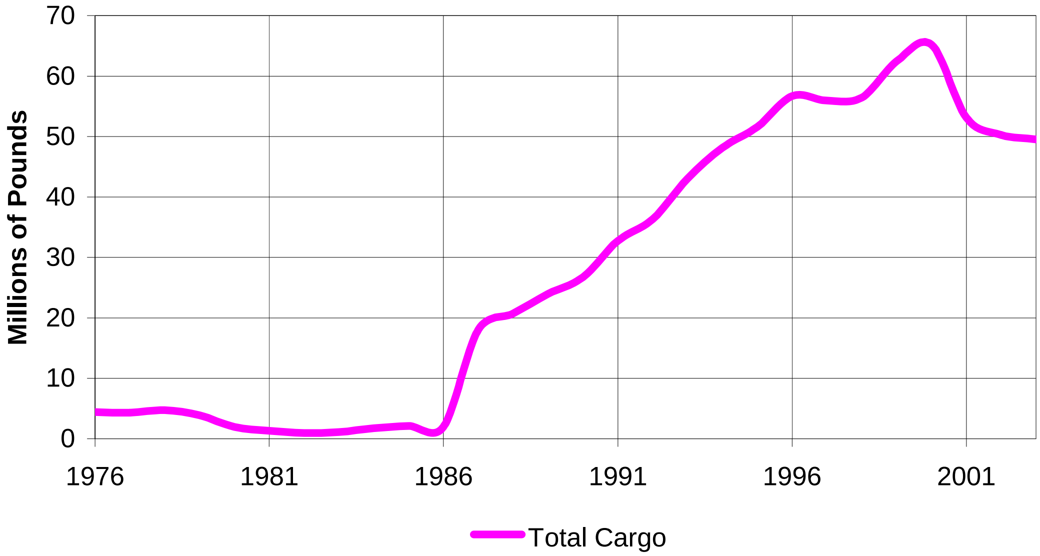
Air cargo at an airport represents the total annual weight of express packages, mail, and other air freight that is shipped into or from an airport loaded on commercial passenger or dedicated air cargo aircraft. United Parcel Service (UPS) and Superior Aviation are the only dedicated air cargo airlines currently operating at the Airport.

Annual enplaned and deplaned air cargo[3] recorded at the Airport since 1976 is presented in **Table 2-7**. The Airport experienced tremendous growth in air cargo beginning in 1987 when UPS began operations at the Airport. Prior to this, most air cargo was processed by the commercial air carriers operating at the Airport. The amount of air cargo has increased every year from 1986 through 2000 with the exception of 1997 when air cargo decreased by 1.4 percent from the prior year. The amount of air cargo peaked in 2000, decreased significantly in 2001 resulting from the recession and has remained at comparable levels through 2002 and 2003.

Total air cargo increased at an average annual growth rate of 6.5 percent between 1987 and 2003. This is a result of UPS's choice to use the Airport as a collection point where cargo is transitioned from ground operation to the air operation. This cargo tends to be small packages (less than 150 pounds). Heavy freight (greater than 150 pounds) tends to be trucked to destinations and, if it is a high valued commodity, may be trucked to a large airport (Detroit's Wayne County or Willow Run, Chicago's O'Hare, or New York's JFK) for transport as belly freight or on larger all-cargo aircraft. Because the non-UPS flight services at the Capital City Airport are dominated by small commuter aircraft, the ability to economically transport freight greater than 150 pounds as belly freight is limited, especially given that trucking rates have decreased so significantly in the past decades. This trend is reflected in the historical activity and is likely to continue into the future.

[3] Airmail and air freight have been combined and classified as air cargo in this report.

Table 2-7
HISTORICAL AIR CARGO



Year	Enplaned Cargo	Deplaned Cargo	Total Cargo	Annual Increase (Decrease)
1986	1,357,540	567,951	1,925,491	
1987	9,059,462	9,005,844	18,065,306	838.2%
1988	10,436,683	10,303,095	20,739,778	14.8%
1989	11,683,185	12,286,972	23,970,157	15.6%
1990	13,119,777	13,636,331	26,756,108	11.6%
1991	16,150,253	16,589,553	32,739,806	22.4%
1992	18,893,839	17,458,973	36,352,812	11.0%
1993	22,170,967	20,867,000	43,037,967	18.4%
1994	23,341,298	24,794,498	48,135,796	11.8%
1995	24,403,658	27,195,613	51,599,271	7.2%
1996	27,744,281	28,980,989	56,725,270	9.9%
1997	26,910,455	29,034,682	55,945,137	-1.4%
1998	26,653,142	29,808,183	56,461,325	0.9%
1999	30,477,532	31,995,537	62,473,069	10.6%
2000	31,182,164	34,043,098	65,225,262	4.4%
2001	23,921,156	29,207,153	53,128,309	-18.5%
2002	23,091,622	27,189,021	50,280,643	-5.4%
2003(E)	22,752,100	26,796,200	49,548,300	-1.5%
Average Annual Growth				
1987 - 2003	5.9%	7.1%	6.5%	

Source: Capital Region Airport Authority
Compiled by Reynolds, Smith and Hills, Inc.

2.2 Factors Affecting Future Aviation Demand

The terrorist acts of September 11, 2001, resulted in a pronounced negative impact on the aviation industry. A brief review of what has happened at the Airport since September 11, 2001, is followed by a discussion of other factors that will have an affect on the aviation industry. The national economy, local socioeconomic conditions, airfare levels, airline competition, and the quality of airline service are reviewed to determine what effect these variables may have on the demand for future aviation activity at Capital City Airport.

2.2.1 Impact of September 11, 2001

The events of September 11 had a profound impact on passenger interest to travel in the ensuing months. Capital City Airport and many other airports were also impacted by the airline economic troubles that followed September 11. Service cutbacks were widespread and many smaller communities where deeply impacted.

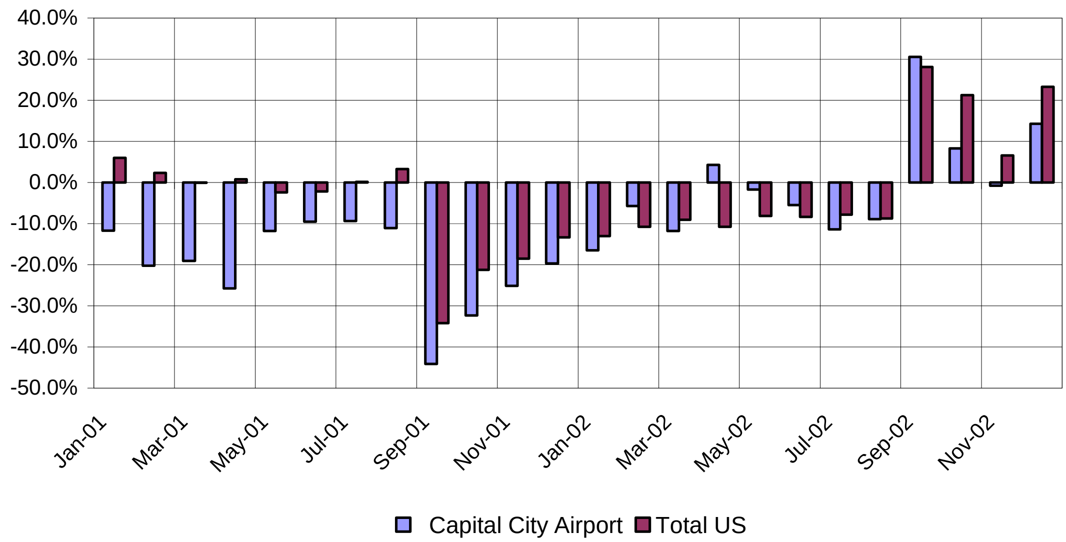
While the Airport was impacted by service cutbacks following September 11, declines in enplanements had begun prior to that date. Enplanements at the Airport peaked in calendar year (CY) 1999 with more than 367,000 enplanements. Enplanements in CY 2000 were approximately 10 percent lower than those in CY 1999 with each month exhibiting a decrease of approximately 10 percent over the prior year, with the exception of March as a result of spring break traffic. This trend continued in CY 2001.

It is difficult to identify the traffic losses due solely to September 11. It can be seen that the traffic losses in the last quarter of 2001 are more significant than the traffic losses in the prior months. The traffic losses prior to September 11 were more a factor of the loss of service by American Airlines, a declining national and local economic climate, and the diversion of traffic from the Lansing market to Detroit. September 11 contributed to a certain loss of service, but this was complicated by the other factors emerging at the time. Clearly September 11 exacerbated the problems and directly contributed to the loss of service by other airlines such as ATA and later, Continental Express.

Table 2-8 tracks monthly enplanements at Capital City Airport compared to the airline industry during CY 2001 and 2002. The decrease in enplanements at the Airport each month since September 2001 was generally higher than the entire industry for the last four months of 2001 but comparable to the industry thereafter. Enplanements during the first eight months of 2001 were 15.0 percent lower at the Airport compared to 0.8 percent for the industry.

This is not the first time that the Airport has experienced a fluctuation in the number of enplanements. Historically, airlines have initiated service to the Airport and subsequently discontinued service. As a result, enplanements at the Airport have experienced significant growth in some years, followed by a similar period of decline. The Authority has recently increased its efforts to improve the level of air service at the Airport. The Airport will recover from the effects of September 11, but possibly at a slower rate than the national average.

Table 2-8
MONTHLY ENPLANEMENTS -
CAPITAL CITY AIRPORT AND THE AIRLINE INDUSTRY



	Capital City Airport				Total US			
Month	Eps 2001	Change/ Prior Year	Eps 2002	Change/ Prior Year	Eps (1,000s) 2001	Change/ Prior Year	Eps (1,000s) 2002	Change/ Prior Year
January	21,547	-11.7%	17,992	-16.5%	43,832	6.0%	38,126	-13.0%
February	21,302	-20.2%	20,085	-5.7%	47,560	2.3%	42,429	-10.8%
March	27,563	-19.0%	24,321	-11.8%	52,825	-0.1%	48,047	-9.0%
April	20,675	-25.7%	21,564	4.3%	52,097	0.8%	46,477	-10.8%
May	24,065	-11.8%	23,652	-1.7%	50,720	-2.4%	46,581	-8.2%
June	24,257	-9.5%	22,929	-5.5%	54,889	-2.2%	50,293	-8.4%
July	24,397	-9.4%	21,612	-11.4%	55,497	0.2%	51,156	-7.8%
August	24,965	-11.1%	22,748	-8.9%	56,143	3.2%	51,226	-8.8%
September	14,076	-44.1%	18,370	30.5%	31,409	-34.2%	40,224	28.1%
October	19,769	-32.3%	21,411	8.3%	39,817	-21.2%	48,273	21.2%
November	20,878	-25.1%	20,713	-0.8%	41,503	-18.5%	44,226	6.6%
December	21,705	-19.7%	24,793	14.2%	40,450	-13.4%	49,865	23.3%
Total	265,199	-20.0%	260,190	-1.9%	566,743	-6.5%	556,923	-1.7%
Jan - August		-15.0%				0.8%		

Source: Capital Region Airport Authority and T-100 Domestic Market (Industry)
Compiled by: Reynolds, Smith and Hills, Inc.

2.2.2 National Economic Conditions

The national economy began slowing during the latter stages of 2000. Since the conclusion of the Persian Gulf War in early 1992, the national economy was in an expansion mode for a record number of quarters until 2000. On November 26, 2001, the National Bureau of Economic Research announced that the U.S. Economy had entered its 10th recession since the end of World War II. However, the severity of the recession was not known until early 2002. Many analysts predicted the recession would last for one quarter but the economy actually declined for three consecutive quarters, starting with the first quarter of 2001. Not coincidentally, the downturn in U.S. domestic passenger and cargo demand also began during this same quarter.

The U.S. Gross Domestic Product averaged 3.3 percent during the 10-year expansion period after the Persian Gulf War, but only reached 0.8 percent and 1.7 percent in federal fiscal years 2001 and 2002, respectively. This recovery period is considered weak compared to previous recovery periods.

According to FAA and other national forecasts, the national economy will reverse its current trend and grow throughout the forecast period. It is expected that federal fiscal year 2003 will bring a 2.7 percent increase in the economy. During the next two years, the economy will increase at a 3.6 percent annual growth rate and will continue to grow at 3.1 percent annually throughout the remainder of the planning period[4]. These forecasts have been considered in calculating future annual growth rates at the Airport. The timing, extent, and rate of annual growth in the U.S. economy and future changes in real disposable income will affect the rate of future airline traffic both nationally and at the Airport.

US Airways and United were particularly hard hit by the economic slowdown discussed above and filed for bankruptcy protection in August and December 2002, respectively. All airlines struggled to remain solvent during the economic down turn made worse by September 11. Recovery from the negative passenger concerns for safety has largely diminished; however, the problematic economic conditions persist but are improving.

2.2.3 Local Socioeconomic Conditions

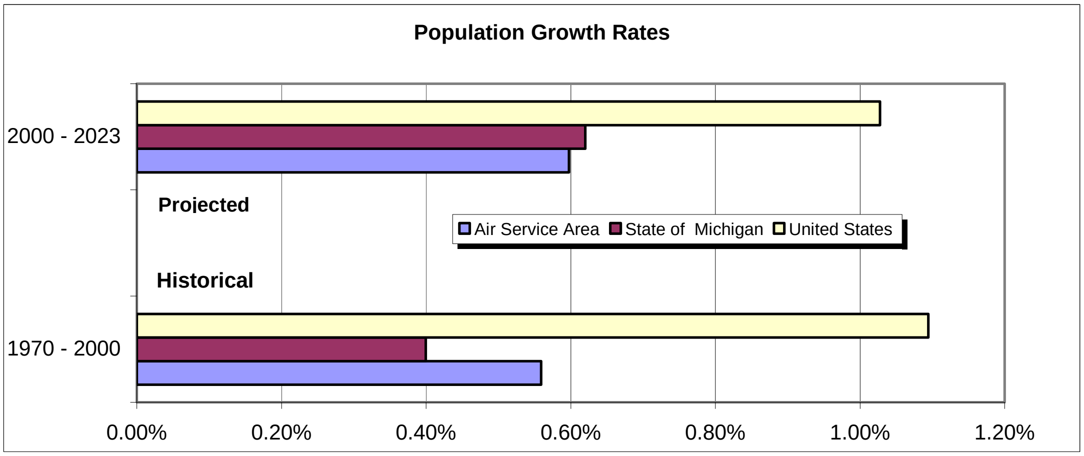
Consideration of a community's economic character is particularly important to the determination of business travel, general aviation, and air cargo levels. Prior to developing the aviation demand forecasts for the Airport, a review of current and projected economic trends and population projections associated with the Airport's primary air service area (ASA) was conducted. As previously described in Chapter One, the Airport's primary ASA was determined to be the Lansing Metropolitan Statistical Area (MSA), consisting of Ingram, Eaton, and Clinton counties.

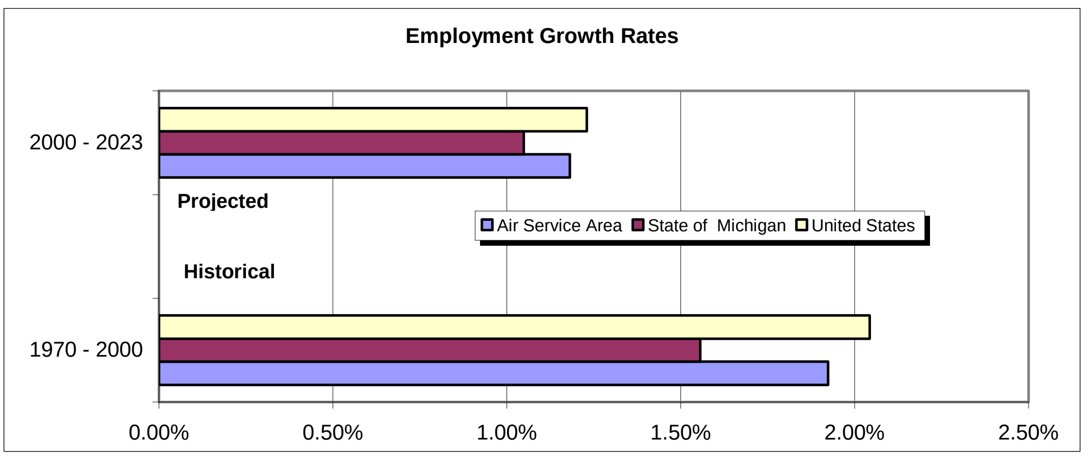
Historical and projected information for the ASA, the State of Michigan, and the United States are presented in **Table 2-9**.

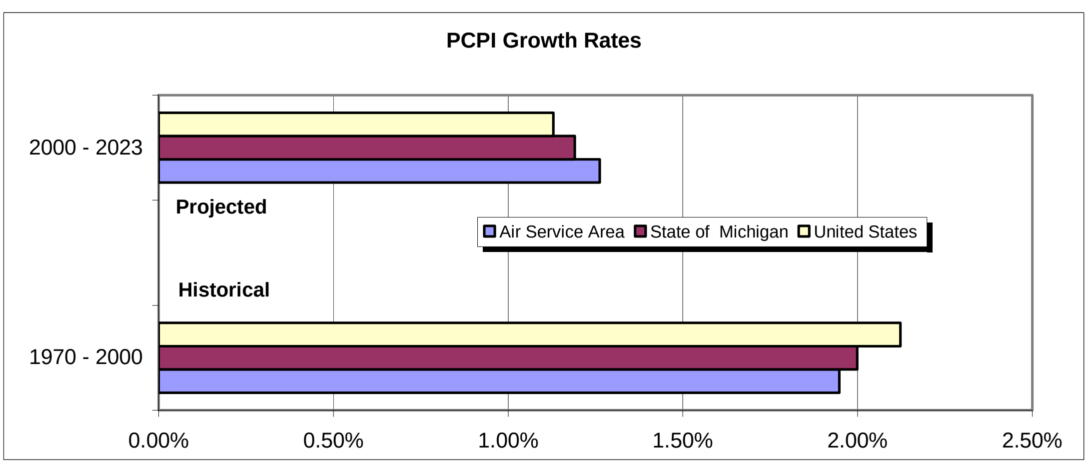
[4] FAA Aerospace Forecasts, Fiscal Years 2003 – 2014, Table 2.

Table 2-9

HISTORICAL AND PROJECTED DEMOGRAPHIC GROWTH RATES







Source: Woods & Poole

Compiled by Reynolds, Smith and Hills, Inc.

The following summarizes information depicted in Table 2-9:

- Population growth rates for the ASA have been higher than the State of Michigan but less than the United States from 1970 through 2000. Population growth rates in the ASA are projected to parallel the anticipated growth rates for population in the State of Michigan but lower than the increase projected for the United States over the next 20 years.
- Historical and projected growth rates in employment for the ASA have surpassed the State of Michigan but were slightly lower than the United States.
- Historical and projected per capita personal income (PCPI) for all three areas was similar.

The local socioeconomic picture derived from examination of the historical trends and forecasts presented in Table 2-9 present positive outlooks for the ASA. It is expected that population and the economy will continue to grow at a moderate rate as experienced over the last 30 years.

2.2.4 Northwest Airlines Hub in Detroit

The Northwest Airlines hub in Detroit is identified as a source of passenger diversion for the Airport. Passenger preference for non-stop service, combined with perceived higher air fares to fly from Capital City Airport encourage some passengers to drive to Detroit, despite the added expense at Detroit (higher automobile parking rates) and the convenience of the Capital City Airport.

As noted in an earlier section, the disadvantage of air service from a spoke city is the necessity to make a connection. Experienced travelers recognize the problems of using hubs for connections and passengers from the ASA began to drive to Detroit Metropolitan, rather than board a flight at Capital City Airport and connect through the hub in Detroit. In 2000, this diversion began to occur more frequently, contributing to the decrease in enplanements at the Airport.

The Capital Region Airport Authority has documented the passenger diversion from its natural market area to Detroit. Contributing factors include:

- fare differences to connect through a hub versus originating at the hub
- prop versus jet preferences
- loss of competitive hub services by American
- new terminal completion by Northwest Airlines at Detroit Metropolitan

The apparent weakening of the local passenger market as evidenced by the declines following 2000 is not necessarily attributable to the market strength, but to a continuation of other factors related to industry issues. The current airport management team has recognized these passenger diversion issues and is taking active measures to mitigate the situation.

2.2.5 Air Fares

Airfare levels have an important effect on the demand for airline service nationally and at the Airport. Airfares are influenced by airline operational costs such as fuel and aircraft maintenance and industry competition. Overall, aviation fuel has decreased in price since 1980. A slight increase in fuel prices was recorded in the early 1990s as a result of the Persian Gulf War. Aviation fuel prices increased during 1996 and 1997, but stabilized in 1998 before beginning to increase through 2002. Aviation fuel prices are projected to stabilize in 2003 with moderate increases in the range of 3.5 percent to 5.0 percent[5]. Jet fuel prices will add to the long-term stability of airfares nationally and help establish renewed growth of the aviation activity at the Airport. Other costs impacting airfares, such as labor costs, are forecast to increase nominally during the forecast period.

2.2.6 Airline Competition

Competitive factors have a significant influence on airline fares. On routes that are more competitive or in a city with a competitive environment such as one to two major air carriers and a low-fare carrier similar to Southwest, airfares are significantly lower. The staff at the Airport has recognized this fact and has been successful in recruiting service from a low fare carrier. Changes in competitive forces such as airline bankruptcies, mergers, and acquisitions could significantly influence, positively or negatively, airline traffic at the Airport.

2.2.7 Summary

The variables discussed in this portion of the master plan will play an important role in the future demand for aviation activity at the Airport. The ASA has experienced steady population and employment growth since 1970 to the present and are projected to continue to grow through the forecast period.

[5] FAA Aerospace Forecasts, Fiscal Years 2003 – 2014.

2.3 Forecast of Annual Enplaned Passengers

The forecast of enplaned passengers is the foundation upon which other commercial service activity forecasts are developed. The enplaned passenger forecasts are also the basis for determination of the future facilities needed to accommodate projected passenger demands. The preparation of the preferred projection of this element of aviation demand employs a variety of analytical methods including:

- Historical trend line analyses, including time series analyses and historical growth
- Regression analyses, which examine various socioeconomic indicators to determine if strong relationships exist between the indicators and elements of aviation activity
- Market share analyses which compare the performance of the local market to a larger regional or national market

Each of these analytical techniques was employed in the preparation of enplanement projections for the Airport.

2.3.1 Trend Analysis Projections

Trend line analyses are one of the simplest and most familiar forecasting techniques. This technique provides projections of the aviation demand element by extrapolating long-term historical data trends into the future. A fundamental assumption of this technique is the historical stimuli for aviation demand will continue to exert a similar influence on future demand levels. As broad as this assumption may be, this projection technique serves as a benchmark against which the results of other projection methods may be compared. Two different types of trend analyses were performed:

- Ratio and Growth Rate Projections
- Time Series Analysis

2.3.1.1 Ratio and Growth Rate Projections

Five enplanement scenarios were developed using ratio and growth rate projections. Ratio and growth rate projections rely on historical trends and the forecaster's judgment to develop possible future activity levels. Each projection is typically associated with a scenario rooted in the past. For example, one scenario might be that the historical ratio of enplanement per capita will continue to grow at historical rates.

In two scenarios, historic annual ratios of air passengers to regional population totals were calculated to determine annual enplanements per capita factors. Three scenarios were developed using varying assumptions regarding future average annual enplanement growth rates.

As indicated on **Table 2-10**, enplanements per capita ratios in the Lansing area were 0.31 in 1970 and increased to 0.74 in 2000 prior to decreasing in subsequent years. Two scenarios were prepared to project future enplanements at the Airport based on this trend technique.

In the first scenario it is assumed that the enplanements per capita ratio would remain constant throughout the planning horizon at the level experienced at the Airport in 2000, as depicted in

Table 2-10. In the second scenario, the enplanement per capita ratio was assumed to grow at the same rate experienced from 1970 through 2000. These ratios were applied to forecasts of regional population for the Lansing ASA. The enplanement projections developed using enplanement per capita factors are presented in Table 2-10.

Table 2-10
ENPLANEMENT PROJECTIONS USING PER CAPITA TRENDS

				Per Capita Trend Scenarios			
				Scenario A		Scenario B	
Year	Eps	Population	EP/Capita	EP/Capita	Eps	EP/Capita	Eps
Historical							
1970	117,642	379,200	0.31				
1975	160,519	399,800	0.40				
1980	186,877	420,300	0.44				
1985	172,966	415,600	0.42				
1990	268,354	433,400	0.62				
1995	314,540	443,400	0.71				
2000	331,363	448,200	0.74				
2001	265,199	449,800	0.59				
2002	260,190	452,600	0.57				
2003	271,161	455,100	0.60				
Projected							
2008		468,300		0.74	346,200	0.85	400,100
2013		482,400		0.74	356,600	0.99	476,400
2023		514,000		0.74	380,000	1.14	587,200
Average Annual Growth							
1970 - 2000					2.6%		2.6%
2003 - 2013					2.8%		5.8%
2003 - 2023					1.7%		3.9%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

Three scenarios of average annual growth rate assumptions were used to develop the enplanement projections presented in **Table 2-11.** The average annual growth rate in enplanements at the Airport averaged 1.0 percent per year between calendar year 1995 and 2000. In the first scenario using this trend analysis technique, it was assumed this rate of growth would continue through the planning period. The second scenario reflects an assumption that future growth will parallel the historical growth rate of 2.6 percent experienced over the last 25 years. In the third scenario, an average annual growth rate of 3.5 percent was assumed. This growth rate mirrors the growth rate experienced at the Airport from 1970 through 2000.

Table 2-11
ENPLANEMENT PROJECTIONS USING AVERAGE ANNUAL GROWTH RATES

			Average Annual Growth Rates		
Year	**Enplanements**	**Percentage Change**	**1.0%**	**2.6%**	**3.5%**
Historical					
1970	117,642				
1975	160,519	6.4%			
1980	186,877	3.1%			
1985	172,966	-1.5%			
1990	268,354	9.2%			
1995	314,540	3.2%			
2000	331,363	1.0%			
2001	265,199	-20.0%			
2002	260,190	-1.9%			
2003	271,161	4.2%			
Projected					
2008			285,700	307,700	322,200
2013			301,000	349,200	382,900
2023			334,100	449,800	540,800

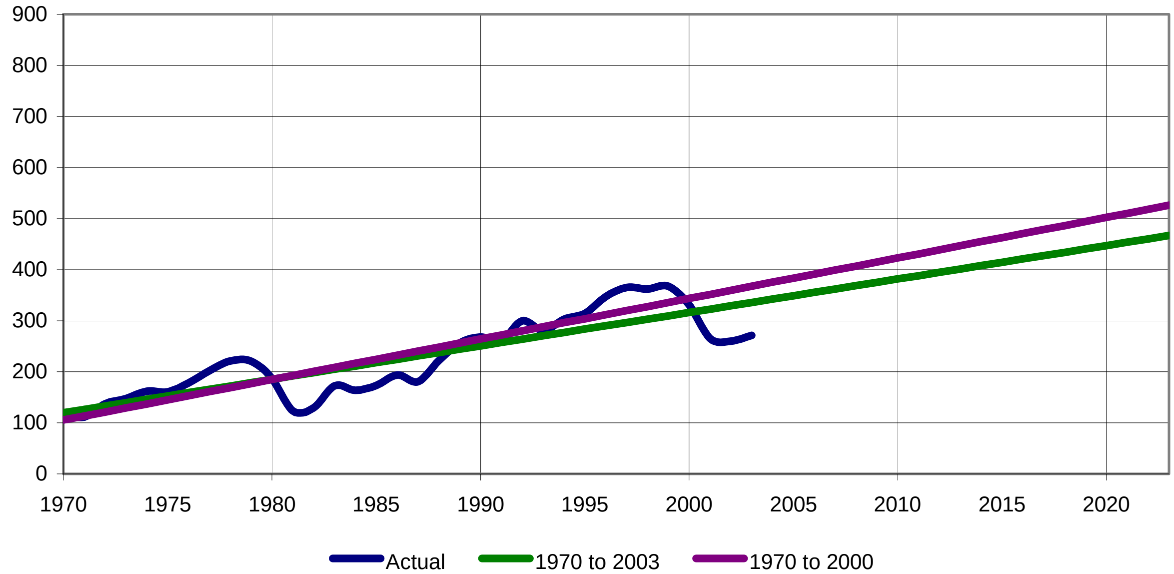
Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.3.1.2 Time Series Analysis

Two time series analyses were performed on the historical enplanements to project future enplanements. The first examines annual enplanements from 1970 to 2003. The second examines 1970 to 2000, thus excluding the profound decline in passenger enplanements at the Airport attributable to the combined impact of the economic recession, airline industry economic crisis, and terrorist acts of September 11, 2001.

As shown in **Table 2-12**, the 1970 to 2003 analysis results in a slightly lower trend line, reflective of the recent negative conditions. The 1970 to 2000 analysis produces higher projections, approximately 526,100 enplanements in 2003, representing an average annual growth rate of 3.6 percent from the enplanement level in 2003.

Table 2-12
TREND LINE ANALYSIS



Year	Actual	Trendlines 1970 to 2003	Trendlines 1970 to 2000
Historical			
1970	117,642		
1975	160,519		
1980	186,877		
1985	172,966		
1990	268,354		
1995	314,540		
2000	331,363		
2001	265,199		
2002	260,190		
2003	271,161		
Projected			
2008		370,000	407,100
2013		403,000	446,800
2023		469,000	526,100
Average Annual Growth			
2003 - 2008		6.4%	8.5%
2003 - 2013		4.0%	5.1%
2003 - 2023		2.8%	3.4%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.3.2 Econometric and Socioeconomic Regression Analysis

Several local socioeconomic indicators were reviewed and tested to determine if a statistically significant relationship exists between historical enplanements at Capital City Airport and the selected indicators for the ASA. The indicators reviewed in this analysis included: population, employment, per capita personal income (PCPI), and airline yields. Two different scenarios were examined for the US carriers' domestic yield. Scenario 1 assumed that the airlines' yield would continue to decline based on an extension of the FAA's yield projections. Scenario 2 assumed that the airlines' yield would increase from the recession lowered 2002 level to the pre-recession 2000 level and decline thereafter to 7.5 cents per mile. Historical data and projections of these socioeconomic indicators were taken from the Woods and Poole *2003 MSA Profile*.

The statistical significance of projections produced by a regression analysis is assessed using the coefficient of determination, or R^2 value. The R^2 value is the square of the correlation coefficient and measures the contribution of the independent variables in the prediction of the dependent variable. The R^2 value will range between 0.00 and 1.00 with 1.00 indicating a perfect correlation between the independent and dependent variables. R^2 values of less than 0.70 generally indicate there is little correlation between the two variables.

Table 2-13 presents the results of this projection technique for predicting future enplanements at the Airport. The three socioeconomic independent variables and two yield scenarios were examined using a single independent variable regression analysis. In addition, a multiple regression analysis was performed combining the PCPI and Scenario 2 yield independent variables.

As shown, the R^2 value for all seven regression ranges between 0.77 to 0.86, which indicates a statistical correlation between the independent and dependent variables.

Table 2-13
REGRESSION ANALYSIS PROJECTION SUMMARY

	Independent Variables					
Year	**Population**	**Employment**	**PCPI**	**Scenario 1 Domestic Yield**	**Scenario 2 Domestic Yield**	**PCPI and Scenario 2 Domestic Yield**
	Projected Enplanements (Dependent Variable)					
2008	387,200	395,400	435,100	361,600	326,000	415,400
2013	435,800	430,700	478,900	375,000	329,500	451,300
2023	545,400	507,300	571,600	399,500	336,400	527,300
R^2 Values	0.791	0.857	0.818	0.769	0.769	0.821

Source: Reynolds, Smith and Hills, Inc.

2.3.3 Market Share Analysis

The historical market share for the Airport was calculated by dividing each year's enplanements at the Airport by total domestic U.S. commercial enplanements for the corresponding year. The resulting historical market share percentages were reviewed and a projection of future market share percentages was applied to the FAA's forecast of total U.S. enplanements.

Table 2-14 presents the historical market share of commercial service enplanements at the Airport as well as two different scenarios to project future enplanements. The first scenario assumes that the future market share of enplanements at the Airport will equal the average market share (0.058 percent) experienced at the Airport from 1994 through 2001 and remain constant throughout the planning period. The second scenario assumed the 2008 market share of enplanements would increase to the level experienced in 1999, increase in the next five years by the growth experienced from 1994 through 1999 and remain at that level through 2023.

Table 2-14
MARKET SHARE METHODOLOGY

	Airport		United States		Market Share Scenarios			
Year	Enplanements	Annual Growth	Enplanements	Annual Growth	Constant	Eps	Increasing	Eps
Historical								
1994	299,006		511,300,000		0.058%			
1995	316,948	6.0%	531,100,000	3.9%	0.060%			
1996	343,893	8.5%	558,100,000	5.1%	0.062%			
1997	362,017	5.3%	577,800,000	3.5%	0.063%			
1998	359,829	-0.6%	590,400,000	2.2%	0.061%			
1999	370,706	3.0%	610,900,000	3.5%	0.061%			
2000	339,912	-8.3%	639,800,000	4.7%	0.053%			
2001	295,340	-13.1%	626,700,000	-2.0%	0.047%			
Projected								
2008			758,000,000		0.058%	439,900	0.061%	462,400
2013			914,600,000		0.058%	530,800	0.063%	578,900
2023			1,331,542,951		0.058%	772,800	0.063%	842,800
Average Annual Growth								
1994 - 2001		-0.2%						
2001 - 2013				3.2%		1.8%		5.8%
2001 - 2023				3.5%		1.0%		4.9%

Source: TAF and *FAA Aerospace Forecasts, Fiscal Years 2003 - 2014, Table 11.* (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.3.4 Selection of a Preferred Annual Enplanement Forecast and Forecast Range

The projections of future enplanements developed through use of the various analytical methods are illustrated in the chart contained in **Table 2-15**.

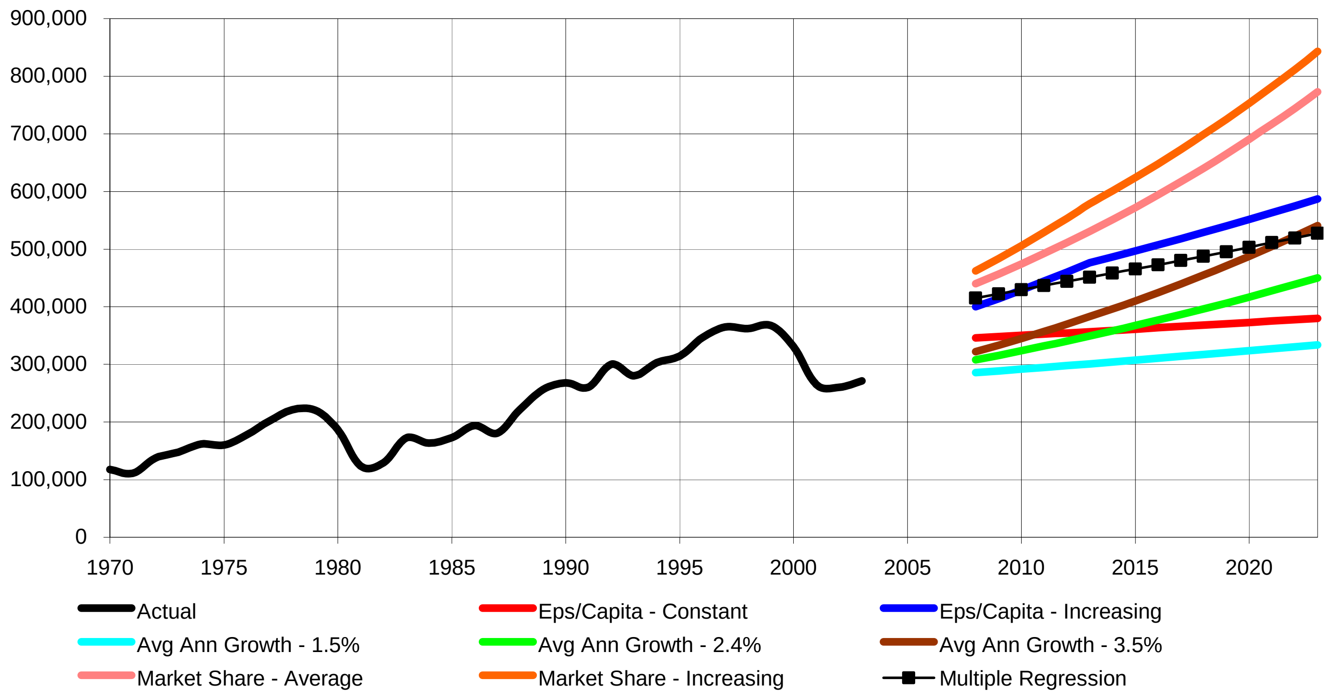
For the purposes of this study, the multiple regression analysis performed using PCPI and Scenario 2 yield (airline yield increases to the pre-recession 2000 level and decreases thereafter) forecast was chosen as the preferred enplanement forecast for the Airport. The enplanement forecast predicts an 8.9 percent growth rate for the initial five-year period of 2003 to 2008, with moderate growth of approximately 1.7 percent thereafter. Overall enplanement growth is projected to increase by 3.4 percent from 2003 to 2023 using this methodology. This higher than average growth rate was selected for the following reasons:

- As previously shown in Table 2-5, enplanements grew at an average annual rate of 11.5 percent from 1987 through 1992. This phenomenal growth over these six years was followed by another period of strong growth from 1993 to 1997 during which time enplanements grew by a robust 6.5 percent each year. Therefore, it was judged that the Airport can support periods of high growth.
- The forecast growth is very consistent with the likely types of services that may be added to the Airport in the short-term. The higher growth rate during the short-term horizon anticipates continued success by Airport management in attracting an additional carrier to the facility during this period. If this happens, it is anticipated that possibly four additional daily flights could be added to the schedule. For example, four daily flights with a 50 seat aircraft and a load factor of 50 percent could add 36,000 annual enplanements to the total.
- The enplanement forecast is consistent with the Capital Region Airport Authority's ***Strategic Planning Report Capital City Airport***. Among other items, this study set the goals and objectives for Airport management to increase scheduled passenger air service as well as charter services. Therefore it was judged that the Airport Authority's commitment to growth merits an upward forecast trend.
- The selected forecast of enplanements is consistent with the long-term historical growth (1970 – 2003) experienced at the Airport and the strong marketing for additional air service demonstrated by the Capital Regional Airport Authority.

The preferred enplanement forecast developed in this section projected 527,300 total enplanements in 2023. This figure was based on knowledge of aviation trends and understanding of the factors that affect those trends. However, developing forecasts is an art rather than a science. The accuracy of the forecasts depends greatly upon how well future trends are predicted and how these trends impact traffic at the Airport.

In order to provide guidance in how year-to-year events may cause actual future enplanements to vary above or below the preferred forecast trend line, a forecast range analysis was undertaken.

Table 2-15
COMPARISION OF ENPLANMENT PROJECTIONS



		EPs/Capita		Average Annual Growth			Multi	Market Share		Preferred
Year	**Actual**	**Constant**	**Increase**	**1.0%**	**2.6%**	**3.5%**	**Regrsn**	**Constant**	**Increase**	**Methodology**
1970	117,642									
1975	160,519									
1980	186,877									
1985	172,966									
1990	268,354									
1995	314,540									
2000	331,363									
2001	265,199									
2002	260,190									
2003	271,161									
Projected										
2008		346,200	400,100	285,700	307,700	322,200	415,400	439,900	462,400	415,400
2013		356,600	476,400	301,000	349,200	382,900	451,300	530,800	578,900	451,300
2023		380,000	587,200	334,100	449,800	540,800	527,300	772,800	842,800	527,300
Average Annual Growth										
1991 - 2003	2.6%									
1991 - 2000	3.5%									
2003 - 2008		5.0%	8.1%	1.1%	2.6%	3.5%	8.9%	10.2%	11.3%	8.9%
2003 - 2023		1.7%	3.9%	1.0%	2.6%	3.5%	3.4%	5.4%	5.8%	3.4%

Source: Reynolds, Smith and Hills, Inc.

A consideration in establishing forecast ranges is how widely historical enplanements have fluctuated from year to year. As previously discussed, the Airport has had very wide fluctuations in historical enplanements over relatively short periods. The average historical fluctuation from the 1970 to 2003 trend line is approximately 15.0 percent, a very wide range. It is likely that such wide fluctuations will occur into the future.

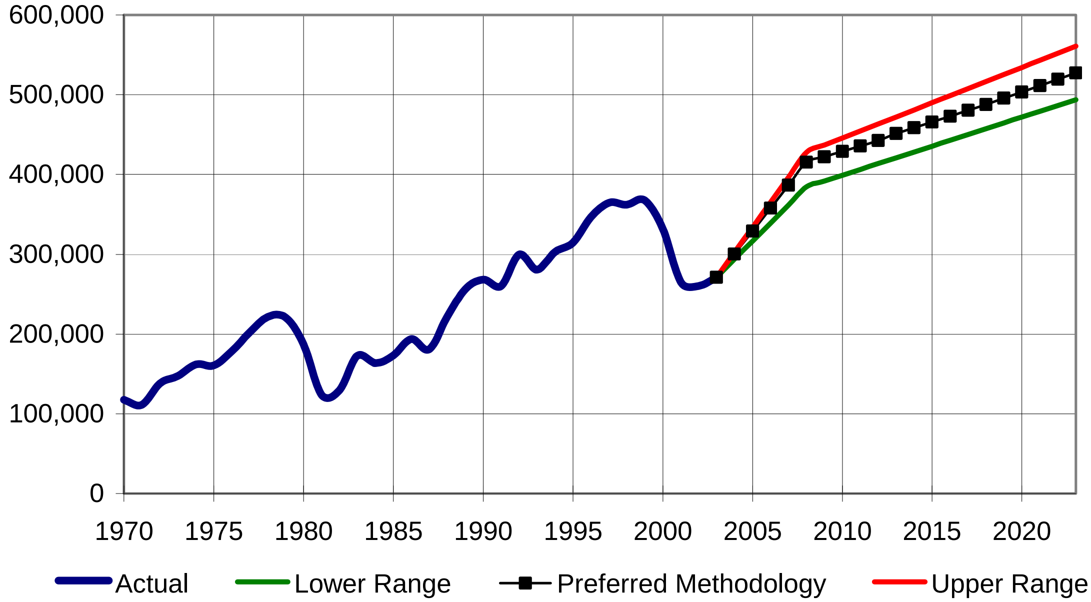
While it may be statistically safe to establish a very wide forecast range similar to the 15.0 percent plus or 15.0 percent minus observed historically, such an extremely wide forecast range is not useful for facility planning. Therefore, forecast ranges were established for the Airport that were judged to represent an appropriate compromise between the need for forecast accuracy and forecast consistency. The 2023 range of roughly 6.3 percent plus or minus is reflective of the variance associated with the 1970 to 2000 and 1970 to 2003 trend line analysis.

The absolute enplanement count variation of about 30,000 to 35,000 annual enplanements is generally reflective of the impact of new service by a single carrier (three to four new daily flights on 50-seat aircraft with a 50 percent load factor) above and beyond the normal growth assumed in the preferred forecast. Therefore, in the long run (after the recovery from the current slump), the forecast range is generally reflective of service by an additional carrier.

As shown in **Table 2-16**, the enplanements in 2023 could range as high as 560,800 or as low as 493,800. The lower range projects enplanements to grow from 2003 at a 3.0 percent growth rate. The higher level assumes a higher, but attainable growth rate of 3.7 percent from 2003 to 2023.

The selected enplanement forecast will result in a doubling of the enplaned passengers over the 20-year period beginning in 2003. The preferred forecast will be used in subsequent sections of this chapter to derive other measures of future aviation activity.

Table 2-16
RANGE OF ENPLANEMENT PROJECTIONS



Year	Actual	Lower Range	Preferred Methodology	Upper Range
Historical				
2000	331,363			
2001	265,199			
2002	260,190			
2003	271,161			
Projected				
2008		384,466	415,400	427,862
2013		420,900	451,300	472,200
2023		493,800	527,300	560,800
Average Annual Growth				
2003 - 2008		7.2%	8.9%	9.6%
2003 - 2023		4.5%	5.2%	5.7%
2003 - 2023		3.0%	3.4%	3.7%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.4 Forecasts of Annual Aircraft Operations

Forecasts of annual aircraft operations were prepared for four separate elements of aviation activity. The three elements include commercial service (air carrier and commuter) operations, general aviation operations, and military operations.

2.4.1 Annual Commercial Service Operations Forecast

Air carrier and commuter enplanement splits were prepared using historical activity. The percentage of air carrier enplanements has decreased since 1991. In 1991, 70.9 percent of all enplanements were classified as air carrier enplanements whereas by 2001 air carrier enplanements declined to 58.9 percent of the total, as shown in **Table 2-17**. This decrease of air carrier enplanements and resulting increase of commuter enplanements is not atypical of similar size airports served by one major airline and numerous commuter airlines feeding enplanements to their hub airports.

It is anticipated that total air carrier enplanements for 2008 will reflect the average market share experienced at the Airport between 1991 and 2001 and decrease slightly each year thereafter, following nation wide trends of increased emphasis on regional aircraft (including regional jet aircraft).

Table 2-17

**PREFERRED ENPLANEMENT FORECAST -
AIR CARRIER AND COMMUTER**

Year	Total Enplanements	Air Carrier	Percent of Total	Commuter	Percent of Total
Historical					
1991	255,624	181,292	70.9%	74,332	29.1%
1992	304,461	200,139	65.7%	104,322	34.3%
1993	282,704	157,501	55.7%	125,203	44.3%
1994	299,006	145,523	48.7%	153,483	51.3%
1995	316,947	158,513	50.0%	158,434	50.0%
1996	343,893	155,779	45.3%	188,114	54.7%
1997	362,017	171,903	47.5%	190,114	52.5%
1998	359,829	151,786	42.2%	208,043	57.8%
1999	370,706	156,347	42.2%	214,359	57.8%
2000	339,912	155,923	45.9%	183,989	54.1%
2001	295,339	173,830	58.9%	121,509	41.1%
Projected					
2008	415,400	216,400	52.1%	199,000	47.9%
2013	451,300	225,700	50.0%	225,600	50.0%
2023	527,300	253,100	48.0%	274,200	52.0%

Source: Terminal Area Forecast (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

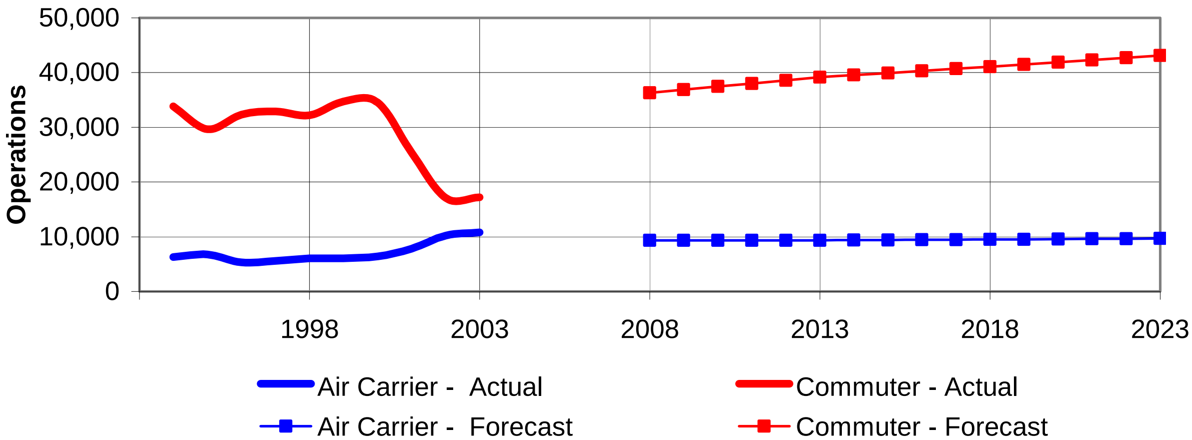
The forecast of operations performed by commercial service aircraft is a function of the number of seats on the aircraft used to serve the Airport and the percentage of seats occupied in those aircraft. Historical enplanement per departure ratios for the years 1994 through 2001 is presented in **Table 2-18** for air carrier and commuter operations. For the purposes of this analysis, total operations for UPS were deducted from the total number of air carrier operations in order to more accurately estimate the number of enplanements reflected in passenger airline, air carrier operations[6]. Future UPS operations were estimated based on historical trends, future cargo tonnage, and added back into the total air carrier operations forecast.

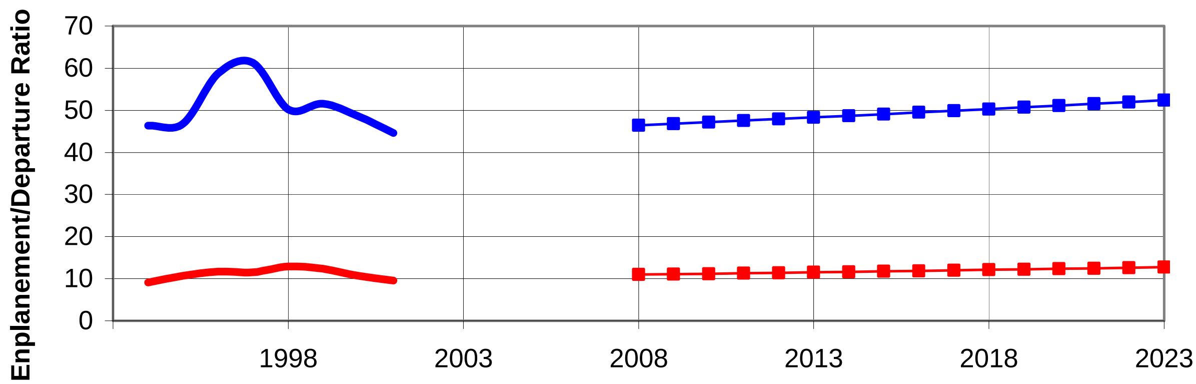
As indicated on Table 2-18, the air carrier and commuter enplanements per departure were projected for each year of the planning period in order to forecast total operations at the Airport. The ratio for air carrier enplanements per departure ratio climbs at a slow but steady pace throughout the planning period based on the average annual growth from 1994 though 2000 (0.8 percent each year). The historical growth for the commuter carriers increased by 2.7 percent each year over the same period. It was estimated that this rate of growth would continue through 2008 but decrease to 1.0 percent each year thereafter based on growth in average seats per departure for regional aircraft projected by the FAA from 2008 through 2014. This climb reflects growing load factors as well as slight growth in the average size of aircraft in the regional airline fleet as larger regional jets replace turboprop aircraft.

As shown in Figure 2-18, total commercial service operations are projected to increase from 35,000 in 2001 to 51,700 in 2023, representing an average annual growth rate of 1.8 percent.

[6] The same analysis was performed for commuter carriers based on the annual operations of Superior Aviation. This did not have a material effect on the enplanements per departure for commuter carriers so these figures were not adjusted.

Table 2-18
FORECAST OF COMMERCIAL SERVICE OPERATIONS





	Enplanements/Departure		Enplanements			Operations		
Year	**Air Carrier**	**Commuter**	**Total**	**Air Carrier**	**Commuter**	**Air Carrier (1)**	**Commuter**	**Total**
Historical								
1994	46.3	9.1	299,006	145,523	153,483	6,281	33,821	40,102
1995	46.8	10.7	316,947	158,513	158,434	6,780	29,630	36,410
1996	58.8	11.6	343,893	155,779	188,114	5,301	32,302	37,603
1997	61.3	11.6	362,017	171,903	190,114	5,613	32,896	38,509
1998	50.2	12.9	359,829	151,786	208,043	6,047	32,204	38,251
1999	51.5	12.3	370,706	156,347	214,359	6,067	34,732	40,799
2000	48.6	10.7	339,912	155,923	183,989	6,412	34,514	40,926
2001	44.6	9.6	295,339	173,830	121,509	7,800	25,356	33,156
Projected								
2008	46.4	11.0	415,400	216,400	199,000	9,300	36,300	45,600
2013	48.3	11.5	451,300	225,700	225,600	9,300	39,200	48,500
2023	52.4	12.7	527,300	253,100	274,200	9,700	43,100	52,800

Source: Terminal Area Forecast (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.4.2 Annual General Aviation Operations Forecast

Except for several years of growth in the early 1980s, general aviation (GA) operations at the Airport have generally declined since 1976. As shown in **Table 2-19**, total GA operations have decreased from approximately 150,000 in 1976 to 60,000 in 2003, similar to nationwide trends in GA operations.

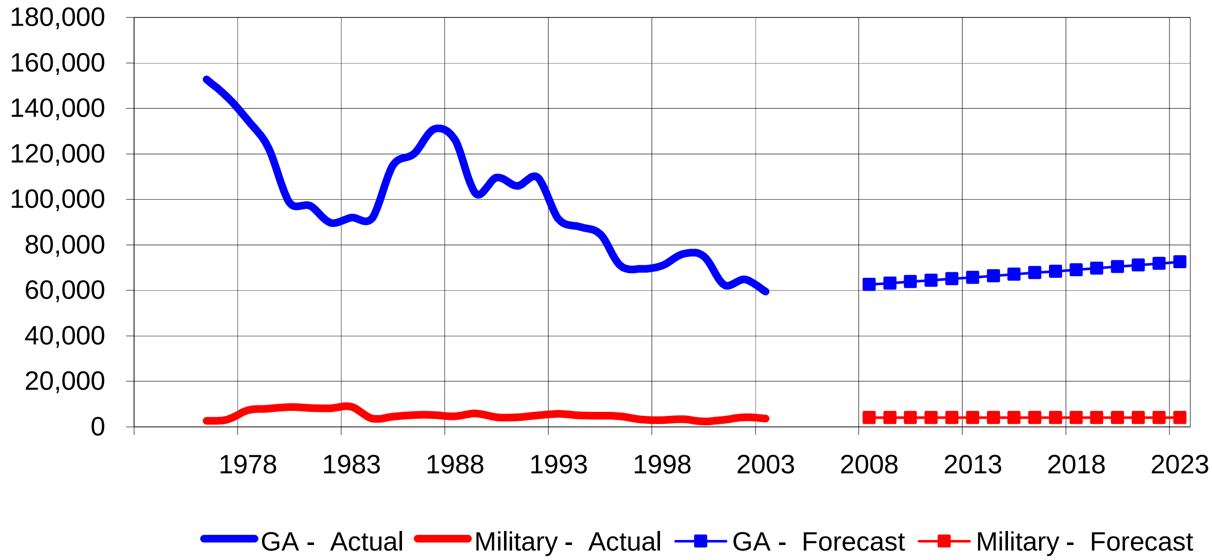
Future general aviation operations at the Airport are projected to grow at a moderate rate similar to the average annual growth rate projected by the FAA nationwide for GA operations at airports with an air traffic control tower. GA operations are projected to increase by 1.0 percent annually from the 2003 level of 60,000 to 72,580 in 2023.

2.4.3 Annual Military Operations Forecast

Annual activity by military aircraft is a function of Department of Defense policy, military appropriations, and the mission assigned to a particular flying unit. As such, projections of future operations by military aircraft are not reliably predictable through use of socioeconomic indicators or trend analyses.

Military aircraft operations at Capital City Airport have ranged between 2,397 and 8,264 since 1976. The average number of operations over the last ten years has been 4,000. For the purposes of this forecast effort, military activity is projected to maintain an annual level of 4,000 operations, as indicated on Table 2-19.

Table 2-19
FORECAST OF GENERAL AVIATION AND MILITARY OPERATIONS



Year	General Aviation	Military
Historical		
1976	152,753	2,637
1981	97,284	8,264
1986	119,972	5,166
1991	105,959	4,191
1992	109,641	5,032
1993	91,300	5,717
1994	88,029	5,093
1995	84,720	4,898
1996	70,782	4,597
1997	69,398	3,243
1998	70,895	2,976
1999	75,975	3,381
2000	75,123	2,397
2001	62,429	3,026
2002	64,815	4,262
2003	59,482	3,579
Projected		
2008	62,500	4,000
2013	65,700	4,000
2023	72,600	4,000

Source: Terminal Area Forecast (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.4.4 Itinerant and Local Operations

Aircraft operations are classified in this chapter as commercial service, general aviation, or military operations. General aviation and military operations can be further segregated into two additional categories -- local or itinerant. Aircraft operating in the traffic pattern or within sight of the tower, aircraft known to be departing to or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport are classified by the FAA air traffic controllers as local operations. Itinerant operations are all other aircraft operations and represent takeoffs and landings from one airport to another. All commercial service operations are itinerant operations.

Local and itinerant general aviation operations are shown in **Table 2-20.** Itinerant operations reached a peak in 2000 representing 58.7 percent of total general aviation operations. Local operations have not exceeded itinerant operations since 1995 representing 54.4 percent of total general aviation operations.

Forecasts for local and itinerant general aviation operations were based on a review of the historical percent of total experienced at the Airport from 1993 through 2003. The average percentage from 1997 to 2001 was determined to be most representative of the future mix of total GA operations at the Airport over the planning period. The ratio of itinerant operations averaged 58.0 percent during that time period and was held constant over the planning horizon.

Table 2-20
GENERAL AVIATION OPERATIONS - LOCAL AND ITINERANT

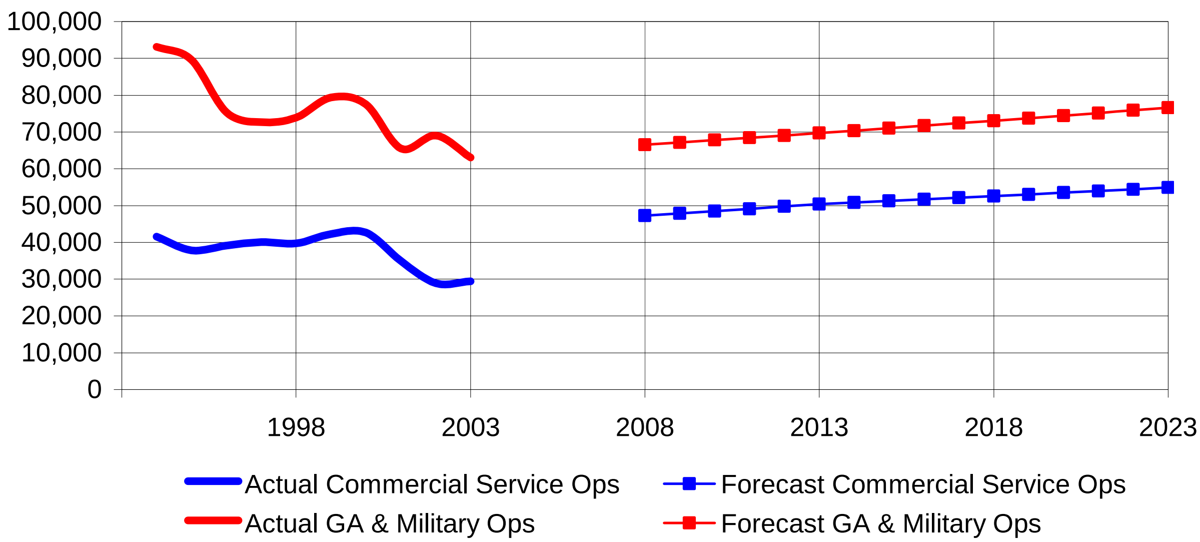
		Itinerant		Local	
Year	**Total Operations**	**Operations**	**Percent of Total**	**Operations**	**Percent of Total**
Historical					
1993	91,300	36,834	40.3%	54,466	59.7%
1994	88,029	38,211	43.4%	49,818	56.6%
1995	84,720	38,664	45.6%	46,056	54.4%
1996	70,782	41,043	58.0%	29,739	42.0%
1997	69,398	38,651	55.7%	30,747	44.3%
1998	70,895	41,381	58.4%	29,514	41.6%
1999	75,975	42,235	55.6%	33,740	44.4%
2000	75,123	44,106	58.7%	31,017	41.3%
2001	62,429	36,579	58.6%	25,850	41.4%
2002	64,815	36,585	56.4%	28,230	43.6%
2003 (E)	59,482	31,727	53.3%	27,755	46.7%
Projected					
2008	62,500	36,300	58.0%	26,200	42.0%
2013	65,700	38,100	58.0%	27,600	42.0%
2023	72,600	42,100	58.0%	30,500	42.0%

Source: Terminal Area Forecast (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.4.5 Summary of Total Operations

Table 2-21 presents the forecast of total operations at the Airport for the combined elements of commercial service operations, general aviation operations, and military operations.

Table 2-21
FORECAST OF TOTAL OPERATIONS



	Commercial Service Operations							
	Air Carrier					General		
Year	**Passenger**	**Cargo**	**Total**	**Commuter**	**Total**	**Aviation**	**Military**	**Total**
Historical								
1994	6,281	1,416	7,697	33,821	41,518	88,029	5,093	134,640
1995	6,780	1,368	8,148	29,630	37,778	84,720	4,898	127,396
1996	5,301	1,550	6,851	32,302	39,153	70,782	4,597	114,532
1997	5,613	1,520	7,133	32,896	40,029	69,398	3,243	112,670
1998	6,047	1,444	7,491	32,204	39,695	70,895	2,976	113,566
1999	6,067	1,444	7,511	34,732	42,243	75,975	3,381	121,599
2000	6,412	1,782	8,194	34,514	42,708	75,123	2,397	120,228
2001	7,800	1,792	9,592	25,356	34,948	62,429	3,026	100,403
2002	10,232	1,508	11,740	17,117	28,857	64,815	4,262	97,934
2003 (E)	10,784	1,358	12,142	17,218	29,360	59,482	3,579	92,421
Projected								
2008	9,300	1,600	10,900	36,300	47,200	62,500	4,000	113,700
2013	9,300	1,900	11,200	39,200	50,400	65,700	4,000	120,100
2023	9,700	2,100	11,800	43,100	54,900	72,600	4,000	131,500

Source: Terminal Area Forecast (Historical)
Compiled by Reynolds, Smith and Hills, Inc.

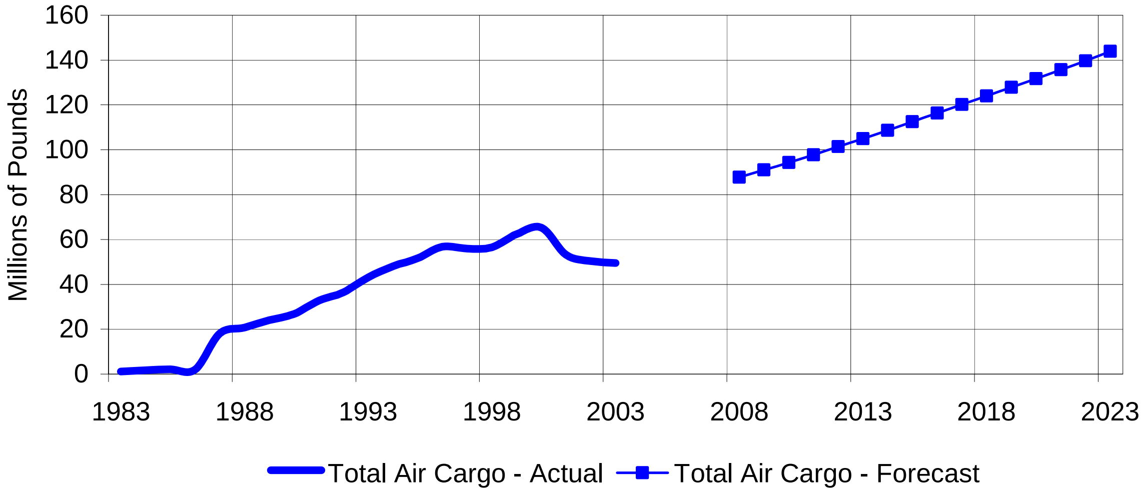
2.5 Forecast of Enplaned Cargo

The Airport has experienced a dramatic increase in air cargo since 1987 due to the initiation of service by UPS. As previously mentioned, UPS handles nearly all of the air cargo into and out of the Airport.

UPS's operation at Capital City Airport is part of the company's integrated land/air service for the greater Lansing area and includes truck and air feeds from the entire state of Michigan. Cargo activity at the Airport will continue to be dependent on the demographic characteristics and economic health of the region and the state of Michigan. Air cargo activity will continue to increase as population and the economy increases. As a result, a number of regression analyses using population, employment, and PCPI were performed to determine which independent variables most closely reflected the growth of air cargo at the Airport. This investigation determined the population of the State was the most reliable historical predictor of the enplaned cargo at the Airport based on the statistical relationships between historical cargo volumes at Capital City Airport and state population.

The forecast of enplaned air cargo for the Airport is presented in **Table 2-22.**

Table 2-22
FORECAST OF CARGO TONNAGE



Year	State of Michigan Population	Enplaned Cargo	Deplaned Cargo	Total Cargo
Historical				
1987	9,127,789	9,059,462	9,005,844	18,065,306
1988	9,187,476	10,436,683	10,303,095	20,739,778
1989	9,218,012	11,683,185	12,286,972	23,970,157
1990	9,253,343	13,119,777	13,636,331	26,756,108
1991	9,311,319	16,150,253	16,589,553	32,739,806
1992	9,400,446	18,893,839	17,458,973	36,352,812
1993	9,479,065	22,170,967	20,867,000	43,037,967
1994	9,540,114	23,341,298	24,794,498	48,135,796
1995	9,597,737	24,403,658	27,195,613	51,599,271
1996	9,676,211	27,744,281	28,980,989	56,725,270
1997	9,758,645	26,910,455	29,034,682	55,945,137
1998	9,809,051	26,653,142	29,808,183	56,461,325
1999	9,847,942	30,477,532	31,995,537	62,473,069
2000	9,897,116	31,182,164	34,043,098	65,225,262
			R^2 Value	**0.82**
Projected				
2008	10,411,946	42,834,500	44,853,400	87,687,865
2013	10,718,726	51,279,000	53,695,900	104,974,904
2023	11,409,514	70,293,800	73,607,000	143,900,776
Annual Growth Rates				
1987 - 2000		10.0%	10.8%	10.4%
2000 - 2023		3.6%	3.4%	3.5%

Source: Capital Region Airport Authority (Historcial)
Reynolds, Smith and Hills, Inc. (Projected)

2.6 Based Aircraft

Based aircraft at an airport represents the total number of active aircraft permanently located or projected to be located at an airport during a specific period. Based aircraft categories include single-engine, multiengine, jet, rotorcraft, and other. The national general aviation industry has experienced declines in nearly all measures of activity since the early 1980s including new aircraft shipments, active fixed base operators (FBOs), hours flown, etc. The number of aircraft based at individual airports also dropped at many facilities, including Capital City Airport.

In the mid 1990s, according to the FAA records, 122 general aviation aircraft were based at the Airport. By 2003, the number had declined to 100. However, airport management reports that the based aircraft count has remained around 100 to 115 aircraft depending on the time of year the count is made. Some aircraft owners will temporarily base their aircraft at the Airport depending on the time of year and weather conditions.

The FAA forecast reflects little change in based aircraft for the next 12 years. Considering the anticipated closure of aircraft storage hangars in close proximity to the Airport and airport management efforts to recruit a full-service FBO, based aircraft were incrementally increased for the 2008 forecast and are anticipated to increase at the same growth rate the FAA is projecting industry-wide beyond 2008 (see **Table 2-23**).

Table 2-23
BASED AIRCRAFT

Year	Single Engine	Multi Engine	Jet	Rotorcraft	Other Experimental Misc craft	Total
Historical						
1994	69	48	1	4	0	122
1995	65	36	4	5	1	111
1996	65	36	4	5	1	111
1997	57	32	4	7	1	101
1998	57	32	4	7	1	101
1999	65	34	4	5	1	109
2000	65	34	4	5	1	109
2001	68	33	7	3	1	112
2002	68	33	7	3	1	112
2003	59	32	6	2	1	100
Projected						
2008	64	37	9	2	1	113
2013	64	39	11	2	1	117
2023	66	43	15	2	1	128
Average Annual Growth						
1994 - 2003	-1.6%	-0.3%	-1.7%	-4.4%	0.0%	-1.3%
2003 - 2013	0.9%	2.0%	6.1%	0.7%	0.0%	1.6%
2003 - 2013	0.6%	1.5%	4.8%	0.7%	0.0%	1.2%

Source: FAA TAF Based Aircraft Data and Capital Region Airport Authority. (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.7 Annual Instrument Approaches

An instrument approach, as defined by the FAA for towered airports, is an approach to an airport by an aircraft with an instrument flight plan where visibility is less than three miles or the ceiling is at or below the minimum initial approach altitude. Instrument approaches are used by the FAA to determine an airport's eligibility for enhanced instrument approach capability and additional navigational aids.

Historical and forecast instrument approach data for the Airport are presented in **Table 2-24**. Annual instrument approaches have decreased from 3,620 in 1993 to 2,837 in 2003, representing an average annual decrease of 2.4 percent during this period. The number of annual instrument approaches performed ranged from a high of 5,078 in 1995 to a low of 2,782 in 2002.

Instrument approaches are anticipated to increase at the same pro-rata share that each component of total operations is anticipated to increase over the planning period.

Table 2-24
INSTRUMENT APPROACHES

Year	Air Carriers	Commuter	General Aviation	Military	Total
Historical					
1993	592	1,824	1,148	56	3,620
1994	457	1,898	1,093	45	3,493
1995	700	2,635	1,655	88	5,078
1996	604	2,865	1,492	76	5,037
1997	691	2,795	1,429	49	4,964
1998	647	2,526	1,364	40	4,577
1999	438	2,059	1,017	36	3,550
2000	477	2,397	1,482	59	4,415
2001	596	1,427	1,053	61	3,137
2002	749	1,050	934	49	2,782
2003 (E)	789	1,054	911	83	2,837
Projected					
2008	780	2,590	1,040	60	4,470
2013	800	2,790	1,100	60	4,750
2023	840	3,070	1,210	60	5,180

Source: Air Traffic Control Tower records (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.8 Design Day/Design Hour Activity Forecasts

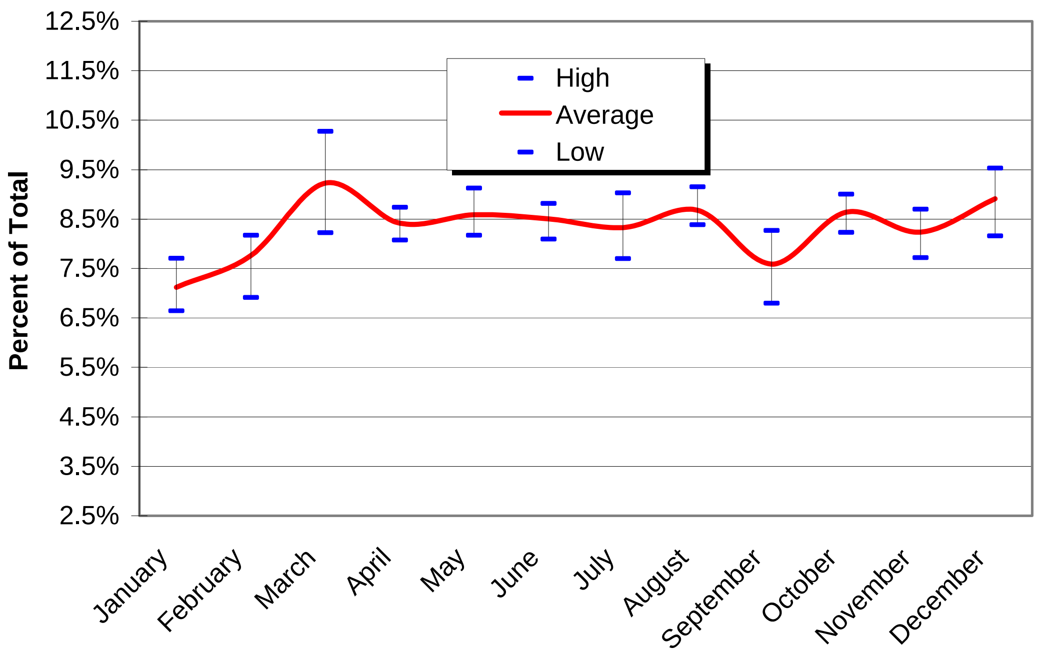
Capacity analyses and determination of future facility requirements of various elements of airport facilities are often based on design day or design hour activity levels. To avoid the construction and operational cost of acquiring capacity that would be rarely used, design day and design hour activity levels should not be the absolute busiest period at the airport. Rather the design day and design hour activity levels should be representative of busy periods but not the absolute peak periods. Often the design day is generally equivalent to the 85th percentile of activity for the design year. Facilities designed to accommodate this level of activity in the design year will provide a comfortable level of service for the large majority of the time. During unusually high activity periods such as the Wednesday before and the Sunday after Thanksgiving Day, airport facilities can be expected to experience more crowded conditions and longer, but not unreasonable or intolerable, processing times.

The design day level of activity is often calculated in airport planning efforts using a peak month/average day definition. **Table 2-25** through **Table 2-27** present high, low, and average monthly distributions of annual enplanements, annual total operations, and annual commercial service operations from 1993 to 2003 at the Airport[7]. As is common when evaluating such data at various airports, the calendar month that experienced the highest level of activity in a given year often varies. However, the annual activity in the peak month expressed as a percentage of annual activity is usually fairly constant from year to year. If annual activity were equally distributed among all 12 months in a year, monthly activity would be 8.3 percent.

[7] The year of 2001 was excluded from the analysis.

Table 2-25

MONTHLY DISTRIBUTION OF ANNUAL ENPLANEMENTS

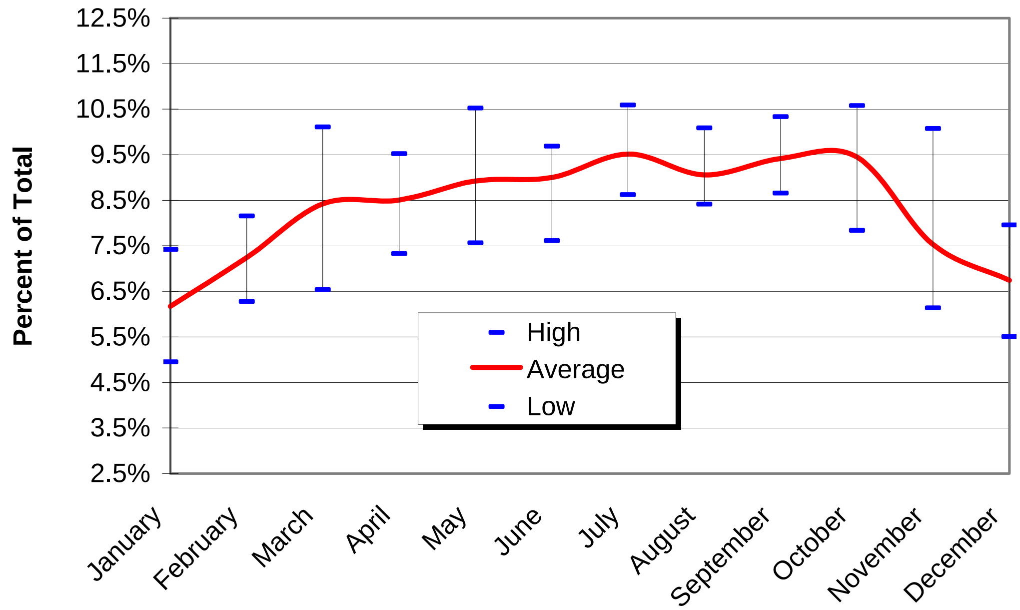


Monthly Enplanements

Month	Average	Max	Min
January	7.1%	7.7%	6.6%
February	7.8%	8.2%	6.9%
March	**9.2%**	**10.3%**	**8.2%**
April	8.4%	8.7%	8.1%
May	8.6%	9.1%	8.2%
June	8.5%	8.8%	8.1%
July	8.3%	9.0%	7.7%
August	8.7%	9.1%	8.4%
September	7.6%	8.3%	6.8%
October	8.6%	9.0%	8.2%
November	8.2%	8.7%	7.7%
December	8.9%	9.5%	8.2%

Source: Michigan Department of Transportation
Compiled by Reynolds, Smith and Hills, Inc.

Table 2-26
MONTHLY DISTRIBUTION OF TOTAL OPERATIONS

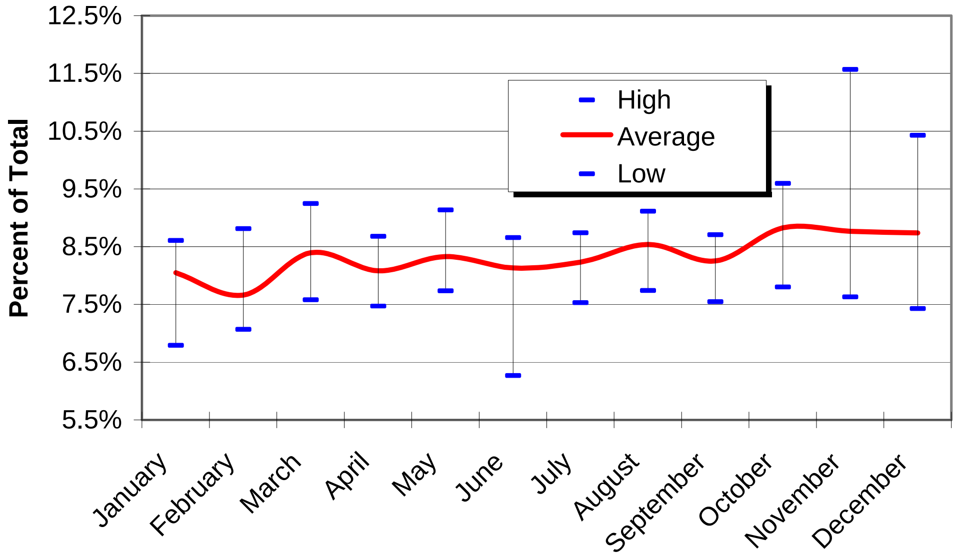


Total Operations

Month	Average	Max	Min
January	6.2%	7.4%	5.0%
February	7.2%	8.2%	6.3%
March	8.4%	10.1%	6.5%
April	8.5%	9.5%	7.3%
May	8.9%	10.5%	7.6%
June	9.0%	9.7%	7.6%
July	**9.5%**	**10.6%**	**8.6%**
August	9.1%	10.1%	8.4%
September	9.4%	10.3%	8.7%
October	9.4%	10.6%	7.8%
November	7.5%	10.1%	6.1%
December	6.7%	8.0%	5.5%

Source: Michigan Department of Transportation
Compiled by Reynolds, Smith and Hills, Inc.

Table 2-27
MONTHLY DISTRIBUTION OF COMMERCIAL SERVICE OPERATIONS



Commercial Service Operations

Month	Average	Max	Min
January	8.0%	8.6%	6.8%
February	7.7%	8.8%	7.1%
March	8.4%	9.2%	7.6%
April	8.1%	8.7%	7.5%
May	8.3%	9.1%	7.7%
June	8.1%	8.7%	6.3%
July	8.2%	8.7%	7.5%
August	8.5%	9.1%	7.7%
September	8.3%	8.7%	7.5%
October	**8.8%**	**9.6%**	**7.8%**
November	**8.8%**	**11.6%**	**7.6%**
December	8.7%	10.4%	7.4%

Source: Michigan Department of Transportation
Compiled by Reynolds, Smith and Hills, Inc.

