5.0 FACILITY REQUIREMENTS

The *Facility Requirements* chapter of this Master Plan Update (MPU) describes airside and landside facilities, which are needed to accommodate existing and forecast demand at the Greater Binghamton Airport (BGM) in accordance with Federal Aviation Administration (FAA) design criteria and current safety standards. The facility requirements are based upon the FAA approved Aviation Demand Forecasts that were presented in Chapter 3 of this MPU. They have been developed in accordance with the guidelines provided in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, and 14 CFR Part 77, *Objects Affecting Navigable Airspace*. Development of the facility requirements also considers recommendations of airport management and tenants. The findings of this chapter will serve as the basis for the development of the airside and landside alternatives and development recommendations, which will be presented in subsequent chapters of this report. Major sections of this chapter include:

- Airfield Capacity Analysis
- Airside Facility Requirements
- Airspace Requirements
- Landside Facility Requirements
- Facility Requirements Summary

5.1 AIRFIELD CAPACITY ANALYSIS

Airfield capacity refers to the ability of an airport to safely accommodate a given level of aviation activity. In Chapter 3, *Aviation Demand Forecasts*, a historical view of the various aviation demands placed on the airport was presented along with a forecast of future demand over the planning period. The airport must be able to accommodate the projected demand by providing sufficient airside and landside facilities. If deficiencies exist in either of these two areas they will impede the use of the airport. This, in turn, may hinder the economic potential of the airport and communities it serves. The evaluation of airside capacity and an airport's ability to meet projected aviation demand is accomplished through a capacity and facility requirements analysis.

The FAA has prepared a number of publications and computer programs to assist in the calculation of capacity. This report will use the methodologies described in AC 150/5300-13 and AC 150/5060-5, *Airport Capacity and Delay*, along with the FAA Airport Design Computer Model.

AC 150/5060-5 defines capacity as a measure of the maximum number of aircraft operations which can be accommodated at an airport. The advisory circular provides a methodology that identifies separate levels of hourly capacity for visual flight rule (VFR) and for instrument flight rule (IFR) conditions. In addition, an annual measure of capacity is the Annual Service Volume (ASV), which is defined as a reasonable estimate of an airport's annual maximum capacity. ASV accounts for differences in runway use, aircraft mix, weather conditions, etc. that may be encountered over a year's time. It should be noted that airports can, and often do, exceed their stated ASV, however delays begin to increase rapidly once the ASV has been exceeded.

5.1.1 Factors Affecting Capacity

It is important to understand the various factors that affect the ability of an air transport system to process demand. Once these factors are identified and their effect on the processing of demand is understood, efficiencies can be evaluated. The airfield capacity analysis will consider several factors that affect the ability of the airport to process demand. These factors include:

- Meteorological Conditions
- Runway/Taxiway Configuration
- Runway Utilization
- Aircraft Fleet Mix
- Percent Arriving Aircraft
- Percent Tough-and-Go Operations
- Exit Taxiway Locations
- Peaking Characteristics

Meteorological Conditions

Meteorological conditions specific to the location of an airport not only influence the airfield layout, but affect the use of the runway system. As weather conditions change, airfield capacity can be reduced by low ceilings and visibility. Runway usage will change as the wind speed and direction change, also impacting the capacity of the airfield.

To better understand the impacts of weather conditions on capacity, three types of aviation conditions must be understood. For purposes of capacity evaluation, these weather conditions are described as VFR conditions, IFR conditions and Poor Visibility and Ceiling (PVC) conditions. According to AC 150/5060-5, VFR conditions occur when the cloud ceiling is at least 1,000 feet above ground level (AGL) and the visibility is at least three statute miles. IFR conditions occur when the reported cloud ceiling is at least 500 feet but less than 1,000 feet and/or visibility is at least one statute mile but less than three statute miles. PVC conditions exist when the cloud ceiling is less than 500 feet and/or visibility is less than one statute mile.

To determine the weather conditions at an airport, wind data collected from a weather station and complied by the National Oceanic and Atmospheric Administration (NOAA) is utilized. Based upon data collected from the reporting station located at BGM, VFR conditions occur at the airport approximately 84.8% of the time, IFR conditions occur approximately 7.2% of the time, while PVC conditions, are present at the airport approximately 8% of the time. At BGM, the occurrence of IFR and PVC conditions is slightly above normal.

Runway/Taxiway Use Configurations

The configuration of the runway system refers to the number, location and orientation of the active runway(s), the type and direction of operations and the flight rules in effect at a particular time. BGM has two intersecting hard surfaced runways: primary Runway 16-34 and crosswind Runway 10-28.

Currently, neither runway at the airport is served by a traditional full length parallel taxiway. However, the airport is in the midst of a taxiway design project that will result in a full length parallel taxiway to primary Runway 16-34. If funding is available, construction of this taxiway is expected to begin in spring 2008.

While Taxiway "K" provides access to the approach end of Runway 10 and Taxiway "H" provides access to the approach end of Runway 28; Runway 10-28 is not served by a full length parallel taxiway. While airport capacity does not appear to be adversely affected by the current taxiway system, other factors are involved in recommending taxiway improvements. The need for a full length parallel taxiway to Runway 10-28 will be examined in greater detail in a subsequent section of this chapter.

Runway Utilization

As discussed in the meteorological conditions section, aircraft generally desire to takeoff and land into the wind. At BGM, when winds favor Runway 16-34, all traffic will typically use this runway. When winds favor Runway 10-28, some large jets and regional airliners may still use Runway 16-34 due to the additional runway length available, resulting in both runways being in use; or both runways being "active" at the same time.

Approximately 30% of operations are conducted on Runway 16, and approximately 43% of operations are conducted on Runway 34 for a combined Runway 16-34 total accounting for 73% of total airport operations. The remaining 27% of the operations are conducted on Runway 10-28, with 4% of the operations on Runway 10 and 23% of the operations on Runway 28.

Aircraft Fleet Mix

The capacity of a runway is also dependent upon type and size of aircraft that use it. As per AC 150/5060-5, aircraft are placed into one of four classes (A through D) when conducting capacity analysis. These classes are based on the amount of wake vortex created when the aircraft passes through the air. They differ from the classes used in the determination of the Airport Reference Code (ARC).

For the purposes of capacity analysis, Class A consists of aircraft in the small wake turbulence class, single engine and a maximum takeoff weight of 12,500 pounds or less. Class B is made up of aircraft similar to Class A, but with multiple engines. Class C aircraft are in the large wake turbulence class with multiple engines and with takeoff weights between 12,500 pounds and 300,000 pounds. Class D aircraft are in the heavy wake turbulence class and have multiple engines and a maximum takeoff weight greater than 300,000 pounds. Typically, Class A and B aircraft are general aviation single engine and light twin engine aircraft. Class C and D consist of large jet and propeller driven aircraft generally associated with larger commuter, airline, air cargo, and military use.

The aircraft fleet mix is defined by the percentage of operations conducted by each of these four classes of aircraft at BGM. The approximate percentage of operations conducted at BGM by each of these types of aircraft is portrayed in Table 5.1.

Table 5.1: Aircraft Fleet Mix

Aircraft Type	Percent of Operations
Class A	17%
Class B	36%
Class C	47%
Class D	0%

The mix index for an airport is calculated as the percentage of Class C aircraft operations, plus three times the percentage of Class D operations (%C + 3D). Since there are no Class D aircraft now using or forecast to use the airport, the mix index is equal to the percentage of Class C operations. At BGM, this is approximately 47% of the current activity. At airports with only Class A and Class B aircraft, the separation distance required for air traffic is lower than at airports with use by aircraft in Class C or D. Small aircraft departing behind larger aircraft must hold longer for wake turbulence separation. The greater the separation distance required, the lower the airfield's capacity.

Percent Arriving Aircraft

The capacity of the runway is also influenced by the percentage of aircraft arriving at the airport during the peak hour. Arriving aircraft are typically given priority over departing aircraft. Therefore, the higher the percentage of aircraft arrivals during peak periods of operations, the lower the annual service volume. According to airport management operational activity at BGM is well balanced between arrivals and departures. Therefore, it is assumed in the capacity calculations that arrivals equal departures during the peak period.

Percent Touch-and-Go Operations

A touch-and-go operation refers to an aircraft maneuver in which the aircraft performs a normal landing touchdown followed by an immediate takeoff, without stopping or taxiing clear of the runway. These operations are normally associated with training and are included in the local operations figures reported by the air traffic control tower (ATCT). Approximately 20% of the airport's local GA operations can be attributed to touch-and-go operations. In 2005 (base year for forecasts) there were 4,520 local GA operations which included approximately 904 touch-and-go operations. This accounts for approximately 3.4% of the airport's total operations.

Exit Taxiway Locations

A final factor in analyzing the capacity of a runway system is the ability of an aircraft to exit the runway as quickly and safely as possible. The location, design, and number of exit taxiways affect the occupancy time of an aircraft on the runway system. The longer an aircraft remains on the runway, the lower the capacity of that runway.

A total of eight entrance/exit taxiways are located along Runway 16-34. No two of these taxiways are more than 1,600' apart. A total of four entrance/exit taxiways are located along Runway 10-28. These taxiways are also spaced so as to provide an exit from the runway approximately every 1,600'. The airport's existing exit taxiways for both runways appear to be sufficient for maintaining capacity.

Peaking Characteristics

Peak activity estimates for both airline and general aviation (GA) operations were forecast in Chapter 3, *Aviation Demand Forecast*. Airline activity at BGM exhibits daily peaks during early morning and late evening hours. The level of daily operational demand is relatively constant throughout the year with no seasonal peaks that would impact airfield capacity. General aviation activity does not reach a level that would impact capacity.

5.1.2 VFR/IFR Hourly Capacities and Annual Service Volume (ASV)

The FAA computer model used to calculate airfield capacity provides estimates on hourly airfield capacity under both VFR and IFR conditions, which are the theoretical maximum number of aircraft operations (takeoffs and landings) that can take place on the runway system in one hour under VFR or IFR conditions respectively. The model consolidates these capacities into a single figure, the Annual Service Volume (ASV) for the airport. The ASV is the theoretical maximum number of aircraft operations that the airport can support over the course of a year.

VFR/IFR Hourly Capacities

Because characteristics of airports vary so widely, guidance in AC 150/5060-5 is provided for different types of airports, from large commercial service hubs, to small single runway facilities. According to AC 150/5060-5, VFR and IFR capacity calculations are based on certain assumptions. These assumptions and their relevance to BGM are described below:

a.) Runway-Use Configuration: Any runway layout can be approximated by one of the 19 depicted runway-use configurations which are included in both AC 150/5060-5 and the FAA Airport Design Computer Model. Multiple arrival streams are only to parallel runway configurations. For BGM, Runway Configuration 9 was chosen based on two intersecting runways. (Appendix B includes the 19 possible runway use configurations.)

b.) Percent Arrivals: Arrivals equal departures.

c.) Percent Touch-and-Go's: The percent of touch-and-go's is within the range in Table 2-1 of AC 150/5060-5. (Percentage of touch-and-go's at BGM is approximately 20% of local GA operations or 3.4% of total airport operations. This is within the range specified in the AC. Table 2-1 from AC 150/5060-5 is included in Appendix B.)

d.) Taxiways: The airport is currently not serviced by any full length parallel taxiways.

e.) Airspace Limitations: There are no airspace limitations which would adversely impact flight operations or otherwise restrict aircraft which operate at the airport. It should be noted that VFR airspace at Chenango Bridge Airport (located approximately six nautical miles west of BGM) overlaps Binghamton's airspace by approximately one-mile, however existing ATC procedures minimize potential conflicts.

f.) Runway Instrumentation: There are instrument landing system (ILS) approaches to both ends of Runway 16-34. BGM has the necessary air traffic control (ATC) facilities and services to carry out operations in a radar environment.

Table 5.4 provides a summary of the existing and forecast peak hour demand and hourly VFR and IFR capacity figures at BGM.

Annual Service Volume

The Annual Service Volume (ASV) for BGM was calculated using the FAA Airport Design Computer Program. The program reduces the VFR and IFR hourly capacities provided in AC 150/5300-13, *Airport Design*, to a weighted hourly capacity (C_W) through use of a formula that considers the relative occurrence of those two conditions, as well as PVC conditions. This number is then multiplied by two factors that account for airport peaking characteristics. The H and D ratios are used to adjust for hourly peak periods during the day, and daily peak periods during the year, respectively. This formula is illustrated below.

ASV = C_W * H * D, where:

ASV = Annual Service Volume
C_W = Weighted Hourly Capacity
H = Ratio of Average Daily Demand to Average Peak Hour Demand, and
D = Ratio of Annual Demand to Average Daily Demand

Table 5.4 presents a summary of the above airfield capacity calculations for BGM compared to the current and forecast level of activity. The complete computer program outputs are provided in Appendix B. These figures indicate that the airport is currently operating at 13% of capacity on an annual basis. The utilization of the airfield is expected to climb to approximately 15% of ASV by 2025. Because BGM is a commercial service airport, IFR hourly capacity figures were used for percent peak hour comparison purposes. Currently the airport is operating at approximately 23% of capacity during the peak hour, and increased activity is expected to increase that percentage to approximately 26% of capacity by the end of the forecast period in 2025. FAA guidance recommends that planning for capacity enhancement should begin when capacity reaches the 60% level. The airport is not forecast to reach this level within the 20-year planning period.

Table 5.2: Airfield Demand and Capacity Summary

Year	Demand		Capacity				
	Annual Operations	Peak Hour	ASV	Hourly VFR	Hourly IFR	Percent Peak Hour	Percent ASV
2005	26,471	13	200,000	77	57	23%	13%
2010	26,935	13	200,000	77	57	23%	13%
2015	28,934	14	200,000	77	57	25%	14%
2025	30,231	15	200,000	77	57	26%	15%

5.2 AIRSIDE FACILITY REQUIREMENTS

Airside facility requirements address the items that are directly related to the arrival and departure of aircraft, primarily runways and taxiways and their associated safety areas. Although apron areas are included in what is often termed aircraft movement areas, they will be addressed in a later section along with the use areas they are associated with. To assure that all runway and taxiway systems are correctly designed, the FAA has established criteria for use in the planning and design of airfield facilities. The selection of appropriate FAA design standards for the development of airfield facilities is based on the characteristics of the most demanding aircraft expected to use the airport or that particular facility at the airport on a regular basis (500 operations per year). Correctly identifying the future aircraft types that will use the airport is particularly important, because the design standards that are selected will establish the physical dimensions of facilities, and the separation distances between facilities that will impact airport development for years to come. Use of appropriate standards will ensure that facilities can safely accommodate aircraft using the airport today, as well as aircraft that are projected to use the airport in the future.

Airport design standards are described in AC 150/5300-13, *Airport Design*. This document provides criteria for grouping of aircraft into Airport Reference Codes (ARC). The ARC consists of a letter representing an Aircraft Approach Category (based on approach speed), and a number representing an Airplane Design Group (based on wingspan). These groupings are presented in Table 5.5 below.

Table 5.3: Airport Reference Code (ARC)

Aircraft Approach Category	**Approach Speed**
A	Less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more
Airplane Design Group	**Wingspan**
I	Up to but not including 49 feet
II	49 feet up to but not including 79 feet
III	79 feet up to but not including 118 feet
IV	118 feet up to but not including 171 feet
V	171 feet up to but not including 214 feet
VI	214 feet up to but not including 262 feet

Section 3.6, *Selection of Design Aircraft*, from the Aviation Demand Forecasts has documented that the future ARC of Runway 16-34 is C-III based on the selection of a narrow-bodied jetliner such as the Airbus 320 or a regional jet such as an Embraer 190 as

the design aircraft. The existing and future ARC for Runway 10-28 is B-II based on selection of the turboprop Saab 340, or the family of mid-size business jets as the design aircraft. Because the taxiways serving the runway system are used by aircraft in both groups, they should be designed to meet C-III criteria with the exception of those few taxiways and taxilanes serving small general aviation aircraft exclusively.