For the purposes of this forecast element, the peak month for all three demand elements under review is assumed to parallel historical peak month activity calculated in Table 2-25 through 2-27. The peak month average day activity is expressed as the peak month activity divided by the number of days in the month (typically 31). The peak hour is expressed as a percentage of the peak month average day activity.

For passenger enplanements, the peak hour is projected to be 20 percent of the average day activity. This figure is based on the summer 2003 peak weekday flight schedule, which had approximately 19.7 percent of total daily departing seats in the peak 60-minute period (7:11 am to 8:10 am).

Commercial service peak hour operations, based on the summer 2003 peak weekday flight schedule and information regarding UPS and Superior Aviation's cargo activity, are estimated at 12.0 percent of the peak month average day operations. The design day and design hour activity levels that result from the application of these factors to annual forecasts of the respective demand elements are presented on **Table 2-28**

Table 2-28
DESIGN DAY/DESIGN HOUR ACTIVITY FORECASTS

	Actual	Forecast		
Description	2003	2008	2013	2023
ENPLANEMENTS				
Annual Enplanements	271,161	415,400	451,300	527,300
Peak Month (9.2% of Annual)	25,022	38,332	41,644	48,657
Average Day (31 days)	807	1,237	1,343	1,570
Peak Hour (20.0 Percent)	161	247	269	314
TOTAL OPERATIONS				
Annual Operations	92,421	113,700	120,100	131,500
Peak Month (9.5% of Annual)	8,790	10,814	11,423	12,507
Average Day (31 days)	284	349	368	403
Peak Hour (10.0 Percent)	28	35	37	40
COMMERCIAL SERVICE OPERATIONS				
Total Commercial Service	29,360	47,200	50,400	54,900
Air Carrier Operations	12,142	10,900	11,200	11,800
Commuter Operations	17,218	36,300	39,200	43,100
Peak Month (8.8% of Annual)	2,592	4,167	4,450	4,847
Average Day (31 days)	84	134	144	156
Peak Hour (12.0 Percent)	10	16	17	19

Source: Air Traffic Control Tower records (Historical)
Reynolds, Smith and Hills, Inc. (Projected)

2.9 Comparison with Other Forecast Efforts

Forecasts prepared in a master plan are reviewed by the FAA and compared to the Terminal Area Forecast (TAF) projections. FAA Order 5090.3C provides guidance on the FAA review process and states that the FAA will find an airport planning forecast acceptable if the five-year, 10-year, and 15-year forecasts contained in the planning document (master plan) are within 10 percent of the TAF projections. It should be noted that if the proposed airport forecast in the master plan exceed the TAF by more than 10 percent and is consider valid by the FAA, they will be incorporated into the TAF and replace the existing TAF projections.

The purpose of this section of the master plan is to compare the projections developed in this chapter to other existing forecasts. **Table 2-29** presents a comparison of the enplanement and operations forecasts prepared in this chapter with FAA projections as published in the current TAF and the forecasts prepared in the previous Master Plan completed for the Airport in 1995. The operations forecast prepared by the Michigan Department of Transportation are presented in **Table 2-30**. This information is also presented graphically in **Table 2-31**.

Table 2-29
ENPLANEMENT COMPARISON

Year	Actual	TAF	Previous Master Plan	Current Master Plan
1983	172,679			
1984	163,620			
1985	172,966			
1986	193,813			
1987	180,653			
1988	221,651			
1989	256,345			
1990	268,354			
1991	260,172			
1992	299,996			
1993	280,529		280,529	
1994	302,819		295,114	
1995	314,540		310,457	
1996	346,708		326,598	
1997	364,737		343,578	
1998	361,994		361,440	
1999	367,618		380,232	
2000	331,363		400,000	
2001	265,199	295,340	413,987	
2002	260,190	271,376	428,463	
2003	271,161	293,799	443,445	
2004		301,785	458,952	295,308
2005		309,913	475,000	321,605
2006		318,041	489,134	350,244
2007		326,169	503,688	381,433
2008		334,297	518,675	415,400
2009		342,425	534,108	422,344
2010		350,553	550,000	429,404
2011		358,681	568,686	436,582
2012		366,809	588,008	443,880
2013		374,937	607,985	451,300
2014		383,065	628,642	458,379
2015		391,193	650,000	465,569
2016		399,321		472,871
2017		407,449		480,289
2018		415,577		487,822
2019		423,705		495,474
2020		431,833		503,246
2021		440,555		511,139
2022		449,452		519,157
2023		458,530		527,300

Note: Projected years for each study identified with a box, other years extrapolated.

Sources: Capital Region Airport Authoriy, TAF, and previous Master Plan
Compiled by Reynolds, Smith and Hills, Inc.

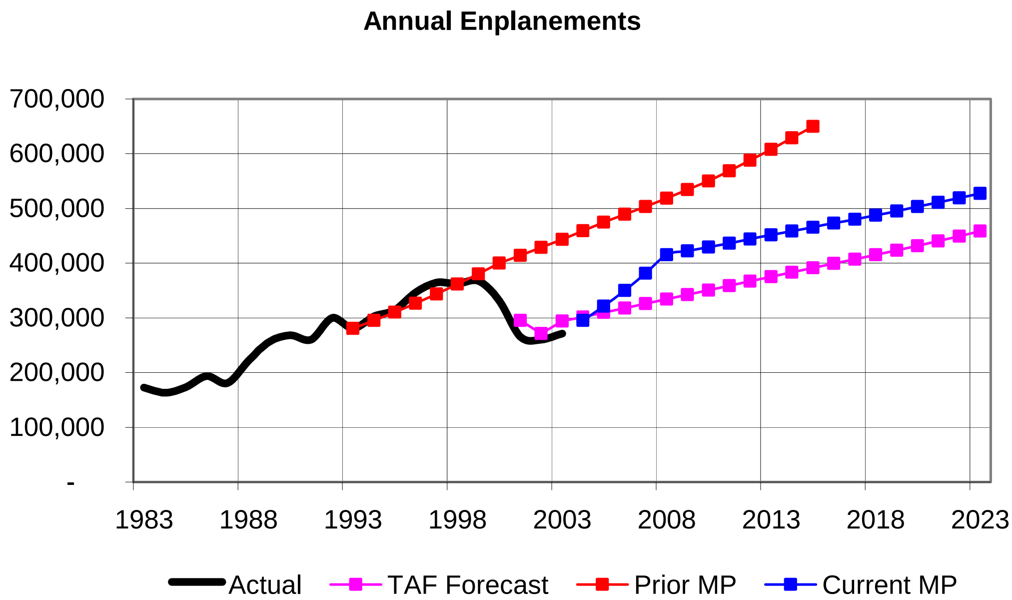
Table 2-30
OPERATIONS COMPARISON

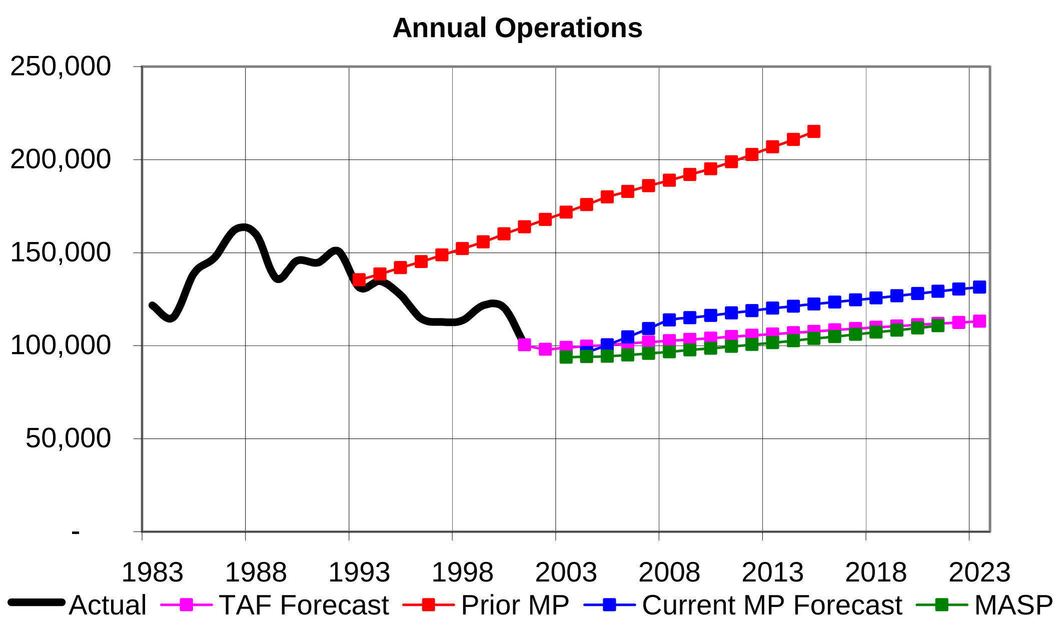
	Total Operations					**Commercial Service Operations**			
				Master Plan				**Master Plan**	
Year	**Actual**	**TAF**	**MASP**	**Previous**	**Current**	**Actual**	**TAF**	**Previous**	**Current**
1983	121,659					20,675			
1984	115,217					19,749			
1985	138,764					19,237			
1986	147,242					22,104			
1987	162,419					26,400			
1988	159,874					29,072			
1989	136,012					27,556			
1990	145,614					31,835			
1991	144,669					34,519			
1992	150,775					36,102			
1993	131,292			135,302		34,275		41,880	
1994	134,640			138,527		41,518		42,686	
1995	127,396			141,829		37,778		43,507	
1996	114,532			145,210		39,153		44,345	
1997	112,670			148,671		40,029		45,198	
1998	113,566			152,215		39,695		46,068	
1999	121,599			155,843		42,243		46,955	
2000	120,228			160,000		42,708		50,000	
2001	100,403	100,403		163,814		34,948	34,948	50,962	
2002	97,934	97,934	93,802	167,719		28,857	28,857	51,943	
2003	92,421	99,058	94,013	171,716		29,360	29,882	52,943	
2004		99,776	94,224	175,809	96,332		30,500	53,962	32,284
2005		100,493	94,860	180,000	100,408		31,118	55,000	35,500
2006		101,209	95,765	182,905	104,656		31,736	55,966	39,036
2007		101,927	96,678	185,856	109,084		32,354	56,948	42,924
2008		102,646	97,600	188,856	113,700		32,973	57,948	47,200
2009		103,364	98,530	191,903	114,952		33,591	58,965	47,823
2010		104,083	99,470	195,000	116,218		34,210	60,000	48,455
2011		104,801	100,537	198,845	117,498		34,828	60,968	49,095
2012		105,519	101,615	202,766	118,792		35,446	61,952	49,743
2013		106,238	102,705	206,765	120,100		36,065	62,952	50,400
2014		106,956	103,807	210,842	121,194		36,683	63,968	50,833
2015		107,675	104,921	215,000	122,298		37,302	65,000	51,269
2016		108,393	106,046		123,412		37,920		51,710
2017		109,111	107,184		124,536		38,538		52,154
2018		109,830	108,333		125,671		39,157		52,602
2019		110,548	109,495		126,816		39,775		53,054
2020		111,267	110,670		127,971		40,394		53,509
2021		111,870			129,137		40,703		53,969
2022		112,477			130,313		41,014		54,432
2023		113,087			131,500		41,328		54,900

Note: Projected years for each study identified with a box, other years extrapolated.

Sources: Capital Region Airport Authoriy, TAF, and previous Master Plan
Compiled by Reynolds, Smith and Hills, Inc.

Table 2-31
COMPARISON WITH OTHER FORECASTS





Sources: Terminal Area Forecast, previous Master Plan
Compiled by Reynolds, Smith and Hills, Inc.

As illustrated on Table 2-30, the forecasts of enplanements prepared in this chapter are less aggressive than the previous master plan forecasts and more optimistic than the current FAA projections in the TAF. Total aircraft operations projected in this chapter are higher than those contained in the TAF and considerably lower than the previous master plan.

A comparison between the projections in this master plan and the current TAF are presented in **Table 2-32**. As shown, the enplanement projections in the master plan are higher than 100 percent of those contained in the TAF. Total operations in this master plan are initially lower than those contained in the TAF and slightly exceed the 10.0 percent threshold by the year 2018. Commercial service operations in the master plan are considerably higher than the same figures in the TAF. The Capital Region Airport Authority has an aggressive marketing plan in place to increase commercial air service at the Airport. As a result, the commercial service operations will recover quicker than projected by the FAA, as presented in the current TAF.

The aviation activity projections contained in the TAF should be revised to match the figures contained in the master plan.

Table 2-32
TAF COMPARISON

Description	Year	Master Plan Forecast	TAF	Percent Higher (Lower)
ENPLANEMENTS				
Base Year	2003 (E)	271,161	271,161	0.0%
Base Year + 5 years	2008	415,400	334,297	24.3%
Base Year + 10 years	2013	451,300	374,937	20.4%
Base Year + 15 years	2018	487,800	415,600	17.4%
TOTAL OPERATIONS				
Base Year	2003 (E)	121,599	121,599	0.0%
Base Year + 5 years	2008	113,700	102,646	10.8%
Base Year + 10 years	2013	120,100	106,238	13.0%
Base Year + 15 years	2018	125,671	109,830	14.4%
COMMERCIAL OPERATIONS				
Base Year	2003 (E)	29,360	29,360	0.0%
Base Year + 5 years	2008	47,200	32,973	43.1%
Base Year + 10 years	2013	50,400	36,065	39.7%
Base Year + 15 years	2018	52,600	39,157	34.3%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc.(Projected)

2.10 Summary of Forecasts

Table 2-32 presents a summary listing of the aviation demand forecasts at the Airport. These projections are used in the next chapter of the master plan to assess the capacity of existing facilities and determine facility expansions or improvements needed to satisfy future activity levels.

Table 2-33
FORECAST SUMMARY

Description	Actual 2003 (E)	Planning Activity Level 1	2	3	Average Annual Growth 2003-2023
Year					
Lower		2012	2017	2028	
Preferred		2008	2013	2023	
Upper		2007	2011	2019	
ENPLANEMENTS					
Lower Range	271,161	384,500	420,900	493,800	3.0%
Preferred Methodology	271,161	415,400	451,300	527,300	3.4%
Upper Range	271,161	427,900	472,200	560,800	3.7%
Air Carrier	141,260	216,400	225,700	253,100	3.0%
Commuter	129,901	199,000	225,600	274,200	3.8%
Peak Hour	161	176	269	314	3.4%
OPERATIONS					
Air Carrier	12,142	10,900	11,200	11,800	-0.1%
Commuter	17,218	36,300	39,200	43,100	4.7%
General Aviation					
Local	27,755	26,200	27,600	30,500	0.5%
Itinerant	31,727	36,300	38,100	42,100	1.4%
Military	3,579	4,000	4,000	4,000	0.6%
Annual Operations	92,421	113,700	120,100	131,500	1.8%
BASED AIRCRAFT	100	113	117	128	1.2%

Source: Capital Region Airport Authority (Historical)
Reynolds, Smith and Hills, Inc.(Projected)

CHAPTER 3
FACILITY REQUIREMENTS

3.1 General

This chapter analyzes the ability of the current facilities at Capital City Airport, as documented in Chapter 1, to accommodate the aviation demand forecasts developed in Chapter 2. The Federal Aviation Administration (FAA) has approved forecasts generated in Chapter 2 of this study. These forecasts are utilized in this chapter to establish the specific facility requirements necessary to accommodate the forecast demand.

The Airport's major component areas, which include airspace, airside, and landside facilities, have been analyzed to determine the necessary facility requirements. Typical industry requirements for commercial aviation and general aviation demand have been identified for various activity levels to indicate required facilities. It is important to note that major components must be in balance with each other to achieve system optimization. Specific facility expansion and airport development alternatives to adequately meet the projected demand will be addressed in Chapter 4, Alternative Analysis.

3.1.1 Airfield Layout

The airfield layout refers to the location and orientation of the runways, taxiways, and apron areas. The primary airfield facility is the runway. A runway designation identifies a runway according to the facility's magnetic azimuth. Runway designation markings are provided on each end of a runway and are used by pilots to identify landing facilities. A runway designation consists of a number and, on parallel runways, is supplemented with a letter. The designation number represents the whole number nearest the magnetic azimuth when viewed from the direction of approach. Runway 10R/28L serves as the primary air carrier runway at Capital City Airport. Runway 10L/28R is parallel to primary Runway 10R/28L, and serves primarily small, general aviation aircraft at the Airport. Runway 6/24 is a crosswind runway primarily serving general aviation aircraft.

Runway 10R/28L is 7,251 feet long by 150 feet wide. Runway 10L/28R is 3,601 feet long by 75 feet wide. Runway 6/24 has a total pavement length of 5,003 feet long by 120 feet wide.

Runway 10R/28L is served by a parallel taxiway, Taxiway B, located on the south side of the runway. Taxiway B has a runway to taxiway separation of 437 feet and has a total of eight connector taxiways. Runway 6/24 is also served by a parallel taxiway, Taxiway C, located on the southeast side of the runway. Taxiway C has a runway to taxiway separation of 437 feet and has a total of six connector taxiways. Runway 10L/28R is served by a parallel taxiway, Taxiway E, located on the south side of the runway. Taxiway E has a runway to taxiway separation of 200 feet and has a total of four connector taxiways.

3.1.2 Runway Wind Coverage

The prevailing winds generally determine runway orientation and the need for a crosswind runway. FAA planning standards state that a runway system should provide a minimum of 95 percent wind coverage. If a single runway direction cannot provide this level of coverage, then an additional crosswind runway may be needed.

A runway wind coverage analysis was conducted using the FAA's Airport Design Microcomputer Program Version 4.2D with data supplied by National Oceanic and Atmospheric Administration (NOAA) for the weather reporting station at Lansing for the period of 1994 to 2003. Runway wind roses were developed for all weather conditions and instrument flight rules (IFR).

As shown, the existing primary runway (Runway 10R/28L) provides 89.44 percent or more wind coverage for all crosswind components during all weather and IFR conditions. The crosswind runway (Runway 6/24) provides 91.08 percent or better wind coverage during all weather and IFR wind conditions. The combined runway system at Capital City Airport provides more than 95 percent wind coverage for all crosswind components during all weather and IFR conditions. Therefore, the current runway configuration at the Airport is adequate with respect to providing sufficient wind coverage and no additional crosswind runways are needed.

Wind coverage by runway end was evaluated to determine which runway offers the greatest wind coverage. Results of the individual runway end analysis are presented in **Table 3-1**.

Table 3-1

WIND COVERAGE FOR INDIVIDUAL RUNWAY ENDS

Runway	All Weather (kts)		IFR (kts)	
	10.5	13.0	10.5	13.0
6/24	91.08%	95.72%	92.91%	96.39%
10/28	89.44%	94.81%	91.02%	95.55%
Combined	96.07%	98.61%	96.24%	98.69%

Source: NOAA

3.2 Airport Role and Service Level

An airport must be included in the NPIAS to be eligible for funding under the Airport Improvement Program (AIP). The NPIAS is prepared by the FAA every two years and identifies public-use airports considered necessary to provide a safe, efficient, and integrated system of airports to meet the needs of civil aviation, national defense, and the United States Postal Service. It also takes into consideration the relationship of each airport to the rest of the transportation system in a particular area, the forecast of technological developments in aeronautics, and the development forecast in other modes of transportation. A detailed description of the NPIAS can be found in **Appendix B**.

The airport service level reflects the type of public use the airport provides to the community and the funding categories established by Congress to assist in airport development. Capital City Airport is a public airport that enplanes more than 2,500 annual passengers and receives aircraft offering scheduled passenger service. Therefore, the Airport is identified as a commercial service airport. In addition to service level, the NPIAS further classifies airports into one of four basic levels that describe the service level and role that an airport currently provides to the community and is anticipated to provide to the community at the end of the five-year planning period. Capital City Airport is identified as a primary commercial service airport as it enplanes more than 10,000 annual passengers. The Airport role and service level will not change throughout the planning period.

3.3 Critical Aircraft Identification and Airport Reference Code

The FAA refers to the aircraft approach category and the airplane design group of the design aircraft at an airport as an airport reference code (ARC). The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate at an airport. The FAA's aircraft approach categories and airplane design groups are listed in **Table 3-2**. Examples of aircraft classified by the airplane design group are listed in **Table 3-3**.

Table 3-2
AIRCRAFT APPROACH CATEGORY AND AIRPLANE DESIGN GROUP

Aircraft Approach Category	Approach Speed
Category A	Speed less than 91 knots
Category B	Speed 91 knots to less than 121 knots
Category C	Speed 121 knots to less than 141 knots
Category D	Speed 141 knots to less than 166 knots
Category E	Speed 166 knots or more
Airplane Design Group	**Wingspan**
Category I	Less than 49 feet
Category II	49 feet to less than 79 feet
Category III	79 feet to less than 118 feet
Category IV	118 feet to less than 171 feet
Category V	171 feet to less than 214 feet
Category VI	214 feet to less than 262 feet

Source: FAA Advisory Circular 150/5300-13

Table 3-3

AIRPLANE DESIGN GROUP AIRCRAFT

Airplane Design Group	Representative Aircraft
I	Beech Baron 58A, Cessna 150, Gates Learjet 35A, Piper Navajo
II	Beech King Air C90, Canadair Regional Jet, Cessna Citation III, Gulfstream IV, Saab 340
III	Airbus A-320, Boeing 727, Boeing 737, Douglas DC-9, Fokker 100, Gulfstream V, McDonnell-Douglas MD-80
IV	Boeing 757, Boeing 767, Airbus A-300, Douglas, DC-10, Boeing MD-11
V	Airbus 340, Boeing 747, Boeing 777
VI	Antonov AN-124, Lockheed C-5B

Source: Jane's All the World's Aircraft

To determine airfield facility requirements, FAA planning guidelines recommend the identification of an existing and future design aircraft. The design aircraft is typically defined as the most demanding aircraft that performs or is projected to perform at least 250 annual departures (or 500 annual operations) at the airport. At airports designed to accommodate various types of traffic each runway may have a different ARC. For example, one runway may be designed to accommodate general aviation aircraft and another designed to serve commercial service aircraft.

The 1995 Capital City Master Plan identified the Boeing 757 as the design aircraft for the Airport, which has a corresponding ARC of C-IV. The Boeing 737-300 was identified as the critical aircraft for Runway 6/24 which has a corresponding ARC of C-III. However, runway usage has been assessed and the design aircraft for this runway is redefined as ARC B-II. The majority of Runway 6/24 and associated development has been designed to C-II standards. Runway 10L / 28R is ARC B-I.

The fleet of aircraft currently operating at Capital City Airport includes MD-80, DC-9, CRJ200, and EMB-145 aircraft serving the scheduled service needs of the community. In addition, Capital City Airport has a wide variety of charter aircraft that utilize the facility on a regular basis, including service for athletic events at Michigan State University. The air cargo operators currently operate B757-200, B727-100 and 200, DC-8-70, Fairchild Metro, and Cessna Caravan aircraft. The current general aviation fleet operating at the Airport consists of aircraft ranging from small, single-engine aircraft to high performance corporate jet aircraft.

The fleet of aircraft at Capital City is not anticipated to change substantially during the planning period. It is anticipated that the airlines serving the Airport will continue to predominantly use regional jets and narrowbody jets, such as the Boeing 737 and MD 80 aircraft. The forecast of aviation activity anticipates a higher frequency of service (i.e. more operations) as opposed to larger aircraft to meet the increasing enplanement levels. In addition, charter aircraft use at the Airport is anticipated to continue to grow over time with the use of Boeing 737 and 757 aircraft as the most predominant charter aircraft. Types of air cargo aircraft are forecast to remain similar to existing types. As such, the ARCs for the Airport are expected to remain constant throughout the 20-year planning period.

3.4 Airfield Requirements

The airfield is the system of components upon which aircraft operate. When determining capacity and delay, operations on the runways, taxiways, and gates at most airports can be considered independent of each other and may be analyzed separately. For planning purposes, it is assumed that airfield components generally do not affect the capacity of another component. Therefore, the capacity of the entire airfield is governed by the component that is most restrictive. Analysis in this section will include the airfield demand capacity, runways, taxiways, and airport signage.

3.4.1 Airfield Demand Capacity Analysis

The airfield demand capacity analysis identifies the existing annual capacity and hourly capacity of Capital City Airport based on the current operational characteristics. Airfield capacity is an estimate of the number of aircraft that can be processed through the airfield system during a specific period of time with acceptable levels of delay. The hourly capacity is an estimate of the maximum number of aircraft that can be accommodated within a one-hour period. Similarly, the annual service volume (ASV) is a reasonable estimate of Capital City Airport’s annual capacity, accounting for the various conditions encountered over the course of a year. The level of delay that is acceptable to a particular airport may differ from the level deemed acceptable at a similar airport. As a result, the level of delay can influence the estimated capacity for a given airfield. Other major factors that affect airfield capacity include the runway configuration, air traffic control operating procedures, weather conditions, and aircraft fleet mix. For instance, the number of aircraft that can operate out of an airport under IFR conditions will be much less than in VFR conditions. This is due to the fact that separation distances and aircraft movement are reduced during IFR conditions for safety concerns. Similarly, the other factors mentioned above would each have an effect on overall airfield capacity.

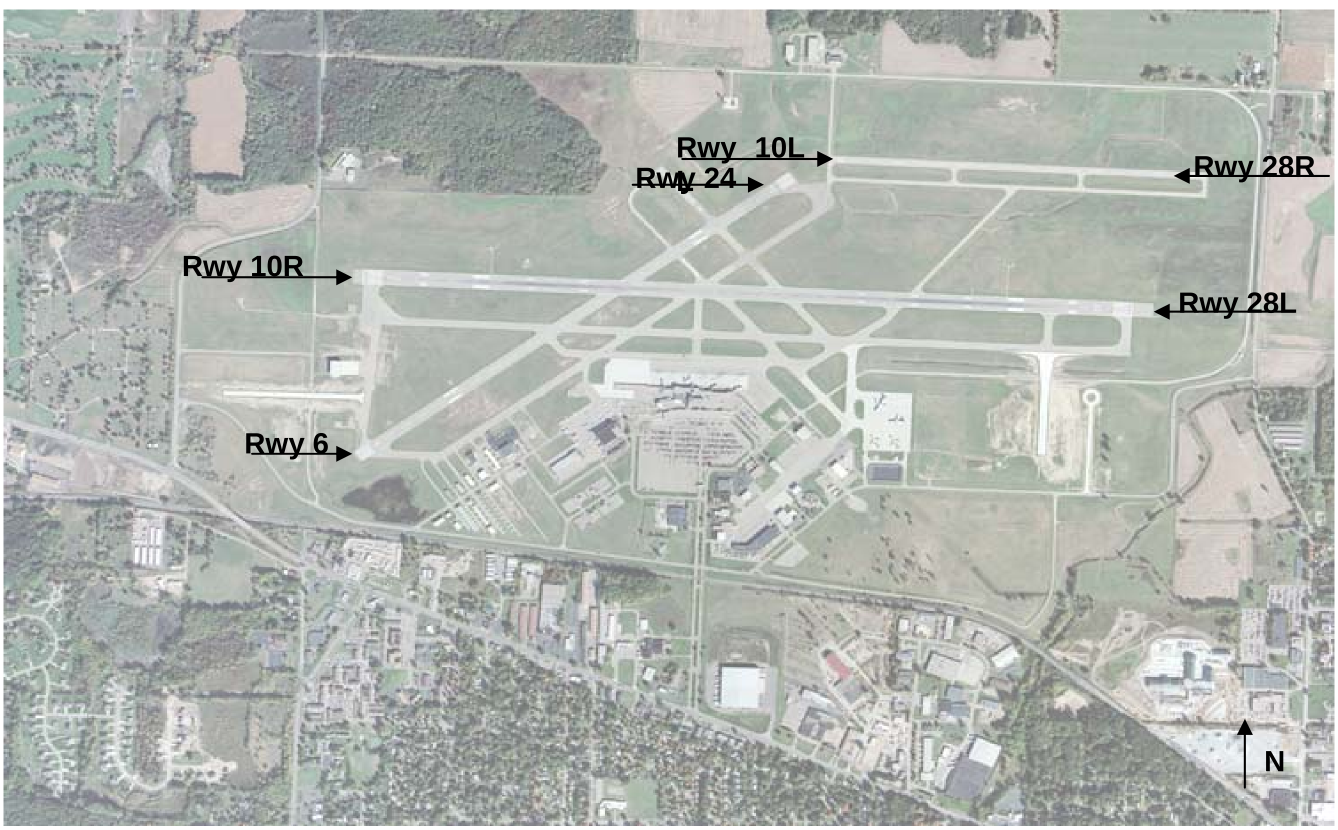
Estimates of existing airfield capacity at Capital City Airport were developed in accordance with the methods presented in FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.

3.4.1.1 Existing Airfield Configuration

The airfield at Capital City Airport consists of three runways: two parallel runways, 10L/28R and 10R/28L, and one crosswind runway, 6/24. The parallel runways have a lateral separation of 1,400 feet and thresholds that are staggered by 4,300 feet on the west end and 641 feet on the east end. The crosswind runway intersects the primary Runway 10R/28L at a point 2,270 feet from the end of Runway 10R and 4,700 feet from the end of Runway 28L. The runway configuration is shown in **Exhibit 3-1**. The significance of these configuration attributes includes:

- Lateral separation determines the wake vortex standards that apply to simultaneous operations.
- Threshold stagger provides the basis to determine adjusted, effective lateral separation for wake vortex considerations.
- Intersection distances determine opportunities for land and hold short operations.

Exhibit 3-1
RUNWAY CONFIGURATION



A runway's operational characteristics are related to the physical characteristics of length and width. Runway 10L/28R is 3,601 feet in length and 75 feet wide. The length of this runway limits its use to aircraft in Approach Categories A and B (aircraft less than 12,500 pounds with approach speeds less than 121 knots). Runway 10R/28L is 7,251 feet in length and 150 feet wide and can accommodate virtually any aircraft type operating on short stage lengths (less than 1,000 miles). Weight limitations may apply for stage lengths over 1,000 miles depending upon the aircraft type and weather conditions. Runway 6/24 is 5,001 feet in length and 120 feet wide and can generally accommodate turboprop and small jet aircraft operations.

3.4.1.2 Aircraft Fleet Mix

Aircraft fleet mix is another significant factor that affects the capacity of an airfield. Sequencing of arrival aircraft can be performed relatively efficiently for a uniform fleet mix and with aircraft of similar approach speeds. The reverse situation, where there is diversity in the range of aircraft speeds, will generally decrease the hourly capacity of an airfield. Similarly, the hourly capacity of an airfield generally decreases as the average aircraft size of the fleet mix increases. During flight, wake turbulence resulting from the disruption of normal airflow is created behind an aircraft and can represent a significant safety hazard for trailing aircraft or other aircraft operating in the vicinity. Heavier aircraft generate more severe wake turbulence thereby requiring greater separation between aircraft during departure and arrival operations. As a result, aircraft arrivals and departures must be properly sequenced to allow for spacing between consecutive aircraft. This spacing is dictated by their respective speeds and weights. As smaller aircraft are more susceptible to wake turbulence, spacing between aircraft is greatest when smaller aircraft are sequenced behind large aircraft. This increased separation between successive arrivals or departures can significantly decrease the capacity of the airfield.

In order to account for the uniformity or diversity of an airport's fleet mix and the impact that the fleet mix has on the airfield capacity, an aircraft mix index is calculated based on the distribution of aircraft weights and sizes operating at the airport. The mix index is a mathematical expression representing the portion of large aircraft in the fleet. The mix index for a particular fleet is calculated by adding the percentage of Class C aircraft to three times the percentage of Class D aircraft using the aircraft classes defined in **Table 3-4**.

Table 3-4
AIRCRAFT CLASSIFICATIONS FOR DETERMINING THE FLEET MIX INDEX

Aircraft Class	Maximum Takeoff Weight	No. of Engines	Wake Turbulence Classification
A	12,500 lbs or less	Single-engine	Small
B	41,000 lbs or less	Multi-engine	Small
C	41,000 lbs to 300,000 lbs	Multi-engine	Large
D	over 300,000 lbs	Multi-engine	Heavy

Source: FAA Advisory Circular 150/5060-5 Airport Capacity and Delay

The aircraft operational mix at Capital City Airport for 2003 is estimated in **Table 3-5**.

Table 3-5
ESTIMATED 2003 OPERATIONAL FLEET MIX

Aircraft Category	Air Carrier	Commuter	Military	General Aviation	Total
2003 Operations	12,142	17,218	3,579	59,482	92,421
Airport Percent	13%	19%	4%	64%	100%
A (<91 kts)	0%	15%	0%	60%	41.4%
B (>91<11 kts)	0%	15%	0%	35%	25.3%
C(>121<141 kts)	99%	70%	100%	5%	33.1%
D(>141<166 kts)	1%	0%	0%	0%	0.1%
E (>166 kts)	0%	0%	0%	0%	0%
Category Total	100%	100%	100%	100%	

3.4.1.3 Touch-and-Go Operations

The percentage of touch-and-go operations applied to this study is based on air traffic controller assessment of runway usage. All touch-and-go operations are conducted by general aviation aircraft, and effectively all occur on Runway 10L/28R. Of the total number of general aviation operations, approximately 15 percent are touch-and-go operations.

3.4.1.4 Demand Capacity Calculation

The capacity of the airfield at Capital City Airport was determined by following the method outlined in FAA Advisory Circular 150/5060-5. This capacity was based on the existing airfield with the existing navigational and approach aids. The primary measure of airfield capacity utilized in this analysis is the annual service volume (ASV). The ASV is an estimate of total annual airfield capacity based on the runway layout, aircraft fleet mix, historical weather, and operational characteristics of the Airport. Two procedures for calculating the ASV are provided in AC 150/5060-5. Chapter 2 of AC 150/5060-5 provides a simple method for estimating airfield capacity and is generally used for long-range planning purposes. Chapter 3 of AC 150/5060-5 provides a more detailed methodology for estimating airfield capacity. Both methods are considered in the following sections.

For the purposes of assessing the range of uses of the existing airfield, six different airfield operating configurations are considered:

- Single runway for small (Category A and B) aircraft only
- Single runway for large (Category C and D) aircraft only
- Parallel runways, not length restricted, and Capital City Airport 2003 Mix Index
- Parallel runways, one length restricted, and Capital City Airport 2003 Mix Index
- Two intersecting runways and Capital City Airport 2003 Mix Index
- Three runways, two parallel and one intersecting, and Capital City Airport 2003 Mix Index

Exhibit 3-2 depicts examples of these airfield operating configurations employing the Airport's runway configuration. These six runway configurations are assessed to understand the contribution that each configuration makes to the overall airfield capacity and the affects of the mix index on capacity. The associated capacity estimates are shown in **Table 3-6**.

Exhibit 3-2

DEMAND CAPACITY CALCULATIONS
AIRFIELD OPERATING CALCULATIONS

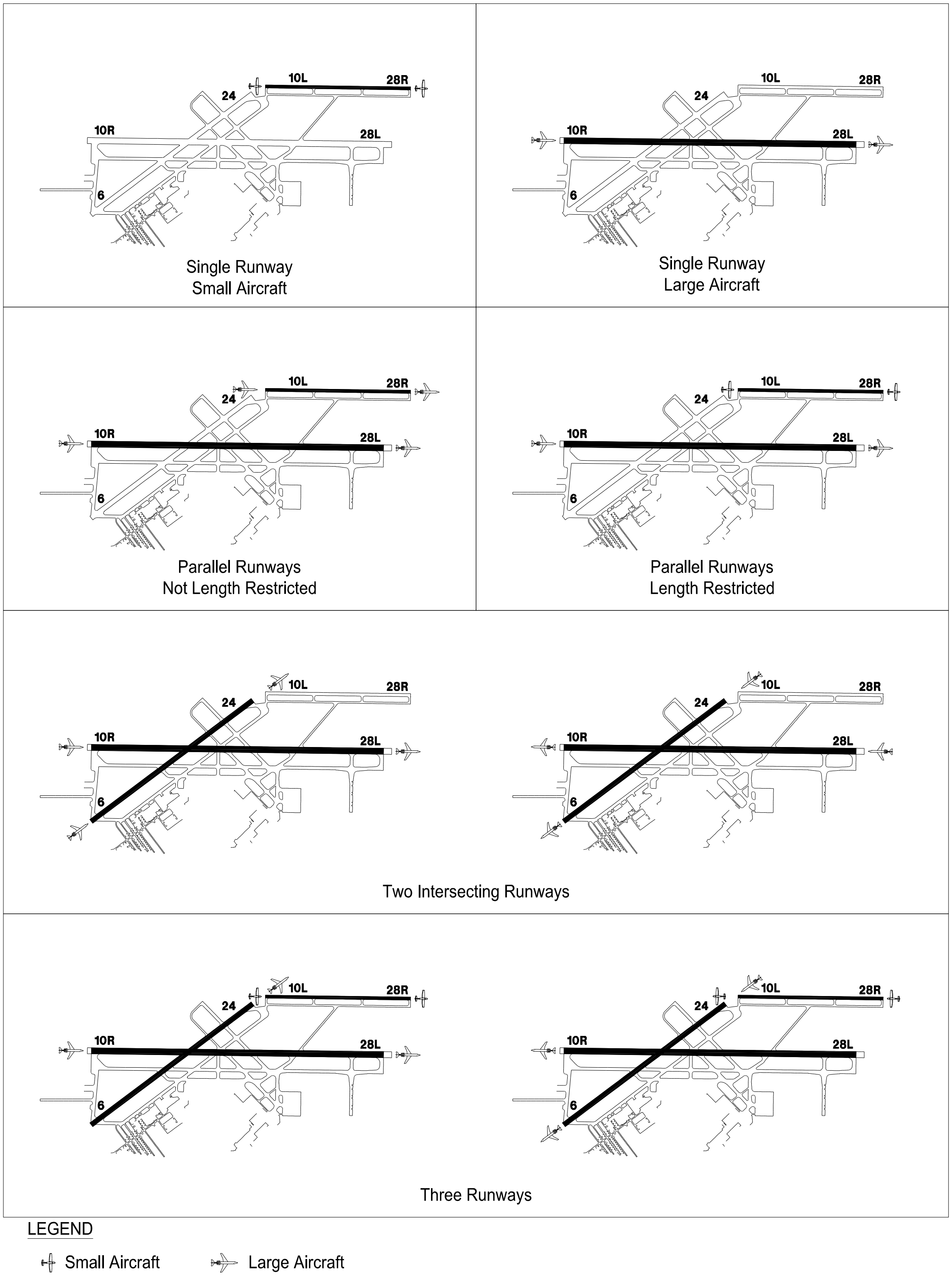


Table 3-6
AIRFIELD CAPACITY ESTIMATES

Runways	Uses	Mix Index	VFR	IFR	ASV
Single Runway	Small Aircraft Only	0%	98	59	230,000
Single Runway	Large Aircraft Only	100%	55	53	210,000
Parallel Runways	Capital City Airport Mix	33%	145	57	275,000
Parallel Runways	One Restricted to Small Aircraft	33%	130	56	240,000
Two Intersecting Runways	Capital City Airport Mix	33%	77	57	200,000
Three Runways	Capital City Airport Mix	33%	63	56	205,000

VFR – Visual Flight Rules
IFR – Instrument Flight Rules
ASV – Annual Service Volume

As shown, the differences in capacity for a single runway are significant in VFR and less so in IFR between a single runway limited to small aircraft and a single runway capable of accommodating large aircraft. The ASV is nominally less for the large aircraft scenario than the small aircraft scenario.

When taking into consideration the parallel runway and the Capital City Airport mix index, the fact that Runway 10L/28R is restricted to small aircraft reduces capacity in VFR, IFR, and the ASV. The actual lateral separation is less than 2,500 feet, a condition that requires consideration of wake vortices. Moreover, because the thresholds are staggered, the effective lateral runway separation must be considered. The effective lateral separation is 2,260 feet in east flow, but only 1,375 feet in west flow. The larger effective lateral separation in the east flow is a result of the stagger being positive. These effective lateral separation adjustments reflect the larger aircraft landing on the longer runway. Both conditions produce a lateral separation less than 2,500 feet and, therefore, vortex restrictions apply. The differences in the IFR values show that the combination of a parallel runway with a restricted small runway that is not instrumented essentially reverts to a single runway when the ceiling is less than 1,000 feet and visibility is less than three miles. Limited credit is given for departures (but no arrivals) in IFR.

Considering the two larger intersecting runways only (Runway 10R/28L and Runway 6/24), the capacity is greater than that for a single runway, but less than that for two parallel runways in the optimum operating direction (arrivals and departures on Runway Ends 10R and 6). This operation is less than a parallel configuration since aircraft must be metered through the intersection and greater aircraft separations are used to accomplish the metering. Converging approaches are not permitted below a ceiling of 1,000 feet and visibility of three miles (700 feet and two miles if both runways had instrumentation). This result has the appearance of implying that Runway 6/24 has limited value or a detrimental effect on the airfield operation/capacity. This is not the case since maximum crosswind components for small aircraft would limit the use of Runway 10L/28R and the availability of Runway 6/24 provides the opportunity to maintain a higher capability, even thought it is not as high as the parallel use.

The last scenario is the simultaneous use of all three runways. Simultaneous use, however, can only occur in VFR and when winds are less than 10 knots. The capacity for simultaneous use of all three runways is the lowest of all runway use combinations since the three runways interact to produce operational limitations on each other. These limitations reduce the operational utility of each runway when used simultaneously.

Based upon the forgoing analysis, the parallel runway scenario best reflects the capacity and ASV of the airfield. The lack of credit given to Runway 6/24 should not be implied to mean that this runway has no value. During the times of the year when wind velocity exceeds 10 knots, Runway 6/24 is heavily utilized by general aviation aircraft. As general aviation accounts for almost 65 percent of the activity at the Airport, Runway 6/24 is considered a valuable enhancement to the airfield.

A potential enhancement to capacity on a limited basis is the potential to implement land and hold short operations (LAHSO) on Runway 28L to hold short of Runway 6/24. A distance of 4,700 feet is available and current procedures would permit Group V aircraft and smaller to use the procedure. This would include some of the turboprop commuter aircraft in the current fleet as well as most of the general aviation fleet. While this would be a limited benefit at the present time, the use of LAHSO could provide future efficiency. For example, with a threshold to intersection distance of 6,000 feet, Group VII aircraft could use this procedure. This would include almost all aircraft that would be using Capital City Airport now and in the future. The proposed extension to the east end of Runway 28L would provide sufficient distance to implement LAHSO procedures.

Comparing the defined capacity of the airfield for existing conditions to the current and future demand results in the demand/capacity relationship. This relationship is expressed as a percentage of the airfield capacity. For future years, the existing airfield capacity is expected to change as a result of the evolving fleet mix at the Airport. Turboprop aircraft currently used for commercial service are expected to change to regional jets and a portion of the general aviation fleet mix is expected to grow to higher performance aircraft. These fleet mix changes would reduce the VFR capacity of the airfield, but would not affect the IFR capacity. Since VFR dominates air traffic on the airfield, a reduction in the ASV is expected as well. These changes in fleet mix, expressed as the mix index, the associated airfield capacity, and the demand/capacity relationship are shown in **Table 3-7**.

Table 3-7
FUTURE AIRFIELD DEMAND/CAPACITY

Planning Horizon	Mix Index	Hourly Capacity		ASV	Forecast Demand	Demand / Capacity
		VFR	IFR			
2003	33	130	56	240,000	91,918	38%
2008	40	125	56	230,000	113,500	49%
2013	45	117	56	220,000	119,900	55%
2023	50	110	56	210,000	131,300	63%

As shown, the mix index increases over the planning horizon and results in a decrease in the hourly VFR capacity and ASV. The demand/capacity relationship increases from the existing 38 percent to 63 percent in 2023. The FAA provides criteria for airfield planning in FAA Order 5090.3C. This FAA Order indicates that planning for new or additional airfield capacity should begin when the demand/capacity ratio reaches 60 percent. As the 60 percent threshold is reached prior to 2023, consideration of additional capacity should begin now so appropriate land use planning can occur.

3.4.2 Runway Analysis

The runway analysis addresses specific requirements relative to the ability of the existing runways at Capital City Airport to facilitate the projected demand. At a minimum, runways must have the proper length, width, strength, and prescribed FAA design standards to safely accommodate the design aircraft for each runway.

3.4.2.1 Runway Length Analysis

Runway length planning analysis was conducted to determine recommended runway length requirements for various categories of aircraft, as well as for specific aircraft. The physical layout of Capital City Airport and the operating requirements of the design (or critical) aircraft typically dictate runway length requirements. The FAA's Airport Design Microcomputer Program was used as an initial screening tool to determine general runway length requirements for the Airport. The results of this runway length analysis are listed in **Table 3-8**.

Table 3-8
AIRCRAFT RUNWAY LENGTH REQUIREMENTS

Aircraft Category	Recommended Runway Length
Small airplanes (Less than 12,500 lbs.)	
100% of fleet (Less than 10 seats)	2,590 feet
Small airplanes (Less than 12,500 lbs.)	
100% of fleet (10 or more seats)	4,100 feet
Large airplanes (Between 12,501 lbs.-60,000 lbs.)	
75% of fleet @ 60% Useful Load	4,730 feet
75% of fleet @ 90% Useful Load	6,010 feet
100% of fleet @ 60% Useful Load	5,120 feet
100% of fleet @ 90% Useful Load	7,360 feet
Large Airplanes (Greater than 60,000 lbs.)	
500 Mile Stage Length	5,310 feet
1,000 Mile Stage Length	6,300 feet
2,000 Mile Stage Length	8,050 feet
3,000 Mile Stage Length	9,480 feet

Source: FAA Airport Design Microcomputer Program

As shown, the existing runway system at Capital City Airport can generally accommodate 100 percent of small airplanes, 100 percent of large airplanes less than 60,000 pounds at 60 percent useful load and large airplanes greater than 60,000 pounds with a stage length up to 1,000 miles.

Runway length is normally defined in a manner that provides sufficient length for 90 percent of the operational fleet on the longest reasonably expected flight stage length. For airports that must accommodate new service opportunities to the greatest extent practical, such as Capital City Airport, the availability to accommodate new service that would enhance airport revenues and community services is very important. An extension to Runway 10R/28L from 7,251 feet to 8,000 feet is currently planned in the near term and an ultimate extension to 8,500 feet in the long term. The following sections analyze the utility of the extension.

Critical Stage Length

The location of Capital City Airport in the midwest United States places the Airport within 1,000 miles of numerous markets. Some Florida markets and markets located in the Mountain and Pacific time zones (generally west of Denver) are over 1,000 miles. The only destination in excess of 1,000 miles currently served with non-stop flights from Capital City Airport is Las Vegas (1,690 miles). Additional markets in these areas that are potential destinations include:

- Los Angeles – 1,970 miles
- Phoenix - 1,660 miles
- San Francisco – 2,070 miles
- Seattle – 1,910 miles

These markets are likely to be served by charter flights related to Michigan State University sports teams and fan charters. Future international charter service to Mexico and the Caribbean are also possibilities. The distances to a sampling of these potential charter markets include:

- Cancun – 1,425 miles
- Grand Cayman – 1,560 miles
- Mexico City – 1,800 miles
- Nassau – 1,215 miles
- Puerto Vallarta – 1,900 miles
- San Juan – 1,910 miles

For runway length planning purposes, a stage length of 2,000 miles would be the maximum and 1,700 miles would be the minimum. As most of these markets are expected to be charter markets, full passenger loads would be expected.

Runway Length Factors
The existing conditions important to runway length calculations include the following:

- **Runway Operations** - The primary runway at Capital City Airport is Runway 10R/28L. The predominate direction of operation for arrivals and departures is to the west.
- **Runway Length** - The length of Runway 10R/28L is 7,251 feet.
- **Obstructions** - There are no known obstructions in the departure area that affect departure performance.
- **Airport Elevation** - The airport field elevation is 861 feet above mean sea level (MSL).
- **Runway Slope** - The runway end elevations are 10R = 861 feet MSL and 28L = 852 feet MSL. The elevation differential results in a 0.12 percent slope, which is considered negligible for the purposes of runway length calculations.
- **Temperature** - The average maximum high temperature in each month of the year is shown in **Table 3-9**. (Absolute high temperature can reach 100^{o}F.)

Table 3-9
AVERAGE MAXIMUM HIGH TEMPERATURE

Month	Max High (^oF)	STD
January	48.4	8.7
February	49.7	6.6
March	67.3	7.2
April	78.7	4.5
May	84.9	4.2
June	90.7	3.5
July	93.2	2.8
August	92.2	3.8
September	87.8	4.4
October	79.3	5.0
November	67.3	5.6
December	54.4	7.7

Source: National Climatic Data Center (1952 to 1990)

Based upon the runway length factors, calculations were made utilizing the aircraft manufacturer's information for the large aircraft types that are expected in the operational fleet mix at Capital City Airport. The use of aircraft manufacturer Airport Planning Manuals for runway length estimates is an approximation method. The manual data is based upon numerous static assumptions about enroute wind, local wind, temperature, and engine type, amongst others. Interpolations are required that are not precise but yield reasonable estimates of runway length. These values are not to be used for anything more than planning. In addition, the FAA altered the standard weights used in the Average Weight Program employed by almost all airlines to calculate payload weights. This change, made in May 2003, had a significant affect on aircraft departure runway length requirements, especially for charter aircraft that typically have an all coach seating configuration. The higher values are used in this analysis. Runway length estimates are provided in **Table 3-10**.

Table 3-10
RUNWAY LENGTH ESTIMATES

Aircraft Type	Pax[1]	Payload (#s)[2]	Owe (#s)[3]	Total	TOW (#s)	Dry STD	Dry STD+[4]	Wet[6] STD	Wet[6] STD[5]
MD82	161	36,225	78,000	114,225	149,000	7,900	8,400	9,085	9,660
MD83	161	36,225	80,000	116,225	151,000	7,200	7,700	8,280	8,855
MD87	139	31,275	73,275	104,550	136,000	6,100	6,400	7,015	7,360
B737-300	134	30,150	72,540	102,690	135,000	7,000	7,500	8,050	8,625
B737-400	159	35,775	74,170	109,945	138,000	7,300	7,800	8,395	8,970
B737-700	148	33,300	83,000	116,300	144,000	7,000	7,500	8,050	8,625
B737-800	184	41,400	91,300	132,700	163,000	7,300	7,800	8,395	8,970
B737-900	189	42,525	94,580	137,105	165,000	7,200	7,700	8,280	8,855
B757-200	212	47,700	130,860	178,560	228,000	6,800	7,100	7,820	8,165
B767-200	242	54,450	177,000	231,450	295,000	5,600	6,000	6,440	6,900
B767-300	290	65,250	189,750	255,000	320,000	7,200	7,700	8,280	8,855

[1] All coach configuration assumed.
[2] Based upon standard weight program requirements (all coach configuration)
[3] Reflects heaviest version
[4] Temperature increase varies from standard day 25°F to 31°F
[5] A 15 percent increase is assumed
STD – Standard Day
TOW – Take Off Weight

Source: Aircraft Manufacturer's Airport Planning Manuals.

As shown, eight of the eleven sample aircraft are able to use the existing runway for the 2,000-mile stage length on a standard day. This condition represents a temperature of approximately 56°F (adjusted for elevation). The higher than standard day condition represents temperatures that range from 80°F to 85°F (adjusted for elevation). As shown, the associated take-off distances increase with temperature, resulting in the existing runway being usable to only three of the sample aircraft. Since the average high temperature in May, June, July, August, and September is higher than the standard day temperatures, greater runway length distances than those shown would be expected. Where the estimated runway length calculations exceed the length available, payload restrictions are likely.

The wet runway conditions shown in the table are normally estimated as being 15 percent higher than the dry runway conditions. These conditions would further increase the desired runway length for the critical stage length. Considering the sample aircraft in wet runway conditions, the runway is usable to only two aircraft types on a standard day, and only one type on a high temperature day.

Based upon this data, the Capital Region Airport Authority's plan to extend the runway represents a minimum extension length. This would permit reasonable unrestricted departures by most aircraft in both wet and dry conditions. This condition meets the 90 percent criteria for the longest reasonable flight stage length.

Crosswind Runway length

The FAA recommends that the length of a crosswind runway should be 80 percent of the length of the primary runway. Runway 6/24 at Capital City Airport has a length that is 69 percent of the length of Runway 10R/28L. Runway 6/24 is considered to provide an alternate that may enhance utility for larger aircraft operations when winds are inappropriate for using Runway 10R/28L. An extension of Runway 6/24 to 80 percent of the primary runway length would be desirable; however, it is considered a low priority since the current length is sufficient for a large percentage of the operational fleet currently using the Airport.

3.4.2.2 Runway Design Standards

The FAA defines runway design standards that are consistent with the airfield design aircraft. Depending upon the demand, portions of an airfield may be designed for one aircraft type and other portions for a different aircraft type. In the case of Capital City Airport, Runway 10R/28L is designed for large air carrier operations (Approach Category C and D, Design Group V and smaller), and Runway 10L/28R is designed exclusively for small aircraft (Approach Category A and B, Design Group II and smaller). Runway 6/24 is designed to a higher standard than that for small aircraft but less than that for the large aircraft (Approach Category C, Design Group III).

The largest critical aircraft for commercial operations at the Airport is considered to be a Design Group IV aircraft. Design Group IV includes aircraft with a wingspan between 118 feet and 171 feet. Typical aircraft in this Design Group include the Boeing 757, 767, and 787; Airbus A300 and A310; and McDonnell Douglas DC10 and MD11. Runway 10R/28L meets the standards for Design Group IV.

The runway design standards for each of the runways at the Airport are summarized in **Table 3-11**.

Table 3-11
RUNWAY DESIGN STANDARDS

Design Criteria		10R/28L	10L/28R	6/24
App. Cat. / Design Group		C/D-IV	A/B–II	C/D-III
Width		150’	75’	100’ (120’ actual)
Shoulders		25’	10’	20’
Blast Pad		200’ (10R 100’ actual)	None	None
Runway Safety Area	width	500’	150’	500’
	length beyond threshold	1,000’	300’	1,000’
Object Free Area	width	800’	500’	800’
	length beyond threshold	1,000’	300’	1,000’
Runway Protection Zone	inner width	1,000’	500’	500’
	outer width	1,750’	700’	1,010’
	length	2,500’	1,000’	1,700’

Source: FAA AC 150/5300-13

Runway Safety Area Analysis

A runway safety area (RSA) is an area centered on the runway centerline and is designed to enhance the safety of aircraft that undershoot, overrun, or veer off the runway. The RSA should also support and provide greater accessibility for firefighting and rescue equipment during aircraft accidents and incidents. The design of the RSA must conform to the following:

- Cleared, graded, and have no potentially hazardous ruts, humps, depressions, or other surface variations.
- Drained by grading or storm sewers to prevent water accumulation.
- Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- Be free of objects, except for objects that need to be located in the RSA because of their function.

A complete RSA compliance study is being done as a component of the Master Plan study. For Runway 6, Airport Access Drive, the Airport security fence, the storm water retention pond, numerous utility facilities, and grading represent non-compliance with RSA standards. For Runway 24, there are numerous grading issues associated with stormwater drainage ditches and with the service road. The first phase of the RSA study has recommended reclassification of Runway 6/24 from an ARC C-III to B-II. Actual runway usage statistics and the redefining of the design aircraft support this action. This action would result in the RSA size reducing from 500 feet by 1,000 feet to 150 feet by 300 feet, and limiting the required RSA compliance corrective action to minor grading off the Runway 6 end.

Preliminary RSA evaluations have been done for the remaining two runways. For Runway 10R/28L, RSA non-compliant items include navigational aid servicing equipment and grading. Grading is also the primary issue for Runway 10L/28R. These issues will be addressed in conjunction with airfield improvement alternatives developed as part of this study.

<u>Runway Object Free Area Analysis</u>
The runway object free area (OFA) is an area on the ground centered about the runway centerline that is provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for aircraft navigation or ground maneuvering purposes. The runway OFA is a two-dimensional surface comprising both the runway OFA and the precision object free area (POFA).

For Runway 6, Airport Access Drive, the railroad, utility poles and lines, the Airport security fence, the storm water retention pond, and numerous utility facilities represent OFA standards non-compliance issues. The Runway 10R OFA is impacted by Airport Road and Airport security fence. These existing OFA non-compliance issues, as well as OFA standards associated with proposed future airport development, will be assessed for compliance mitigation as part of the airfield alternative analysis.

<u>Runway Protection Zone Analysis</u>
For the protection of people and property on the ground, the FAA has identified an area of land off each runway end as the runway protection zone (RPZ). For paved runways, the trapezoidal-shaped RPZ is centered on the extended runway centerline starting 200 feet from the paved runway end. The RPZ varies in width and length based on runway instrument approach classification.

The FAA recommends that the Airport, through property deeds and/or avigation easements, owns or controls the entire RPZ. Only the Runway 6 RPZ is not completely owned or controlled. The necessity for acquisition of this easement is assessed as part of the airfield alternative analysis.

<u>Runway Width</u>
The FAA recommends minimum runway widths based on aircraft category and design group standards that also consider operations conducted during reduced visibility. The runway widths provided for Runway 10R/28L and Runway 10L/28R are in compliance with applicable FAA design standards. However, Runway 6/24 exceeds the recommended runway width by 20 feet. The additional 20 feet of runway width is not sufficient to upgrade the runway to the next design standard category but is not considered to be an operational deficiency.

<u>Pavement Strength Analysis</u>
In FAA Form 5010-1, the pavement strength for Runway 10R/28L is currently listed at 100,000 pounds single-wheel gear (SWG), 175,000 pounds dual-wheel gear (DWG), and 300,000 dual

wheel tandem gear (DWTG). The pavement strength for Runway 6/24 is listed at 45,000 pounds SWG, 65,000 pounds DWG, and 100,000 pounds DWTG. Runway 10L/28R pavement strength is currently listed as 12,000 pounds SWG and is primarily used by smaller aircraft.

Verification of these pavement strengths and runway pavement conditions are completed as part of the Pavement Management Plan conducted in conjunction with this master plan.

3.4.2.3 Runway Lighting

Runway edge lights consist of a single row of two-directional lights bordering each side of the runway and can be classified according to three intensity levels. High intensity runway lights (HIRL) are the brightest runway lights available. Medium intensity runway lights (MIRL) and low intensity runway lights (LIRL) are, as their names indicate, lower in intensity.

Runway 10R/28L is equipped with HIRL. Runway 10L/28R and Runway 6/24 are equipped with MIRL. There is no LIRL installed at Capital City Airport. These lighting configurations are considered to be adequate for the existing and planned configuration of the Airport.

3.4.3 Taxiway Analysis

This section addresses specific requirements relative to the ability of the existing taxiways at Capital City Airport to facilitate the projected demand. At a minimum, taxiways must provide efficient circulation and must have the proper width, strength, and prescribed FAA design standards to safely accommodate the design aircraft for each system.

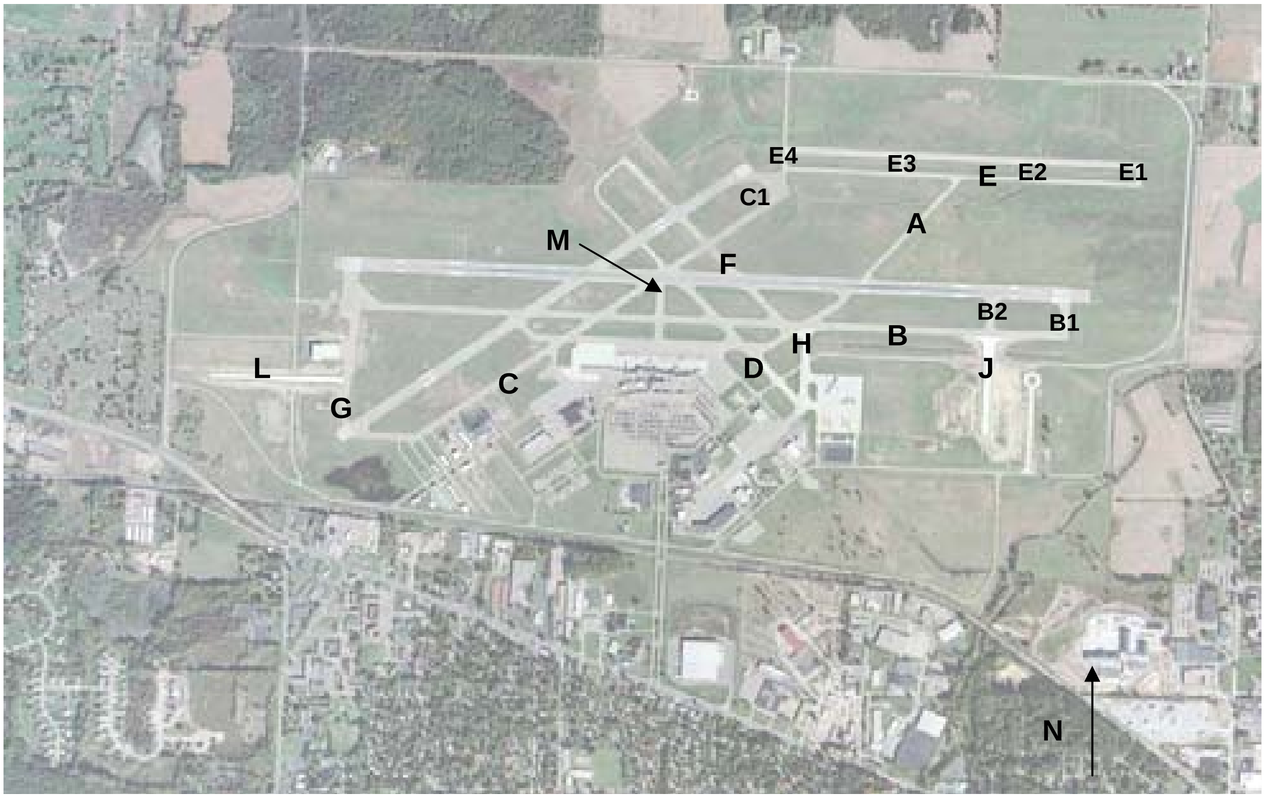
3.4.3.1 Taxiway Designations

The runways are supported by a taxiway system that provides an access interface between the runways and the aircraft parking and hangar areas. Taxiways are classified as either:

- **Parallel** - these taxiways facilitate the movement of aircraft to and from the runway
- **Exit** – these taxiways provide a means of entering and exiting the runway (does not include those taxiways designated as connector, parallel, or apron edge taxiways)
- **Connector** - these taxiways connect the runway and parallel taxiway system with the aprons and aircraft storage facilities
- **Apron Edge** - these taxiways are located on the edge of the aircraft parking apron
- **Apron Taxilanes** - these taxiways provide access to individual aircraft parking positions and/ or hangar areas

Taxiway design standards and dimensional criteria are defined on the basis of the design aircraft. The taxiways at Capital City Airport are shown in **Exhibit 3-3**.

Exhibit 3-3
TAXIWAY SYSTEM



<u>Parallel Taxiways</u>
The primary taxiways serving the runways are the parallel taxiways. Each runway at Capital City Airport has a full-length parallel taxiway.

The parallel taxiway serving Runway 10R/28L is designated as Taxiway B. The centerline to centerline separation between Taxiway B and Runway 10R/28L is 437.5 feet. FAA recommended design standards require a minimum lateral separation of 400 feet for Design Group IV aircraft. Taxiway B is 75 feet wide, which also meets the FAA recommended design standards for Design Group IV.

Runway 10L/28R has a full-length parallel taxiway, designated Taxiway E. The lateral separation between Taxiway E and Runway 10L/28R is 200 feet. This lateral separation exceeds the minimum separation standard for Approach Category A and B, Design Group I by 50 feet, but is 50 feet short of meeting Approach Category A and B, Design Group II standards. Taxiway E is 40 feet wide, a dimension that exceeds the minimum for Design Group II aircraft by five feet.

Runway 6/24 has a full-length parallel taxiway, designated Taxiway C. The lateral separation between Taxiway C and Runway 6/24 is 437.5 feet. This lateral separation also exceeds the minimum FAA standard separation for the aircraft able to use Runway 6/24. Taxiway C is 75 feet wide, meeting the standard for design groups IV and V. Taxiway C also serves as the primary aircraft access route to general aviation hangars and facilities located southwest of the terminal building.

Exit Taxiways

In addition to Connector and Parallel taxiways, Runway 10R/28L currently has eight exit taxiways available and Runway 6/24 has six exit taxiways available. Runway 10L/28R has four exit taxiways. Runway 10R/28L has eight total taxiways providing runway access, and Runway 6/24 has six total. Combined with the parallel and connector taxiways, the existing configuration of exit taxiways is considered adequate for existing and future operations at the Airport.

Connector Taxiways

There are six connector taxiways at the Airport. These include:

- **Taxiway A** – this taxiway connects Runway 10L/28R and Runway 6/24 with the terminal ramp 40 feet to 75 feet in width
- **Taxiway D** – this taxiway connects Runway 6/24 with the terminal, cargo, and southeast general aviation ramps
- **Taxiway F** – this taxiway connects Runway 6/24 with the terminal and cargo ramps
- **Taxiway G** – this taxiway connects Runway 6/24 with Taxiway B and serves the development located on the west ramp
- **Taxiway H** – this taxiway connects Taxiway B with the cargo ramp
- **Taxiway J** – this taxiway connects the east general aviation area to Taxiway B
- **Taxiway L** – this taxiway connects the west general aviation area to Taxiway G
- **Taxiway M** – this taxiway connects Runway 10R/28L with the terminal ramp

All of the connector taxiways are 75 feet in width, meeting the minimum FAA recommended design standard, with the exception of the portion of Taxiway A located north of Runway 10R/28L and Taxiway L. The portion of Taxiway A north of Runway 10R/28L is 35 feet wide and meets the minimum design standards for Group II. Taxiway L is 50 feet wide.

Apron Edge Taxiways

A portion of Taxiway A serves as an apron edge taxiway for the commercial passenger terminal area. The portion of Taxiway A located between Taxiway C and Taxiway D is configured in an east/west direction and is parallel to both Taxiway B to the north and the terminal aircraft parking apron to the south. The centerline to centerline separation between Taxiway A and Taxiway B is 250 feet. This exceeds the FAA recommended design standard for Design Group IV, but is short of meeting recommended design standards for Design Groups V and VI.

Apron Taxilanes

These taxilanes are generally oriented perpendicular to the primary access taxiway and are designed to taxilane standards. The apron taxilanes serving the southwest, west, and southeast general aviation facilities are taxilanes.

3.4.3.2 Taxiway Design Standards

The FAA defines taxiway design standards that are consistent with the airfield design aircraft. Depending upon the demand, portions of an airfield may be designed for one aircraft type and other portions for a different aircraft type. In the case of Capital City Airport, taxiways specifically associated with Runway 6/24 and Taxiway L have criteria specific to design group C-III aircraft.

This applies primarily to Taxiway C. The taxiways associated with Runway 10L/28R should have criteria specific to the design group B-I aircraft. However, criteria for design group B-II have been used, which is an acceptable practice providing an additional level of safety. These taxiways include A (north of Runway 10R/28L), E, E-1, E-2, and E-3. All other taxiways have criteria specific to design group D-IV aircraft. The FAA design separation standards for taxiways and taxilanes are provided in **Table 3-12**.

Table 3-12
TAXIWAY/TAXILANE SEPARATION STANDARDS

Design Group	Wingspan Range	Taxiway[1] to		Taxilane[2] to	
		Parallel Taxiway	FMO[3]	Parallel Taxilane	FMO[3]
I	< 49'	69.0'	44.5'	64.0'	39.5'
II	49' – 78'	105.0'	65.5'	97.0'	57.5'
III	79' – 117'	152.0'	93.0'	140.0'	81.0'
IV	118' – 170'	215.0'	129.5'	198.0'	112.5'
V	171' – 213'	267.0'	160.5'	245.0'	138.0'
VI	214' – 262'	324.0'	193.0'	298.0'	167.0'

[1] Taxiway – Under control of ATCT (movement area)
[2] Taxilane – Not under control of ATCT (non-movement area)
[3] FMO – Fixed or Movable Object

Source: FAA AC 150/5300-13

There is a separation of 93 feet between the centerline of Taxiway A and the terminal aircraft parking area clearance limit line. The tails of the aircraft expected to park in this area serve as the fixed or moveable object. The 93-foot separation between Taxiway A and the aircraft parking area limits Taxiway A to Design Group III aircraft. This would effectively eliminate usage by aircraft equivalent to a Boeing 757 or larger.

The FAA permits modifications from standard centerline to centerline separations based on the specific aircraft types expected to use the taxiways or taxilanes. Based on these permitted modifications to standards it may be possible to uniquely define the clearances to allow most aircraft operating at the Airport to continue to utilize Taxiway A and Taxiway B. Specific dimensions for aircraft currently or forecast to use Capital City Airport are provided in **Table 3-13**.

Table 3-13
AIRCRAFT SPECIFIC TAXIWAY/TAXILANE SEPARATION STANDARDS

Aircraft	Wingspan	Taxiway[1] to		Taxilane[2] to	
		Parallel Taxiway	FMO[3]	Parallel Taxilane	FMO[3]
RJ	66'	89.2'	56.2'	82.6'	49.6'
RJ	77'	102.4'	63.9'	94.7'	56.2'
B757	125'	160.0'	97.5'	147.5'	85.0'
DC-8-70	142'	180.9	109.7'	166.6'	95.4'
B767	156'	197.2'	119.2'	181.6'	103.6'
B747-200	196'	245.2'	147.2'	225.6'	127.6'
B777	200'	250.0'	150.0'	230.0'	130.0'

[1] Taxiway – Under control of ATCT (movement area)
[2] Taxilane – Not under control of ATCT (non-movement area)
[3] FMO – Fixed or Movable Object

The design aircraft at Capital City Airport is the Boeing 757. Based on its wingspan, this aircraft would require a taxilane centerline to fixed or moveable object separation of 85 feet. This dimension is eight feet less than the minimum standard required for a Group III taxiway. Thus, the largest aircraft currently operating at the Airport could taxi along Taxiway A if it were designated as a taxilane. A Douglas DC-8-70, which frequently operates at the Airport, or a Boeing 767 could not use Taxiway A under either designation since the taxilane clearance requirements for these aircraft are greater than the available dimension.

Since the aircraft parking apron depth ranges between 212 and 242 feet along the primary face of the terminal building, additional apron depth would not be needed. Thus, while there is excess lateral separation dimension, reducing this would not provide any particular benefit at the present time, and no changes would be warranted or recommended. If in the future it is decided to expand the north face of the existing terminal building, the excess dimension could be used to alter the position of Taxiway A and not diminish the utility of the apron depth of taxiway/taxilane capability.

Taxiway Safety Area

A taxiway safety area (TSA) is an area centered on the taxiway centerline and is designed to enhance the safety of aircraft that veer off the taxiway. The TSA should also support and provide greater accessibility for firefighting and rescue equipment during aircraft accidents and incidents. The design of the TSA must conform to the following:

- Cleared, graded, and have no potentially hazardous ruts, humps, depressions, or other surface variations.
- Drained by grading or storm sewers to prevent water accumulation.
- Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment and the occasional passage of aircraft without causing structural damage to the aircraft.
- Be free of objects, except for objects that need to be located in the TSA because of their function.

At Capital City Airport, all TSAs are in compliance with design criteria.

Taxiway Object Free Area

The taxiway object free area (TOFA) is an area on the ground centered on the taxiway centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the TOFA for aircraft navigation or ground maneuvering purposes. At Capital City Airport, all TOFAs are in compliance with design criteria.

Taxiway Hold Aprons/Bypass Taxiways

Air traffic control personnel occasionally encounter bottlenecks when moving aircraft ready for departure to the desired takeoff runway. Bottlenecks occur when a preceding aircraft is not ready for takeoff due to IFR departure clearances, or similar circumstances, and blocks the access taxiway. The FAA recommends that taxiway hold aprons and bypass taxiways be constructed when the runway operations reach a level of 30 operations per hour. Peak hour operations are forecast to exceed 15 operations per hour prior to 2008. However, average day operations at Capital City Airport are not forecast to exceed 17 operations per hour for the planning horizon. Therefore, it is not necessary for Capital City Airport to provide taxiway hold aprons or bypass taxiways.

3.4.3.3 Taxiway Pavement Analysis

Complete analyses of taxiway pavement conditions are included in the Pavement Management Plan completed in conjunction with this master plan.

3.4.3.4 Taxiway Lighting

All taxiways at Capital City Airport are equipped with medium intensity taxiway lights (MITL) except Taxiway G located on the west ramp.

3.4.4 Airfield Signage

The FAA recommends that all airports install a system of runway and taxiway guidance signs in accordance with the standards found in FAA AC 150/5340-18C, Standards For Airport Signage Systems. Guidance signs include mandatory instruction holding position signs for runway/runway intersections, runway/taxiway intersections, ILS Critical Areas, and Runway Approach Areas. Additional taxiway guidance signs include runway/taxiway location, runway exit and taxiway direction, inbound/outbound destination, and information signage. Airports installing the components of the runway and taxiway guidance sign system outlined in the Advisory Circular would be in compliance with the airport certification requirements of FAR Part 139. The Advisory Circular also indicates that runway distance remaining signage should be installed on all runways used by turbojet aircraft. Capital City Airport is in compliance with FAA signage requirements. Future airfield improvements must be designed incorporating these signage standards.

3.5 Airspace Requirements and Navigational Aids

Analysis of airspace requirements and navigational aids at Capital City Airport concludes that Visual Approach Slope Indicators should be replaced by Precision Approach Path Indicators when required due to equipment aging. The analysis also recommends that servicing stands used for approach light systems on Runway 10R and 28L are not compliant with FAA standards and should be removed. The bases of these conclusions are provided in the airspace, navigational aids, and visual lighting sections below.

3.5.1 Airspace Capacity Enhancements / Operational Efficiency

The current Class C Airspace is adequate for the existing and future operational requirements expected at Capital City Airport. Aircraft operating in the existing airspace have limited regimental procedures at the present time due to the limited volume and the airfield layout. If parallel air carrier runways (separated by 2,500 feet or more) are considered in the future, more detailed airspace procedures will have to be developed to recognize the simultaneous use of the runways. Specifically, directional arrival fixes will need to be defined along with downwind routes and flight altitudes that facilitate simultaneous approaches. Minimum separations of either three nautical miles or 1,000 feet of vertical separation will have to be maintained until aircraft are established on precision guidance. In addition, departure flight tracks that diverge by 15^{O} will have to be recognized as both an operational requirement and a noise consideration.

3.5.2 Navigational Aids

NAVAIDS and landing aids are generally grouped into airport facility equipment that provides horizontal guidance information for a non-precision approach, provide horizontal and vertical guidance information for a precision instrument approach, or provide visual cues to assist pilots in locating the airport and making final landing corrections.

All of the existing runways at Capital City Airport have appropriate navigational aids that are properly sited and in working condition. Both ends of Runway 10R/28L have instrument landing systems that provide a glide slope, localizer, and approach lighting system. The systems installed for Runway 28L and 10R meets Category I landing requirements, which require ceiling above 200 feet and visibility greater than ½ statute miles.

The FAA has officially adopted global positioning satellite-based navigation as the standard for the future. The existing radio based ground systems will be retained for the foreseeable future, but ultimately will be decommissioned with proper evolution of the satellite-based systems and procedures. The current deployment of the satellite based navigation system is referred to as the wide area augmentation system (WAAS). This capability is fully functional; however, airport standards for implementing the system and aircraft equipage are not yet ubiquitous. WAAS is currently authorized for use as a non-precision approach. Future reductions to precision approaches and, ultimately, to Category III capabilities is expected. Satellite based systems have the benefit of not requiring ground based systems such as localizers, glide slopes, and approach markers and eliminating the installation, operation, and maintenance costs associated with such systems. Significant benefits of WAAS include added system reliability and accuracy as a result of the artificially created real vision of an aircraft's position relative to surrounding terrain and manmade structures.

The FAA is still in the process of defining the requirements for the future capabilities of the satellite-based system. The focus is on the presence and elimination of obstructions, airport geometry standards compliance, and lighting systems. Each of these areas has renewed focus for strict adherence to FAA standards and are priority items at Capital City Airport for assuring compatibility with future capabilities.

3.5.3 Visual Aids

Visual aids include equipment that provides visual directional guidance to the pilot.

3.5.3.1 VASI / PAPI

Runways 6 and 24 are each equipped with a visual approach slope indicator system (VASI) to provide visual descent guidance to the runway. The VASIs are in good condition. As replacement becomes necessary due to equipment aging, it is recommended that the VASIs should be replaced with precision approach path indicators (PAPI).

3.5.3.2 Rotating Beacon

The Airport rotating beacon is located adjacent to the airport rescue and firefighting facility on the north side of the Airport. The beacon is in good condition and only in need of routine maintenance.

3.5.3.3 Approach Lighting Systems

Runways 10R and 28L are equipped with a medium intensity approach lighting system (MALSR) which extends 2,400 feet into each runway's approach area. Both of the Airport's MALSRs are owned by the FAA. The MALSRs are in good condition. However, there are servicing stands in each that are non-complaint with runway safety area standards and must be removed.

An extension of 1,250 feet is planned for Runway 28L. However, the threshold will remain in its current location. This will require conversion of the first four MALSR units to in-pavement units, and may require the lowering of remaining units. Facility requirements call for the future extension of this runway to 8,501 feet. With this extension, additional MALSR modifications will be required.

3.6 Terminal Area Requirements

Passenger terminal facilities at Capital City Airport include the main terminal building, air carrier ramp apron and surface parking lots.

3.6.1 Terminal Building

Peak hour and peak day passengers and aircraft operations are analyzed when evaluating the existing and forecast demand associated with terminal building requirements. The peak hour defines the minimum requirements and the peak day defines the utilization. These key demand values are summarized in **Table 3-14**.

Table 3-14
TERMINAL REQUIREMENTS FORECAST SUMMARY

Forecast Element	Year			
	2003	2008	2013	2023
Passenger Enplanements				
Peak Month Average Day	776	1,237	1,343	1,570
Peak Hour	155	247	269	314
Aircraft Operations				
Peak Month Average Day	84	134	144	156
Peak Hour	10	16	17	19

The facility design parameters are set by the demand pattern. The demand pattern resulting from peak month average day and peak hour passenger enplanements and aircraft operations is focused in the early morning hours. All of the airlines currently operating at Capital City Airport have early morning departures, the vast majority of which are by aircraft that remain over night at the Airport.

The terminal building should be defined to provide a balanced capacity with gate demand. The methodology for defining the existing demand and capacity of the terminal building and apron include the definition for the terminal building requirements given demand and comparing this to the existing area available. This method allows for a direct correlation between existing and future scenarios. An important aspect of this approach is to look at the requirements for numerous terminal building functional subcategories. If certain areas are under capacity and other areas are over capacity and only total square footage is considered, the terminal building may appear to be adequate. However, the terminal building may have critical deficiencies that are overlooked. The methodology used in this analysis considers the subcategories as well as the total terminal square footage in order to identify those deficiencies.

3.6.1.1 Total Square Footage

The existing terminal space utilization was presented in Chapter 1. This space utilization defined the functional use of the existing building for numerous space subcategories associated with the following six key functional areas:

- Airline
- Public
- Concession
- Utility
- Management
- Government

These space categories are used to define the existing facility capacity. A comparison of the existing terminal building requirements to the existing terminal building spaces is provided in **Table 3-15.**

Table 3-15
EXISTING TERMINAL SPACE DEMAND CAPACITY

2003 Existing Terminal Spaces						
Functional Area	**Domestic Area**		**International Area**		**Total Area**	
	Square Feet	**Percent**	**Square Feet**	**Percent**	**Square Feet**	**Percent**
Airline	59,670	40.2%	0	0.0%	59,670	40.2%
Public	44,230	29.8%	0	0.0%	44,230	29.8%
Concession	11,546	7.8%	0	0.0%	11,546	7.8%
Utility	11,488	7.7%	0	0.0%	11,488	7.7%
Management	20,334	13.7%	0	0.0%	20,334	13.7%
Government – TSA	1,072	0.7%	0	0.0%	1,072	0.7%
Subtotal	148,340	100.0%	0	0.0%	148,340	100.0%
Government	FIS @ 200 pax / hr		0	0.0%		
Total	148,340	100.0%	0	0.0%	148,340	100.0%

2003 Required Terminal Spaces						
Functional Area	**Domestic Area**		**International Area**		**Total Area**	
	Square Feet	**Percent**	**Square Feet**	**Percent**	**Square Feet**	**Percent**
Airline	43,312	32.7%	0	0.0%	43,312	32.7%
Public	40,666	30.7%	0	0.0%	40,666	30.7%
Concession	11,032	8.3%	0	0.0%	11,032	8.3%
Utility	11,750	8.9%	0	0.0%	11,750	8.9%
Management	21,150	16.0%	0	0.0%	21,150	16.0%
Government – TSA	4,500	3.4%	0	0.0%	4,500	3.4%
Subtotal	132,410	100.0%	0	0.0%	132,410	100.0%
Government	FIS @ 200 pax / hr		0	0.0%		
Total	132,410	100.0%	0	0.0%	132,410	100.0%

2003 Terminal Space Comparison						
Functional Area	**Domestic Area**		**International Area**		**Total Area**	
	Square Feet	**Percent**	**Square Feet**	**Percent**	**Square Feet**	**Percent**
Airline	16,358	102.7%	0	0.0%	16,358	102.7%
Public	3,564	22.4%	0	0.0%	3,564	22.4%
Concession	514	3.2%	0	0.0%	514	3.2%
Utility	(262)	-1.6%	0	0.0%	(262)	-1.6%
Management	(816)	-5.1%	0	0.0%	(816)	-4.9%
Government – TSA	(3,428)	-21.5%	0	0.0%	(3,428)	-21.5%
Subtotal	15,930	100.0%	0	0.0%	15,930	100.0%
Government	FIS @ 200 pax / hr		0	0.0%		
Total	15,930	100.0%	0	0.0%	15,930	100.0%

The requirements for each of the functional areas are defined on the basis of accepted industry standards to support the passenger and airline demands. As shown, the existing building area exceeds the required spaces by 15,930 square feet. This implies that there is additional capacity in the existing terminal building to accommodate future passenger demand. There are currently unused spaces in the terminal building, but the review of the individual spaces shows use and functional issues that are masked when the total aggregate square footage requirements are viewed. As a result, a complete analysis of all functional areas in the terminal was conducted.

Airline

There is currently a greater amount of airline space than is needed. This is largely a result of the constructed, but unleased, areas in the ticket area that include ticket queuing, ticket counter ATO, and baggage make-up. There are other issues associated with the current airline space that are noteworthy. These areas of concern are discussed below.

Ticket Counter Area

As noted in the inventory, there are seven ticket modules. Normally these would be allocated to one airline each. In January 2004, there were only four airlines operating at Capital City Airport (Northwest Airlines, Delta Airlines, United Airlines, and US Airways) and occupying dedicated ticket counter space (Allegiant and Continental are handled by Northwest). As a result, there is space for three independent airlines to be assigned space. The excess spaces are also a result of differing allocation standards used in the definition of the required spaces. For example, each existing module includes four ticket positions. In this requirements analysis, airlines operating small aircraft, turboprops and regional jets, were only allocated two ticket positions. These differences account for the existing excess capacity in the ticketing related areas. A notable limitation of the existing ticketing area is the lack of self-ticketing machines. These are not a factor today but are expected to be in the future.

Passenger Security Screening Area

The passenger screening areas at many airport terminals are paid for by the airlines as common space and should be included. Current peak hour passenger demand is below the capacity of a single lane ($\pm$ 170 passengers per hour). However, as demand approaches the capacity of a single lane, a second lane is typically necessary due to peaking within the hour. A second lane was recently added at Capital City Airport. This should be adequate for the foreseeable future.

Also noteworthy is that baggage screening is now conducted in the ticket counter queuing area using explosive trace detection (ETD) equipment. This will likely be the standard for small airports for the foreseeable future; however, this may change as the TSA completes deployment and funding for explosive detection systems (EDS) at larger, higher priority airports. The EDS units are much larger than the ETD units, and are typically deployed in the outbound baggage rooms. If this becomes a requirement for Capital City Airport, the existing baggage room configuration will not easily be capable of accommodating the units in the baggage screening configuration that is considered to be the most efficient.

Baggage Claim Area

The existing two baggage claim devices are adequate in number, but it would be desirable that at least one of the units have a greater amount of presentation frontage. A typical rule of thumb is that one claim unit can serve four to five gates. Thus, the two existing baggage claim units should adequately serve the existing gates. Regarding the presentation frontage, most flights can operate adequately on the existing 90 linear foot units. This is an industry standard for small narrowbody aircraft. Larger narrowbody aircraft would desirably have at least 120 linear feet of presentation frontage and widebodies would have 190 linear feet of presentation frontage.

Passenger Departure lounges/Holdrooms

The total holdroom area available exceeds the required area. However, this is misleading because of the distribution of the spaces. There are five areas that are designated as holdrooms. These areas do not necessarily provide a capacity to match the associated gate capacity. As an example, the largest passenger demands are associated with Northwest Airlines who operates the largest aircraft (gates). Their assigned holdroom is one of the smallest of the five areas. The largest holdroom only serves one regional jet. The distribution of the gates and the holdrooms is disproportionate and should be more closely associated with the gate capabilities. The addition of one or more passenger loading bridges is advisable, especially if additional regional jet users initiate services to the Airport.

Public
There are no notable limitations in this area. All spaces are approximately proportional to those that would be required. The excess shown is largely due to the ticket lobby associated with the unleased ticket counter modules.

Concession
Total concession space is shown to be slightly in excess of desired spaces. However, the predominant concession areas are located in the non-secure areas of the terminal. Limited food and beverage offerings are provided in the secure area at the present time, and there are no News/Sundry/Gift or specialty retail offerings in the secure area. Desirably, the majority of the concession spaces would be located in the secure areas of the terminal building. This is a noted limitation for the existing functional location of concession areas.

In addition, there are associated meeting rooms classified as concession area that have been historically retained in the terminal but receive limited use. Total concession spaces are typically in the 10 percent range of total terminal space. Airports with a more aggressive concession program may have as much as 12 to 15 percent of the total terminal spaces dedicated to concessions.

Utility
Utility spaces typically represent about four to six percent of the total building space. The types of building systems now in place represent almost eight percent of the total terminal building space. The types of systems used are a contributing factor to this existing relationship. It is assumed that because of the age of the building that the spaces and systems represent old approaches to HVAC systems and have a greater enclosed space requirement than those used in other terminal buildings. The existing systems are recognized as required since they are in place.

Management
There are no notable space limitations in this area. All spaces are approximately proportional to those that would be required. A point of note, however, is that the airport administrative offices are a non-essential part of the terminal building. While it is convenient for these offices to be located in the terminal, these requirements could be met in another facility. This may be an important consideration if the CRAA elects to develop a new terminal building. These requirements would not necessarily need to be replicated. Similarly, there are terminal maintenance functions in the terminal building that could be located in another facility.

Government (TSA)
While these requirements are still evolving, the spaces currently provided are estimated to be a minimum. The TSA typically has interests for space greater than that currently provided. Additional space will likely be needed/desired in the future. As a result, this space category is shown to be deficient at the present time. The consideration in the requirements for the TSA space category is related only to the personnel and support spaces rather than the actual processing area that is included as Airline Space.

3.6.1.2 Future Terminal Facility Requirements

The space requirements for the passenger, aircraft, and gate demands have been calculated for 2008, 2013, and 2023, using similar criteria to that used to calculate the existing terminals space requirements. These requirements are summarized in **Table 3-16**. As shown, the total terminal area increases with increasing passenger demands and the number of airlines serving Capital City Airport. The increased square footages are described below:

- In 2008, an additional 30,000 square feet of terminal space will be required over the required terminal areas calculated for 2003. The vast majority of this additional space is available from the currently unassigned space. Only 12,000 square feet of new space is required. As noted in the previous section, numerous spaces are not being used efficiently and modifications to these spaces could compensate for the new space requirements in this timeframe without additional new construction, and acceptance of some limited level of service losses.

- In 2013, the deficiency increases by an additional 15,000 square feet for domestic operation, and an additional 27,750 square feet for an FIS to support international services. Even with efficiency improvements, the 2013 terminal space requirements exceed the capability of the existing terminal building. New domestic terminal space required is over 25,000 square feet greater than the existing available. Expansion would be required in this timeframe.

  It is noteworthy that an FIS is included as a new building area in this time frame. Marketing efforts of the CRAA have identified international charter services as a potential, but need an FIS to accommodate the arrivals. All of the local international traffic is diverted to other airports as a result. The need for an FIS could be a nearer term need. It is shown in the 2013 time frame to reflect the time frame when the domestic portions of the terminal building clearly necessitate some expansion. It is noteworthy that the FIS space requirement definition is based upon past standards and may be reduced with emerging standards reflective of the combined agency organization that is now in place under Homeland Security relative to that when the FIS agencies were under the Department of Justice. The higher requirements are used here until new requirements are produced.

- In 2023, a total of 237,500 square feet of area will be needed in the terminal building. All functional areas become over subscribed. The total terminal area square footage required is almost 100,000 square feet greater than the area currently available.

While there are space deficiencies identified for the existing terminal, it is expected that interim improvements can be made to allow it to accommodate demand up to those associated with the 2013 time frame. The number of airlines that are expected in this time frame could use the existing ticketing related facilities. Improvements to the gates and holdrooms will be necessary to use the available spaces more efficiently than at the present time. In fact, the holdroom requirement will not exceed the existing space available until the 2023 timeframe. Secure concessions would desirably increase with increasing passenger levels. This deficiency represents a lost revenue opportunity rather than a functional deficiency, and could remain adequate with limited supplemental areas within existing spaces. It is important to note that by 2013, prop aircraft are not expected to be in the airline fleet. The ground level boarding facilities will become unneeded as time advances, placing added importance to increasing the number of passenger loading bridges in the building.

Table 3-16
FUTURE TERMINAL SPACE REQUIREMENTS SUMMARY

2003 Terminal Space Program Summary

Functional Area	Domestic Area		International Area		Total Area	
	Square Feet	Percent	Square Feet	Percent	Square Feet	Percent
Airline	43,312	32.9%	0	0.0%	43,312	32.9%
Public	40,666	30.4%	0	0.0%	40,666	30.4%
Concession	11,032	8.4%	0	0.0%	11,032	8.4%
Utility	11,750	8.9%	0	0.0%	11,750	8.9%
Management	21,150	16.0%	0	0.0%	21,150	16.0%
Government – TSA	4,500	3.4%	0	0.0%	4,500	3.4%
Subtotal	131,810	100.0%	0	0.0%	131,810	100.0%
Government	FIS @ 200 pax / hr		0	0.0%	0	0.0%
Total	131,810	100.0%	0	0.0%	131,810	100.0%

2008 Terminal Space Program Summary

Functional Area	Domestic Area		International Area		Total Area	
	Square Feet	Percent	Square Feet	Percent	Square Feet	Percent
Airline	60,181	37.5%	0	0.0%	60,181	37.5%
Public	46,153	28.2%	0	0.0%	46,153	28.2%
Concession	16,682	10.4%	0	0.0%	16,682	10.4%
Utility	11,750	7.3%	0	0.0%	11,750	7.3%
Management	21,150	13.2%	0	0.0%	21,150	13.2%
Government – TSA	4,500	2.8%	0	0.0%	4,500	2.8%
Subtotal	160,415	100.0%	0	0.0%	160,415	100.0%
Government	FIS @ 200 pax / hr		0	0.0%	0	0.0%
Total	160,415	100.0%	0	0.0%	160,415	100.0%

2013 Terminal Space Program Summary

Functional Area	Domestic Area		International Area		Total Area	
	Square Feet	Percent	Square Feet	Percent	Square Feet	Percent
Airline	67,289	38.4%	0	0.0%	67,289	38.4%
Public	47,665	27.2%	0	0.0%	47,665	27.2%
Concession	17,470	10.0%	0	0.0%	17,470	10.0%
Utility	11,750	6.7%	0	0.0%	11,750	6.7%
Management	26,350	15.1%	0	0.0%	26,350	15.1%
Government – TSA	4,500	2.6%	0	0.0%	4,500	2.6%
Subtotal	175,024	100.0%	0	0.0%	175,024	86.3%
Government	FIS @ 200 pax / hr		27,745	100.0%	27,745	13.7%
Total	175,024	100.0%	27,745	100.0%	202,769	100.0%

2023 Terminal Space Program Summary

Functional Area	Domestic Area		International Area		Total Area	
	Square Feet	Percent	Square Feet	Percent	Square Feet	Percent
Airline	75,582	39.4%	0	0.0%	75,582	39.4%
Public	56,696	28.4%	0	0.0%	56,696	28.4%
Concession	20,367	10.2%	0	0.0%	20,367	10.2%
Utility	11,750	5.9%	0	0.0%	11,750	5.9%
Management	26,450	13.3%	0	0.0%	26,450	13.3%
Government – TSA	5,500	2.8%	0	0.0%	5,500	2.8%
Subtotal	199,345	100.0%	0	0.0%	199,345	83.9%
Government	FIS @ 400 pax / hr		38,155	100.0%	38,155	16.1%
Total	199,345	100.0%	38,155	100.0%	237,500	100.0%

3.6.1.3 *Terminal Expansion Options*

The options for accommodating the future terminal requirements include one of the following:

- Continue to expand the existing building
- Move to a new site and develop a new terminal

While these may seem to be overly simplistic characterizations of the expansion opportunities, there are several considerations that need further analysis to draw a rational conclusion. First is that the existing building has numerous deficiencies at the present time that will further exacerbate the “band aid” look and feel of the existing terminal building. Second is that there are six future terminal building requirements that will require significant modifications to the terminal building:

- A new FIS facility
- Baggage claim capacity
- Additional (third) passenger security screening lane
- Additional secure concessions
- Potential new TSA baggage screening requirements
- HVAC system improvements

Continued investment in the existing terminal building will make it harder to move to a new facility that could be efficiently designed with proper functional adjacencies to effectively accommodate future growth. While the existing terminal is well maintained, constructing a new terminal would significantly improve the image of the Airport, provide growth for the long term (post 2023) future, and provide standards for critical areas that are less than desirable today. Moreover, other potential improvements may warrant that a new site be considered as well. These considerations include possible airfield expansion, as well as interests and options to provide a direct ground access connection to the freeways to the north of the Airport.

Based upon the analysis completed for the forecasting and the terminal requirements presented herein, a decision on these opportunities should be made in the near term. It is expected that the existing terminal can accommodate additional passenger traffic and new airlines envisioned for the 2013 time frame with minor modifications and a lessening, but acceptable, level of service. A detailed study may be needed to resolve the questions regarding the possible relocation of the terminal to a new site. These would include a complete financial analysis of revenues and expenses, as well as, a funding source review to address investments in new ground access, auto parking, apron and terminal building costs. These collective issues will be addressed in the alternative analysis chapter.

3.6.1.4 *Gates*

Recent trends in the airline industry have shown that regional jets are replacing turboprop aircraft. This trend is well established and is expected to continue growing; therefore, the existing gates are defined to represent a mix of turboprop and jet aircraft in order to accommodate the variable fleet mix utilizing Capital City Airport. Turboprop aircraft activity at the Airport was reduced in late 2003, following the withdrawal of service by US Airways. The existing gates at Capital City Airport are shown in **Exhibit 3-4**. The existing peak hour fleet mix is shown in **Table 3-17**.

Exhibit 3-4
TERMINAL GATES

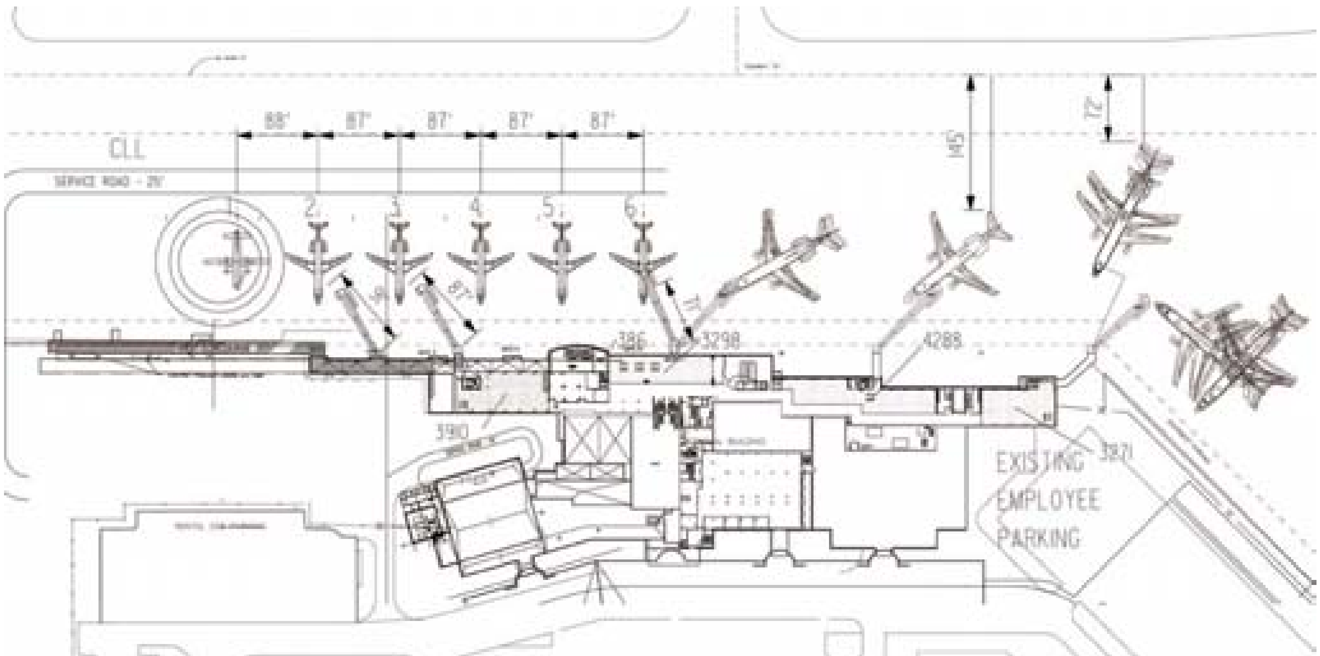


Table 3-17
2003 PEAK HOUR FLEET MIX

Aircraft Size Categories		Typical Aircraft	Number of Gates
Turboprop	Prop	Saab 340, BE1	3
Small regional jet	RJ SM	CRJ, EMB145	2
Large regional jet	RJ LG	CR70	0
Small narrowbody	NB SM	B737-300	2
Large narrowbody	NB LG	A320, B737-800/900	1
B757	B757	B757	0
Widebody	WB	B767	0
Widewing	WW	B777, A340	0
Jumbo jet	Jumbo	B747	0
New large aircraft	NLA	A380	0

Ten aircraft parking positions are served by five loading bridges. Three of the jet gates currently provide one passenger loading bridge for every two jet positions. By utilizing three of the passenger loading bridges for multiple jet positions the Airport is able to accommodate five to seven jet aircraft.

The apron, however, is complicated by the turboprop positions that use the same areas as the jet aircraft. This apron setup limits the ability to accommodate additional jet aircraft. Therefore, existing gate capability provides for three turboprop aircraft and five jet aircraft.

Taking into account the constraints placed on the gates by mixing turboprop and jet aircraft, the existing gates are currently operating at capacity. If additional service is introduced by a new airline it is expected that regional jets would be utilized. The existing configuration of passenger loading bridges may limit scheduling flexibility and result in difficulty sustaining the new service.

The forecast of peak hour operations implies either a growth in the number of airlines serving Capital City Airport in the future, an increase in markets served, or both. The peak hour is reflective of the morning period when most airlines would want a departure and, therefore, a gate. A hypothesized future peak hour airline, aircraft, and departure matrix for each of the planning horizons is shown in **Appendix I**. The airlines and the markets are speculative, but are presented to show that the forecast can be rationalized in terms of actual and potential airlines and markets. There is no commitment or expectation that the airlines shown in the hypothesis will emerge to fulfill the forecast, merely that these would be logical candidates in today's industry. Gate requirements for the future based upon the hypothesized users are provided in **Table 3-18**.

Table 3-18
FUTURE GATE REQUIREMENTS AND UTILIZATION

Planning Horizon	Peak Operations		Peak Departures		Number of Gates	Utilization	
	Hour	Day	Hour	Day		Hour	Day
2003	10	84	8	42	8	1.0	5.3
2008	16	134	11	67	11	1.0	6.1
2013	17	144	11	72	11	1.0	6.5
2023	19	156	15	78	15	1.0	5.2

The gate requirements are derived from the forecast demands. The peak hour generally reflects the use of each gate for a single departure. This could be representative of the number of airlines serving the airport, the number of markets served, or both. Defining the gate requirements for the peak hour can be overstated if the daily utilization of the each gate is not appropriate. Daily utilization would be in excess of 5.0 for all periods. The Air Transport Association rule of thumb for gate utilization suggests that between four and six departures per gate per day is reasonable utilization. In order to maintain this utilization rate, the required number of gates increases with future increases in peak aircraft operations.

Gate requirements must also consider the presence of an FIS facility. While there are currently no FIS facilities at Capital City Airport, marketing plans for the Airport include charter flights to Mexico and the Caribbean. Arriving international passengers are required to remain sterile until processed by FIS agencies. This requirement would necessitate that a gate be directly connected to FIS facility. It is recommended that this gate be developed to serve both the international charters and other non-scheduled flights. This arrangement would provide flexibility for other charters that now use scheduled airline gates. Future gate requirements and utilization are summarized in **Table 3-19** and recommended gate sizes are defined in **Table 3-20**.

Table 3-19
FUTURE GATE REQUIREMENTS AND UTILIZATION SUMMARY

Planning Horizon	Domestic Scheduled	Charter[1]	Total Gates
2003	8	0	8
2008	11	0	11
2013	11	1	12
2023	15	1	16

[1] Implies a non-dedicated use gate operated and assigned by the Airport Authority to serve international and domestic non-scheduled flights.

Table 3-20
FUTURE GATE SIZES

Type/Use	Aircraft Types									
Planning Horizon	Prop	SM RJ	LG RJ	SM NB	LG NB	WB	WW	Jumbo	NLA	Total
Domestic Scheduled										
2003	3	2	0	2	1	0	0	0	0	8
2008	2	6	0	2	1	0	0	0	0	11
2013	0	5	3	0	3	0	0	0	0	11
2023	0	7	4	1	3	0	0	0	0	15
Charter										
2003	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	1	0	0	0	1
2023	0	0	0	0	0	1	0	0	0	1
Total All Gates										
2003	3	2	0	2	1	0	0	0	0	8
2008	2	6	0	2	1	0	0	0	0	11
2013	0	5	3	0	3	1	0	0	0	12
2023	0	7	4	1	3	1	0	0	0	16

Prop = 30 seats, SM RJ = 50 seats, LG RJ = 70 seats, SM NB = 120 seats, LG NB = 150 seats, WB = 240 seats, WW = 300 seats, Jumbo = 400 seats, NLA = 550 seats

Gate requirements increasing over time is consistent with a growing market. The regional jet is the predominant aircraft type anticipated to be used at Capital City Airport. It is recommended that the charter gate be capable of accommodating a widebody (WB) aircraft, as some charters are likely to be a Boeing 767 aircraft. International flights are expected to utilize either Boeing 757 or large narrowbody aircraft (LG NB). No wide wing aircraft (WW), Jumbo (B747), or new large aircraft (NLA) are expected at Capital City Airport at any point in the future.

3.6.2 Apron

Frontage associated with the gates is a measure of the linear feet of terminal apron interface needed. This dimension can vary as a function of the gate operational mode (i.e., power-in/power-out versus power-in/push-out) and the minimum wingtip clearances between aircraft. The gate frontage is a dimension measured across the face of the terminal within the aircraft parking area. This dimension indicates the number of aircraft that can be parked at the same time. The total gate frontage available at Capital City Airport is 1,612 linear feet, of which 880 linear feet is prime frontage and 378 linear feet is usable but not prime. The usable frontage is estimated to be 1,130 linear feet.

Typically, power-in/power-out operation is a luxury that can rarely be afforded at many airports. At Capital City Airport this is the predominant gate access and egress operational mode and is a contributing factor to the difficulties expected in the future. Industry standards for wingtip clearances are:

- Turboprops and regional jets = 10 feet
- Narrowbody and B757 = 20 feet
- Widebody and Larger = 25 feet

Clearances from service roads within the aircraft parking area (i.e., those not parallel to the depth clearance limit line or adjacent to the aircraft parking area) are 10 feet for all aircraft types. The gate frontage requirements are summarized in **Table 3-21**. The existing gate frontage is expected to be adequate until 2013. This will require that a change in the predominant operating mode be made from power-in/power-out to power-in/push-out for all gates.

Table 3-21
POWER-IN/PUSH-OUT GATE FRONTAGE REQUIREMENTS

Planning Horizon	Gate Frontage (linear feet)
2003 Existing	1,130
2003	781
2008	1,030
2013	1,119
2018	1,509

3.6.3 <u>Auto Parking</u>

Auto parking requirements include public vehicle parking at the terminal, and Airport employee parking.

3.6.3.1 Public Parking

Capital City Airport provides two public parking options for airline passengers and meeters and greeters: short-term and long-term parking. The public parking lot is conveniently located directly across from the terminal with an average walking distance of 420 feet. The existing total parking capacity is 1,842 spaces, including 164 short-term and 1,678 long-term spaces.

In order to determine the future parking requirements, a ratio of parking spaces per enplanements has been utilized. The industry norm for medium to small hub airports is a ratio of 3.5 to 4.0 spaces per 1,000 enplanements. However, several factors, such as the high percentage of passengers driving to the Capital City Airport, the lack of private off-airport parking, and the recent introduction of holiday charter flights, affect the standard ratio. Therefore, for the purposes of facilities planning the higher ratio of 4.0 spaces per 1,000 enplanements was applied to determine existing and future parking requirements.

To ensure that using the ratio of 4.0 spaces per 1,000 enplanements is appropriate, historical parking counts were collected and analyzed from Standard Parking for December 2003 and March 2004 (which are, per Standard Parking's records, recent peak periods). According to Standard Parking's records, the peak month, average day parking count in the lot for December 2003 was 1,010 vehicles and March 2004 was 1,073 vehicles. Standard Parking's records further indicate that long term vehicles stayed an average of three days and short-term averaged 1.5 hours per visit. Given the parking records, as noted above, and the enplaned passenger counts (271,000 for

2003), it can be seen that historically the Airport has had a ratio of 3.73 cars per 1,000 enplanements (1010/[271,000/1000] = 3.73); therefore, the proposed ratio of 4.0 per 1,000 enplaned passengers is considered appropriate.

As an additional consideration, each parking area is assumed to have a maximum utilization rate of 90 percent. This utilization rate, which is an industry norm, is intended to avoid excessive circulation of vehicles in search of parking. Therefore, the 90 percent utilization rule has been applied to each planning period.

Table 3-22 illustrates the existing and future parking demand by number of spaces and calculates the approximate area required to satisfy that demand. Currently, the parking facilities have excess capacity, however by 2008 or when annual enplanements reach 415,000, the parking lot will reach capacity. By 2023, approximately 477 spaces or approximately 3.8 acres of additional parking space will be required.

Table 3-22
AUTO PARKING SPACES REQUIRED

	Historic	**Forecast**		
	2003*	**2008**	**2013**	**2023**
Annual Enplanements	271,000	415,000	451,000	527,000
Current Total Spaces	1,842			
Current Area (in Acres)	14.7			
Public Parking: Total Parking Demand	1,084	1,660	1,804	2,108
Total Parking Spaces Required (Including 10% over)	1,192	1,826	1,984	2,319
Utilization Rate	59%	90%	90%	90%
Additional Parking Spaces Required (to maintain max 90% utilization)	n/a	*at capacity*	142	477
Additional Space Required (in Acres)**			1.1	3.8

***Source: Airport Records*
****Source: Base mapping and Aerial photography*

Short Term vs. Long Term Parking

The division between short term and long term parking typically varies from 10 percent to 20 percent. Currently, the short term parking ratio is 9 percent of the total spaces. With convenient long term parking available, a lower short term parking percentage of 10 percent will be applied to determine future parking requirements.

Based on Table 3-22, the public parking lot will approach capacity in approximately 2008, and thus will require expansion to meet demand for both short and long term parking. To determine the appropriate number of short and long term spaces required over the planning period, the above ratio of 10 percent short term parking spaces was applied to the total number of spaces required to satisfy the forecast demand (see Table 3-23).

Table 3-23
SHORT AND LONG TERM PUBLIC PARKING REQUIREMENTS

	Historic	Forecast		
	2003*	**2008**	**2013**	**2023**
Public Parking:				
Total Parking Demand	1,192	1,826	1,984	2,319
Short-Term Parking Spaces	119	183	198	232
Long-Term Parking Spaces	1,073	1,643	1,786	2,087

**Source: Airport Records*

Security Related Impacts on Public Parking

Immediately following the events of September 11, 2001, the newly established Transportation Security Administration (TSA) implemented what has been commonly referred to as the "300-foot Rule". This rule required an airport eliminate the ability of users to park within 300 feet of the terminal building, under specified threat levels, in order to minimize the potential for damage caused by vehicle based explosive devices. Implementation of this rule at Capital City Airport resulted in the loss of the majority of short term parking as well as a portion of the long term parking.

To circumvent the "300-foot rule", airports were allowed by the TSA to prepare Bomb Blast Analyses for inclusion in their Contingency Plans. Approval and implementation of these plans eliminated the requirement to comply with the "300-foot Rule". In order to regain the lost parking, the Airport prepared and submitted for approval their plan in 2002. In May of that year the TSA approved the Airport's Bomb Blast Analysis as part of the Contingency Plan the Airport implemented to address security related issues, and thus allowed passenger parking within 300 foot of the terminal.

Terminal Employee Parking

At Capital City Airport, there are currently 108 employee parking positions required (per Airport records), with only 99 spaces available in the employee parking lot located on the east side of the terminal building. Thus, the lot fills daily, a situation that requires several employees to park in the public parking. Given the current "overflow" situation, it is clear that as the number of passengers increase, that additional employee parking will be required. It is also clear that the current ratio of 0.4 employees per 1,000 annual enplanements is higher than the industry standard of 0.12 employees per 1,000 annual employees (source: American Association of Airport Executives). However, for the purpose of facility planning, the higher ratio of 0.4 employees per 1,000 enplanements has been utilized to determine employee parking requirements (see **Table 3-24**).

As shown in Table 3-24, the current employee parking lot is at capacity and additional space is required. By 2023 the existing employee lot will be required to double in size to accommodate an additional 112 spaces.

Table 3-24
TERMINAL EMPLOYEE PARKING REQUIREMENTS

	Historic	Forecast		
	2003	**2008**	**2013**	**2023**
Annual Enplanements	271,000*	415,000	451,000	527,000
Current Parking Capacity:	99			
Current Parking Area (Acres):	1.1**			
Required Employee Parking	108	166	180	211
Additional Required Spaces	9	67	81	112
Additional Acres Required	+.07	+.5	+.65	+.9

*****Source: Airport Records*
***Figure is derived from aerial photography and base maps*

3.6.4 Rental Car Requirements

Parking requirements for rental car agencies are defined based on the agency locations. The facility requirements analysis segregates the agencies as on-airport and off-airport agencies.

On Airport Rental Car Agencies
Four rental car agencies have on-airport facilities at Capital City: Avis, Budget, Hertz and National. Currently, these rental car companies have 250 square feet of exclusive ticket counters in the terminal, adjacent to the baggage claim area. The existing rental car ready/return lot west of baggage claim, which is comprised of 92 spaces, is also shared among the four agencies. The rental car agencies also require vehicle storage and service areas that are operated independently. Contained on approximately 3.4 acres, the four storage and service areas are located southwest of the terminal.

The required rental car demand fluctuates based upon passenger demand and time of year. During the summer months (which are the peak periods) the number of rentals can increase by 50 percent to 75 percent. For planning purposes, the typical airport standard for medium to small hub airports is one space per 750 annual enplanements. Therefore, the total rental car demand was calculated based upon forecast enplanements, and the overall facility requirements were calculated on their current space utilization. The total parking available in the storage area was calculated based on 125 spaces per acre, which provides parking for 425 vehicles. **Table 3-25** illustrates the projected rental car demand.

Table 3-25
RENTAL CAR REQUIREMENTS

	Historic	Forecast		
	2003	**2008**	**2013**	**2023**
Annual Enplanements	271,000*	415,000	451,000	527,000
Rental Car Parking Capacity				
Ready/Return Lot	92*			
Four Storage Facilities	425*			
Parking Available	517*			
Rental Car Parking Demand	361	553	601	703
Additional required Spaces	0	36	84	186
Additional Acres Required		+0.3	+0.7	+1.5

*****Source: Airport Records

Based on the above rental car parking demand, the available ready/return parking lot and storage/service area would be over capacity by 2008. In addition, the above calculation does not account for the introduction of any additional agencies. It assumes that only four agencies continue to serve the airport, and thus does not account for an overall increase in the total number of rental cars and space required to accommodate additional agencies, such as those currently operating off-airport (see below). Therefore, the additional space of 1.5 acres required to support the 2023 forecast demand for rental cars can be considered conservative, and does not account for rental car agency space, which is assumed to be included in the terminal itself, nor does it reflect the intent of the Airport to draw the off-airport agencies onto Airport property.

Off Airport Rental Car Agencies
Two off-Airport rental car agencies, Thrifty and Enterprise, accommodate a small percentage of the Airport rental car passenger demand. Thrifty is the closest, located on Capital City Boulevard, with capacity to store 45 vehicles. Approximately 75 percent of Thrifty's business comes from Airport passengers. Enterprise, which is located 10 minutes from the Airport, only obtains 5 percent of its business from Airport passengers. Hence, limited overflow capacity is available at off-airport rental car agencies to handle the future Airport rental car demand.

Additionally, as indicated above, it is the desire of the Airport to have these agencies either housed in the terminal itself or located on Airport property. Therefore, for the purpose of facility planning, the rental car facility requirements should be adjusted to include all the potential rental agencies and their requirements.

3.6.5 Public Transportation

Public transportation is available to the Airport via bus service provided by the Capital Area Transit Authority (CATA). A fixed bus route, #14 and #12A, provides service to the Capital City Airport from downtown with multiple stops. The Airport bus route service is scheduled on week days starting at 6:30 am and the last pick-up is at 6:05 pm. The fare is $1.00 and the bus stop is located in front of the terminal on the outer curb roadway.

3.7 General Aviation Requirements

General Aviation (GA) activity is forecast to increase by 1 percent annually from 2003, reaching 72,600 annual operations by 2023 – an increase of more than 13,000 operations over the next twenty years. Of those operations, 42 percent are anticipated to be made by based aircraft and 58 percent by itinerant aircraft. Based on current trends, it is anticipated that the itinerant aircraft operations will be composed of light to medium weight business jets such as, Bombardier Learjets, Cessna Citations, and Raytheon Hawkers. A mix of single and multi-engine piston and heavy business jets, such as Canadair and Gulfstream series aircraft, are also anticipated to be included in the itinerant aircraft mix.

The increase in overall operations will affect the requirements for both hangars (for based aircraft) and tie-down space (for both based and itinerant aircraft). To determine the facility requirements both historic activities and current capacities have been compared to forecast activities to ascertain the facilities required throughout the forecast period.

3.7.1 Aircraft Storage Hangars

The amount of hangar space required at an airport is often a function of local weather conditions, aircraft type, airport security and user preferences. Airports that experience moderate weather conditions generally store 30 percent of the based aircraft in hangars. Airports that experience extreme weather conditions, such as severe winter temperatures and precipitation, generally store more than 80 percent of the based aircraft in hangars. As general aviation aircraft continue to develop into more sophisticated and expensive investments, it is anticipated that the owners of these aircraft would desire hangars to protect their investment.

Currently, most of the based multi-engine and corporate business jets at the Airport are stored in conventional hangars, while the smaller single-engine aircraft are stored in the 60 available T-hangar units. Combined, the two types of aircraft storage provide the Airport with approximately 100 GA aircraft storage hangar positions.

To determine the number and type of aircraft storage facilities required over the planning period, the forecast of based aircraft, which was developed as part of the Forecast of Aviation Demand, has been compared to existing trends in aircraft storage. To assist in determining the amount of area necessary to accommodate the required hangar space, a planning standard of 1,200 square feet per T-hangar, and 2,000 square feet per aircraft stored in a box-hangar has been utilized. **Table 3-26** demonstrates the facility requirements for both conventional hangars and T-hangars. To ensure the Airport's ability to both attract and accommodate growth in the area of based aircraft the facility requirements have been prepared based on a 95 percent occupancy rate, thus allowing the Airport to continually provide capacity in aircraft storage.

Table 3-26
HANGAR STORAGE REQUIREMENTS

	Historic	Forecast		
	2003	**2008**	**2013**	**2023**
Based Aircraft*				
Single-Engine	59	64	64	66
Multi-engine	32	37	39	43
Jet	6	9	11	15
Rotorcraft	2	2	2	2
Other Miscellaneous	1	1	1	1
Total Based Aircraft	100	113	117	127
Hanger Space**				
T-Hangar Positions	60	68	68	68
Box Hangar Positions	40	48	52	60
T-Hangar Area (sq. ft.)	72,000	81,600	81,600	81,600
Box Hangar Area (sq. ft.)	80,000	96,000	104,000	120,000
Total Hangar Positions	100	116	120	128

**Source: Airport Records*
***Source: Base mapping and Aerial photography*

3.7.2 Aircraft Apron

An aircraft parking apron should be supplied to accommodate aircraft used for training, itinerant aircraft, and some portion of the total based aircraft. However, in regard to the based aircraft, it should be noted that both the current and projected hangar capacity equals the existing and forecast based aircraft. As such, the overall number of based aircraft that will be used to determine the size of the overall apron has been limited to a conservative 15 percent of total based aircraft during the forecast period.

FAA Advisory Circular 150/5300-13, Appendix 5, provides methodology by which apron requirements can be determined for GA facilities, based on the knowledge of busy-day operations. Simply stated, the methodology assumes the number of operations in the busiest day to be 10 percent greater than the average day operations. Appendix 5 recommends that the amount of itinerant aircraft parking positions needed at one time be approximately 50 percent of the peak-day itinerant operating aircraft. The FAA planning criteria further specifies that 360 square yards of apron be provided for each based aircraft not stored in a hangar and that 670 square yards of apron is provided for each itinerant aircraft position (See **Table 3-27**).

Table 3-27
AIRCRAFT PARKING APRON REQUIREMENTS

	Historic	Forecast		
	2003	2008	2013	2023
Based Aircraft Apron Requirements				
Based Aircraft Positions	15	17	18	19
Apron Area (sq. yds.)*	5,500	6,000	6,500	7,000
Itinerant Ramp Requirements				
Busy Day Itinerant Operations	96	110	115	127
Itinerant Aircraft Positions	24	28	29	32
Aprons Area (sq. yds.)*	16,000	19,000	19,500	21,500
Total Positions	39	45	47	51
Required Apron Area (sq. yd.)*	21,500	25,000	26,000	28,500

**Source: All apron area requirements were calculated based on the FAA criteria set forth in AC 150/5300-13 Appendix 5.*

As discussed in Chapter 1, Inventory, Superior Aviation, Inc., currently leases approximately 7,000 square yards of apron space from the Airport. This space is presently used for charter and air cargo operations and is not available for transient aircraft parking, but has been included in this analysis due to the activity of based GA aircraft used by Superior for parking space. Transient aircraft are able to utilize the AvFlight GA apron located southwest of the main passenger terminal, which provides approximately 15,000 square yards of apron and 10 tie-down spaces. Therefore, the total GA apron available at the Airport is approximately 22,000 square yards. As such the total GA apron available is required to increase by approximately 6,500 square yards during the course of the planning period.

3.7.3 Fixed Base Operators

A fixed base operator (FBO) is the primary provider of services to general aviation aircraft. The forecast for this segment is important when considering future FBO requirements. The small increase in based aircraft and general aviation operations in the next 20 years appear to create limited demand for additional FBO operators at the Airport. However, the potential for the Airport to solicit a specialized FBO focusing on a specific business segment of aviation should be considered. As an example, the addition of an avionics installation and repair facility may create additional general aviation demand. The Airport may also plan for additional hangar space by requiring overnight hangar storage service.

AvFlight currently operates as the only FBO providing services to General Aviation aircraft. Jet Center provides typical services such as aircraft fueling and maintenance along with specialty services such as catering for business aircraft; however no avionics repair services are available through the Jet Center. Additionally, Jet Center provides fueling services to the airlines operating at Capital City Airport. All of these services are provided through Jet Center's facility located west of the terminal building.

Jet Center's 34,200 square feet building contains space for pilot lounge, passenger waiting area, business offices, weather and flight planning areas, and rest room facilities. Attached to the office building is an aircraft hangar large enough to hold four Saab 340 type aircraft. This hangar is used by Aero Genesis (a company affiliated with Jet Center) to conduct heavy maintenance on these aircraft. Jet Center also leases apron space from the Airport Authority to provide aircraft parking space for transient aircraft using Jet Center's services. Coordination with Jet Center staff indicates that the current facilities are sufficient for existing and planned business.

3.8 Aviation Support Facilities

This section discusses the facility needs of aviation support facilities including air cargo, airport rescue and fire fighting, airport maintenance and fuel storage.

3.8.1 Air Cargo

The purpose of this section is to identify the facilities required to support air cargo operations at the Airport. As indicated in the forecast, air cargo is anticipated to increase throughout the planning period, with the current operators – UPS and Superior, continuing to play a major role. It is also anticipated that another large cargo operator may also serve the Airport at some point in the planning period. To ascertain the facilities required to support this activity at the Airport, it is necessary to understand the current operations, and be able to project future facility requirements for three primary areas associated with the Air Cargo: the air cargo processing facility, the aircraft apron, and the landside area (automobile and transport truck parking/unloading areas).

Currently, UPS, with Superior acting as a feeder operation, operates at the Airport utilizing a 12,500 square foot cargo processing facility and a 15,000 square yard aircraft apron. The air cargo processing facility has both a designated, contiguous parking lot and an additional semi-remote, unpaved overflow parking area associated with the facility. The parking lot occupies approximately 2,000 square yards, with the overflow parking covering approximately 2,500 square yards (for a combined total of 4,500 square yards). It has been indicated by representatives from UPS that the current cargo processing facility operates at approximately 75 percent of capacity during off-peak periods, with 100 percent utilization during holiday periods, such as Christmas, when package volume traditionally increases. It has also been indicated that the aircraft apron and the landside area associated with the processing facility exceed existing capacity during those same peak periods.

For the landside areas, peak periods generate truck traffic that exceeds the capacity of the landside area and the cargo facility, and thus the trucks are required to wait (park) prior to transferring their packages to/from the facility. This is indicative of unmet demand and appears to suggest a need for expanding both the existing air cargo processing facility and the landside area associated with the facility, thus increasing its throughput capacity to meet the landside demand. Doing so would, in turn, place pressure on the apron area and thus require an increase in capacity in that area of UPS's air cargo operation. However, representatives of UPS have indicated that peak periods represent a substantial increase in operations, and thus do not reflect the typical demand placed on these facilities. It has been further indicated that UPS is willing to accept the delays associated with the current configuration during peak periods provided that the overall facilities, particularly the cargo processing facility, maintain a 25 percent "surge potential" beyond the normal, off-peak, demand.

Therefore, to determine the facility requirements for the cargo processing area for UPS, the current demand and capacity of the facility (which maintains the desired 25 percent "surge capacity") has been compared to the forecast demand to determine the overall size of the air cargo processing facility, aircraft apron, and landside areas required to meet the forecast demand.

Sort Facility
As cargo volume is forecast to triple during the planning period, the sort facilities, and the landside areas associated with it, will require expansion. The current Air Cargo facilities processed approximately 24,800 tons of total cargo in 2003, or approximately 4,000 pounds per square foot. During 2000, the peak year for air cargo volume according to Airport records, the facility processed 32,600 tons of cargo, which equates to over 5,000 pounds per square foot. Based on the current and historic operation of the facility, and on the indicated requirement to maintain a 25 percent surge capacity within the processing facility, a conservative 4,000 pounds of cargo per square foot of cargo building has been utilized to establish the facility requirements for the Air Cargo processing building (see **Table 3-28**).

Table 3-28
AIR CARGO SORT FACILITY

	Historic	**Forecast**		
	2003	**2008**	**2013**	**2023**
Air Cargo (tons)	24,800*	43,800	52,500	71,950
Sort Facility (sq. ft.)	12,500**	22,000	26,500	36,500
Landside Area (sq. yds.)	4,500**	7,900	9,500	13,000

**Source: Airport Records*
***Source: Base mapping and Aerial photography*

In addition to the expansion of the sort facility, the landside areas, such as the truck docks, employee parking, etc., must also be expanded to increase their capacity. As indicated above, the landside component operates at or below capacity at all times except peak periods. Therefore, it is assumed that expanding the landside areas in step with the sort facility should provide adequate, non-peak capacity. As such, the percentage growth in the sort facility has been equally applied to the landside facilities to determine that areas overall facility requirements, as depicted in Table 3-28.

Aircraft Apron
As the volume of cargo is anticipated to increase threefold over the planning period, it can also be assumed that the lift capacity must also increase to meet that increased demand. An increase in lift capacity can be accomplished either or both of two ways: increase the number of flights or increase the size of aircraft. Given that the current UPS aircraft do not operate at high load factors during off-peak periods, it has been assumed that their current fleet mix will remain unchanged in the short term (less than 10 years); however, it is anticipated that as demand dictates larger aircraft, such as the B767 with greater lift capacities, may either replace or supplement the aircraft currently being utilized by UPS to serve the Airport. For the purpose of this analysis it is also assumed that the air cargo apron currently operates at or below capacity for the majority of the year, while meeting or exceeding capacity during peak periods. As such, it is also assumed that the air cargo apron would require an increase in size to accommodate any increase in the number of operations or size of aircraft.

Currently, air cargo flights are conducted by UPS using Boeing 757s and by Superior Aviation Inc., which functions as a feeder carrier for UPS, operating Cessna Caravans and Fairchild Merlins. The aircraft apron required to simultaneously “park” this mix of aircraft, and also provide ample maneuver area for loading and unloading air cargo, may be determined in a variety of ways; however, for the purpose of determining planning level facility requirements the following areas per aircraft, which take into account "power-in and power-out operations", FAA clearance requirements, and basic vehicle maneuvering areas, have been approximated as follows: Boeing 757 - 5,400 square yards, and Cessna Caravan or Fairchild Merlin - 2,100 square yards. Based on those general area requirements per aircraft the current cargo apron has an approximate capacity of three B757s, or a combination of two B757s and two Caravans/Merlins.

It has been noted, however, that due to the current configuration of the air cargo apron, situations often develop in which aircraft, particularly those associated with Superior Aviation, may block the taxilane serving the Southeast Ramp area. One goal of any potential expansion of the air cargo apron should be to eliminate any such interference with aircraft operations and to provide an ample apron area to allow for unimpeded flow of aircraft ingress or egress of the air cargo apron. Additionally, the future expansion of the air cargo apron should take into account potential changes in the fleet mix of air cargo aircraft serving the Airport. These considerations should be reflected in the overall apron area required for each future planning period.

To determine the overall apron area required per forecast period it was also necessary to establish a comparative ratio between total cargo volume and total cargo operations, with the understanding that current operations do not utilize 100 percent load factors. In 2003, air cargo amounted to 24,800 tons, with just under 1,400 operations. Utilizing those totals it can be assumed that each operation averaged approximately 18 tons. By 2023 the annual cargo demand is forecast to be almost 72,000 tons.

Given that a B757-200PF (a typical aircraft in UPS's fleet) has a payload of approximately 40 tons, assuming a 280 nautical mile stage length (the equivalent of Lansing to Louisville, KY), it can be seen that the current number of flights (three per day, typically) and aircraft types (a mix of B757 and B727s) has additional capacity to support short-term growth. Therefore, expansion of the cargo apron to support the forecast increase in cargo tonnage is not required; however, the above does not take into account either an increase in Superior's own activity, nor does it account for the entry of another cargo operator to the Airport.

Thus, for the purpose of facility planning, some form of additional cargo area, commensurate with that this is currently available, should be reserved for use by a potential additional cargo operator.

3.8.2 Aircraft Rescue and Fire Fighting (ARFF)

Airports that serve scheduled and unscheduled air carrier flights are required to provide firefighting facilities and equipment. For FAR Part 139 certified airports, ARFF equipment requirements are identified by an airport's "Index" ranking (A, B, C, D, or E). This index is determined by the length of the largest air carrier aircraft operating at the airport and the average number of daily departures conducted by this aircraft. **Table 3-29** lists the minimum ARFF equipment requirements for FAA certified airports.

Table 3-29
FAR PART 139 ARFF EQUIPMENT REQUIREMENTS

Airport Index	Number of Vehicles	Aircraft Length	Scheduled Departures	Agent and Water Foam Requirements
A	1	Less than 90 ft	1 or more	500 lbs DC/HALON 1211 or 450 lbs DC and 100 g water
B	1 2	Equal or greater than 90 ft and less than 126 ft Equal or greater than 126 ft or less than 159 ft	5 or more Less than 5	Index A equipment and 1,500 g water Index A equipment and 1,500 g water
C	2 3	Equal or greater than 126 ft or less than 159 ft	5 or more Less than 5	Index A and 3,000 g water Index A and 3,000 g water
D	3	Equal or greater than 159 ft and less than 200 ft	5 or more Less than 5	Index A and 4,000 g water Index A and 4,000 g water
E	3	Equal or greater than 200 ft	5 or more	Index A equipment and 6,000 g water

According to the Airport Inventory, the ARFF facility and equipment at the Airport currently meet the FAA Index C criteria in terms of the capacity of the equipment and staffing (per FAR Part 139.315 – *Aircraft rescue and firefighting: Index determination*). The ARFF index is determined by a combination of the length of the longest air carrier aircraft serving the Airport and the average daily departures of that type of aircraft. Index C includes aircraft at least 126 feet but less than 159 feet in length.

Currently the aircraft that determines the Airport's ARFF Index is the DC9-30, which is 119 feet in length. This aircraft requires an ARFF index of "B" as it is at least 90 feet long and less than 126 feet long. The Airport was previously required to maintain an ARFF Index of "C" as determined by the 134–foot long DC9-50, which was the longest passenger aircraft conducting five or more daily operations. Allegiant Air currently conducts passenger operations with MD83s (148 feet long), but less than five daily departures are conducted with this aircraft. Although the Airport is required to maintain ARFF Index B at all times, an Index C is maintained during peak times, between 6 a.m. and 10 p.m. Decreasing the Index to a B during off peak hours allows for less ARFF personnel required on site.

An FAA ARFF Index of "C" is expected to remain sufficient to support both existing and forecast demand, in that it is not anticipated that a passenger air carrier aircraft longer than the MD83 shall conduct more than an average of five daily departures, which would justify an increase in the ARFF Index. UPS currently conducts cargo operations utilizing the DC-8-60's (154 feet long; Index C), which is the longest design aircraft currently operating at the Airport; however, non-passenger flights, such as cargo operations, cannot be utilized to determine the ARFF Index. However, for the benefit of these operators and the overall perception of the safety of the Airport it is recommended that further consideration be given to a phased increase in the ARFF Index should cargo operators increase utilization of aircraft longer than that allowed by the Index C, such as the DC-8-63 or 757-300 (179 feet long; Index D).

3.8.3 Airport Maintenance

The demand for Airport Maintenance facilities is directly related to the amount of pavement, lighting equipment, terminal building size, and overall grounds maintenance that is required by the Airport. Therefore, it can be assumed that as the airfield or facility increases in size, the existing maintenance facility may require expansion or relocation. The current Airport Maintenance facility is located adjacent to the ARFF facility and provides approximately 31,500 square feet of storage space. The maintenance building consists of 14,500 square feet, the ARFF has 6,500 square feet, and there is 10,000 square feet of cold maintenance storage. As this facility is not currently operating at full capacity and can accommodate an increase in demand, it has been assumed that no additional facility requirements are necessary to ensure the Airport Maintenance Facility is capable of serving the Airport effectively throughout the forecast period.

3.8.4 Fuel Farm

Fueling operations are currently conducted by the Airport's only FBO, AvFlight, which also owns the fuel tanks used for fuel storage. The FBO's facilities are used to store fuel for GA and commercial operations, including airline and cargo operations. As such, this facility must maintain adequate fuel storage capacity to accommodate the future GA and commercial operational demands of the Airport. The requirements of the fuel facilities owned and operated by other entities, such as the Federal Government and Michigan State Police, should be determined and maintained by the owners based on their needs and preferences, and are not considered herein. However, it has been indicated that the current capacity for automotive and diesel fuel storage is adequate for the number of vehicles serviced by existing facilities, and will be driven in the future by the needs of ARFF and Airport Maintenance equipment.

It has also been indicated that the aircraft fueling facilities owned and operated by AvFlight meet the current demand; however, as total operations increase expansion of aviation jet fuel storage may be necessary. According to the FBO, approximately 10,000 gallons of fuel is received each day to re-place fuel pumped during the previous twenty-four hour period. Given that the current storage capacity is 87 percent Jet A (100,000-gal Jet A/ 115,000-gal. total) and 13 percent 100LL, it has been calculated that on average 87 percent of each 10,000 gallons replenished each day is Jet A, and therefore it is estimated that 3.18 million gallons of Jet A is processed through the existing facility annually. GA fuel, 100LL, is considered to comprise the remaining 13% of the total fuel replenished daily. Therefore, an estimated 475-thousand gallons of 100LL is processed through the existing fuel facility each year. The available fuel storage at the Airport is depicted in **Table 3-30**.

According to Airport records, GA operations totaled 59,482 in 2003; therefore it can be estimated, based on the 475,000 gallon of 100LL used each in that same year, that approximately 8 gallons of fuel per operation. The Airport records also indicate that total commercial operations in 2003 were 29,360, which calculates to approximately 108 gallons of fuel per operation, based on the 3.18 million gallons of Jet A used that same year. It is assumed that as the trend in general aviation continues to introduce more business jets, a greater number of the GA operations will require Jet A fuel. Therefore, it is estimated that in the future GA 100LL fuel flow per operation will decrease, and the Jet A fuel flow per operation will increase commensurately.

Given that 10,000 gallons of fuel are delivered to the existing facility each day, the existing capacity is being replaced every 11.5 days or 2.6 times per month on average. This fuel re-supply interval ensures adequate reserves in case of supply or delivery issues; therefore it was also applied to future fuel storage requirements. At current capacity, by 2008 the forecast traffic increases will require delivery of over 15,000 gallons (1,200-gal. 100LL and 14,095-gal. Jet A) each day, maintaining current 11.5 day re-supply interval. At that same rate of re-supply, by 2013 the traffic increases will require delivery of over 16,000 gallons (1,080-gal. 100LL and 15,189-gal. Jet A) each day. And, it is estimated that by 2023 traffic increases will require delivery of over 17,500 gallons (995-gal. 100LL and 16,696-gal. Jet A) each day. **Table 3-31** depicts the fuel storage requirements for GA and commercial operations throughout the planning period.

Table 3-30
FUEL STORAGE

Owner/ Operator	Stored Material	Number & Capacity
AvFlight	Aviation Gasoline (100LL)	1 – 15,000 gal
AvFlight	Jet Fuel (Jet A)	2 – 20,000 gal ASTs
AvFlight	Jet Fuel (Jet A)	3 – 20,000 gal USTs
Federal Government	Diesel Fuel	1 – 1,000 gal UST
Federal Government	Diesel Fuel	1 - 3,000 gal AST
Michigan State Police	Aviation Gasoline (100LL)	1 - 6,000 gal UST
Michigan State Police	Jet Fuel (Jet A)	1 - 12,000 gal UST
Capital City Airport	Unleaded Auto Gasoline	1 - 5,000 gal UST
Capital City Airport	Diesel Fuel	2 - 5,000 gal UST

Source: Capital City Airport Storm Water Pollution Prevention Plan (December 2003)
UST – Underground Storage Tank
AST – Aboveground Storage Tank

Table 3-31
FUEL STORAGE REQUIREMENTS

	Historic	Forecast		
	2003*	**2008**	**2013**	**2023**
Annual Operations				
General Aviation	59,482	62,500	65,700	72,600
Commercial	29,360	47,200	50,400	54,900
Fuel Flow per Operation (gal)				
General Aviation (100LL)	8	7	6	4
Commercial (Jet A)	108	109	110	112
Daily Fuel Flow (gal)				
100LL	1,300	1,200	1,080	795
Jet A	8,700	14,095	15,189	16,846
Fuel Storage Required (11.5 days)				
100LL	15,000	14,000	12,500	9,100
Jet A	100,000	162,000	175,000	194,000

**These baseline/existing figures were calculated based on the avg. weekly fuel delivery.*

3.8.5 Air Traffic Control Tower

The existing Lansing ATCT was constructed in 1959 and is located on top of the air carrier terminal building. The tower has a total height of 936 feet, which includes the antenna towers on the roof. The elevation of the cab floor is 905 feet. The current tower meets all FAA siting criteria as defined in Order 6480.4, *Airport Traffic Control Tower Siting Requirements*. Criteria that are met that are of particular concern are controller line-of-sight to all airfield movement areas and controller sight depth perception angle. This latter criterion is also met considering planned future and ultimate extensions to Runway 28L. However, the condition of this 45 year old tower is worsening, and its aging continually reduces the cost-effectiveness of repairs. In addition, the tower design precludes the ability to install modern replacement equipment as existing equipment fails. A replacement site for an ATCT will be considered as part of the Alternatives Analysis.

3.9 Non-Aviation Support Facilities

Non-Aviation Support facilities at the Airport encompass a broad set of functions that exist to ensure the safe and efficient operation of the airport's primary role and mission, and provide revenue generating opportunities for the Airport.. These support facilities include:

- Utilities
- Industrial Parks
- Hotel/Business Park Development
- Storm Water Management
- Fencing

3.9.1 Utilities

Utilities to the Airport are currently sufficient for existing demands. Utility provision capability will need to be assessed consistent with individual airfield improvements.

3.9.2 Industrial Parks

The Capital Region Airport Authority has identified approximately 41 acres of property in the southeast portion of the Airport for development as an industrial park. This land is south of East Airport Service Drive, and therefore does not currently have airfield access. This industrial park is currently undeveloped.

There is an off-airport industrial park located west of the Airport, primarily north of Grand River Road. This park provides airport-compatible development in an area that is typically noise sensitive.

3.9.3 Hotel/Business Park Development

There are currently no hotels in the immediate vicinity of the Airport. Hotels are primarily located in the Lansing business district and along the regional major highways. Previous efforts by private developers to build hotels near the Airport have failed.

There are no business park developments on or in the immediate vicinity of the airport. While not in the existing development plans for the Airport, the master plan will consider business park development in the future airport land use plan.

3.9.4 Storm Water Management

The Airport and its tenants are required to conform to State of Michigan and Federal environmental rules and regulations to prevent any potential pollution from occurring.

Capital City Airport currently has a National Pollutant Discharge Elimination System (NPDES) permit that must be periodically updated and expanded to include all airport-related activities as well as tenant activities, which have the potential to pollute the environment. An NPDES permit must be obtained for all construction projects that exceed the threshold established by the U.S. Environmental Protection Agency (EPA).

The Airport also has an MS4 Watershed General Permit that authorizes the Airport Authority to discharge storm water through a separate storm water drainage system into waters of the State. In association with this permit, the Airport Authority is required to submit a Storm Water Pollution Prevention Initiative and a Watershed Management Plan.

The NPDES permit was issued in October of 2003 and reflects the current Airport operating environment. The Storm Water Pollution Prevention Initiative and the Watershed Management Plan must be submitted to the Michigan Department of Environmental Quality by April of 2006. The Airport is a nested identity within the Clinton County Drain System, which represents the Airport and prepares and submits these documents. Airport development, resulting from or independent of this master plan may require amendments to these documents.

3.9.5 Fencing

There is currently fencing around the perimeter of Capital City Airport with numerous access control gates. The east and west perimeter has 8 feet tall wood fencing with three strands of barbed wire for additional security. The remainder of the airport has chain link fence, 8 feet tall in the terminal area and 10 feet tall around the remainder of the Airport. The fence is generally in good condition, subject to routine maintenance.

3.10 Airport Access

All airport access roadways can be characterized in one or both of two ways: “on-airport” and “off-airport”. For most airports, some portion of the route that the majority of the airport’s users (both passengers and cargo) utilize is within the property line of the airport, but can only be accessed via public roadways. Therefore, for the purpose of this master plan both on- and off-airport access roadways have been analyzed to assist in determining not only the facility requirements for existing roadways, but also the ability of alternate routes to support the proposed airport development.

To facilitate the analysis guidance has been obtained from two distinct resources: the Federal Highway Administration (FHWA) and the FAA jointly published *Airport Ground Access Planning Guide*, and the Transportation Research Board’s *Highway Capacity Manual* (HCM) and *Highway Capacity Software* (HCS). The former report identifies performance measures and capacity characteristics of “on-airport” roadways, whereas the latter two, which are the officially accepted traffic analyses methodology for FHWA and the Michigan Department of Transportation (MDOT), provide calculations to determine the capacity and levels of service of traffic flows. The most recent version of the HCM/HCS, updated in year 2000, was used in this capacity analysis.

In broad terms, the capacity of a roadway is the maximum number of vehicles per lane, per hour that can be accommodated within a given level of service. Therefore, each roadway has a different capacity based on design characteristics. But to further define the capacity of a roadway the HCM established six levels of service (LOS), designated by the letters A through F. The LOS for a roadway refers to both its ability to support additional growth and its need for expansion, with a “LOS A” indicating that a roadway could support additional traffic and a “LOS F” indicating that the roadway is congested and operating at maximum capacity. It should also be noted that the preferred level of service is a “LOS C” or “D”, where traffic flow is moving and stable, and delays are minimal.

In addition to capacity analyses, other roadway planning considerations are necessary such as safety, easy way-finding, and future development – both on and off airport. The locations of such items as the terminal, major highways access and other on-airport support facilities also dictate roadway development needs and improvements. Combined, these considerations and the demand/capacity analyses/LOS evaluations dictate future off-airport and on-airport roadway facility requirements.

To determine the facility requirements for all of the Airports access roadways it is also necessary to determine the peak hour demand that will be analyzed. For the purpose of this analysis, the Airport’s peak hour, derived from the design hour activity forecast (from 7:11 am to 8:10 am), has been utilized. Because it is typical for passengers to arrive prior to departure peak, it has also been established that the Airport’s peak traffic demand will occur from approximately 6:00 to 7:00 am.

3.10.1 Off-Airport Access

Several roadways comprise the transportation system and serve Capital City Airport. Roads used by traffic bound for the Airport include:

- **Airport Road**, located west of the Airport, is a two-lane, north-south roadway with interchange access to the north at I-69. Airport Road provides access to West Airport Service Road, which leads to Capital City Boulevard.
- **Capital City Boulevard** is the main Airport access roadway having a north-south orientation and is comprised of two lanes in each direction. Capital City Boulevard is signalized at Grand River Road with a separate left and right turn lane. A railroad crossing, located at grade, intersects Capital City Boulevard approximately 1,500 feet from the terminal curb front roadway.
- **DeWitt Road** is a north-south roadway, located east of the Airport, with interchange access to the north at I-69 and connection to Martin Luther King Boulevard south of Grand River Road. DeWitt is a two-lane roadway north of Grand River and expands to four and six lanes southbound. Two railroad crossings intersect DeWitt Road near Grand River Rd.
- **Grand River Road** is a major east-west arterial connecting airport bound traffic to Capital City Boulevard. Grand River Road consists of four lanes east of Airport Road and three lanes west of Airport Road. Grand River Road is considered a collector roadway in the Federal regional system with signalized intersections.
- **Waverly Road** is a north-south arterial, signalized roadway which intersects at Grand River Road approximately 3/4 mile west of Capital City Boulevard. Waverly Road connects to the south at I-496 and airport traffic is directed to use Waverly Road to the Airport.

Traffic counts were collected by the City of Lansing, Clinton County Road Commission, and MDOT. The average daily traffic (ADT) on Grand River Road, east of DeWitt Road in 2002, was approximately 19,200. Capital City Boulevard experienced an average ADT of 5,350 in 2002 and Waverly Road shows an average ADT of 11,000. Airport Road and DeWitt Road are two-lane roadways and two-way hourly traffic volumes are required for LOS analyses.

The directional capacity and LOS were determined based upon the FHWA Planning Design Guidelines, the updated 2000 HCM/HCS procedures and MDOT capacity procedures. The number of through lanes per direction, capacity, ADT, and LOS calculations are shown in following **Table 3-32**:

Table 3-32
EXISTING LEVEL OF SERVICE RESULTS

Street Name	Thru Lanes One Direction	Direction Capacity	ADT	2-Way Hourly	Peak LOS	Peak LOS
Airport Road	1	1,400		678	D	D
Capital City Boulevard	2	1,400	5,350		D	D
DeWitt Road	1	1,400		462	C	C
Grand River	2	3,200	19,200		C	E
Waverly Road	2	3,000	11,000		C	E

The traffic period analyzed is comprised of commuter traffic with a peak period from 7:00 to 8:00 am. Since the Airport traffic will peak prior to the commuter traffic peak, approximately 6:00 to 7:00 am, the traffic volumes in the earlier hour are substantially less, approximately 40 percent less based on hourly traffic counts. The Airport peak LOS was calculated and conditions improve in the earlier hour. Since the peaks do not coincide, the roadway operations are acceptable for existing conditions. However, if the Airport adjusts its flight schedule in the future, airport access along Grand River Road could prove to be problematic and congested. Adequate airport access requires reliable and moving traffic operations, including a LOS C or D. Alternative access to the Airport should be considered for future airport growth and flexibility.

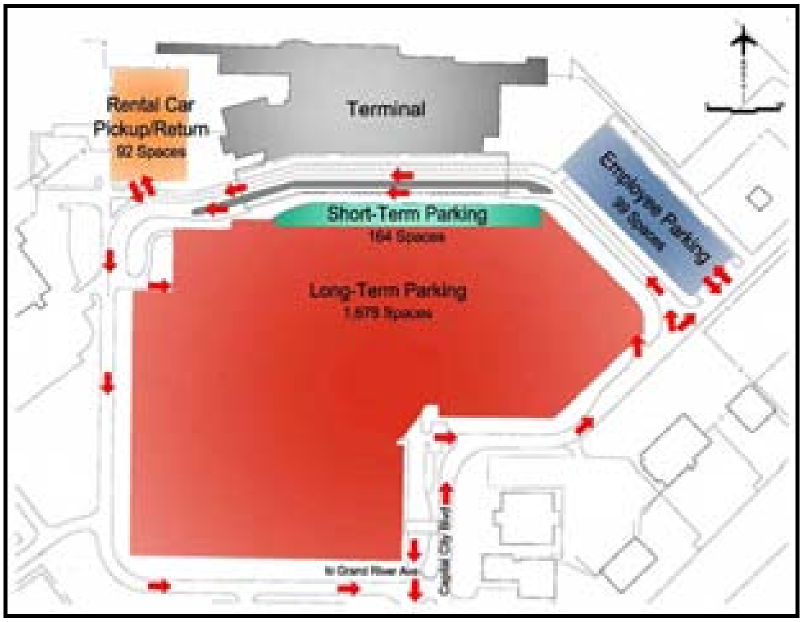
During the traffic peak, the LOS calculations indicate that Grand River Road and Waverly Road operate at LOS E in the morning peak. The definition of LOS E determines traffic approaches capacity and unstable conditions and significant delays occur. Capital City Boulevard, Airport Road, and DeWitt Road function at the LOS D or better, which is acceptable. In the airport peak, 6:00 to 7:00 am, all five roadways studied operate at acceptable conditions. Again, if the Airport peak shifts and airport traffic coincides with the commuter peak, traffic conditions for airport bound and commuters on Waverly Road and Grand River Road will deteriorate to failing operations.

3.10.2 On-Airport Circulation

This section presents the results of the curbfront traffic analyses, which include curbfront vehicular traffic demand and curbfront length requirements for the on-Airport circulation roadway. The basic assumptions, general calculations and results are provided in this section.

Physical Characteristics
Capital City Blvd is the on-airport roadway that extends north from Grand River Avenue and loops in front of the Terminal as shown in **Exhibit 3-5**. The Airport has a centralized roadway circulation system where all passenger related vehicles travel on one roadway, one level, for parking, arrivals, departures and rental car access.

Exhibit 3-5
ON-AIRPORT CIRCULATION ROADWAY



3.10.2.1 <u>Curbfront Traffic Demand</u>

The vehicular traffic demand for the curbfront was derived from the peak hour passenger flight forecast. The airport peak hour analyzed is from 6:00-7:00 am and assumed that the arrival and departure peak hours are separate, yet alike. Based on passenger demand, vehicle mode choice and vehicle occupancy calculations were applied to determine the curbfront traffic demand. **Table 3-33** presents the curbfront traffic demand for existing and forecast years, in vehicles per hour for passenger vehicles, rental cars, taxis and courtesy vehicles.

Table 3-33
CURBFRONT PEAK HOUR TRAFFIC DEMAND

	Historic 2003	Forecast 2008	2013	2023
Passenger Demand (pk hr passengers)	322*	494	538	628
Curbfront Traffic Demand (pk hr vehicles)				
Private Vehicle[(a)]	188	289	315	368
Rental Car[(b)]	36	55	60	70
Taxi[(b)]	4	6	7	8
Courtesy Van / Bus[(c)]	3	5	5	6
Subtotal	231	355	387	485

(a) private vehicle 80%, 1.5 vehicle occupancy, 10% visitors
(b) rental car & taxi, 15%, 1.2 vehicle occupancy
(c) courtesy van & bus 5%, 5.0 vehicle occupancy

**Source: Aviation Demand Forecast*

3.10.2.2 Existing Curbfront

The terminal building is served by a one-level, two curb roadway system. As shown in **Exhibit 3-6**, an inner curb with three lanes serves passengers for arrivals and departures. The outer curbfront serves commercial vehicles and includes two lanes. The passenger curbfront length is 670 feet total, comprised of 400 feet for departures and 270 feet for arrivals. The commercial vehicle curb is 580 linear feet.

3.10.2.3 Curbfront Analyses Assumptions

As part of the curbfront analyses at Capital City Airport, it was necessary to determine the percentage of vehicles that proceed directly to parking and do not use or impact the curbfront. Parking is conveniently located close to the terminal and a percentage of passengers, i.e. business travelers, will not drop-off or pick-up passengers. Therefore these vehicles have not been included in the curbfront analyses. This assumption has been validated through field studies and parking data review, which revealed that approximately 20 percent of private vehicles proceed directly to parking and 80 percent utilize the curbfront for passenger drop-off or pick-up.

Rental cars are not applicable in the arrival curbfront analyses since these vehicles have convenient pick-up access directly west of the terminal in the exclusive rental car lot. For deplaning analyses, 50 percent of the rental cars were assumed to stop and use the curbfront for drop-off purposes.

3.10.2.4 Curbfront Requirements

Curbfront length requirements presented in **Table 3-34** were determined based on the curbfront traffic demand and capacity analyses using the foot minute methodology. This detailed methodology utilizes curbfront traffic volumes, vehicle lengths, dwell times and lane utilization rates to determine curbfront length requirements. The curbfront requirements summary is shown in Table 3-34.

Exhibit 3-6
TERMINAL CURBFRONT LANE CONFIGURATION

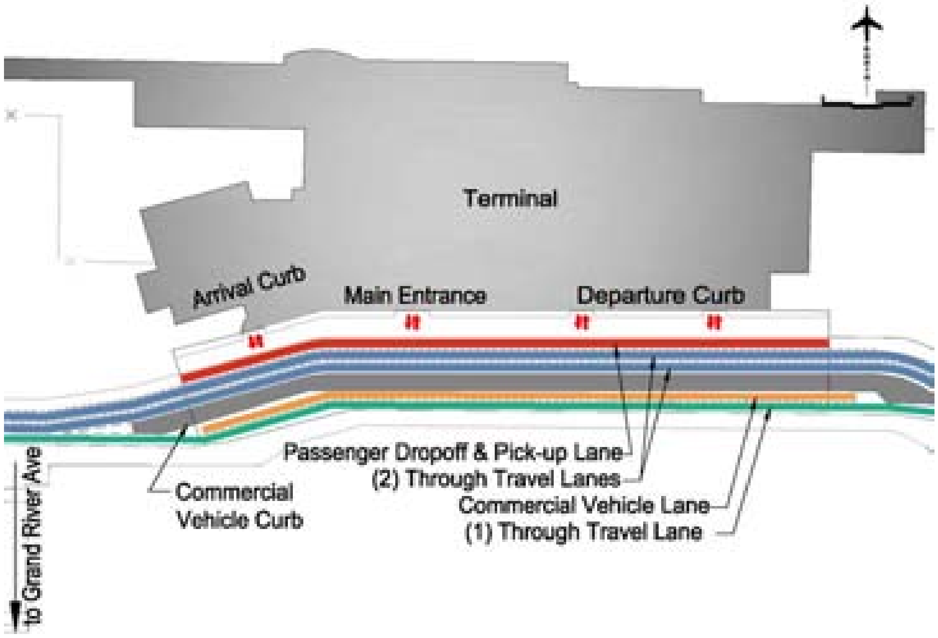


Table 3-34
CURBFRONT REQUIREMENTS

	Historic 2003	2008	Forecast** 2013	2023
Passenger Enplanements (per year)	271,000*	415,000	451,000	527,000
Passenger Demand (pk hr)	322	494	538	628
Curbfront (length in feet)***				
Departures	400	290	310	360
Arrivals	270	270	290	350
Commercial Vehicles	580	200	220	250

**Source: Airport Records*
***Source: Aviation Demand Forecast*
****Required Curbront length (calculated)*

Three separate areas of curbfront uses were analyzed: departure curb, arrival curb and commercial vehicle curb. The requirements for each of these three areas are discussed below.

Departure Curb

The existing departure curbfront length is adequate for existing and the future planning years. One lane for drop-off and two through lanes provides a sufficient level of service. It is recommended that when determining a new curbfront length the airline ticket counter needs and locations must also be considered since this affects vehicles grouping and curbfront congestion.

Arrival Curb

The arrival curbfront approaches congestion and capacity by 2008 when peak hour demand approaches 500 passengers per hour. By 2013 the demand exceeds the available curbfront length, causing congestion and resulting in a lower than acceptable level of service. To maintain an acceptable level of service, the curbfront area will need to be extended when passenger demand exceeds 500 passengers per hour.

Commercial Vehicle Curb

The Commercial Vehicle curbfront length is adequate throughout the planning years. However, if an increase of charter buses, taxis or delivery vehicles occurs, then congestion in this curbfront lane may begin to occur.

It should be noted that based on the *2003 Survey of Passenger Opinions* regarding Capital City Airport, three of the top reasons why passengers choose Capital City Airport are because of “shorter drive”, “convenient terminal” and “less crowded”. Maintaining adequate level of service and avoiding congestion along the Curbfront is an important customer service characteristic at Capital City Airport. As indicated by Table 3-34 above, the existing departure and commercial curbfronts exceed the lengths required throughout the planning period. However, the arrival curbfront is expected to reach capacity by 2008, thus requiring a minimum extension of 80 feet. This would provide the 350 linear feet of curbfrontage required throughout the planning period.

3.10.2.5 Terminal Roadway Capacity Analyses

Based on the guidelines in the FHWA / FAA Airport Ground Access Planning, the capacity of the two inner lanes along the terminal roadway is 900 vehicles. The volume to capacity (V/C) ratio was derived for the terminal curbfront roadway as shown in **Table 3-35**. If the V/C approaches 1.0, the traffic demand is approaching capacity and severe congestion is occurring. A desirable V/C ratio for this type of roadway is 0.6 to 0.7. Therefore, the terminal curbfront roadway has adequate capacity to accommodate the existing and projected 2023 passenger demand.

Table 3-35
CAPITAL CITY BLVD. TRAFFIC COUNT

	Historic	**Forecast**		
	2003	**2008**	**2013**	**2023**
Volume/ Capacity (V/C)	0.28	0.42	0.46	0.54
Capital City Blvd. Traffic:				
Total Traffic	353	511	596	698

3.11 Land Requirements

Capital City Airport occupies approximately 2,000 acres of land that is currently owned in fee simple by the Capital Region Airport Authority. Currently all of this land is designated for airport activity. The Airport also has protection rights for 39 acres of avigation easements. Based on the existing Airport development, there is no demand for fee simple or avigation easement land acquisition. However, planned Airport development resulting from this master plan for the 20-year planning horizon will define the ultimate need for acquisition.

3.12 Financial Capacity

The fiscal capacity of the Capital Region Airport Authority to undertake capital improvements can be estimated using some very broad assumptions. While not intended as a substitute for a comprehensive financial plan, such a gross estimate of the Authority's fiscal capacity is useful to establish the scale of what capital improvements could be practical when considering development alternatives in the subsequent chapter of this plan..

Funding for capital projects can come from a number of sources including FAA grants, debt (typically airport revenue bonds), passenger facility charges, user fees and rents, and local tax revenues. For the purposes of establishing a fiscal capacity range, the following broad and simplifying assumptions were used:

- FAA grants consist only of entitlement dollars. The entitlement dollars are based on the current formulas and a high congressional funding level for the Airport Improvement Program.
- Debt is estimated based on three issues (5, 10, and 20 years into the future), all of which are repaid by increases in user fees and rents and increases in tax revenues above and beyond that which would normally occur from year to year. Passenger facility charges are also assumed to be used for debt service at the $3.00 and the $4.50 rate.
- To simplify the calculations, this analysis ignores the time value of money and presents all figures in then-year dollars.
- All calculations are based on first debt issued and cash flow beginning with 2008.

Please note that the estimates shown on **Table 3-36** are intended to only serve as an order of magnitude guide and may be substantially different from the comprehensive financial plan that will be necessary to support the implementation of the capital program. Further, these gross estimates of capital capacity would be used to address all types of projects at the Airport including expansion projects and capital maintenance projects.

Table 3-36
20-YEAR CAPITAL FUNDING CAPACITY

	No Rate/Tax Increase	1.0% Incremental Increase	2.0% Incremental Increase
$3.00 PFC and AIP	$76 million	$99 million	$127 million
$4.50 PFC and AIP	$89 million	$112 million	$140 million

As illustrated above, the range of capital program options available to the Authority is very broad – $76 million to $140 million over 20 years, and is dependent on how aggressively the Authority would pursue a general increase in user fees and rents and local tax revenues.

3.13 Local Government Coordination Requirements

There are two land use and zoning controls that may need amendment based on the recommendations of the master plan. These controls include off-airport land use and zoning, and the airport hazard area ordinance.