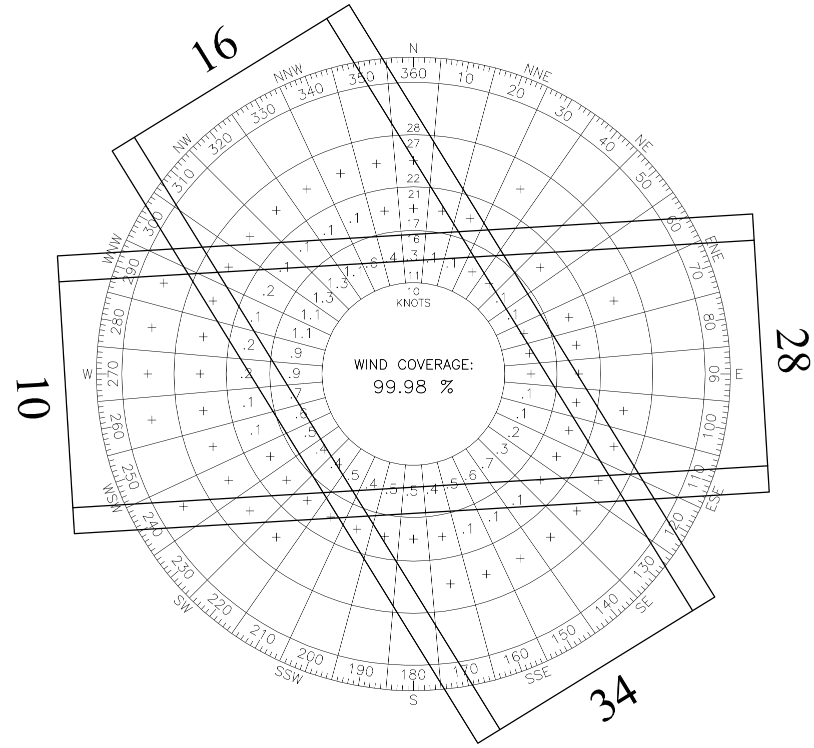
5.2.1 Runways

Runway Orientation

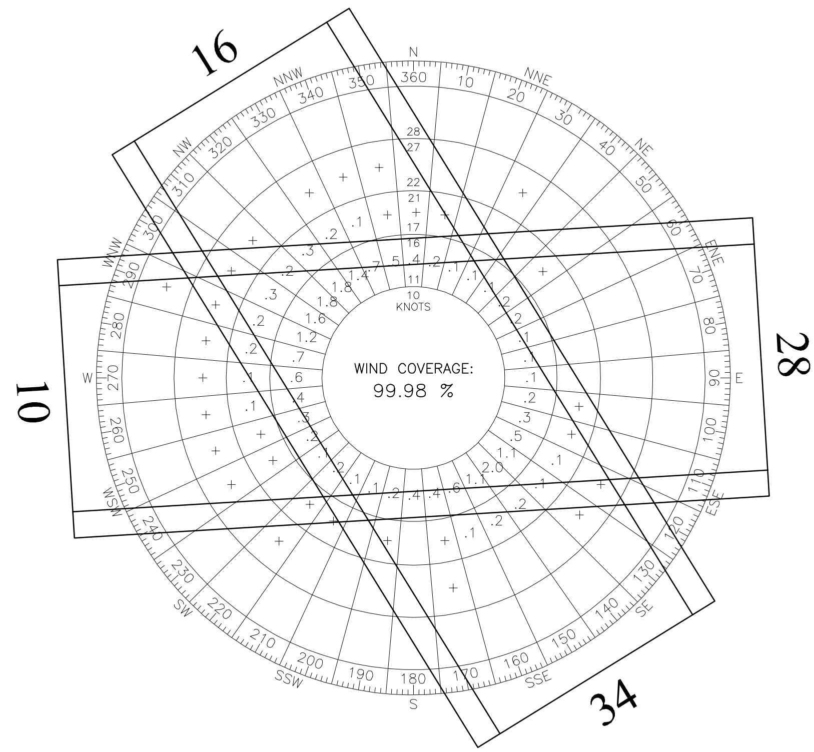
A major factor in evaluating a runway's orientation is the direction and velocity of the prevailing winds. Ideally, all aircraft takeoffs and landings would be conducted into the wind. A runway alignment that does not allow an aircraft to go directly into the wind creates what is known as a crosswind component, which makes it more difficult for a pilot to guide the airplane down the intended path. The commonly used measure of degree to which a runway is aligned with the prevailing wind conditions is the wind coverage percentage. Wind coverage percentage is that percentage of time aircraft within a particular design group will be able to safely use the runway. Put another way, this is the percentage of time when the crosswind component on a particular runway is below the acceptable limit for a particular type of aircraft. Small aircraft are more susceptible to crosswinds than large aircraft. Current FAA standards recommend that airfields provide 95% wind coverage factor.

Wind data from BGM was obtained for the ten-year period 1996 through 2005. The wind data was compiled into All Weather and IFR Wind Roses presented in Figure 5-1. The wind roses show the percentage of time winds originated from different directions at different velocities. The wind roses have been supplemented by an All Weather and IFR wind persistency graph, Figure 5-2, which provides a graphical representation of the direction and strength of the winds at BGM. The allowable crosswind component for ARC B-II runways (Runway 10-28) is 13 knots, and 16 knots for ARC C-III runways (Runway 16-34). Based on these criteria, the current runway alignment at BGM provides the following wind coverage:

All Weather	13 knots	99.83 %
	16 knots	99.98 %
IFR	13 knots	99.89 %
	16 knots	99.98%



ALL WEATHER WINDROSE



IFR WINDROSE

WIND COVERAGE		
KNOTS	A/W	IFR
13.0	99.83%	99.89%
16.0	99.98%	99.98%

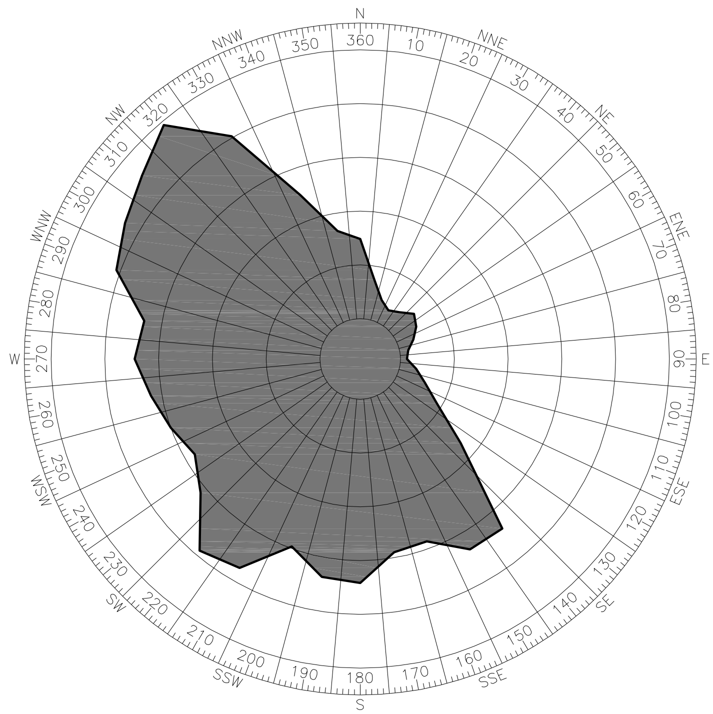
SOURCE:
BINGHAMTON, NY
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
1996 – 2005

GREATER BINGHAMTON AIRPORT
BROOME COUNTY, NEW YORK

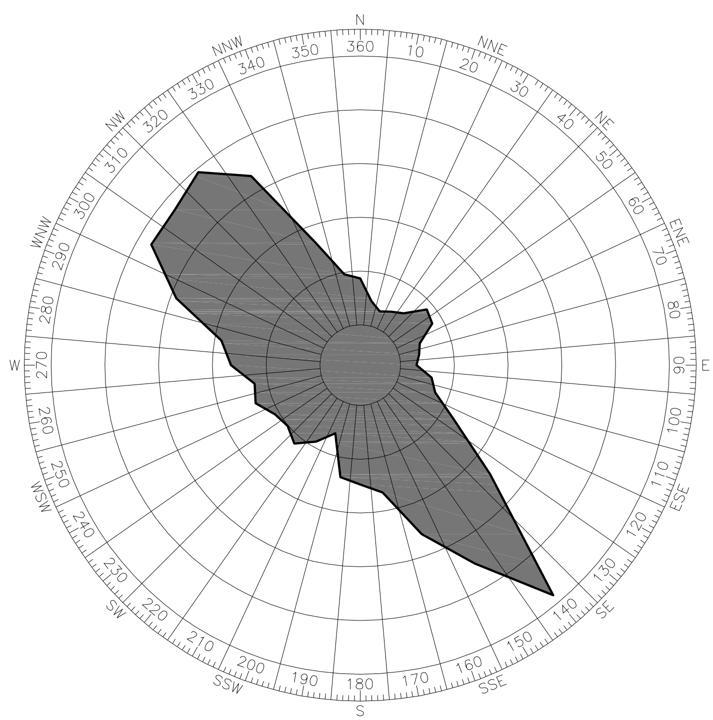
ALL WEATHER AND IFR WINDROSES

SCALE:	DATE:	FIGURE:
NONE	JANUARY 2008	5-1

McFarland Johnson



ALL WEATHER WIND PERSISTENCY



IFR WIND PERSISTENCY

GREATER BINGHAMTON AIRPORT

BROOME COUNTY, NEW YORK

ALL WEATHER AND IFR PERSISTENCY GRAPHS

SCALE:	DATE:	FIGURE:
NONE	JANUARY 2008	5-2

McFarland Johnson

The runway alignment at BGM provides excellent wind coverage, exceeding the recommended 95% wind coverage for 13 knots and 16 knots under both all weather and IFR conditions.

Runway Approach Visibility

This section will expand the wind analysis described above to include consideration of the ceiling and visibility conditions associated with certain winds. Ideally, the primary instrument runway at an airport should be the runway that has the highest percentage of wind coverage under IFR conditions, during which the procedure is most needed. Wind coverage percentages were compiled for each runway end under both all-weather and IFR conditions

Runway End	True Bearing (degrees)	Crosswind (knots)	All Weather (percent)	IFR (percent)
16	148.31	13	48.84	49.40
16	148.31	16	49.67	49.83
34	328.32	13	53.72	53.87
34	328.32	16	55.13	54.91
10	86.56	13	33.73	44.16
10	86.56	16	34.90	45.99
28	266.57	13	67.80	56.06
28	266.57	16	69.89	58.17

Note: Wind coverage percentages for the two ends of the same runway do not add up to 100% due to the presence of calm conditions which contribute to the wind coverage of both ends.

This analysis indicates that under both all weather and IFR conditions, with either a 13-knot or a 16-knot crosswind component, Runway 28 has the highest wind coverage. Instrument approaches to Runway 28 do not have the lowest airport minimums. Runway 28 has a non-precision approach procedure with visibility minimums of one-mile for aircraft in approach categories A and B and 1 ¼-mile for aircraft in approach category C and D. Both Runway 16 and 34 are served by ILS approaches with minimums of ½ mile. Although the majority of air carriers use Runway 16-34 because of its greater length, and ILS to those runway ends is needed, an improved approach procedure to Runway 28 would benefit the aircraft that use it during periods of favorable winds. The increasing availability of satellite based vertically guided approach procedures makes this recommendation feasible.

Runway Length

Runway length requirements are based upon the needs of the most demanding aircraft, or aircraft group, anticipated to use the airport on a regular basis (250 annual takeoffs). For airports such as BGM serving aircraft weighing more than 60,000 pounds, the runway length analysis is based on the needs of a specific aircraft.

Table 5.4: Runway Length Requirements

Runway 16-34		
Aircraft Model	**Published Takeoff Field Length**	**Adjusted Takeoff Field Length**
Embraer 145 MP	6,660’	9,029’
Embraer 170 AR	5,394’	7,440’
Embraer 170 LR	5,161’	7,148’
Embraer 170 STD	4,843’	6,749’
Embraer 190 AR	6,759’	9,153’
Embraer 190 LR	6,004’	8,206’
Embraer 190 STD	5,295’	7,316’
Bombardier CRJ 200 ER	5,800’	7,950’
Bombardier CRJ 200 LR	6,290’	8,565’
Bombardier CRJ 700	5,130’	7,109’
Bombardier CRJ 700 ER	5,500’	7,573’
Bombardier CRJ 700 LR	6,072’	8,291’
Bombardier CRJ 700 Series 705	5,833’	7,991’
Bombardier CRJ 700 Series 705 ER	6,105’	8,333’
Bombardier CRJ 700 Series 705 LR	6,379’	8,677’
Bombardier CRJ 900	5,833’	7,991’
Bombardier CRJ 900 ER	6,105’	8,333’
Bombardier CRJ 900 LR	6,379’	8,677’
Airbus 320-200	5,900’	8,075’
Runway 10-28		
Aircraft Model	**Published Takeoff Field Length**	**Adjusted Takeoff Field Length**
SAAB 340	3,830’	4,997’
deHavilland Dash-8	3,280’	4,787’
Cessna 550 Citation II	2,990’	3,943’
Dassault Falcon 900DX	4,890’	6,328’
Dassault Falcon 900EX	5,215’	6,736’
Dassault Falcon 2000	5,440’	7,018’
Dassault Falcon 2000DX	4,800’	6,215’
Dassault Falcon 2000EX	5,375’	6,936’
Raytheon/Hawker 125-800	5,380’	6,943’

Source: Aviation Week & Space Technology Aerospace Source Book 2007; http://www.embraercommercialjets.com.br/english/content/ejets/emb_170.asp (Accessed 1-15-08); Regional Guidance Letter Airports Division, Southern Region RGL 01-2 Runway Length and Strength Requirements for Business Jet Aircraft

The air carrier aircraft that use or are likely to use the airport by the end of the planning period were identified in Table 3.17, *Aircraft Characteristics.* Table 5.7 above presents the takeoff distances required for each of these aircraft:

Various models of the aircraft listed in Table 3.17 are included in Table 5.7. The published takeoff field lengths for each aircraft were adjusted using site specific data for temperature (mean maximum daily temperature = 78.4° F), airport elevation (1,636'), and difference in elevation between runway ends (Runway 16-34 = 67'; Runway 10-28 = 19') specific to BGM. Adjustments were made using the Takeoff Runway Length Adjustment calculator prepared by the FAA Southern Region as part of Regional Guidance Letter 01-2. Worksheets are provided in Appendix B.

These distances were compared to the currently available runway length for Runway 16-34 of 7,100' (ASDA) and for Runway 10-28 of 5,002' (ASDA). Aircraft that would likely be considered for use at BGM by the airline currently operating there would include 70 and 90 seat regional jets such as the ERJ 170 and 190 series and the CRJ 700 and 900 series. Of these aircraft, only the Embraer 170 STD (standard version) would be able to depart at maximum takeoff weight on a "hot" day without incurring a payload or stage length penalty. The Canadair CRJ 700 would be able to takeoff with only minor weight restrictions. All other aircraft in this group, including the larger 90 seat regional jets now entering service with most airlines, would need to operate at less than their maximum capabilities, and extended or long-range versions of these aircraft would incur more significant weight restrictions.

The most distant city currently served with direct flight from Binghamton is Detroit, Michigan, a distance of 368 statute miles. Other recent direct flights have been offered to Cincinnati (496 statute miles) and Atlanta (736 statute miles). It is possible that in the near future direct service to Atlanta will resume again. Direct service to other hubs served by airlines now at BGM is also possible. A destination such as Memphis, Tennessee (a Northwest Airlines hub) is approximately 900 statute miles, while Charlotte, North Carolina (a USAir hub) and Chicago, Illinois (a United Airlines hub) are 545 and 600 statute miles, respectively.

The carrier with the most flights out of BGM is USAir and, as noted in Chapter 2, that airline is replacing the smaller first generation regional jets with larger RJs, specifically the Embraer 190. As mentioned in the *Aviation Demand Forecasts* chapter (Chapter 2), US Airways is already in the process of "getting out of the 50-seat aircraft (in favor of) 86-seat and 90-seat aircraft." Based upon their current (March 2008) operating schedule, US Airways currently has six departures Monday through Friday, four departures on Saturday, and five departures on Sunday. At BGM, they currently utilize the 50-seat regional jets and 37-seat Dash-8. Assuming that just two of US Airways daily flights at BGM are conducted in the future utilizing the 90-seat regional jet, this will account for approximately 1,408 annual operations {352 days/year X 4 operations (2 arrivals & 2 departures) = 1,408 annual operations} by the 90-seat regional jets. This conservative estimate assumes that none of the other airlines operating at BGM will begin utilizing the larger regional jets; however, if the regional affiliates associated with Northwest and/or United begin operating the Embraer 190, it is likely that BGM would see operations conducted with the larger RJ's by these airlines as well.

As noted above, the takeoff field length requirement for the "standard" (STD) version of this aircraft at MTOW adjusted for local conditions is 7,316'. At maximum landing weight, the landing length requirement is 7,235' on dry pavement (taking into consideration the FAR Part 121.195 requirement for the airplane to land within 60% of the available runway length). Under wet and slippery runway conditions, which occur often at Binghamton, the required length is 8,230'. Based upon the aircraft manufacturer's airport planning manual (APM) for the Embraer 190, a runway length of 8,440 feet is required for the Embraer 190 to operate unrestricted at BGM. (The ERJ 190 takeoff field length nomogram from the APM can be viewed in Appendix B.) These distances are not currently available at BGM.

Based upon the above analysis, the current length of the primary runway will restrict most of the air carrier aircraft that may potentially use the airport from operating at their full potential. In order to permit the operation of the 90-100 seat regional jets to their full capabilities at BGM, and improve safety during the frequent wet and slippery runway conditions that prevail, an increase in length of the primary runway is needed. In 2009 the EMAS at the Runway 34 end is scheduled to be replaced and in conjunction with this project some increase in runway length may be feasible. Because landing distance during wet and slippery conditions is also a concern, reduction or removal of the 401' displaced landing threshold on Runway 16 should also be considered. Alternatives that increase the usable length of Runway 16-34 should be considered as part of the Alternatives portion of this Master Plan Update. Increased runway length of up to 8,400 feet should be considered, understanding that site topography may limit the ultimate runway length that is achievable. Although 8,400 feet will not allow unrestricted use by all aircraft it would accommodate the vast majority of aircraft operations anticipated at the airport under most conditions.

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, indicates that for scheduled commercial service airports, such as BGM with a different ARC for each runway, the length of the crosswind runway should equal 100% of the recommended runway length determined for the lower crosswind capable airplanes using the primary runway. As a B-II runway, the commercial service aircraft which use that runway most frequently is the Saab 340B. A number of business jet aircraft also use the runway, as shown in Table 5.7. The adjusted takeoff field length requirements at MTOW of these aircraft range from 3,943' to 7,018'. Additional runway length is needed in order to meet the needs of these aircraft. Provision of 7,018' on this runway is not felt to be needed, because aircraft needing that length could use the primary runway, but some increase is warranted to improve safety during wet and slippery conditions. The improved instrument approach procedure that is recommended for this runway will increase usage, especially during IFR conditions when Runway 28 has the best wind coverage of any runway end. For these reasons development of alternatives providing 6,000' on Runway 10-28 are recommended, but terrain may limit the feasible length.

Runway Width

The standard runway width for facilities with an ARC of C-III (Runway 16-34) is 100 feet and the standard runway shoulder is 20 feet. If the runway serves aircraft with maximum certificated takeoff weight greater than 150,000 pounds, the standard runway width is 150 feet and the standard shoulder is 25 feet. As noted in Section 2.2.1, the current width of Runway 16-34 is 150 feet. The runway sees occasional use from the C-130 (155,000 pounds or 164,000 pounds MTOW depending on the model), but none of the commercial aircraft now using the runway have MTOW greater than 150,000 pounds, although the Airbus 320-200, mentioned as a potential user, has a MTOW of 169,800 pounds. Another consideration in determining a recommended width of Runway 16-34 is the location of the runway edge lights. These are presently located 10' from the runway edge, within the limits of a 12' paved shoulder which has been provided to improve the airport's ability to remove snow from the runway as well as to provide a paved surface for any inadvertent aircraft excursions from the runway. Reducing the runway width would require the relocation of the edge light system as well as reduce the paved surface available for aircraft operations and is not recommended. The recommended width for Runway 16-34 is 150'.

For runways with ARC of B-II and [current] visibility of one mile the standard width is 75 feet and the shoulder width is 10 feet. For runways serving aircraft in ARC B-II with visibility minimums lower than ¾-statute mile, the design standard width is 100 feet with a 10 foot shoulder. The improved instrument approach procedure to this runway is expected to result in minimum visibility of at least ¾ mile, and could lead to visibility requirements as low as ½ mile within the forecast period. As noted in Section 2.2.1 the current width of Runway 10-28 is 150 feet and there is no paved shoulder. Because this runway sees occasional use from the same aircraft that use Runway 16-34, because there is currently no designated paved shoulder, and because reducing the width would require relocation of runway edge lights, maintaining the current Runway 10-28 width of 150 feet is recommended.

Runway Strength

The Airport Master Record (FAA Form 5010-1) includes published runway strengths for Runway 16-34 and Runway 10-28 as shown below:

Type of Landing Gear	Runway 16-34	Runway 10-28
Single Wheel	98,000	98,000
Dual Wheel	125,000	125,000
Dual Tandem	187,000	187,000

Airport pavement design, however, is not predicated on a particular weight that is not to be exceeded. The current pavement could safely handle much heavier aircraft on most days, but repeated use would result in premature pavement failure. Design is based on the mix of aircraft that are expected to use the runway over the anticipated life of the pavement, usually taken to be twenty years. The methodology used to develop the runway pavement design considers the number of operations by both large and small aircraft, and reduces this data to a number of "equivalent annual operations" by a design aircraft, which is the most demanding in terms of pavement loading expected to use the airport. This may or may not be the design aircraft for planning purposes and its selection considers the type of landing gear and tire pressure in addition to weight. The outcome of the design process is a recommended pavement section that will accommodate operations by the forecast fleet mix, and withstand weather stresses without premature failure of the pavement.

In 2006 Runway 16-34 received its first major rehabilitation since 1990. The pavement model used to approximate the impacts that aircraft fleet mix changes may have upon the runway pavements incorporated an increase in the total commercial traffic of 10%, and conversion of 1,000 commercial operations yearly to the larger 100 seat RJs. The model utilized a 107,564 pound RJ (ERJ-195), as the design aircraft with 2,872 equivalent annual departures. These parameters are consistent with the forecasts in this report. The pavement is currently in excellent condition and no major improvements are recommended.

Runway 10-28 was rehabilitated in 1999. The pavement was experiencing problems with reflective cracking at that time and the improvements included cold milling, crack filling and two 4" asphalt overlays with a paving fabric interlayer installed over the more severe longitudinal and transverse pavement cracks. The design aircraft for the pavement design was the DC 9-30, which was in service at Binghamton Regional Airport at that time. This pavement remains in very good condition and no major improvements are recommended.

Runway Line of Sight Standards

Standards have been developed for pilot visibility along runways, and between intersecting runways. For individual runways, the current standard requires that an object extending five feet above the surface of the runway should be visible from any other point five feet above the runway surface, for the entire length of the runway. If the runway has a full parallel taxiway, the requirement is lessened to one half the runway length.

For intersecting runways, a clear line of sight between the ends of intersecting runways is recommended. If that condition cannot be met, the FAA has defined a less demanding minimum standard, the runway visibility zone (RVZ). The RVZ is an area formed by imaginary lines connecting two runway's visibility points. These points may be the runway ends or some point along the runway between the end and the intersection as defined by the advisory circular. Within the RVZ, an object five feet above the runway centerline elevation should be visible from any other point five feet above the runway centerline elevation within the RVZ. Figure 5-3 illustrates BGM's runway visibility zone. The runway system at BGM was built on top of a hill, and terrain falls off in all directions so there are no terrain obstructions to the RVZ. RVZ standards are met. A 2007 obstruction removal project removed trees within the transitional surface and improved visibility between the runway ends. One building penetration exists, a very small portion of the northeastern most corner of the terminal building lies between the visibility points of Runways 10 and 16.

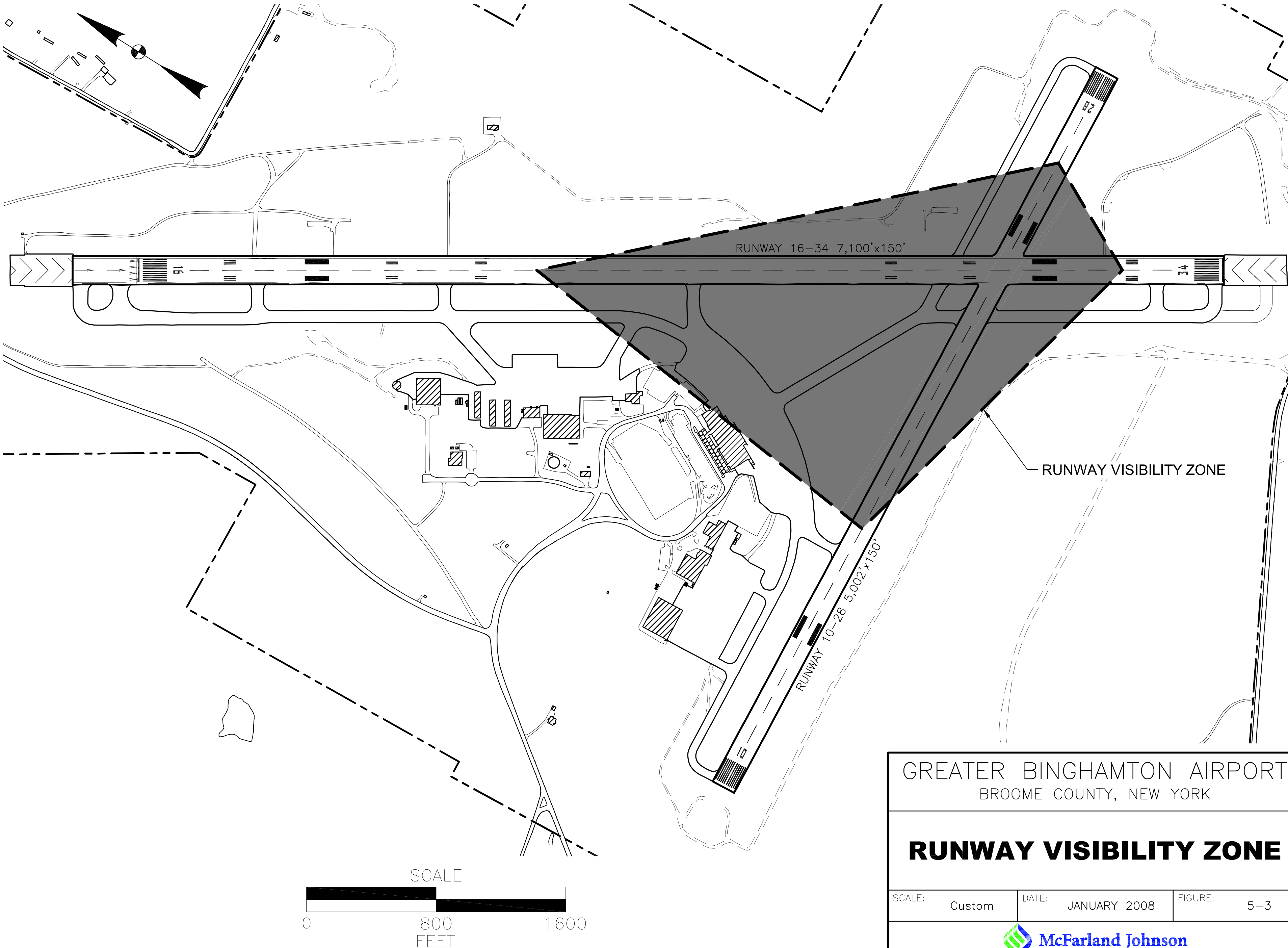
A final line-of-sight or visibility standard is that the entire airfield – the aircraft movement area – should be visible from the air traffic control tower. This standard is met at BGM except for a portion of hard surface pavement west of the airport maintenance building, westernmost portions of Taxiway A and Taxiway B. No changes to ATCT siting are recommended.

Runway Safety Areas (RSA):

The RSA is defined as a *"surface surrounding a runway prepared for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. This area must be cleared and graded and have no potentially hazardous ruts, humps, depressions or other surface variations. The surface should not permit water accumulation and, under dry conditions, should be capable of supporting snow removal equipment, aircraft rescue, and fire fighting equipment, and the occasional passage of aircraft. The RSA should be free of objects higher than three inches, except for those objects that must be located in the area for air navigation or aircraft ground maneuvering purposes."* Those objects should be frangible. Specific grading standards for various portions of the RSA have been developed to ensure that the area is relatively flat and level.

For runways designed to ARC C-III standards, the RSA is 500 feet in width and extends 1,000 feet beyond the runway ends. For runways designed to ARC B-II with minimum visibility of not lower than ¾ mile, the RSA is 150 feet wide and 300 feet in length. For B-II runways with visibility below ¾ mile the RSA width is 300 feet and the length beyond the runway end is 600 feet.

FAA sponsored RSA studies were conducted at BGM in 2001 and 2006. The 2001 study determined that RSA for neither runway complied with standards then in effect. As a result of that study a new technology, EMAS, was employed to mitigate the non-standard RSA at both ends of Runway 16-34. EMAS, which is an acronym for Engineered Materials Arresting System, is a type of "crushable concrete" that is designed



GREATER BINGHAMTON AIRPORT
BROOME COUNTY, NEW YORK

RUNWAY VISIBILITY ZONE

SCALE:	DATE:	FIGURE:
Custom	JANUARY 2008	5-3

McFarland Johnson

to arrest an aircraft that overruns the runway at a speed of up to 70 knots without causing harm to the aircraft or passengers. EMAS beds, 315' long at the approach end of Runway 16 and 311' on Runway 34, resulted in some slight shortening of the total runway length, but the remaining 7,100' of pavement is available for all operations except landing on Runway 16, which has a displaced threshold of 401' due to the location of the FAA glideslope antenna.

The 2006 study, which was conducted subsequent to FAA issuance of revised RSA requirements, determined that the Runway 16-34 improvements adequately mitigated the non-standard RSA condition on that runway, and recommended an improvement project for Runway 10-28 based on an updated ARC for that runway of B-II. In 2006 – 2007 the airport undertook an RSA improvement project involving the installation of approximately 200,000 cubic yards of earthen fill materials off the ends Runways 10 and 28. Clearing of trees, realignment of the perimeter fence and perimeter service roads were also included in the project. The Runway 10-28 RSA is now 150' in width and extends 300' beyond the runway ends, in conformity to B-II criteria for runways with visibility minimums not lower than 3/4 mile.