3.13.1 Off-Airport Land Use and Zoning

The local comprehensive land use plans for the City of Lansing, and DeWitt Charter, Delta, Lansing and Watertown Townships address the Airport and land use compatibility around Capital City Airport. The master plan will define recommended land uses for the area surrounding the Airport to promote compatible development in the Airport environment. The joint Tri-County Region Planning Commission represents Eaton County, Ingham County, Clinton County, and four cities, and is the Metropolitan Planning Organization (MPO) for the area. The townships and the MPO are represented on the Advisory Committee associated with this master plan update to contribute to the development of the land use recommendations.

The Capital Region Airport Authority has also adopted the Capital City Airport Zoning Ordinance to provide additional safety and protection to the users of the Airport and to the people who live and work in its vicinity. This ordinance defines off-airport height zoning necessary to protect the navigable airspace surrounding the airport. This height zoning is overlay zoning to existing zoning defined by the local government agencies. Based on the approved, planned airport improvements resulting from this master plan, the Zoning Ordinance may need to be amended.

3.13.2 Airport Hazard Area

The Capital City Airport Zoning Ordinance includes the definition and protective measures for the Airport Hazard Area. For property within the area, the Ordinance defines height limitations and conforming land-uses. Based on adopted planned airport improvements resulting from this study, the Ordinance and Hazard Area may have to be revised.

3.14 Environmental Mitigation

Environmental mitigation is an important consideration for any airport improvement. Development and evaluation of airfield improvement alternatives in subsequent sections of this study will include avoidance or mitigation of environmental impacts consistent with FAA and State of Michigan environmental guidelines.

3.15 Security Concerns

Airport security has become much greater since the terrorist attacks of September 11, 2001. Airport security as it relates to the commercial service terminal building requirements is discussed in the terminal portion of this chapter.

3.16 Part 150 Study

A FAR Part 150 Noise Compatibility Study is being prepared in conjunction with this Master Plan Update. The Part 150 Study will define areas for land use compatibility, and will define noise compatibility programs that may include land acquisition. Required actions included in the FAA-approved Part 150 Study are eligible for Federal funding. The Part 150 Study will incorporate future Airport aircraft activity and development recommended by this master plan.

3.17 Summary

The following is a summary of the recommended improvements by year to accommodate the anticipated growth at Capital City Airport. The information contained in **Table 3-37** will be used for the analysis or airfield development alternatives, the preparation of the Airport Layout Plan Set, and the evaluation of financial feasibility.

Table 3-37
FACILITY REQUIREMENTS SUMMARY

	2003	Planning Phase		
		1	**2**	**3**
AIRSIDE REQUIREMENTS				
Demand Capacity Analysis				
Annual Service Volume	240,000	230,000	220,000	210,000
Demand Capacity	38%	49%	55%	63%
Runway Length				
10R/28L	7,251'	8,500'	8,500'	8,500'
10L/28R	3,601'	3,601'	3,601'	3,601'
6/24	5,001'	5,001'	5,001'	5,001'
Pavement Condition	*Information to be supplied from on-going pavement management plan.*			
AIRSPACE REQUIREMENTS				
Approach Procedure				
Runway 10R				
Instrument Approach	Precision	Precision	Precision	Precision
Approach Type	ILS	ILS	ILS	ILS
Approach Slope	50:1	50:1	50:1	50:1
Runway 28L				
Instrument Approach	Precision	Precision	Precision	Precision
Approach Type	ILS, NDB/GPS	ILS, NDB/GPS	ILS, NDB/GPS	ILS, NDB/GPS
Approach Slope	50:1	50:1	50:1	50:1
Runway 10L				
Instrument Approach	Visual	Visual	Visual	Visual
Approach Type	Visual	Visual	Visual	Visual
Approach Slope	20:1	20:1	20:1	20:1
Runway 28R				
Instrument Approach	Visual	Visual	Visual	Visual
Approach Type	Visual	Visual	Visual	Visual
Approach Slope	20:1	20:1	20:1	20:1
Runway 6				
Instrument Approach	Non-Precision	Non-Precision	Non-Precision	Non-Precision
Approach Type	VOR/GPS	VOR/GPS	VOR/GPS	VOR/GPS
Approach Slope	34:1	34:1	34:1	34:1
Runway 24				
Instrument Approach	Non-Precision	Non-Precision	Non-Precision	Non-Precision
Approach Type	VOR/GPS	VOR/GPS	VOR/GPS	VOR/GPS
Approach Slope	34:1	34:1	34:1	34:1
TERMINAL AREA REQUIREMENTS				
Terminal Passenger Building				
Terminal Area (square feet)	131,800	160,415	202,769	237,500
Number of Gates	8	11	12	16
Gate Frontage (linear feet)	781'	1,030'	1,119'	1,509'
Baggage Claim Length (linear feet)	120'	180'	200'	240'
Curbfront (linear feet)				
Arrivals	400	290	310	360
Departures	270	270	290	350
Commercial	580	220	220	250

	2003	Planning Phase		
		1	2	3
Auto Parking				
Public Parking				
Short Term (@ 110% of demand)	119	183	198	232
Long Term (@ 110% of demand)	1,073	1,643	1,786	2,087
Total	1,192	1,826	1,984	2,319
Additional Parking Spaces Required	-	-	142	477
Additional Space Required (acres)	-	-	1.1	3.8
Rental Car				
Ready/Return and Storage Demand	361	553	601	702
Additional Rental Car Space Req.	-	36	84	185
Additional Space Required (acres)	-	0.2	0.4	1.1
Employee Parking	108	166	180	211
Additional Employee Parking Req.	9	67	81	112
Additional Space Required	0.07	0.5	0.65	0.9
GENERAL AVIATION REQUIREMENTS				
Hangars[1]				
T-hangar	60	68	68	68
T-Hangar 5% Surge		4	4	4
Conventional (Box) Hangar	40	48	52	60
T-hangar space required (sq. ft.)	72,000	81,600	81,600	81,600
T-Hangar Space Req. (5% Surge)		4,800	4,800	4,800
Conventional Hangar Space Req. (sq. ft.)	80,000	96,000	104,000	120,000
Apron[2]				
Itinerant Tie-Down Spaces	24	28	29	32
Based Tie-Down Spaces	15	17	18	19
Required Apron Space (sq. yd.)	21,500	25,000	26,000	28,500
SUPPORT FACILITY REQUIREMENTS				
Air Cargo				
Building Space (square feet)	12,500	22,000	26,500	36,500
Apron Space (square yards)	*Facility is sufficient, in terms of overall space, to support activities over the balance of the planning period. However, if an additional cargo operator is attracted to the Airport additional facilities – for both airside and landside, must be provided. Therefore, at a minimum sufficient space on should be reserved as part of the overall airport development to support such growth.*			
ARFF	*Facility and equipment are sufficient for the balance of the planning horizon unless development beyond the planned extension to Runway 28R is required. Under this scenario, further analysis will be required.*			
Airport Maintenance	*Facility and equipment are sufficient for the balance of the planning horizon based on the current airport configuration. Airport improvements may necessitate facility and/or equipment modifications/additions.*			

	2003	Planning Phase		
		1	2	3
Fuel Farm				
Aviation Gas Storage (gallons)	15,000	14,000	12,500	9,100
Jet A Storage (gallons)	100,000	162,000	175,000	194,000
Auto/Diesel Storage (gallons)[3]	19,000	19,000	19,000	19,000
Air Traffic Control Tower	*Existing facility will be replaced. Site selection to be conducted with Alternatives Analysis.*			

[1]***Source*****:** *Current (2003) hangar area is an approximation based on aerial photography and base mapping.*
[2]***Source****: All apron area requirements were calculated based on the FAA criteria set forth in AC 150/5300-13 Appendix 5.*
[3]***Source****: Auto/Diesel Storage assumed sufficient throughout the planning period. Storage requirement may increase based on vehicle types and quantities used.*

CHAPTER 4
IDENTIFICATION AND EVALUATION OF ALTERNATIVES

4.1 Airport Development Alternatives

The purpose of this chapter of the Airport Master Plan Update is to identify and evaluate facility development alternatives for Capital City Airport (LAN) that will satisfy the facility requirements outlined in Chapter 3, will satisfy the strategic goals of the Airport, and will meet safe operational standards set by the FAA and the Airport. The result of the analyses will be a cohesive plan for Airport development that functionally combines all individual facilities requiring improvement.

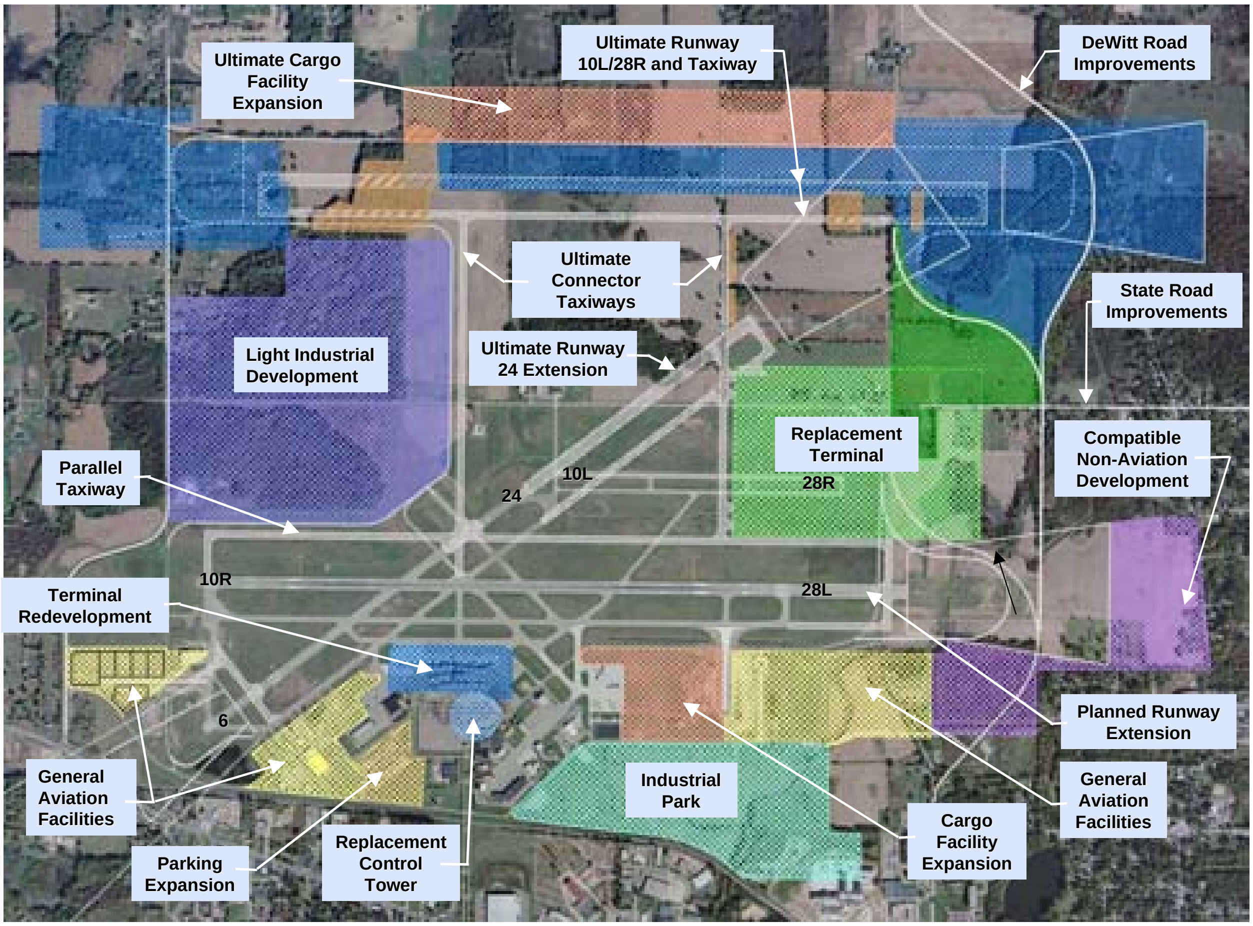
4.1.1 Preferred Development Alternative

The preferred airfield development alternative, identified in this study as Alternative D5, includes a new airline passenger terminal, the extension of the primary runway, and the long-term protection for the development of a new air carrier Runway 10L/28R or the extension of existing Runway 6/24 to serve air carrier aircraft. This alternative also includes planning for the following facility improvements:

- Interim terminal and vehicle parking improvements
- Expanded cargo facilities
- Ultimate development of new cargo facilities
- Expanded general aviation facilities
- Site for a replacement airport traffic control tower
- Improved airport access
- Existing terminal area redevelopment
- Development of the Airport Industrial Park
- Development of Airport-compatible non-aviation land uses

Exhibit 4-1 depicts the preferred development alternative.

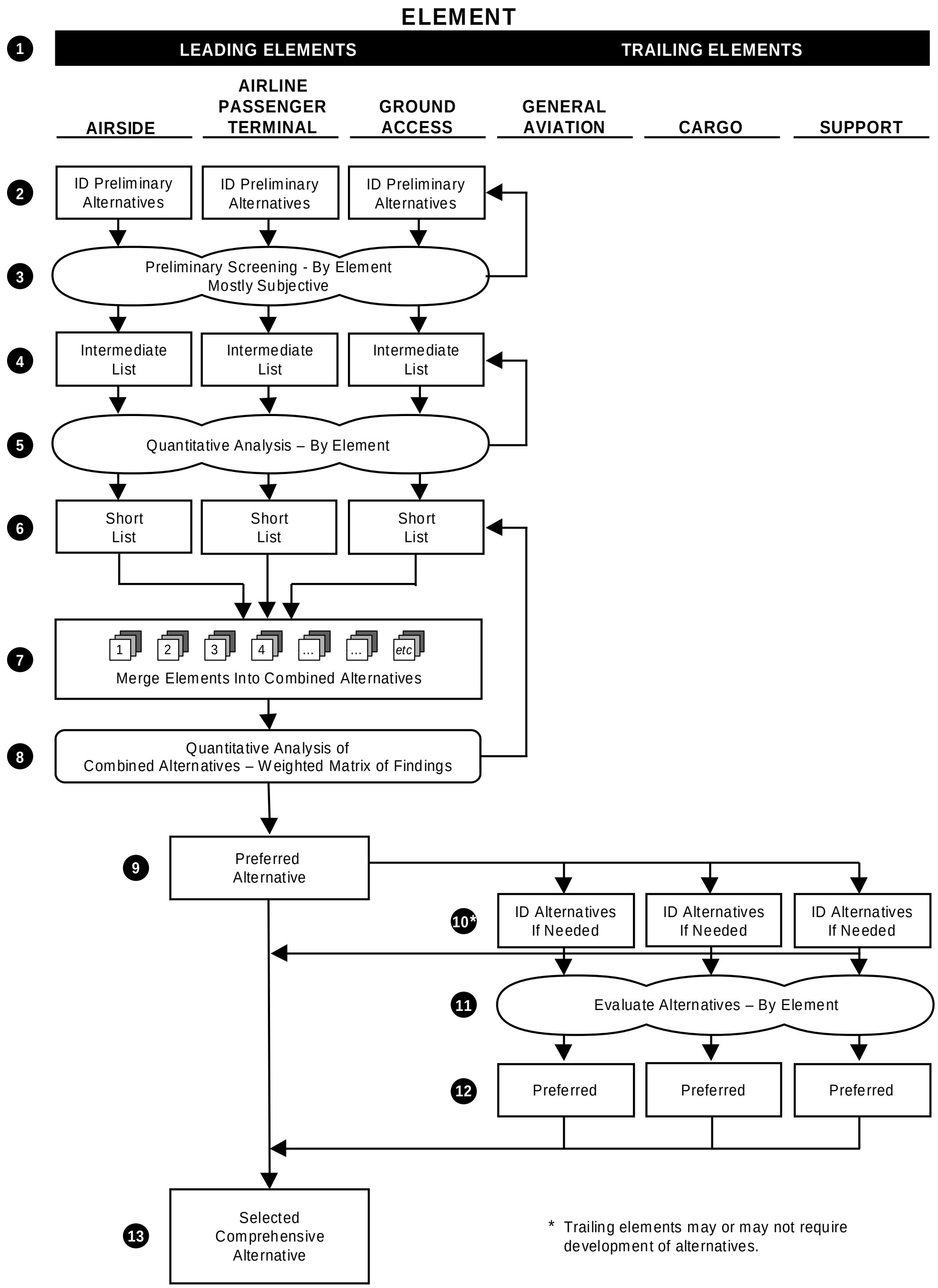
Exhibit 4-1
PREFERRED DEVELOPMENT ALTERNATIVE



4.2 Alternative Development and Evaluation Process

The identification and analysis of airport development alternatives is divided into two main groups, leading elements and trailing elements. The purpose for this division is to initially focus on those leading elements that require significant area both in terms of physical facilities and area protected for operational safety. Subsequent to definition of areas required for these facilities, trailing elements alternatives can be defined and analyzed. This alternatives development and evaluation process is generically depicted in **Exhibit 4-2**.

Exhibit 4-2
ALTERNATIVE PROCESS



4.3 Leading Elements

Based on the facility requirements analysis, three leading elements were identified:

- Airfield Configuration (Capacity)
- Terminal Improvement / Location
- Airport Access

4.3.1 Airfield Configuration

The airfield is comprised of the runway and taxiway system, and defined protection areas surrounding these facilities.

4.3.1.1 Runway Capacity

The facility requirements analysis determined that the existing runway configuration provides the necessary capacity through the 20-year planning period. However, near the end of the planning period the runway usage demand exceeds 60 percent of the total runway capacity. The FAA establishes this percentage is a benchmark at which planning for additional capacity should begin. As such, this master plan update includes the identification of, and analysis for, additional runway capacity.

4.3.1.2 Runway Length

The facility requirements analysis identified the immediate need for an extension of the primary runway. The current design aircraft requirement is 8,500 feet, a 1,249-foot extension to the existing runway. This requirement concurs with previous runway length analyses completed independent of this master plan. This extension will be to the east, added to the Runway 28L end. Design has begun for an initial 800-foot runway extension, and the subsequent extension balance of 500 feet.

The master plan has also assessed the runway length requirement based on the forecast future aircraft fleet mix and destinations. This assessment has determined that the 8,500-foot length will be sufficient throughout the planning period.

4.3.1.3 Runway Safety Area

The runway safety area (RSA) is a defined area surrounding a runway intended to provide a measure of safety in the event of an aircraft's excursion from the runway. The FAA has identified areas of non-compliance with RSA standards at the Airport. The master plan will address modifications necessary for compliance in conjunction with the recommended airfield improvement alternative.

4.3.2 Terminal Improvements / Location (CC)

The airline passenger terminal facility characteristics evaluated in the facility requirements analysis of this master plan generally focused on the available space and space allocation within the terminal building, the aircraft gate area, and the terminal area vehicle access and parking capacity. The facility requirements analysis determined that the existing terminal will provide an unacceptable service level mid-way through the 20-year planning period, and will require significant modification or replacement.

4.3.3 Airport Access

As a leading element, Airport access focuses on providing passengers an expedient and convenient roadway network leading to and from the terminal. This section also addresses impediments along the current airport access routes. Passenger origin locations and travel route patterns were analyzed to determine and compare travel times of routes to the existing and alternative terminal locations.

Consideration was also given to the terminal curbfront roadway system and its capacity to accommodate future arrival, departure and service vehicle traffic. Based on this analysis, it has been determined that it is probable that additional area will be necessary to accommodate future parking, curbfront demand, rental cars, employee parking and other vehicles that serve the terminal. The rationale from which this conclusion has been assessed is addressed later in this chapter.

4.3.4 Leading Elements Evaluation

The evaluation of leading elements is based on a combination of runway configuration, terminal location, and terminal related airport access. **Exhibit 4-3** presents a matrix of the combinations of runway and terminal alternatives representing the leading element alternatives for evaluation. The descriptions and evaluations of the alternatives are presented in the subsequent sections.

4.3.4.1 Runway Configuration Alternatives

The most expressive feature of an airfield configuration is the hourly capacity. This is used as the basis to compare the benefits of any runway alternative. The master plan demand/capacity and facility requirements analysis shows that additional airfield capacity will not be needed until after the 20-year planning period of this master plan. However, the CRAA has a continuing strategic plan and marketing program that is resulting in increased passenger service and pursuit of additional cargo activity at the airport. Due to the speculative uncertainty of the cargo growth, it cannot be recognized in the current forecasts or facility requirements. However, the potential for such additional demand requires that the master plan for the long-term future identify runway development / capacity increasing options so that appropriate land use protections can be established.

An additional important consideration for the airfield is the type of traffic envisioned. Over 60 percent of the current and forecast aircraft operational demand is for Approach Category A and B aircraft. These are small aircraft used by the general aviation community versus Approach Category C and D aircraft that are typically used by commercial operators. The current airfield has a runway that is only usable for Approach Category A and B aircraft. While the concept of aircraft type segregation is cost effective and operationally efficient, it limits airfield use flexibility for larger aircraft when maintenance activities or other temporary airfield disruptions occur.

As defined in the facility requirements chapter, the master plan will define and evaluate alternative runway configurations. The matrix of alternative configurations is shown on Exhibit 4-3. With each alternative configuration, the “T” represents a proposed location for the future replacement passenger terminal. An “x” represents a closed runway. **Table 4-1** identifies the key runway configuration feature for each row of the matrix in Exhibit 4-3.

Exhibit 4-3
LEADING ELEMENTS ALTERNATIVES MATRIX

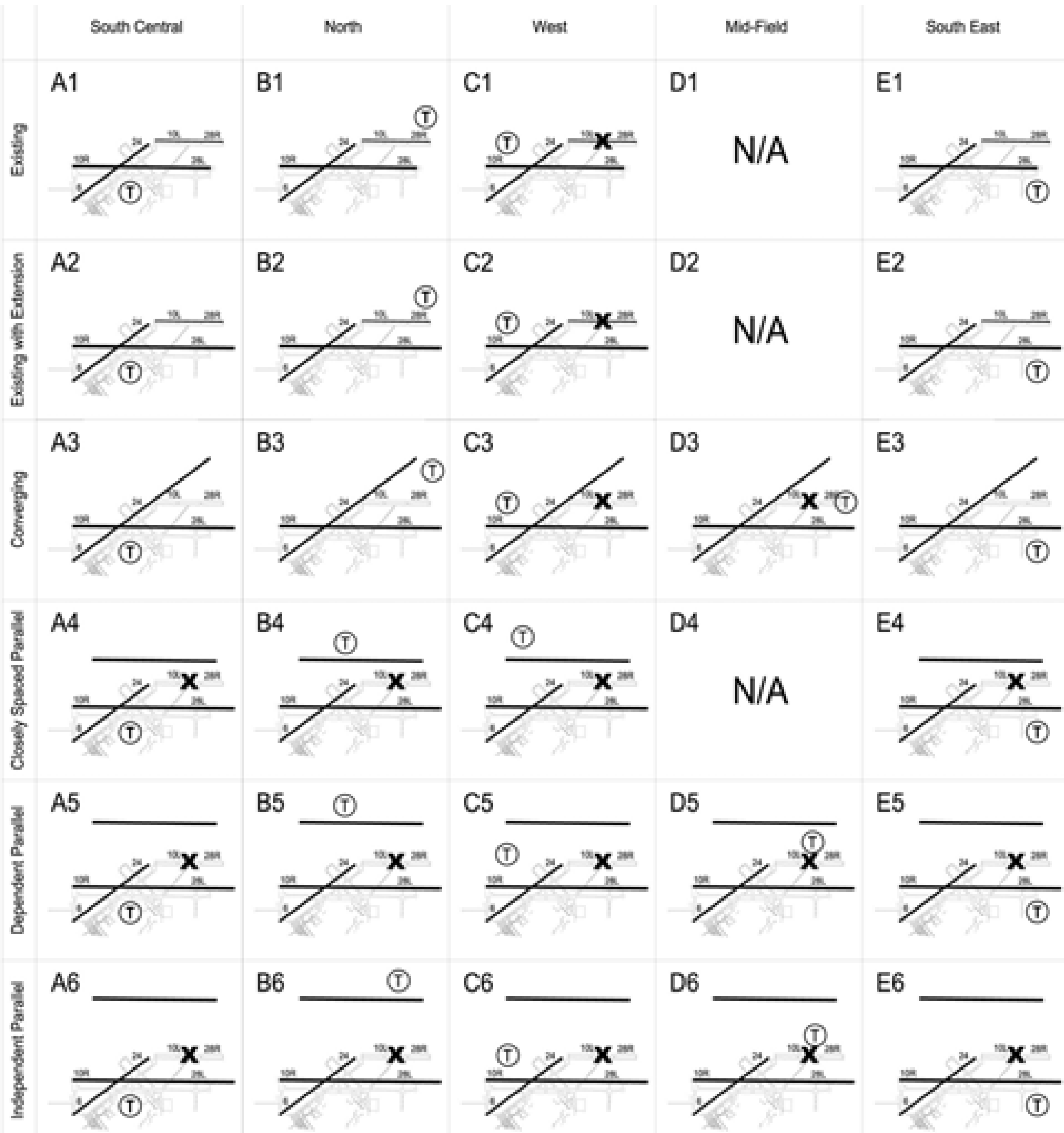


Table 4-1
ALTERNATIVE RUNWAY CONFIGURATIONS

Alternative	Runway Configuration
1	Existing
2	Existing with Primary Runway Extension
3	Converging Runways
4	Closely Spaced Parallel Runways
5	Dependent Parallel Runways
6	Independent Parallel Runways

Each alternative is evaluated in the following sections.

1. Existing

The existing airfield includes the current runway configuration and lengths. The existing airfield has distinct large and small aircraft operational characteristics.

- Runway 10R/28L accommodates all aircraft using the Airport.
- Runway 10L/28R is restricted to small, predominantly general aviation aircraft. Much of the capacity for this runway is used for touch and go training operations. The origin and destination locations on the Airport for aircraft typically using this runway are located across Runway 10R/28L and 6/24.
- Runway 6/24 has limited runway length and operations are limited to predominantly general aviation and corporate aircraft. The intersection geometry of the ends of Runways 6 and 10L are such that these runways are not usable simultaneously. Because of the prevailing winds and the limited current demand by large aircraft, Runway 6/24 is not used extensively. Its primary use is in high wind situations. The capacity of this runway essentially represents a trade-off with that of Runway 10L/28R so the determination of total airfield capacity effectively does not consider simultaneous use of these runways.

- 2. Existing With Extension

In terms of alternative consideration and evaluation, the existing configuration with primary runway extension supersedes the existing configuration, as the extension is being implemented independent of this master plan. However, the existing configuration is included for benchmarking and alternative comparison purposes.

The existing airfield with the future Runway 28L extension maintains the same configuration and the same lengths for Runways 10L/28R and 6/24. The operational characteristics are the same as the existing configuration.

- 3. Converging Runways

An extension of 3,475 feet is added to the end of Runway 24 to produce two converging runways capable of serving large air carrier aircraft. Airfield capacity increase through the use of converging runways is based on an “assured landing” either holding short of, or passing the intersecting runway before an operation can occur on the intersecting runway. Capacity is increased as the second aircraft movement can occur while the first aircraft is still occupying its runway.

With this alternative, the Runway End 6 is shortened by as much as 700 feet to bring the runway safety area in to compliance with FAA design standards. The shortening of this runway and associated relocation of obstruction clearance surfaces in the approach area, results in restrictions on developable area and aircraft movement areas in the southwest corner of the airport.

Restrictions include future facility development area to the west of Taxiway G, along Taxiway L. This alternative would also require that Runway 10L would need to be extended approximately 800 feet to locate the threshold out of the Runway 6/24 runway safety area (500 feet west of the centerline).

This alternative is referred to as “unsymmetrical”, meaning that the capability on one direction is not equal to the capability on the reveres direction. In west flow (i.e., aircraft arriving and departing to the west), this configuration provides the greatest arrival capacity. When combined with Land and Hold Short (LAHSO) procedures, additional capacity can be achieved. LAHSO requires that aircraft arriving on one of the converging runways must stop or exit the runway prior to reaching the intersecting runway. With LAHSO, simultaneous arrivals to both converging runways can occur, (subject to specific weather conditions and aircraft characteristics). In East Flow, simultaneous arrivals are not practical. The close intersection in east flow created efficient departure capability, but only a single arrival capability, hence the application of the term “unsymmetrical”.

- 4. Closely Spaced Parallel Runways

This alternative creates a new air carrier runway parallel to, and north of, the existing air carrier Runway 10R/28L. The minimum lateral runway separation between the parallel runways is 1,000 feet. It may be possible to locate the new runway such that the existing Runway 10L/28R becomes a parallel taxiway for the new runway. If the new runway is located north of the Runway 10L/28R, the lateral runway separation between the new parallel runways would be 2,200 feet. If the new runway is located south of existing Runway 10L/28R, the lateral runway separation between the new parallel runways would be 1,400 feet.

This alternative configuration provides an arrival/departure runway pair that is usable for both large and small aircraft. The close spacing of the two runways requires them to operate dependently in all weather and visibility conditions, but does provide a capacity increase for large aircraft and leaves the small aircraft capacity unchanged. Runway 6/24 has limited use in this alternative except for high wind situations.

The runway length of new runway 10L/28R is 6,500 feet. This length will accommodate most aircraft using the airport, except for the largest air carrier and cargo aircraft. Thus, the runway has slightly less departure and arrival capability than the longer Runway 10R/28L. Terminal location will be an important factor in achieving the maximum use of this runway. Shorter taxiing distances between the runway and terminal (and other aircraft destinations on the Airport) minimize aircraft operational cost.

For the closely spaced runway alternatives, the thresholds are equal (i.e., not staggered) at the east end, a factor that minimizes operational restrictions in west flow (the predominant flow direction) due to the impacts of wake vortex generated by larger aircraft. In east flow the ends are staggered due to the differing total runway lengths and wake vortex that must be considered. For this flow the highest operational capability would result from assigning arriving aircraft to the “near,” or furthest west, threshold, reducing wake vortex impacts. However, the operational restriction reduces runway capacity. In this case, the runway with the furthest west threshold, 10R/28L, is also the longest runway, which would also be the preferred departure runway. This even further increases the demand for this runway, and further effectively decreases airport capacity.

- 5. Dependent Parallel Runways

The minimum runway centerline-to-centerline separation for dependent parallel runways is 2,500 feet. With a separation of 2,500 feet or greater, consideration of wake vortex separations between the runways are not required. Arrival rates increase in this case relative to the single arrival case (closely spaced) since simultaneous arrivals to the parallel runways can be operated, subject to defined staggering, or diagonal spacing, between successive arrivals. With the development of a dependent parallel runway, the utility of the existing Runway 10L/28R is limited. The operability of this runway between two large aircraft runways makes effective and safe use impractical for small aircraft, and this runway would likely need to be closed.

Existing airport development would prohibit a dependent parallel runway from being located exactly 2,500 feet from existing Runway 10R/28L. The Airport Rescue and Fire Fighting (ARFF) and Airport maintenance facility would be in conflict with this runway. To avoid conflict, a minimum lateral separation of 3,350 feet is required to create a dependent parallel runway without necessitating ARFF and maintenance facility relocation. It is noteworthy that parallel runways separated by 3,400 feet can be considered "independent" which means that simultaneous independent operations can be conducted in IFR conditions if a Precision Radar Monitor (PRM) is installed versus traditional radar technology (ASR).

- 6. Independent Parallel Runways

A minimum lateral runway separation distance of 4,300 feet is needed to conduct independent, simultaneous arrival and departure operations on two runways. This alternative provides the maximum arrival and total capacity for two runways. This separation would place a new runway well north of the ARFF and maintenance facility.

The utility of the existing Runway 10L/28R is limited in this case and would likely need to be closed. The operability of this runway between two large aircraft runways makes this an impractical operation for small aircraft.

Table 4-2 presents the capacity differences between the alternatives. The capacities are presented in terms of hourly capacity, in visual (VFR) and instrument (IFR) flight rules, and annual service volume (ASV). The results of the analysis show that higher capacities are achieved with increased spacing for the runways. All alternatives provide capacities well in excess of the forecast demand.

Table 4-2
RUNWAY CAPACITY ASSOCIATED WITH ALTERNATIVES RUNWAY CONFIGURATIONS

	Runway Separation	Total		Ratio	ASV	Percent
		VFR	IFR	IFR/VFR		Increase
Existing		77	56	73%	215,000	
Closely Spaced Parallel	> 700 < 2,500 Feet	121	56	46%	260,000	21%
Dependent Parallel	> 2,500 < 4,300 Feet	126	65	52%	275,000	28%
Independent Parallel	> 4,300 Feet	126	111	88%	305,000	42%

1/ FAA Advisory Circular AC 150/5060-5. Mix index = 60.

4.3.4.2 Alternative Terminal Locations

The alternative terminal locations are representative of general airfield locations used in the evaluation process. The alternative locations are depicted in Exhibit 4-2. The selected terminal location alternative will influence the choice of an airfield configuration. A preferential terminal location minimizes taxi distances and number of runway crossings to and from the terminal and runway thresholds and exit locations. The preferred terminal location will also provide the opportunity to improve landside vehicle access. **Table 4-3** identifies the alternative terminal locations.

Table 4-3
ALTERNATIVE TERMINAL LOCATIONS

Alternative	Runway Configuration
A	South Central (Existing Terminal Area)
B	North
C	West
D	Mid-Field
E	Southeast

The mid-field terminal represents a location between parallel runways. This alternative location is not applicable, based on runway separation and clearance requirements, when combined with runway alternatives 1, 2, and 5.

- A. South Central (Existing Site)

This alternative would maintain the terminal in the existing location. The terminal is well positioned to efficiently work with the existing main runway 10R/28L. It is centrally located between the runway ends. It is also conveniently located adjacent to Runway 6/24.

With runway development options that provide greater lateral separations for operational capability, the acceptability of the existing terminal location diminishes with greater runway separation. Runway crossings and taxi distance would increase with increased use of a new north runway as aircraft (arrivals and departures) would be required to cross Runway 10R/28L. This becomes increasingly more problematic at higher operational volumes.

- B. New Terminal West

This alternative provides a new terminal location north of Runway 10R/28L and west of Runway 6/24. For airfields with parallel runway configurations, a terminal located between the runways has the advantage of minimize runway crossings. However, when considered with the Capital City Airport configuration, and application of the east versus west aircraft flows, this alternative locates the terminal opposite the primary departure runway ends (Runways 28L and 28R), necessitating a crossing of Runway 6/24 for arrival and departure operations.

- C. New Terminal Mid-Field

This alternative provides a new terminal location north of Runway 10R/28L and east of Runway 6/24. This location has the advantage of locating a terminal between runways to minimize runway crossings. This alternative locates the terminal adjacent to the primary departure runway ends, minimizing the necessity of a crossing of Runway 6/24 for arrival and departure operations on Runway 10R/28L.

- D. New Terminal North

This alternative locates a terminal north of the runway complex. This alternative has the same characteristics as the existing location (Terminal Alternative A) and provides no advantage over this situation.

- E. New Terminal Southeast

This alternative locates a new terminal site to the east of the existing terminal building and provides the opportunity to construct a new terminal that eliminates issues with the existing terminal. The airfield/terminal operational relationships remain similar to the existing airfield (Terminal Alternative A), with higher capacity airfield options becoming more distant and less efficient.

4.3.5 Leading Elements Evaluation

Criteria used to evaluate the leading elements alternatives are presented in this section. Each criterion is defined and applicable comparison metrics are discussed. The evaluation process defines six major categories. Within each category, sub-categories are defined, and each sub-category contains specific evaluation criteria. This section will present and discuss these evaluation elements. The process and results of the evaluations and comparisons are presented in subsequent Section 4.3.6.

4.3.5.1 Airside

Airside addresses each leading element alternative in terms of the runway and taxiway operating environment, and the interface between the runways and taxiways, and the terminal development. The key criteria within the heading are airfield capacity, airfield capability, and airfield and terminal efficiency.

- Airfield Capacity

  Airfield capacity is an estimate of the number of aircraft that can be processed through the airfield system during a specific period of time with acceptable levels of delay. Similarly, the annual service volume (ASV) is a reasonable estimate of Capital City Airport's annual capacity, accounting for the various conditions encountered over the course of a year. Major factors that affect airfield capacity include the runway configuration, air traffic control operating procedures, weather conditions, and aircraft fleet mix.

  The airfield capacity considered each alternative based on two different scenarios. As was discussed in Chapter 3, based on forecast aircraft activity levels, the airport will surpass 60 percent of its total capacity near the end of the 20-year planning period. Therefore, this study is including protection for the ultimate provision of additional airfield capacity beyond the planning period. The evaluation of airfield capacity first considers each alternative's ability to provide the program capacity needed during the planning period. The evaluation then assesses the ability to provide strategic capacity representing the post-planning period time frame, which, for this study, accounts for a doubling of growth forecast during the current planning period.

- Airfield Capability

  The airfield capability refers specifically to runway length. For this criterion two major issues were considered: the Airport's ability to meet the technical runway length requirement and the strategic runway length requirement.

  The technical runway length requirement addresses the requirements of the design aircraft currently using, or forecast to use the Airport. For aircraft currently using the airport, any runway length adjustment would be supported by the operating statistics. Similarly, for aircraft forecast to use the Airport, programming for runway length adjustments would also be appropriate.

The strategic runway length addresses the strategic goals of the Airport. Specifically, the Airport has a goal to expand its role as an air cargo airport, and as such, the master plan addresses the ability to provide runway with sufficient length to allow aircraft to reach primary international cargo destinations. Assessment of this evaluation criterion did not specifically identify aircraft types, destinations, and runway lengths. Rather, the criteria qualitatively compared each runway alternative's ability to provide a significantly lengthened primary runway, and the associated impacts associated with such an improvement.

- Airfield and Terminal Efficiency

  This evaluation criterion assesses the efficiency of each airfield and terminal alternative combination. Specifically, this criterion addresses commercial passenger aircraft taxiing efficiency in terms of taxi distance, commercial passenger aircraft taxiing efficiency in terms of the quantity of runway crossings, and the location optimization of the cargo and general aviation facilities.

  The taxiing distance addresses the length of taxiway between the terminal area and various runway locations used by air carrier aircraft. This assessment considers multiple aircraft operating characteristics such as typical runway exit locations, future runway use patterns, and typical airport operating configurations.

  The taxiing efficiency focuses primarily on the quantity of runway crossings necessary to get to or from a runway. Runway crossings affect the speed at which an aircraft can move to or from the terminal or runway. However, more importantly, runway crossings are a significant issue in terms of aircraft safety.

  The location optimization of the general aviation and cargo operations considers the relationship between the location where these aircraft originate or are destined on the Airport, and the runways they would typically use. As with the taxi distance analysis, this criterion considered multiple aircraft operating characteristics such as typical runway exit locations, future runway use patterns, and typical airport operating configurations.

4.3.5.2 Landside

Landside evaluation criteria, as applied to the leading elements, specifically address the terminal alternatives. Each terminal alternative was evaluated with regards to terminal site capacity, accessibility, and site access issues.

- Terminal Site Capacity

  Terminal site capacity addresses each candidate site's ability to provide sufficient space for the future and ultimate terminal development. The facility requirements analysis identified the space requirements necessary for terminal, vehicle parking and vehicle access for the 20-year planning period. Based on these requirements, a conceptual terminal area layout was created to quantify the total area necessary for future terminal development. Similar to the analysis completed for the ultimate runway development, the ultimate terminal area space requirement considers a doubling of the terminal area space requirements, which would hypothetically address planning for the 40-year requirements.

The alternative site evaluations qualitatively compared each site in terms of general impacts associated with providing, initially the future required terminal development, and subsequently, the ultimate development.

- Terminal Site Accessibility

  Access to the terminal area utilizing a well-defined and convenient system of roadways will be a critical component of the continued success and growth of Capital City Airport. A study of the current and proposed travel routes was done to ensure that a high level of service, in terms of well defined way finding, limited congestion, and direct access, is provided to passengers ingressing and egressing the Airport via the terminal access roadways. The terminal site accessibility study included an analysis of off-airport roadways in relation to passenger origination and the routes chosen to arrive at the Airport. Thus, this analysis reviewed the level of congestion on each of the proposed travel routes and determined the average travel time per passenger.

  Based on that analysis it was determined that under lower traffic volume scenarios and lower passenger volumes, the current airport roadway access network is sufficient. However, the Lansing region has experienced an increase in traffic demand on the surrounding roadways, and it is fully expected, based on the passenger forecasts, that increases in passenger volume and origin distances will be experienced in the future. As a result, it is anticipated that the current access routes will no longer be sufficient to support future growth.

  As described in the Inventory chapter, primary access to the Terminal is currently provided by Capital City Boulevard via Grand River Road. Capital City Boulevard maintains adequate capacity to handle the current Airport vehicle traffic; however its location and route present inconveniences to the traveling public. The existing Airport signage directs users through local streets via Grand River Road, which does not conveniently connect to a freeway system. Furthermore, the at-grade railroad crossing with Capital City Boulevard presents operational and safety hazards to airport passengers.

  Approximately 24 trains pass through the rail crossing on Capital City Boulevard each day. During the train delays airport inbound and outbound vehicles are forced to stop and wait for the train to pass. The Airport’s need for safe, efficient, functional and logical access should preclude the interaction between future Airport access and the rail crossing. In order to accomplish this at the current location, both tunnel and bridge options were considered. However, when analyzed, the costs and access limitations of each were too prohibitive to be considered viable options. Therefore, alternative roadway access should be considered to improve Airport access and avoid the impacts of the railroad. Additionally, optimal roadway access to the Airport Terminal would best be provided by a nearby freeway interchange, including adequate signing.

  To analyze and compare airport access alternatives between potential terminal locations, travel time studies were conducted and passenger origin routes were analyzed. The large majority (approximately 80 percent) of Capital City passenger traffic originates from the southeast quadrant of Lansing. The southeast quadrant includes areas such as Downtown Lansing (i.e. Core), Michigan State University and the southeast suburbs. The routes to the Terminal from each of these areas were studied independently as various routes in the roadway network could be selected from each. Based on marketing analyses data, the percentage of passengers originated from general geographic areas/directions was determined. These percentages are presented in **Table 4-4**.

Table 4-4
PASSENGER ORIGIN LOCATION

NE	SE	SW	NW	Core	MSU
8%	24%	7%	4%	37%	20%

As part of the travel time study, the level of congestion on the Airport roadway network was calculated in the peak hour for the appropriate roadway sections that would be used by passengers. Congestion was calculated based on peak hour traffic volume versus roadway capacity. Congestion currently occurring on the roadway network varies from Level of Service A (acceptable) to F (heavily congested). The congestion level impacts speed and travel time in the passenger route analysis.

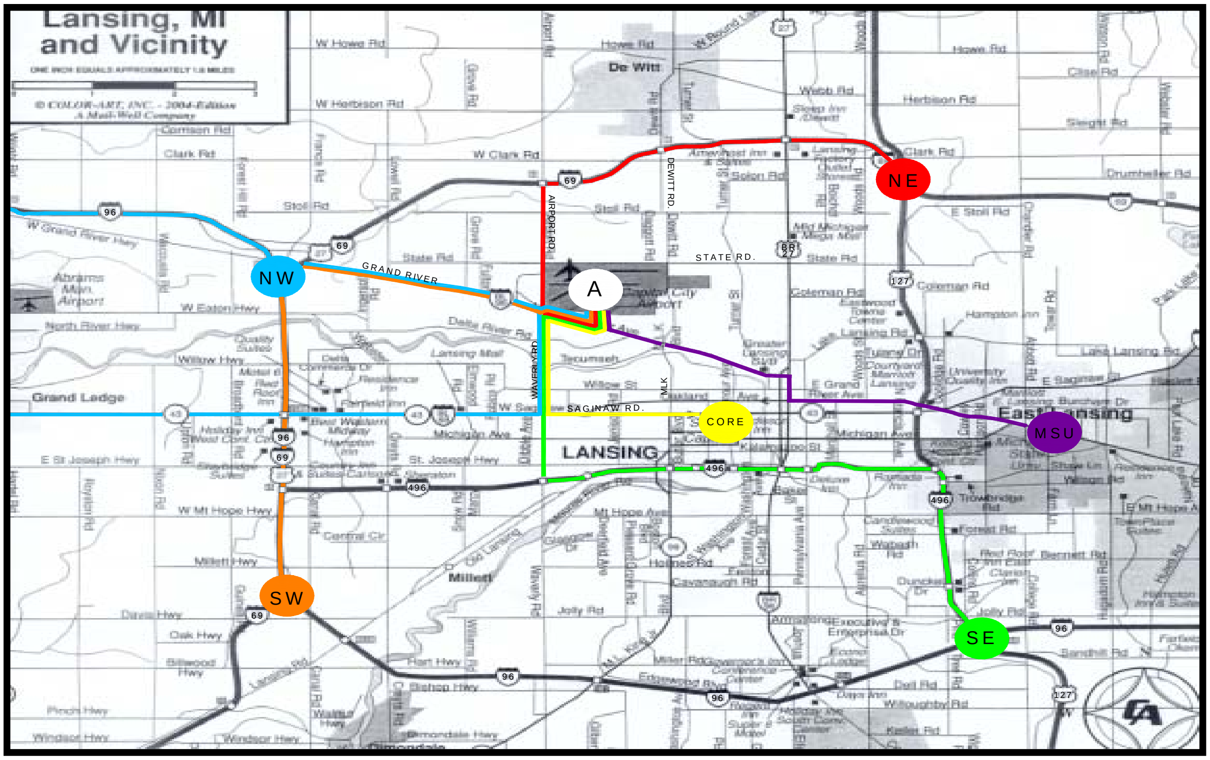
For each of the future terminal site alternative locations, access routes were developed. The premise of each route was to provide the most direct access to the terminal site, maximize use of the regional highway and state route network, avoid at-grade railroad crossing, and avoid use of local roads.

- Passenger Travel Routes

A. Existing Terminal Location

Passenger route choices are shown for the existing terminal location, in **Exhibit 4-4**. Current signage directs the majority of traffic to use the local streets of Waverly and Grand River Road, both of which have sections of heavy congestion, which create higher travel times to the Airport. Such congestion could be avoided by using the I-69 freeway to the north or US-127 to the east, but these routes span comparatively longer distances, therefore are seldom used. The average travel time calculated to the existing terminal is approximately 17-minutes.

Exhibit 4-4
EXISTING TERMINAL ACCESS ROUTES



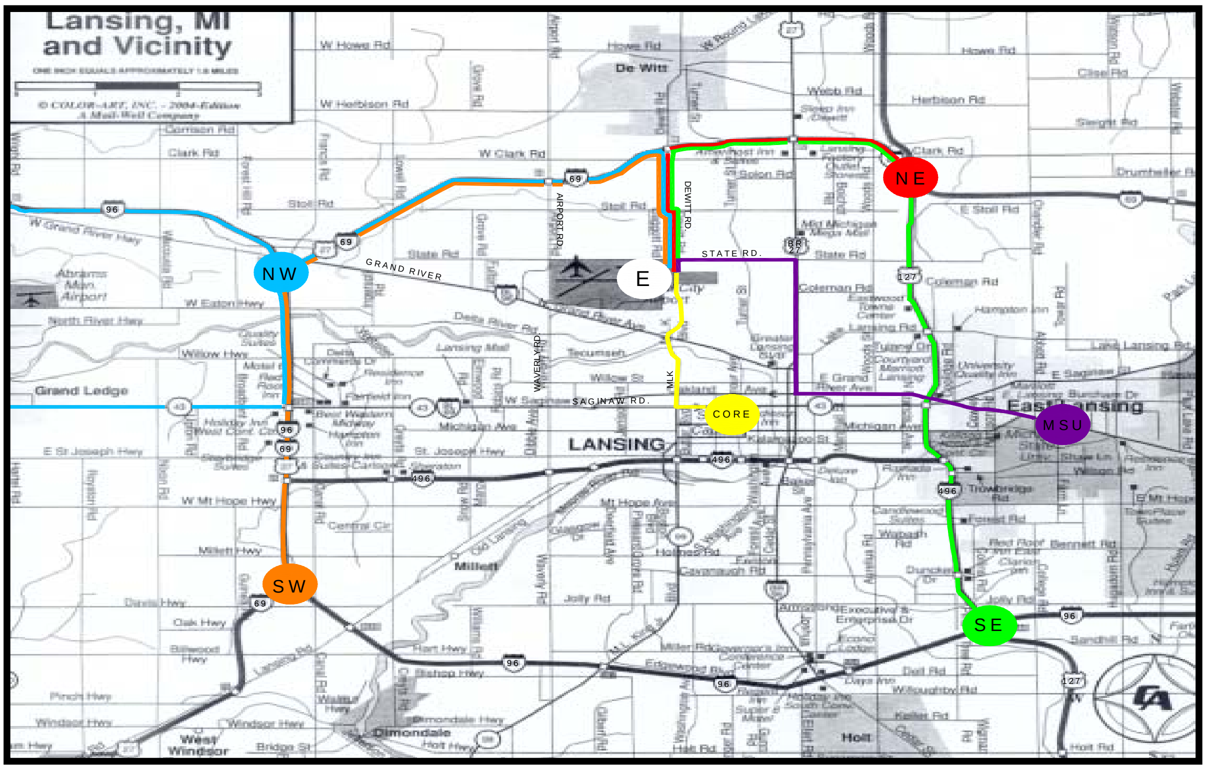
B. East Terminal Location

As discussed in the previous chapters, a terminal on the east areas of the Airport had several potential locations: southeast adjacent to the Air Cargo Facility, northeast, north of the future runways and mid-east, located in between the runways. All three eastern terminal locations were best served and assumed to have the main roadway access located from DeWitt Road.

With the location of a terminal to the east, passenger traffic would access the terminal from DeWitt Road. Compared to the rest of the City, the Downtown or Core traffic would have a shorter, more direct route to an east alternative new terminal due to the access along DeWitt. Traffic from Michigan State and a portion of traffic from the Lansing business district could take advantage of Business Route 27 and State Road, which would be a faster, shorter route than that currently used for the existing terminal. The remainder of passenger traffic could remain on the freeway system and use the I-69, DeWitt Road interchange from the north for easy access to the proposed new terminal location. These new route patterns would create considerable travel time savings per passenger. Furthermore, the majority of traffic would be able to avoid the railroad impact along Capital City Boulevard; however, Downtown traffic may still be affected by the rail crossings at the Martin Luther King Boulevard (MLK) and Grand River Road intersection.

In summary, all the eastern terminal locations have a passenger travel time average of 10.7 minutes (a 37 percent reduction from the current average). Travel route summaries are shown in **Exhibit 4-5**.

Exhibit 4-5
EAST TERMINAL ACCESS ROUTES

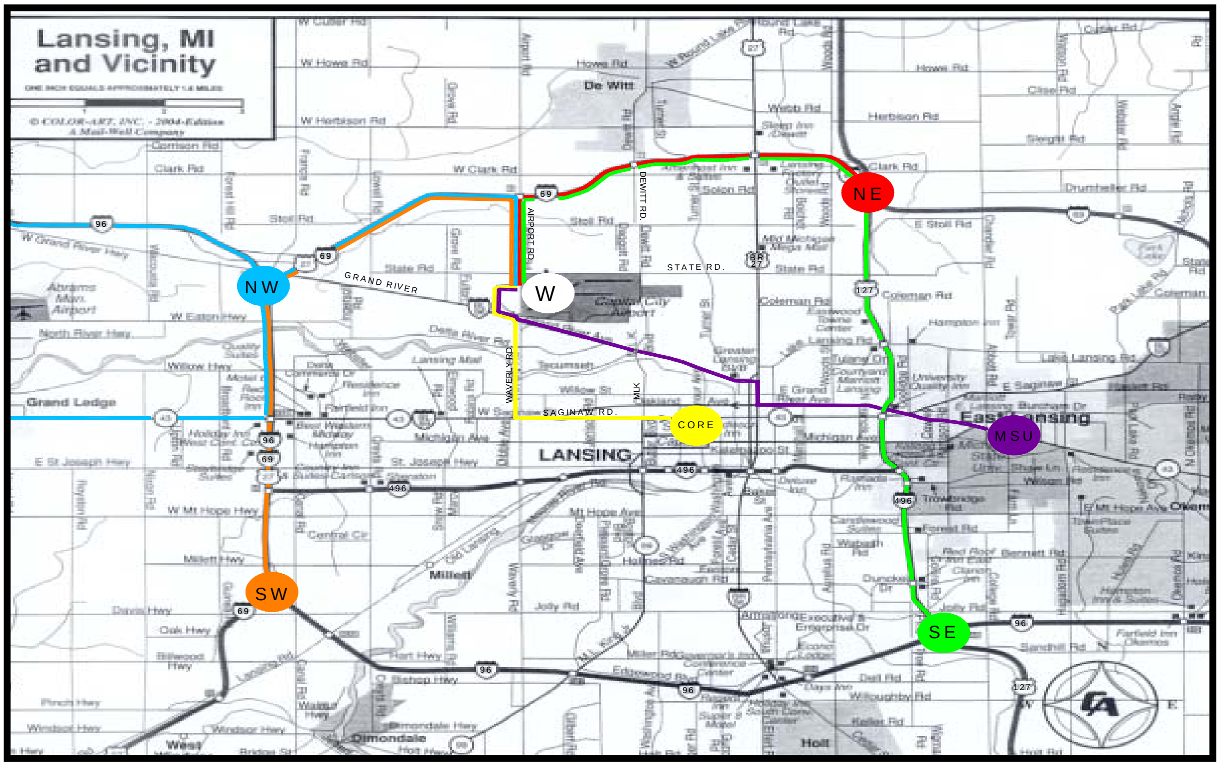


C. West Terminal Location

Selection of a western alternative terminal location along Airport Road would create a slightly longer travel distance for passengers from the east as shown in **Exhibit 4-6.** A small portion of the passengers to the west would benefit from this alternative, but as the majority of passenger trips start from the east, total travel time for this alternative would increase to an average travel time of 12.0 minutes.

As for cost responsibility of the off-airport roadways, the roadway improvements proposed to accommodate an increase in traffic demand are expected to occur along State Road and DeWitt Road. The appropriate county roadway agencies were contacted to discuss potential changes in traffic patterns, but the county agencies have no future plans to expand or improve these roadways, therefore the Airport would assume the responsibility of the expense.

Exhibit 4-6
WEST TERMINAL ACCESS ROUTES



- Terminal Site Access Issues

  The Terminal access roadway links the passenger traffic to the Airport landside areas such as: parking, curbfront arrival and departure or rental car facilities. The access roadway and landside areas were studied in the previous chapter and it has been determined that based upon the increase in passenger demand additional space is required for all three of the terminal landside areas. The access roadway needs to be designed for convenience and easy signing to designated areas. In the future, the main, terminal access roadway can be improved to provide a more aesthetic, appealing terminal entranceway, but most importantly, an improved design would provide users greater advanced notices to parking ramps, rental car areas and curbfront destinations.

A. Existing Terminal Access

The existing Terminal curbfront roadway, as studied in the previous chapter, is reaching a maximum capacity along the arrival curb only during the peak hours by 2008. The departure and commercial vehicle curb areas are adequate through the planning years. To maintain adequate level of service and avoid congestion for the arrival curbfront, additional curbfront length is required. Approximately 80 feet is required; however, the arrival curbfront is a condensed area and extending the curb could be difficult due the curved curbfront roadway and there are no additional terminal exit doorways. In summary, the cost of additional curbfront is prohibitive, so an alternative option is to reallocate the curbfront areas; however it will only result in a minimal improvement.

B. New Terminal Access

Ultimately, if a new terminal were located to the east or west, the landside areas would be designed to accommodate the forecast growth, and as a result would encompass larger areas of land compared to the existing infrastructure. Convenient short and long-term parking are planned to be located directly across from the new Terminal facility and encompass approximately 3.8 acres; approximately 2,300 auto parking spaces. A new access roadway should maintain capacity similar to the existing, and is envisioned to include a total of four lanes on the primary access route, with two lanes approaching the terminal. The design of a new, one level terminal would require an increase the curbfront length, adequate to serve all arrival, departure and service vehicles. The future location of an expanded rental car facility is required to provide additional spaces and should be located on Airport property; however size, functionality and location of such facilities will be determined in the facility design.

4.3.5.3 <u>Environmental</u>

Impacts to the environment were assessed as part of the evaluation of each alternative. This assessment was a planning level cursory review of environmental impact categories, with noise and wetlands impacts being the primary focus. As such, each alternative was reviewed for its particular impact on those environmental categories and was subsequently compared to each of the other alternatives to define their relative cumulative impact.

Additionally, these same categories were also considered during the development of the alternatives themselves, with specific efforts made to identify and, as applicable, avoid environmentally sensitive areas, such as wetlands. As a result, the leading elements were planned with a minimization of environmental impacts as a primary driver. This ensured that those alternatives that had a significant environmental impact were discarded in advance.

The resultant alternatives, which included as leading elements the terminal location, airport access, and airfield configuration changes, were thus formulated with regard to their potential environmental impact. However, that is not to state that each did not have some form of environmental impact. In particular, each proposed alternative required some amount of property acquisition, and as a result of airfield configuration changes caused an inherent shift in noise patterns, which when combined with the forecast increase in activity, resulted in increased noise impacts off of Airport property. Furthermore, while effort was made to avoid wetlands, some of the proposed alternatives would encroach upon delineated wetland areas.

As previously indicated, five general alternative locations were described for the passenger terminal. The locations included: south central (existing location), north, west, east and southeast.

Combined with six airfield configuration alternatives, these alternatives were each evaluated based on the environmental considerations discussed above and on known environmental conditions.

The environmental analysis determined that only the west terminal site has wetlands impacts. The analysis further determined that airfield configurations based on an extension of Runway 6-24 to the northeast, or an independent parallel Runway 10L-28R placed north will introduce noise to areas either currently not affected by or experiencing limited aircraft noise. The end result is that all of the proposed alternatives, when considering their cumulative impacts, had comparable environmental impacts, with only four alternatives demonstrating significant differences.

Four alternatives had environmental impacts significantly different than the other alternatives. Alternatives that include closely spaced parallel runways and terminal locations either at the existing location (south central) or in the southeast quadrant of the Airport (south east) have significantly less impacts as development would most closely resemble the existing airfield characteristics. Conversely, alternatives that include the replacement terminal located to the west (west), and utilized either a widely spaced parallel runway (Independent) or extended Runway 6-24 to the northeast (converging), have significantly greater impacts. The terminal location impacts known wetlands located in the northwest quadrant, and the runway development increases the number of persons impacted by noise.

4.3.5.4 Costs

In order to provide the necessary basis for a cost comparison between the identified leading elements, and thus provide the ability to compare each primary alternative to the other in an equitable fashion, Planning Level Order of Magnitude (PLOOM) Costs were developed for each of the primary components of the various alternatives. The PLOOM Costs do not reflect a detailed analysis of the construction related costs, but rather reflect an estimation of the cost of major items, such as runways, terminal buildings, pavements, parking lots, and roadways. Therefore, these PLOOM Costs represent "rolled up" cost for a large number of distinct items into a single cost per unit, such as square acre, yard or foot.

To further assist the Airport in its evaluation, the PLOOM costs have also been categorized by which entity can be anticipated to be responsible for them. Categorized as "Airport" and "Other Agency" costs, they reflect the anticipated participation by Local, State and Federal funding agencies. This categorization is an experienced-based breakdown based on the current FAA Airport Improvement Program (AIP) legislation, which dictates the maximum funding level at which the FAA will participate in certain projects. It should be pointed out that these figures represent a potential level of funding support for the identified major components of each alternative, and as such the dollar amounts presented do not represent assurances from either the FAA or State that such funding amounts will be available.

For each of the proposed Leading Elements Alternatives a series of PLOOM Costs were developed and utilized within the Evaluation Matrix. Because each of the Alternatives is actually a series of alternatives (using the airfield development alternatives as the primary driver and the location of any proposed terminal and access improvements as secondary drivers) each primary alternative – labeled as Alternatives 2 thru 6, has a range of PLOOM costs that is dependent upon the terminal and access alternative selected. As an example, Airfield Alternative 2 can utilize terminal and Access Alternatives A, C and E; therefore, the PLOOM costs for Alternative 2 actually reflects costs for 2A, 2C and 2E.

4.3.5.5 Implementation

Implementation addresses the ability to develop the proposed alternative. This criterion addresses three implementation aspects: site constraints, FAA implementability, and the functioning of each alternative as it is developed.

- The site constraints criterion assesses specific limitations at each site that would preclude or hinder alternative development. This is a qualitative assessment that considers existing site characteristics.

- FAA implementability is based on an assessment of the Agency's policies and procedures, and their impact on alternative development. This criterion considers topics such as project justification, fundability, and Agency priority.

- The function of each alternative as it is phased addresses the Airport operating characteristics during various phases of each comprehensive alternative. Each leading element alternative includes improvements that could be implemented in varying near, mid, and long-term phases. As such, this analysis considered the functionality of the Airport during the phasing process. For example, a new terminal located on the north side of the Airport could be developed well in advance of additional runway development. As such, the terminal would be remotely located from the runway and taxiway system, creating an operating inefficiency.

4.3.5.6 Planning Compatibility

Planning compatibility provides a qualitative analysis of each concept in terms of subsequent alternatives analyses in this master plan, balanced facility development, and the alternative's conformance with the Airport's strategic plans.

The leading elements analysis is by definition intended to evaluate the alternatives considering the features identified as requiring the largest area protection. However, it is prudent to consider the subsequent step in the master plan process that will address trailing elements, including alternatives for general aviation and other support facilities. Each leading element alternative was evaluated in terms of the overall impact to the Airport and the size and functionality of space remaining for the trailing elements.

Each alternative was assessed in terms of the balance between the airfield and terminal components of the alternative. Balance refers to the ability of each facility (i.e., runway and taxiway system versus terminal) to accommodate aircraft and the relationship between each.

The analysis of leading elements considered the conformance of each alternative with the Airport's strategic plan. The Airport and Airport Board have established a strategic plan that, in general, calls for the expansion or growth of air carrier service, charter service, air cargo, and general aviation. The analysis considered not only the ability of each alternative to provide for these goals independently, but also the means by which each goal can be achieved concurrently without having a negative impact imposed on any one goal.

4.3.6 Leading Elements Preferred Alternative

For the evaluation of the leading elements and selection of a preferred alternative, a series of matrices was created linking each alternative with each of the evaluation criteria identified in this section. The purpose of the matrices was to assign rankings to each evaluation criteria establishing a means by which a preferred alternative could be selected.

The initial matrix compared each alternative purely in comparison to all other alternatives within a specific evaluation criterion. For presentation purposes, the initial matrix was divided into three separate **Tables, 4-5, 4-6, and 4-7**. The matrices show the division by category, sub-category, and evaluation criteria (e.g., Airside, Airfield Capacity, and Program Capacity), discussed in Section 4.3.5. The process for evaluation is as follows:

- For each leading element alternative, each evaluation criteria was assigned a ranking based on favorableness of the evaluation, with five representing the most favorable and one representing the least.
- Each evaluation criterion was assigned a weighting factor based on its importance within the evaluation category, with five representing the most important, or most impacting, and one representing the least.
- Within each category, the evaluation criteria ranking was multiplied by the weighting factor, and the resulting total for each criteria was added by leading element alternative to produce the total points by category for each alternative.

The matrix also identifies the total points achievable for each category. This total is the sum of the products of each of the maximum possible criteria ranking (five) and the assigned weighting factor within a category.

A second matrix was then developed to allow comparison of each leading element alternative within a given category, and to quantitatively compare each of the categories. **Table 4-8** presents this matrix. The process for evaluation in this matrix is as follows.

- The total points each alternative received in the first matrix were compared to the maximum achievable points, and presented as a percentage of total points.
- A weighting factor was assigned to each category. This allowed a relative importance to be assigned to each category with respect to the other categories.
- The percentage of total points was multiplied by the weighting factor to produce a score for the category.
- The score for each category was added to produce a total score for each alternative.
- Each total score was compared against the maximum achievable total score to present each alternative as a percentage of the maximum total score.

Table 4-5
LEADING ELEMENT ALTERNATIVE EVALUATION MATRIX (1 OF 3)

Category	Weighting Factor	Leading Element Alternative 2 A	2 C	2 E	3 A	3 C	3 D	3 E
Airside								
1 **Airfield Capacity:**								
A Program Capacity	4	2	1	2	3	2	2	3
B Strategic Capacity	3	1	1	1	2	1	1	2
2 **Airfield Capability:**								
A Meets technical R/W length requirement	3	4	4	4	5	5	5	5
B Meets strategic R/W length requirement	3	3	3	1	3	4	3	1
3 **Airfield & Terminal Efficiency:**								
A Taxiing Efficiency -- Distance	5	5	3	2	5	3	2	2
B Taxiing Efficiency -- Runways Crossing	4	5	4	5	5	4	4	5
C Location Optimization - GA and Cargo	2	2	1	2	2	1	1	2
Total Points	**120**	**81**	**61**	**60**	**91**	**71**	**63**	**70**
Landside								
4 **Terminal Site Capacity:**								
A Meets 20-Year Capacity Need	4	4	5	5	4	5	5	5
B Meets 40-Year Capacity Estimate	3	1	5	5	1	5	5	5
5 **Terminal Site Accessibility:**								
A Off-Airport - Accessibility Convenience	4	2	4	5	2	4	5	5
6 **Terminal Site Access Issues:**								
A On-Airport future landside flexibility	3	2	5	5	2	5	5	5
B On-Airport aesthetics	1	3	5	5	3	5	5	5
C Traffic Management (Env. Implications)	4	1	4	5	1	4	5	5
Total Points	**95**	**40**	**87**	**95**	**40**	**87**	**95**	**95**
Environmental								
7 **Environmental**								
A Noise Impacts	5	4	4	4	3	3	3	3
B Wetlands	3	5	1	5	5	1	3	5
C Land Acquisition - Airport & Roads	4	1	1	1	1	1	1	1
Total Points	**65**	**39**	**27**	**39**	**34**	**22**	**28**	**34**
Costs								
8 **Airfield, Terminal & Access Costs**								
Airport Costs								
A Airfield Costs		$0.8	$2.8	$0.8	$3.3	$5.2	$4.0	$3.8
B Terminal Costs		$41.0	$54.0	$51.7	$41.0	$54.0	$51.7	$51.7
C On-Airport Roadway Access Costs		$8.9	$12.9	$0.0	$8.9	$12.9	$0.0	$0.0
D Accessibility Cost (Off Airport Costs)		$3.1	$3.1	$12.2	$3.1	$3.1	$10.8	$10.8
Total Airport Cost		$53.8	$72.7	$64.7	$56.2	$75.1	$66.5	$66.3
Airport Cost Points	3	**5**	**1**	**3**	**5**	**1**	**3**	**3**
Other Agency Costs								
A Airfield Costs		$7.6	$24.8	$7.6	$29.4	$46.4	$35.8	$34.4
B Terminal Costs		$85.1	$112.1	$107.3	$85.1	$112.1	$107.3	$107.3
C On-Airport Roadway Access Costs		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
D Accessibility Cost (Off Airport Costs)		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total Other Agency Cost		$92.6	$136.9	$114.9	$114.5	$158.5	$143.1	$141.7
Other Agency Cost Points	2	**5**	**2**	**4**	**4**	**1**	**2**	**2**
Total Airfield, Terminal & Access Cost		$146.4	$209.6	$179.6	$170.7	$233.6	$209.6	$208.0
Total Points	**25**	**25**	**7**	**17**	**23**	**5**	**13**	**13**
Implementation								
9 **Airfield and Terminal Implementation**								
A Site constraints to construction	3	3	3	5	2	2	4	4
B FAA Implementability	1	5	1	5	4	3	3	4
C Function of Alternative as it is phased	5	5	5	5	5	4	4	5
Total Points	**45**	**39**	**35**	**45**	**35**	**29**	**35**	**41**
Planning Compatibility								
10 **Airfield & Terminal Alternative Planning**								
A Room for well-placed support facilities?	1	3	3	3	3	3	3	3
B Balance between Airfield & Terminal	3	1	1	1	3	3	3	1
C Conformance with Strategic Plan functionally	5	2	1	2	4	3	3	4
Total Points	**45**	**16**	**11**	**16**	**32**	**27**	**27**	**26**

Table 4-6

LEADING ELEMENT ALTERNATIVE EVALUATION MATRIX (2 OF 3)

		LEADING ELEMENT ALTERNATIVE							
		4				5			
Category	Weighting Factor	A	B	C	E	A	C	D	E
Airside									
1 **Airfield Capacity:**									
A Program Capacity	4	4	4	4	4	5	5	5	5
B Strategic Capacity	3	3	3	3	3	4	4	4	4
2 **Airfield Capability:**									
A Meets technical R/W length requirement	3	4	4	4	4	4	4	4	4
B Meets strategic R/W length requirement	3	5	5	5	1	5	5	3	1
3 **Airfield & Terminal Efficiency:**									
A Taxiing Efficiency -- Distance	5	5	1	3	5	4	5	5	2
B Taxiing Efficiency -- Runways Crossing	4	2	1	1	2	2	4	4	2
C Location Optimization - GA and Cargo	2	4	5	5	3	3	5	5	3
Total Points	**120**	**93**	**71**	**81**	**79**	**93**	**110**	**104**	**71**
Landside									
4 **Terminal Site Capacity:**									
A Meets 20-Year Capacity Need	4	4	5	5	5	4	5	5	5
B Meets 40-Year Capacity Estimate	3	1	5	5	5	1	5	5	5
5 **Terminal Site Accessibility:**									
A Off-Airport - Accessibility Convenience	4	2	4	4	5	2	4	5	5
6 **Terminal Site Access Issues:**									
A On-Airport future landside flexibility	3	2	5	5	5	2	5	5	5
B On-Airport aesthetics	1	3	5	5	5	3	5	5	5
C Traffic Management (Env. Implications)	4	1	5	4	5	1	4	5	5
Total Points	**95**	**40**	**91**	**87**	**95**	**40**	**87**	**95**	**95**
Environmental									
7 **Environmental**									
A Noise Impacts	5	5	5	5	5	4	4	4	4
B Wetlands	3	5	3	1	5	5	1	3	5
C Land Acquisition - Airport & Roads	4	1	1	1	1	1	1	1	1
Total Points	**65**	**44**	**38**	**32**	**44**	**39**	**27**	**33**	**39**
Costs									
8 **Airfield, Terminal & Access Costs**									
Airport Costs									
A Airfield Costs		$4.0	$4.6	$4.8	$4.2	$3.7	$5.1	$4.8	$3.9
B Terminal Costs		$41.0	$51.7	$54.0	$51.7	$41.0	$54.0	$51.7	$51.7
C On-Airport Roadway Access Costs		$8.9	$0.0	$12.9	$0.0	$8.9	$12.9	$0.0	$0.0
D Accessibility Cost (Off Airport Costs)		$3.1	$10.8	$3.1	$10.8	$3.1	$3.1	$10.8	$10.8
Total Airport Cost		$57.0	$67.1	$74.8	$66.6	$56.7	$75.1	$67.3	$66.3
Airport Cost Points	3	**5**	**2**	**1**	**3**	**5**	**1**	**2**	**3**
Other Agency Costs									
A Airfield Costs		$36.1	$41.7	$43.6	$37.4	$33.7	$46.2	$43.5	$34.7
B Terminal Costs		$85.1	$107.3	$112.1	$107.3	$85.1	$112.1	$107.3	$107.3
C On-Airport Roadway Access Costs		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
D Accessibility Cost (Off Airport Costs)		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total Other Agency Cost		$121.1	$149.0	$155.6	$144.8	$118.7	$158.2	$150.8	$142.0
Other Agency Cost Points	2	**3**	**1**	**1**	**2**	**4**	**1**	**1**	**2**
Total Airfield, Terminal & Access Cost		$178.1	$216.1	$230.4	$211.4	$175.4	$233.3	$218.1	$208.3
Total Points	**25**	**21**	**8**	**5**	**13**	**23**	**5**	**8**	**13**
Implementation									
9 **Airfield and Terminal Implementation**									
A Site constraints to construction	3	1	1	1	3	1	1	3	3
B FAA Implementability	1	5	4	4	4	3	3	3	3
C Function of Alternative as it is phased	5	5	3	2	5	5	4	4	5
Total Points	**45**	**33**	**22**	**17**	**38**	**31**	**26**	**32**	**37**
Planning Compatibility									
10 **Airfield & Terminal Alternative Planning**									
A Room for well-placed support facilities?	1	3	3	3	3	3	3	3	3
B Balance between Airfield & Terminal	3	3	3	3	3	3	5	5	3
C Conformance with Strategic Plan functionally	5	5	5	5	5	5	5	5	5
Total Points	**45**	**37**	**37**	**37**	**37**	**37**	**43**	**43**	**37**

Table 4-7
LEADING ELEMENT ALTERNATIVE EVALUATION MATRIX (3 OF 3)

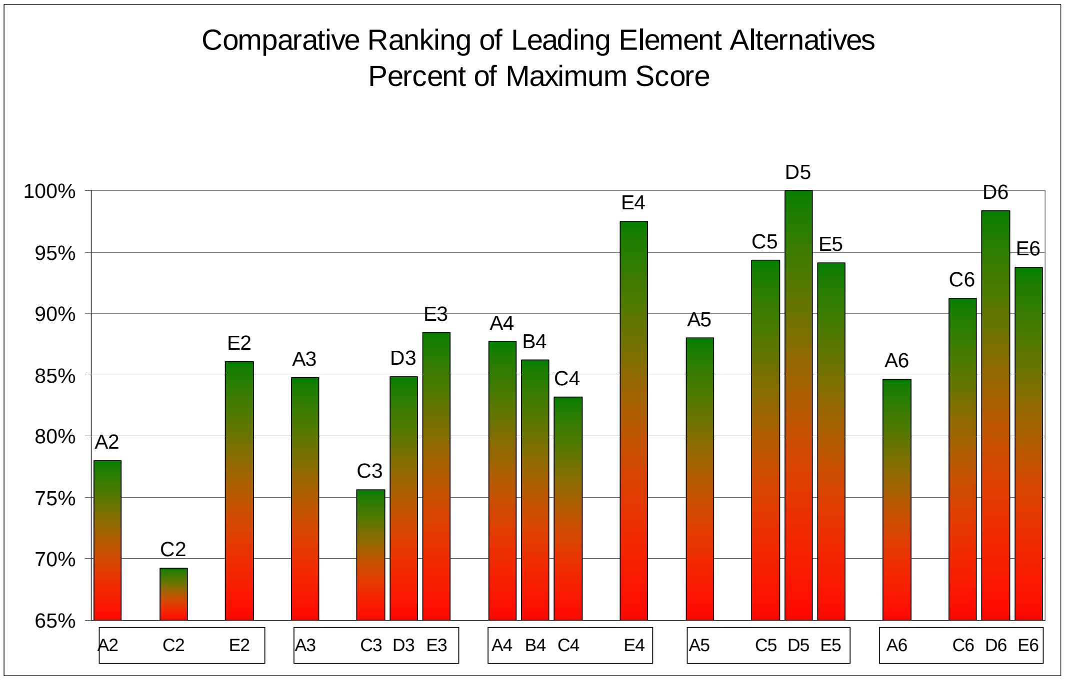
	Category	Weighting Factor	LEADING ELEMENT ALTERNATIVE 6 A	C	D	E
Airside						
1	**Airfield Capacity:**					
A	Program Capacity	4	5	5	5	5
B	Strategic Capacity	3	5	5	5	5
2	**Airfield Capability:**					
A	Meets technical R/W length requirement	3	4	4	4	4
B	Meets strategic R/W length requirement	3	5	5	3	1
3	**Airfield & Terminal Efficiency:**					
A	Taxiing Efficiency -- Distance	5	3	4	5	2
B	Taxiing Efficiency -- Runways Crossing	4	2	4	4	2
C	Location Optimization - GA and Cargo	2	3	5	5	3
	Total Points	**120**	**91**	**108**	**107**	**74**
Landside						
4	**Terminal Site Capacity:**					
A	Meets 20-Year Capacity Need	4	4	5	5	5
B	Meets 40-Year Capacity Estimate	3	1	5	5	5
5	**Terminal Site Accessibility:**					
A	Off-Airport - Accessibility Convenience	4	2	4	5	5
6	**Terminal Site Access Issues:**					
A	On-Airport future landside flexibility	3	2	5	5	5
B	On-Airport aesthetics	1	3	5	5	5
C	Traffic Management (Env. Implications)	4	1	4	5	5
	Total Points	**95**	**40**	**87**	**95**	**95**
Environmental						
7	**Environmental**					
A	Noise Impacts	5	3	3	3	3
B	Wetlands	3	5	1	3	5
C	Land Acquisition - Airport & Roads	4	1	1	1	1
	Total Points	**65**	**34**	**22**	**28**	**34**
Costs						
8	**Airfield, Terminal & Access Costs**					
	Airport Costs					
A	Airfield Costs		$4.0	$5.4	$5.0	$4.1
B	Terminal Costs		$41.0	$54.0	$51.7	$51.7
C	On-Airport Roadway Access Costs		$8.9	$12.9	$0.0	$0.0
D	Accessibility Cost (Off Airport Costs)		$3.1	$3.1	$10.8	$10.8
	Total Airport Cost		$57.0	$75.4	$67.5	$66.6
	Airport Cost Points	3	**5**	**1**	**2**	**3**
	Other Agency Costs					
A	Airfield Costs		$36.1	$48.6	$45.4	$37.1
B	Terminal Costs		$85.1	$112.1	$107.3	$107.3
C	On-Airport Roadway Access Costs		$0.0	$0.0	$0.0	$0.0
D	Accessibility Cost (Off Airport Costs)		$0.0	$0.0	$0.0	$0.0
	Total Other Agency Cost		$121.1	$160.7	$152.7	$144.4
	Other Agency Cost Points	2	**3**	**1**	**1**	**2**
	Total Airfield, Terminal & Access Cost		$178.1	$236.0	$220.2	$211.0
	Total Points	**25**	**21**	**5**	**8**	**13**
Implementation						
9	**Airfield and Terminal Implementation**					
A	Site constraints to construction	3	1	1	3	3
B	FAA Implementability	1	2	2	2	2
C	Function of Alternative as it is phased	5	5	4	4	5
	Total Points	**45**	**30**	**25**	**31**	**36**
Planning Compatibility						
10	**Airfield & Terminal Alternative Planning**					
A	Room for well-placed support facilities?	1	3	3	3	3
B	Balance between Airfield & Terminal	3	3	4	4	3
C	Conformance with Strategic Plan functionally	5	5	5	5	5
	Total Points	**45**	**37**	**40**	**40**	**37**

Table 4-8
COMPARATIVE RANKING OF LEADING ELEMENT ALTERNATIVES MATRIX

			LEADING ELEMENT ALTERNATIVE																		
			2			3				4				5				6			
Category	**Weight**	**Descriptor**	**A**	**C**	**E**	**A**	**C**	**D**	**E**	**A**	**B**	**C**	**E**	**A**	**C**	**D**	**E**	**A**	**C**	**D**	**E**
Airside		Rank Points:	81	61	60	91	71	63	70	93	71	81	79	93	110	104	71	91	108	107	74
Airfield Capacity, Capability, & Air/Term Efficiency		%	68%	51%	50%	76%	59%	53%	58%	78%	59%	68%	66%	78%	92%	87%	59%	76%	90%	89%	62%
	5	Score	3	3	3	4	3	3	3	4	3	3	3	4	5	4	3	4	5	4	3
Landside		Rank Points:	40	87	95	40	87	95	95	40	91	87	95	40	87	95	95	40	87	95	95
Terminal Site Capacity & Landside Accessibility		%	42%	92%	100%	42%	92%	100%	100%	42%	96%	92%	100%	42%	92%	100%	100%	42%	92%	100%	100%
	5	Score	2	5	5	2	5	5	5	2	5	5	5	2	5	5	5	2	5	5	5
Environmental		Rank Points:	39	27	39	34	22	28	34	44	38	32	44	39	27	33	39	34	22	28	34
Wetlands, noise, & land acquisition		%	60%	42%	60%	52%	34%	43%	52%	68%	58%	49%	68%	60%	42%	51%	60%	52%	34%	43%	52%
	2	Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Costs		Rank Points:	25	7	17	23	5	13	13	21	8	5	13	23	5	8	13	21	5	8	13
Airfield, Terminal & Access PLOOM Cost Estimates		%	100%	28%	68%	92%	20%	52%	52%	84%	32%	20%	52%	92%	20%	32%	52%	84%	20%	32%	52%
	3	Score	3	1	2	3	1	2	2	3	1	1	2	3	1	1	2	3	1	1	2
Implementation		Rank Points:	39	35	45	35	29	35	41	33	22	17	38	31	26	32	37	30	25	31	36
Site Constraints, FAA & Phasing		%	87%	78%	100%	78%	64%	78%	91%	73%	49%	38%	84%	69%	58%	71%	82%	67%	56%	69%	80%
	1	Score	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
Planning Compatibility		Rank Points:	16	11	16	32	27	27	26	37	37	37	37	37	43	43	37	37	40	40	37
Support Facilities, Balance & Strategic Plan		%	36%	24%	36%	71%	60%	60%	58%	82%	82%	82%	82%	82%	96%	96%	82%	82%	89%	89%	82%
	3	Score	1	1	1	2	2	2	2	2	2	2	2	2	3	3	2	2	3	3	2
		Total Score	**11.6**	**10.3**	**12.8**	**12.6**	**11.3**	**12.6**	**13.2**	**13.1**	**12.8**	**12.4**	**14.5**	**13.1**	**14.0**	**14.9**	**14.0**	**12.6**	**13.6**	**14.6**	**14.0**
		% of Max	78%	69%	86%	85%	76%	85%	88%	88%	86%	83%	98%	88%	94%	100%	94%	85%	91%	98%	94%

Exhibit 4-7 presents a graphical summary of the findings of Table 4-8, showing Leading Alternative D-5 having received the highest score in the alternatives analysis, and thus being the recommended leading element alternative.