Runway Object Free Areas (ROFA):

The ROFA is a two-dimensional surface surrounding the runways that should be clear of objects, except for objects that need to be located within the area for aeronautical purposes. Again, these objects should be frangible. The ROFA clearing standard requires clearing the ROFA of aboveground objects protruding more than 3 inches above the RSA edge elevation. For C-III runways, the ROFA width is 800' and extends 1,000' beyond the runway end, but not farther than the RSA. This caveat (footnotes 6 and 7 to Table 3-3 of AC 150/5300-13) applies to the ROFA at Binghamton because of the presence of EMAS at both runway ends. As a result, the ROFA length beyond runway end criteria for BGM is 600'. For B-II runways with visibility not less than ¾-mile, the ROFA width is 500' and it extends 300' beyond the runway ends. If visibility is reduced less than ¾ mile the design standard width will be 800' and the length beyond the runway end will be 600'. Both runways at BGM currently meet the ROFA criteria.

Obstacle Free Zones (OFZ):

There are four Obstacle Free Zones that apply to BGM: The Runway OFZ, the Inner-Approach OFZ, the Inner-transitional OFZ, and the Precision OFZ. The Runway OFZ is defined as the three dimensional airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The ROFZ extends 200 feet beyond each end of the runway. At BGM, which serves large aircraft, the width is 400 feet. These dimensions apply to both runways. The ROFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except frangible visual NAVAIDS that need to be located in the ROFZ because of their function. Based on current use BGM is in compliance with ROFZ criteria. Due to non-standard runway taxiway separation, ROFZ criteria would be violated by aircraft with wingspans of 150' on Runway 10-28 and 175' on Runway 16-34.

The inner-approach OFZ applies to runways having approach light systems and the Inner-transitional OFZ applies to runways with less than ¾ mile visibility. At BGM these apply only to Runway 16-34. The Inner-approach OFZ is basically an extension of the ROFZ along the length of the approach light system. At BGM, where the approach lights are elevated, there are no penetrations to this airspace. The inner-transitional OFZ extends the protected airspace along either side of the ROFZ above the taxiways and landside facilities. At BGM, this protected airspace begins approximately 67' above the present taxiway centerline. No airport facilities or aircraft now or expected to use the airport violate this zone.

The final OFZ for consideration is the Precision OFZ (POFZ), which is in effect when: 1) the airport has a vertically guided approach, 2) ceiling is below 250 feet and/or visibility is less than ¾ mile, and 3) an aircraft on final approach is within 2 miles of the runway threshold. Presently it applies only to Runway 16-34. The POFZ consists of the airspace above an area beginning at the runway threshold and extending outward for 200 feet, and for 400' on either side of the runway centerline for a dimension of 200' x 800'. No portion of an aircraft holding on a taxiway except the wings may penetrate the POFZ. At BGM this zone is of concern to the displaced threshold on the Runway 16 approach. A separate holding position is provided to ensure that aircraft on Taxiway A do not taxi past the displaced threshold when the POFZ is in effect.

Runway Protection Zones (RPZ):

RPZs are large trapezoidal areas on the ground off each runway end that underlie aircraft approach and departure paths. The RPZ begins 200 feet beyond the end of the runway. The dimensions of the RPZ for each runway end are dependent on the type of aircraft and the approach visibility minimums associated with operations on that runway.

The RPZ is intended to enhance the protection of people and property on the ground. Certain land uses (i.e. residential, places of public assembly and fuel storage) are prohibited by FAA guidelines within these areas (These prohibitions, however, are only enforceable if the RPZ is owned or controlled by the airport Sponsor). Airport control of these areas is strongly recommended and is achieved through airport property acquisition, easements, or zoning to control development and land use activities. The RPZ beyond Runway 16 is owned by the airport, however only portions of the remaining three RPZ are within the airport property boundary.

The RPZ dimensions at BGM are those for runways serving large aircraft (over 12,500 pounds). Both the existing and future approach visibility minimums for both ends of Runway 16-34 are lower than ¾-mile. Therefore, the existing and proposed RPZ dimensions will not change, as shown in Table 5.8. For both ends of Runway 10-28, the current visibility minimums are not lower than one-mile. No changes are being recommended to the existing approach to Runway 10; however an improved approach with vertical guidance to Runway 28 is under consideration. For planning purposes Table 5.8 will consider that the lowest authorized minimums for that approach, ½ mile, will be attained. According to AC 150/5300-13, *Airport Design*, the RPZ dimensions for runways with approach visibility minimums lower than ¾-mile should measure 2,500 feet in length with an inner width of 1,000 feet and an outer width of 1,750 feet, which are the proposed dimensions shown for Runway 28 in Table 5.5. Land acquisition of approximately 66.06 acres will be required for the airport to control the expanded Runway 28 RPZ, 7.19 acres for the Runway 10 RPZ, and 36.13 acres for the Runway 34 RPZ.

Table 5.5: RPZ Dimensions

RPZ Dimension	Runway 16 / 34		Runway 10 / 28		
	Existing	Proposed	Existing	Proposed	
				10	28
Length	2,500’	2,500’	1,000’	1,000’	2,500’
Inner Width	1,000’	1,000’	500’	500’	1,000’
Outer Width	1,750’	1,750’	700’	700’	1,750’

5.2.2 Taxiways

As described in Chapter 2, *Inventory*, there are 13 taxiways at BGM designated “A” through “P” (not including “I”, “N”, or “O”). Both runways are served by partial parallel taxiways. Planning standards for taxiways include taxiway width, taxiway safety areas, taxiway object free areas, taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines as listed below:

Design Standard	Design Group III	Design Group II
Taxiway width	50’	35’
Taxiway shoulder width	20’	10’
Taxiway Safety Area width	118’	79’
Taxiway Object Free Area width	186’	131’
Runway-Taxiway Separation	400’	240’*

* For Group II runways with less than ¾ mile visibility, design standard separation is 300’

As listed in Chapter 2, most taxiways serving Runway 16-34 are 75’ in width and most taxiways serving Runway 10-28 are 50’ in width. None of the taxiways have paved shoulders, which are recommended for taxiways on which are operated turbine powered aircraft, particularly those that have engines attached to the wings. Engines located outboard from the aircraft fuselage have a tendency to erode non-stabilized taxiway shoulders and also can ingest foreign objects resulting in severe engine damage. For these reasons maintaining the current pavement width of 75' is recommended for Taxiways A through G and J, serving Runway 16-34. The recommended width of Taxiways K through P and H, serving Runway 10-28 is a continuation of the current 50 feet. In addition to the reasons listed above, Runway 10-28 receives regular use by aircraft within Design Group III and 50' width meets the needs of those aircraft. Aircraft with engines mounted on the wings will typically use Runway 16-34, so the additional width recommended for those taxiways is not recommended for the Runway 10-28 taxiway system. Because of the generous width of the taxiways, the addition of paved shoulders is not recommended.

The definitions, grading and object clearance criteria for taxiway safety area and taxiway OFA are very similar to those for runways. The taxiway system at BGM is in compliance with TSA and TOFA criteria.

The principal non-standard feature of the taxiway system at BGM is the runway to taxiway centerline separation. The distance between Runway 16-34 and Taxiways A and G is 287.5 feet, except for a small section of Taxiway A between Taxiway C and the approach end of Runway 16 where the distance is 300'. Construction of that section required issuance of a modification of design standards by FAA in April of 1988, but no modification is in place for the remaining non-standard sections.

The rationale behind the centerline separation distance design standard is to ensure that no portion of an aircraft on a taxiway should be within the bounds of either the RSA or the ROFZ of an active runway. For Runway 16-34, the RSA is the wider of the two areas, requiring that no part of an aircraft be within 250' of the runway centerline when the runway is in use. Based upon the current separation of 287.5 feet for portions of the taxiway, this restricts taxiway use to aircraft with a wingspan less than 75 feet (37.5' x 2). Most aircraft using the airport have wingspans of less than 75', but larger aircraft that use or may use the airport include the deHavilland Dash 8 (90'), the C-130 Hercules (132' 7"), the CRJ 700 (76'3"), the EMB 170 (85'4"), the CRJ 900 (76'3"), ERJ 190 (94' 3") and the Airbus 320 (111'1").

A project is currently underway to improve the non-standard separation of Taxiway A to 300'. This will allow aircraft with wingspans of up to 100' to be located on Taxiway A while the runway is in use. On completion of that project, aircraft with wingspans of greater than 100' will require special clearance to use the taxiway system. The current project includes the shifting of Taxiway G (approximately 1,800') to the 300' separation distance.

For taxiways serving Runway 10-28, the current separation distance of 275' meets the design standard. No modification of design standards (MOD) is required. If, however, the approach visibility for that runway is reduced to less than ¾-mile the design standard would be 300'. Justification for a MOD would be based on the width of the ROFZ, which at 400' would exceed the width of the expanded RSA (width of 300'). The ROFZ width would permit an aircraft with a wingspan of 150' to be on the taxiway without a penetration. It does not appear that taxiway separation will be a constraint to lowered visibility on Runway 10-28.

The final consideration for the taxiway system is the need for additional taxiways. Presently neither runway has a full parallel taxiway although access is provided to both runways by means of a "detour" through the airline terminal apron. The Taxiway "A" improvements now in design include extending Taxiway "A" to connect directly to Taxiway "G". This will provide a full parallel taxiway to Runway 16-34 and eliminate the need to transit the terminal apron. A future project to provide a full parallel taxiway for Runway 10-28 by connecting Taxiways "K" and "H" would improve circulation on that runway and eliminate the need for corporate and general aviation aircraft based on the West Apron to transit the terminal apron when taxiing to or from the approach end of Runway 28. Therefore, a full parallel taxiway to Runway 10-28 is recommended. The existing runway-taxiway separation should be adequate for all future use, though a MOD may be needed if visibility minimums below ¾ mile for Runway 28 are authorized.

5.2.3 Lighting and Instrumentation

Lighting/Visual Aids:

Current lighting and visual aids are discussed in Section 2.2.4. The current project to improve Taxiway A includes relocation and installation of additional taxiway edge lights and improvements to the electrical vault to accommodate the new lights. Recommended future projects include installation of an approach light system on the approach end of Runway 28 to provide lowest minimums for a vertically guided approach procedure. A TERPS specified approach light system is required to obtain credit for lights. For planning purposes a MALSR similar to the current systems on Runways 16 and 34 should be programmed, but as the LPV criteria evolve the requirements may change. A second visual aid that should be programmed is the installation of new PAPI on all four runway ends. The current VASI systems serving Runways 10 and 28 should be replaced with the more widely used PAPI systems. The VASI were installed prior to 1988 and are approaching the end of their useful life. The PAPI now serving Runway 10-28 will also be due for replacement before the end of the planning period. Additionally, REILs are currently provided for Runway 28 but not for Runway 10. Installation would improve pilot recognition of the runway end during periods of low visibility and is recommended.

The installation of centerline lights is being recommended to improve pilot identification of the runway environment during snow and ice conditions. BGM is located in an area that can receive various forms of frozen precipitation for up to seven or eight months in a year. This precipitation is sometimes heavy, but sometimes is light and windblown for long periods of time. This persistent frozen precipitation is white, the same color as the runway markings, and pilots have reported difficulty identifying the markings even during times when the runway is cleared in accordance with all requirements. As noted in AC 150/5340-1J, *Standards for Airport Markings*, markings that cannot be seen by pilots and others operating on marked surfaces are useless. Supplemental lighting or reflective markers identifying the runway centerline would improve pilot situational awareness and improve safety. Centerline lighting will also facilitate development of a future CAT 2 precision instrument approach procedure, is an element in obtaining lower departure visibility minimums, and would improve reliability of service at the airport. Based on site specific conditions at BGM, centerline lighting supplementing the runway markings is recommended.

Electronic Navigational Aids (Navaids)

Existing electronic Navaids at BGM are also described in Section 2.2.4. The only recommended upgrade to the airport's electronic Navaids is installation of additional transmissometers. Currently, only one RVR reading for BGM is available from a unit located near the touchdown end of Runway 34. Requirements for instrument operations are often based on the availability of up to three RVR values from equipment located at the touchdown, midpoint, and roll-out end of the runway. Although lack of sufficient visibility information is not now a major problem, addition of at least two more transmissometers is recommended for the planning period. One is recommended for the roll-out end of Runway 34 (the touchdown end of Runway 16), and at least one more is recommended to provide precise RVR information for Runway 10-28.

Included in electronic Navaids is the glideslope serving the approach end of Runway 16. The glideslope is in its current location because it is based on that runway's threshold location prior to installation of the airport's EMAS. At that time, the decision was made to leave the threshold in its existing location due to the cost of relocation. Because of the need to increase landing length however, relocating the displaced threshold on this runway could increase landing distance on Runway 16 by an equivalent distance. Because airline equipment scheduling is based on the shorter of the various operating distances for the two runway ends, some improvement in runway utility could be obtained with minimum construction impacts.

5.2.4 Airside Facility Requirements Summary

The table below summarizes the current condition, design standard, and recommended design of the airside elements discussed above.

Table 5.6: Airside Facility Requirements Summary			
Item / Facility	**Existing Facility or Capacity**	**Ultimate Requirement**	**Deficit**
RUNWAYS			
Primary Runway (16-34) Length	7,100’	8,400’	1,300
Runway 16-34 Width	150’	150’	0’
Crosswind Runway (10-28) Length	5,002’	6,000’	998’
Runway 10-28 Width	150’	150’	0’
TAXIWAYS (Includes Partial Parallel Only)			
Parallel Taxiway	Partial parallel	Full parallel	Full parallel
Runway 16 to Taxiway “A” Offset*	300’	400’	100’
Runway 34 to Taxiway “G” Offset*	287.5’	400’	112’
Runway 10 to Taxiway “K” Offset	275’	300’	0’
Runway 28 to Taxiway “H” Offset	275’	300’	25’
LIGHTING & VISUAL AIDS			
Runway 16	HIRL; MALSR; PAPI	HIRL; MALSR; PAPI, Centerline	Relocate glideslope, Centerline lights
Runway 34	HIRL; MALSR; PAPI	HIRL; MALSR; PAPI; Centerline, Transmissometer	Centerline lights, Transmissometer
Runway 10	MIRL; VASI	MIRL; PAPI; Transmissometer	PAPI; REIL; Transmissometer
Runway 28	MIRL; VASI; REIL	MIRL; PAPI; MALSR; Transmissometer	PAPI; MALSR; Transmissometer
INSTRUMENTATION			
Runway 16	ILS; RNAV (GPS)	ILS; RNAV (GPS)	None
Runway 34	ILS; RNAV (GPS)	ILS; RNAV (GPS)	None
Runway 10	VOR or GPS	VOR or GPS	None
Runway 28	RNAV (GPS)	LPV	LPV

* A taxiway project is currently in the design phase that will connect Taxiways “A” and “G” to form a full length parallel taxiway to Runway 16-34 with an offset of 300’.

5.3 AIRSPACE REQUIREMENTS

Airspace requirements include meeting criteria contained in FAR Part 77, *Objects Affecting Navigable Airspace,* most of which was first published in 1965, as well as other airspace criteria contained in FAA Advisory Circulars and Orders as they may impact future airspace requirements at BGM. This section will also examine VFR and IFR airspace and possible conflicts with other airports.

5.3.1 FAR Part 77 Surfaces

To protect the safety of aircraft operations, the FAA defines and regulates the airspace surrounding airports in Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. This airspace is defined and delineated by a set of geometric surfaces referred to as "imaginary surfaces" that extend outward and upward from airport runways. These imaginary surfaces identify the maximum acceptable height of objects beneath them. Objects that penetrate these surfaces are deemed obstructions to air navigation and should be marked and lighted in accordance with FAA regulations. The height and dimensions of the imaginary surfaces are determined by the airfield elevation, the size of aircraft using the airport, and type of approaches to the runways. The imaginary surfaces are described below and illustrated in Figure 5-4. When an object penetrates an imaginary surface, it is considered an obstruction to air navigation. The determination of whether an object constitutes a hazard to air navigation is made by the FAA on a case by case basis. Obstructions to air navigation should be removed if feasible, or marked and lighted if not. Additional analysis of close-in obstructions will be conducted as part of the Airport Layout Plan (ALP) drawing set, on the *Approach and Runway Protection Zone Plan(s)*.

Primary Surface

The Primary Surface is a surface longitudinally centered on the runway. When the runway has a paved surface, the Primary Surface extends 200 feet beyond each runway end. The Primary Surface for a turf runway extends only to the runway end. The width of the Primary Surface depends upon the type of approach provided to the runway. The elevation of any point of the Primary Surface is the same as the nearest point on the runway centerline.

For Runway 16-34 which has a precision approach, the Primary Surface width is 1,000 feet. This is the maximum width of the Primary Surface and will remain the same in the future.

For Runway 10-28, which also is designed to serve large airplanes, the Primary Surface width is 500 feet based upon a non-precision instrument approach procedure with visibility minimums greater than ¾-statute mile. As a result of the recommended improved approach to Runway 28, the future Primary Surface will be 1,000 feet in width based on criteria for a non-precision instrument runway with visibility minimums as low as ¾-statute mile.

Transitional Surface

The Transitional Surface is a surface extending outward and upward at right angles from the sides of the Primary and Approach Surfaces at a slope of 7:1. The Transitional Surface terminates at the overlying Horizontal Surface.

Horizontal Surface

The Horizontal Surface is a horizontal plane 150 feet above the highest point on the runway surface. The elevation of the Horizontal Surface at BGM is 1,786 feet mean sea level (MSL).

The perimeter of the Horizontal Surface is constructed by swinging arcs of specified radii from the center of each end of the Primary Surface of each runway; the arcs are connected by tangents. For all other runways at BGM, the radius of each arc is 10,000 feet.

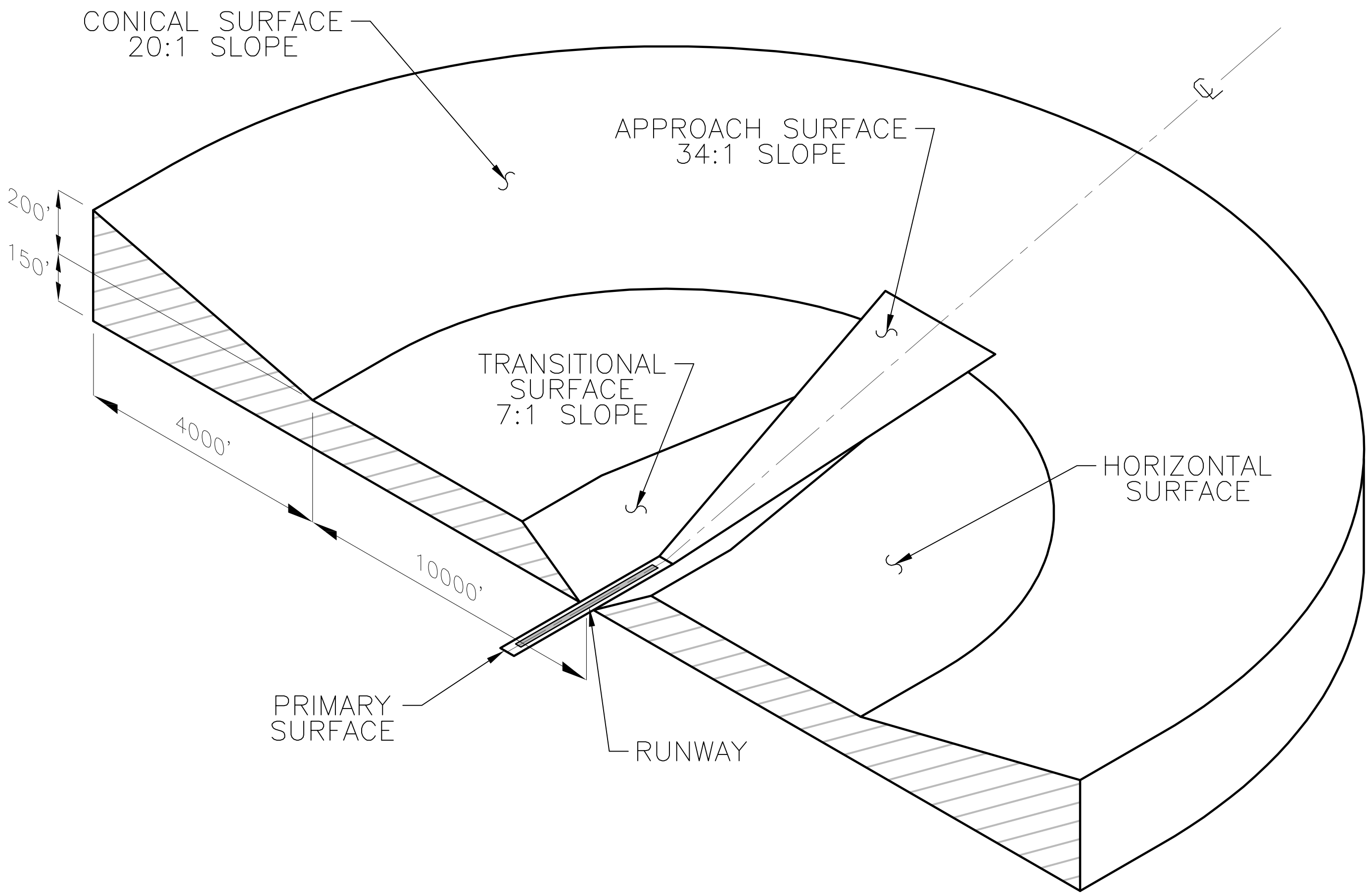
Conical Surface

The Conical Surface is a surface extending outward and upward from the perimeter of the Horizontal Surface at a slope of 20:1 for a horizontal distance of 4,000 feet. Its maximum elevation is 1,986’ MSL.

Approach Surface

Approach Surfaces for each runway end are longitudinally centered on the extended runway centerline, extending outward and upward from the Primary Surface. The dimensions and slope of these surfaces are based on the category of approach (visual, non-precision, precision), the visibility minimums of the published approach(es), and the type of aircraft that will use the approach (more than or less than 12,500 pounds). At BGM this surface is based on the current and future use of both runways by large aircraft. There are currently precision (ILS) approaches to both ends of Runway 16-34, and non-precision approaches to Runway 10-28 with visibility of at least one mile. An improved approach to Runway 28 is being recommended as part of this report with anticipated visibility of less than one mile. As a result, the dimensions of Runway 28’s proposed Approach Surface will be different than the dimensions of the existing Approach Surface. The inner width of the proposed Runway 10 Approach Surface will also increase from 500 feet to 1,000 feet as a result of the increased primary surface width for Runway 10-28 based upon the recommended approach to Runway 28. There will be no change to the future Runway 16 or Runway 34 Approach Surfaces as there are no other recommended changes to any of the airport’s existing approach procedures. The existing and proposed Approach Surface dimensions for each runway end are shown in Table 5.9. An approach feasibility analysis for the Runway 28 approach is recommended to determine the appropriate level of instrumentation appropriate for that runway.

ISOMETRIC VIEW OF IMAGINARY SURFACES



GREATER BINGHAMTON AIRPORT

BROOME COUNTY, NEW YORK

ISOMETRIC VIEW OF IMAGINARY SURFACES

SCALE:	DATE:	FIGURE:
NONE	JANUARY 2008	5-4

McFarland Johnson

Table 5.7: Existing and Proposed Approach Surfaces				
Runway End	**Existing**		**Proposed**	
16	Length Inner Width Outer Width Slope	50,000 1,000' 16,000' 50:1 (1st 10,000') 40:1 (Add. 40,000')	Length Inner Width Outer Width Slope	50,000' 1,000' 16,000' 50:1 (1st 10,000') 40:1 (Add. 40,000')
34	Length Inner Width Outer Width Slope	50,000' 1,000' 16,000' 50:1 (1st 10,000') 40:1 (Add. 40,000')	Length Inner Width Outer Width Slope	50,000' 1,000' 16,000' 50:1 (1st 10,000') 40:1 (Add. 40,000')
10	Length Inner Width Outer Width Slope	10,000' 500' 3,500' 34:1	Length Inner Width Outer Width Slope	10,000' 1,000' 3,500' 34:1
28	Length Inner Width Outer Width Slope	10,000' 500' 3,500' 34:1	Length Inner Width Outer Width Slope	10,000' 1,000' 4,000' 34:1

5.3.2 VFR Airspace

A standard aircraft traffic pattern incorporates the use of left hand traffic, or all turns made to the left. There are standard left hand traffic patterns to all four runway ends at BGM. The traffic pattern altitude at BGM is 2,436 feet above mean sea level (MSL) or 800 feet above the airport elevation. The airport elevation is 1,636 feet.

Figure 2-13, which is located in the *Inventory* chapter of this report, shows a scaled representation of the VFR traffic pattern airspace for BGM and other airports in close proximity to BGM. The figure is based on a "busy day" traffic pattern extending five miles beyond the Runway 16-34 ends and three miles beyond the Runway 10-28 ends. Only public use airports are included on the figure. If private use airports were included, it would be shown that Chenango Bridge Airport (located approximately six nautical miles east of BGM) overlaps Binghamton's airspace by approximately one-mile. Existing ATC procedures minimize potential conflicts.

5.3.3 IFR Airspace

According to the FAA's Air Traffic Activity System (ATADS) an instrument approach is an approach made to an airport and completed by an aircraft with an IFR flight plan when visibility is less than three miles or ceiling is at or below the minimum initial approach altitude. Currently, 4% (1,136) of airport operations are considered instrument approach operations. By 2025, the number of instrument approach operations is expected to increase to 1,691 or 5% of the total airport operations. Improved approach to Runway 28 could increase this number.

Existing instrument approach procedures at BGM include instrument landing system (ILS) approaches to both ends of Runway 16-34, area navigation (RNAV) global positioning system (GPS) approaches to both ends of Runway 16-34 and to Runway 28, very high frequency omnidirectional range (VOR)/distance measuring equipment (DME) approach to Runway 28 and a VOR or GPS approach to Runway 10. It is the recommendation of this report that the airport request that the existing RNAV (GPS) approach to runway 28 be upgraded to an APV approach. Visibility minimums of approximately ½-mile should be attainable for this runway. (Requirements for APV approaches can be found in Figure 5-5.)

5.4 LANDSIDE FACILITY REQUIREMENTS

While the airside facilities provide for the movement of aircraft takeoffs and landings, the landside facilities address the needs of the airport users, and activities which support the operation of the aircraft. This includes facilities that support such activities as airfield maintenance, aircraft fueling, maintenance of aircraft, and the airport's hangars and aprons. Landside facilities also include the airport's passenger terminal and cargo facilities. For the efficient operation of an airport, the landside and airside facilities must work in concert with one another. The following landside facilities will be discussed in greater detail.

- Passenger Terminal
- Air Cargo
- General Aviation
- Aviation Support Facility Requirements
- Airport and Aviation Business Facility Requirements

Table A16-1B. Approach Procedure With Vertical Guidance (APV-RNP) Approach Procedure Requirements

Visibility Minimums [1]	< ¾ - Statute Mile	<1- Statute Mile	1- Statute Mile	> 1- Statute Mile [14]
Height Above Touchdown (HAT) [2]	250 ft	300 ft	350 ft	400 ft
TERPS Glidepath Qualification Surface (GQS) [3]	TABLE A2-1, Row 7, Criteria, and Appendix 2, par. 5a Clear			
TERPS Paragraph 251	34:1 clear	20:1 clear	20:1 clear, or penetrations lighted for night minimums (See AC 70/7460-1)	
Precision Object Free Area (POFA) 200 x 800 [4]	Required	Recommended		
Airport Layout Plan [5]	Required			
Minimum Runway Length	4,200 ft (1,280 m) (Paved)	3,200 ft (975 m) (Paved) [6]	3,200 ft (975 m) [6,7]	
Runway Markings (See AC 150/5340-1)	Nonprecision (Precision Recomended)		Nonprecision [7]	
Holding Position Signs &Markings (See AC 150/5340-1 And AC 150/5340-18)	Nonprecision (Precision Recomended)		Nonprecision [7]	
Runway Edge Lights [8]	HIRL/MIRL		MIRL/LIRL	
Parallel Taxiway [9]	Required		Recommended	
Approach Lights [10]	Required [11]		Recommended	
Runway Design Standards: e.g., Obstacle Free Zone (OFZ) [12]	APV OFZ Required			
Threshold Siting Criteria To Be Met [13]	Table A2-1, Row 4 and 9, Criteria		Appendix 2, Table A2-1, Row 4 and 8, Criteria	
Survey Required for Lowest Minima	Table A16-2, Row 6, Criteria			

1. Visibility minimums are subject to the application of FAA Order 8260.3 (TERPS) and associated orders or this table, whichever is higher.
2. The HAT indicated is for planning purposes only. Actual obtainable HAT is determined by TERPS.
3. The Glidepath Qualification Surface (GQS) is applicable to approach procedures providing vertical path guidance. It limits the magnitude of penetration of the obstruction clearance surfaces overlying the final approach course. The intent is to provide a descent path from DA to landing free of obstructions that could destabilize the established glidepath angle. The GQS is centered on a course from the DA point to the runway threshold. Its width is equal to the precision "W" surface at DA, and tapers uniformly to a width 100 feet from the runway edges. If the GQS is penetrated, vertical guidance instrument approach procedures (ILS/MLS/WAAS/LAAS/Baro-VNAV) are not authorized.
4. This is a new airport surface (see paragraph 306).
5. An ALP is only required for obligated airports in the NPIAS; it is recommended for all others .
6. Runways less than 3,200' are protected by 14 CFR Part 77 to a lesser extent (77.23(a)(2) is not applicable for runways less than 3200 feet). However runways as short as 2400 feet could support an instrument approach provided the lowest HAT is based on clearing any 200-foot obstacle within the final approach segment.
7. Unpaved runways require case-by-case evaluation by regional Flight Standards personnel.
8. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
9. A parallel taxiway must lead to the threshold and, with airplanes on centerline, keep the airplanes outside the OFZ.
10. To achieve lower visibility minimums based on credit for lighting, a TERPS specified approach light system is required.
11. ODALS, MALS, SSALS are acceptable. For LPV based minima approach lights are recommended not required.
12. Indicates what chart should be followed in the related chapters in this document.
13. Circling procedures to a secondary runway from the primary approach will not be authorized when the secondary runway does not meet threshold siting (reference Appendix 2), OFZ (reference paragraph 306) and TERPS paragraph 251 criteria.
14. For circling requirements see Table 16-1C.