Exhibit 4-7
COMPARATIVE RANKING OF LEADING ELEMENT ALTERNATIVES



4.4 Trailing elements

The trailing elements, by definition, are those facilities with required or proposed development external of the leading elements. For this master plan, the trailing elements include general aviation, aviation support facilities, non-aviation support facilities, and airport access.

4.4.1 General Aviation Facilities

The Forecast and Facilities Requirements chapters identified the need for additional general aviation (GA) facilities throughout the planning period. Facilities include 28 additional GA hangars (having space requirement equivalent to five acres) and approximately 29,000-square yards (equivalent to six acres) of apron will be required. Therefore the area(s) selected for future GA expansion must provide a minimum of 11 acres.

The previous master plan focused on preserving the land north of existing Runway 10L-28R for future GA facilities. However, GA growth has been less than forecast, and the north GA facility development never materialized.

Additional airfield infrastructure has recently been constructed for use by future GA facilities, with airfield access provided via Taxiways “J” and “G”. Taxiway “J” was constructed in the Airport’s southeast corner, and was designed to provide airfield access to the future air cargo expansion to the east and ultimate GA development areas, as were identified in the 1995 ALP. Taxiway "G" was constructed in the Airport's southwest corner, and was designed to provide airfield access to this area, which includes future GA development. Based on the forecast GA demand and associated facility requirements, there is an overabundance of potential areas for GA expansion. The following paragraphs describe the most logical alternatives for meeting the needs of future GA growth while maintaining the strategic goals of the Airport.

As discussed in the Inventory chapter, the general aviation GA facilities are currently located in two areas; one southwest of the terminal and the other located immediately southeast of the terminal. The southwest GA development area encompasses approximately 45-acres, while the southeast area encompasses approximately 28-acres. The GA expansion possibilities between these areas are limited to the southwest area, as the southeast GA area has reached its capacity.

Approximately 14-acres of land are currently available for hangar and apron development in the southwest GA area, which exceeds the area required by three acres. Therefore, it is recommended that this area be used to house the eight additional T-hangars and requisite apron area forecast to be needed throughout the planning period consistent with the existing GA facilities in this area.

The allocation of the southwest GA complex for future expansion offers several advantages to both the Airport and its users. The most obvious advantage to the selection of this area is that current infrastructure exists that would support the desired expansion. This infrastructure includes taxiways, taxilanes, apron and utility lines. Selection of this alternative would also promote a centralized area for general aviation activities, simplifying itinerant operations and reducing the potential interaction with large commercial aircraft traffic.

The recently acquired 17-acre area just northwest of Runway 6 is a preferable place to locate the 20 conventional hangars required over the planning period, as this area is suitable for development of a corporate/business aircraft complex.

As mentioned above, the recent Taxiway J addition was built to accommodate projected air cargo and GA demand. As such, an 11.5 acre area east of Taxiway J has also been identified as an alternative for future GA expansion and is depicted as "GA 3" on **Exhibit 4-8**. This site has already undergone infrastructure improvements such as Taxiway J and a vehicle access road. As such future development of this site would require minimal supporting infrastructure. Additional undeveloped land (identified as potential ATCT and industrial park development on subsequent Exhibits 4-9 and 4-10) currently surrounds this alternative site, providing flexibility for additional expansion should the need for such arise.

Exhibit 4-8
GENERAL AVIATION DEVELOPMENT AREAS

4.4.2 Aviation Support Facilities

This section discusses the recommended alternatives for aviation support facilities including air cargo, airport rescue and fire fighting, airport maintenance, fuel storage, and the air traffic control tower.

4.4.2.1 Air Cargo

The Forecast and Facilities Requirements Chapters have indicated that the level of air cargo activity at the Airport is anticipated to increase throughout the planning period, ultimately tripling the current operations. It is also anticipated that an additional large cargo operator may serve the Airport at some point in the planning period. The current cargo landside and sort facilities are near capacity. To meet the forecast demand, additional cargo facilities will be needed. Conversely, the cargo apron is sufficient, in terms of overall space, to support activities over the planning period. However, if another large cargo operator is attracted to the Airport additional facilities must be provided.

The area directly east of the existing air cargo development is well suited to accommodate future needs of the current cargo operations as well as the potential needs of an additional large cargo operator. This area has previously been identified by the Airport for the expansion of air cargo operations, and encompasses approximately 45-acres of undeveloped land, which is well in excess of the 13-acres forecast to be needed. Additionally, infrastructure, such as the new Taxiway "J", has already been constructed in that area to support such growth.

4.4.2.2 Airport Rescue and Fire Fighting

The ARFF facilities current location is an optimal position, as it may become the centerpiece of the Airport should future airfield additions, such as parallel Runway 10L – 28R and midfield passenger terminal facilities be constructed. Given that it is not anticipated that a passenger air carrier aircraft longer than the MD83 shall conduct more than an average of five daily departures, an FAA ARFF Index of "C" is expected to remain sufficient to support both existing and forecast demand.

It has been recommended that consideration be given to a phased increase in the ARFF Index in order to improve the overall perception of the safety of the Airport and for the benefit of the cargo operators, whom potentially will utilize aircraft longer than that allowed by the Index C, such as the B 757-300 (179-ft long; Index D). Should the recommendation for an upgrade to the ARFF Index be acted upon, it is expected that the current ARFF location will provide sufficient land area and access to support such growth.

4.4.2.3 Airport Maintenance Facilities

The demand for Airport Maintenance facilities is directly related to the amount of pavement, lighting equipment, terminal building size, and overall grounds maintenance that is required by the Airport. According to the facility requirements the current facility is not operating at full capacity, and can accommodate an increase in demand. Therefore, no additional facility requirements are necessary to ensure that the maintenance facility remains capable of serving the Airport effectively throughout the forecast period. As a result, no alternatives for future expansion of the Airport maintenance facilities are needed.

4.4.2.4 Fuel Farm

It was determined from the Forecasts and Facility Requirements chapters that as total operations increase, primarily as a result of a forecast increase in the total number of GA business jet traffic, expansion of aviation jet fuel storage may be necessary. The greater number of the GA jet operations are anticipated to require additional Jet-A fuel storage, therefore the Jet-A storage tank capacity is required to double over the planning period in order to meet the forecast demand. It was further estimated that the future GA (100LL) fuel flow per operation would decrease commensurate to the increase in the Jet-A fuel flow per operation. As a result, no additional 100LL fuel facilities are anticipated for the Airport, as the current capacity should meet the demand throughout the planning period.

The most logical location for this expansion to occur is adjacent to the current Lansing Jet Center fuel farm, as they are the primary fuel provider at the Airport. Sufficient space is available in that location, particularly so given the expected decrease in 100LL storage and distribution requirements over the planning period.

4.4.2.5 Airport Traffic Control Tower

Although the existing ATCT currently meets all FAA siting criteria, there are several conditions that support the need for a new tower. As indicated in the Inventory Chapter of this report, the current tower was constructed more than 45-years ago. During the past 45 years the tower's condition has naturally declined to a state of dilapidation. The facility has exceeded its designed capacity for personnel and equipment, and as the Airport continues to increase in traffic and provided services, new, advanced equipment and technology will be needed, which may not be feasible to install in the current tower. Future development, such as runway extensions, additional runways and taxiways, a new terminal building and commercial aircraft parking apron, also present the need to relocate or raise the ATCT for site requirements.

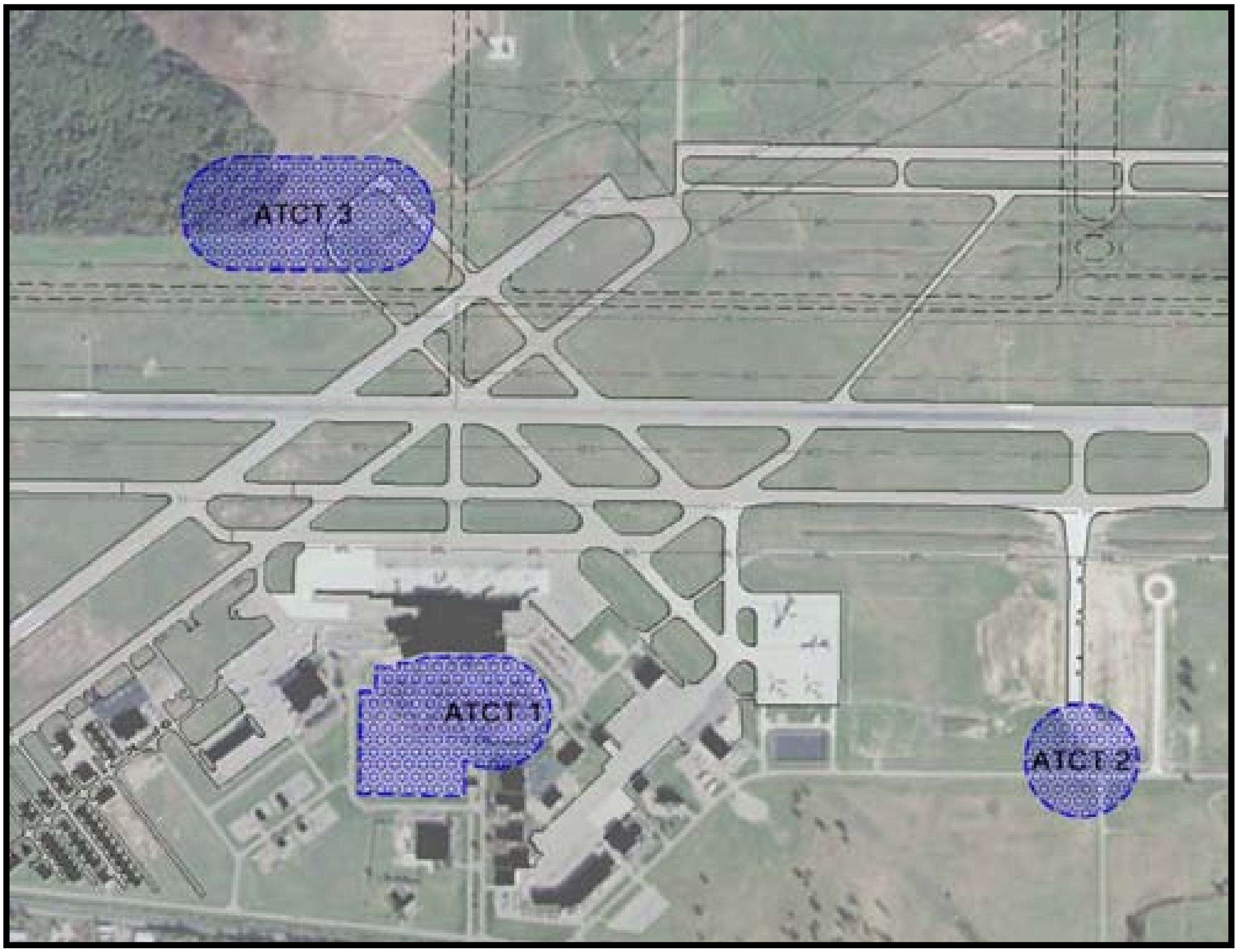
As a result of the above, a cursory siting analysis, utilizing the basic criteria included in the FAA's Order 6480.4, *Airport Traffic Control Tower Siting Criteria,* has been prepared to select and evaluate several potential locations for a replacement ATCT. The principal concern for the selection of any ATCT location is visibility to critical portions of the traffic pattern and the airfield, in particular the runways and the approach surfaces, as well as other movement areas, such as taxiways and taxilanes. Secondary considerations include the typical direction of sight from the ATCT, the location of the ATCT relative to approaches, missed approach paths, traffic patterns and the location of the facility relative to both existing and planned development on and off the airport.

An additional concern relative to the location of a future ATCT is the FAA's "300 foot rule", which requires that ATCT facilities be located such that there are no other parking lots, structures or roadways other than those required for the ATCT within 300 feet of the Tower, thus provided sufficient physical security around the ATCT. These requirements, intended to prevent, or at least restrict the ability of, an attack on the facility further complicate the siting process.

There are several potential locations suitable for an ATCT, as depicted on **Exhibit 4-9,** all of which meet the general criteria promulgated by the FAA for locating such facilities. It is recommended that an independent siting study including further analysis, such as line-of-site and shadow studies, be conducted in order to determine the best possible height and location of a new tower. However, for the benefit of this analysis, and in light of the proposed sequence of events that would lead to the development of the various facilities, terminals and runways detailed within this Master Plan, it is recommended that adequate space be reserved within the existing passenger terminal area – auto parking lot for the development of a replacement ATCT.

This site offers the best short and long term solution for the ATCT based on known conditions and the proposed developments, including the long-term prospect of a second parallel runway north of the proposed new mid field terminal location. However, it does assume that the sequence of development will allow for the construction of the new ATCT after the development of a new passenger terminal. Should that sequence be proven to be unacceptable, alternative locations should be investigated. And, regardless of that potentiality, the previously mentioned site selection studies must be completed in order to validate this and the other potential locations.

Exhibit 4-9
AIRPORT TRAFFIC CONTROL TOWER ALTERNATIVE SITES



4.4.3 Non-Aviation Support Facilities

This section discusses the recommended alternatives for non-aviation support facilities including industrial parks, hotel and business park development, and storm water management.

4.4.3.1 Industrial Parks

There are several areas within the existing and/or future property that can be allocated for revenue generating uses, such as industrial parks. Generally speaking, the areas defined are typically vacant or lands with minimal existing structures, all of which are either currently owned or are slated for acquisition. The properties, once under the ownership of the Airport, can then be leased by the CRAA to private users for either aeronautical or non-aeronautical development that is compatible with the long-term development plans for the Airport.

As depicted on **Exhibit 4-10**, two major areas have been identified for this type of development. One of the areas located in the Airport's southeast quadrant. This area, which has been in the planning stages for over a decade, comprises approximately 130 acres, and is intended to accommodate many types of light industrial and commercial uses. In addition, there is the potential to support intermodal facilities within this area, given the proximity of the CSX rail line and the air cargo area directly north.

Exhibit 4-10
ALTERNATIVE INDUSTRIAL PARK SITES

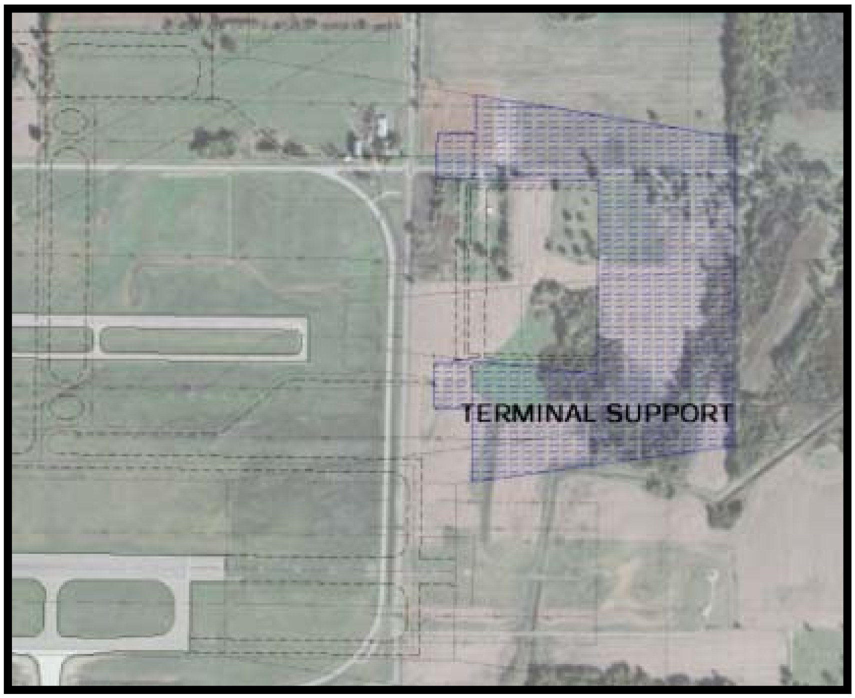
The second area is located in the northwest quadrant of the Airport and is shown as located between the existing 10R-28L and ultimate 10L-28R runways. It is envisioned that this area, which encompasses approximately 130 acres, would be a prime candidate for both aeronautical and non-aeronautical development, given its access to the primary runway(s). Such development may include, but would not be limited to light industry, air cargo, or business parks. This area also represents a possible site for a Free Trade Zone, which would also benefit from being adjacent to the runway environment.

4.4.3.2 <u>Business Park/Airport Compatible Development</u>

As passenger enplanements in 2023 are forecast to more than double the current passenger enplanements, infrastructure in addition to new terminals, runways and taxiways, etc. need to be planned. The additional infrastructure required to support the forecast growth and the proposed new mid-field terminal area could include hotels, office parks and other compatible developments. Adjacent to and southeast of the proposed mid-field terminal area are areas that are ideally situated to support activities such as business parks and hotel development.

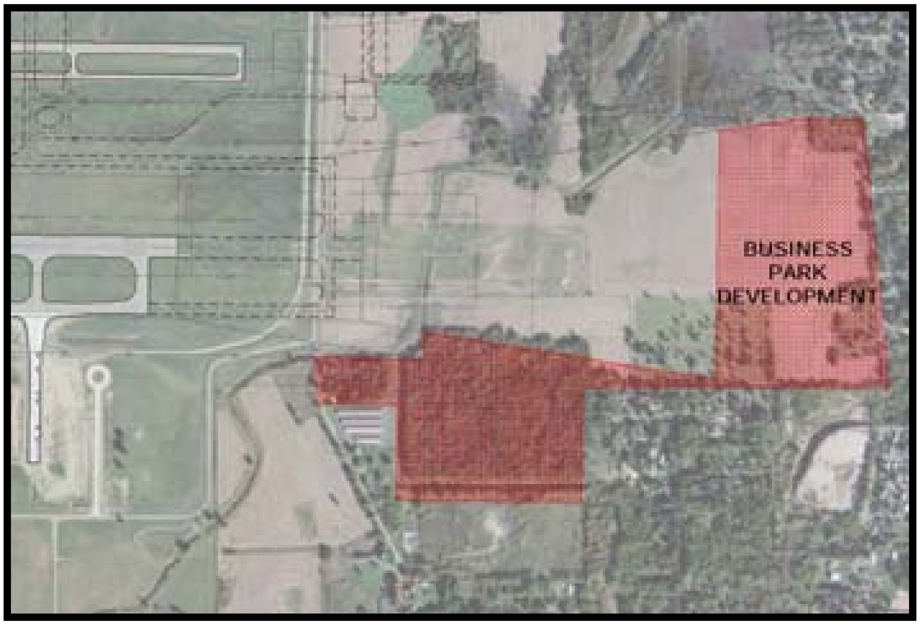
East of the proposed mid-field terminal site and its requisite parking areas is an area that covers approximately 20 acres. This area, given its proximity to the proposed terminal, represents an ideal location for a hotel "campus", which could comprise one or more hotels, restaurants and meeting facilities. As shown on **Exhibit 4-11**, this site also provides immediate access to the proposed DeWitt Road relocation.

Exhibit 4-11
ALTERNATIVE BUSINESS PARK/AIRPORT COMPATIBLE DEVELOPMENT SITES



Southeast and south of the proposed terminal location are two areas, totaling approximately 80 acres that, given their access to both the terminal area and the primary access roads in the vicinity of the terminal, are conducive to the development of office parks, retail shopping centers, restaurants, and other compatible land uses. These areas are depicted in **Exhibit 4-12**.

Exhibit 4-12
ALTERNATIVE BUSINESS PARK/AIRPORT COMPATIBLE DEVELOPMENT SITES



4.4.3.3 *Storm Water Management*

Proper storm water management must be ensured for future development of all the above detailed airside and landside improvements. As more impervious surfaces such as runways, taxiways, aprons, parking lots, roads, etc. are constructed, storm water infrastructure such as detention ponds and drainage ditches must also be planned and constructed in order to prevent ponding or flooding. To support that growth land dedicated to storm water runoff retention and detention should be maintained within the existing and proposed Airport boundaries. Suggested areas include land lying under runway approaches, parcels that do not have proper access, and tracts that may not be suitable for development due to environmental consideration. Existing storm water infrastructure must also be considered as part of the overall development of the Airport, as some portions of the proposed improvements affect systems already in place.

Specifically, the extension of Runway 10R-28L to the east, which was been started in 2004, impacts the Reynolds Drain. The Reynolds Drain, which is a county owned storm water conveyance channel, runs north to south along the eastern periphery of the Airport. In order to extend the runway as proposed the drainage ditch must be partially enclosed. An enclosure of this type has already occurred within the Airport boundary, where the current Runway 10L-28R now lies. For that application, the Airport placed several hundred feet of a branch of the Reynolds Drain into underground conveyance pipes.

Accomplished in order to provide the necessary runway safety areas for Runway 10L-28R, that conveyance system would require extension and revision to support the proposed mid-field terminal, as it is envisioned to overlie the existing 10L-28R site. This would require a significant enlargement in the underground conveyance system, and may also necessitate changes to the routing and outfall of this storm water system.

Changes to the current storm water system resulting from proposed airside and landside improvements must be considered and planned for well in advance of any actual development. While outside the scope of this Master Plan Update, a storm water management plan may be necessitated by the developments described above, and should be undertaken prior to, or concurrently with, any changes to the current airside and landside configuration.

4.4.4 Airport Access

This section summarizes the landside access evaluation for other major development areas such as air cargo and general aviation. Passenger Terminal access was evaluated as a leading element.

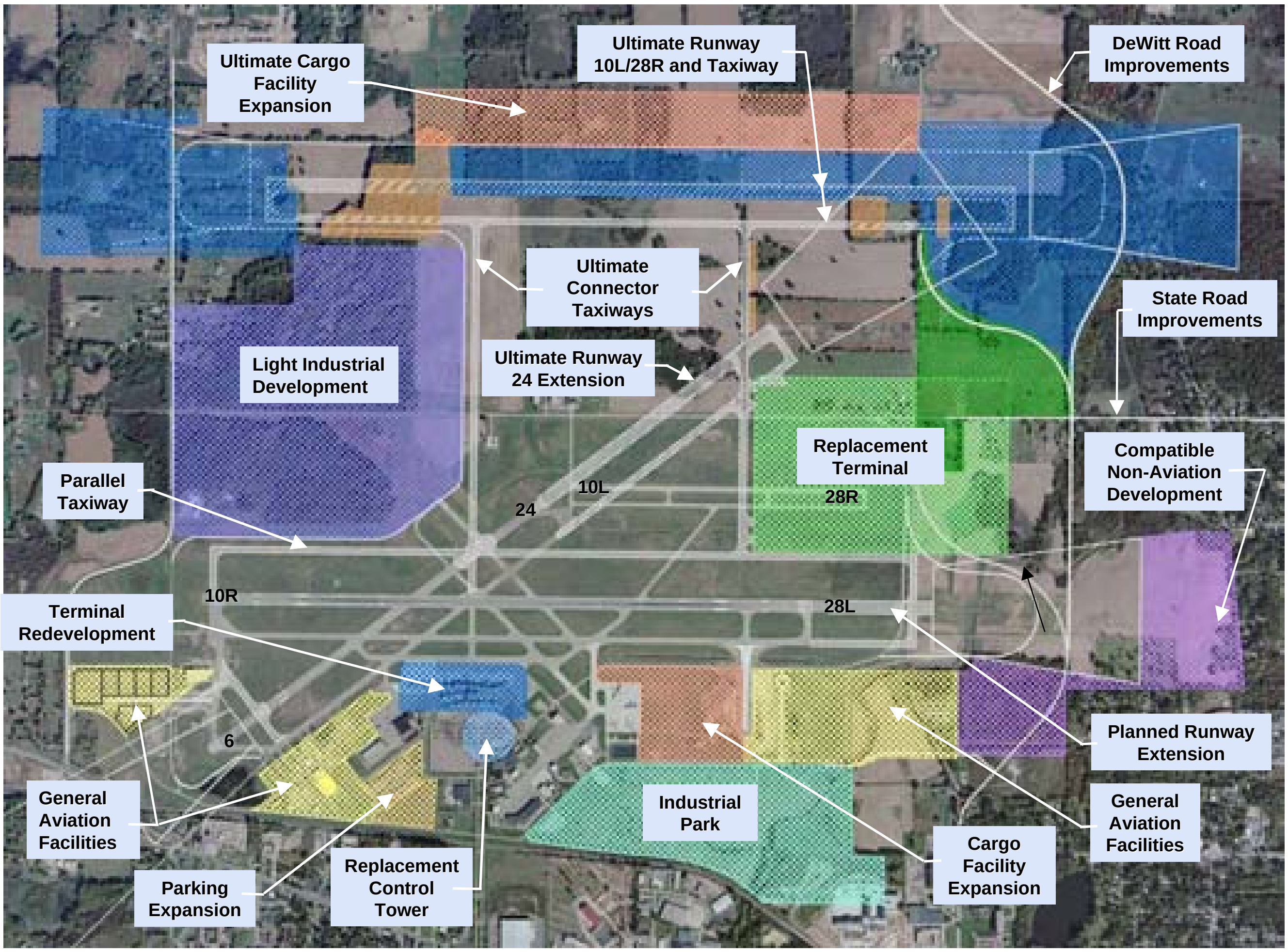
The future plans for air cargo development indicate expansion of the facility east of its current location. Should a new Terminal location be to the north and east along DeWitt Road, it is envisioned that passenger vehicles will not use the current Capital City Boulevard or Airport Service Road for Terminal access. Route separation between cargo trucks and passenger vehicles would be an operational advantage as fewer vehicles would be traveling from south of the Airport, thus minimizing the traffic on East Airport Service Drive. Truck traffic would continue to use the previous routes that include Capital City Blvd, Airport Road and Airport Service Dr and Martin Luther King Blvd. A small portion of truck traffic may be mixed on DeWitt Road from the north; however the overall gain to air cargo access would be beneficial. In addition, expansion of the air cargo facility will necessitate the need for additional trucks thus affecting landside parking demand.

The future plans for the General Aviation facilities include steady, yet minimal growth for the GA flight operations. Since the current facilities are able to accommodate the operations in their existing locations adjacent to the airfield, the vehicle access to these facilities has been analyzed and determined to be adequate for the future planning years.

4.5 Recommended Development Alternative

The composite Airport development plan combining leading and trailing elements is depicted on **Exhibit 4-13**.

Exhibit 4-13
RECOMMENDED AIRPORT DEVELOPMENT



CHAPTER 5
ENVIRONMENTAL EVALUATION

This environmental evaluation was completed and is a part of the on-going environmental process in order to further examine the environmental consequences associated with the implementation of the development program recommended in this Airport Master Plan Update for Capital City Airport. In previous planning efforts, additional environmental overviews and oversight analyses were undertaken in the context leading elements of the Master Plan as defined in Chapter 4. This Chapter will focus on the trailing elements and expand the environmental evaluation impacts of the preferred leading element alternative. The findings presented in this Chapter are based on consultant observations; correspondence with federal, state, and local environmental and planning agencies; and other available data.

5.1 Proposed Development

A number of airport improvements have been recommended for implementation during and beyond the planning period. The Airport Layout Plan (ALP) set, contained in Chapter 6 of this report, illustrates the development proposed during this period.

The major projects planned for the short-term development include the following:

- Land Acquisition
- 1,300 foot extension to Runway 28L
- 1,300 foot taxiway extension with the Runway 28L extension
- Installation of a MALSR on extended Runway 28L approach end
- Relocation of Dewitt Road associated with the Runway 28L extension
- Relocation of the ARFF road associated with the Runway 28L extension
- Construction of a 3,000 square yard cargo apron
- Expansion of the existing General Aviation (GA) aircraft parking apron
- Construction of 8 T-hangars
- Construction of 20 conventional aircraft hangars
- Relocation of ARFF road east of Runway 10R-28L

Additional projects planned for long-term development include the following:

- Land Acquisition for the Ultimate New Parallel Runway 10L-28R
- Construction of a new Airport Traffic Control Tower (ATCT)
- Construct Ultimate New Parallel Runway 10L-28R – located 5,000 feet north of the existing Runway 10R-28L
- Ultimate Dewitt Road relocation associated with the Ultimate Runway 10L-28R
- Ultimate ARFF road relocation associated with the Ultimate Runway 10L-28R
- Addition to existing ARFF road to serve the Ultimate Runway 10L-28R
- Relocate Runway 6 approach end 700 feet to the northeast
- Construction of a new 1,100 foot access taxiway on the end of the relocated Runway 6 approach threshold
- 3,600 foot Runway 24 approach end extension
- Taxiway C extension associated with the Runway 24 extension

- Expansion to the proposed 3,000 square yard cargo apron by an additional 3,500 square yards
- 600 foot expansion to existing Runway 10L approach end (Ultimate Runway 10L)
- Taxiway E extension associated with the existing Runway 10L approach extension

Examination of the environmental effects associated with each individual project will be undertaken in subsequent, separate studies. (See discussion in the following section.)

5.2 Environmental Consequences

This environmental evaluation was completed in accordance with *Federal Aviation Administration (FAA) Order 5050.4B, Airport Environmental Handbook*, with particular emphasis placed on Paragraph 47(e), *Environmental Consequences – Other Considerations.* Twenty-two categories of potential environmental impact are identified in Paragraphs 47(e) and 47(f) and are as follows:

- Noise
- Compatible Land Use
- Social Impacts
- Induced Socio-Economic Impacts
- Air Quality
- Water Quality
- Department of Transportation Act, Section 4(f)
- Historical, Architectural, Archaeological and Cultural Resources
- Biotic Communities
- Endangered and Threatened Species of Flora and Fauna
- Wetlands
- Floodplains
- Coastal Zone Management Program
- Coastal Barriers
- Wild and Scenic Rivers
- Farmland
- Energy Supply and natural Resources
- Light Emissions
- Solid Waste Impacts
- Construction Impacts

It should be noted that a more detailed Environmental Assessment (EA) may be required by the Federal Aviation Administration (FAA) prior to funding of major construction activities at Capital City Airport. In the event the FAA requires preparation of a full EA for the Airport, a separate, more detailed environmental evaluation must be completed.

An EA would analyze the potential impacts associated with the various aspects of an expansion of the airport facilities, as well as any required mitigation. The ability to mitigate the environmental impacts will dictate either a Federal Finding of No Significant Impact (FONSI), completing the NEPA process, or the need to prepare an Environmental Impact Statement (EIS).

1. Noise Impacts

Aircraft noise is recognized as one of the most critical environmental parameters in airport planning and can become one of the most controversial in community acceptance and approval of airport development projects. The extent of aircraft noise generated by airport operations is a function of variables such as the physical configuration of the airfield, the level of aircraft operations, and the type of aircraft which characteristically use the airport.

Taken individually or as a cumulative effect, the proposed near-term projects should present no significant impact on noise; however, there is one notable exception. The expansion of the Cargo Facilities will occur commensurate with an increase in cargo activity. The nature of cargo operations tends to be during nighttime hours, thus having more significant noise impacts than operations occurring during daylight hours.

The Authority recently completed a Federal Aviation Regulation (FAR) Part 150 Study for the Capital City Airport. The FAR Part 150 Noise Study provides the opportunity for aviation representatives, local government officials and the public to address aircraft noise and land use compatibility issues related to Capital City Airport. The study estimates existing and future (five-year) levels of aircraft noise exposure using methods approved by the FAA. Further information regarding the noise impacts associated with the near-term proposed development is contained within the FAR Part 150 Noise Study.

2. Land Use Compatibility

An important factor to be considered in the development of the Airport is the compatibility of the airport development plans with adjacent off-airport land uses and land use plans. A prime factor in land use planning is the ability for an airport to expand to meet increased demand without infringing upon airport neighbors' property requirements. Generally, the primary sources of conflict between airports and adjacent non-airport land uses are aircraft noise and development restrictions based on FAR Part 77 Imaginary Surfaces.

FAR Part 150 provides guidelines for land use compatibility around airports. Residences and community facilities, such as schools, churches and hospitals, are generally considered to be incompatible with noise levels of 65 DNL (Day-Night Average Sound Level) and greater. Agricultural, commercial and industrial land uses are generally considered compatible with aircraft noise levels exceeding 65 DNL.

As land use compatibility is largely determined by the types of land uses which occur, or are permitted to occur, in the vicinity of an airport, the Part 150 Study examines existing land use, planned land use, and zoning in the vicinity of the Airport to determine the existing and anticipated impacts of airport development on off-airport land uses.

The FAR Part 77 Imaginary Surfaces for a civil airport, such as Capital City Airport, consist of a series of imaginary planes extending outward and upward from the runway surfaces. The purpose of identifying these "imaginary surfaces" is to delineate the area required for the safe operation of aircraft during instrument meteorological condition (IMC). Objects which penetrate these Imaginary Surfaces generally represent a hazard to the safe operation of aircraft and should be mitigated. To the extent that a penetration cannot be mitigated, the penetrating object should be marked and lighted in accordance with the *FAA Advisory Circular 70/7460-1K, Obstruction Marking and Lighting.*

The Part 77 Imaginary Surfaces for the existing airfield configuration at Capital City Airport are presented in Chapter 6 of this Master Plan Update, *Airport Layout Plan*.

3. Social Impacts

Airport development affects the natural environment as well as the human social environment. This section describes what, if any, adverse impacts the proposed alternatives have on the human social environment. Typically, the types of social impacts considered within Airport Master Planning projects include the following:

- Relocation of residences and/or businesses
- Disruption of established communities
- Disruption of planned development
- Alteration of existing patterns of surface transportation
- Changes in employment resulting from Airport development activities

The construction of a new parallel runway, Runway 10L-28R, requires approximately 506 acres of land acquisition and 19 acres of avigation easement spreading from the northwest to the northeast of the field. This property is currently devoted to agricultural uses with some suburban residential use and includes 66 residences.

4. Induced Socioeconomic Impacts

Also known as secondary or indirect impacts, the effects of induced socioeconomic impacts are directly proportional to the scope of a project. Changes in regional growth and development patterns, such as shifts in residential development patterns, related population distribution and growth, changes in the nature or level of demand for public services, and changes in business and economic activity are types of induced impacts that may result from airport development activities. The assessment of socioeconomic impacts is usually associated with major development at large air carrier airports.

It is anticipated that the continued development of Capital City Airport will be a stimulus to the economic well-being of the Airport and its surrounding areas. The proposed development should improve the aviation capabilities of the area, thus enhancing the socioeconomic character of the surrounding airport community and providing a long-term positive effect on the local economy. Additionally, neither the proposed airport improvements nor land acquisition are expected to alter the population and/or growth movements of the local community.

5. Environmental Justice

February 11, 1994 marked the signing of Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The Executive Order requires that each Federal agency shall, to the greatest extent allowed by law, administer and implement its programs, policies and activities that affect human health or the environment so as to identify and avoid "disproportionately high and adverse" effects on minority and low-income populations.

The airport is located in a suburban area of Lansing that, according to the 2000 Census, has a population of 119,128 – 1.2 percent of Michigan's total population. Furthermore, the Census indicates 65.3 percent of Lansing's population is Caucasian, 21.9 percent African American, 10.0 percent Hispanic or of Latino origin, with the remainder being Asian or Pacific Islander and American Indian or Alaskan Native. There are no apparent adverse impacts related to Environmental Justice; however, a socioeconomic and ethnographic analysis of the project area would be required prior to any expansion of the Airport facility.

6. Air Quality

Air quality has become a major component of pollution control in the last 30 to 50 years. The passing of the Clean Air Act in 1970 marked the beginning of a serious government regulation to ensure pollution is controlled to the maximum extent possible.

Additionally, revisions to the *Code of Federal Regulations (CFR) Parts 6, 51, and 93 for Determining Conformity of General Federal Actions to State or Federal Implementation Plans* (commonly known as the General Conformity Rule) have focused additional attention on air quality issues. Prior to these revisions, only roadway transportation projects were covered by the general conformity rule. Under the revised rule, all federal projects not covered by the transportation conformity rule are now covered by the general conformity rule. Airport projects using federal funds fall under the general conformity rule. Currently, airports in non-attainment and maintenance areas must meet the requirements of the general conformity rule while airports in attainment areas are exempt at this time.

The *Vision 100—Century of Aviation Reauthorization Act*, signed into law on December 12, 2003 (P.L. 108-176), directs the FAA to establish a national program to reduce airport ground emissions at commercial service airports located in air quality non-attainment and maintenance areas.

On April 15, 2004, the U.S. Environmental Protection Agency (EPA) announced the designation of 25 counties in Michigan as non-attainment areas for the 8-hour ozone National Ambient Air Quality Standard (NAAQS), under Subpart 1. "Subpart 1" denotes 8-hour non-attainment areas that are covered under Subpart 1, Part D, Title I of the Clean Air Act. "Subpart 1" is considered non-attainment without a classification. Subpart 1 non-attainment areas are generally affected more by transport emissions than by local emissions. They have to comply with the more general non-attainment requirements of the Clean Air Act, as apart from classified areas with designated severity to their ozone problem (i.e., marginal, moderate, serious, severe, extreme). The designations became effective on June 15, 2004. The tri-county area of the Airport – Clinton County, which includes Capital City Airport, Eaton County and Ingham County – are among the non-attainment counties. The air quality modeling that is used to determine NAAQS compliance is the responsibility of the local metropolitan planning organization. Coordination with the Tri-County Regional Planning Commission will be necessary to insure that current modeling includes predicted aircraft and vehicular traffic associated with near-term and long-term airport expansion.

Capitol City Airport is listed in the National Plan for Integrated Airport Systems (NPIAS) per 49 USC § 47102(7). This list indicates facilities that are eligible for the Voluntary Airport Low Emissions (VALE) Program. The new VALE Program will allow airport sponsors to use the Airport Improvement Program (AIP) and Passenger Facility Charges (PFCs) to finance low- emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements. Under *Vision 100*, no other formal agreements or protocols between airport sponsors and Federal and State agencies would be needed for the VALE Program.

7. Water Quality

The *Federal Water Pollution Control Act*, as amended by the *Clean Water Act*, provides the authority to establish water quality standards, control discharges into surface and subsurface water, develop waste treatment management plans, and issue permits for discharges and for dredged or fill material. The three issues dealing most closely with water quality are water resources, groundwater quality and storm water runoff.

The 1998 Environmental Assessment noted the Airport uses only 0.05 percent of the production capacity of the City's water utility. None of the uses associated with the proposed near-term projects will have significant demands for water resources and will have no significant impact.

The major source of water pollution associated with an airport generally occurs from the use of chemical de-icing agents on aircraft and paved surfaces. Capital City Airport uses a designated area for aircraft de-icing with the runoff contained and released into the sanitary sewer system for treatment. Pavement de-icing is accomplished with a potassium acetate product, listed as a non-hazardous waste. In April of 2003, the Airport received a Storm Water General Permit from the Michigan Department of Environmental Quality (MDEQ). The proposed near-term projects should have minimal impacts on the quality of the surface or ground water.

In response to the 1987 Amendments to the Clean Water Act (CWA), the EPA developed Phase I of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program in 1990. The Phase I program addressed sources of storm water runoff from a designated group, including construction activity disturbing five or more acres of land. Administration of the NPDES Storm Water Program in Michigan has been delegated to MDEQ. MDEQ currently utilizes Permit by Rule for NPDES authorization. Construction activities involving 5 acres or more with a point source discharge to waters of the state are required to submit a Notice of Coverage (NOC) to obtain coverage under Permit by Rule. Prior to submitting the NOC, a Soil Erosion and Sedimentation Control (SESC) Permit must be obtained. A completed NOC form must be submitted, along with the required attachments, to the address on the NOC.

The Airport drains into two main drain ways that lead into the Grand River. The proposed near-term projects should not affect the flow of these drain ways or the feeders leading to them. Slight volume impacts are expected as a result of the addition of impervious area, but the use of surface ditches and vegetation should restrain the flow into the system for most normal storm events. During the design of each project, analysis will be undertaken to minimize impact and, if needed, measures will be taken to ensure that additional inputs should not adversely affect existing systems.

Capitol City Airport currently has an individual Industrial Storm Water Permit through the MDEQ. Planned improvements to the airport facility should be coordinated with the MDEQ District Office for guidance of appropriate action regarding applicability of the existing permit. If additional outfalls are required as part of the proposed improvements, the existing Storm Water Pollution Prevention Plan would require an update, and the existing permit would likely require modification.

8. Department of Transportation Act, Section 4(f) Lands

The U.S. Department of Transportation Act of 1966, Section 4(f) prohibits the acquisition of any public park land, recreation area, or wildlife and waterfowl refuges of national, state or local significance, or land of a historic site of national, state or local significance, unless there is "no feasible and prudent" alternative to the use of that land. By definition, the "use" of such land not only includes the physical acquisition of property, but also the "overflow" of airport operations onto adjacent property to the extent that the normal use of this non-airport property is interrupted due to airport operations or their by-products.

There are no public parks, recreation areas, or wildlife or waterfowl refuges of national, state or local significance in the immediate vicinity of Capital City Airport.

9. Historic, Architectural, Archaeological and Cultural Resources

Historical resources are those limited to nonrenewable districts, sites, buildings, structures and objects having significant associations with historical, architectural, cultural events, persons or social movements. Archaeological resources are objects or areas made or modified by man that contain information about man's past. They are a record of past human activity that took place and how long the site was occupied.

An examination of historic, architectural, archaeological and cultural resources in a proposed project area is mandated by the National Historic Preservation Act of 1966 and requires that a review be conducted to determine whether any properties contained in, or eligible for inclusion in, the *National Register of Historic Places* will be affected by the proposed development activities. The Archaeological and Historic Preservation Act of 1974 requires the survey, recovery and preservation of significant and pre-historical data, which may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.

At least two properties in the immediate vicinity of Capital City Airport are currently listed in the State Register or National Register of Historic Places. These are the Philip Orin Parmelee Marker and the Lansing Civil Air Patrol Headquarters. The Parmelee Marker, erected in 1978, signifies a noted early aviator in American history whom resided in Clinton County. The marker is located at the intersection of North Grand River Avenue and Capital City Boulevard. The second property, the Lansing Civil Air Patrol Headquarters, was listed in 1991 and is made up of three Quonset pre-fabricated steel huts from the Second World War, which were originally set up in November 1941 and now currently serves as a Civil Air Patrol training facility. The huts are planned to be restored in the future as a museum devoted to the history or the Civil Air Patrol in Lansing.

Although it is not anticipated that these historic resources will be directly impacted by the proposed action, additional coordination with the State Historic Preservation Officer is recommended in the environmental assessment stage of project development. At a minimum, the State Historic Preservation Officer may require a site reconnaissance of the proposed construction sites by a qualified archaeologist to evaluate the potential for additional archaeological sites in the vicinity, as well as an evaluation of construction and noise impacts on the National Register and National Register eligible properties in the area.

10. Biotic Communities

Biotic communities may be affected directly or indirectly by airport development and aviation activities. Development may not only alter or eliminate existing vegetation, but it may also affect wildlife using the vegetation for shelter and forage opportunity. Due to the potential conflicts between wildlife and aircraft or other vehicles, a reduction in the wildlife population and habitat on or near an Airport is usually considered a positive undertaking from an airport's perspective (*FAA Advisory Circular 150/5200-33A*).

11. Endangered and Threatened Species of Flora and Fauna

Section 7 of the *Endangered Species Act* (ESA), as amended, and FAA Order 5050.4B require that the sponsor of any project utilizing federal funding coordinate with the U.S. Fish and Wildlife Service (USFWS) to determine the presence or absence of federally listed endangered or threatened species within the proposed project area. Likewise, the State of Michigan has regulatory authority over state listed endangered and threatened fish, plants, and wildlife under *Part 365, Endangered Species Protection, of the Natural Resources and Environmental Protection Act of 1994*.

Though no formal investigations were performed as a part of this report, the Michigan Department of Natural Resources' (MDNR) Endangered Species Assessment website (www.mcgi.state.mi.us/esa) was reviewed. The website indicated that the area of the Airport (Sections 31 & 32, Township 5N, Range 2W) exhibits a "high potential for endangered, threatened, or special concern species, high quality natural communities, or other unique natural features" (reviewed 06/24/2005).

Three categories of species are considered in any development proposal: endangered species, threatened species and candidate species. An endangered species is any member of the animal kingdom (mammal, fish or bird) or plant kingdom (seeds, roots, etc.) that is in danger of extinction through all or a significant portion of its range. Federal endangered and threatened species are afforded legal protection under the ESA, as amended. Threatened species are those members of the animal kingdom that are likely to become endangered within the foreseeable future. Candidate species are those members for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. They are not afforded legal protection under the authorities of the *Endangered Species Act*; however, federal agencies are encouraged to consider potential impacts because the USFWS may proceed at anytime with listing actions for these species.

The 1998 Environmental Assessment indicated one endangered species of plant, cattail sedge (*Carex typhina*), has been located on the Airport property. This was located in the northeast quadrant of the property and would be outside of the areas of the identified near-term projects. The Cattail Sedge is currently listed as a state-listed threatened species.

Based on secondary-source data from the USFWS and MDNR, four federally listed species and 25 state listed species were noted as being of possible occurrence in the immediate vicinity of Capital City Airport. The four federal species identified by the USFWS are as follows:

- Indiana bat* (*Myotis sodalis* – endangered)
- Eastern massasauga rattlesnake, (*Sistrurus catenatus catenatus* – species of concern)
- Prairie fringed orchid* (*Plantathera leuchophaea* – threatened)
- Copperbelly water snake* (*Nerodia erythrogaster neglecta* – threatened).

The state listed species identified by the MDNR are as follows:

- Cattail sedge (threatened)
- Spotted turtle (*Clemmys guttata* – threatened)
- Least shrew (*Cryptotis parva* – threatened)
- White lady-slipper (*Cypripedium candidum* – threatened)
- Dwarf spike-rush (*Eleocharis parvula* – threatened)
- Showy orchis (*Galearis spectabilis* – threatened)
- Goldenseal (*Hydrastis candensis* – threatened)
- Prairie fringed orchid* (endangered)
- King rail (*Rallus elegans*- endangered)
- Olney’s bulrush (*Scirpus olneyi* – threatened)
- Snow trillium (*Trillium nivale* – threatened)
- Wholed pogonia (Istoria vertcillata – threatened)
- Virginia flax (Linum virginianum – threatened)
- Virginia bluebells (Mertensia virginica – threatened)
- Indiana bat* (endangered)
- Copperbelly water snake* (endangered)
- False hop sedge (*Carex lupuliformis* – threatened)
- Raven’s-foot sedge (*Carex crus-corvi* – threatened)
- Beak grass (*Diarrhena americana* – threatened)
- Virginia water-horehound (*Lycopus virginicus* – threatened)
- Red mulberry (*Morus rubra* – threatened)
- Ginseng (*Panax quinquefolius* – threatened)
- Bog bluegrass (*Poa paludigena* – threatened)
- Small skullcap (*Scutellaria parvula* – threatened)

- Cup-plant (*Silphium perfoliatum* – threatened)

* - Species that appear on both federal and state lists

The National Environmental Policy Act (NEPA) of 1969 requires an analysis of potential impacts to federally listed species. Therefore, habitat characteristics of identified federal species are included.

Indiana Bat
The Indiana bat is listed as a federal and state endangered species. Its area of summer habitat includes small to medium river and stream corridors with well-developed riparian woods; woodlots within one to three miles of small to medium rivers and streams; and upland forests. The bat uses caves and mines as hibernacula. Potential Indiana bat habitat exists in the northwestern (forested) portion of Airport property.

Eastern Massasauga Rattlesnake
The eastern massasauga rattlesnake is listed as a "species of special concern," is protected by the State of Michigan, and is a candidate for federal listing. The snake's area of habitation is throughout the entire Lower Peninsula; although its population has declined over the years due to loss of wetland habitats and human harassment. During spring, the snake's habitat is made up of open, shallow wetlands or shrub swamps. It also can be found in crayfish towers or small animal burrows that are adjacent to drier upland, open shrub forest sites. During summer, the snake moves upland to drier areas. It can be found "sunning" in open fields, grassy meadows or farmed sites. Potential eastern massasauga rattlesnake habitat exists in the northwestern (forested) portion of the airport property.

Eastern Prairie-Fringed Orchid
The eastern prairie-fringed orchid, also known as the white-fringed orchid, is listed as threatened by the federal government and endangered by the State of Michigan. Most populations of the flower are concentrated in the southern Great Lakes region, occurring primarily in southern Wisconsin, Illinois, Ohio, and southern Lower Michigan. A 1990 inventory of this species' remaining strongholds in Michigan found approximately 1,100 plants total, with few populations supporting large numbers of plants in a good quality, viable habitat. In recent years, only a fraction of the plants tallied before have been observed in many habitats, apparently due to highly droughty growing seasons. The flower occurs in two distinct habitats in Michigan: wet prairies and bogs. It thrives best in the lakeplain, wet or wet-mesic prairies that border Saginaw Bay and Lake Erie. These communities have relatively alkaline, lacustrine soils and are dominated by *Carex aquatilis, C. stricta*, and *Calamagrostis canadensis*, as well as several prairie grasses and forbs. Habitat characteristics for this species are low within the airport property.

Copperbelly Water Snake
The copperbelly water snake is in decline throughout much of its limited range. Within the Great Lakes region, where it is presently recognized as endangered, it is very rare and restricted to a few isolated colonies. Many populations have been recently extirpated, and those that remain face continued threats from human activities. Copperbelly water snake habitats typically occur in or near shrub swamps, ponds, lakes, oxbow sloughs, fens, and slow-moving streams, usually associated with either mature or second-growth woodlands but occasionally in more open situations. In spring these snakes often inhabit the open edges of shallow ponds and buttonbush (*CephaIanthus occidentalis*) swamps and frequently bask on shoreline vegetation, muskrat lodges, or woody debris. When temperatures rise and these seasonal waters begin to dry up in early summer, the snakes migrate to permanent waters (lake and stream edges), often using fairly dry

wooded or grassy upland corridors. They may become largely nocturnal during hot weather. Unlike the northern water snake, this species may spend considerable periods of time in relatively dry habitats away from water, apparently by choice as well as necessity. They sometimes aestivate underground or beneath logs or debris piles during hot weather or drought. An individual copperbelly water snake may occupy a home range of 20 hectares (50 acres) or more, but the vast majority of its time will likely be spent in a few small areas within this range. Potential copperbelly water snake habitat exists in the northwestern portion (forested) of the Airport property.

12. Wetlands

Wetlands are identified in *Executive Order 11990, Protection of Wetlands*, as "those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas such as sloughs, potholes, wet meadows, river overflows and natural ponds."

Only one of the near-term projects is located in an area identified as a wetland area on the national wetlands inventory maps. This is the West Ramp Access Road, which is already under design. Environmental documentation has already taken place, and mitigation is envisioned to be a part of a larger mitigation project to be undertaken in conjunction with a future road relocation project.

According to the National Wetland Inventory (NWI) Maps of the area, there is a dense cluster of emergent and forested wetlands around the intersection of State Road and Airport Road in the northwestern portion of the Airport property. There are also emergent wetlands clustered around the drainage features on the property (Edwards Drain to the west and Reynolds Drain to the north, northeast and east). The NWI indicates a large forested/emergent wetland on the south side of the property, along Airport Service Drive.

A formal wetland determination/delineation would be required to verify the presence/extent and jurisdiction of wetlands on the property. Wetlands that are hydrologically continuous to "waters of the U.S." are regulated by the U.S. Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act of 1972. Isolated wetlands are conditionally regulated by Michigan Department of Environmental Quality (DEQ) under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act of 1994.

Section 404[b][1] of the Clean Water Act states that, in reference to "waters of the U.S." including wetlands, "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 CFR § 230.10[a]). Therefore, any project that would have potential impacts on wetlands regulated by the Corps would need to demonstrate avoidance and/or minimization of impacts and mitigation of unavoidable impacts.

13. Floodplains

Floodplains are defined in *Executive Order 11988, Floodplain Management*, as "the lowland and relatively flat area adjoining…coastal waters…including at a minimum that area subject to a one percent or greater chance of flooding in any given year…"

The Airport is not in a floodplain according to FEMA Flood Insurance Rate Maps of the area. Individually, none of the proposed near-term projects will trigger the two square mile alteration or impact to an existing drain, and MDEQ floodplain permitting will not be required. Further exploration of this is needed in the documentation required for each project through agency coordination.

14. Coastal Zone Management

It is the policy of the FAA to comply with the provisions of approved Coastal Zone Management Programs, as per the National Oceanic and Atmospheric Administration (NOAA) regulations. However, Capital City Airport is not located in a Coastal Zone Management Area, as defined by the NOAA, nor will the proposed development activities at the Airport have an adverse impact on any lands protected under the provisions of the Coastal Zone Management Program. Therefore, Coastal Zone Management Program concerns are not applicable to this Environmental Evaluation.

15. Coastal Barriers

The provisions of the Coastal Barriers Resource Act of 1982 pertain to development within the Coastal Barriers Resource System – a series of undeveloped barrier islands along the Atlantic and Gulf coasts of the United States. Capital City Airport is not located on a coastal barrier island. Therefore, Coastal Barrier concerns are not applicable to this Environmental Evaluation.

16. Wild and Scenic Rivers

The *Wild and Scenic Rivers Act* describes those river areas eligible for protection under the act. Usually these rivers possess outstanding scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar value. The Airport lies within the vicinity of Grand River and Looking Glass River. Neither river is part of or slated for inclusion in the National Wild and Scenic Rivers System. As such, Wild and Scenic Rivers are not applicable to this Environmental Evaluation.

17. Farmland

The *Farmland Protection Policy Act* (FPPA) authorizes the United States Department of Agriculture (USDA) to develop criteria for identifying the effects of federal programs on the conversion of farmland to non-agricultural uses. Generally, this act relates to prime and unique farmland. According to the Act, "[p]rime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber…without intolerable soil erosion… Unique farmland is land, other than prime farmland, that is used for production of specific high value food and fiber crops…"

No unique or prime farmland is expected to be taken as a result of the near-term projects. All of the near-term projects are within the boundary of the Airport as it now exists, and no additional properties should be needed. None of the property affected by these projects is currently being used for agricultural purposes, and it is unlikely it ever would be in the future. Therefore, Farmland concerns are not applicable to this Environmental Evaluation.

18. Energy Supply and Natural Resources

Energy and natural resource impacts of airport activity are related to the amount of energy required to operate the following:

- Aircraft
- Aircraft Support Vehicles
- Airport Lighting
- Terminal Facilities

The energy requirements of Capital City Airport, with the exception of Airport lighting, are largely dependent upon the amount of aviation activity occurring at the Airport. Increased aviation activity levels translate into more energy required to operate aircraft, aircraft support vehicles and airport facilities.

Of the four types of energy consumption, the proposed development plan will have the greatest impact on aircraft fuel consumption. The related and corresponding increase in energy consumption for Airport lighting, aviation support vehicles, and the heating/air conditioning/lighting of the terminal and other facilities is expected to be negligible.

Energy requirements for the movement of aircraft are directly proportional to the level of airport expansion and operation. The extension of or development of a runway, additional cargo facilities, and other airport-related facilities will result in an increase in overall airport use and energy consumption. However, this increase in fossil fuel demand is not anticipated to have an adverse impact on the fossil fuel resources of the suburban Lansing area.

The proposed airfield improvements should not require the use of natural resources other than the energy requirements outlined in the preceding paragraphs. No natural resources that are unusual in nature or are in short supply should be used for the proposed construction. Additionally, there are no known natural resources on the site that would be irretrievable after the proposed improvements have been implemented. Therefore, concerns related to natural resource consumption, other than as related to the energy supply requirements of the proposed facilities, are not addressed in this Environmental Evaluation.

19. Light Emissions

The purpose of evaluating the change in light emissions is to determine the extent to which lighting improvements associated with proposed airport development will create an annoyance for inhabitants of properties in the immediate vicinity of the Airport. The determination of impact was based on the nature and intensity of lighting facilities at the Airport and its physical characteristics and anticipated uses of adjacent properties.

Light emissions from any of the near-term projects are expected to be localized and should not have any impacts beyond the areas of concern. Given the nature of the projects, lighting will be confined to area illumination of parking areas, aircraft aprons and roadway lighting as required.

The lighting impacts from the proposed long-term improvements are expected to be insignificant. Light emissions from runway development typically come from a few specialized sources:

- *Edge Lighting* outlines the pavement areas on runways and taxiways. This lighting is either of a relatively low intensity or focused into a fairly narrow beam. As such, emissions beyond the airport pavement are minimal.
- *Approach Lighting* is used to guide an approaching aircraft to the runway. Typical approach light systems start at the runway threshold and continue outward for 2,400 feet. Most of these systems use a mixture of steady-burning and strobe lights. All lights are angled upward and are in an area of limited public use. Therefore, the addition of the approach lighting will not have significant impacts on the human environment.

20. Solid Waste Impacts

In general, two types of solid waste impacts are evaluated in conjunction with airport development:

- Increases in Solid Waste Generation, and
- Location of Solid Waste Disposal Facilities in the Vicinity of the Proposed Runways.

Seeing as the near-term project areas are already in areas cleared of trees and debris, solid waste impacts related to construction should be minimal. If significant amounts of buried waste found to be unsuitable for backfill are encountered during excavation, there are suitable landfills located within close proximity to the Airport.

The long-term improvement projects should not generate significant amounts of waste; therefore, further concerns related to Solid Waste Impacts are not applicable to this Environmental Evaluation.

21. Construction Impacts

The construction impacts associated with the implementation of the development program outlined in this Airport Master Plan are generally temporary in nature and should cease once construction activities are completed. Nevertheless, the environmental consequences of the following construction activities were evaluated:

- Noise of On-Site Construction Equipment;
- Noise, Dust and Congestion from Delivery of Materials on Area Roadways;
- Relocation of Dewitt Road and ARFF road.

Construction Impacts would be confined to short-term water runoff control, fugitive dust control, and some additional surface traffic caused by construction related vehicles.

22. Relocation Impacts

No relocation impacts related to the short-term projects are expected, as they are all contained within Airport property and are planned to be constructed on vacant land parcels.

The long-term and ultimate projects consist of the construction of a new parallel runway to the existing Runway 10-28. The impacts associated with this construction include the acquisition of 525 acres of land both in fee and easement rights – in which 66 residences are located. There are 26 residences located toward the western end of the proposed Runway 10L-28R, ten are located along the central portion of the proposed runway, and the remaining thirty are located toward the eastern end of the proposed runway and along Turner Road.

Each of the potential relocation residences appears to be rural and suburban, single-family type homes, and adequate, similar replacement housing is available within the area. The appropriate processes should be followed by the Airport to ensure adequate replacement housing is provided.

5.3 Summary of Impacts

As per this environmental evaluation, a small number of environmental consequences have been identified in relation to the proposed short-term and long-term projects at Capital City Airport. The possible impacts to the Airport and its surrounding area are based strictly on consultant observation; correspondence with federal, state and local environmental and planning agencies; and other available data.

The proposed near-term projects, including the construction of taxiway and runway pavement, the relocation of Dewitt Road and the ARFF road, and construction of new apron pavement, should present no significant impacts on noise in the area. As grading and paving activities proceed, temporary increases in noise levels caused by construction equipment and operations will be noted. Over time, however, the cargo facilities expansion could attract additional cargo operators, which often operate during nighttime hours, thus leading to an increase in more noticeable noise impacts during the night.

The surrounding human social environment will be minimally impacted. Due to the construction of a new parallel Runway 10L/28R, approximately 506 acres of land acquisition and 19 acres of avigation easement are anticipated. The continued development of the Airport is expected to be a stimulus to the economic well-being of the Airport and its surrounding areas; therefore, the proposed airport improvements and land acquisition should bear no negative impacts to the population and/or growth movements of the local community.

The historic resources in the vicinity of the Airport, the Philip Orin Parmelee Marker and the Lansing Civil Air Patrol Headquarters, are not anticipated to be directly impacted by the proposed projects. However, additional coordination with the State Historic Preservation Officer is recommended in the environmental assessment stage of project development.

Endangered and threatened species of flora and fauna in the area have been identified as the Indiana Bat, Eastern massasauga rattlesnake, Prairie fringed orchid, and Copperbelly water snake. It is recommended a formal investigation of these species' habitats be performed prior to the proposed development.

The West Ramp Access Road, which is already under design, is the only near-term project located in an area identified as a wetland. Environmental documentation has already taken place, and mitigation is envisioned to be a part of a larger mitigation project to be undertaken in conjunction with a future road relocation project. A formal wetland determination/delineation would be required to verify the presence/extent and jurisdiction of wetlands on the Airport property.

Short-term, unavoidable impacts will result from the construction of the proposed development. Air pollution from dust and diesel fumes will also increase for the short-term. These increases should be localized in the immediate vicinity of the project area and should have only a minimal impact on off-airport properties.

CHAPTER 6
AIRPORT LAYOUT PLAN

The Airport Layout Plan (ALP) serves several roles for the Airport, MDOT, and the FAA. As presented the FAA Master Plan Advisory Circular, there are five primary functions of the ALP that define its purpose:

- The approved plans are necessary in order to receive financial assistance under the terms of the Airport and Airway Improvement Act of 1982 (AIP), as amended, and specific Passenger Facility Charge actions. The maintenance of a current plan and conformity to the plan are grant assurance requirements at an airport on which Federal funds have been expended under the AIP and the previous airport development programs, including the 1970 Airport Development Aid Program (ADAP) and Federal Aid Airports Program (FAAP) of 1946, as amended. While ALPs are not required for airports other than those developed with assistance under the aforementioned Federal programs, this guidance can be applied to all airports.

- The plans create a blueprint for airport development by depicting proposed facility improvements consistent with the strategic vision of the airport sponsor. The plans provide a guideline by which the airport sponsor can assure that development maintains airport design standards and safety requirements, and is consistent with airport and community land use plans.

- The ALP serves as a public document that is a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.

- The approved ALP provides the FAA with a plan for airport development. This will allow compatible planning for FAA-owned facility improvements at the airport. It also allows the FAA to anticipate needs for budgetary and procedural needs. The approved ALP will also allow the FAA to protect necessary airspace for planned facility or approach procedure improvements.

- The plans can be a working tool for use by the airport sponsor, including development and maintenance staff.

Development of the ALP is a direct result of the Master Plan processes presented in the previous chapters. The Airport conditions and Master Plan recommended improvements depicted on the ALP are presented in the previous chapters. The ALP reflects the Airport technical requirements defined through the Master Planning process and the strategic vision for the Airport as defined by the Airport Board and Staff.

ALP approval independent from the Master Plan is required. As such, review of the ALP drawing set is accomplished through several intermediate steps, including reviews by the Airport, the FAA Airports District Office (ADO), and several other FAA offices involved in the associated airspace review. A current ALP that has Airport sponsor and FAA approval from the standpoint of safety, utility and efficiency of the airport is required by United States Code, Title 49, 47107(a)(16).

The Capital City Airport Layout Plan is prepared using several applicable guidelines and checklists. These sources include:

- FAA Advisory Circular 150/5300-13, *Airport Design*

- FAA Advisory Circular 150/5070-6B, *Airport Master Plans*
- FAA Great Lakes Region Policy and Procedures Memorandum 5050.5C, *Planning: Airport Layout Plan Approval and Airport Master Plan Acceptance*
- Michigan Department of Transportation, Bureau of Aeronautics, *Guidelines for Developing Quality Airport Layout Plans*

This chapter will present the Airport's compliance with FAA design standards (section 6.1), FAA maintained facilities requiring modification (section 6.2), lists revisions to the ALP since the previous approved ALP (section 6.3), and presents reduced size Revised ALP drawing set (section 6.4).

6.1 Airport Compliance with FAA and MDOT Design Standards

The FAA provides airport design standards to ensure safe and efficient airport operations. The primary guidance is contained in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*. The Master Planning process also relies on numerous other FAA and Federal Agency documents, including:

- Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace
- FAA Order 8260.3B, United States Standards for Terminal Instrument Procedures
- FAA Order 5200.8, Runway Safety Area Program
- FAA Order 6480.4, Airport Traffic Control Tower Siting Criteria
- Numerous other ACs and Orders

6.1.1 Runway Safety Area Compliance

The Runway Safety Area (RSA) is intended to provide a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs. RSA dimensions and design criteria are established in AC 150/5300-13, Airport Design, and are based on the Airport Reference Code (ARC).

RSA standard compliance is a primary objective of the FAA. The FAA's Runway Safety Area (RSA) Program, as detailed in FAA Order 5200.8 dated October 1, 1999, states that all RSAs at federally obligated airports and all RSAs at airports certified under 14 Code of Federal Regulations (CFR) Part 139, shall conform to the standards contained in AC 150/5300-13 Airport Design, to the extent practical.

In order to comply with the requirements of FAA Order 5200.8, the FAA's Detroit Airports District Office (ADO) in association with the FAA's Great Lakes Regional Office prepared an RSA inventory for Capital City Airport and made an RSA determination for each runway. This inventory was presented in the form of Runway Safety Area Data Sheets, which are presented in Appendix I. The general findings of the FAA RSA review are that it is practical for Capital City Airport to make improvements that will result in all RSAs meeting current FAA RSA Design Standards.

The Master Plan scope has been expanded to include a more thorough investigation of RSA compliance, including all runways at the Airport. A master plan typically identifies RSA dimensional standards and areas of non-compliance. The purpose of the overall study is to:

- Undertake a more detailed evaluation of the existing Capital City Airport RSAs
- Assess RSA deficiencies per FAA design standards
- Assess potential airfield modifications to correct any RSA deficiencies
- Consider required RSA improvements in conjunction with recommended airfield improvement resulting from the Master Plan
- Recommend improvements to the RSAs at a planning level of detail that can be used for the bases of subsequent design engineering

The following sections discuss the RSA compliance issues and recommended resolutions for each runway at the Airport individually.

6.1.1.1 Runway 6-24 Safety Area

The FAA's inventory of RSA non-compliance, as compiled in the Runway Safety Area Data Sheets, identified numerous issues of non-compliance for Runway 6-24. At the inception of the Master Plan effort, the FAA and Airport had begun exploring options to resolve the RSA non-compliance for this runway. A separate RSA Study for this runway was completed, and is presented in Appendix I. This study recommended that Runway 6-24 be reclassified as an Airplane Design Group (ADG) II runway. This would reduce the size of the RSA and make most objects that are non-compliant within the existing RSA fall outside the boundary of the recommended revised RSA. Because Runway 6-24 is forecast to continue to be used as an ADG II runway (as it has been for a number years), this reclassification would have no practical impact on its usage. The FAA approved the classification change, the RSA size was reduced, and the revised RSA is depicted on the Existing Airport Layout Plan.

The ultimate Airport development defined by the Master Plan protects for the optional extension of Runway 6-24 and the associated reclassification to an ADG IV. Based on the existing Runway 6 end location and an ADG IV classification, the RSA extending 1,000 feet beyond the runway end would have non-compliant features including Airport Service Drive and the railroad tracks. To clear the RSA the Runway 6 end would need to be relocated approximately 700 feet to the northeast to protect the full RSA. This configuration is depicted on the Future/Ultimate ALP.

6.1.1.2 Runway 10R-28L Safety Area

Runway 10R-28L has numerous features within the RSA that may be non-compliant. **Table 6-1** presents features as identified by the FAA on the Data Sheet and identified through the Master Planning process. Those objects with one or more Object Statuses being False, may require compliance corrective action. Following Table 6-1, discussion is presented regarding the disposition of each of these objects, including consideration of on-going or planned airfield improvements previously presented in this Master Plan.

Table 6-1
OBJECTS AND FEATURES LOCATED IN THE RUNWAY 10R/28L RSA

		Object Status [1/]			
Object	**Runway End**	**Identified by FAA [2/]**	**FAA Facility**	**Fixed by Function**	**Frangible to 3 inches**
Runway 10R ALS [3/] - 4 Units	10R	TRUE	TRUE	TRUE	TRUE
Runway 10R ALS Servicing Light Stands - 4 Units	10R	TRUE	TRUE	FALSE	FALSE
Runway 10R Service Road (Former Airport Road)	10R	FALSE	FALSE	FALSE	FALSE
Runway 28L ALS [3/] - 4 Units	28L	TRUE	TRUE	TRUE	TRUE
Runway 28L ALS Servicing Light Stands - 4 Units	28L	TRUE	TRUE	FALSE	FALSE
Runway 28L Wind Sock	28L	TRUE	FALSE	FALSE	TRUE

Notes: 1/ Object status descriptions consistent with format used in FAA Runway Safety Area Data Sheets
2/ Identified on FAA Runway Safety Area Data Sheet
3/ Approach Lighting System

- Runway 10R ALS Servicing Light Stands

The ALS Light Stands in the Runway 10R RSA must either be removed, or converted to frangible mountings. The FAA has scheduled their removal in 2005.

- Runway 10R Service Road

The service road that is a remnant segment of the former Airport Road alignment passes through the RSA. A service road is typically not RSA compatible. The plan calls for the relocation of the road outside of the RSA.

- Runway 28L ALS Servicing Light Stands

Airport development plans include the extension of Runway 28L. The runway will be extended 1,250 feet to the east in two phases. The first phase, scheduled for construction in 2005, will extend the runway 750 feet. With this extension, the runway threshold and RSA will remain in their current locations, and declared distances will be employed. With this runway improvement, the approach light system will need to be redesigned, and accordingly, the non-compliant light stands will be removed. In the second phase of extension, the threshold will be located at the physical runway end, and the completely compliant RSA will be prepared.

- Runway 28L Wind Sock

The Runway 28L windsock is located in the RSA. The windsock is not fixed by function and must be moved out of the RSA. The movement of the windsock from the RSA is scheduled in 2005.

6.1.1.3 Runway 10L-28R Safety Area

Runway 10L-28R serves primarily small, general aviation aircraft. While all runways must meet RSA design criteria, this category of runway is not currently included in the FAA Runway Safety Area Program, and the FAA has not prepared RSA Determinations and Data Sheets for this runway.

The existing runway meets all RSA design criteria with one exception. One set of the Runway End Identifier Lights (REILs) for Runway 24 is in the Runway 10L RSA. A compliance evaluation criterion is the determination if an object is fixed by function. These REILs are not fixed by function for Runway 10L and its RSA; they are fixed by function for Runway 24. Per the FAA RSA Determination and Data Sheet for Runway 24, the REILs are frangibly mounted. Based on this RSA compliant mounting, the REILs can remain in the 10L RSA.

The Alternatives chapter identified an ultimate Airport development scenario in which Runway 6-24 is extended and upgraded to an ADG IV design standard. Should this extension occur coincident with continued use of Runway 10L-28R, Runway 10L would need to be extended to the west to avoid Runway intersection and RSA conflicts. Under this scenario, a complete RSA would be provided for Runway 10L.

6.1.2 Design Standard Modifications

The existing, approved ALP, dated December 22, 1994, which accompanies the 1995 Airport Master Plan, has one granted design standard modification that remains applicable to the ALP update accompanying this Master Plan. As excerpted from the FAA October 18, 1995 Airport Layout Plan Approval Letter (AIP Grant No. 95-2-3-26-0055-1790, Airspace Case No. 95_AGL-626-NRA):

- 2. Airport Road and the fencing are in the existing Object Free Area for Runway 28R.

The road and fence are in the northwest corner of the runway object free area, west of the Runway 10R end.

6.2 FAA Airfield Modifications

The following are FAA facilities that require modification for compliance to design standards. It is the FAA's responsibility to ensure these modifications occur, and as applicable, with consistent required implementation schedules.

- Runway Safety Area Design Standard Compliance

As discussed in section 6.1.1.2, Runway 10R-28L Safety Area, light stands used for servicing of the runway approach lighting systems for Runway 10R and 28L require modification. The approach lighting system and light stands are FAA facilities. As previously discussed, the FAA plans to remove the impacting light stands in the approach the Runway 10R in 2005. The impacting light stands in the approach to Runway 28L will be corrected in association with planned runway improvements in 2005.

- Glide Slope Design Standard Compliance

For Runway 10R, components of the instrument landing system's glide slope are not in compliance with design standards. The glide slop antenna array, if frangibly mounted, can be located in the runway object free area (OFA). However, the glide slope equipment shelter must be located outside of the OFA. For Runway 10R, the shelter is currently located in the OFA and must be relocated.

6.3 Airport Layout Plan Modifications

This section highlights significant changes to the ALP since approval of the December 22, 1994 ALP.

6.3.1 Implemented Improvements

- Runway 6/24 has been reclassified ARC B-II (from ARC C-III)
- The air cargo ramp has been enlarged
- Removal of Taxiway F, south of Taxiway B
- Construction of Taxiway H
- Nine hangars / buildings have been removed along the west ramp; First new hangar in the general aviation development area has been constructed
- Taxiway G & L constructed providing access to the general aviation development area west of Runway 6
- Taxiway J constructed providing access to the southeast general aviation development area south of Runway 28L and Taxiway B
- Construction of access road and installation of utilities to the southeast general aviation development area
- Expansion of the Terminal Building
- Expansion of terminal vehicle parking
- Airport Access Drive was relocated and renamed West Airport Service Drive
- Airport Acquisition of property west of DeWitt Road, mid-way between State Road and Stoll Road
- Southwest general aviation hangar complex taxiway and taxi street reconfiguration
- Construction of perimeter vehicle service road around Runway 6 end

6.3.2 Improvements Currently Being Implemented

- Runway 28L 750-foot extension
- Airport Surveillance Radar (ASR) relocation

6.3.3 Planned or Proposed Improvements

- Runway 27L 500-foot extension
- Interim existing terminal vehicle parking expansion
- Replacement Terminal Development
- DeWitt Road Relocation
- Land Acquisition for Terminal and South of Runway 28L
- Relocation of East Airport Service Drive
- New air carrier runway; construction of new, north parallel Runway 10/28 **OR** extension and improvements to Runway 6/24.
- Continued development of southwest, west, and southeast general aviation areas
- Expansion of cargo facilities

6.4 Airport Layout Plan Drawings

The ALP drawings are presented in this section. These are reduced size versions of the original 24” x 36” drawings on file with the Airport, FAA, and MDOT.

FAA APROVAL LETTER

U.S. Department of Transportation
Federal Aviation Administration

Detroit Airports District Office
Metro Airport Center
11677 S. Wayne Road, Ste. 107
Romulus, MI 48174

JUN 18 2008

Mr. Bob Selig
Executive Director
Capital City Airport Authority
4100 Capital City Blvd.
Lansing, MI 48906

Dear Mr. Selig:

Capital City Airport, Lansing, Michigan
Airport Layout Plan (ALP) Approval
Aeronautical Study: 07-AGL-089-NRA

Enclosed is a conditionally approved copy of the Capital City Airport, Airport Layout Plan (ALP), dated December 6, 2006. This letter cancels or supersedes all prior ALP approvals. The ALP approval is based on recognition of and adherence to the following:

1. The approval is not to be considered a commitment of Federal funding for the proposed development. The FAA has concurred with the proposed development for planning purposes only based on current safety, utility, and efficiency standards. Actual development should comply with approved standards applicable at the time of construction. The airport will need to provide the FAA justification of need before seeking FAA financial participation in the following projects:
   - Shift and extension of runway 6-24 with proposed approach improvements;
   - Removal of a short parallel runway (3,601') currently identified as 10L-28R;
   - Construction of a new runway (9,000') with an ILS system to the north of the existing airfield with a runway designation of 10L-28R;
   - Associated parallel taxiway construction for the above referenced runways;
   - Expansion of the cargo operations area;
   - Proposed ATCT relocation;
   - Identification of a future terminal development area;
   - Relocation of Dewitt Road in several phases as development dictates;
   - Achieving the lowest possible minimums for the airport including the installation of additional NAVAIDs; and
   - Purchasing additional land and clearing all objects necessary to meet approach and Part 77 requirements necessary for development and protection of FAA design criteria.
2. The previous design standard modification has been granted as follows:

   Road and fence in Object Free Area for Runway 10R and Runway 28L (see FAA letter/ALP Approval dated October 18, 1995).