GREATER BINGHAMTON AIRPORT
BROOME COUNTY, NEW YORK

APPROACH PROCEDURE WITH VERTICAL GUIDANCE APPROACH REQUIREMENTS

SCALE:	DATE:	FIGURE:
NONE	MAY 2008	5-5

McFarland Johnson

5.4.1 Passenger Terminal Requirements

Evaluation of passenger terminal requirements includes not only the passenger terminal building, but also the air carrier parking apron and its associated taxiways/taxilanes along with the provision for passenger ground access and automobile parking. The functional areas that will be evaluated in this section are:

- Airline gates
- Airport Security / TSA
- Terminal public areas
- Airport terminal tenants
- Terminal airline operations
- Air carrier apron
- Vehicle parking

Airline gates

Airline gate requirements are dependent on the number of arriving and departing flights supported by the airport. Of particular importance is the distribution of flights throughout the day, particularly the number of peak hour flights. Other factors influencing gate requirements are the time individual aircraft remain at the gate, and the number of aircraft that arrive late in the day and remain at the gate overnight so as to be ready for early morning departure. As shown below, the current (January 2008) consolidated schedule for BGM indicates that the peak hours are between 5:45 and 7:25 am, and 3:00 and 4:00 pm weekdays. The morning peak sees four departing flights and the afternoon sees two arriving and two departing. The morning flights use three gates and the afternoon flights utilize two gates. The aviation forecasts in Chapter 3 anticipate that the number of airline peak hour operations will increase to 7 by the year 2025. The current provision of six airline gates – four with passenger boarding bridges – should be able to accommodate this increase.

The schedule indicates that four aircraft currently remain overnight and leave early the next morning: two CRJs, a Dash-8, and a SAAB. Presently all four can remain overnight at a gate with a boarding bridge. The time period between the earliest and latest of these departures is slightly less than two hours. At most regional airports, the main factor influencing the number of overnight aircraft is the number of hubs served by the airlines serving the airport. The four early departures, operated by three airlines, now provide early service to three hubs. When an additional one or two hubs are added to the schedule at BGM, the number of overnight aircraft, and early morning departures connecting to those hubs, could increase to five or six. Assuming a 30-minute gate time for departing flights, the four boarding bridge equipped gates should be able to accommodate eight departures within two hours. Should early morning departures increase beyond that number, or should the departure schedule be compressed, additional jet bridge could be needed within the forecast period.

Table 5.8: Consolidated Flight Schedule January 2008

Time	in/out	to/from	flight	carrier	equipment	notes	pax
5:45 AM	departure	Phila	3793	USAir	CRJ		50
6:00 AM	departure	Dulles	5250	United	SAAB		30
6:10 AM	departure	Detroit	2992	NWA	CRJ		50
7:25 AM	departure	Phila	3631	USAir	DH-8		37
9:55 AM	arrival	Dulles	5251	United	SAAB		30
10:15 AM	departure	Dulles	5256	United	SAAB		30
12:00 PM	arrival	Phila	4467	USAir	DH-8		37
12:30 PM	departure	Phila	4467	USAir	DH-8		37
12:55 PM	arrival	Phila	4052	USAir	CRJ	Sunday	50
1:15 PM	arrival	Phila	4052	USAir	CRJ	Saturday	50
1:15 PM	departure	Phila	3644	USAir	CRJ	Sat/Sun	50
1:25 PM	departure	Phila	4052	USAir	CRJ	Sunday	50
1:45 PM	departure	Phila	4052	USAir	CRJ	Saturday	50
2:05 PM	arrival	Phila	3644	USAir	CRJ		50
2:05 PM	arrival	Dulles	5257	United	SAAB		30
2:30 PM	departure	Dulles	5252	United	SAAB		30
2:50 PM	departure	Phila	3644	USAir	CRJ		50
4:25 PM	arrival	Detroit	2995	NWA	CRJ		50
5:00 PM	arrival	Phila	4172	USAir	DH-8		37
5:00 PM	departure	Detroit	2994	NWA	CRJ		50
5:30 PM	departure	Phila	4172	USAir	DH-8		37
6:40 PM	arrival	Dulles	5253	United	SAAB		30
7:10 PM	departure	Dulles	5254	United	SAAB		30
7:30 PM	arrival	Phila	4599	USAir	DH-8		37
7:35 PM	arrival	Phila	3978	USAir	DH-8	Saturday	37
8:00 PM	departure	Phila	4599	USAir	DH-8		37
10:45 PM	arrival	Phila	3796	USAir	CRJ		50
10:55 PM	arrival	Detroit	2993	NWA	CRJ		50
11:05 PM	arrival	Dulles	5255	United	SAAB		30
11:55 PM	arrival	Phila	3986	USAir	DH-8		37

A final consideration regarding gate requirements is the ability of the current passenger boarding bridges to accommodate larger aircraft. The four bridges now in use were designed with length and height adjustments to serve all regional jets then in service as well as larger narrow-body jetliners such as the B-737 and the A-320 series. No additional gates or jet bridges are recommended within the forecast period.

Airport Security/TSA/Customs

Airport Security and TSA space demands continue to be some of the most fluid space requirements in any airport. Beginning in 2002 the area required to meet new requirements for security equipment and personnel has been changing constantly. The most current guidelines are: *Recommended Security Guidelines for Airport Planning, Design and Construction*, revised June 15, 2006, and published by the TSA. It is these guidelines that are applied for this analysis. It should be noted that the TSA makes the final determination of what equipment should be installed at each Passenger Security Screening Checkpoint (SSCP), so they are the final arbiters of the actual space requirements.

The SSCP is the gateway between the "non-secure" portions of the airport available to the general public, and the secure portions of the airport available only to ticketed passengers and authorized personnel. This has been the area upon which most of the attention has been focused, due, not in small part, to the public scrutiny and complaints regarding queues to pass through these areas. Proper SSCP design helps avoid a host of problems for the airport and airlines, including congestion, delays and unnecessary security risks. In theory, these spaces should be designed to accommodate both existing technology and provide the flexibility for future security equipment as it becomes available and cost-effective. Generally, a standard SSCP consists of:

- Walk through metal detector
- Carry-on baggage x-ray with roller extensions
- Explosives Trace Detection (ETD) machine
- Search table
- Glass wanding & holding station
- Private search area
- Law enforcement officer (LEO) station or position

Generally, for a single-lane SSCP a space between 12'6" and 16'2" wide is proscribed to accommodate all of the equipment required. In either case, the length recommended is between 42' and 44', exclusive of queuing space. This yields a maximum demand for space between 525 and 715 square feet of space, not including space for passenger queues or any office space that might be needed by the TSA. Currently approximately 510 square feet of space is allocated for the SSCP function at BGM. The facility has a design "throughput" maximum capacity of 200 passengers per hour.

The aviation forecasts in Chapter 3 state that the number of peak hour enplanements at the time of writing was 152. That level of activity resulted in some perceived delays for passengers through the SSCP during the Monday and Friday early morning peak periods. The peak number of hour emplaning passengers at BGM is forecast to increase to 264 by 2025. This will result in longer waiting periods at the security check in unless the capacity of the SCCP is increased. Because the passenger screening area is located in a passageway approximately 24' in width located between the airport restrooms and the restaurant, adding another queue alongside the existing one may require reconfiguration of interior space over the long term. Because the limiting factor for increasing the speed at which passengers are screened is the carry-on baggage X-ray machine, it may be possible to increase capacity by adding a second machine and reconfiguring the queuing area without increasing the width of the facility.

International arrivals are also supported at BGM through the services of a US Customs office located at the airport. This office also provides on-call service to the Elmira-Corning Regional Airport. This is a "user fee" office and is able to process both US and international visitors on board international arrivals. Currently the office is located on the second floor of the terminal building and space is adequate. Proposed regulations associated with the "US Visit" program may require additional space in the general aviation terminal but no increase in terminal space requirements is foreseen.

Public Areas

Public areas in the terminal include the passenger departure lounge, the arrivals waiting area, the queuing area at the ticket counters, and the baggage claim area. The only one of these areas located on the secure side of the airport is the departure lounge. That area contains approximately 8,415 square feet of space in which are located about 144 seats, two long corridors leading to passenger boarding gates 1 and 6, and entrances to gates 2 through 4. Rest rooms and vending machines are provided, but no retail space is open to the secure side of the airport. FAA guidance, in Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, recommends approximately 675 square feet of departure lounge space per gate serving aircraft up to 80 seats at a 75-85% load factor. Applied to BGM's six gates, this guideline results in a facility requirement of 4,050 square feet of departure waiting area. Even though the shape of the current waiting area is long and narrow, not optimal for seating arrangements, the total area should be adequate for the planning period.

The public areas on the non-secure side of the terminal flow into one another, with the ticket counter at one end of the building, the baggage claim at the other, and a loosely defined open arrivals waiting area in between. Traffic flows are generally good and there is ample space, with over 21,000 square feet. At the ticketing area, 110 linear feet of counter accommodates four airline stations, and a queuing space 20 feet in depth in front of the counter extends nearly to the terminal entrance and meets the FAA recommended depth. The arrivals waiting area, located generally in the center of the terminal, has a variety of seating options located along the building front and extending in front of the ticketing area. All told, at least 10,000 square feet is devoted to the arrivals waiting area, which functions basically as a walking around area providing the opportunity for passengers to view the various exhibits and informational kiosks while watching the flight information boards which are posted in that area. This space allocation exceeds the FAA recommended area for a single function waiting area.

The baggage claim area contains one oval sloping bed baggage carousel within a 5,500 square foot space that opens directly to the outdoors and the loading curb. The carousel has approximately 140 linear feet of claim frontage and provides bag storage of from 150 to 240 bags, based on FAA guidance. The baggage claim area is well sized for the current level of activity, with plenty of available room and crowding is minimal. For future activity, the carousel should be able to meet the needs of a 90-seat aircraft at 80% occupancy, with each passenger having two bags.

Should the secure area need to be expanded at some time during the planning period, ample space is available within the non-secure portion of the terminal for re-configuration. This would probably be due to demands of TSA screening. Some reallocation of terminal space could probably be made without adversely affecting the non-secure areas, though passenger flow and convenience could be impacted.

Airport Terminal Tenants

Airport tenants include a 2,075 square foot restaurant/gift shop, three rental car agencies and a taxi company who occupy four offices totaling 1,135 square feet. Due to the requirement for physical separation of secure and non-secure terminal areas, all concessions are accessible only from the non-secure terminal areas. Experience of the concessionaires at BGM is that, during the period when the restaurant was accessible from both the secure and non-secure areas, most of their business came from airport visitors rather than from passengers in the secure waiting area. Because during non-peak hours the security screening process is relatively quick, passengers generally wait until just before their flight to go through security and access to concessions is not a problem. As enplanements increase and passengers encounter longer waits going through security they will spend more time in the secure area. Access to concessions from the secure area may become an issue in the future and the matter should be re-examined if and when terminal reconfiguration is required. Current space allocations falls within the guidelines of Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities,* but the shop concession space may become strained over time as aircraft become larger and more people use each flight.

Airline Operations

Airline Operations areas include the ticket counters, outgoing baggage make-up areas, the incoming baggage handling area, and the individual airline office space, which includes office/operations space, employee break rooms, etc.. All these areas except for the ticket counters are on the secure side of the airport.

The airline offices are the only spaces that are individually assigned, the outgoing and incoming baggage areas are shared by all carriers. FAA criteria for baggage claim (incoming) "backroom" areas having 140 linear feet of claim frontage is slightly over 2,000 square feet. The inbound baggage area now has 1,020 square feet. Although it currently serves its purpose, room is not available for storage of ground service airline equipment as is often done at airports where inclement weather is frequent. Future service by larger aircraft, that hold more baggage, will exacerbate the need for space and expansion of this area into adjacent storage space is recommended.

The FAA criteria for baggage makeup areas are based on the concept of "Equivalent Gate Arrivals," or EQA. Passenger aircraft arrivals in periods of peak 20 minutes are the basis for these calculations (arrivals serving as a proxy for airline departures). At BGM, the future EQA is estimated to be below 5, which results in a recommended baggage makeup area of between 2,500 and 4,000 square feet. The current space, excluding the conveyor belts, contains approximately 4,435 square feet. Because these space guidelines predate the implementation of heightened security procedures put in place since 2001, application of the FAA guidelines may underestimate the requirements for baggage makeup areas because of EDT baggage screening machines, but the current area should be adequate for this function.

In summary, the overall size of the terminal is in conformity with FAA guidelines, but the above analysis indicates that some reconfiguration may be needed before the end of the planning period. Specifically, the airport passenger screening area, the incoming baggage area, and the secure passenger waiting area may all require some level of reconfiguration or expansion into other airport areas within the planning period. At some time within the next five to ten years, a terminal space allocation study is recommended.

Air Carrier Apron

The portion of the airline terminal apron dedicated to aircraft parking, approximately 24,000 square yards, lies between the face of the terminal and an apron taxiway that describes an arc along the outer edge of the paved area between the North Apron and the West Apron (Taxiway F). This taxiway is marked to provide wingtip clearance for a DC-9 (Series DC 9-20 through DC 9-50) with a wingspan of 93.3 feet. The clearance line is thus marked at 76.36’ from the taxiway centerline, while the standard design group III marking would be 93’. The DC 9 is slightly more demanding than the DHC Dash 8 with a wingspan of 90’. A distance of approximately 175’ between the terminal building and the edge of the wingtip clearance line is available for aircraft parking. When at a boarding bridge, parked aircraft are approximately 30’ from the face of the terminal, leaving about 145’ before a parked aircraft or ground equipment servicing the aircraft would intrude into the taxiway clearance area. This distance is more than adequate for regional jets, and most narrow bodied aircraft now using or expected to use the airport in the future.

The most recent BGM Airfield Pavement Surface Evaluation and Rating Manual (last modified April 28, 2006) rated the air carrier apron pavement with a score of three signifying that it is in fair condition. The rating system used by BGM is based on AC 150/5320-17 *Airfield Pavement Surface Evaluation and Rating Manuals*, which ranks pavement from a low of one (failed) to a high of five (excellent). Improvements to the apron are recommended within the next five years. These improvements should include replacing the small concrete pads located where the landing gear rests on the pavement at aircraft parking spots with a standard concrete terminal apron that can accommodate a variety of aircraft in a variety of locations. The concrete pavement is better able to withstand the weight of aircraft in the summer months and the stresses of snow plowing in the winter months than asphalt. To ensure that all airport pavements remain in good condition, and that pavement rehabilitation is done at the right time to maximize cost effectiveness, an overall airport pavement management plan should be initiated.

Vehicle Parking

As documented in Section 2.3.1 of the Inventory chapter, there are currently 653 parking spaces available for airline passengers. Of these, 133 are in the short term lot directly across from the terminal, and 520 are located in the long term lot located behind the short term lot. The counterclockwise circulation around the parking area provides excellent access, and the roadway and public parking has recently been rehabilitated and presents an attractive appearance. Although historical parking occupancy records are not available, airport management reports that prior to the recent improvements the airport has experienced a shortfall of about 50-60 spaces during peak periods. The recently completed project has added 109 long term spaces which should be sufficient to accommodate current peak period demands.

Future parking demand will be proportional to the increase in passenger enplanements and may also be influenced by future peaking characteristics. To estimate the future facility requirement, the current peak period parking demand (assumed to be 600 spaces) was increased by the percent increase in enplanements for each of the forecast years. Because larger aircraft are expected to enter service at BGM toward the end of the forecast period, the level of enplanements during peak periods will see an additional increase due to this greater capacity. The forecast year parking estimates were increased by 5% in 2010, 7% in 2015 and 10% in 2025 to account for the impact of stronger peaking characteristics in the future due to the use of larger aircraft. These passenger parking projections are given below:

Year	Parking Demand	Existing	Over/Under
Current	604	653	+49
2010	647	653	+6
2015	697	653	-44
2025	770	653	-117

By 2010 the airport should begin to see periods in which parking demand exceeds supply but they will not be as severe as they were prior to the recent improvements. Because the additional demands are not large this requirement may be met by expansion of the current long term lot or by reallocation or reconfiguration of other existing lots.