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3. We note the following:
   a. If any runways are to be shifted or extended, the shift/extension must be designed such that Standard Runway Safety Areas and Object Free Areas are maintained.
   b. If any design critical aircraft or aircraft group changes for any of the runways identified, this ALP must be reevaluated by the FAA.
4. Our approval does not infer or imply that the land in the airport vicinity is considered compatible with airport operations. Federal requirements stipulate:
   a. All development programs should be reasonably consistent with the plans of local and state planning agencies for the development in the airport vicinity.
   b. That fair consideration has been given to the interest of communities in or near the airport.
   c. That development programs provide for the protection and enhancement of the environment.
5. The FAA offers no objections to the proposed ultimate airspace utilization as depicted on the ALP based on considerations of safe and efficient use of airspace. The ALP has the status of "Plan on File" for the purpose of 14 CFR 77, Obstruction Evaluations, and 14 CFR 152, Airport Aid Program. A review of the airside landing area development was conducted according to the following 14 CFR's: -77, -152, -and –157, Notice of Construction, Alteration, Activation, and Deactivation of Airports (reference Aeronautical Study Number 07-AGL-0972-NRA). It should be noted that FAA cannot prevent erection of any structure near an airport. Airport environs can only be protected through state and local zoning ordinances, building regulations, and like requirements. Please refer to the FAA Airspace letter dated August 1, 2007 for additional detailed information.
6. All development depicted on this ALP must comply with the National Environmental Policy Act (NEPA) of 1969. FAA environmental approval is required for all airport development actions depicted on this ALP. This would apply to development projects, event if there were no FAA funding involved in the project. Additional requirements concerning FAA NEPA approval can be found in FAA Order 5050.4B *"National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions"*.
7. To avoid conflicts with future development, we recommend you utilize the ALP when preparing leases. We further recommend you provide copies to the local and state planning zoning boards and county and city officials and encourage them to adopt compatible land use criteria in and around the airport. Copies should also be distributed to the Fixed Base Operators (FBO's) and airport users.
8. The Airport and Airway Improvement Act (49 USC 47107(a) (16) (D)) requires the sponsor to eliminate any adverse effects on Federal facilities, or bear all costs to relocate those facilities, that are a result of an airport change. However, if AIP eligible construction/development items adversely affect FAA facilities, the cost of relocating the facilities may be eligible under AIP. If the proposed development requires any displaced or relocated FAA facility, the construction will have to be coordinated with the FAA in order to establish reimbursable funding for the engineering and relocation.
9. This approval does not include a detailed evaluation of actual construction. Prior to constructing any development on the airport, notice (FAA Form 7460-1) consistent with 14 CFR 77 must be filed with this office. This approval does not include approval for

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temporary construction equipment which may be used during actual construction, e.g., cranes, equipment staging areas, site access routes, etc. A separate construction safety/phasing plan for any project should be reviewed by the FAA no less than 60 days prior to beginning any project. The airport must take all measures necessary during construction to ensure there are no runway incursions.

10. If development is planned without aviation trust fund investments that will change the status or geometrics of runways, taxiways, aprons, or other operating airport surfaces, notice (FAA Form 7480-1) must be filed with this office consistent with 14 CFR 157.
11. The planned runway developments will require new FAA flight procedures. If the FAA concurs with these developments there will need to be close coordination with different FAA offices. Development on new approaches will not begin until environmental approvals have been given and the sponsor requests the FAA Flight Procedures Office to initiate design of new approaches. Publication of revised Instrument Approach Procedures (IAPs) could take from 18 months to two years, after runway data is submitted. Review of this ALP does not constitute an automatic request for amended procedures.

We trust this letter provides a clear explanation of the conditions and terms of our approval. If you desire further clarification, please contact Brad N. Davidson at (734)-229-2900.

Sincerely,

Brad Davidson, P.E.
Detroit Airports District Office

cc: AJW-327E (w/ ALP)
AGL-470 (w/ ALP)
AJW-C15A
AGL-520 (w/ ALP)
MDOT (w/ ALP)
AGL-620 (w/ ALP)
AGL-230 (w/ ALP)
DET ADO (w/ALP)
Reynolds Smith & Hills (w/ ALP)

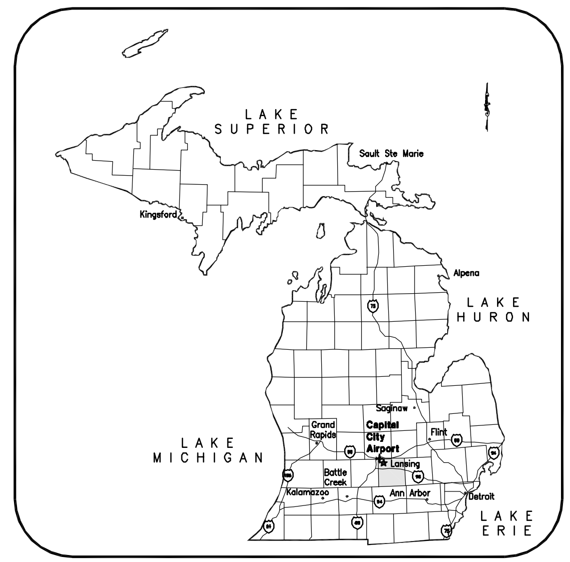
AIRPORT LAYOUT PLANS
FOR
CAPITAL CITY AIRPORT

LANSING, MICHIGAN

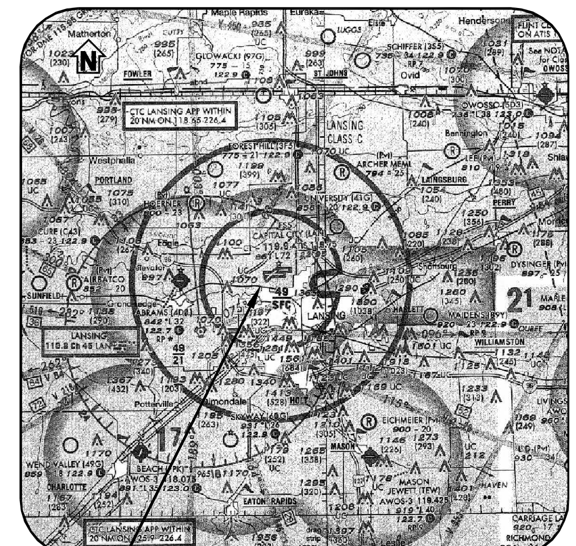
Sponsored By:

CAPITAL REGION AIRPORT AUTHORITY

ALP DATE: DECEMBER 6, 2006

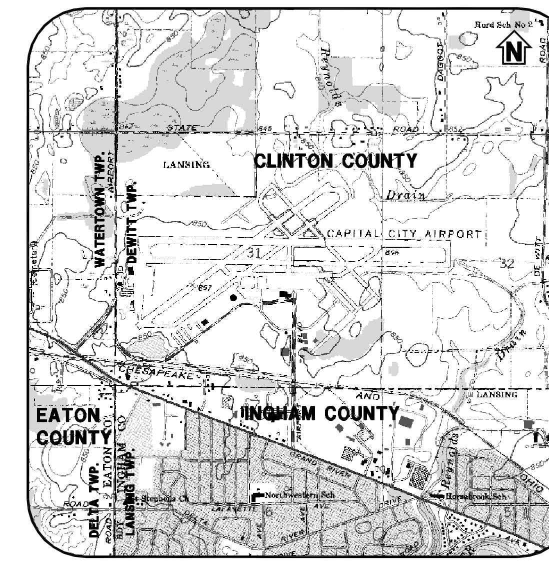


COUNTY MAP
SCALE: N.T.S.



LOCATION MAP
SCALE: 1:500,000

CAPITAL CITY AIRPORT



VICINITY MAP

SHEET NUMBER	INDEX TO SHEETS	REVISION DATE
1	TITLE SHEET	
2	AIRPORT DATA SHEET	
3	EXISTING AIRPORT LAYOUT PLAN	
4	FUTURE/ULTIMATE AIRPORT LAYOUT PLAN	
5	TERMINAL AREA PLAN	
6	ACCESS PLAN	
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ALP Checklist Certification for Airspace Review

On behalf of Reynolds, Smith and Hills, Inc., I certify that the ALP prepared for the Capital City Airport, was prepared according to the ALP checklist and accurately depicts the proposed use of airspace. The ALP conforms with FAA design standards, except as noted:

RW 10R – ROAD AND FENCE IN OFA.

RW 28L – ROAD, SERVICE ROAD AND FENCE IN RSA AND OFA.

Signed:________________ Date:________

MICHIGAN AERONAUTICS COMMISSION

APPROVED ________ AIRPORTS DIVISION ADMINISTRATOR 6-17-08 DATE

APPROVED ________ AP MANAGER – DAVID L. BAKER, P.E. 6-17-08 DATE

CAPITAL REGION AIRPORT AUTHORITY

APPROVED ________ ROBERT F. SELIG, AAE EXECUTIVE DIRECTOR 6-18-08 DATE

APPROVED ________ DATE

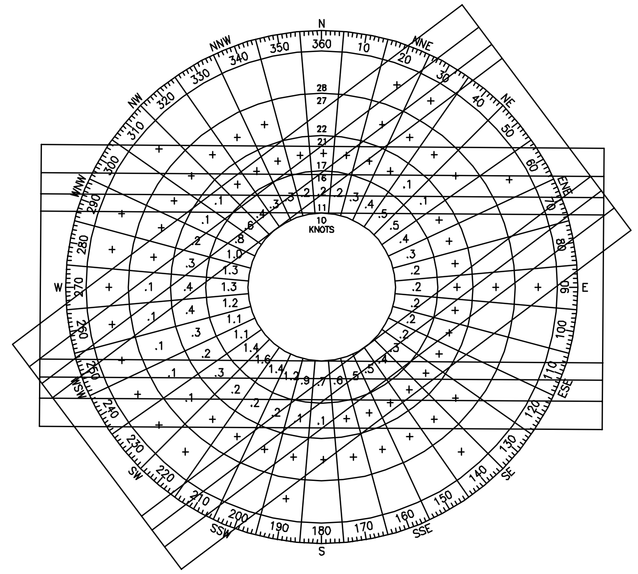
PLANS PREPARED BY:

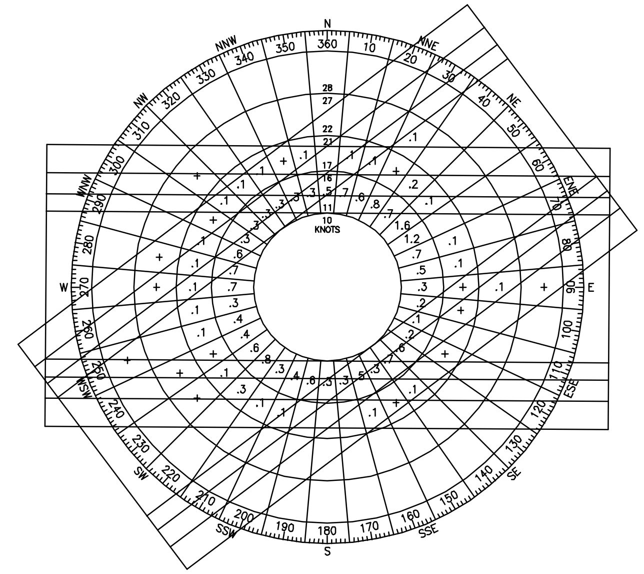
RS&H

Reynolds, Smith and Hills, Inc.
850 East Diehl Road, Suite 120
Naperville, Illinois 60563
(630) 505-1991 FAX (630) 505-1977

APPROVED ________ NEIL A. WESTLUND 6/11/08 DATE

ALL WEATHER WIND COVERAGE TABLE		
AIRPORT WIND COVERAGE		
RUNWAY	CROSS WIND COMPONENTS	
	10.5 KNOTS	13 KNOTS
10-28	89.44%	94.81%
6-24	91.08%	95.72%
COMBINED	96.07%	98.61%





IFR WIND COVERAGE TABLE		
AIRPORT WIND COVERAGE		
RUNWAY	CROSS WIND COMPONENTS	
	10.5 KNOTS	13 KNOTS
10-28	91.02%	95.55%
6-24	92.91%	96.39%
COMBINED	96.24%	98.69%

SUMMARY TABLE

DATA SOURCE: NATIONAL CLIMATIC DATA CENTER
STATION: LANSING, MICHIGAN
NO. OF OBSERVATIONS: 82,173
PERIOD OF OBSERVATIONS: 1994-2003

EXISTING AIRPORT DATA TABLE		
COUNTY: CLINTON, INGHAM & EATON	TOWNSHIP: DEWITT, WATERTOWN, LANSING, DELTA	TOWN: 5N & 4N
MEAN MAXIMUM TEMPERATURE:	83°	RANGE: 2W
AIRPORT REFERENCE POINT:	LAT.: 42°46'43.20"N	LONG.: 84°35'12.08"W
AIRPORT ELEVATION:	861' MSL	
AIRPORT AND TERMINAL NAVAIDS	CAT I ILS, VOR, NDB, GPS	
SERVICE LEVEL	PRIMARY NON-HUB	
AIRPORT REFERENCE CODE (ARC)	D-IV	

FUTURE AIRPORT DATA TABLE		
COUNTY: CLINTON, INGHAM & EATON	TOWNSHIP: DEWITT, WATERTOWN, LANSING, DELTA	TOWN: 5N & 4N
MEAN MAXIMUM TEMPERATURE:	83°	RANGE: 2W
AIRPORT REFERENCE POINT:	LAT.: 42°46'43.13"N	LONG.: 84°35'10.35"W
AIRPORT ELEVATION:	861' MSL	
AIRPORT AND TERMINAL NAVAIDS	CAT I ILS, VOR, NDB, GPS	
SERVICE LEVEL	PRIMARY NON-HUB	
AIRPORT REFERENCE CODE (ARC)	D-IV	

ULTIMATE AIRPORT DATA TABLE		
COUNTY: CLINTON, INGHAM & EATON	TOWNSHIP: DEWITT, WATERTOWN, LANSING, DELTA	TOWN: 5N & 4N
MEAN MAXIMUM TEMPERATURE:	83°	RANGE: 2W
AIRPORT REFERENCE POINT:	LAT.: 42°47'01.59"N	LONG.: 84°35'04.80"W
AIRPORT ELEVATION:	861' MSL	
AIRPORT AND TERMINAL NAVAIDS	CAT I ILS, CAT II ILS, VOR, NDB, GPS	
SERVICE LEVEL	PRIMARY NON-HUB	
AIRPORT REFERENCE CODE (ARC)	D-IV	

RUNWAY AND APPROACH DATA

ITEM / RUNWAY	10R-28L EXISTING	10R-28L FUTURE	10L-28R EXISTING	10L-28R FUTURE	10L-28R ULTIMATE	6-24 EXISTING	6-24 FUTURE	6-24 ULTIMATE
RUNWAY LENGTH	8001	8501	3601	3601	9001	5003	5003	7785
DISPLACED THRESHOLD DISTANCE	750	NONE	NONE	NONE	NONE	NONE	NONE	NONE
TAKEOFF RUN AVAILABLE	10R 8001 28L 8001	10R 8501 28L 8501	10L 3601 28R 3601	10L 3601 28R 3601	10L 9001 28R 9001	6 5003 24 5003	6 5003 24 5003	6 7785 24 7785
TAKEOFF DISTANCE AVAILABLE	10R 8001 28L 8001	10R 8501 28L 8501	10L 3601 28R 3601	10L 3601 28R 3601	10L 9001 28R 9001	6 5003 24 5003	6 5003 24 5003	6 7785 24 7785
ASDA	10R 7251 28L 8001	10R 8501 28L 8501	10L 3601 28R 3601	10L 3601 28R 3601	10L 9001 28R 9001	6 5003 24 5003	6 5003 24 5003	6 7785 24 7785
LDA	10R 7251 28L 7251	10R 8501 28L 8501	10L 3601 28R 3601	10L 3601 28R 3601	10L 9001 28R 9001	6 5003 24 5003	6 5003 24 5003	6 7785 24 7785
STOPWAY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
CLEARWAY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
RUNWAY WIDTH	150'	150'	75'	75'	150'	120'	100'	150'
RUNWAY GRADIENT (%)	.138%	.138%	.138%	.138%	.138%	.219%	.219%	.219%
PAVEMENT TYPE	ASPHALT	ASPHALT/ CONCRETE	ASPHALT	ASPHALT	ASPHALT	ASPHALT OR CONCRETE	ASPHALT OR CONCRETE	ASPHALT OR CONCRETE
PAVEMENT STRENGTH	S-100;D-175; DT-300	S-100;D-175; DT-300	S-12	S-12	S-100;D-175; DT-300	S-45;D-65; DT-100	S-45;D-65; DT-100	S-100;D-175; DT-300
RUNWAY LIGHTING	HIRL	HIRL	MIRL	MIRL	HIRL, ℄	MIRL	HIRL	HIRL
RUNWAY MARKING	PI	PI	VISUAL	VISUAL	PI	NPI	NPI	PI
NAVIGATIONAL AIDS	10R CAT I 28L CAT I, NDB OR GPS	10R CAT I 28L CAT I, NDB OR GPS	10L NONE 28R NONE	10L NONE 28R NONE	10L CAT II 28L CAT II	6 VOR OR GPS 24 VOR OR GPS	6 VOR OR GPS 24 VOR OR GPS	6 VOR OR GPS 24 VASI, GPS, CAT I
APPROACH	CAT I	CAT I	NONE	NONE	CAT II	NPI	NPI	CAT I
VISUAL AIDS (IE: VASI, REIL)	10R MALSR 28L MALSR	10R MALSR 28L MALSR	10L NONE 28R NONE	10L NONE 28R NONE	10L ALSF-2 28R ALSF-2	6 VASI, REIL 24 VASI, REIL	6 VASI, REIL 24 VASI, REIL	6 VASI, REIL 24 MALSR, VASI
AIRCRAFT APPROACH CATEGORY	D	D	B	B	D	B	B	D
AIRPLANE DESIGN GROUP	IV	IV	I	I	IV	II	II	IV
APPROACH RATIO FAR PART 77	10R 50:1 28L 50:1	10R 50:1 28L 50:1	10L 20:1 28R 20:1	10L 20:1 28R 20:1	10L 50:1 28R 50:1	6 34:1 24 34:1	6 34:1 24 34:1	6 34:1 24 50:1
RUNWAY PROTECTION ZONE	10R 1000x1750x2500 28L 1000X1750X2500	10R 1000x1750x2500 28L 1000X1750X2500	10L 500x700x1000 28R 500X700X1000	10L 500x700x1000 28R 500X700X1000	10L 1000x1750x2500 28R 1000X1750X2500	6 500x700x1000 24 500X700X1000	6 500x700x1000 24 500X700X1000	6 500x1010x1700 24 1000X1750X2500
APPROACH VISIBILITY MINIMUMS	10R 1/2 MILE 28L 1/2 MILE	10R 1/2 MILE 28L 1/2 MILE	10L VISUAL 28R VISUAL	10L VISUAL 28R VISUAL	10L 1/4 MILE 28R 1/4 MILE	6 1 MILE 24 1 MILE	6 1 MILE 24 1 MILE	6 1 MILE 24 1/2 MILE
RUNWAY END COORDINATES LAT.	10R 42°46'41.52"	10R 42°46'41.52"	10L 42°46'54.89"	10L 42°46'54.89"	10L 42°47'30.85"	6 42°46'23.39"	6 42°46'23.39"	6 42°46'27.56"
LONG.	10R 84°36'03.80"	10R 84°36'03.80"	10L 84°35'05.92"	10L 84°35'05.92"	10L 84°35'54.80"	6 84°36'03.75"	6 84°36'03.75"	6 84°35'56.26"
LAT.	28L 42°46'40.69"	28L 42°46'40.63"	28R 42°46'54.52"	28R 42°46'54.52"	28R 42°47'29.90"	24 42°46'53.13"	24 42°46'53.13"	24 42°47'13.82"
LONG.	28L 84°34'16.54"	28L 84°34'09.79"	28R 84°34'17.63"	28R 84°34'17.63"	28R 84°33'54.10"	24 84°35'10.17"	24 84°35'10.17"	24 84°34'32.88"

LEGEND
GPS: GLOBAL POSITIONING SATELLITE
VOR: VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE
PI: PRECISION INSTRUMENT
NPI: NON-PRECISION INSTRUMENT
NDB: NON-DIRECTIONAL BEACON
MALSR: MEDIUM INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR LIGHTS
ALSF-2: APPROACH LIGHT SYSTEM WITH SEQUENCED FLASHING LIGHTS
REIL: RUNWAY END IDENTIFIER LIGHTS
PAPI: PRECISION APPROACH PATH INDICATOR
GS: GLIDE SLOPE
LOC: LOCALIZER
IM: INNER-MARKER
OM: OUTER-MARKER
MIRL: MEDIUM INTENSITY RUNWAY LIGHTS
HIRL: HIGH INTENSITY RUNWAY LIGHTS
VASI: VISUAL APPROACH SLOPE INDICATORS

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CAPITAL REGION AIRPORT AUTHORITY

CAPITAL CITY AIRPORT

AIRPORT LAYOUT PLAN

CONSULTANTS
R.W. ARMSTRONG
Union Station 300 South Meridian Street Indianapolis, Indiana 46225 (317)786-0461
CONWAY CONSULTING
AIRPORTS & AVIATION

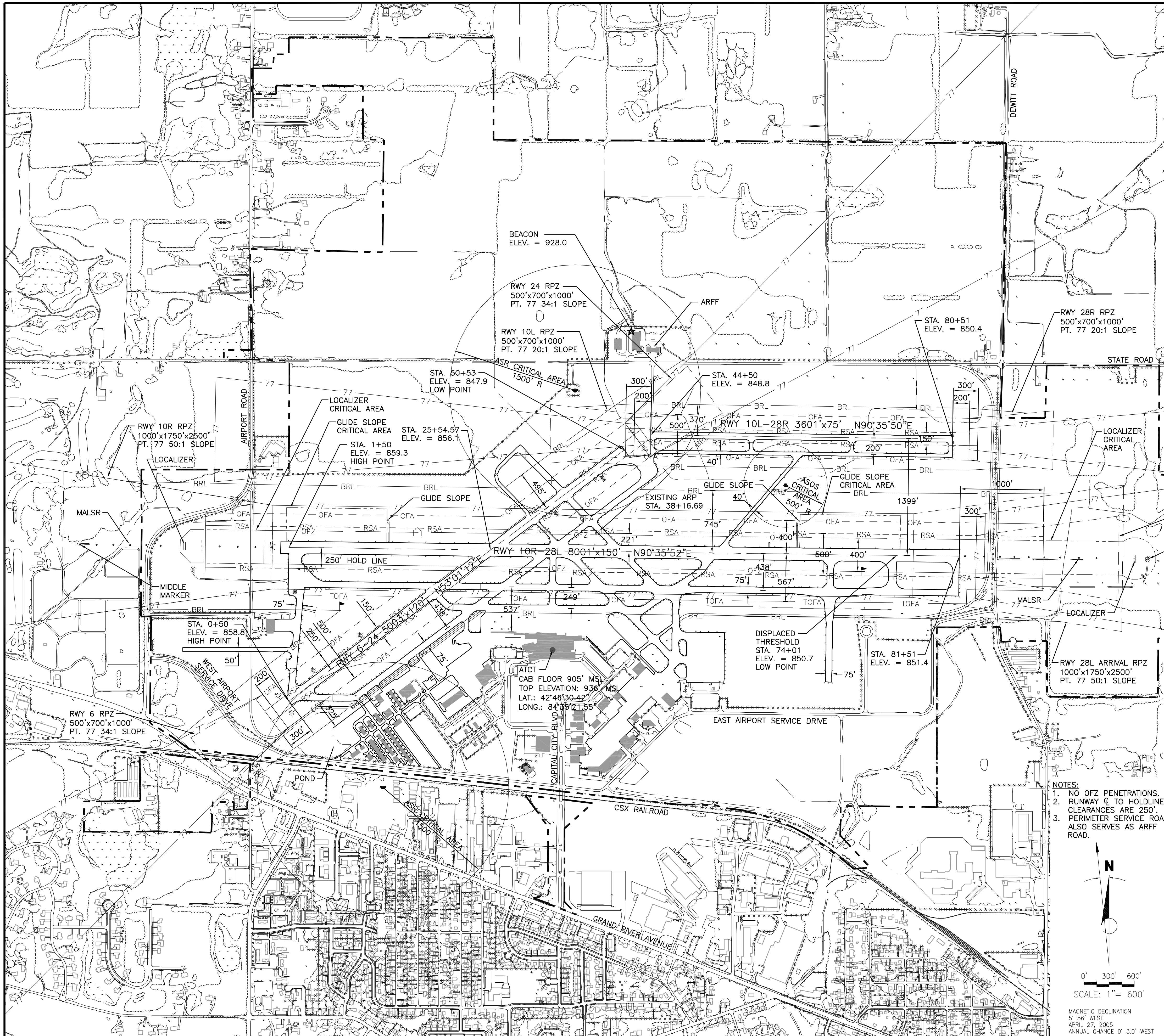
REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE
AIRPORT DATA SHEET

SHEET NUMBER



NOTES:
1. NO OFZ PENETRATIONS.
2. RUNWAY ℄ TO HOLDLINE CLEARANCES ARE 250'.
3. PERIMETER SERVICE ROAD ALSO SERVES AS ARFF ROAD.

DESCRIPTION	EXISTING
PROPERTY LINE	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	OFA
RUNWAY OBSTACLE FREE ZONE	OFZ
RUNWAY PROTECTION ZONE	
TAXIWAY OBJECT FREE AREA	TOFA
BUILDING RESTRICTION LINE	BRL
PRIMARY SURFACE	77
AIRFIELD PAVEMENT	
AIRPORT BUILDINGS	
NON–AIRPORT BUILDINGS	
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)	
ASR (AIRPORT SURVEILLANCE RADAR)	
REIL (RUNWAY END IDENTIFIER LIGHT)	
VASI (VISUAL APPROACH SLOPE INDICATOR)	
ARP (AIRPORT REFERENCE POINT)	
BEACON	☆
WINDSOCK	
TREES	
FENCE	X
COMPASS CALIBRATION PAD	
UTILITY POLE	
APPROACH LIGHT	

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AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

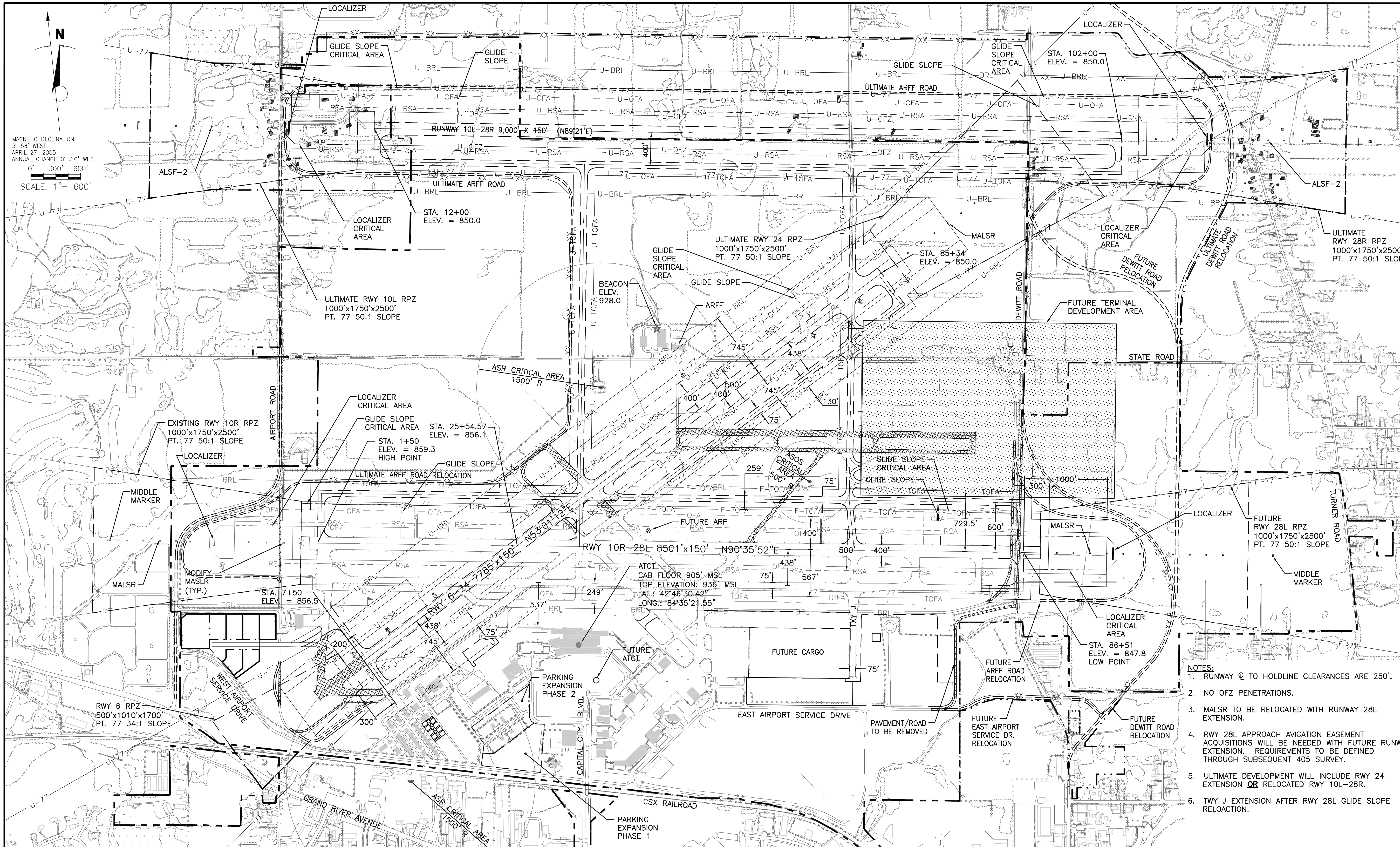
DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

EXISTING AIRPORT LAYOUT PLAN

SHEET NUMBER
3 OF 18



NOTES:
1. RUNWAY ℄ TO HOLDLINE CLEARANCES ARE 250'.
2. NO OFZ PENETRATIONS.
3. MALSR TO BE RELOCATED WITH RUNWAY 28L EXTENSION.
4. RWY 28L APPROACH AVIGATION EASEMENT ACQUISITIONS WILL BE NEEDED WITH FUTURE RUNWAY EXTENSION. REQUIREMENTS TO BE DEFINED THROUGH SUBSEQUENT 405 SURVEY.
5. ULTIMATE DEVELOPMENT WILL INCLUDE RWY 24 EXTENSION **OR** RELOCATED RWY 10L-28R.
6. TWY J EXTENSION AFTER RWY 28L GLIDE SLOPE RELOACTION.

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F-RSA	U-RSA
RUNWAY OBJECT FREE AREA	OFA	F-OFA	U-OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F-OFZ	U-OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA	U-TOFA
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
NON-AIRPORT BUILDING REMOVAL			

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURVEILLANCE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	X	XX XX	XX XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

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AIRPORTS & AVIATION

REVISIONS

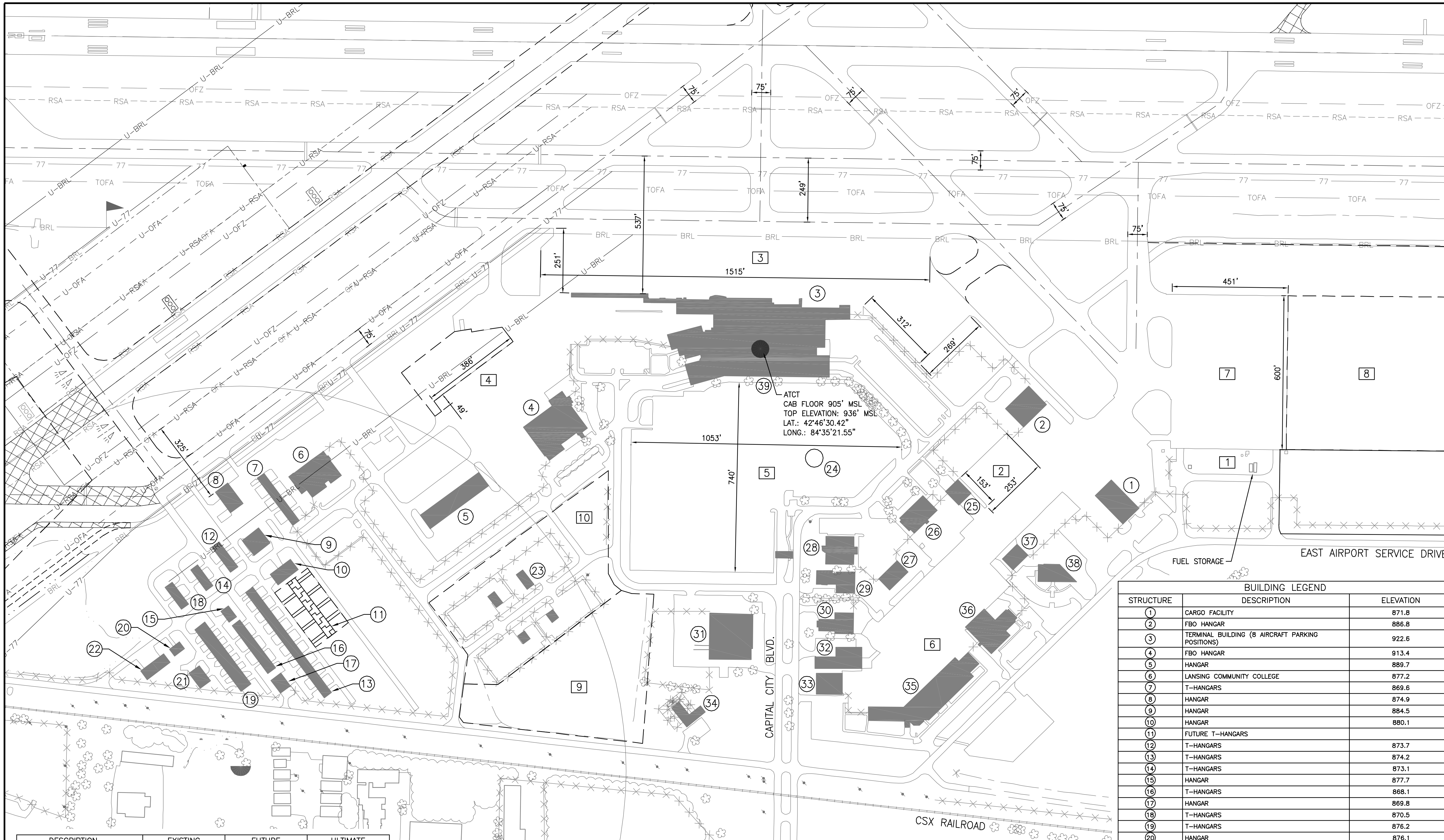
NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

FUTURE/ULTIMATE AIRPORT LAYOUT PLAN

SHEET NUMBER



DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F–RSA	U–RSA
RUNWAY OBJECT FREE AREA	OFA	F–OFA	U–OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F–OFZ	U–OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F–TOFA	U–TOFA
BUILDING RESTRICTION LINE	BRL	F–BRL	U–BRL
PRIMARY SURFACE	77	F–77	U–77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
TREES			
FENCE	X	XX	XX
ASR (AIRPORT SURVEILLANCE RADAR)			
COMPASS CALIBRATION PAD			
UTILITY POLE			

N

0' 100' 200'
SCALE: 1" = 200'

MAGNETIC DECLINATION
5° 56' WEST
APRIL 27, 2005
ANNUAL CHANGE 0° 3.0' WEST

PAVEMENT AREAS

AREA NO.	DESCRIPTION	AREA
1	FUEL STORAGE	33,600 SF
2	TIE-DOWN AREA 2	20,000 SF
3	TERMINAL APRON	1400'x200'(280,000 SF)
4	TIE-DOWN AREA 1	20,000 SF
5	AUTO PARKING	564,500 SF
6	SOUTHEAST AIRCRAFT APRON	203,191 SF
7	CARGO APRON	270,600 SF
8	FUTURE CARGO APRON	729,682 SF
9	FUTURE AUTO PARKING – PHASE 1	263,540 SF
10	FUTURE AUTO PARKING – PHASE 2	302,057 SF

BUILDING LEGEND

STRUCTURE	DESCRIPTION	ELEVATION
1	CARGO FACILITY	871.8
2	FBO HANGAR	886.8
3	TERMINAL BUILDING (8 AIRCRAFT PARKING POSITIONS)	922.6
4	FBO HANGAR	913.4
5	HANGAR	889.7
6	LANSING COMMUNITY COLLEGE	877.2
7	T–HANGARS	869.6
8	HANGAR	874.9
9	HANGAR	884.5
10	HANGAR	880.1
11	FUTURE T–HANGARS	
12	T–HANGARS	873.7
13	T–HANGARS	874.2
14	T–HANGARS	873.1
15	HANGAR	877.7
16	T–HANGARS	868.1
17	HANGAR	869.8
18	T–HANGARS	870.5
19	T–HANGARS	876.2
20	HANGAR	876.1
21	HANGAR	871.5
22	HANGAR	878.4
23	RENTAL CAR READY RETURN	873.4
24	FUTURE AIR TRAFFIC CONTROL TOWER	
25	FBO HANGAR	879.7
26	FAA AUTOMATED FLIGHT SERVICE STATION	871.8
27	HANGAR	868.7
28	OFFICE	883.2
29	OFFICE/HANGAR	879.9
30	OFFICE	878.1
31	OFFICE	865.8
32	OFFICE/HANGAR	874.2
33	MI ARNG (OFFICE/HANGAR)	882.3
34	KENNEL	862.6
35	MDOT BUREAU OF AERONAUTICS	897.3
36	MI STATE POLICE	875.8
37	HANGAR	880.7
38	OFFICE	872.7
39	ATCT CAB FLOOR/TOPELEVATION	905.0/936.0

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CAPITAL REGION AIRPORT AUTHORITY

CAPITAL CITY AIRPORT

AIRPORT LAYOUT PLAN

CONSULTANTS

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CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

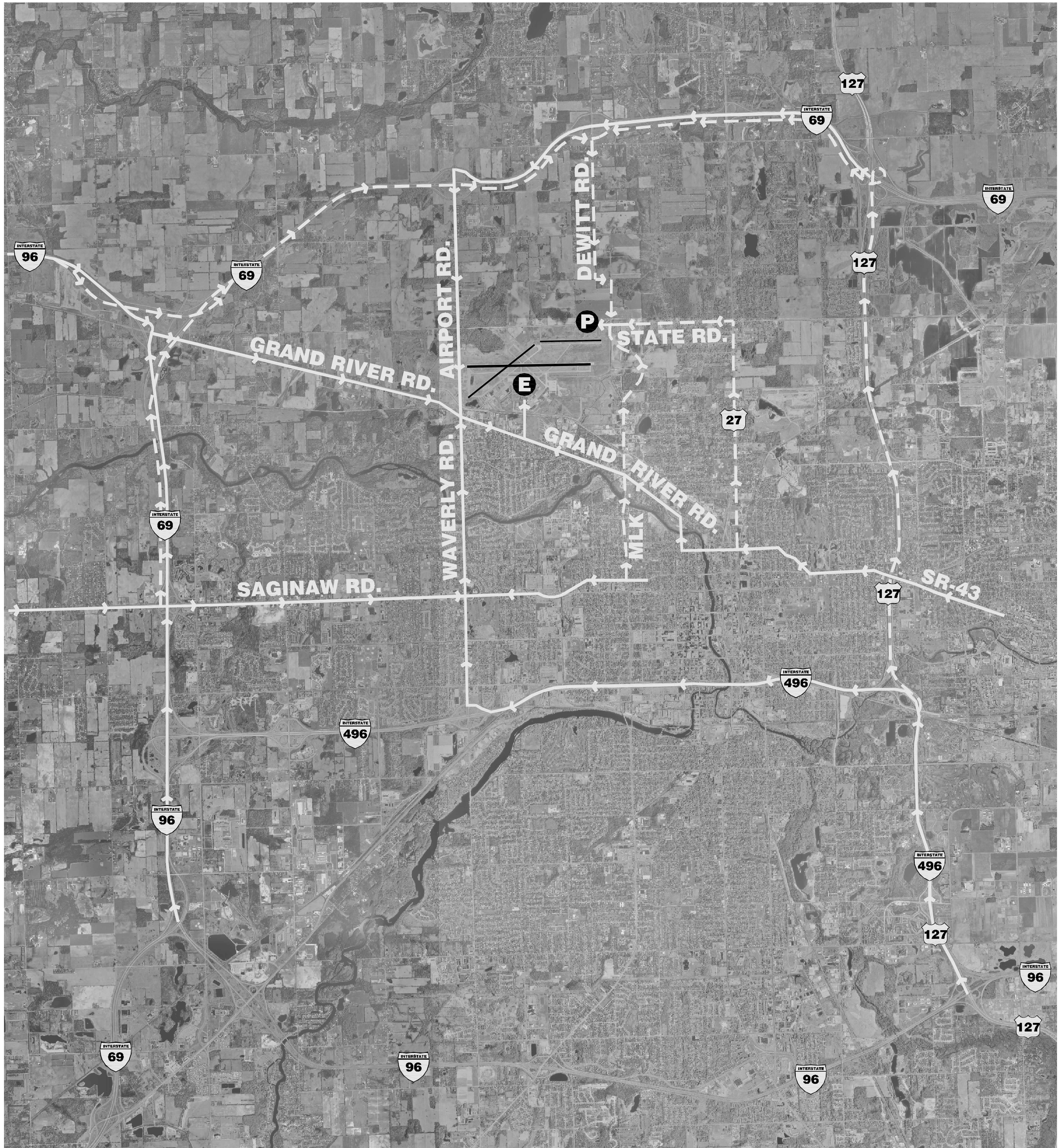
DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

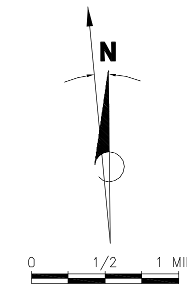
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

TERMINAL AREA PLAN

SHEET NUMBER
5 OF 18





TRAVEL ROUTES

- EXISTING
- FUTURE
- E — EXISTING TERMINAL
- P — PROPOSED TERMINAL

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Indianapolis, Indiana 46225 (317)786-0461

CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

ACCESS PLAN

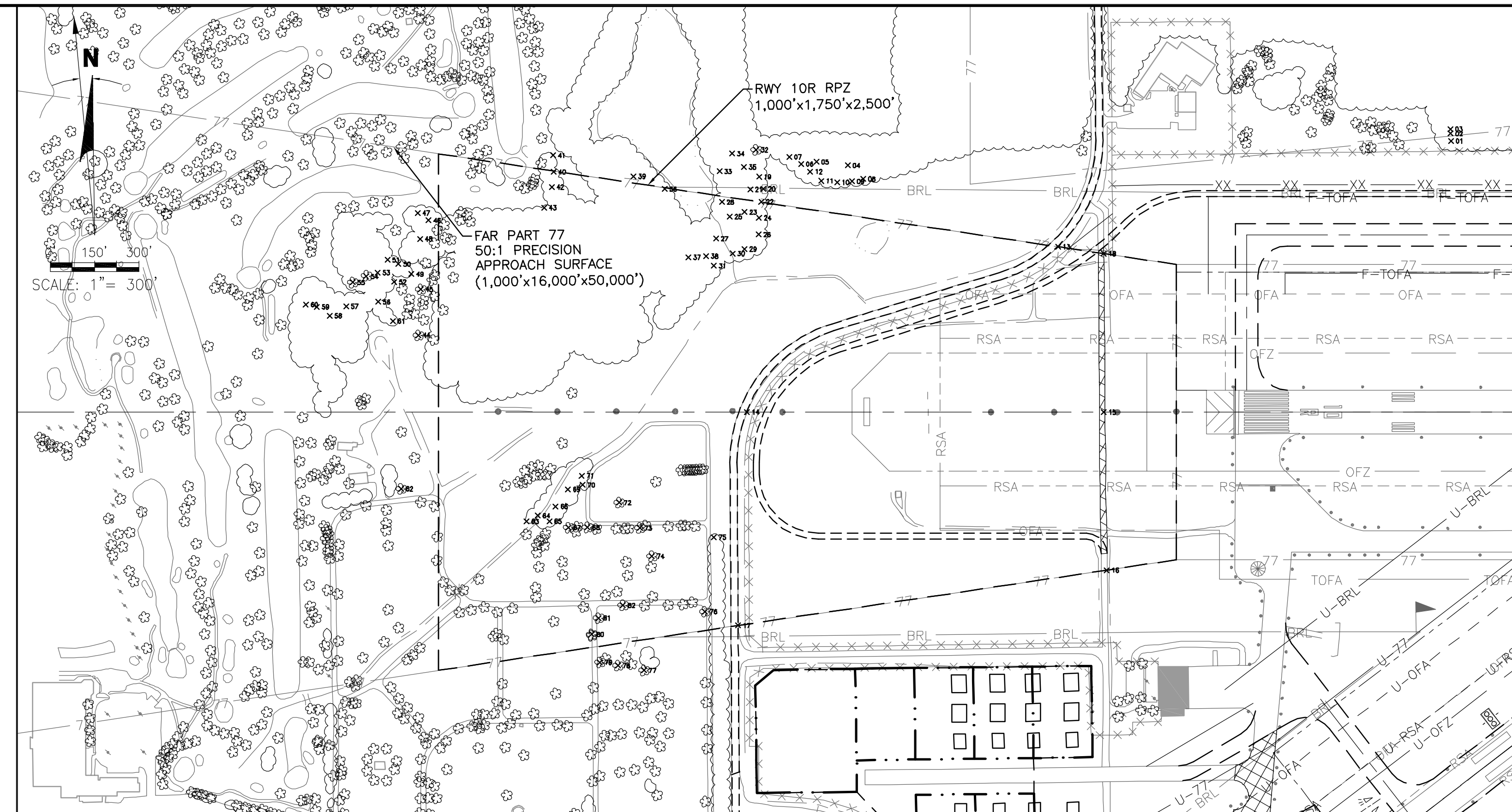
SHEET NUMBER

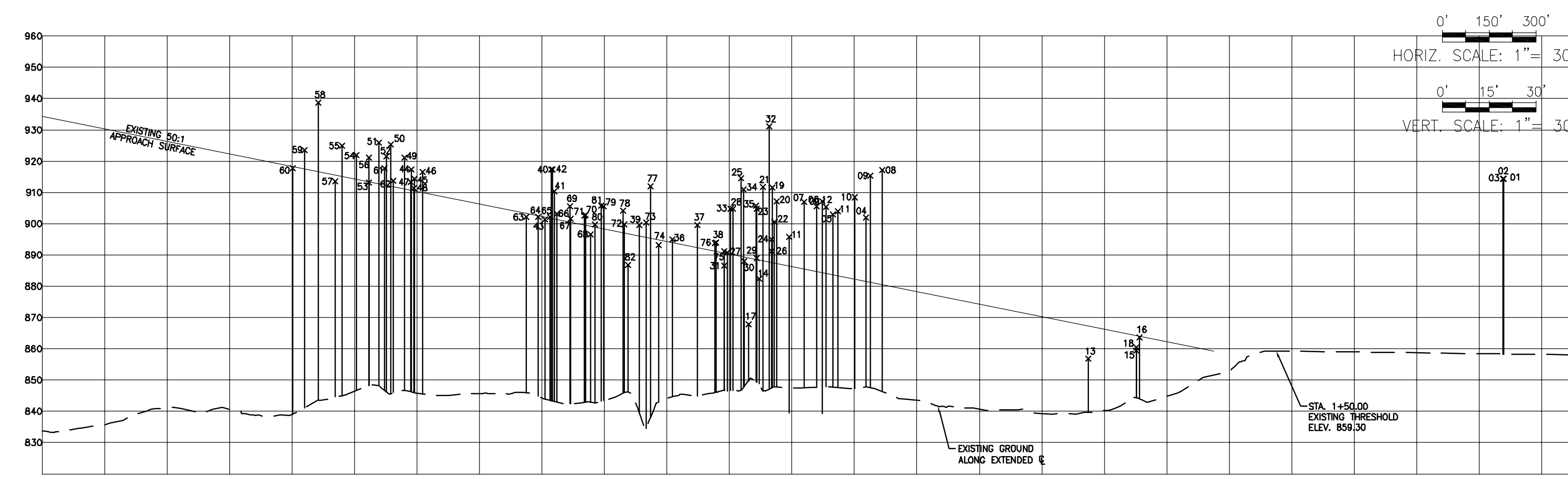
6 OF 18

19–1

EXISTING RUNWAY 10R OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	Max. Allowable Elev. Existing 50:1	Amt. of Penetration Existing 50:1	Disposition Existing 50:1
10R-1	Tree	914.3	919.1	-4.8	None
10R-2	Tree	914.3	922.7	-8.4	None
10R-3	Tree	914.3	924.8	-10.5	None
10R-4	Tree	902.0	905.6	-3.6	None
10R-5	Tree	902.9	907.2	-4.2	None
10R-6	Tree	905.6	906.1	-0.5	None
10R-7	Tree	906.9	909.5	-2.6	None
10R-8	Tree	917.2	899.2	18.0	Remove
10R-9	Tree	915.3	898.0	17.3	Remove
10R-10	Tree	908.5	897.5	11.0	Remove
10R-11	Tree	904.0	898.0	6.0	Remove
10R-12	Tree	905.3	902.5	2.8	Remove
10R-13	Road	856.8	867.3	-10.6	None
10R-14	Road	862.3	888.4	-26.1	None
10R-15	Road	859.4	864.2	-4.8	To Be Relocated
10R-16	Road	863.6	864.0	-0.4	To Be Relocated
10R-17	Road	867.9	889.0	-21.1	None
10R-18	Road	860.4	864.2	-3.8	To Be Relocated
10R-19	Tree	911.6	899.7	11.8	Remove
10R-20	Tree	907.1	893.9	13.2	Remove
10R-21	Tree	911.7	893.6	18.0	Remove
10R-22	Tree	900.6	887.7	12.9	Remove
10R-23	Tree	904.8	888.6	16.3	Remove
10R-24	Tree	894.9	887.6	7.4	Remove
10R-25	Tree	914.5	889.6	24.9	Remove
10R-26	Tree	891.2	887.6	3.5	Remove
10R-27	Tree	890.9	890.5	0.4	Remove
10R-28	Tree	904.7	890.1	14.6	Remove
10R-29	Tree	888.9	888.6	0.3	Remove
10R-30	Tree	888.0	889.4	-1.4	None
10R-31	Tree	886.7	890.6	-4.0	None
10R-32	Tree	931.1	912.8	18.3	Remove
10R-33	Tree	904.7	902.2	2.5	Remove
10R-34	Tree	911.0	910.8	0.1	Remove
10R-35	Tree	905.8	904.4	1.4	Remove
10R-36	Tree	895.0	894.0	1.0	Remove
10R-37	Tree	899.6	892.4	7.2	Remove
10R-38	Tree	894.0	891.2	2.8	Remove
10R-39	Tree	899.6	899.4	0.2	Remove
10R-40	Tree	917.4	901.5	15.9	Remove
10R-41	Tree	910.3	909.1	1.2	Remove
10R-42	Tree	917.2	901.6	15.6	Remove
10R-43	Tree	901.3	902.1	-0.8	None
10R-44	Tree	917.4	910.7	6.7	Remove
10R-45	Tree	914.3	910.5	3.8	Remove
10R-46	Tree	916.7	909.9	6.7	Remove
10R-47	Tree	913.4	910.7	2.7	Remove
10R-48	Tree	911.4	910.5	0.9	Remove
10R-49	Tree	921.1	911.1	10.0	Remove
10R-50	Tree	925.4	912.0	13.4	Remove
10R-51	Tree	925.9	912.7	13.2	Remove
10R-52	Tree	921.4	912.3	9.2	Remove
10R-53	Tree	913.1	913.4	-0.3	None
10R-54	Tree	921.9	914.2	7.7	Remove
10R-55	Tree	925.0	915.1	9.9	Remove
10R-56	Tree	921.1	913.4	7.7	Remove
10R-57	Tree	913.6	915.5	-2.0	None
10R-58	Tree	938.8	916.6	22.1	Remove
10R-59	Tree	923.5	917.5	6.0	Remove
10R-60	Tree	917.8	918.3	-0.5	None
10R-61	Tree	917.8	912.4	5.4	Remove
10R-62	Tree	913.7	911.8	1.9	Remove
10R-63	Tree	902.2	903.3	-1.1	None
10R-64	Tree	902.2	902.6	-0.4	None
10R-65	Tree	902.2	901.8	0.4	Remove
10R-66	Tree	903.1	901.3	1.8	Remove
10R-67	Tree	901.6	900.5	1.1	Remove
10R-68	Tree	896.5	899.2	-2.7	None
10R-69	Tree	905.6	900.5	5.1	Remove
10R-70	Tree	902.8	899.5	3.3	Remove
10R-71	Tree	902.6	899.6	3.0	Remove
10R-72	Tree	899.7	897.1	2.7	Remove
10R-73	Tree	900.4	895.7	4.7	Remove
10R-74	Tree	893.2	894.8	-1.6	None
10R-75	Tree	891.3	890.6	0.6	Remove
10R-76	Tree	893.8	891.2	2.6	Remove
10R-77	Tree	912.0	910.3	1.7	Remove
10R-78	Tree	904.1	907.8	-3.7	None
10R-79	Tree	905.6	906.1	-0.5	None
10R-80	Tree	899.7	898.9	0.8	Remove
10R-81	Tree	905.8	898.4	7.3	Remove
10R-82	Tree	886.9	896.8	-9.9	None





DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F-RSA	U-RSA
RUNWAY OBJECT FREE AREA	OFA	F-OFA	U-OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F-OFZ	U-OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA	U-TOFA
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS TO BE REMOVED			

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURFACE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	X	XX	XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

NOTES:

1. MALSR APPROACH LIGHTS CLEAR OF APPROACH SURFACE.

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CAPITAL REGION AIRPORT AUTHORITY

CAPITAL CITY AIRPORT

AIRPORT LAYOUT PLAN

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CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

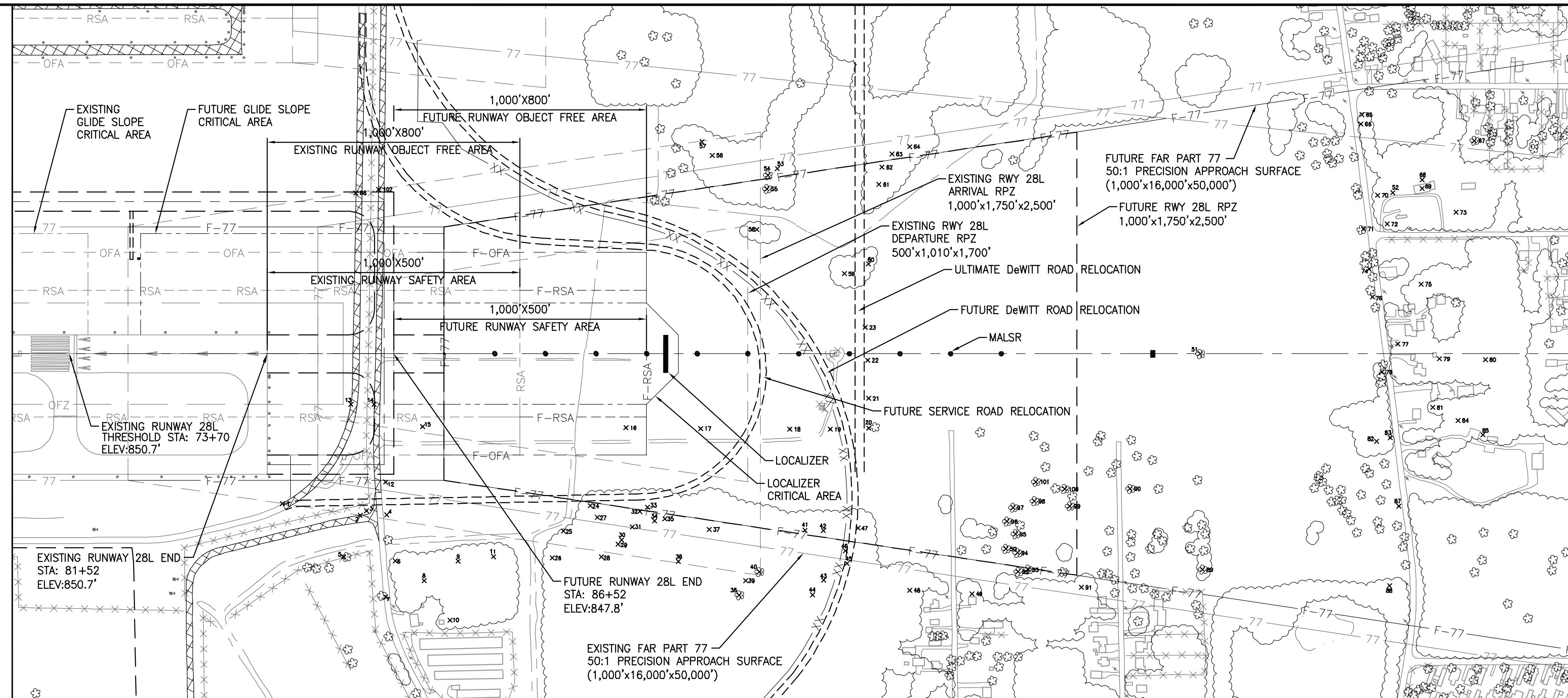
RUNWAY 10R APPROACH ZONE DRAWING (EXISTING & ULTIMATE)

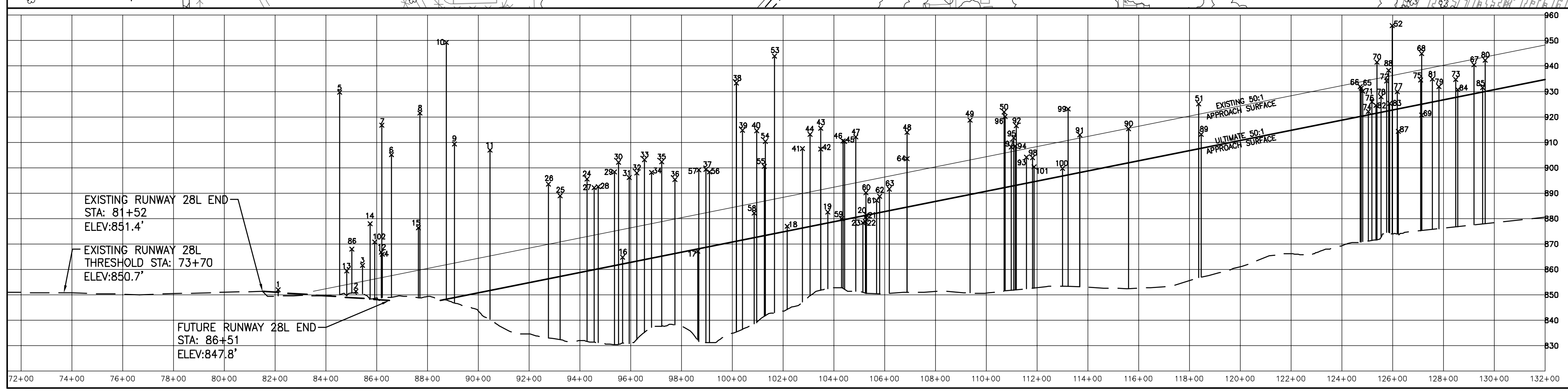
SHEET NUMBER

7 OF 18

RUNWAY 28L OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	MAX. ALLOWABLE ELEV.		AMT. OF PENETRATION		DISPOSITION	
			EXISTING 50:1	FUTURE 50:1	EXISTING 50:1	FUTURE 50:1	EXISTING 50:1	FUTURE 50:1
28L–1	ROAD	853.8	855.3	852.7	–1.5	1.1	NONE	RELOCATE
28L–2	ROAD	851.5	870.1	867.5	–18.7	–16.0	NONE	REMOVE
28L–3	POLE	861.6	867.5	864.9	–5.9	–3.3	NONE	REMOVE
28L–4	ST. LIGHT	866.0	869.8	867.3	–3.8	–1.3	NONE	REMOVE
28L–5	TREE	929.7	893.7	890.9	36.0	38.7	REMOVE	N/A
28L–6	TREE	905.2	895.8	893.3	9.4	11.8	REMOVE	N/A
28L–7	TREE	916.7	916.0	913.5	0.7	3.2	TOP	N/A
28L–8	TREE	921.5	906.7	904.4	14.8	17.1	REMOVE	N/A
28L–9	TREE	909.4	895.5	893.3	13.9	16.1	REMOVE	N/A
28L–10	TREE	949.3	928.9	926.7	20.5	22.6	REMOVE	N/A
28L–11	TREE	906.9	892.7	890.5	14.2	16.4	REMOVE	N/A
28L–12	POLE	866.8	856.1	848.8	10.7	18.0	BURY	N/A
28L–13	SERVICE ROAD	865.6	853.5	847.8	12.1	17.8	RELOCATE	REMOVE
28L–14	EX. DEWITT RD	859.9	855.3	847.8	4.6	12.1	RELOCATE	REMOVE
28L–15	POLE	876.4	859.0	847.8	17.4	28.6	BURY	REMOVE
28L–16	POLE	864.9	875.1	862.1	–10.2	2.7	NONE	REMOVE
28L–17	POLE	867.2	881.0	868.0	–13.8	–0.9	NONE	NONE
28L–18	POLE	877.0	888.0	875.1	–11.0	1.9	NONE	LOWER
28L–19	POLE	882.6	891.2	878.3	–8.6	4.3	NONE	LOWER
28L–20	POLE	881.3	894.2	881.3	–12.9	0.0	NONE	NONE
28L–21	POLE	880.5	894.2	881.3	–13.7	–0.8	NONE	NONE
28L–22	POLE	878.8	894.2	881.2	–15.4	–2.5	NONE	NONE
28L–23	POLE	878.3	894.0	881.0	–15.6	–2.7	NONE	NONE
28L–24	TREE	895.5	872.2	861.2	23.2	34.2	REMOVE	N/A
28L–25	TREE	888.9	878.0	875.8	11.0	13.1	REMOVE	N/A
28L–26	TREE	893.6	893.1	890.9	0.6	2.7	TOP	N/A
28L–27	TREE	892.2	872.8	867.7	19.4	24.5	REMOVE	N/A
28L–28	TREE	892.6	892.3	890.1	0.3	2.5	TOP	N/A
28L–29	TREE	898.4	885.0	882.8	13.4	15.5	REMOVE	N/A
28L–30	TREE	902.2	882.5	880.4	19.6	21.8	REMOVE	N/A
28L–31	TREE	896.1	875.6	873.0	20.5	23.0	REMOVE	N/A
28L–32	TREE	898.0	876.2	864.2	21.8	33.7	REMOVE	N/A
28L–33	TREE	903.1	876.8	863.8	26.3	39.2	REMOVE	N/A
28L–34	TREE	898.1	877.3	869.4	20.8	28.7	REMOVE	N/A
28L–35	TREE	902.4	878.1	868.3	24.2	34.1	REMOVE	N/A
28L–36	TREE	895.4	894.5	892.3	0.9	3.1	TOP	N/A
28L–37	TREE	899.3	881.6	874.0	17.6	25.3	REMOVE	N/A
28L–38	TREE	933.2	913.0	910.8	20.2	22.4	REMOVE	N/A
28L–39	TREE	914.6	904.8	902.6	9.8	12.0	REMOVE	N/A
28L–40	TREE	914.6	899.8	897.6	14.8	7.0	REMOVE	N/A
28L–41	TREE	907.6	889.2	876.3	18.4	31.3	REMOVE	N/A
28L–42	TREE	907.3	890.7	877.7	16.6	29.5	REMOVE	N/A
28L–43	TREE	915.6	904.2	902.0	11.4	13.6	REMOVE	N/A
28L–44	TREE	913.1	912.5	910.3	0.6	2.8	REMOVE	N/A
28L–45	TREE	910.3	894.6	892.4	15.7	17.9	REMOVE	N/A
28L–46	TREE	910.6	892.4	885.2	18.2	25.3	REMOVE	N/A
28L–47	TREE	912.1	893.4	880.5	18.7	31.7	REMOVE	N/A
28L–48	TREE	913.8	909.3	907.1	4.5	6.7	TOP	N/A
28L–49	TREE	918.8	910.9	908.7	7.8	10.0	TOP	N/A
28L–50	TREE	922.0	905.1	892.2	16.9	29.8	REMOVE	N/A
28L–51	TREE	925.1	920.4	907.5	4.7	17.6	REMOVE	N/A
28L–52	TREE	955.9	935.7	922.7	20.2	33.1	REMOVE	N/A
28L–53	TREE	943.8	887.0	878.9	56.8	64.9	REMOVE	N/A
28L–54	TREE	910.4	886.3	875.2	24.1	35.2	REMOVE	N/A
28L–55	TREE	900.5	886.2	873.3	14.3	27.3	REMOVE	N/A
28L–56	TREE	898.3	888.9	886.8	9.4	11.6	REMOVE	N/A
28L–57	TREE	899.1	896.7	894.5	2.4	4.5	TOP	N/A
28L–58	TREE	882.1	885.4	872.5	–3.3	9.6	NONE	TOP
28L–59	TREE	879.9	892.3	879.4	–12.4	0.5	NONE	TOP
28L–60	TREE	890.1	894.2	881.3	–4.1	8.8	NONE	TOP
28L–61	TREE	887.2	895.1	882.1	–7.8	5.1	NONE	TOP
28L–62	TREE	888.7	895.3	882.4	–6.6	6.3	NONE	TOP
28L–63	TREE	891.7	896.1	886.5	–4.4	5.2	NONE	TOP
28L–64	TREE	903.6	897.5	890.5	6.1	13.0	REMOVE	N/A
28L–65	TREE	931.3	933.2	920.3	–1.9	11.0	NONE	TOP
28L–66	TREE	931.8	933.1	920.2	–1.3	11.6	NONE	TOP
28L–67	TREE	940.5	942.1	929.2	–1.6	11.3	NONE	TOP
28L–68	TREE	944.9	938.0	925.0	6.9	19.8	REMOVE	N/A
28L–69	CHIMNEY	920.7	938.0	925.1	–17.3	–4.4	NONE	NONE
28L–70	TREE	941.5	934.4	921.5	7.0	20.0	REMOVE	N/A
28L–71	POLE	930.1	933.3	920.4	–3.3	9.7	NONE	LOWER
28L–72	TREE	934.1	935.2	922.3	–1.1	11.8	NONE	TOP
28L–73	TREE	934.8	940.6	927.7	–5.8	7.1	NONE	TOP
28L–74	POLE	922.2	933.8	920.9	–11.6	1.3	NONE	LOWER
28L–75	TREE	934.4	937.9	925.0	–3.5	9.5	NONE	TOP
28L–76	POLE	925.8	934.0	921.1	–8.2	4.7	NONE	LOWER
28L–77	TREE	930.0	936.1	923.1	–6.1	6.8	NONE	TOP
28L–78	POLE	927.9	934.8	921.9	–6.9	6.0	NONE	LOWER
28L–79	TREE	932.0	939.3	926.4	–7.4	5.6	NONE	TOP
28L–80	TREE	942.4	943.0	930.0	–0.6	12.4	NONE	TOP
28L–81	TREE	934.8	938.8	925.9	–4.0	9.0	NONE	TOP
28L–82	TREE	924.6	934.4	921.5	–9.8	3.1	NONE	TOP
28L–83	POLE	925.3	935.4	922.5	–10.1	2.8	NONE	LOWER
28L–84	TREE	930.7	940.8	927.9	–10.1	2.8	NONE	TOP
28L–85	TREE	931.4	942.8	929.8	–11.3	1.6	NONE	TOP
28L–86	SERVICE ROAD	868.0	853.7	850.9	14.3	17.1	RELOCATE	N/A
28L–87	TREE	914.4	936.1	923.2	–21.7	–8.8	NONE	NONE
28L–88	POLE	938.4	935.4	922.5	3.0	15.9	LOWER	LOWER
28L–89	TREE	913.2	920.6	907.7	–7.4	5.5	NONE	TOP
28L–90	TREE	915.2	914.9	902.0	0.3	13.3	TOP	N/A
28L–91	TREE	912.8	911.0	904.5	1.8	8.3	TOP	N/A
28L–92	TREE	916.6	906.1	896.1	10.5	20.4	REMOVE	N/A





RUNWAY 28L OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	MAX. ALLOWABLE ELEV.		AMT. OF PENETRATION		DISPOSITION	
			EXISTING 50:1	FUTURE 50:1	EXISTING 50:1	FUTURE 50:1	EXISTING 50:1	FUTURE 50:1
28L–93	TREE	904.2	906.8	894.8	–2.6	9.4	NONE	TOP
28L–94	TREE	908.4	906.0	893.1	2.5	15.4	REMOVE	N/A
28L–95	TREE	911.8	905.8	892.9	5.9	18.9	REMOVE	N/A
28L–96	TREE	920.1	905.2	892.2	14.9	27.8	REMOVE	N/A
28L–97	TREE	908.1	905.7	892.7	2.4	15.4	REMOVE	N/A
28L–98	TREE	903.9	907.3	894.4	–3.4	9.5	NONE	TOP
28L–99	TREE	923.2	910.1	897.2	13.1	26.0	REMOVE	N/A
28L–100	TREE	899.7	909.7	896.8	–10.0	2.9	NONE	TOP
28L–101	TREE	900.3	907.4	894.5	–7.1	5.8	NONE	TOP
28L–102	EX DEWITT RD	870.7	855.5	852.9	15.2	17.7	RELOCATE	N/A
28L–103	ULT DEWITT RD	853.0	893.2	880.3	–40.2	–27.3	NONE	NONE
28L–104	FUT DEWITT RD	853.3	871.8	858.9	–18.5	–5.6	NONE	NONE
28L–105	FUT SERVICE RD	854.8	862.2	849.3	–7.4	5.5	NONE	RELOCATE
28L–106	UTL DEWITT RD	853.0	893.2	880.2	–40.2	–27.2	NONE	NONE
28L–107	FUT DEWITT RD	852.0	889.9	877.0	–37.9	–25.0	NONE	NONE
28L–108	FUT SERVICE RD	853.2	885.6	872.6	–32.4	–19.4	NONE	NONE
28L–109	FUT DEWITT RD	860.0	892.7	879.8	–32.7	–19.8	NONE	NONE
28L–110	FUT SERVICE RD	851.5	868.8	855.9	–17.3	–4.4	NONE	NONE

N

0' 150' 300'
SCALE: 1"= 300'

0' 15' 30'
VERT. SCALE: 1"= 30'

NOTES:

1. DESCRIPTION TABLE ALSO APPLIES TO SHEETS 9 AND 10.
2. THE FUTURE AND ULTIMATE DEWITT ROAD RELOCATIONS WILL REMAIN CLEAR OF THE F.A.R. PART 77 SURFACES.
3. RWY 28L APPROACH AVIGATION EASEMENT ACQUISITIONS WILL BE NEEDED WITH FUTURE RUNWAY EXTENSION. REQUIREMENTS TO BE DEFINED THROUGH SUBSEQUENT 405 SURVEY.
4. EXISTING AND FUTURE MALSR APPROACH LIGHTS CLEAR OF APPROACH SURFACE.