In addition to the lots dedicated to airline passenger parking, there are separate lots for airport employees (150 spaces), rental car companies (131 spaces), Airport Rescue & Fire Fighting (±20 spaces), Hangar 1 (currently occupied by Lockheed Martin - ±60 spaces), National Weather Service (±30 spaces), Airfield Maintenance ((±25 spaces), and three lots in the general aviation area (±50, ±40, and ±25 spaces). Adequate parking is available for all airport employees and tenants.

5.4.2 Air Cargo Requirements

There is currently no air cargo going out of BGM, although some packages from western hubs arrive in BGM by air. The majority of package delivery companies in the city truck air freight directly to the Syracuse airport for routing to the major hubs. The airlines no longer carry belly cargo due to the transition to smaller regional jets with very little extra space available.

The limited package delivery that occurs at BGM occurs on the West Apron. Most of the larger transient aircraft that come into BGM also utilize the West Apron where the FBO is located. This is a more compatible area for air cargo operations than the North Apron, where most of the smaller general aviation aircraft are based. Discussions with UPS and FedEx indicate that if demand were to result in greater use of BGM, future use would likely be limited to simple transfer operations in which cargo is transferred between a truck and an aircraft. This would occur directly on the ramp and no building would be required.

The air cargo facility requirement is therefore limited to provision of apron space on the transient apron adequate to handle an aircraft such as a Cessna Caravan or a Fokker 100, two aircraft often used by package delivery contractors. The existing 6,100 square foot air freight building, located adjacent to the North Apron, is no longer required for that use. That site is recommended for redevelopment.

5.4.3 General Aviation Requirements

In addition to providing facilities for airline activity, general aviation (GA) is an important activity at BGM. GA facilities must be able to serve a wide range of aircraft, from small, privately owned aircraft used for recreational travel, to large corporate jets, which are used for business travel.

Landside facility requirements for GA activities at BGM will be calculated based on the Aviation Demand Forecasts in Chapter 3, interviews with airport tenants and personnel, FAA guidelines and industry standards. The following facilities will be examined in this analysis.

- Aircraft Storage
- GA Apron(s)
- GA Terminal Building
- GA Automobile Parking

Aircraft Storage

Because it is the largest and best equipped airport in the county, many of the area's business and corporate owned aircraft are based at BGM. Important clients include the Raymond Corporation, Energy East (NYSEG), SBL Services, Wemco, private businesspeople/pilots, and charter and flight training businesses. Most of these aircraft are kept in a well lit and heated conventional hangar. Aircraft used mainly for recreational flying are usually kept in individual T-hangars. There are no year-round apron tie-down sites on the airport managed by the County, although the FBO may have long term arrangements on the transient apron.

The future need for GA hangar space at the airport will be projected using the based aircraft fleet mix forecast presented in Table 3.11 in Chapter 3, *Aviation Demand Forecasts*. A second factor to be considered is the preferred storage type (conventional or T-hangar storage) of the aircraft owners. Owners of larger and more expensive aircraft will tend to prefer the convenience of heated hangar storage to T-hangar storage, and the preference for conventional hangar space will increase during the winter. Based on discussions with airport management, preferences demonstrated at other airports having similar climate, and taking into consideration the current and anticipated future fleet mix, the following assumptions have been made as to the preferred usage of hangar storage and space requirements of based aircraft at BGM.

Aircraft Type	Storage Preferences Per Aircraft	Space Requirement Per Aircraft
Single-Engine	80 % T-Hangar	1 Unit
	20 % Conventional Hangar	1,200 Square Feet
Multi-Engine	90 % Conventional Hangar	1,600 Square Feet
	10 %T-Hangar	1 Unit
Jet	90 % Conventional Hangar	3,200 Square Feet
	10 % T-Hangar	1 Unit

The above assumptions were applied to the based aircraft fleet mix to obtain the facility requirements presented in Table 5.11. The table reveals that the demand for T-hangars is expected to show modest growth while the demand for conventional hangar space dedicated to aircraft storage is expected to grow by about 50%. It is worth noting that the T-hangars at BGM are over twenty years old, present a poor appearance, and do not have the amenities available in more modern units. For these reasons it is believed that improvement to those buildings would result in greater demand for that type of hangar, which could draw additional based aircraft to the airport.

There are currently 15 T-hangar units at the airport, of which three are vacant. Due to their condition, many of the types of aircraft that would normally be expected to be found in T-hangars are housed in a conventional hangar. Of the airport's conventional hangars, one (Hangar #1) is leased to a private business and is not available for storage of based aircraft. Of the other two hangars, Hangar #2 contains approximately 26,000 square feet of clear bay space, and Hangar #3 has approximately 15,000 square feet of clear bay space for a total of 41,000 square feet of space. Competing demands for the hangar space include aircraft maintenance services provided by two FBOs, mostly in Hangar #2, and storage of de-icing and ground service equipment in Hangar #3. Allotting approximately 5,000 square feet to aircraft maintenance and 3,000 square feet to storage of de-icing and other commercial aircraft ground service equipment reduces the space available to approximately 33,000 square feet.

Table 5.9: G. A. Hangar Demand – Aircraft Storage

Year	Facility Demand	Current Provision	Shortage
Current			
T-Hangars	15 Units	15 Units	none
Conventional Hangars	20,400 SF	33,000 SF	none
2010			
T-Hangars	15 Units	15 Units	none
Conventional Hangars	24,320SF	33,000 SF	none
2015			
T-Hangars	16 Units	15 Units	1 Unit
Conventional Hangars	28,720 SF	33,000 SF	none
2025			
T-Hangars	17 Units	15 Units	2 Units
Conventional Hangars	33,120 SF	33,000 SF	120 SF

Although demand is presently met by the existing facilities, by 2015 there will begin to be a shortfall of T-hangar units, and a relatively small shortage of conventional hangar space. This analysis does not indicate a significant shortage in hangar space for aircraft storage, but increased aircraft maintenance or other airport based businesses could result in less space available for aircraft storage, and need for expanded capacity. Improvements to T-hangar condition could also increase demand for those units. For these reasons, the Alternatives section of this report will consider locations for up to three additional conventional hangars and up to 15 additional T-hangar units.

General Aviation Aprons

The four components that typically determine the required apron area for general aviation uses are: 1) based aircraft parking, 2) itinerant (transient) aircraft parking, 3) aircraft fueling apron, and 4) staging and maneuvering areas. The sum of these components provides a good estimate of the total area of apron required to meet the forecasts level of GA activity at an airport. At BGM allowance needs to be made for some additional activities. Portions of the apron are used for de-icing activities, and portions of the North Apron in particular are used by transiting aircraft, fueling vehicles, airfield maintenance equipment, and ARFF access. The sections below will review these uses.

Based Aircraft Parking

There are no areas dedicated to based aircraft tie-down at BGM, and due to severe winter weather, none are recommended. Aircraft kept at BGM for extended periods in summer months will use the transient tie-down areas.

Transient Aircraft Parking

The second apron need is parking for itinerant aircraft. AC 150/5300-13, A*irport Design*, suggests one methodology for determining apron space requirements for transient aircraft. This methodology has been adjusted as outlined below to reflect current conditions at the airport and is used to project future transient apron space requirements.

- **Design Day GA Operations** - Calculate the total design day operations for all itinerant GA operations. The GA design day operations were calculated in Section 3.5.3, *General Aviation* in Chapter 3.
- **Design Day Itinerant Arrivals** - Itinerant operations now make up 68% of all GA operations and that percentage is expected to increase to 70% in 2015 and 2025. Arrivals are assumed to make up 50% of operations.
- **Itinerant Aircraft on Apron** - Assume that approximately 70% of these aircraft will require transient parking space during the course of the design day. The other 30% of the itinerant arrivals are based aircraft that will return to their assigned spaces.
- **Peak hour Transient Parking Demand** – Because of the high proportion of business use, the peak period will probably be associated with business meetings or special events that will last an entire day, so up to 80% of these transient arrivals will be assumed to be on the apron at the same time.
- **Required Transient Apron Space** - Allow an area of 400 square yards per transient airplane, due to the need for taxiing space and aircraft of different sizes.

Table 5.10 below presents the results of these computations. According to the above methodology, approximately 4,000 square yards of apron space is currently required by transient parking. By the end of the planning period this need is forecast to increase to approximately 5,200 square yards.

Table 5.10: Transient GA Aircraft Apron Demand					
Year	**Design Day GA Operations**	**Design Day Itinerant Arrivals**	**Itinerant Aircraft on Apron**	**Peak Hour Transient Parking Demand**	**Required Transient Apron Space (sq yd)**
Current	51	18	13	10	4,000
2010	53	19	13	10	4,000
2015	59	21	15	12	4,800
2025	65	23	16	13	5,200

Aircraft Fueling Apron

Currently all aircraft, both commercial service and general aviation, are fueled by trucks. Commercial aircraft fueling operations occur at the gate, and general aviation fueling occurs on the transient parking apron on the North Apron near the aircraft's storage location. The aviation fuel farm is located adjacent to the North Apron and fueling vehicles transit that apron en route to the commercial aircraft and West aprons. The current aviation fueling procedures work well at BGM. No changes are recommended for commercial aircraft fueling operations because the airport does not see enough operations to warrant installation of a hydrant fueling system, the other fueling method used for commercial aircraft. Delivery of fuel to GA users by truck also works well. The airport is attended continuously so there is no need for self service fueling operations during after hours activity.

The airport's vehicle fueling operation also occurs on apron pavement. The fuel tanks are located adjacent to the West Apron, and the operation utilizes about 300 square yards of apron space. Additionally, the current location blocks future provision of hangar apron should the former ARFF building be replaced by an aircraft hangar. Relocation is recommended.

Staging and Maneuvering Areas

Adequate space for the safe maneuvering of aircraft to and from aprons, hangars, and taxiways must also be included in any forecast of apron requirements. Staging and maneuvering is most closely associated with the provision of space in front of conventional clear span hangars. Atlantic Aviation's two hangars on the West Apron contain approximately 41,000 square feet (approximately 4,500 square yards) of hangar space. On the North Apron, Hangar #1 contains 28,000 square feet (approximately 3,100 square yards). An industry standard planning practice is to reserve an area from one to one and a half times the amount of hangar space in front of the hangars for staging and maneuvering. Based upon the existing conventional hangar space currently available at the airport, the appropriate space allotment for staging and maneuvering would be approximately 11,500 square yards. Although such staging and maneuvering areas are not typically assigned to T-hangars, the location of the T-hangars at BGM requires taxi routes across the apron in order to reach taxiways and the airport's runways. The most direct route across the apron to the airfield requires approximately 1,800 square yards of apron

De-icing Areas

De-icing now occurs within designated areas on both the North and West Aprons. De-icing and anti-icing fluids are captured by means of dedicated drains in these areas and are held for future treatment or release in accordance with NYSDEC regulations. On the North Apron this area occupies approximately 2,300 square yards. Queuing and transit routes providing adequate wingtip clearance are also associated with this use, and add 10,600 square yards for a total estimated area of 13,000 square yards. De-icing on the West Apron is usually limited to smaller general aviation aircraft, but is available for use as needed by airliners. An estimated 8,000 square yards is dedicated to de-icing operations on the West Apron.

Apron Summary

In summary, a current need for approximately 19,343 square yards of space has been identified for the 20,000 square yard North Apron. That total does not include space used by transiting snow removal equipment or maintaining clear lanes for the ARFF equipment which is located adjacent to that apron. In reality, very little excess space is currently available on the North Apron. Redevelopment of the currently underutilized "air cargo" building to hangar space, or expansion of the T-hangars, would result in an apron space shortfall of up to 5,000 square yards.

For the 17,000 square yard West Apron, a current demand for 19,100 square yards has been shown, which is expected to grow to 20,333 square yards due to increased demand for transient aircraft parking. This apron receives much less through traffic than the North Apron and less space is needed for transiting vehicles. Future redevelopment of the former ARFF facility to hangar space would generate demand for approximately 2,000 square yards of apron, further exacerbating the current shortfall.

GA Terminal Building

The General Aviation terminal, as described in Chapter 2, is adequate for current use. The modest increase in peak hour general aviation operations will not require additional space. Additional space in the building is available should the FBO expand its operations into other aviation related businesses.

GA Automobile Parking

General Aviation at BGM is divided between the primarily business and corporate users who operate from the West Apron, and the typically recreational users who store aircraft in the T-hangars next to the North Apron. As documented above, in Section 5.2.1, *Vehicle Parking*, there are approximately 115 parking spaces serving general aviation uses at the West Apron. These spaces are currently underutilized, and were constructed at a time when a previous airport FBO had a much larger and more diverse operation at the airport. Owners of aircraft stored in T-hangars typically drive to their hangar unit and park inside or in front of the hangar. Controlled access to this area is provided through either the ARFF or the Maintenance Hangar access points.

5.4.4 Aviation Support Facilities

Fuel Storage and Distribution

As documented in Section 2.3.5 of Chapter 2, *Inventory*, the aviation fuel farm provides storage for 50,000 gallons of Jet A and 20,000 gallons of AVGAS. The storage tanks are approximately 12 years old, meet all current environmental requirements, and are in excellent condition. Interviews with the FBO indicate that deliveries are taken about three times per week, and the amount of storage is adequate to permit volume discounts.

The aviation fuel farm is located in a good location between the T-hangars and the airfield maintenance building. It is convenient for the refueling vehicles, and deliveries can be made without the need for tankers to drive on airfield movement areas. Although the level of operations is expected to increase slightly at BGM over the forecast period, the larger aircraft that will replace the current fleet are more fuel efficient than those now in use. No need for additional storage capacity is recommended. As noted above, the vehicle fuel farm is recommended for relocation.

Air Traffic Control

The control tower cab was rehabilitated in 1999 along with the airline terminal facilities and is in excellent condition. No projects are recommended.

Airport Rescue and Fire Fighting

The 2004 renovation of the ARFF facility brought it up to current standards, and the facility is in excellent condition. As noted in Section 2.3.5 of Chapter 2, *Inventory*, the airport's ARFF currently meets criteria for Index level B, applicable to airports serving five or more daily departures by airplanes between 90 and 126 feet in length. This rating exceeds the requirement for BGM, at which the longest airplane currently using the airport on a regular basis (the CRJ-200) measures 87 feet in length. Future aircraft expected to enter service at BGM include the CRJ-700 (106' long) and/or the CRJ 900 (106' long), both of which will require ARFF meeting Index level B. Maintaining the current Index B is recommended. Equipment will have to be replaced over the planning period to maintain compliance with Index criteria.

The building that at one time housed the airport's ARFF, located adjacent to the West Apron, is no longer used for that purpose and the site should be redeveloped.

Airfield Maintenance and Ground Support Equipment

The airfield maintenance facility was constructed in 2004 and meets all the airport's needs. No additional facilities are recommended for this function, although the ACIP should include a continuing program of vehicle replacement.

Aircraft Maintenance

Aircraft maintenance services at BGM are provided directly or contracted through the FBO, Atlantic Aviation. Presently less than 5,000 square feet of hangar space is dedicated to aircraft maintenance, and only limited aircraft maintenance services are available. The level of service at BGM is typical of what one would find at a smaller general aviation airport. The provision of expanded services at BGM is encouraged, and both office and hangar space is available for that use. A facility requirement of 10,000 square feet is recommended, but additional space could readily be provided through construction of another hangar on the West Apron if demand exists.

Deicing

Aircraft de-icing during winter months currently takes place at dedicated ramp areas on both the North and West Aprons. The North Apron is the primary de-icing site and as documented above, the queuing and taxiing associated with the de-icing occupies a great deal of space particularly during early morning departures, and can result in delays. Additionally, the favored runway end for takeoffs, especially during winter months, is Runway 34 and the site on the North Apron is nearest the opposite runway end, Runway 16.