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F–RSA	U–RSA
RUNWAY OBJECT FREE AREA	OFA	F–OFA	U–OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F–OFZ	U–OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F–TOFA	U–TOFA
BUILDING RESTRICTION LINE	BRL	F–BRL	U–BRL
PRIMARY SURFACE	77	F–77	U–77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON–AIRPORT BUILDINGS			
NON–AIRPORT BUILDINGS TO BE REMOVED			
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURFACE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	X	XX	XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

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AIRPORT LAYOUT PLAN

CONSULTANTS

AIRPORTS • ARCHITECTURE
R.W. ARMSTRONG
EST. 1961
ENVIRONMENTAL • TRANSPORTATION
Union Station 300 South Meridian Street Indianapolis, Indiana 46225 (317)786-0461

CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

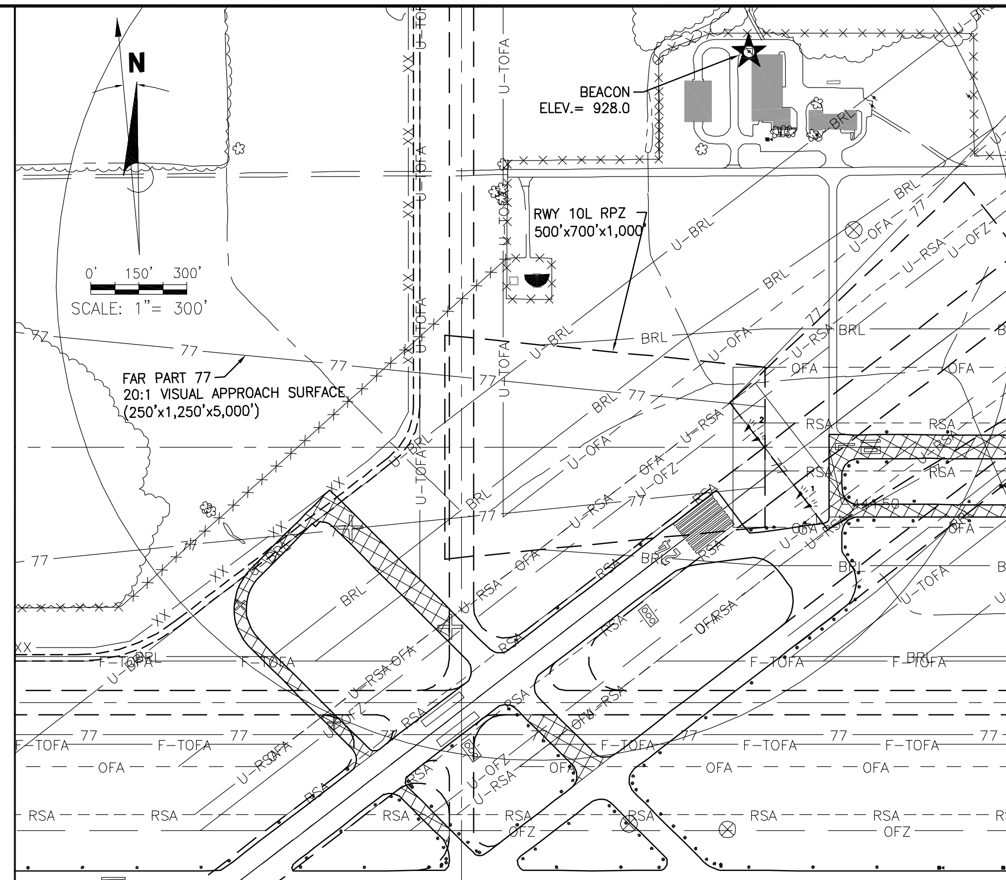
RUNWAY 28L APPROACH ZONE DRAWING (EXISTING, FUTURE & ULTIMATE)

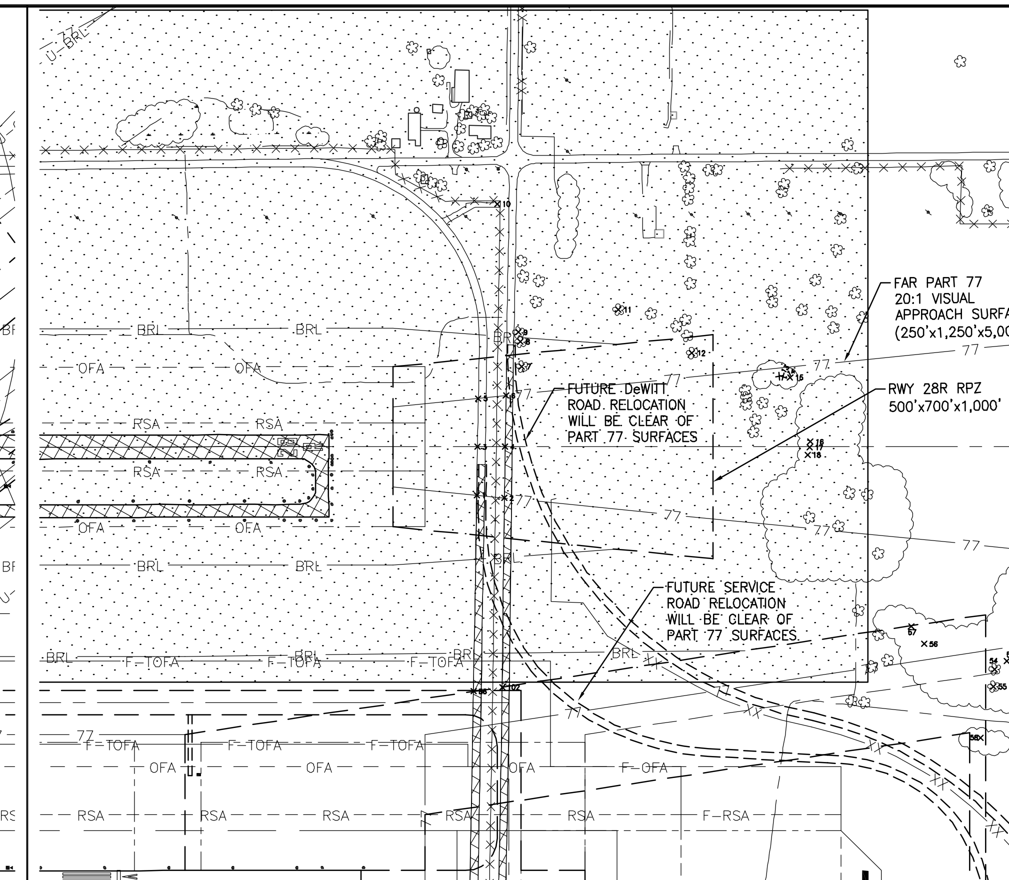
SHEET NUMBER

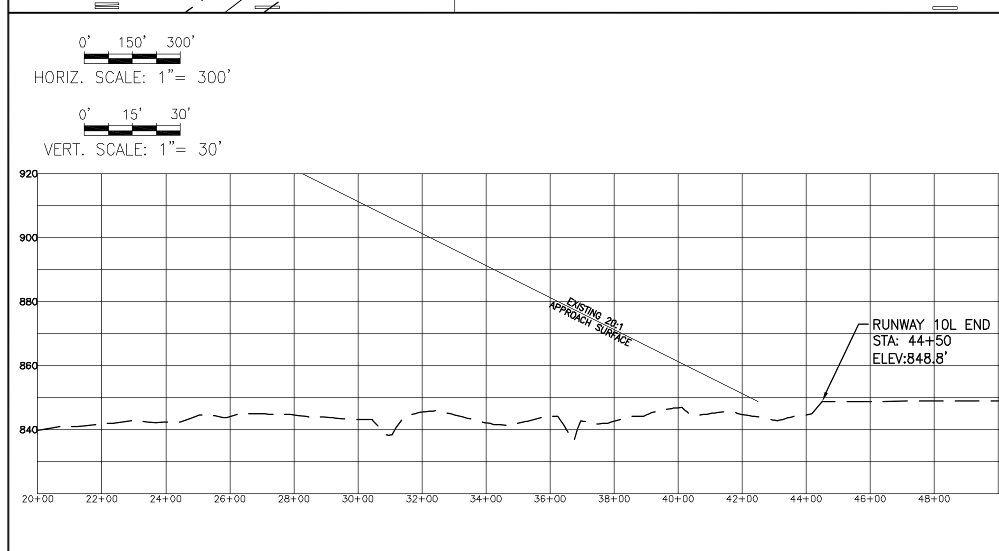
8 OF 18

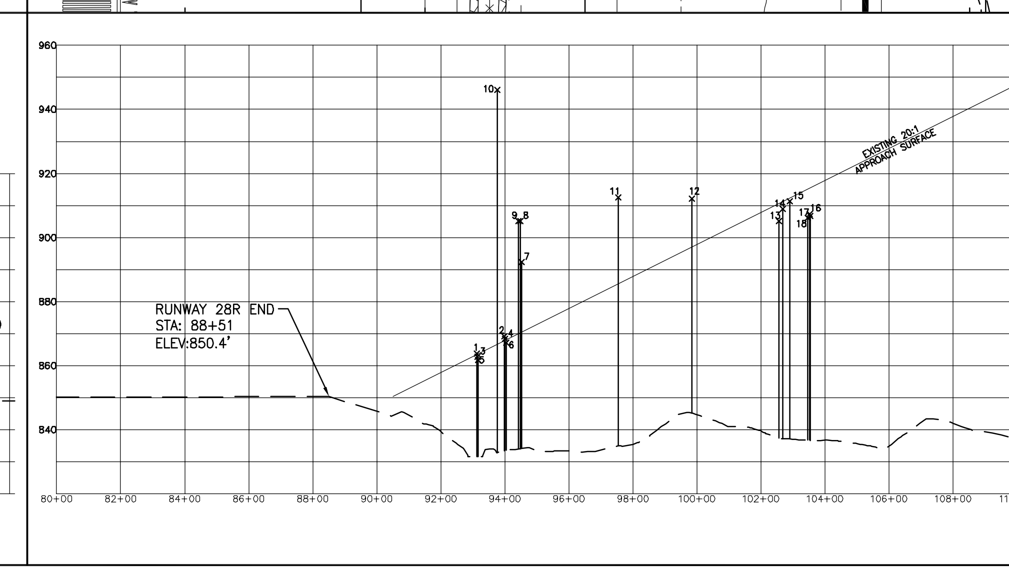
19–1

DESCRIPTION	EXISTING
PROPERTY LINE	— — —
RUNWAY SAFETY AREA	— RSA —
RUNWAY OBJECT FREE AREA	— OFA —
RUNWAY OBSTACLE FREE ZONE	— OFZ —
RUNWAY PROTECTION ZONE	— — — —
TAXIWAY OBJECT FREE AREA	— TOFA —
BUILDING RESTRICTION LINE	— BRL —
PRIMARY SURFACE	— 77 —
AIRFIELD PAVEMENT	——
AIRPORT BUILDINGS	(shaded)
NON-AIRPORT BUILDINGS	(outline)
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)	●
ASR (AIRPORT SURVEILLANCE RADAR)	◒
REIL (RUNWAY END IDENTIFIER LIGHT)	
VASI (VISUAL APPROACH SLOPE INDICATOR)	
ARP (AIRPORT REFERENCE POINT)	⊗
BEACON	☆
WINDSOCK	
TREES	
FENCE	— x —
COMPASS CALIBRATION PAD	
UTILITY POLE	
APPROACH LIGHT	●









EXISTING RUNWAY 10L OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	Max. Allowable Elev. Existing 20:1	Amt. of Penetration Existing 20:1	Disposition Existing 20:1
10L–1	RWY 24 L REIL	850.9	848.8	1.1	Fixed by Function
10L–2	RWY 24 R REIL	850.9	848.8	1.1	Fixed by Function

EXISTING RUNWAY 28R OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	Max. Allowable Elev. Existing 20:1	Amt. of Penetration Existing 20:1	Disposition Existing 20:1
28R–1	Road	863.8	863.4	0.3	Relocate
28R–2	Road	869.2	867.8	1.4	Relocate
28R–3	Road	862.8	863.6	–0.8	None
28R–4	Road	868.4	867.9	0.5	Relocate
28R–5	Road	861.9	863.7	–1.9	None
28R–6	Road	867.1	868.0	–0.9	None
28R–7	Tree	892.3	882.8	9.5	Remove
28R–8	Tree	905.2	893.8	11.4	Remove
28R–9	Tree	905.2	897.7	7.5	Remove
28R–10	Tree	946.1	952.7	–6.5	None
28R–11	Tree	912.6	918.9	–6.4	None
28R–12	Tree	912.1	907.9	4.2	Remove
28R–13	Tree	905.2	910.7	–5.6	None
28R–14	Tree	909.0	911.3	–2.3	None
28R–15	Tree	911.4	912.4	–1.0	None
28R–16	Tree	906.7	915.5	–8.8	None
28R–17	Tree	907.4	915.4	–8.0	None
28R–18	Tree	906.0	915.1	–9.1	None
28R–19	L REIL	848.2			
28R–20	R REIL	848.2			

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

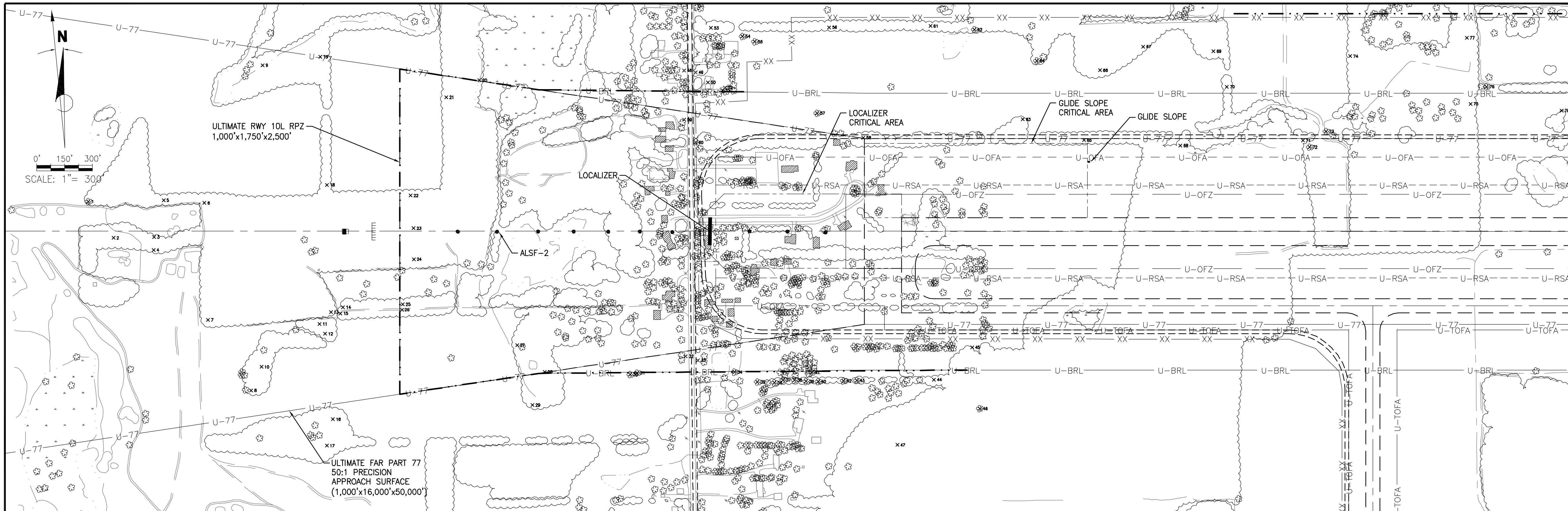
SHEET TITLE

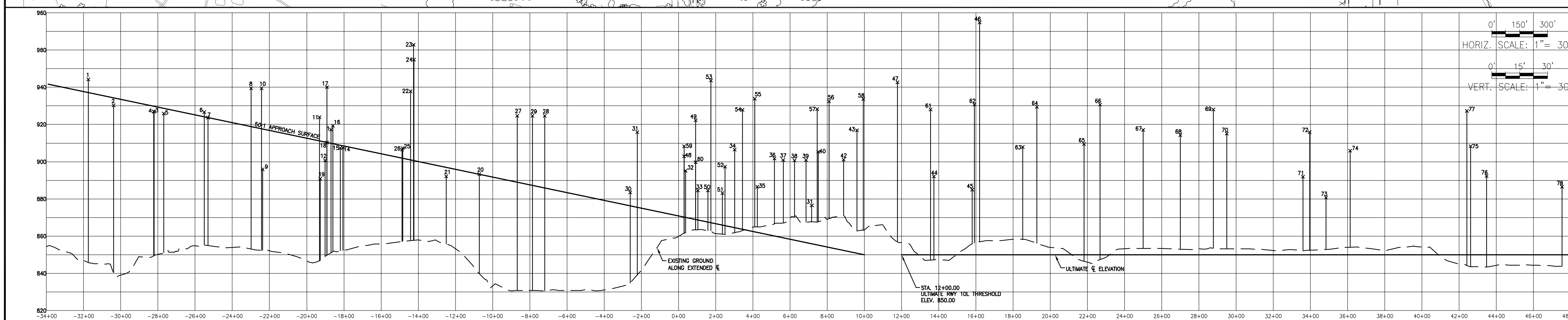
RUNWAY 10L-28R APPROACH ZONE DRAWING (EXISTING)

SHEET NUMBER

9 OF 18

19–1





ULTIMATE RUNWAY 10L OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
10L–1	Tree	944.3	933.5	10.8	Top/Remove
10L–2	Tree	930.2	930.8	–0.6	None
10L–3	Tree	926.9	926.4	0.5	Top/Remove
10L–4	Tree	927.2	926.4	0.7	Top/Remove
10L–5	Tree	925.9	925.4	0.5	Top/Remove
10L–6	Tree	926.7	921.0	5.7	Top/Remove
10L–7	Tree	923.7	920.6	3.1	Top/Remove
10L–8	Tree	939.6	916.0	23.6	Top/Remove
10L–9	Tree	915.8	914.7	1.1	Top/Remove
10L–10	Tree	939.6	914.9	24.7	Top/Remove
10L–11	Tree	923.9	908.6	15.3	Top/Remove
10L–12	Tree	900.8	873.8	27.0	Top/Remove
10L–13	Tree	917.4	907.4	10.0	Top/Remove
10L–14	Tree	907.6	873.7	33.9	Top/Remove
10L–15	Tree	907.3	906.4	0.9	Top/Remove
10L–16	Tree	919.2	919.0	0.2	Top/Remove
10L–17	Tree	940.1	939.5	0.6	Top/Remove
10L–18	Tree	910.3	907.8	2.5	Top/Remove
10L–19	Tree	910.9	908.5	2.4	Top/Remove
10L–20	Tree	893.4	891.6	1.7	Top/Remove
10L–21	Tree	892.1	895.0	–2.8	None

ULTIMATE RUNWAY 10L OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
10L–22	Tree	938.0	898.8	39.1	Top/Remove
10L–23	Tree	962.8	898.5	64.4	Top/Remove
10L–24	Tree	954.9	898.5	56.4	Top/Remove
10L–25	Tree	907.3	899.7	7.6	Top/Remove
10L–26	Tree	906.5	899.7	6.8	Top/Remove
10L–27	Tree	924.7	887.4	37.3	Top/Remove
10L–28	Tree	924.7	884.4	40.3	Top/Remove
10L–29	Tree	924.7	909.6	15.1	Top/Remove
10L–30	Tree	883.5	886.9	–3.4	None
10L–31	Tree	915.9	885.7	30.2	Top/Remove
10L–32	Pole	895.2	873.3	21.9	Remove
10L–33	Pole	884.6	876.5	8.1	Remove
10L–34	Tree	906.6	885.8	20.8	Top/Remove
10L–35	Tree	886.6	893.6	–7.1	None
10L–36	Tree	901.6	894.3	7.3	Top/Remove
10L–37	Tree	901.0	892.3	8.7	Top/Remove
10L–38	Tree	900.8	892.4	8.4	Top/Remove
10L–39	Tree	900.7	893.5	7.1	Top/Remove
10L–40	Tree	905.3	893.7	11.6	Top/Remove
10L–41	Tree	876.6	886.7	–10.1	None
10L–42	Tree	901.2	893.5	7.7	Top/Remove

ULTIMATE RUNWAY 10L OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
10L–43	Tree	916.9	893.3	23.6	Top/Remove
10L–44	Tree	892.0	892.6	–0.6	None
10L–45	Tree	884.9	867.8	17.2	Top/Remove
10L–46	Tree	974.8	914.9	59.9	Top/Remove
10L–47	Tree	942.6	942.8	–0.2	None
10L–48	Pole	902.9	900.8	2.1	Remove
10L–49	Pole	922.4	899.4	22.9	Remove
10L–50	Building	884.3	891.8	–7.5	None
10L–51	Building	883.1	885.9	–2.8	None
10L–52	Pole	897.3	888.0	9.3	Remove
10L–53	Tree	943.7	933.6	10.0	Top/Remove
10L–54	Tree	927.9	927.4	0.5	Top/Remove
10L–55	Tree	934.0	923.4	10.6	Top/Remove
10L–56	Tree	932.6	935.1	–2.5	None
10L–57	Tree	928.3	869.0	59.2	Top/Remove
10L–58	Tree	933.7	850.5	83.2	Top/Remove
10L–59	Pole	908.3	869.4	38.9	Remove
10L–60	Pole	899.7	868.2	31.6	Remove
10L–61	Tree	928.2	936.2	–8.1	None
10L–62	Tree	930.7	933.5	–2.8	None
10L–63	Tree	908.0	864.6	43.4	Top/Remove

ULTIMATE RUNWAY 10L OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
10L–64	Tree	929.5	909.6	19.9	Top/Remove
10L–65	Tree	909.5	850.0	59.5	Top/Remove
10L–66	Tree	930.7	902.3	28.4	Top/Remove
10L–67	Tree	917.0	920.5	–3.5	None
10L–68	Tree	914.2	850.0	64.2	Top/Remove
10L–69	Tree	928.0	916.9	11.1	Top/Remove
10L–70	Tree	915.1	889.6	25.5	Top/Remove
10L–71	Tree	892.0	850.0	42.0	Top/Remove
10L–72	Tree	915.9	850.0	65.9	Top/Remove
10L–73	Tree	880.7	855.3	25.4	Top/Remove
10L–74	Tree	906.0	913.2	–7.2	None
10L–75	Tree	908.4	876.5	31.8	Top/Remove
10L–76	Tree	892.3	889.6	2.6	Top/Remove
10L–77	Tree	927.3	927.2	0.1	Top/Remove
10L–78	Tree	886.5	871.3	15.2	Top/Remove

NOTE:

1. ULTIMATE GROUND CONTOURS WILL BE GRADED IN ACCORDANCE WITH FAA STANDARDS.
2. ULTIMATE APPROACH LIGHT SYSTEM AND NAVIGATIONAL AIDS TO REMAIN CLEAR OF PART 77 SURFACE.

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

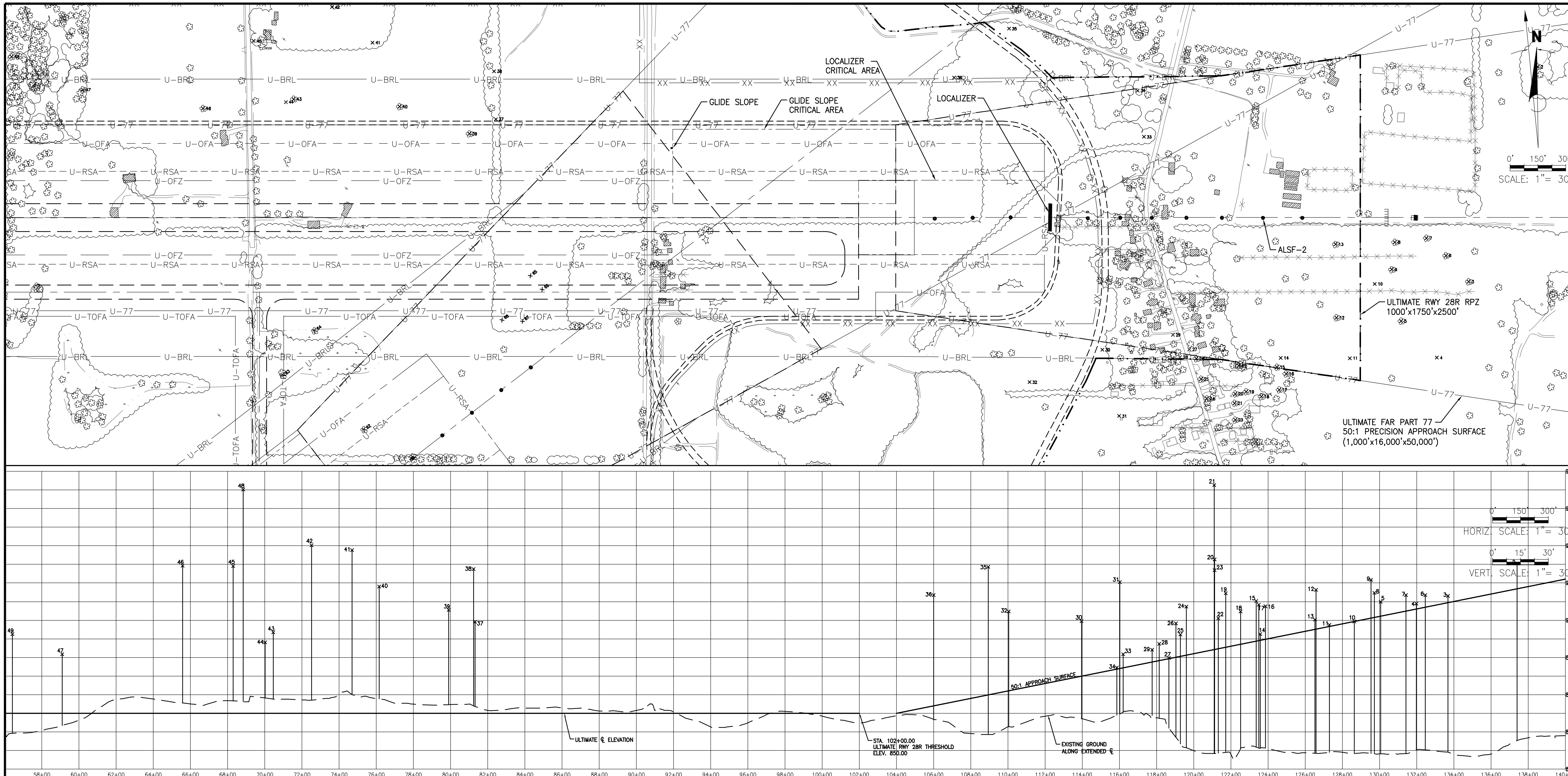
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

RUNWAY 10L APPROACH ZONE DRAWING (ULTIMATE)

SHEET NUMBER
10 OF 18

19-1



ULTIMATE RUNWAY 28R OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
28R-1	Tree	929.8	931.2	-1.4	None
28R-2	Tree	930.5	919.1	11.4	Top/Remove
28R-3	Tree	913.0	911.7	1.4	Top/Remove
28R-4	Tree	908.9	908.2	0.6	Top/Remove
28R-5	Tree	909.9	904.4	5.5	Top/Remove
28R-6	Tree	913.6	909.2	4.4	Top/Remove
28R-7	Tree	913.4	907.1	6.3	Top/Remove
28R-8	Tree	914.8	903.7	11.1	Top/Remove
28R-9	Tree	921.6	903.4	18.2	Top/Remove
28R-10	Tree	899.3	901.6	-2.3	None
28R-11	Tree	897.6	898.9	-1.3	None
28R-12	Tree	916.3	897.4	18.8	Top/Remove
28R-13	Tree	900.3	897.3	3.0	Top/Remove
28R-14	Tree	892.5	891.4	1.0	Top/Remove
28R-15	Tree	910.3	891.0	19.2	Top/Remove
28R-16	Tree	907.5	895.7	11.8	Top/Remove
28R-17	Tree	908.4	908.1	0.3	Top/Remove
28R-18	Tree	904.6	913.5	-8.8	None
28R-19	Tree	914.6	909.8	4.8	Top/Remove

ULTIMATE RUNWAY 28R OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
28R-20	Tree	932.6	911.5	21.1	Top/Remove
28R-21	Tree	952.7	918.7	34.0	Top/Remove
28R-22	Tree	901.1	890.0	11.1	Top/Remove
28R-23	Tree	927.0	931.5	-4.5	None
28R-24	Tree	907.3	915.5	-8.2	None
28R-25	Tree	892.2	900.4	-8.2	None
28R-26	Tree	898.3	884.8	13.4	Top/Remove
28R-27	Pole	879.7	881.6	-1.9	None
28R-28	Pole	887.3	883.7	3.6	Remove
28R-29	Pole	884.1	879.8	4.3	Remove
28R-30	Tree	899.5	878.7	20.8	Top/Remove
28R-31	Tree	920.5	929.4	-9.0	None
28R-32	Tree	904.6	904.1	0.5	Top/Remove
28R-33	Tree	881.7	876.7	5.0	Top/Remove
28R-34	Tree	874.6	876.0	-1.4	None
28R-35	Tree	928.6	922.7	5.9	Top/Remove
28R-36	Tree	913.5	885.5	28.0	Top/Remove
28R-37	Tree	899.2	854.0	45.1	Top/Remove
28R-38	Tree	927.6	890.8	36.8	Top/Remove
28R-39	Tree	905.4	850.0	55.4	Top/Remove
28R-40	Tree	918.1	863.6	54.4	Top/Remove

ULTIMATE RUNWAY 28R OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
28R-41	Tree	937.7	912.7	24.9	Top/Remove
28R-42	Tree	940.3	940.1	0.2	Top/Remove
28R-43	Tree	893.5	869.4	24.1	Top/Remove
28R-44	Pole	888.1	867.2	20.9	Remove
28R-45	Tree	929.0	914.1	14.9	Top/Remove
28R-46	Tree	929.3	862.2	67.1	Top/Remove
28R-47	Tree	881.7	876.7	5.0	Top/Remove
28R-48	Tree	950.3	948.8	1.5	Top/Remove
28R-49	Tree	892.4	902.0	-9.5	None

NOTE:

1. ULTIMATE GROUND CONTOURS WILL BE GRADED IN ACCORDANCE WITH FAA STANDARDS.
2. ULTIMATE APPROACH LIGHT SYSTEM AND NAVIGATIONAL AIDS TO REMAIN CLEAR OF PART 77 SURFACE.

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F-RSA	U-RSA
RUNWAY OBJECT FREE AREA	OFA	F-OFA	U-OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F-OFZ	U-OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA	U-TOFA
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS TO BE REMOVED			
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURVEILLANCE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	x	XX	XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

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AIRPORT LAYOUT PLAN

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AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

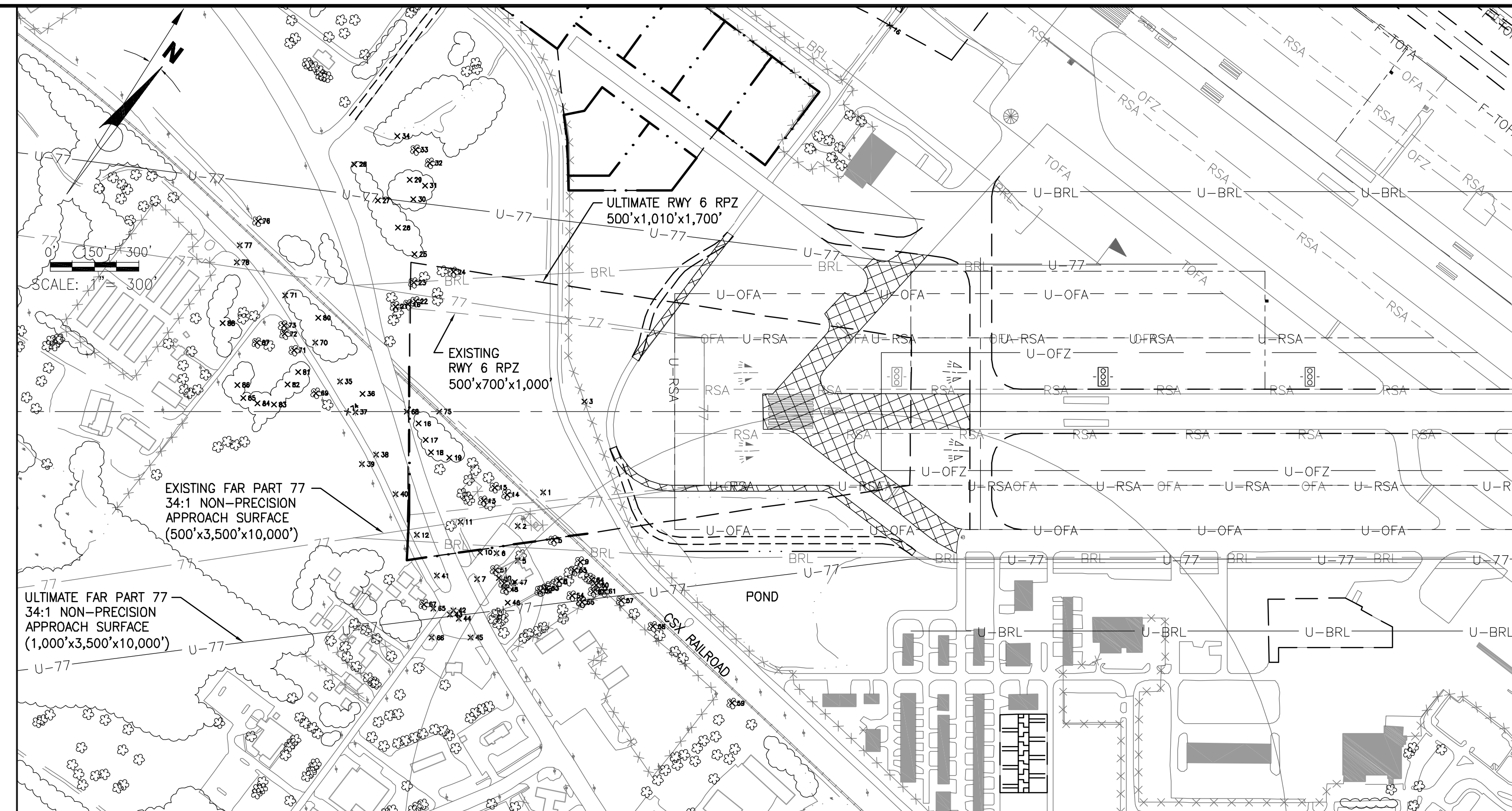
SHEET TITLE

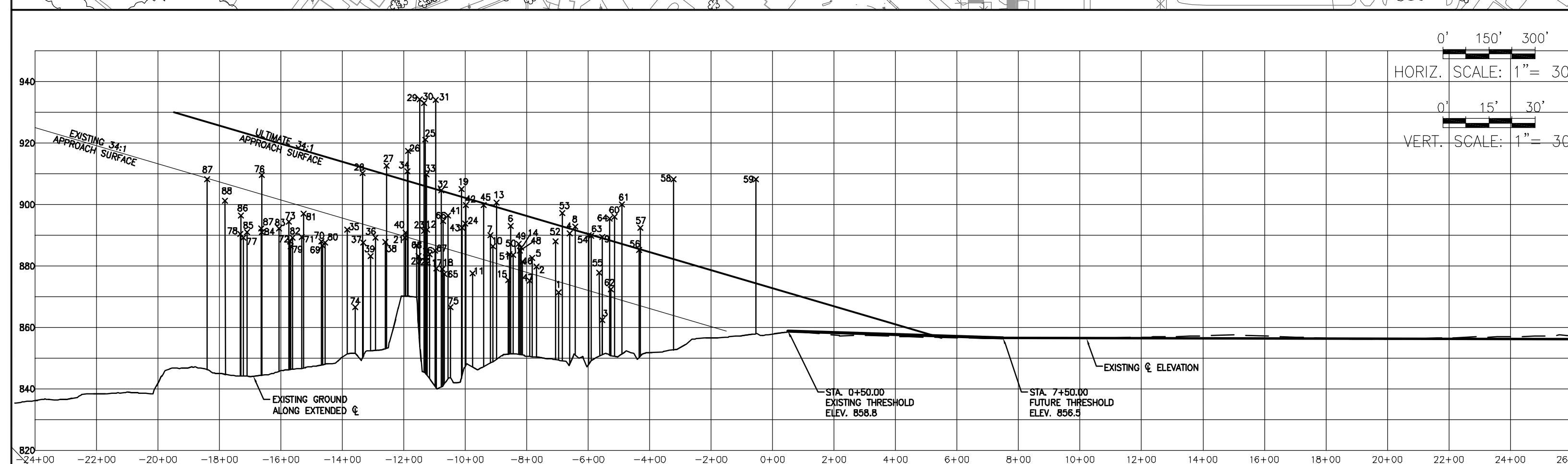
RUNWAY 28R APPROACH ZONE DRAWING (ULTIMATE)

SHEET NUMBER

EXISTING RUNWAY 6 OBSTRUCTIONS SUMMARY TABLE

Item No.	Object	Object Elevation	MAX. ALLOWABLE ELEVATION Existing 34:1	MAX. ALLOWABLE ELEVATION FUTURE 34:1	AMOUNT OF PENETRATION EXISTING 34:1	AMOUNT OF PENETRATION FUTURE 34:1	DISPOSITION EXISTING 34:1	DISPOSITION FUTURE 34:1
6-1	POLE	871.4	874.8		-3.4		NONE	NONE
6-2	POLE	879.9	883.6		-3.7		NONE	NONE
6-3	FENCE	862.4	870.7		-8.3		NONE	NONE
6-4	TREE	890.6	889.5		1.1		TOP	REMOVE
6-5	POLE	882.6	900.5		-17.9		NONE	NONE
6-6	POLE	893.0	897.3		-4.3		NONE	LOWER
6-7	POLE	890.1	910.3		-20.2		NONE	LOWER
6-8	TREE	892.8	909.1		-16.4		NONE	REMOVE
6-9	TREE	889.6	899.2		-9.8		NONE	REMOVE
6-10	POLE	886.4	897.3		-10.9		NONE	LOWER
6-11	POLE	877.6	883.2		-5.6		NONE	NONE
6-12	POLE	891.8	890.7		1.1		LOWER	LOWER
6-13	TREE	900.6	880.8		19.8		TOP	REMOVE
6-14	TREE	886.1	878.4		7.6		TOP	REMOVE
6-15	TREE	875.5	879.7		-4.2		NONE	NONE
6-16	TREE	883.7	887.2		-3.5		NONE	NONE
6-17	TREE	879.2	886.6		-7.3		NONE	NONE
6-18	TREE	879.0	886.0		-7.0		NONE	NONE
6-19	TREE	900.0	884.2		15.8		TOP	REMOVE
6-20	TREE	883.2	888.3		-5.1		NONE	NONE
6-21	TREE	889.2	889.6		-0.3		NONE	NONE
6-22	TREE	882.9	887.6		-4.7		NONE	NONE
6-23	TREE	891.5	893.4		-2.0		NONE	REMOVE
6-24	TREE	893.8	897.5		-3.7		NONE	REMOVE
6-25	TREE	921.1	907.2		14.0		TOP	REMOVE
6-26	TREE	917.5	920.4		-3.0		NONE	REMOVE
6-27	TREE	912.6	934.1		-21.6		NONE	REMOVE
6-28	TREE	910.2	952.4		-42.2		NONE	REMOVE
6-29	TREE	934.2	943.3		-9.2		NONE	REMOVE
6-30	TREE	933.1	933.8		-0.7		NONE	REMOVE
6-31	TREE	934.0	940.2		-6.2		NONE	REMOVE
6-32	TREE	904.7	950.9		-46.2		NONE	REMOVE
6-33	TREE	909.8	957.7		-48.0		NONE	REMOVE
6-34	TREE	910.9	964.8		-53.9		NONE	NONE
6-35	POLE	891.9	895.1		-3.2		NONE	NONE
6-36	BILLBOARD	889.3	892.4		-3.1		NONE	NONE
6-37	POLE	887.6	893.6		-6.0		NONE	NONE
6-38	POLE	887.8	891.5		-3.7		NONE	NONE
6-39	POLE	883.3	892.9		-9.6		NONE	NONE
6-40	POLE	890.8	889.5		1.2		LOWER	NONE
6-41	POLE	896.5	909.8		-13.4		NONE	LOWER
6-42	POLE	899.8	926.0		-26.3		NONE	LOWER
6-43	POLE	892.4	928.2		-35.9		NONE	LOWER
6-44	POLE	895.7	930.0		-34.4		NONE	LOWER
6-45	POLE	899.8	938.8		-39.0		NONE	LOWER
6-46	BILLBOARD	881.5	921.0		-39.5		NONE	NONE
6-47	POLE	875.1	910.9		-35.8		NONE	NONE
6-48	TREE	885.1	914.5		-29.5		NONE	REMOVE
6-49	TREE	887.2	911.7		-24.4		NONE	REMOVE
6-50	POLE	883.5	909.3		-25.7		NONE	NONE
6-51	TREE	883.9	905.5		-21.6		NONE	NONE
6-52	TREE	888.1	914.3		-26.2		NONE	REMOVE
6-53	TREE	897.2	912.9		-15.7		NONE	REMOVE
6-54	TREE	890.1	915.8		-25.7		NONE	REMOVE
6-55	TREE	877.8	918.7		-40.9		NONE	NONE
6-56	POLE	885.1	920.2		-35.0		NONE	LOWER
6-57	TREE	892.5	916.9		-24.3		NONE	REMOVE
6-58	TREE	908.3	928.6		-20.3		NONE	REMOVE
6-59	TREE	908.3	964.4		-56.1		NONE	NONE
6-60	TREE	896.1	910.0		-13.9		NONE	REMOVE
6-61	TREE	900.0	912.8		-12.8		NONE	REMOVE
6-62	TREE	872.3	913.3		-41.0		NONE	NONE
6-63	TREE	889.8	903.4		-13.6		NONE	REMOVE
6-64	TREE	895.4	907.6		-12.2		NONE	REMOVE
6-65	POLE	877.4	925.7		-48.3		NONE	NONE
6-66	POLE	894.7	940.0		-45.3		NONE	LOWER
6-67	TREE	885.0	924.0		-39.0		NONE	NONE
6-68	ROAD	886.9	888.5		-1.6		NONE	NONE
6-69	TREE	886.6	897.5		-10.9		NONE	NONE
6-70	POLE	888.0	897.6		-9.6		NONE	NONE
6-71	TREE	889.5	899.7		-10.2		NONE	NONE
6-72	TREE	888.1	900.6		-12.5		NONE	NONE
6-73	TREE	894.5	900.7		-6.2		NONE	NONE
6-74	ROAD	866.6	894.3		-27.7		NONE	NONE
6-75	RAILROAD	866.7	950.8		-84.1		NONE	NONE
6-76	TREE	909.7	927.5		-17.8		NONE	REMOVE
6-77	POLE	889.2	916.2		-27.0		NONE	NONE
6-78	POLE	890.4	908.0		-17.7		NONE	NONE
6-79	POLE	886.5	900.5		-14.0		NONE	NONE
6-80	TREE	887.7	897.2		-9.6		NONE	NONE
6-81	TREE	897.0	899.3		-2.3		NONE	NONE
6-82	TREE	889.1	900.3		-11.2		NONE	NONE
6-83	TREE	892.3	901.7		-9.4		NONE	NONE
6-84	TREE	891.0	903.3		-12.3		NONE	NONE
6-85	TREE	891.0	904.7		-13.7		NONE	NONE
6-86	TREE	896.3	905.3		-9.0		NONE	NONE
6-87	TREE	892.2	903.3		-11.2		NONE	NONE
6-88	TREE	901.2	906.8		-5.6		NONE	NONE





DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F-RSA	U-RSA
RUNWAY OBJECT FREE AREA	OFA	F-OFA	U-OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F-OFZ	U-OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA	U-TOFA
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURVEILLANCE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	X	XX	XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

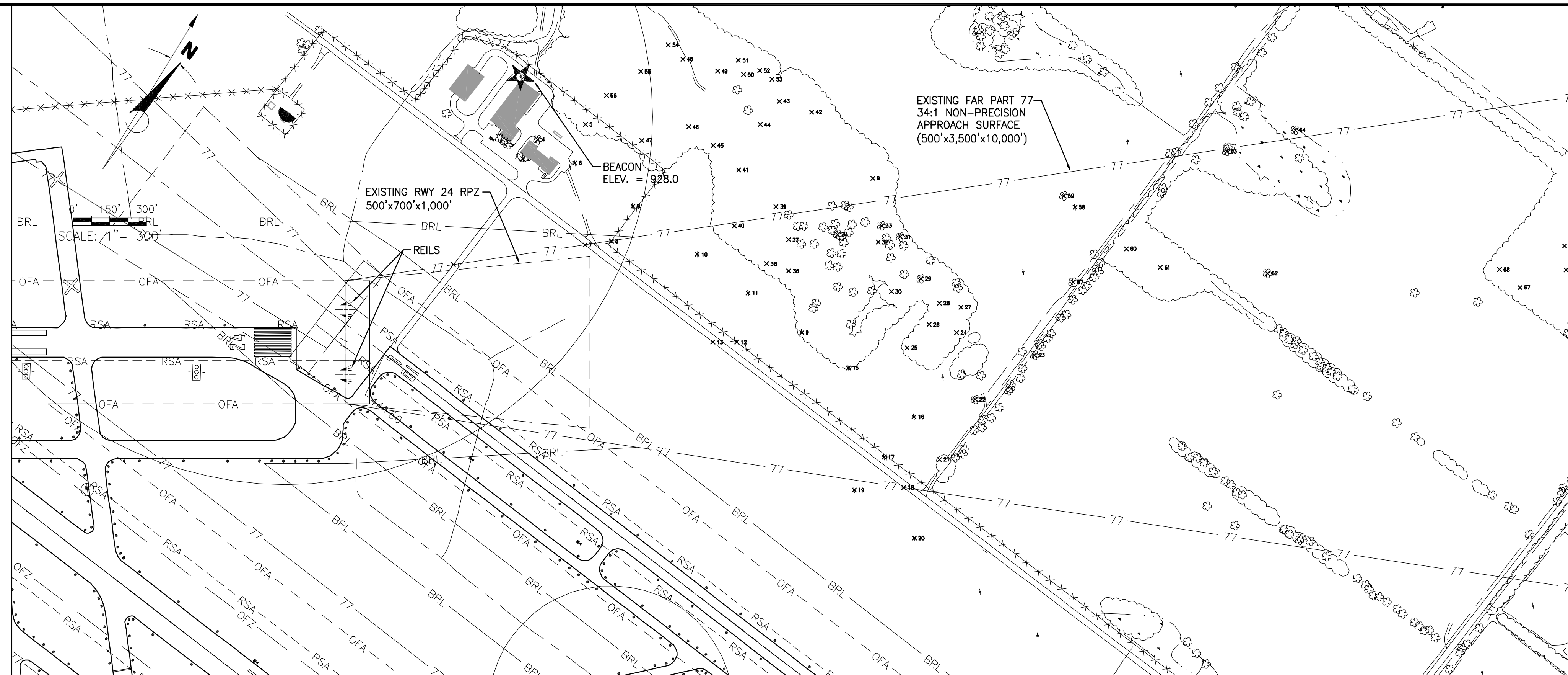
RUNWAY 6 APPROACH ZONE DRAWING (EXISTING & ULTIMATE)

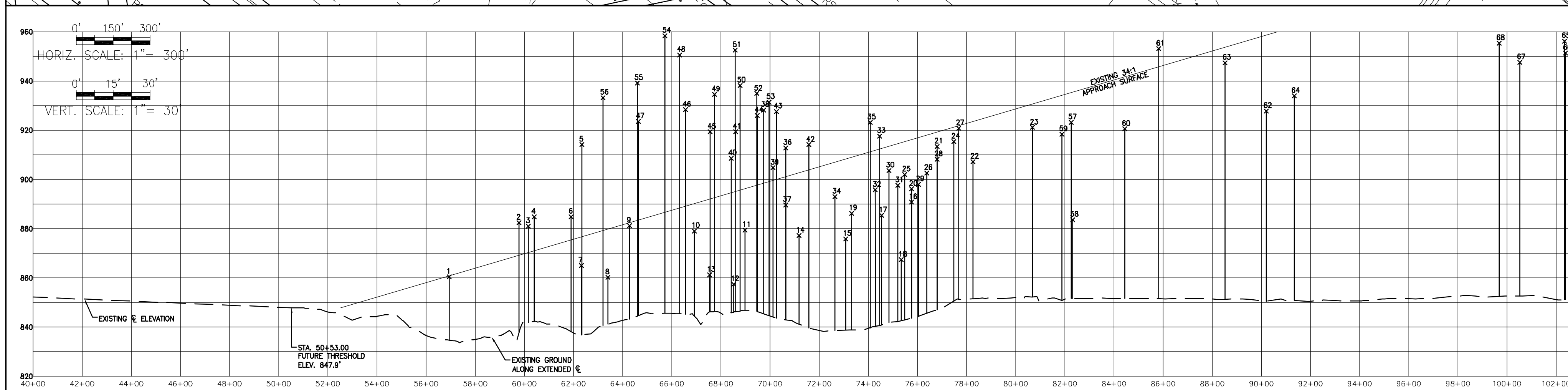
SHEET NUMBER

12 OF 18

EXISTING RUNWAY 24 OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable 34:1	Amt. of Penetration 34:1	Disposition 34:1
24–1	Road	860.1	860.9	–0.8	None
24–2	Pole	882.5	924.9	–42.4	None
24–3	Building	881.0	928.5	–47.4	None
24–4	Tree	884.8	936.6	–51.8	None
24–5	Tree	914.2	947.0	–32.8	None
24–6	Pole	884.9	924.1	–39.3	None
24–7	Road	865.1	876.7	–11.6	None
24–8	Fence	860.2	879.9	–19.7	None
24–9	Fence	881.3	900.8	–19.6	None
24–10	Pole	879.1	890.2	–11.1	None
24–11	Pole	879.4	896.3	–17.0	None
24–12	Fence	857.4	894.9	–37.5	None
24–13	Road	861.2	892.1	–30.9	None
24–14	Pole	877.1	902.7	–25.6	None
24–15	Pole	875.9	908.3	–32.5	None
24–16	Pole	890.8	916.2	–25.4	None
24–17	Pole	885.5	912.6	–27.2	None
24–18	Road	867.4	915.0	–47.7	None
24–19	Pole	886.3	914.9	–28.6	None
24–20	Pole	896.2	944.9	–48.7	None
24–21	Tree	913.4	919.3	–5.9	None
24–22	Tree	907.2	923.6	–16.4	None
24–23	Tree	921.1	930.7	–9.6	None
24–24	Tree	915.3	921.3	–6.0	None
24–25	Tree	902.1	915.4	–13.4	None
24–26	Tree	902.6	918.1	–15.4	None
24–27	Tree	920.8	921.9	–1.0	None
24–28	Tree	908.2	919.3	–11.1	None
24–29	Tree	898.0	917.1	–19.0	None
24–30	Tree	903.6	913.5	–9.9	None
24–31	Tree	897.6	914.6	–17.0	None
24–32	Tree	895.8	911.9	–16.1	None
24–33	Tree	917.6	912.3	5.3	Top
24–34	Tree	893.0	907.1	–14.0	None
24–35	Tree	923.2	925.0	–1.8	None
24–36	Tree	912.8	901.2	11.6	Top
24–37	Tree	889.7	901.1	–11.5	None
24–38	Tree	928.2	898.5	29.7	Top
24–39	Tree	904.8	905.2	–0.4	None
24–40	Tree	908.6	894.6	14.0	Top
24–41	Tree	919.3	925.4	–6.1	None
24–42	Tree	914.1	961.6	–47.5	None
24–43	Tree	927.6	966.8	–39.2	None
24–44	Tree	926.0	952.5	–26.5	None
24–45	Tree	919.3	938.8	–19.5	None
24–46	Tree	928.3	948.8	–20.4	None
24–47	Tree	923.6	939.4	–15.9	None
24–48	Tree	950.6	988.1	–37.5	None
24–49	Tree	934.6	982.2	–47.7	None
24–50	Tree	938.2	981.1	–42.9	None
24–51	Tree	952.5	989.2	–36.7	None
24–52	Tree	934.9	984.0	–49.1	None
24–53	Tree	931.4	979.3	–47.8	None
24–54	Tree	958.4	995.9	–37.5	None
24–55	Tree	939.1	979.5	–40.4	None
24–56	Tree	933.3	964.4	–31.2	None
24–57	Tree	923.2	935.3	–12.1	None
24–58	Pole	883.6	935.5	–51.9	None
24–59	Tree	918.3	934.2	–15.9	None
24–60	Tree	920.5	941.7	–21.2	None
24–61	Tree	953.1	945.8	7.3	Top
24–62	Tree	927.8	958.7	–30.9	None
24–63	Tree	947.4	953.8	–6.4	None
24–64	Tree	933.9	966.7	–32.8	None
24–65	Tree	956.2	994.4	–38.2	None
24–66	Tree	951.4	994.5	–43.2	None
24–67	Tree	947.6	989.0	–41.4	None
24–68	Tree	955.3	986.5	–31.2	None
24–69	Tree	979.1	1030.4	–51.4	None





DESCRIPTION	EXISTING
PROPERTY LINE	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	OFA
RUNWAY OBSTACLE FREE ZONE	OFZ
RUNWAY PROTECTION ZONE	
TAXIWAY OBJECT FREE AREA	TOFA
BUILDING RESTRICTION LINE	BRL
PRIMARY SURFACE	77
AIRFIELD PAVEMENT	
AIRPORT BUILDINGS	
NON-AIRPORT BUILDINGS	
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)	●
ASR (AIRPORT SURVEILLANCE RADAR)	
REIL (RUNWAY END IDENTIFIER LIGHT)	
VASI (VISUAL APPROACH SLOPE INDICATOR)	
ARP (AIRPORT REFERENCE POINT)	⊗
BEACON	☆
WINDSOCK	
TREES	
FENCE	x
COMPASS CALIBRATION PAD	
UTILITY POLE	
APPROACH LIGHT	●

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW

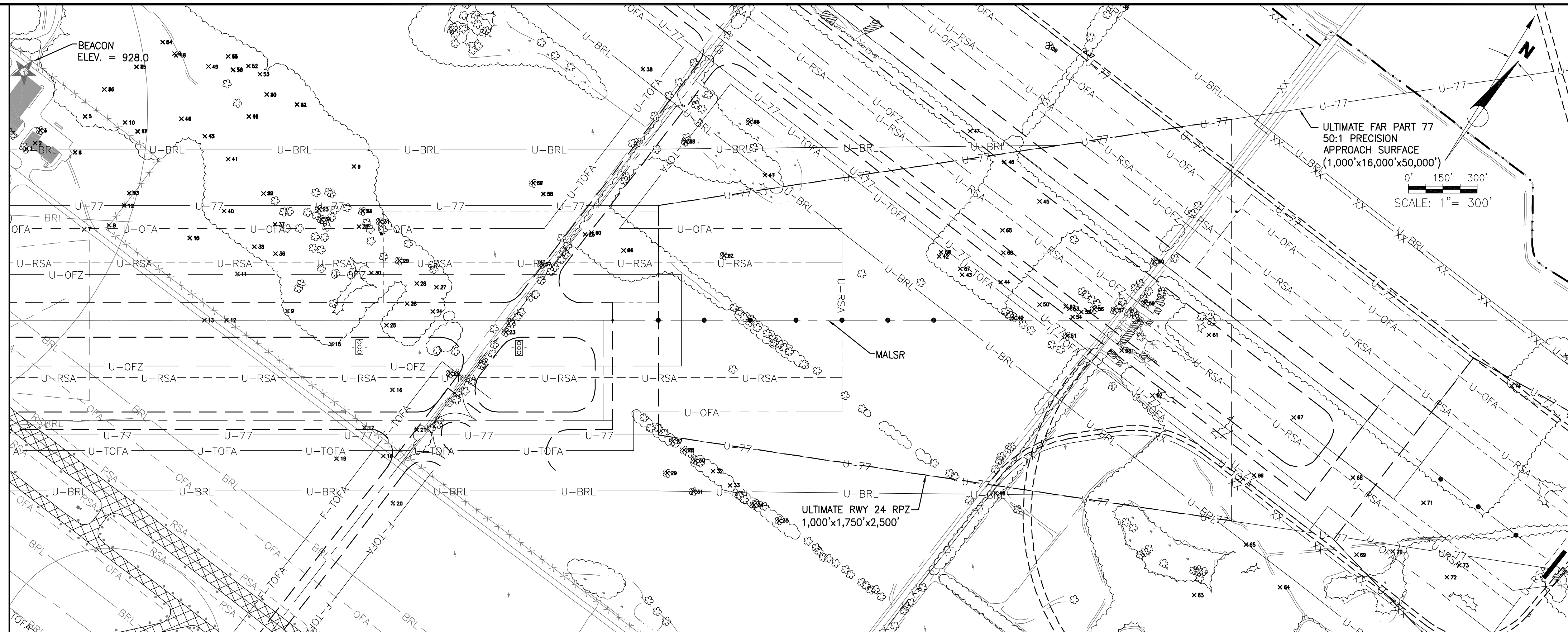
AEP PROJECT NUMBER
213-9391-007

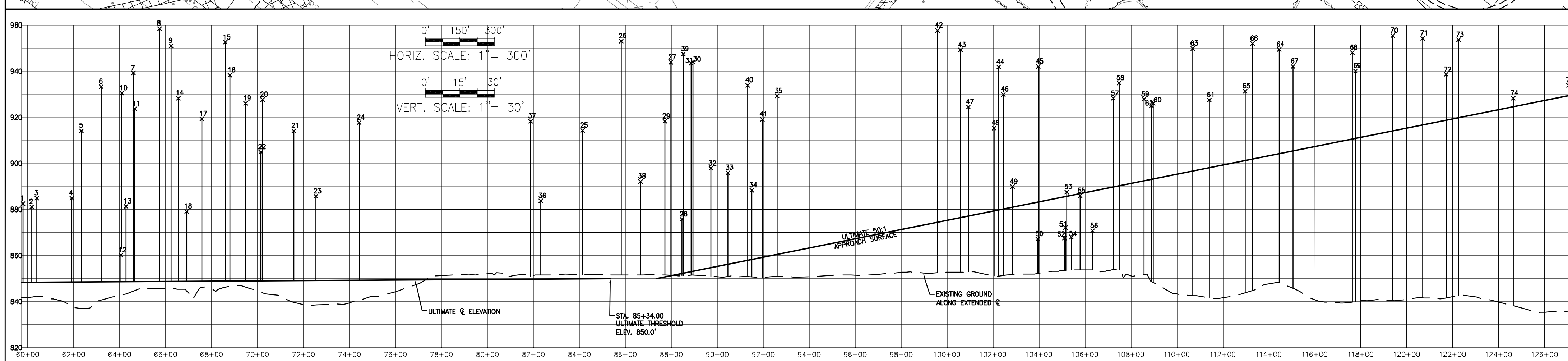
SHEET TITLE

RUNWAY 24 APPROACH ZONE DRAWING (EXISTING)

SHEET NUMBER

13 OF 18





ULTIMATE RUNWAY 24 OBSTRUCTIONS SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev Ultimate 50:1	Amt. of Penetration Ultimate 50:1	Disposition Ultimate 50:1
24U-1	Pole	882.5	885.5	-3.0	None
24U-2	Chimney	881.0	888.7	-7.7	None
24U-3	Tree	884.8	896.8	-11.9	None
24U-4	Pole	884.9	883.0	1.8	Remove
24U-5	Tree	914.2	905.5	8.6	Remove
24U-6	Tree	933.3	922.3	11.0	Remove
24U-7	Tree	939.1	936.3	2.9	Remove
24U-8	Tree	958.4	951.7	6.7	Remove
24U-9	Tree	951.0	944.7	6.3	Remove
24U-10	Tree	930.5	901.6	28.8	Remove
24U-11	Tree	923.6	896.1	27.4	Remove
24U-12	Fence	860.2	850.0	10.2	Relocate
24U-13	Pole	881.3	857.8	23.4	Remove
24U-14	Tree	928.3	904.0	24.4	Remove
24U-15	Tree	952.5	942.8	9.7	Remove
24U-16	Tree	938.2	934.5	3.7	Remove
24U-17	Tree	919.3	893.1	26.2	Remove
24U-18	Pole	879.1	850.0	29.1	Remove
24U-19	Tree	926.0	905.4	20.7	Remove
24U-20	Tree	927.6	919.0	8.6	Remove
24U-21	Tree	914.1	912.7	1.4	Remove
24U-22	Tree	904.8	857.5	47.3	Remove
24U-23	Tree	885.6	850.0	35.6	Remove
24U-24	Tree	917.6	850.0	67.6	Remove
24U-25	Tree	914.2	850.0	64.2	Remove
24U-26	Tree	953.1	851.0	102.1	Remove
24U-27	Tree	943.8	855.3	88.5	Remove
24U-28	Tree	875.6	859.0	16.7	Remove
24U-29	Tree	918.2	873.5	44.7	Remove
24U-30	Tree	944.0	865.4	78.5	Remove
24U-31	Tree	943.4	884.8	58.7	Remove
24U-32	Tree	897.8	871.9	25.8	Remove
24U-33	Tree	895.9	880.6	15.3	Remove
24U-34	Tree	888.3	892.8	-4.5	None
24U-35	Tree	929.2	902.3	26.8	Remove
24U-36	Pole	883.6	857.2	26.4	Remove
24U-37	Tree	918.3	863.9	54.4	Remove
24U-38	Pole	892.1	934.6	-42.4	None
24U-39	Tree	947.4	889.4	58.0	Remove
24U-40	Tree	933.9	901.3	32.7	Remove
24U-41	Tree	919.1	867.9	51.2	Remove
24U-42	Tree	957.7	878.5	79.2	Remove
24U-43	Tree	949.1	880.5	68.6	Remove
24U-44	Tree	941.9	883.8	58.0	Remove
24U-45	Tree	942.0	887.2	54.7	Remove
24U-46	Tree	929.9	884.2	45.7	Remove
24U-47	Tree	924.4	894.1	30.3	Remove
24U-48	Tree	915.3	883.9	31.4	Remove
24U-49	Tree	889.8	885.0	4.8	Remove
24U-50	Pole	867.2	887.2	-20.1	None
24U-51	Tree	872.1	889.6	-17.5	None
24U-52	Pole	867.5	889.5	-22.0	None
24U-53	Pole	887.6	889.8	-2.3	None
24U-54	Building	867.9	890.1	-22.2	None
24U-55	Chimney	885.8	890.9	-5.1	None
24U-56	Tree	870.7	892.0	-21.3	None
24U-57	Tree	928.1	893.8	34.3	Remove
24U-58	Tree	934.9	894.4	40.5	Remove
24U-59	Tree	927.7	896.4	31.3	Remove
24U-60	Tree	926.0	897.3	28.7	Remove
24U-61	Tree	927.4	902.0	25.4	Remove
24U-62	Tree	925.1	897.1	28.0	Remove
24U-63	Tree	949.8	946.4	3.4	Remove
24U-64	Tree	949.4	940.9	8.5	Remove
24U-65	Tree	931.3	914.6	16.7	Remove
24U-66	Tree	951.9	905.9	46.0	Remove
24U-67	Tree	942.1	909.4	32.7	Remove
24U-68	Tree	948.0	914.6	33.4	Remove
24U-69	Tree	940.0	920.2	19.8	Remove
24U-70	Tree	955.4	918.2	37.2	Remove
24U-71	Tree	954.2	920.7	33.5	Remove
24U-72	Tree	938.5	933.5	5.0	Remove
24U-73	Tree	953.5	926.0	27.6	Remove
24U-74	Tree	928.3	928.4	-0.1	None
24U-75	Tree	933.8	933.4	0.4	Remove
24U-76	Tree	935.6	934.3	1.3	Remove
24U-77	Tree	934.5	938.3	-3.8	None
24U-78	Tree	948.6	942.6	6.0	Remove

NOTE:

1. ULTIMATE APPROACH LIGHT SYSTEM AND NAVIGATIONAL AIDS TO REMAIN CLEAR OF PART 77 SURFACE.

2. ULTIMATE RUNWAY WILL INCLUDE CLEARING AND GRADING PER FAA RUNWAY SAFETY AREA DESIGN STANDARDS.

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY SAFETY AREA	RSA	F-RSA	U-RSA
RUNWAY OBJECT FREE AREA	OFA	F-OFA	U-OFA
RUNWAY OBSTACLE FREE ZONE	OFZ	F-OFZ	U-OFZ
RUNWAY PROTECTION ZONE			
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA	U-TOFA
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
PAVEMENT REMOVAL			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			
ASOS (AIRPORT SURFACE OBSERVATION SYSTEM)			
ASR (AIRPORT SURVEILLANCE RADAR)			
REIL (RUNWAY END IDENTIFIER LIGHT)			
VASI (VISUAL APPROACH SLOPE INDICATOR)			
ARP (AIRPORT REFERENCE POINT)			
BEACON			
WINDSOCK			
TREES			
FENCE	x	XX — XX	XX — XX
COMPASS CALIBRATION PAD			
UTILITY POLE			
APPROACH LIGHT			

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REVISIONS

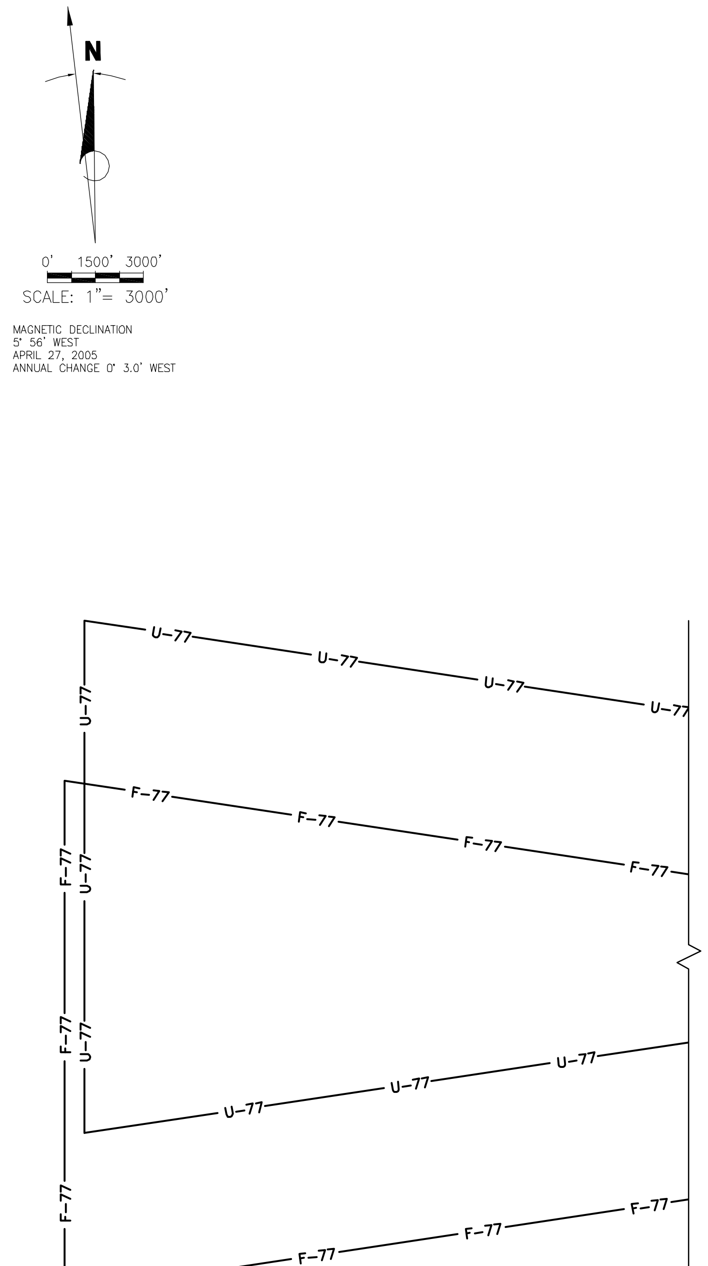
NO.	DESCRIPTION	DATE

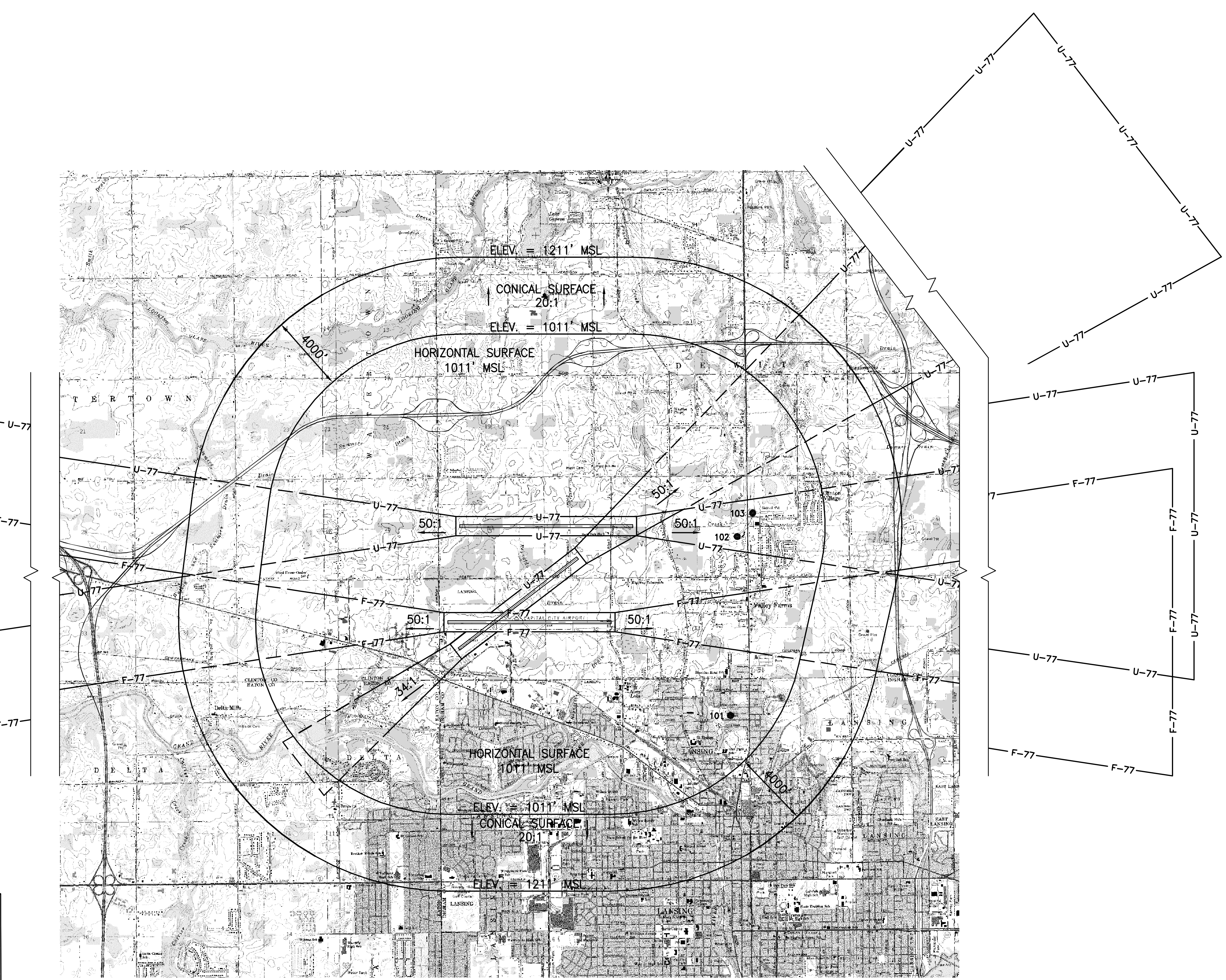
DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY:
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

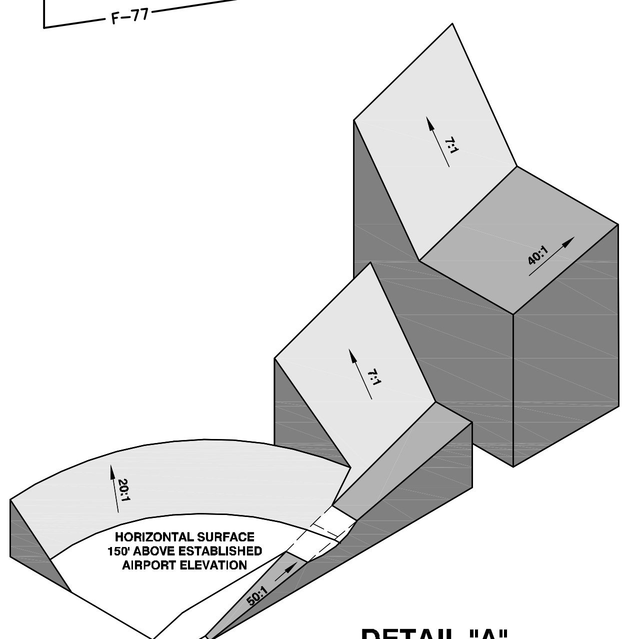
SHEET TITLE

RUNWAY 24 APPROACH ZONE DRAWING (ULTIMATE)

SHEET NUMBER







DETAIL "A"

MAP SOURCE: USGS.GOV

EAST LANSING, MI.	042084F4	1970/1976 PHOTO REVISED
LANSING SOUTH, MI.	042084F5	1965/1973 PHOTO REVISED
DIMONDALE, MI.	042084F6	1965/1973 PHOTO REVISED
BATH, MI.	042084G4	1972/1978 PHOTO INSPECTED
LANSING NORTH, MI.	042084G5	1965/1973 PHOTO REVISED/1980 PHOTO INSPECTED
WACOUSTA, MI.	042084G6	1965/1973 PHOTO REVISED

PART 77 SURFACE OBSTRUCTION SUMMARY TABLE

Item Number	Object	Object Elevation	Max Allowable Elev	Amount of Penetration	Disposition
101	Tank	1020	1011.0	9.0	To Remain
102	Tower	990	954.6	35.4	To Be Removed with Ultimate Runway
103	Tower	990	970.7	19.3	To Be Removed with Ultimate Runway

OBSTACLE SOURCE:
FAA NATIONAL AERONAUTICAL CHARTING OFFICE
DIGITAL OBSTACLE FILE.

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REVISIONS

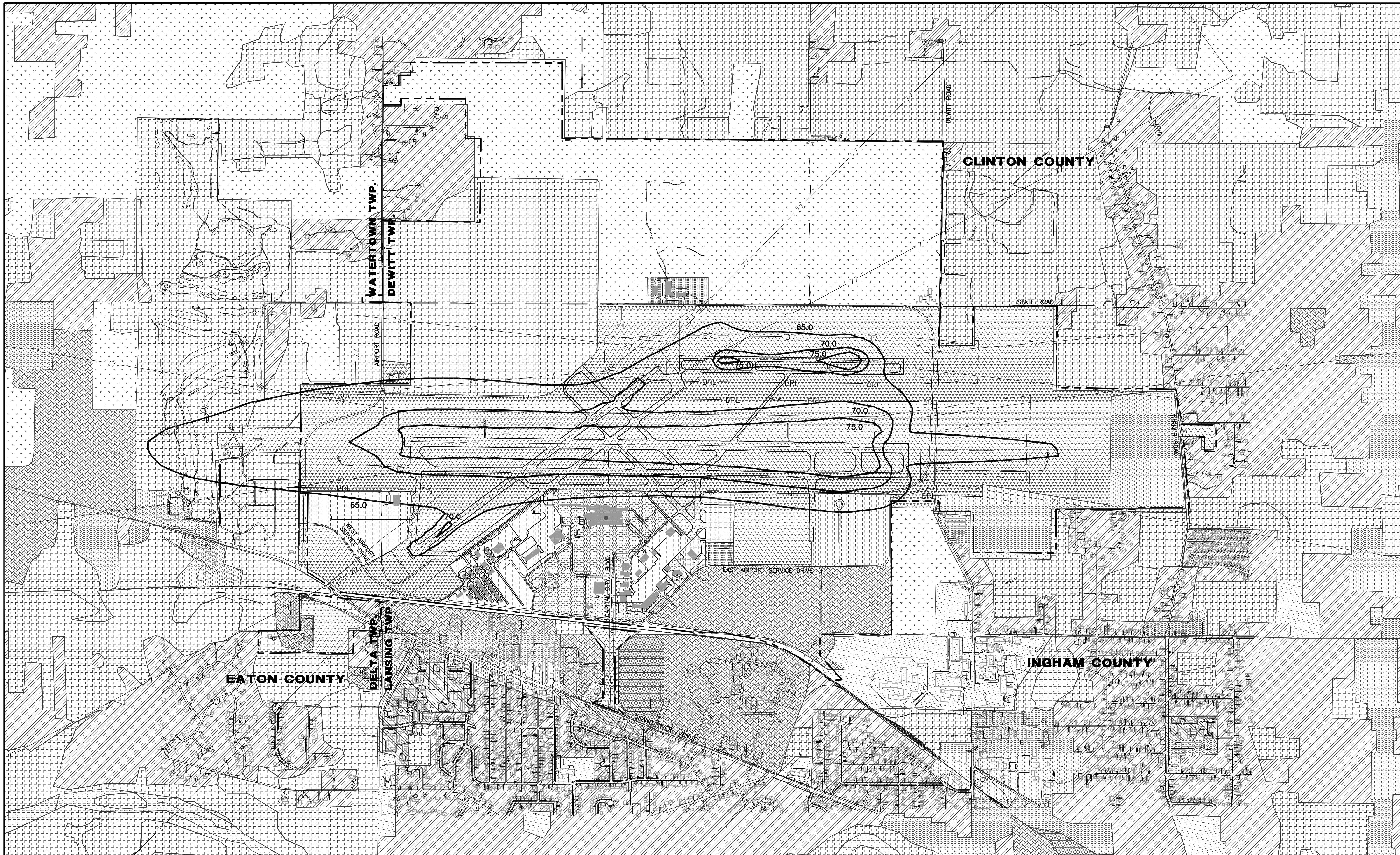
NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

FAR PART 77 SURFACES

SHEET NUMBER
15 OF 18



DESCRIPTION	EXISTING
PROPERTY LINE	
RUNWAY PROTECTION ZONE	
BUILDING RESTRICTION LINE	BRL
PRIMARY SURFACE	77
AIRFIELD PAVEMENT	
AIRPORT BUILDINGS	
NON-AIRPORT BUILDINGS	

DESCRIPTION	EXISTING
PASSENGER TERMINAL	
GENERAL AVIATION	
CARGO	
AIRPORT COMPATIBLE	
AIRPORT SUPPORT	
AIRCRAFT OPERATIONS AREA/CLEAR AREA	
AGRICULTURAL	

DESCRIPTION	EXISTING
RESIDENTIAL – SINGLE FAMILY	
RESIDENTIAL – MULTI-FAMILY	
TRANSPORTATION/UTILITIES	
BUSINESS/COMMERCIAL	
INDUSTRIAL	
INSTITUTIONAL	
PARKS, OPEN SPACE, RECREATION	

DESCRIPTION	EXISTING
WATER	

NOISE CONTOUR SOURCE:
CAPITAL CITY AIRPORT
FAR PART 150 NOISE CAPACITY
STUDY, JANUARY 2005

N

MAGNETIC DECLINATION
5° 56' WEST
APRIL 27, 2005
ANNUAL CHANGE 0° 3.0' WEST

0' 400' 800'
SCALE: 1" = 800'

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REVISIONS

NO.	DESCRIPTION	DATE

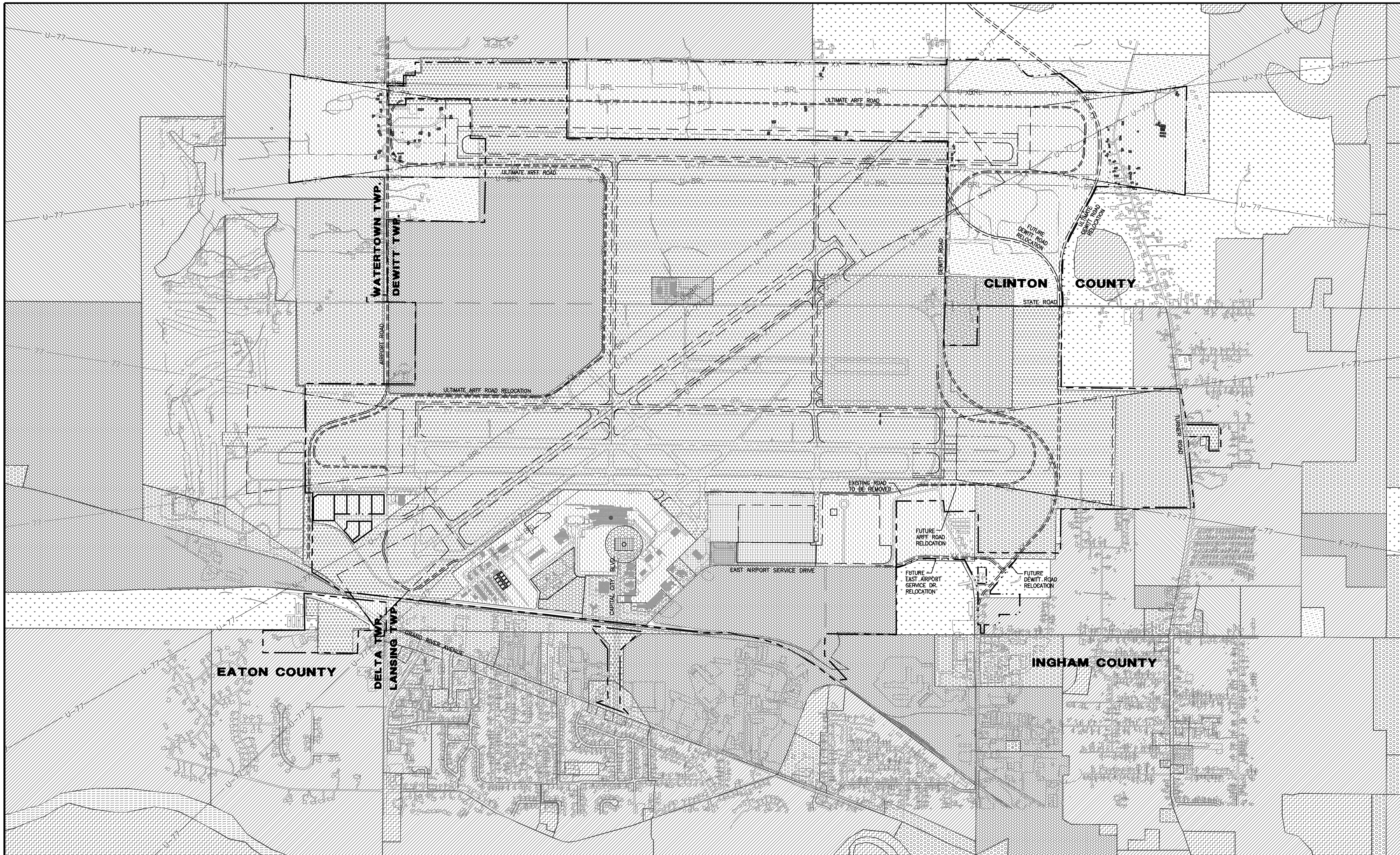
DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

EXISTING LAND USE PLAN

SHEET NUMBER



DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
RUNWAY PROTECTION ZONE			
BUILDING RESTRICTION LINE	BRL	F-BRL	U-BRL
PRIMARY SURFACE	77	F-77	U-77
AIRFIELD PAVEMENT			
AIRPORT BUILDINGS			
NON-AIRPORT BUILDINGS			

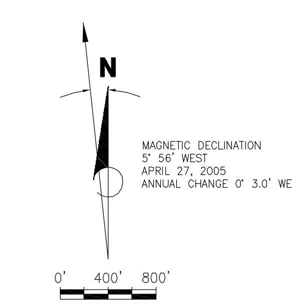
DESCRIPTION	EXISTING
PASSENGER TERMINAL	
GENERAL AVIATION	
CARGO	
AIRPORT COMPATIBLE	
AIRPORT SUPPORT	
AIRCRAFT OPERATIONS AREA/CLEAR AREA	
AGRICULTURAL	

DESCRIPTION	EXISTING
RESIDENTIAL – SINGLE FAMILY	
RESIDENTIAL – MULTI-FAMILY	
TRANSPORTATION/UTILITIES	
BUSINESS/COMMERCIAL	
INDUSTRIAL	
INSTITUTIONAL	
PARKS, OPEN SPACE, RECREATION	

DESCRIPTION	EXISTING
WATER	

NOTE:

NON-AERONAUTICAL LAND USES ON AIRPORT PROPERTY WILL REQUIRE AN FAA LAND RELEASE.



RS&H®
Architectural, Engineering, Planning and Environmental Services
Reynolds, Smith and Hills, Inc.
900 East Diehl Road, Suite 101
Naperville, Illinois 60563
630-505-1991 FAX 630-505-1977
www.rsandh.com

CAPITAL REGION AIRPORT AUTHORITY

CAPITAL CITY AIRPORT

AIRPORT LAYOUT PLAN

CONSULTANTS

R.W. ARMSTRONG — AIRPORTS • ARCHITECTURE • ENVIRONMENTAL • TRANSPORTATION — EST. 1961
Union Station 300 South Meridian Street
Indianapolis, Indiana 46225 (317)786-0461

CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

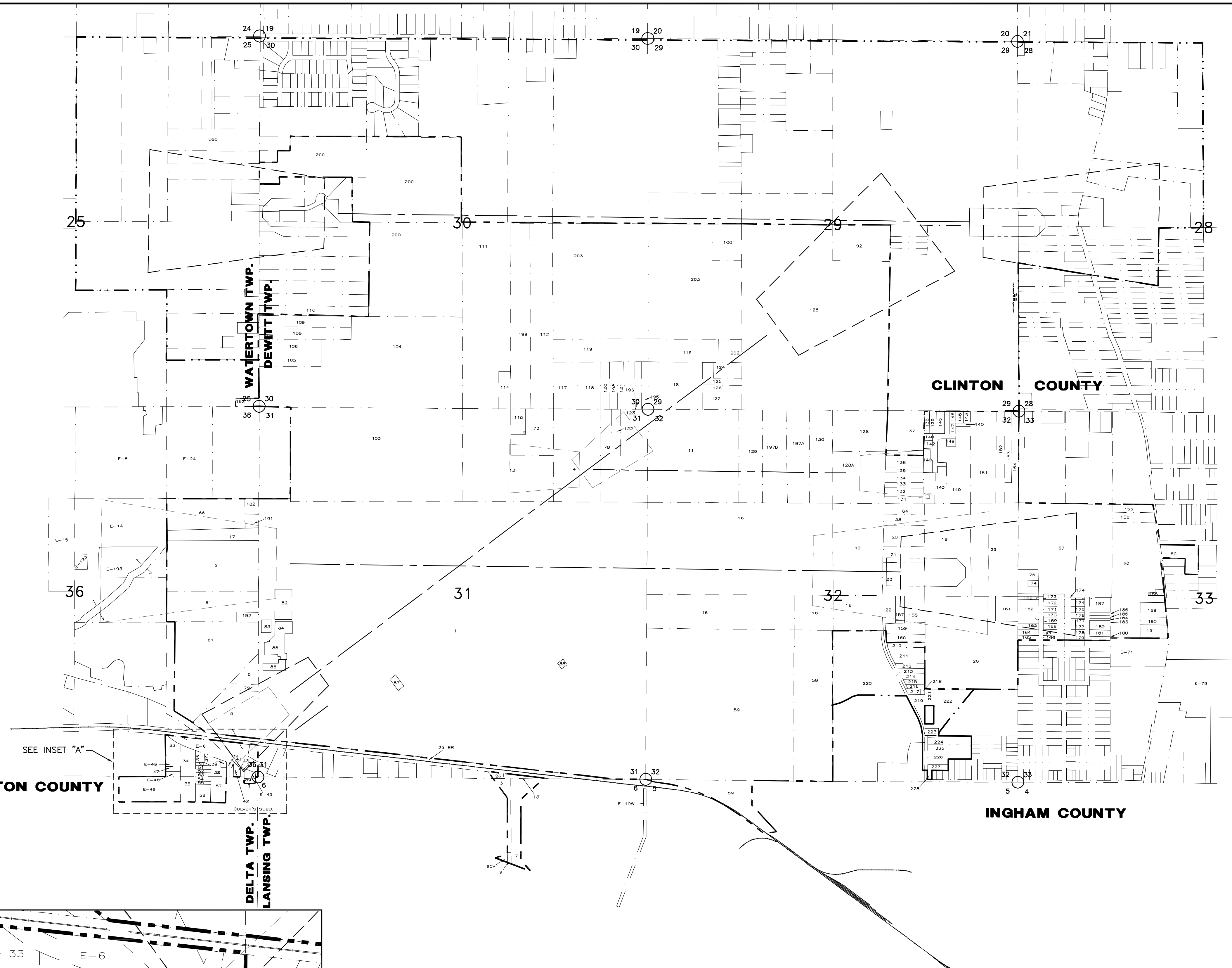
DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW

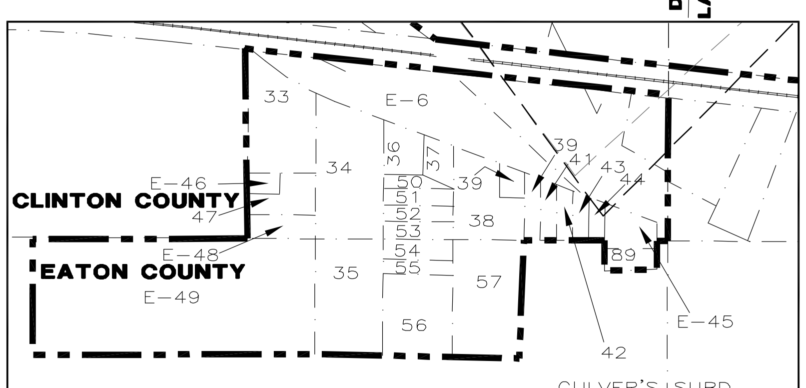
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

FUTURE LAND USE PLAN

SHEET NUMBER

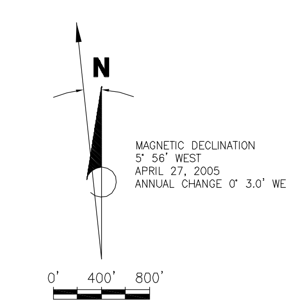




INSET 'A'
SCALE: 1"=300'

DESCRIPTION	EXISTING	ULTIMATE
PROPERTY LINE		
RUNWAY PROTECTION ZONE		

NOTE:
1. RWY 28L APPROACH AVIGATION EASEMENT ACQUISITIONS WILL BE NEEDED WITH FUTURE RUNWAY EXTENSION. REQUIREMENTS TO BE DEFINED THROUGH SUBSEQUENT 405 SURVEY.



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AIRPORT LAYOUT PLAN

CONSULTANTS

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CONWAY CONSULTING
AIRPORTS & AVIATION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW
AEP PROJECT NUMBER
213-9391-007

SHEET TITLE
AIRPORT PROPERTY MAP

SHEET NUMBER
18A OF 18

19-1

NOTES

- PROPERTY LISTED BY LOCATION WITHIN TOWNSHIP AND COUNTY
- PARCELS 1 THROUGH 80 CONVEYED TO CAPITAL REGION AIRPORT AUTHORITY BY QUIT CLAIM DEED DATED 5-24-71. RECORDED IN LIBER 1042, PAGE 620 FROM THE STATE OF MICHIGAN DEPARTMENT OF AERONAUTICS

1- NOTE DELETED
2- PARCEL 68 INCLUDES PARCEL 69
3- REIMBURSEMENT DIVIDED BETWEEN -0182 (E 51 AC.+), AND -0182 (W 18.7 Ac.)
4- SUBJECT TO LIFE LEASE AS RECORDED IN LIBER 499, PAGES 97-107 - EXTINGUISHED 8-28-2006
5- PARCELS REPRESENT LEASEHOLD PURCHASES (BUILDINGS AND EQUIPMENT) UNDERLYING FEE IS PARCEL NUMBER 1.
6- SOLD 18.89 ACRES TO CITY OF LANSING, 12/21/2001

CLINTON COUNTY (DEWITT TOWNSHIP)

TITLE IN FEE SIMPLE INTEREST AS FOLLOWS:

NOTE	FEDERAL PROJECT NO.	PARCEL NO.	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES	
	NOT ELIGIBLE	1	BOYS VAC SCHOOL	ACT	327 PA OF 1945		475.0	
	9-20-035-6012	4	B HAYDEN	WD	290-442	7-9-57	10.0	
	9-20-035-6012	11	H RHINES	WD	293-282	3-26-58	55.0	
	9-20-035-003	12	I WALTER	WD	288-37	12-31-56	30.0	
	9-20-035-6012	13	E COVERT	WD	271-356	5-25-53	0.45	
	NOT ELIGIBLE	16	STATE HEALTH DEPT	ACT	184 PA 1958	4-18-58	140.7	
	9-20-035-6012	18	C MEDDAUGH	WD	296-562	9-30-58	12.0	
	9-20-035-6114	19	C RANDALL	WD	296-561	11-26-58	20.0	
	9-20-035-6114	20	V SHARPE	WD	298-412	4-20-59	4.0	
	9-20-035-6114	21	M BRILLHART	WD	298-411	5-5-59	3.2	
	9-20-035-6114	22	C JONES	WD	300-231	12-29-59	1.7	
	9-20-035-6114	23	M COURSER	WD	300-305-7	1-12-60	6.7	
	9-20-035-6012	26	A CHACHKA	WD	271-357	11-26-52	0.49	
	9-20-035-6114	28	J MCHENRY	WD	308-840	11-23-62	37.5	
	9-20-035-6114	29	GAGE MFG CO	WD	309-684	7-31-61	20.0	
	3-26-0055-0182	58	H PALMER	WD	308-830	1-24-63	2.0	
6.	NOT ELIGIBLE	59	STATE HEALTH DEPT	QC	338-797	4-24-71	130.0	
	9-20-035-0617	64	W DOTSON	WD	313-409	8-14-64	2.0	
	3-26-0055-0182	67	J ANGELL	WD	315-60	1-26-65	37.0	
2.	3-26-0055-0182	68	R ANGELL	WD	321-701	12-30-66	22.95	
	3-26-0055-0182	73	G WALTER	WD	317-317	9-10-65	8.25	
	3-26-0055-0182	74	B HANEY	WD	317-747	11-12-65	0.28	
	3-26-0055-0182	75	G GAGE	WD	321-609	12-16-66	2.55	
	3-26-0055-0182	78	A BURKHOLDER	WD	318-375	1-26-66	2.5	
	NONE	80	E CROOPE	WD	335-216	11-2-70	3.37	
	3-26-0055-2196	100	R ZALEWSKI	WD	360-220	10-20-76	5.0	
	6-26-0055-04	103	CITY OF LANSING	WD	367-174	4-27-78	87.74	
3.*	3-26-0055-0182/0283	104	AMERICAN BANK AND TRUST	WD	395-503	11-16-82	18.7	
	---	105	MSH COMM (H CLAY)	WD	359-776	9-10-76	4.0	
	---	106	H MEDDAUGH	WD	361-930	2-23-77	4.0	
	---	107	MSH COMM (J BERRYHILL)	WD	362-586-7	4-19-77	0.30	
	---	108	J PHILLIPS	WD	362-657	4-29-77	4.7	
	---	109	J SMITH	WD	361-857	2-25-77	5.0	1152.08 Ac.
	---	110	R WILSON					
	3-26-0055-0283	111	W SHANAHAN	WD	385-621	7-31-81	41.3	
	3-26-0055-0182	112	E THELEN	WD	362-143	3-23-77	17.77	
	3-26-0055-0283	114	M CARTER	WD	365-680	12-20-77	2.0	
	6-26-0055-04	115	G WALTER	WD	361-511	1-28-77	1.74	
	6-26-0055-04	116	B HAYDEN	WD	365-340	11-4-77	10.0	
	6-26-0055-06	117	T RUMZEK	WD	361-726	2-15-77	5.0	
	6-26-0055-06	118	K ALFRED	WD	361-37	12-14-76	5.0	
	6-26-0055-06	119	A SOLLID	WD	371-326	3-29-79	17.5	
	6-26-0055-06	120	C BURCH	WD	361-813	2-22-77	2.0	
	6-26-0055-06	121	MSH COMM (D PIKE)	QC	361-431	12-29-76	1.5	
	6-26-0055-04	122	W FOLEY	WD	363-284	6-14-77	1.88	
	6-26-0055-06	123	C ROSS	WD	361-297	1-6-77	1.3	
	6-26-0055-06	124	H MILETT	WD	362-343	4-11-77	2.00	
	6-26-0055-06	125	H MILETT	WD	361-692	2-9-77	1.92	
	6-26-0055-06	126	G SMITH	WD	362-123	3-22-77	1.25	
	6-26-0055-06	127	C MEDDAUGH	WD	362-616	4-28-77	2.48	
4.	3-26-0055-0485	128	B CRANE	WD	494-663	8-2-89	140.92	
	6-26-0055-04	128A	B CRANE	WD	379-973	12-15-80	12.05	
	6-26-0055-04	129	H RHINES	WD	361-334	1-12-77	10.0	
	6-26-0055-04	130	P H I CONST CO	WD	364-439	8-29-77	10.0	
	6-26-0055-04	131	T SCHWARTZFISHER	WD	362-320	4-7-77	1.33	
	6-26-0055-04	132	V WILSON	WD	362-145	3-23-77	1.67	
	6-26-0055-04	133	F MEDDAUGH	WD	364-395	8-29-88	1.0	
	6-26-0055-04	134	D SCHLICHTER	WD	365-679	12-20-77	1.98	
	6-26-0055-04	135	H CORP	WD	365-232	11-2-77	0.94	
	6-26-0055-04	136	L FLOOD	WD	363-611	6-29-77	2.5	299.53 Ac.
		137	R HECK	C				
	6-26-0055-04	138	F TELLER	WD	362-926	5-19-77	0.61	
	3-26-0055-0283	139	I DECKER	WD	362-267	6-13-77	0.61	
	6-26-0055-04	140	F BASEL	C	385-622	8-17-81	10.00	
	6-26-0055-04	141	WEISSMAN CONST CO	WD	367-936	6-22-78	1.65	
	6-26-0055-04	142	L JAY	WD	364-394	8-29-77	0.35	
	6-26-0055-04	143	M MOCERE	WD	364-993	10-11-77	2.28	
	3-26-0055-0283	145	T BOWLER	WD	362-555	4-21-77	0.86	
	---	146	DEWITT TWP	WD	371-997	4-9-79	0.33	
	3-26-0055-0283	147	W HIGGINS	WD	362-887	5-13-77	0.32	
	3-26-0055-0283	148	G BAILEY	WD	366-212	2-8-78	0.33	
	6-26-0055-04	149	J TAYLOR	WD	362-521	4-19-77	0.33	
	6-26-0055-04	151	A BURKHOLDER	CJ	376-278	2-14-80	2.5	
	3-26-0055-0283	152	E DOWNS	WD	366-730	3-31-78	4.0	
	3-26-0055-0283	153	G HANCHETT	WD	362-634	4-28-77	2.33	
	3-26-0055-0283	154	E SEMEAU	WD	370-246	12-8-78	2.68	
	3-26-0055-0182	155	R SPALDING	WD	370-568	1-11-79	1.52	
	3-26-0055-0182	156	R GREENHOE	WD	371-491	4-5-79	2.01	
	6-26-0055-04	157	R ASHTON	WD	362-57	3-16-77	1.0	
	6-26-0055-04	158	J WESTFALL	WD	364-735	9-23-77	2.59	
	6-26-0055-04	159	M HARRISON	WD	363-268	6-13-77	1.62	
	6-26-0055-04	160	J CESARZ	WD	362-522	4-20-77	1.9	
	6-26-0055-04	161	G GAGE	DJ	376-278	2-14-80	2.5	
	6-26-0055-04	162	G BROWN	WD	362-556	4-21-77	3.53	
	6-26-0055-04	163	D DRYER	WD	363-383	6-17-77	0.56	
	6-26-0055-04	164	R GUDGE	WD	362-487	4-12-77	0.56	
	6-26-0055-04	165	W WEST	WD	362-325	4-5-77	0.56	
	6-26-0055-04	166	B HAZARD	WD	363-329	6-14-77	0.56	
	6-26-0055-04	167	B ROBINSON	WD	365-128	10-26-77	0.56	
	6-26-0055-04	168	L TAYLOR	WD	363-270	6-13-77	0.56	
	6-26-0055-04	169	H COMBS	WD	365-272	10-8-77	0.56	
	6-26-0055-04	170	D DRIVER	WD	363-326	6-14-77	0.56	
	6-26-0055-04	171	N EDDY	WD	363-269	6-13-77	0.56	
	6-26-0055-04	172	A WATSON	WD	364-911	10-6-77	0.61	
	6-26-0055-04	173	D YOUNGS	WD	363-286	6-14-77	0.5	
	6-26-0055-04	174	L MATTHEWS	WD	365-678	12-20-77	0.83	
	6-26-0055-04	175	J BARTELL	WD	364-197	8-9-77	0.56	
*	3-26-0055-0182	104	AMERICAN BANK AND TRUST	WD	395-503	11-16-82	51.0	
								106.89 Ac.
	6-26-0055-04	176	R ALBERTSON	WD	365-05	10-13-77	0.6	
	6-26-0055-04	177	R BARKER	WD	365-843	1-4-78	1.13	
	6-26-0055-04	178	N STALLCUP	WD	365-127	10-26-77	0.93	
	6-26-0055-04	179	C LOFTON	WD	362-342	4-11-77	0.20	
	6-26-0055-04	180	R MCGRATH	WD	364-365	8-26-77	0.56	
	6-26-0055-04	181	D TOWNSEND	WD	365-02	10-12-77	0.56	
	6-26-0055-04	182	L STUNNER	WD	365-242	11-3-77	0.56	
	6-26-0055-04	183	C BRUSH	WD	364-416	8-30-77	0.28	
	6-26-0055-04	184	R MULLINS	WD	364-438	8-17-77	0.28	
	6-26-0055-04	185	D FARHAT	WD	365-273	11-4-77	0.28	
	6-26-0055-04	186	R FULLER	WD	365-92	10-24-77	0.28	
	6-26-0055-04	187	W TEMPLER	WD	364-657	9-16-77	1.38	
	6-26-0055-04	188	D WEY	WD	365-367	11-14-77	0.35	
	6-26-0055-04	189	R MINOR	WD	377-941	7-7-80	1.73	
	6-26-0055-04	190	R ANGELL	WD	376-220	2-14-80	1.01	
	6-26-0055-04	191	R ANGELL	WD	376-470	3-18-80	1.82	
	6-26-0055-06	195	G BOGARD	WD	356-322	11-7-75	1.2	
	3-26-0055-0182	196	R BOWKUS	WD	344-97	6-29-72	2.5	
	6-26-0055-04	197A	H RHINES	WD	367-168	5-10-78	10.0	
	6-26-0055-04	197B	K PETERSON	WD	347-23	3-21-73	10.0	
	6-26-0055-06	198	J REUST	WD	354-603	5-14-75	1.5	
	3-26-0055-0283	199	J BUSK	WD	352-945	10-29-74	17.0	
	NONE	201	M WESTFALL (QUIET TITLE)	CJ	379-663	10-5-79	0.3	
	---	200	T WILENSKY	WD	356-766	12-11-75	99.11	
	3-26-0055-2196	202	M SOLLID	WD	393-447	8-26-82	2.5	
	3-26-0055-2196	203	D GORMAN	WD	496-876	9-18-89	95.0	
(5)	3-26-0055-1391	84	WHITE STAR	QC	543-893	12-13-91	0.98	
(5)	3-26-0055-1391	85	HANGAR SERVICES	QC	561-217	6-3-92	1.92	
(5)	3-26-0055-1391	86	VECTOR CONST.	QC	538-446	10-3-91	0.84	
(5)	3-26-0055-1391	87	N CLARK	LEASE	AMENDMENT	11-2-92	0.51	
(5)	3-26-0055-1391	88	T COLLINS LEASE CORP.	QC	542-685	11-1-91	0.65	
	3-26-0055-3805	92	AIRPORT VIEW CHURCH	WD	5041922	9-10-03	10.00	
(6)	NOT ELIGIBLE	59	TO CITY OF LANSING	WD		12-21-01	(18.89)	
								242.13 Ac.
					TOTAL ACRES		1,800.63	
		210						
		211						
		212						
		213						
		214						
	3-26-0055-3906	215						
	3-26-0055-3906	216						
	3-26-0055-3906	217						
		218						
		219						
		220						
		221						
		222						
	3-26-0055-3906	223						
		224						
		225						
	3-26-0055-3906	226						
		227						
	3-26-0055-3906	228						

NOTES: SEE ABOVE

CLINTON COUNTY (DEWITT TOWNSHIP)

EASEMENT INTERESTS LISTED AS FOLLOWS:

FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES	CONTROLLING HEIGHT
---	25	C & O RAILROAD	RRE	302-753	11-28-60	---	
---	E-71	R ANGELL	A-E	321-67	10-14-77	7.2	900 MSL
---	E-79	E DESANDER	A-E	336-255	12-15-70	20.4	895 TO 956 MSL
					TOTAL ACRES	27.6	

CLINTON COUNTY (WATERTOWN TOWNSHIP)

TITLE IN FEE SIMPLE INTEREST AS FOLLOWS:

NOTE	FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES
	9-20-035-802	2	A JANDERNOA	WD	254-138	3-22-49	22.0
	NOT ELIGIBLE	5	MICHIGAN STATE HIGHWAY DEPT	QC	256-96	9-5-41	8.7
	9-20-035-6012	17	H HANES	WD	295-371	4-7-58	4.86
	9-20-035-6215	33	J MILLER	WD	308-831	1-24-63	1.5
	9-20-035-6215	34	J MILLER	WD	308-832	1-24-63	1.5
	9-20-035-6215	36	J MILLER	WD	308-833	1-24-63	0.4
	9-20-035-6215	37	C SKINNER	WD	310-264	7-27-63	0.3
	9-20-035-6215	38	H WILHELM	WD	308-365	11-21-62	1.1
2.	9-20-035-6215	39	H RUMZEK	WD	309-475	4-26-63	0.15
	9-20-035-6215	41	J CORNELL	WD	310-462	8-7-63	0.2
	9-20-035-6215	42	F SATTLER	WD	310-690	9-6-63	0.17
	9-20-035-6215	43	M MUSSLEMAN	WD	310-459	8-15-63	0.14
	9-20-035-6215	44	M MUSSLEMAN	WD	310-461	8-15-63	0.11
	9-20-035-6215	47	M ZISCHKE	WD	313-31	6-23-64	0.48
	9-20-035-6215	50	H TURCOTTE	WD	310-265	7-27-63	0.2
	9-20-035-6215	51	C TURCOTTE	WD	310-266	7-17-63	0.24
	9-20-035-6215	52	F TURCOTTE	WD	310-267	7-17-63	0.24
	9-20-035-6215	53	J MITCHELL	WD	310-268	7-26-63	0.48
	9-20-035-C617	61	G TELLING	WD	313-244	7-20-64	12.0
	9-20-035-C617	66	R TITUS	WD	315-571	4-22-65	11.3
	9-20-035-C617	72	H FOX	WD	316-922	8-18-65	0.75
	9-20-035-04	101	G WARNER	WD	365-63	10-13-77	0.90
	9-20-035-04	102	D BRUNO	WD	362-390	4-13-77	1.01
	9-20-035-04	192	L FLITTON	WD	362-56	3-11-77	1.0
	3-26-0055-2196	81	VECTOR CONST.	WD	719-200-1	11-16-96	25.8
						TOTAL ACRES	95.51

2. PARCEL 39 INCLUDES PARCEL 40

CLINTON COUNTY (WATERTOWN TOWNSHIP)

AVIGATION EASEMENT INTEREST LISTED AS FOLLOWS:

NOTES	FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES	CONTROLLING HEIGHT
	9-20-035-003	E-6	M GORDON	A-E	277-334	9-20-54	1.97	ZO 7-23-53
	9-20-035-003	E-8	V JONES	A-E	273-118	2-17-53	39.0	40:101+50 (RUNWAY ABANDONED)
	9-20-035-003	E-14	MEMORIAL GARDENS	A-E	295-242	6-19-58	39.46	ZO
	9-20-035-003	E-15	S THINGSTEAD	A-E	293-109	2-24-58	12.0	ZO 9-22-53
	9-20-035-003	E-24	M GROSS	A-E	273-120	2-17-53	20.0	40:101+50 (RUNWAY ABANDONED)
2-	9-20-035-6215	E-45	J GLASOVATZ	A-E	311-682	12-16-63		898 MSL
	9-20-035-6215	E-46	W VERHOEVEN	A-E	306-972	5-19-62	0.18	895 MSL
	9-20-035-6215	E-48	M VERHOEVEN	A-E	306-976	5-19-62	0.33	895 MSL
	6-26-0055-04	E-193	MEMORIAL GARDENS ASSOC	C-A-E	381-318	2-5-81	8.63	867 MSL
1-	6-26-0055-04	E-193	MEMORIAL GARDENS ASSOC	CLL-E		2-5-81	1.91	867 MSL
							TOTAL ACRES	122.40

NOTES:

1- 1.08 ACRES OF THIS 1.91 ACRES IS ALSO INCLUDED IN THE 8.63 ACRES LISTED AS C-A-E.
2- PART OF E-45 IS LOCATED IN EATON COUNTY RECORDED LIBER 357 PAGE 28.

EATON COUNTY (DELTA TOWNSHIP)

TITLE IN FEE SIMPLE INTEREST AS FOLLOWS:

FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES
9-20-035-6215	35	J MILLER	WD	351-43	11-5-62	1.9
9-20-035-6215	54	J MITCHELL	WD	353-516	7-26-63	0.24
9-20-035-6215	55	J CHRISTIE	WD	352-440	4-26-63	0.48
9-20-035-6215	56	H ILER	WD	351-44	11-5-62	1.2
9-20-035-6215	57	W TURK	WD	351-121	11-14-62	1.9
3-26-0055-2196	89	P SPADAFORE	WD	931-937	1-4-93	0.38
					TOTAL ACRES	6.10

EATON COUNTY (DELTA TOWNSHIP)

AVIGATION EASEMENT INTEREST LISTED AS FOLLOWS:

FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES	CONTROLLING HEIGHT
9-20-035-6215	E-45	J GLASSOVATZ	A-E	357-28	12-16-63	0.35	898 MSL
9-20-035-6215	E-49	H VERHOEVEN	A-E	348-271	5-19-62	7.8	895 MSL
					TOTAL ACRES	8.15	

INGHAM COUNTY (CITY OF LANSING)

TITLE IN FEE SIMPLE INTEREST AS FOLLOWS:

FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES
9-20-035-6012	3	J MILLER	WD	668-448	10-25-62	1.5
9-20-035-6012	7	J MITCHELL	WD	668-450	11-4-52	6.07
9-20-035-6012	9	J CHRISTIE	WD	668-452	11-25-52	0.16
9-20-035-6012	9CV	H ILER	CV	668-452	11-25-52	
---			DECREE	672-95	5-22-53	
NOT ELIGIBLE	59	STATE HEALTH DEPT	QC	338-797	2-18-54	31.0
					TOTAL ACRES	38.73

INGHAM COUNTY (CITY OF LANSING)

EASEMENT INTEREST LISTED AS FOLLOWS:

NOTE	FEDERAL PROJECT NO	PARCEL NO	GRANTOR	TITLE	LIBER & PAGE	DATE ACQ.	ACRES
3.	---	E10W	FARM BUREAU	WE	55-218MR	4-20-58	---

3. FOLLOWED BY A SUPPLEMENTAL AGREEMENT AS RECORDED IN LIBER 56 MR PAGE 375 I.C.R.

TOTAL ACRES IN EASEMENT 158.15 AC ±

TOTAL ACRES IN FEE 1959.86 AC ±

INSTRUMENT INDEX

WD	=	WARRANTY DEED
QC	=	QUIT CLAIM DEED
C	=	CONDEMNATION
DJ	=	DEFAULT JUDGMENT
MR	=	MISCELLANEOUS RECORDS
AE	=	AVIGATION EASEMENT
LLE	=	LIGHT LANE EASEMENT
WE	=	WATER MAIN EASEMENT
RRE	=	RAILROAD EASEMENT
CV	=	CLEAR VISION
ZO	=	ZONING ORDINANCE
MSL	=	MEAN SEA LEVEL
GL	=	GROUND LEVEL

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CAPITAL REGION AIRPORT AUTHORITY

CAPITAL CITY AIRPORT

AIRPORT LAYOUT PLAN

CONSULTANTS

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CONWAY CONSULTING
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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 12-6-06
REVIEWED BY: MRK
DRAWN BY: TJM
DESIGNED BY: NAW

AEP PROJECT NUMBER
213-9391-007

SHEET TITLE

AIRPORT PROPERTY DATA

SHEET NUMBER

18B OF 18

CHAPTER 7
IMPLEMENTATION PLAN

7.1 Introduction

The implementation plan consists of a project phasing plan and a financial plan. The phasing plan will identify likely time frames for facility development identified in the master plan. The financial plan addresses the financial feasibility of the proposed capital plan for the Airport.

7.2 Phasing Plan

The phasing plan time frames are identified as short-term, long-term, or ultimate. Short-term refers to facilities for which there is a current demand and implementation should begin immediately. Long-term refers to facilities for which demand will likely occur beyond five years to the end of the 20-year planning period. The ultimate facilities are those for which a demand is not foreseen in the planning period, but could materialize with demand change, or likely will materialize beyond the planning period.

The short term phase development includes a description of the development and estimated cost estimate. For long term and ultimate phase, only the project is identified.

The master plan recommends long-term development of a replacement passenger terminal. As a result of the plan recommendation to replace the terminal, a separate Short Term Terminal Optimization Plan (TOP) was completed to assess ways to accommodate interim passenger growth at the airport and maintain a high level of service, while being cognizant of the cost implications and the ultimate goal of replacement. The phasing plan includes and identifies improvements resulting from the TOP.

7.2.1 Short-Term Phase

- Runway 10R-28L extension

  The extension of Runway 10R-28L is a facility requirement driven by current demand. The first phase of the extension, a 750-foot extension, was completed in 2005. The second phase includes a further 500-foot extension to a total runway length of 8,501 feet. The total extension requires an environmental assessment, which has been completed. Enabling projects for this second extension include land acquisition south of the runway, the relocation of DeWitt Road, and relocation of the airport service road.

- Existing terminal improvements

  The TOP identified a number of interim terminal improvements. These improvements include four additional loading bridges, improvements to lower level security, circulation and concessions, additional rental car counters and office, and expanded bag claim facilities. The combined cost for these improvements is approximately $2.5 million. The TOP also identified the potential need for FIS screening facilities for international traffic. The approximate cost for this addition is $3.0 million.

- Additional employee parking, rental car storage and long-term parking

  The master plan identified a deficit in employee parking and in rental car storage. The TOP identified a deficit in long-term parking during peak periods. The long-term and employee parking and rental car storage needs will be met through a two-phased approach, utilizing existing Airport property southwest of the existing parking lot. The first phase will use undeveloped land. The second phase will require relocation of the rental car cleaning and storage facilities, preliminarily sited in the new terminal area. The Phase 1 estimated development cost is $975,000, and the Phase 2 estimated cost, including rental car facility relocation, is $2.48 million.

- T-hangar and conventional hangars

  As general aviation activity continues to grow, demand for hangar facilities also grows. There is a short term demand for eight additional T-hangars with a development cost of $350,000, and conventional hangar space for eight additional aircraft (16,000 square feet total) at a development cost of $750,000.

- General aviation apron and access taxilanes

  The master plan has also identified a shortfall in the amount of apron available for general aviation aircraft parking. The deficit and requirement will grow as aircraft activity increases throughout the planning period. In the short term phase, there is a need for approximately 3,000 to 3,500 square yards of pavement at an estimated cost of approximately $281,000. In addition, there is a need for associated access taxilane development for the apron and hangar development, at an estimated cost of approximately $413,000.

- Air cargo sort facility expansion and apron expansion

  The current air cargo sort facility exceeds the facility capacity during peak periods of the year. The forecast and facility requirements indicate that the space deficit will become continuous near the beginning of the long term period.

  The inventory and facility requirements analyses did not identify a deficit of cargo apron as a function of total available apron space. However, the current cargo facility configuration and the placement of cargo aircraft and vehicles frequently results in apron and taxilane congestion. In addition, the Airport Authority's strategic goals include continued growth in cargo activity. Therefore, the phasing plan identifies a short term cargo apron expansion of 7,500 square yards at an estimated cost of $844,000.

  Commensurate with cargo activity growth, and facility growth, the associated landside facilities for vehicle and truck parking, as well as service vehicle storage, will also need to grow. The short term development includes a 3,400 square yard expansion at an estimated cost of $319,000.

- The master plan identifies the need for additional fuel storage capacity. There is an initial need for approximately 60,000 gallons of Jet A fuel storage (at an estimated cost of $650,000), with an additional 30,000 gallons needed during the long term phase.

7.2.2 Long-Term Phase

Development Project	Estimated Cost
Conventional general aviation hangars	$1.13 million
General aviation apron	$0.33 million
Air cargo sort facility and apron expansion	$5.06 million
Replacement terminal	$213.8 million
Fuel storage	$0.33 million

The master plan facility requirements also identify the long term potential need for development of a replacement airport traffic control tower (ATCT) and additional fuel storage capacity. The necessity and phasing of the ATCT is dependent on redevelopment plans for the site of the existing terminal and the potential upgrade of equipment in the existing ATCT and associated space requirements.

7.2.3 Ultimate Phase

Development Project	Estimated Cost
Second air carrier runway	
Option 1 – new Runway 10L-28R	$86.16 million
Option 2 – extend / upgrade Runway 6-24	$26.62 million

The selection of the runway option is dependent on the required additional airfield capacity. Option 1 provides significantly more capacity. Actual activity levels and forecasts will need to be assessed during the planning period.

7.3 Financial Plan

This section of the master plan update assesses the financial feasibility of proposed capital improvements at Capital City Airport. The analysis and implications cover approximately a 20-year planning period (2006 to 2023). The ability of the Capital Region Airport Authority to undertake its share of improvements proposed in the Master Plan Update Capital Improvement Program (CIP) is critical. This analysis will examine what cost burdens the Authority can incur while maintaining the ability to generate sufficient revenues in the future to cover operations and existing debt service obligations. The financial plan is broken into several elements including, but not limited to, the following:

- Examination of the Airport's historical financial structure including revenue sources, expense categories, debt service obligations and recent trends in operating expenses and revenues.
- A phased plan of scheduled/proposed capital projects covering the master plan period. The planning period is subdivided into two phases: Short-term (2006 to 2008) and Long-term (2009 through 2023). These phases are in line with the forecast periods presented in Chapter 2 Aviation Demand Forecast. The phasing plan also includes a proposed funding plan, including the anticipated Authority funding obligations.
- A funding sources overview including traditional sources such as the Federal Aviation Administration (FAA), the Michigan Department of Transportation (MDOT) Aeronautics

Department, as well as other sources including third party developers, and local sources and cash reserves.

- An analysis of Passenger Facility Charge (PFC) revenue and their use in funding future Airport improvements.
- A projection of future revenues and expenses. This analysis will provide insight into self-funded leveraging options for the Authority to examine, particularly in the intermediate and long-range planning horizon.

An airport's financial structure and position can change dramatically from year to year. Financial projections for the intermediate and long-range planning phases should be viewed accordingly. These projections, while representative of order of magnitude, are difficult and more importantly impractical to use as a meaningful financial planning tool for several reasons including, but not limited to, the following:

1. The priorities in funding initially identified capital improvements may change. Market conditions may cause changes in needed facilities, require new facilities or redefine priorities.

2. Safety and security improvements, whether they are reflected in the CIP or not, may require immediate funding.

3. Cost estimates to provide certain improvements can fluctuate dramatically when considering factors such as technological advancements and economies of scale related to undertaking several improvements at once.

It is recommended that the Financial Plan, including the CIP, be utilized as a working tool, which should be updated annually and incrementally every five years. Capital improvements, their associated costs and financial projections should be re-examined periodically throughout the planning period even though the figures contained herein present a reasonable forecast of needed initiatives to implement the Master Plan Update recommendations.

7.3.1 Authority Financial Structure

The Capital Region Airport Authority was created in 1970 pursuant to Act No. 73 of the Public Acts of Michigan. From 1929 until 1971, Capital City Airport was owned and operated by the State of Michigan and governed by the Michigan Aeronautics Commission. A regional authority was created in 1971, with the City of Lansing and Ingham County.

A six-member Board of Directors governs the Authority. The Board consists of three voting members appointed by the Mayor of the City of Lansing and confirmed by the City Council, and three voting members appointed by the Ingham County Board of Commissioners.

7.3.2 Historical Cash Flow

The Airport's historical cash flow is presented in **Table 7-1** and graphically depited on **Exhibit 7-1**. The largest source of operating revenue in Budget FY 2006 is derived from various terminal space rentals, followed closely by airline landing fees. Total operating revenue has increased over the 1999 to 2006 time period from $5.9 million in FY 1999 to $7.3 million in Budget FY 2006.

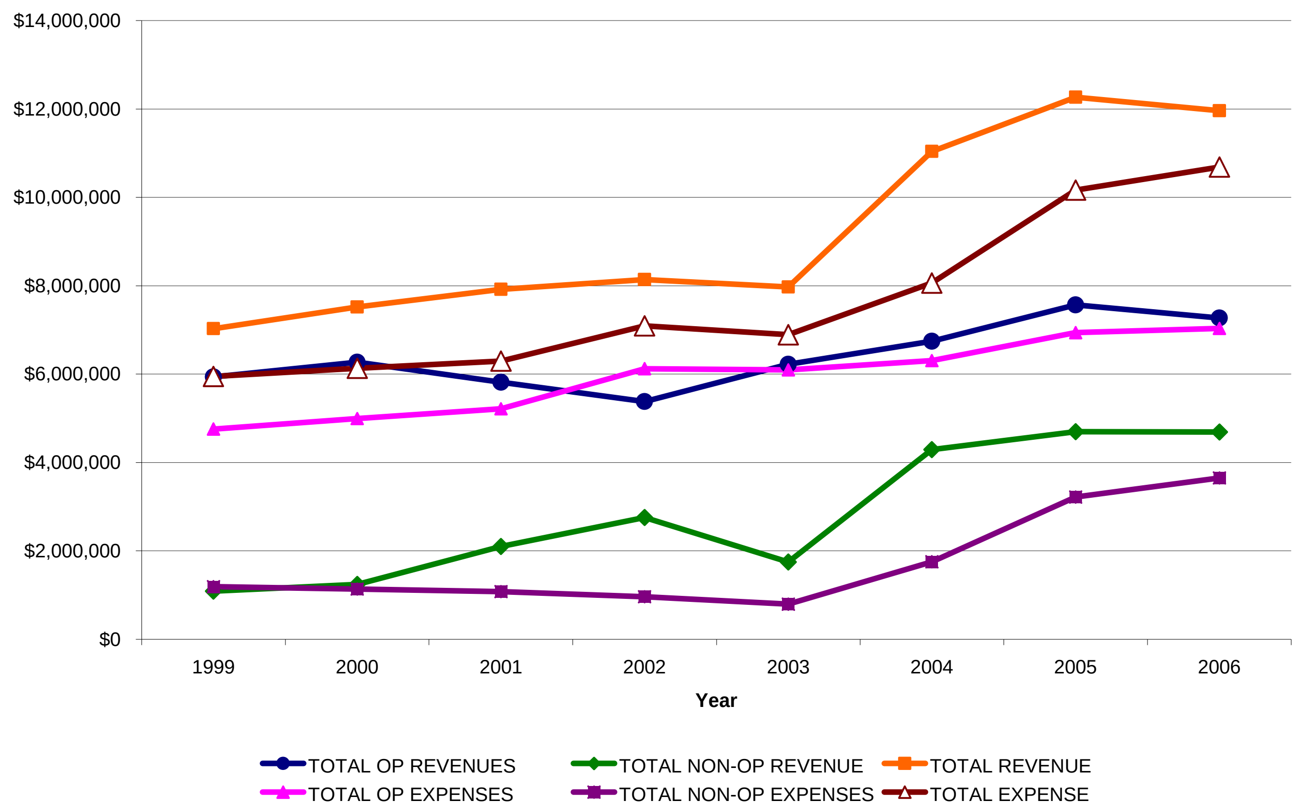
Historical expenses at the Airport during the same period are also depicted in Table 7-1. As shown, salaries account for nearly 40.0 percent of the Authority's total operating expenses in Budget FY 2006. Total operating expenses have increased from $4.8 million in FY 1999 to $7.0 million in Budget FY 2006, representing an average annual growth rate of 5.0 percent.

The Airport generated Operating Income of $1.2 million in FY 1999, decreasing to $0.2 million in Budget FY 2006. Operating Income is increased by Non-Operating revenues and decreased by Non-Operating Expenses to determine Surplus Revenue at the Airport during this period. As shown, Surplus Revenue increased from $1.1 million in FY 1999 to $1.3 million in Budget FY 2006.

Table 7-1
HISTORICAL CASH FLOW

	Actual 1999	Actual 2000	Actual 2001	Actual 2002	Actual 2003	Actual 2004	Actual 2005	Budget 2006
OPERATING REVENUE								
Landing Fees	$1,102,170	$1,260,712	$1,019,915	$936,462	$1,228,663	$1,326,227	$1,637,293	$1,575,000
Apron Fees	127,779	133,586	116,723	108,040	146,100	159,543	188,035	150
Aviation Fuel Sales	76,322	90,065	81,944	85,409	88,199	90,514	83,701	90,000
Land Rentals	690,047	645,488	638,105	665,052	701,395	774,844	698,047	690,048
Wireless Tower Revenue							21,516	20,000
Parking Lot Fees	1,371,854	1,488,253	1,410,318	1,223,022	1,143,820	1,364,660	1,630,861	1,650,000
Terminal Space Rental	1,647,136	1,677,420	1,606,560	1,496,430	1,938,584	1,899,458	2,087,308	2,000,000
Terminal Concessions	771,564	825,271	797,207	720,689	677,383	745,086	770,344	800,000
Loading Bridges	36,110	34,830	25,620	28,110	40,690	39,830	36,470	35,000
Skycap Services	0	0	0	0	50,400	49,054	50,400	50,000
Airline Screening	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900
Mason Jewett Field	50,361	52,900	55,857	53,627	142,557	232,937	298,150	296,163
TOTAL OP REVENUES	$5,937,243	$6,272,425	$5,816,149	$5,380,741	$6,221,691	$6,746,053	$7,566,026	$7,270,261
OPERATING EXPENSES								
Salaries	$1,925,180	$2,093,248	$2,139,893	$2,508,872	$2,249,892	$2,522,340	$2,603,258	$2,621,131
Fringe Benefits	832,501	891,081	1,048,064	1,226,963	1,290,241	1,454,652	1,679,423	1,700,000
Maintenance Material	319,974	304,750	344,082	310,320	408,226	376,613	342,801	350,000
Special Maintenance	349,265	380,500	408,508	319,956	300,164	336,002	376,581	375,000
Electricity	269,792	260,085	253,281	251,661	270,470	279,567	291,615	300,000
Other Utilities	79,973	60,464	66,975	77,814	102,893	110,309	132,003	135,000
Janitorial Services	172,356	177,442	183,711	198,528	214,992	217,392	217,392	218,000
Contractual Service	63,493	68,505	76,407	56,521	55,628	52,206	79,237	80,000
Fuel and Oil	16,034	20,337	33,854	23,027	123,496	179,007	233,949	240,000
Security Expense	0	0	0	417,514	49,835	238,525	221,180	225,000
Insurance	66,363	69,394	71,008	76,592	97,152	109,227	126,504	135,000
Telephone	35,307	29,729	31,615	35,617	49,718	40,005	45,714	46,000
Supplies	8,678	13,830	12,897	12,485	18,095	18,355	13,571	13,500
Postage	3,172	2,570	3,127	3,138	3,971	5,218	5,920	6,000
Education and Travel	60,742	71,688	69,062	71,872	63,199	61,907	70,007	70,000
Business Expense	0	0	0	0	26,201	27,668	17,619	18,000
Air Service Visitations	0	0	0	0	0	10,217	2,794	60,000
Special Events	0	0	0	0	9,563	7,604	10,436	10,500
Dues and Subscriptions	20,914	24,241	25,755	22,659	22,528	18,634	24,194	25,000
Advertising	5,413	14,067	17,960	22,179	28,176	25,550	23,653	25,000
Professional Services	304,744	350,911	239,437	151,615	210,909	122,975	190,935	150,000
Marketing	0	0	0	0	462,657	0	74,848	75,000
Other Expenses	15,573	8,149	8,598	21,506	19,011	13,487	155,363	155,000
TOTAL OP EXPENSES	$4,759,150	$4,997,005	$5,216,011	$6,124,618	$6,093,957	$6,309,157	$6,941,599	$7,033,131
OPERATING INCOME	$1,178,093	$1,275,420	$600,138	($743,877)	$127,734	$436,896	$624,427	$237,130
NON-OPERATING REVENUE								
Earnings on Investments	$220,244	$228,104	$303,190	$132,117	$86,499	$44,372	$85,172	$85,000
Earnings on Bonds							$24,965	
Other Miscellaneous							3,280	3,000
Discounts Taken							305	
DPS- Security Income	776,936	967,747	875,579	730,119	966,076	1,091,748	(1,590)	
DPS- Citation Income							244	
PFC Revenue							1,433,700	1,400,000
Miscellaneous Income	7,133	13,286	38,333	49,107	26,024	22,753	0	20,000
Web Site Revenue	0	0	0	0	0	2,401	5,749	5,000
Tax Revenue	0	0	883,873	951,633	636,530	3,128,393	3,141,313	3,174,055
TOTAL NON-OP REVENUE	$1,092,280	$1,245,365	$2,100,975	$2,755,590	$1,747,209	$4,292,767	$4,699,443	$4,687,055
NON-OPERATING EXPENSES								
Bond Interest and Fees	$1,187,013	$1,134,167	$1,078,842	$961,640	$791,266	$704,625	$750,289	$650,000
Miscellaneous Expenses	3,656	2,111	2,718	4,086	4,145	2,853	0	4,000
Air Service Development	0	0	0	0	0	1,045,127	1,471,108	2,000,000
Capital Purchases/Tax Funded	0	0	0	0	0	0	1,000,000	1,000,000
TOTAL NON-OP EXPENSES	$1,190,669	$1,136,278	$1,081,560	$965,726	$795,411	$1,752,605	$3,221,397	$3,654,000
SURPLUS REVENUE	$1,079,704	$1,384,507	$1,619,553	$1,045,987	$1,079,532	$2,977,058	$2,102,473	$1,270,185

Exhibit 7-1
HISTORICAL CASH FLOWS



7.3.3 Capital Improvement Program

Based on the facility requirements and alternatives developed in previous sections of this master plan update and the Authority's existing airport capital improvement program (ACIP), a CIP and phasing plan have been recommended that incorporate the facility requirements during the 20-year planning period. Each project has been assigned to a particular planning period previously described.

Based on the identified capital improvement projects, their associated costs, and eligible funding amounts, a proposed funding plan was developed. In developing the financing plan, the overriding objective was to maximize the use of external sources and to minimize local funding requirements. In an effort to present the most realistic total cost for the CIP, the project costs were inflated from the 2005 base year to the corresponding year of construction for all airport development.

The Authority's CIP is presented in **Table 7-2** and **Table 7-3**. Table 7-2 presents a list of projects for each year of the short-term planning period (i.e., 2006-2008) with estimated project costs and eligible funding sources. Probable costs were estimated from various costs sources in year 2005 dollars and are considered appropriate for planning and budgeting purposes. Before construction of a specific project commences, detailed costs will be determined.

As shown in Table 7-2, total inflated costs for the short-term development is estimated at $32.9 million. The following funding sources have been identified to pay for the total cost of these projects:

- Federal Aviation Administration (FAA) $25.5 million
- MDOT $1.2 million
- Third Party $1.2 million
- Local $5.1 million

Table 7-2
SHORT-TERM CAPITAL IMPROVEMENT PROGRAM

Year	Item	Description	Total Cost	Total Inflated Cost	Federal	State	Third Party	Local
2006	1	Long-Term Parking Phase 1	$975,000	$1,004,000	$0	$0	$0	$1,004,000
2006	2	Extend RW 28L - 750 feet Phase 1	4,800,000	4,944,000	4,696,800	0	0	247,200
		Yearly Sub-Total	$5,775,000	$5,948,000	$4,696,800	$0		$1,251,200
2007	3	Runway 28L Extension - 1250 Ft.	$0	$0	$0	$0	$0	$0
2007	4	Extend RW 28L - 500 feet Phase 2	11,700,000	12,413,000	11,792,350	310,325	0	310,325
2007	5	Install 4 Loading Bridges	1,150,000	1,220,000	1,159,000	30,500	0	30,500
2007	6	Resurface TW A/Air Carrier Ramp	531,700	564,000	535,800	14,100	0	14,100
2007	7	Construct TW to East Ramp	400,000	424,000	402,800	10,600	0	10,600
2007	8	Lower Level Security, Circulation, Concessic	815,000	865,000	821,750	21,625	0	21,625
2007	9	Ticket Lobby Security	235,000	249,000	236,550	6,225	0	6,225
2007	10	Second Level Secure Concessions	60,000	64,000	60,800	1,600	0	1,600
2007	11	Rental Car Counters/Offices	5,000	5,000	0	0	0	5,000
2007	12	Bag Claim	237,500	252,000	239,400	6,300	0	6,300
2007	13	FIS	3,000,000	3,183,000	3,023,850	79,575	0	79,575
		Yearly Sub-Total	$18,134,200	$19,239,000	$18,272,300	$480,850		$485,850
2008	14	Long-Term Parking Phase 2	$2,475,000	$2,704,000	$0	$67,600	$0	$2,636,400
2008	15	T-Hangars - 8 ea.	350,000	382,000	0	0	382,000	0
2008	16	Conventional Hangars - 8 ea.	750,000	820,000	0	0	820,000	0
2008	17	GA Apron - 3,000 SY	281,250	307,000	276,300	0	0	30,700
2008	18	GA Taxilanes	412,781	451,000	405,900	0	0	45,100
2008	19	Cargo Apron - 7,500 SY	843,750	922,000	829,800	0	0	92,200
2008	20	Land Acquisition for Future Development	1,000,000	1,093,000	983,700	0	0	109,300
2008	21	Cargo Landside Area - 3,400 SY	318,750	348,000	0	0	0	348,000
2008	22	Fuel Storage	650,000	710,000	0	639,000	0	71,000
		Yearly Sub-Total	$7,081,531	$7,737,000	$2,495,700	$706,600	$1,202,000	$3,332,700
		Short-Term Development Total	$30,990,731	$32,924,000	$25,464,800	$1,187,450	$1,202,000	$5,069,750

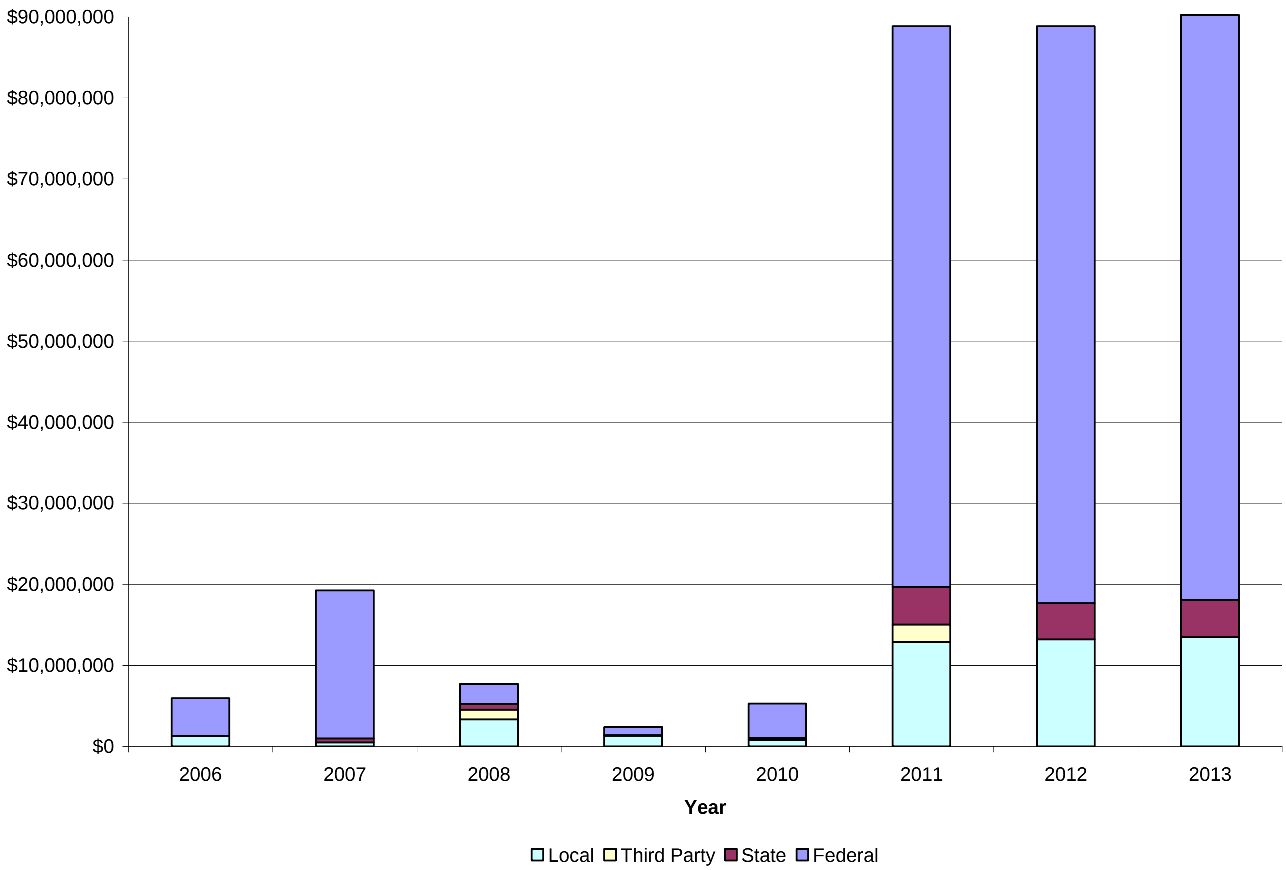
It should be noted that the actual timing of development should be re-assessed each year based on both availability of funds, as well as actual need and demand for facilities and improvements.

The CIP and funding sources for the long-term development are presented in **Table 7-3** and **Exhibit 7-2.**

Table 7-3
LONG-TERM CAPITAL IMPROVEMENT PROGRAM

Item	Description	Total Cost	Total Inflated Cost	Federal	State	Third Party	Local
23	Conventional Hangars - 12 ea.	$1,125,000	$1,266,000	$0	$0	$0	$1,266,000
24	Land Acquisition for Future Development	1,000,000	1,126,000	1,013,400	56,300	0	56,300
	Yearly Sub-Total	$2,125,000	$2,392,000	$1,013,400	$56,300		$1,322,300
25	GA Apron - 3,500 SY	$328,125	$380,000	$342,000	$19,000	$0	$19,000
26	Cargo Apron - 24,500 SY	2,756,250	3,195,000	2,875,500	159,750	0	159,750
27	Cargo Landside Area - 5,100 SY	478,125	554,000	0	0	0	554,000
28	Land Acquisition for Future Development	1,000,000	1,159,000	1,043,100	57,950	0	57,950
	Yearly Sub-Total	$4,562,500	$5,288,000	$4,260,600	$236,700		$790,700
29	New Cargo Processing Facility	$1,825,000	$2,179,000	$0	$0	$2,179,000	$0
30	Replacement Terminal - Phase 1	71,255,392	85,083,000	68,066,400	4,254,150	0	12,762,450
31	Land Acquisition for Future Development	1,000,000	1,194,000	1,074,600	59,700	0	59,700
32	Fuels Storage	325,000	388,000	0	349,200	0	38,800
	Yearly Sub-Total	$74,405,392	$88,844,000	$69,141,000	$4,663,050	$2,179,000	$12,860,950
33	Replacement Terminal - Phase 2	$71,255,392	$87,635,000	$70,108,000	$4,381,750	$0	$13,145,250
34	Land Acquisition for Future Development	1,000,000	1,230,000	1,107,000	61,500	0	61,500
	Yearly Sub-Total	$72,255,392	$88,865,000	$71,215,000	$4,443,250	$0	$13,206,750
35	Replacement Terminal - Phase 3	$71,255,392	$90,264,000	$72,211,200	$4,513,200	$0	$13,539,600
	Yearly Sub-Total	$71,255,392	$90,264,000	$72,211,200	$4,513,200	$0	$13,539,600
	Long-Term Development Total	$224,603,677	$275,653,000	$217,841,200	$13,912,500	$2,179,000	$41,720,300
	TOTAL CIP	$255,594,408	$308,577,000	$243,306,000	$15,099,950	$3,381,000	$46,790,050
	PERCENT OF TOTAL INFLATED COST			78.8%	4.9%	1.1%	15.2%

Exhibit 7-2
CAPITAL IMPROVEMENT PLAN FUNDING SOURCES



7.3.4 CIP Funding Sources

As mentioned earlier in this Section, it is assumed that the CIP will be funded from a combination of funding sources. These sources include:

- Federal Grants
- State Grants
- Third Party
- Passenger Facility Charge
- Local funding

Each of these potential funding sources is discussed in more detail below.

7.3.4.1 Federal Grants / FAA Funding

Airport sponsors are eligible for FAA funding for specifically approved airport projects through the FAA's Airport Improvement Program (AIP). The federal government has been involved in supporting aviation development since 1916. The Airport and Airway Improvement Act of 1982 established the current federal funding mechanism, known as AIP, which provides funding for eligible airport planning, development and noise compatibility projects at public-use airports. While the law has been reauthorized several times, and the amounts appropriated and the funding formulas adjusted to reflect then current national priorities, the basic program has remained essentially the same.

The AIP provides "entitlement" funds for commercial service and cargo airports based on the number of annual enplaned passengers and landed cargo weight at a specific airport. Other appropriations of AIP funds go to states, general aviation airports, other commercial service airports and noise compatibility planning and programs. Any remaining funds are designated as "discretionary" funds and may be used by the FAA for funding eligible projects, which typically enhance airport capacity, safety and security. In some years, discretionary funding has been specifically directed to certain national priorities.

The Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR-21), was signed into law by President Clinton in April 2000. This legislation increased funding for the nation's airports to ensure that tax revenues collected from aviation users and deposited into the Airport and Airway Trust Fund will be dedicated to aviation spending. This four-year bill authorized for the Airport Improvement Program at $2.475 billion in fiscal year 2000, $3.2 billion in 2001, $3.3 billion in 2002, and $3.4 billion in 2003.

The current FAA reauthorization bill, titled "Vision 100 – Century of Aviation Reauthorization Act," was signed by President Bush on December 16, 2003. For the purposes of this analysis, it was assumed that the federal government will continue to participate in funding airport capital projects over the next 20 years based on the levels authorized in Vision 100.

7.3.4.2 State Grants / MDOT Funding

The State of Michigan provides funding to public airport sponsors for eligible projects through the Michigan Department of Transportation (MDOT), Aeronautics Department. Michigan has enacted aviation user taxes that are used to support eligible aviation development at airports in the state of Michigan.

In general, the state participates in matching the local share of AIP eligible projects. It was assumed that the MDOT funding for future airport development would continue at this level.

7.3.4.3 Third Party Development

Additional sources of revenue could include third party financing. One example of how this source of funding works is when an airport sponsor uses a third party developer to finance a construction project. Only projects with a strong positive cash flow can support this type of financing. Generally, the third party leases the structure for a period of years to the tenant paying the airport ground rents. According to the terms of the agreement, the airport sponsor receives ownership of the asset upon expiration of the lease. This method of financing reserves the airport sponsor's cash for higher priority projects including airside improvements, which are not usually funded by third party financing. Projects that are amenable to this type of funding include general aviation hangar development, corporate hangars and cargo facilities.

7.3.4.4 Passenger Facility Charge

The Aviation Safety and Capacity Expansion Act of 1990 authorized the Secretary of Transportation to grant public agencies the authority to impose a Passenger Facility Charge (PFC) to fund eligible airport projects. The initial legislation set the maximum PFC level at $3.00 per enplaned passenger. AIR 21 increased the maximum PFC level from $3.00 to $4.50. Although the FAA is required to approve collection and use of PFCs, the program allows for local collection of PFC revenue through the airlines operating at an airport and provides more flexibility to airport sponsors than AIP funds.

The Authority has submitted and the FAA has approved two different PFC applications for use at the Airport. The Authority has increased the PFC level to $4.50 in both of the applications and is authorized to use a total of $39,127,841 in PFC revenue. The most recent PFC application approved by the FAA permits the Authority to use PFC revenues on existing projects through 2022. As a result, future PFC revenues were determined to be unavailable to reduce the capital cost of the projects included in the Master Plan CIP.

7.3.4.5 Local Funding

Remaining project costs must be financed through local sources. The local share of project costs is assumed to come primarily from two sources: the Authority's annual cash flow and unrestricted cash reserves and revenue/general obligation bonds for projects included in the last three years of the long-term development program.

The following financing assumptions have been utilized in this analysis to estimate the total bonding requirement and the resulting annual debt service:

- The bond proceeds will pay for the net cost of the CIP for the capital projects in 2011 through 2013, including capitalized interest and cost of issuance. The largest project during this time period is the construction of the Replacement Terminal (Phases 1 through 3).
- The bonds will bear an average interest rate of 6.5 percent.
- Interest will be capitalized for three years and included in the bond proceeds.
- Financing costs are assumed to be 2.0 percent of the net bonding requirement.
- Bond proceeds deposited into the construction fund will earn interest at the rate of 4.5 percent per year, until the funds are expended.
- The bonds will have a 30 year term, with a 27 year principal amortization period (30 year term less construction period of three years).

Based on the funding scenario presented for the projects in these years, the Authority will need to issue approximately $49.0 million in bonds to fund the local requirement for the last three years of development in the long-range CIP. As shown in **Table 7-4**, the annual debt service on these bonds would amount to $3.9 million based on the financing assumptions discussed above.

Table 7-4
ESTIMATED AVERAGE ANNUAL DEBT SERVICE

Description	Total
LOCAL BOND FUNDING REQUIREMENT	$39,607,300
PLUS:	
Capitalized Interest [1]	$9,564,612
Financing Costs [2]	980,986
TOTAL ADDITIONS	$10,545,598
LESS:	
Investment Earnings [3]	$1,103,609
NET BONDING REQUIREMENT	$49,049,289
ANNUAL DEBT SERVICE [4]	$3,756,000

[1] Capitalized interest estimated at 6.5% for three years.

[2] 2% of Net Bonding Requirement

[3] 4.5% of half of Net Bonding Requirement

[4] 6.5% for 30 years.

7.3.5 Development Plan Financing Summary

Based on the funding sources and assumptions identified earlier in this section, the overall financing plan for FY 2006 through FY 2023 is presented in **Table 7-5** and summarized as follows:

- Total inflated project costs are $308.6 million.
- AIP entitlement and discretionary funds in the amount of $243.3 million are estimated to be available from the FAA.
- Approximately $15.1 million in MDOT funds are anticipated over the planning period.
- Third party development will account for $3.4 million in capital projects at the Airport, representing 1.1 percent of the total development.
- Once these sources are accounted for, approximately $46.8 million in additional local funds will need to be funded from the Airport's earnings and reserves, or the issuance of debt. These additional local funds will allow the recommended capital projects to be fully implemented.

Table 7-5
CAPITAL IMPROVEMENT PROGRAM SUMMARY

Term	Total Cost	Total Inflated Cost	Federal	State	Third Party	Local
Short-Term Development	$30,990,731	$32,924,000	$25,464,800	$1,187,450	$1,202,000	$5,069,750
Long-Term Development	224,603,677	275,653,000	217,841,200	13,912,500	2,179,000	41,720,300
Total Development Cost	$255,594,408	$308,577,000	$243,306,000	$15,099,950	$3,381,000	$46,790,050
Percent of Total			78.8%	4.9%	1.1%	15.2%

7.3.6 Pro-Forma Cash Flow Analysis

A pro-forma cash flow analysis for the entire planning period is presented in **Table 7-6**. These figures were projected based on historical trends and enplanement growth. The following summarizes the projections used to develop the pro-forma cash flow:

- In general, total operating revenues from budget FY 2006 were increased by 2.5 percent per year. In addition:
  - Aviation fuel sales were also increased by the growth of annual general aviation operations at the Airport (0.6 percent each year).
  - Parking lot fees and terminal concessions were increased by the projected growth of enplanements over the planning period. In addition, parking lot fees were increased by an additional 9.8 percent in FY 2007 and FY 2009 to account for the additional parking spaces as a result of the CIP.
  - Total operating revenue is anticipated to increase from $7.3 million in FY 2006 to $13.6 million in FY 2023, representing an average annual growth rate of 3.8 percent.
- Total operating expenses were increased by 4.3 percent each year and are anticipated to increase from $7.0 million in FY 2006 to FY $14.4 million in FY 2023.

Table 7-6
PROFORMA CASH FLOW
(Page 1 of 4)

	Budget 2006	Projected 2007	Projected 2008	Projected 2009	Projected 2010
OPERATING REVENUE					
Landing Fees	$1,575,000	$1,614,375	$1,654,734	$1,696,103	$1,738,505
Apron Fees	150	154	158	162	166
Aviation Fuel Sales	90,000	92,804	95,694	98,675	101,749
Land Rentals	690,048	707,299	724,982	743,106	761,684
Wireless Tower Revenue	20,000	20,500	21,013	21,538	22,076
Parking Lot Fees	1,650,000	1,949,842	2,194,450	2,593,231	2,753,752
Terminal Space Rental	2,000,000	2,050,000	2,101,250	2,153,781	2,207,626
Terminal Concessions	800,000	900,360	1,013,310	1,076,034	1,142,641
Loading Bridges	35,000	35,875	36,772	37,691	38,633
Skycap Services	50,000	51,250	52,531	53,845	55,191
Airline Screening	63,900	65,498	67,135	68,813	70,534
Mason Jewett Field	296,163	303,567	311,156	318,935	326,909
TOTAL OP REVENUES	$7,270,261	$7,791,523 1929160	$8,273,185	$8,861,914	$9,219,464
OPERATING EXPENSES					
Salaries	$2,621,131	$2,733,840	$2,851,395	$2,974,005	$3,101,887
Fringe Benefits	1,700,000	1,773,100	1,849,343	1,928,865	2,011,806
Maintenance Material	350,000	365,050	380,747	397,119	414,195
Special Maintenance	375,000	391,125	407,943	425,485	443,781
Electricity	300,000	312,900	326,355	340,388	355,025
Other Utilities	135,000	140,805	146,860	153,175	159,761
Janitorial Services	218,000	227,374	237,151	247,349	257,985
Contractual Service	80,000	83,440	87,028	90,770	94,673
Fuel and Oil	240,000	250,320	261,084	272,310	284,020
Security Expense	225,000	234,675	244,766	255,291	266,268
Insurance	135,000	140,805	146,860	153,175	159,761
Telephone	46,000	47,978	50,041	52,193	54,437
Supplies	13,500	14,081	14,686	15,317	15,976
Postage	6,000	6,258	6,527	6,808	7,100
Education and Travel	70,000	73,010	76,149	79,424	82,839
Business Expense	18,000	18,774	19,581	20,423	21,301
Air Service Visitations	60,000	62,580	65,271	68,078	71,005
Special Events	10,500	10,952	11,422	11,914	12,426
Dues and Subscriptions	25,000	26,075	27,196	28,366	29,585
Advertising	25,000	26,075	27,196	28,366	29,585
Professional Services	150,000	156,450	163,177	170,194	177,512
Marketing	75,000	78,225	81,589	85,097	88,756
Other Expenses	155,000	161,665	168,617	175,867	183,429
TOTAL OP EXPENSES	$7,033,131	$7,335,556	$7,650,985	$7,979,977	$8,323,116
OPERATING INCOME	$237,130	$455,968	$622,200	$881,937	$896,348
NON-OPERATING REVENUE					
Earnings on Investments	$85,000	$87,975	$91,054	$94,241	$97,539
Other Miscellaneous	3,000	3,000	3,000	3,000	3,000
PFC Revenue	1,400,000	1,537,200	1,687,846	1,748,608	1,811,558
Miscellaneous Income	20,000	20,000	20,000	20,000	20,000
Web Site Revenue	5,000	5,000	5,000	5,000	5,000
Grant Revenue	0	0	0	0	0
Tax Revenue	3,174,055	3,205,796	3,237,854	3,270,232	3,302,934
TOTAL NON-OP REVENUE	$4,687,055	$4,858,971	$5,044,753	$5,141,081	$5,240,032
NON-OPERATING EXPENSES					
Bond Interest and Fees	$650,000	$650,000	$650,000	$650,000	$650,000
Miscellaneous Expenses	4,000	4,000	4,000	4,000	4,000
Air Service Development	2,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Capital Purchases/Tax Funded	1,000,000	0	0	0	0
Capital Improvement Projects	0	706,300	3,261,700	1,322,300	790,700
New Debt Service	0	0	0	0	0
TOTAL NON-OP EXPENSES	$3,654,000	$2,360,300	$4,915,700	$2,976,300	$2,444,700
SURPLUS REVENUE	$1,270,185	$2,954,638	$751,253	$3,046,718	$3,691,680

Table 7-6
PROFORMA CASH FLOW
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	Projected 2011	Projected 2012	Projected 2013	Projected 2014	Projected 2015
OPERATING REVENUE					
Landing Fees	$1,781,968	$1,826,517	$1,872,180	$1,918,985	$1,966,959
Apron Fees	170	174	178	183	187
Aviation Fuel Sales	104,918	108,187	111,557	115,032	118,615
Land Rentals	780,726	800,244	820,250	840,756	861,775
Wireless Tower Revenue					
Parking Lot Fees	2,822,596	2,893,160	2,965,489	3,039,627	3,115,617
Terminal Space Rental	2,262,816	2,319,387	2,377,372	2,436,806	2,497,726
Terminal Concessions	1,213,370	1,288,478	1,368,234	1,452,928	1,542,864
Loading Bridges	39,599	40,589	41,604	42,644	43,710
Skycap Services	56,570	57,985	59,434	60,920	62,443
Airline Screening	72,297	74,104	75,957	77,856	79,802
Mason Jewett Field	335,081	343,458	352,045	360,846	369,867
TOTAL OP REVENUES	$9,470,112	$9,752,283	$10,044,301	$10,346,582	$10,659,567
OPERATING EXPENSES					
Salaries	$3,235,268	$3,374,385	$3,519,483	$3,670,821	$3,828,666
Fringe Benefits	2,098,314	2,188,541	2,282,649	2,380,803	2,483,177
Maintenance Material	432,006	450,582	469,957	490,165	511,242
Special Maintenance	462,863	482,766	503,525	525,177	547,760
Electricity	370,291	386,213	402,820	420,142	438,208
Other Utilities	166,631	173,796	181,269	189,064	197,193
Janitorial Services	269,078	280,648	292,716	305,303	318,431
Contractual Service	98,744	102,990	107,419	112,038	116,855
Fuel and Oil	296,233	308,971	322,256	336,113	350,566
Security Expense	277,718	289,660	302,115	315,106	328,656
Insurance	166,631	173,796	181,269	189,064	197,193
Telephone	56,778	59,219	61,766	64,422	67,192
Supplies	16,663	17,380	18,127	18,906	19,719
Postage	7,406	7,724	8,056	8,403	8,764
Education and Travel	86,401	90,116	93,991	98,033	102,248
Business Expense	22,217	23,173	24,169	25,208	26,292
Air Service Visitations	74,058	77,243	80,564	84,028	87,642
Special Events	12,960	13,517	14,099	14,705	15,337
Dues and Subscriptions	30,858	32,184	33,568	35,012	36,517
Advertising	30,858	32,184	33,568	35,012	36,517
Professional Services	185,145	193,107	201,410	210,071	219,104
Marketing	92,573	96,553	100,705	105,035	109,552
Other Expenses	191,317	199,543	208,124	217,073	226,407
TOTAL OP EXPENSES	$8,681,010	$9,054,293	$9,443,628	$9,849,704	$10,273,241
OPERATING INCOME	$789,102	$697,990	$600,673	$496,878	$386,326
NON-OPERATING REVENUE					
Earnings on Investments	$100,953	$104,487	$108,144	$111,929	$115,846
Other Miscellaneous					
PFC Revenue	1,876,774	1,944,338	2,014,334	2,086,850	2,161,977
Miscellaneous Income	20,000	20,000	20,000	20,000	20,000
Web Site Revenue	5,000	5,000	5,000	5,000	5,000
Tax Revenue	3,335,964	3,369,323	3,403,017	3,437,047	3,471,417
TOTAL NON-OP REVENUE	$5,338,691	$5,443,148	$5,550,494	$5,660,826	$5,774,240
NON-OPERATING EXPENSES					
Bond Interest and Fees	$650,000	$650,000	$650,000	$650,000	$650,000
Miscellaneous Expenses	4,000	4,000	4,000	4,000	4,000
Air Service Development	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Capital Purchases/Tax Funded	0	0	0	0	0
Capital Improvement Projects	0	0	0	0	0
New Debt Service	0	0	0	3,752,000	3,752,000
TOTAL NON-OP EXPENSES	$1,654,000	$1,654,000	$1,654,000	$6,710,864	$6,710,864
SURPLUS REVENUE	$4,473,793	$4,487,138	$4,497,167	$288,561	$328,034

Table 7-6
PROFORMA CASH FLOW
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	Projected 2016	Projected 2017	Projected 2018	Projected 2019
OPERATING REVENUE				
Landing Fees	$2,016,133	$2,066,536	$2,118,200	$2,171,155
Apron Fees	192	197	202	207
Aviation Fuel Sales	122,310	126,120	130,048	134,099
Land Rentals	883,320	905,403	928,038	951,239
Wireless Tower Revenue				
Parking Lot Fees	3,193,508	3,273,345	3,355,179	3,439,059
Terminal Space Rental	2,560,169	2,624,173	2,689,778	2,757,022
Terminal Concessions	1,638,368	1,739,783	1,847,475	1,961,834
Loading Bridges	44,803	45,923	47,071	48,248
Skycap Services	64,004	65,604	67,244	68,926
Airline Screening	81,797	83,842	85,938	88,087
Mason Jewett Field	379,114	388,592	398,306	408,264
TOTAL OP REVENUES	$10,983,717	$11,319,518	$11,667,480	$12,028,139
OPERATING EXPENSES				
Salaries	$3,993,299	$4,165,011	$4,344,106	$4,530,903
Fringe Benefits	2,589,954	2,701,322	2,817,479	2,938,630
Maintenance Material	533,226	556,154	580,069	605,012
Special Maintenance	571,313	595,880	621,503	648,227
Electricity	457,051	476,704	497,202	518,582
Other Utilities	205,673	214,517	223,741	233,362
Janitorial Services	332,123	346,405	361,300	376,836
Contractual Service	121,880	127,121	132,587	138,288
Fuel and Oil	365,641	381,363	397,762	414,865
Security Expense	342,788	357,528	372,902	388,936
Insurance	205,673	214,517	223,741	233,362
Telephone	70,081	73,095	76,238	79,516
Supplies	20,567	21,452	22,374	23,336
Postage	9,141	9,534	9,944	10,372
Education and Travel	106,645	111,231	116,014	121,002
Business Expense	27,423	28,602	29,832	31,115
Air Service Visitations	91,410	95,341	99,440	103,716
Special Events	15,997	16,685	17,402	18,150
Dues and Subscriptions	38,088	39,725	41,434	43,215
Advertising	38,088	39,725	41,434	43,215
Professional Services	228,525	238,352	248,601	259,291
Marketing	114,263	119,176	124,301	129,645
Other Expenses	236,143	246,297	256,888	267,934
TOTAL OP EXPENSES	$10,714,991	$11,175,735	$11,656,292	$12,157,512
OPERATING INCOME	$268,727	$143,783	$11,188	($129,374)
NON-OPERATING REVENUE				
Earnings on Investments	$119,901	$124,097	$128,441	$132,936
Other Miscellaneous				
PFC Revenue	2,239,808	2,320,441	2,403,977	2,490,520
Miscellaneous Income	20,000	20,000	20,000	20,000
Web Site Revenue	5,000	5,000	5,000	5,000
Tax Revenue	3,506,131	3,541,193	3,576,605	3,612,371
TOTAL NON-OP REVENUE	$5,890,840	$6,010,731	$6,134,022	$6,260,827
NON-OPERATING EXPENSES				
Bond Interest and Fees	$650,000	$650,000	$650,000	$650,000
Miscellaneous Expenses	4,000	4,000	4,000	4,000
Air Service Development	1,000,000	1,000,000	1,000,000	1,000,000
Capital Purchases/Tax Funded	0	0	0	0
Capital Improvement Projects	0	0	0	0
New Debt Service	3,752,000	3,752,000	3,752,000	3,752,000
TOTAL NON-OP EXPENSES	$6,710,864	$6,710,864	$6,710,864	$6,710,864
SURPLUS REVENUE	$365,288	$400,210	$432,682	$462,589

Table 7-6
PROFORMA CASH FLOW
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	Projected 2020	Projected 2021	Projected 2022	Projected 2023
OPERATING REVENUE				
Landing Fees	$2,225,434	$2,281,070	$2,338,096	$2,396,549
Apron Fees	212	217	223	228
Aviation Fuel Sales	138,276	142,584	147,025	151,605
Land Rentals	975,020	999,395	1,024,380	1,049,990
Wireless Tower Revenue				
Parking Lot Fees	3,525,035	3,613,161	3,703,490	3,796,077
Terminal Space Rental	2,825,948	2,896,596	2,969,011	3,043,237
Terminal Concessions	2,083,271	2,212,226	2,349,163	2,494,576
Loading Bridges	49,454	50,690	51,958	53,257
Skycap Services	70,649	72,415	74,225	76,081
Airline Screening	90,289	92,546	94,860	97,231
Mason Jewett Field	418,471	428,932	439,656	450,647
TOTAL OP REVENUES	$12,402,058	$12,789,833	$13,192,087	$13,609,477
OPERATING EXPENSES				
Salaries	$4,725,732	$4,928,938	$5,140,882	$5,361,940
Fringe Benefits	3,064,991	3,196,786	3,334,248	3,477,620
Maintenance Material	631,028	658,162	686,463	715,981
Special Maintenance	676,101	705,173	735,496	767,122
Electricity	540,881	564,139	588,397	613,698
Other Utilities	243,396	253,862	264,778	276,164
Janitorial Services	393,040	409,941	427,568	445,954
Contractual Service	144,235	150,437	156,906	163,653
Fuel and Oil	432,705	451,311	470,717	490,958
Security Expense	405,661	423,104	441,297	460,273
Insurance	243,396	253,862	264,778	276,164
Telephone	82,935	86,501	90,221	94,100
Supplies	24,340	25,386	26,478	27,616
Postage	10,818	11,283	11,768	12,274
Education and Travel	126,206	131,632	137,293	143,196
Business Expense	32,453	33,848	35,304	36,822
Air Service Visitations	108,176	112,828	117,679	122,740
Special Events	18,931	19,745	20,594	21,479
Dues and Subscriptions	45,073	47,012	49,033	51,141
Advertising	45,073	47,012	49,033	51,141
Professional Services	270,440	282,069	294,198	306,849
Marketing	135,220	141,035	147,099	153,424
Other Expenses	279,455	291,472	304,005	317,077
TOTAL OP EXPENSES	$12,680,285	$13,225,538	$13,794,236	$14,387,388
OPERATING INCOME	($278,227)	($435,705)	($602,149)	($777,911)
NON-OPERATING REVENUE				
Earnings on Investments	$137,589	$142,405	$147,389	$152,547
Other Miscellaneous				
PFC Revenue	2,580,179	2,673,065	2,769,295	2,868,990
Miscellaneous Income	20,000	20,000	20,000	20,000
Web Site Revenue	5,000	5,000	5,000	5,000
Tax Revenue	3,648,494	3,684,979	3,721,829	3,759,047
TOTAL NON-OP REVENUE	$6,391,262	$6,525,449	$6,663,513	$6,805,585
NON-OPERATING EXPENSES				
Bond Interest and Fees	$650,000	$650,000	$650,000	$650,000
Miscellaneous Expenses	4,000	4,000	4,000	4,000
Air Service Development	1,000,000	1,000,000	1,000,000	1,000,000
Capital Purchases/Tax Funded	0	0	0	0
Capital Improvement Projects	0	0	0	0
New Debt Service	3,752,000	3,752,000	3,752,000	3,752,000
TOTAL NON-OP EXPENSES	$6,710,864	$6,710,864	$6,710,864	$6,710,864
SURPLUS REVENUE	$489,814	$514,238	$535,745	$554,218

- Non-operating revenues were projected from FY 2006 through FY 2023 based on the following assumptions:
    - Earnings on investments were increased by 3.5 percent each year.
    - PFC Revenues were increased based on the forecast enplanement growth.
    - Grant revenue was reduced to zero as they were previously accounted for in reducing the local share of the CIP.
    - Tax revenue was increased by 1.0 percent each year.
    - Non-operating revenue is projected to increase from $4.7 million in FY 2006 to $6.8 million in FY 2023, an annual increase of 2.2 percent
- Non-operating expenses were held constant over the planning horizon with the following additions:
    - Capital projects paid for on a cash basis were added to the non-operating expenses.
    - Future debt service resulting from the debt financing of the final three years of the long-term development CIP were also included as non-operating expenses.

Based on the assumptions listed above, the Airport will generate a positive cash flow in every year during the planning period, increasing to $0.5 million by FY 2023.

7.3.7 Summary/Recommendations

The following conclusions regarding the Capital Improvement Program proposed by the master plan update pertaining to its financial impact to the Authority can be drawn from information presented in this section:

- The Authority's financial structure and historical revenues and expenses were examined to project future revenues and expenses.
- The total inflated Capital Improvement Program amounts to $308.6 million, as presented in Table 7-2.
- The funding for the proposed Capital Improvement Program is as follows:
    - FAA $243.3 million
    - MDOT $15.1 million
    - Third Party $3.4 million
    - Local $46.8 million
- Funding the local share of the Capital Improvement Program, with the proposed funding levels from the FAA and other sources identified above, results in the Authority issuing debt in FY 2011 to complete construction of the Replacement Terminal.

- It is recommended that the Authority closely monitor the federal AIP and the MDOT funding program for any changes that may enhance or adversely affect future funding of the CIP.

- Total operating revenues are projected to increase from $7.2 million in FY 2006 to approximately $13.6 million in FY 2023, representing an average annual growth rate of 3.8 percent.

- Operating expenses are projected to increase from $7.0 million in FY 2006 to $14.4 million in FY 2023, representing an average annual growth rate of 4.3 percent.

- Operating income is projected to decrease from $0.2 million in FY 2006 to -$0.8 million in FY 2023 based on the assumptions contained in this Section.

- The staging of the Capital Improvement Program is flexible. The Authority should proactively monitor/revise the CIP on an annual basis to ensure projects are not implemented before the appropriate demand levels.

- Surplus revenue is expected to decrease from $1.3 million in FY 2006 to $0.5 million in FY 2023.

Based on the assumptions and the financial analyses presented herein, the Capital Improvement Program is considered practicable and it is anticipated that the Authority will be able to meet its future financial obligations. The financial plan presented as part of this section reflects implementation of the recommended projects of the Capital Improvement Program. It is important that the Authority continually monitor the status of its operating revenues and expenses and the implementation of its capital program. Future analyses may suggest adjusting the implementation of certain projects in the Capital Improvement Program to meet the Authority's other financial objectives.

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