Because of these conditions and operational requirements of airport users, the de-icing activity should be relocated to the air carrier apron so that aircraft could be deiced at the gates. Ample room is available between the terminal front and Taxiway F. Rehabilitation of the air carrier ramp will be needed within the next three to five years, and replacement of the asphalt pavement with concrete is recommended. In conjunction with that rehabilitation, installation of a drainage system dedicated to capturing de-icing fluid runoffs should be feasible. Relocation of the de-icing activities would free up additional space on the North Apron and would make it more attractive to the current users, and is recommended. Changes to reduce glare to pilots during deicing are recommended on the deicing apron as an interim measure until deicing is relocated to the gates.

Airport Security Systems

The majority of the airport's physical security equipment was installed in association with the terminal rehabilitation in 1999. There are no reported problems with either the functioning or the amount of the equipment, but new technologies are continuously being developed. Within the planning period the installation of more current and up-to-date airport security equipment should be programmed.

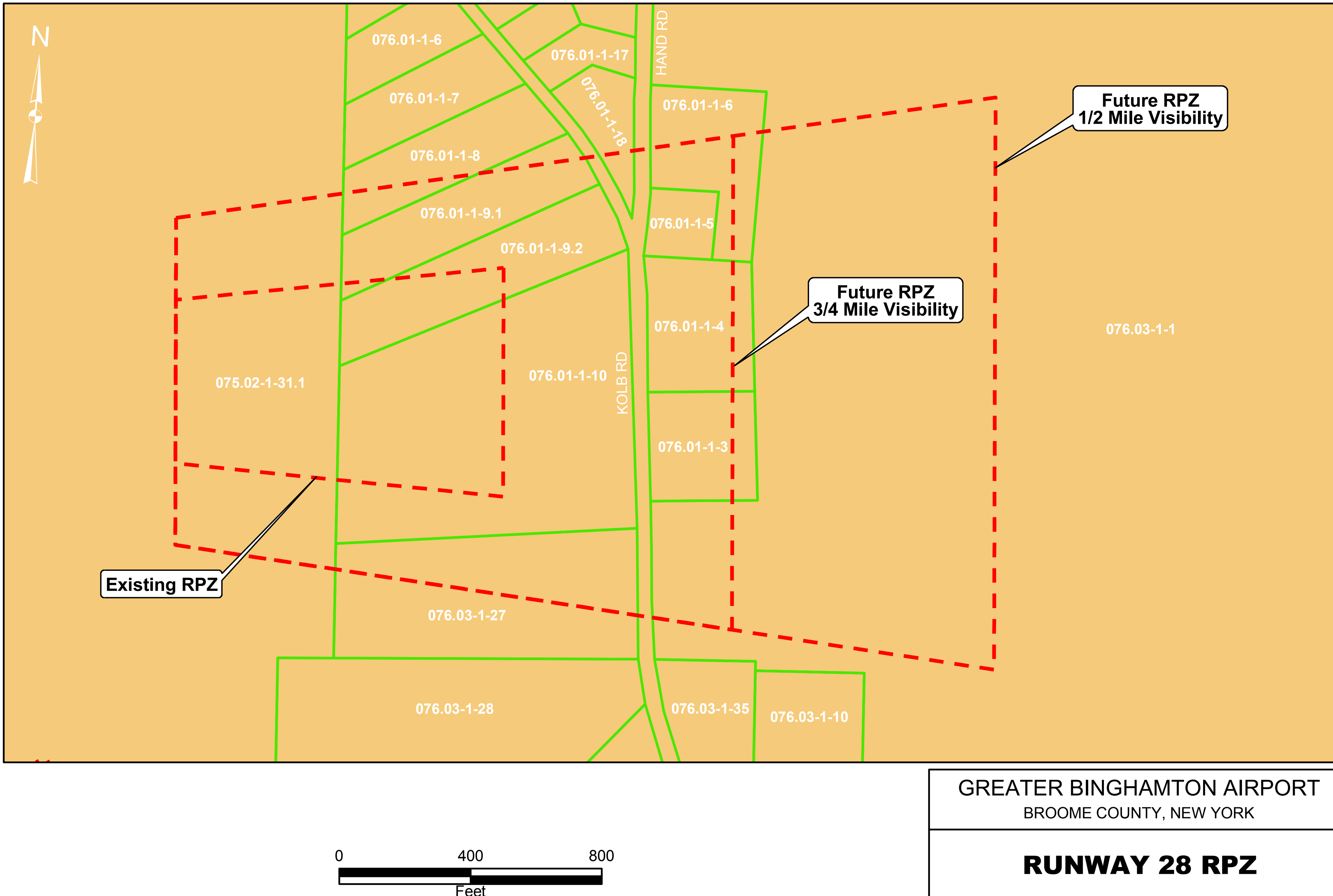
Land Acquisition

FAA guidance recommends that the runway protection zones beyond all runway ends at an airport be owned by the airport Sponsor or controlled through permanent easement. Residences or places of public assembly are not permitted within the RPZ. As shown in Figure 2-4 in the Inventory chapter, the existing RPZ for three of the four runway ends extends off airport property. The proposed improvement to the instrument approach procedure to Runway 28 will increase the size of the RPZ beyond that runway end. Future visibility minimums of ¾ mile will increase the length of the RPZ from 1,000' to 1,700', and the inner width will increase from 500 feet to 1,000 feet. The expanded RPZ would take in portions of seven additional parcels, and include seven residences. Future visibility minimums of ½ mile will increase the length to 2,500', but there would be no increase in the impact to residential property. Figure 5-6 illustrates the impact that expanded Runway 28 RPZ will have on adjacent property. Total area of land recommended for acquisition of all RPZ is approximately 109.4 acres.

Land Release

The Binghamton Regional Airport occupies 1,199 acres on the top of Mount Ettrick. The land acquisition process associated with the airport's original construction resulted in the County's acquisition of considerable acreage surrounding the future airfield site. Much of this land is characterized by relatively steep slopes that preclude the land being used for airfield expansion. As the Binghamton region has grown and developed, residential, commercial and industrial development has gradually grown up around the airport property. The Broome County IDA and other County agencies have long seen the airport as a possible magnet for future commercial and industrial development. Within the last five years the installation of public water service up Airport Road to the airport has made the area more attractive for development. As part of the Master Plan process, the potential for more intensive use of currently underutilized airport property has been explored.

K:\BING\T-1677602 Master Plan\-3 Draw\GIS\28 RPZ.mxd



GREATER BINGHAMTON AIRPORT BROOME COUNTY, NEW YORK		
RUNWAY 28 RPZ		
SCALE : AS SHOWN	DATE : FEBRUARY 2008	FIGURE : 5-5

McFarland Johnson

As previously indicated in Chapter 3, *Aviation Demand Forecasts*, of this report, there is evidence of a rebound in the local economy. Perhaps the most notable of the initiatives described in Section 3.4, *Regional Trends*, is the recent, yet rapid, growth of Lockheed Martin. Although Lockheed Martin's largest local facility is located in Tioga County, the company's growth has directly impacted BGM. Lockheed Martin recently signed a five-year agreement to occupy BGM's Hangar No. 1. Lockheed uses this facility for their "Flying Test Bed" program for advanced technologies and integrated systems and its employees are major airport users.

Despite concerns about the global economy, several new initiatives in Broome County have been announced. On November 20, 2007 New York State Governor Eliot Spitzer held a press conference to announce an economic development plan for Binghamton. The Governor's "City-by-City" plan, which he also unveiled in Buffalo, Rochester, Syracuse, Utica/Rome and Plattsburgh, identifies "priority projects in and around Upstate cities that capitalize on each region's unique assets and are selected based on their potential to spur additional private investment and greater economic development".[1] Binghamton was selected as the recipient of funding for two such projects. These projects include redeveloping the Charles Street Business Park (former Anitec site) and reconstructing downtown Binghamton's parking garage ramps.

The Charles Street Business Park consists of a 33-acre site located in the City of Binghamton's "First Ward". The site was occupied by Anitec, which manufactured specialty film, paper and plates for the graphic arts industry until 1998. According to a press release issued by Governor Spitzer's office, "developers spent approximately $5.5 million demolishing 40 buildings on the site, and several million to clean up pollutants on the property in the late 1990s/early 2000s but in 2005, after unsuccessful attempts to market and sell the property, it was donated to the Broome County IDA".[2] Governor Spitzer announced in November 2007 that the State would commit $1 million to assist in providing a "shovel ready" site at the former brownfield. A recent engineering study estimated that it would cost approximately $1.8 million to provide necessary infrastructure such as roads, sewer, water, electric, gas and landscaping. In addition to providing a location for existing businesses to relocate, the Charles Street Business Park will provide Binghamton with a piece of necessary infrastructure to support future growth and development.

On November 21, 2007, Emerson Network Power-Surge Protection became the first business to announce that it would relocate to the Charles Street Business Park. Emerson's plans include construction of a new 40,000 square foot facility. The $5.9 million project budget includes the purchase of land, new building construction, furnishings, fixtures, and equipment.[3] Emerson received a grant in the amount of

[1] http://www.cityofbinghamton.com/viewarticle.asp?a=2706
[2] http://www.ny.gov/governor/press/Binghamton_City_by_City_Factsheet.pdf
[3] http://www.cityofbinghamton.com/viewarticle.asp?a=2706

$325,000 to help defray the cost of some of their expenses. The company's investment in Binghamton will result in the retention of 56 manufacturing, engineering, marketing, and administrative jobs in the Southern Tier.

The second "City-by-City" project that received State funding is the reconstruction of three parking garage ramps located in downtown Binghamton. The garages, which have fallen into extreme disrepair, are considered a "public safety risk". The State announced its commitment of $670,000 towards the estimated $9 million needed to repair the garages. It is expected that these improvements will attract additional private sector development to downtown Binghamton by providing needed business support facilities.

Broome County's new incubator site, the Greater Binghamton Innovation Center, located at 123 Court Street, is also expected to have a positive influence on business development in the area. Renovations are being provided through a federal grant, and furnishing and rent moderation assistance is being achieved through State grants. The facility is expected to house five-six entrepreneurs and their start-up companies. The impetus behind the development of this business incubator is the Court St. Redevelopment, a group of private businesses.

According to the New York State Department of Labor, additional initiatives planned for Broome County that have been announced since the completion of the *Aviation Demand Forecasts* chapter include:

- October 2007 - Approval was given for a FedEx ground package distribution center to be built in Conklin. It is estimated that this facility will provide approximately 90 full and part time positions.
- July 2007 – National Pipe & Plastics Inc. located in Vestal announced that they will be investing $3 million at this location, adding 50 jobs, and expanding into three new product lines.
- July 2007 – Microdyne Outsourcing, Inc. a technical sales and support call center operator announced that they are planning a new facility in Kirkwood. The company, which is a subsidy of L3 Communications, expects to employ 350 people at their Kirkwood facility by late 2008.

Another potential source of business development for the region is the Empire Zone, encompassing parts of Binghamton, Endwell and Johnson City, as well as the Town of Union and Kirkwood. These areas are designed to be virtually tax-free for many business start-ups and expansions. Benefits range from tax credits and exemptions, to discounts on telephone bills and electricity costs. These incentives can bring new business to the region that will increase both business and personal use of the Airport.

As a site for future industrial development, the airport property is made more attractive by the relative scarcity of industrial sites within the county. The industrial parks that were established years ago are now at or near capacity, and the existence of a large county owned site with the advantages that the airport provides is an opportunity for the IDA to develop a new park without incurring major acquisition costs. Interviews with local economic development specialists confirm the unmet demand for industrial development sites and the ability of the airport to serve some of the demand.

In addition to the aforementioned initiatives that are planned for Broome County, and those previously described in Chapter 3, goings-on at airports located within BGM's service area may help shape the future of BGM.

In October 2007, Proctor & Gamble Pharmaceutical announced that they expect to close their Woods Corners Technical Center in Norwich (Chenango County), New York by the end of 2009, resulting in the loss of about 160 high-paying jobs.[4] According to Chenango County's daily newspaper, *The Evening Sun*, Proctor & Gamble executives have flown between the Norwich Airport and their headquarters in Cincinnati, Ohio most weekdays for decades. Proctor & Gamble is a major customer of PrivatAir, which is based at Norwich's Lt. Warren Eaton Airport. The pullout of Proctor & Gamble leaves some uncertainty about the future of Norwich's airport and whether PrivatAir will remain a based tenant or perhaps considering moving their operation or an aircraft to another service area airport such as BGM.

Finally, uncertainty at the Tri-Cities airport may provide an opportunity for BGM to attract a larger share of Broome County's general aviation market share. As the result of flooding in 2006, some former Tri-Cities tenants chose to relocate to BGM. As recently as December 2007 a bulk hangar at the Tri-Cities Airport was decommissioned after being declared structurally unsound. This resulted in the displacement of 10 based aircraft that were stored in the hangar. It is likely that at least some of these displaced aircraft will be relocated to BGM. As a result of these events, it is recommended that airport land suitable for aviation related and aviation compatible development be identified and land release procedures initiated, as appropriate.

5.5 SUMMARY OF LANDSIDE FACILITY REQUIREMENTS

Table 5.13 below summarizes the existing provision, the facility requirement, and any shortfall for each of the facility areas discussed above.

[4] http://www.labor.state.ny.us/workforceindustrydata/sou/souec.shtm

Table 5.11: Landside Facility Requirements Summary			
Item/Facility	**Existing Facility or Capacity**	**Ultimate Requirement**	**Deficit**
Conventional Hangars (aircraft storage)	33,000 sq. ft.	33,120 sq. ft. plus corporate hangars	Corporate hangars*
T-Hangars	15 units	17 units plus 15 units as demand indicates	2 to 17 units as demand indicates**
Consolidated GA Apron Demand	North: 20,000 sq. yd. West: 17,000 sq. yd.	North: 24,343 sq. yd. West: 22,333 sq. yd.	Expansion in support of potential hangar development
Fuel Storage Capacity	10,000 gal. AVGAS 50,000 gal. Jet-A 5,000 gal. diesel 5,000 gal. Mogas	10,000 gal. AVGAS 50,000 gal. Jet-A 5,000 gal. diesel 5,000 gal. Mogas	Relocate ground vehicle fueling operation
Deicing Pad	22,900 sq. yd. including taxi & queue space	relocate	Relocate to commercial aircraft apron
Airfield Maintenance	24,573 sq ft	24,573 sq ft	None
Aircraft Maintenance Area	5,000 sq ft	10,000 sq ft	None***
Cargo Facility	6,100 sq ft	None	Redevelop
Airline Terminal	62,930 sq. ft.	62,930 sq. ft.	Expand Inbound Baggage Area, Minor Internal Reconfiguration
Airline Terminal Auto Parking (passengers)	653 spaces	770 spaces	117 spaces
GA Area Auto Parking	115 spaces	25 spaces	None
ARFF Facility	5,340 sq. ft.	5,340 sq. ft.	None
Property Acquisition	Partial RPZ Ownership	Complete (expanded) RPZ Ownership	Property within RWY 34, 10 & 28 RPZ (109.4 ac.)

* This figure reflects only space dedicated to storage of based aircraft, and does not include Hangar #1 which is leased in its entirety to an airport tenant. The need for additional hangar space will be driven by tenant demand.

** Although not supported by current based aircraft numbers, improvements to T-hangars would be likely to increase attractiveness and demand for space. T-hangars should be constructed as demand indicates.

*** Additional aircraft maintenance services at BGM are desired. Space is now available and additional hangar construction should be undertaken as demand requires.