



CHAPTER 4 - FACILITY REQUIREMENTS

4.01 Introduction

Cuyahoga County Airport has served general aviation for more than 50 years. Most of the existing airfield assets have been in place since the early 1970s, with the exception of the stopway which was added in 1990. (A stopway is a defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane during an aborted takeoff.) Current users range from student pilots in single engine aircraft to operators of corporate aircraft with transcontinental/transatlantic capability.

The most recent master plan for Cuyahoga County Airport was prepared in 1977 and included recommendations to provide:

- 5,600 feet of runway length on Runway 24 with 5,100 feet of effective length on Runway 6
- Additional apron area to accommodate future hangars
- Additional hangar development and an aviation building

Since 1977, the extension of Runway 24 was implemented in the form of a stopway and some hangar and apron development has occurred. The Airport Layout Plan (drawings depicting airport facilities) were most recently updated in 1991 to include the development that was implemented.

After receiving a small grant from the FAA in 1993, federal grant activity has been sporadic. This lack of funding resulted in deferred development, including maintenance of the existing facilities.

With a constantly evolving air transportation system, the Federal Aviation Administration (FAA) continually evaluates and updates the airport design standards. The national fleet of general aviation aircraft has become more sophisticated since the airfield facilities were constructed, and the FAA design standards have become more demanding. This facility requirements analysis evaluates the existing and forecast users compared to the existing facilities and current FAA standards. This evaluation will then be used as one of the tools to update the future vision for the Airport.



To assess the facility needs, first the Airport’s role and history were reviewed. Qualitative and quantitative factors were then used to assess the facility needs. Finally, the airside and landside facilities were reviewed to identify the anticipated future facility needs. The airside facilities are reviewed first because they allow aircraft to arrive and depart from the Airport. Landside facilities are then developed around the airside system to accommodate aircraft on the ground.

In summary, the most important airside facility needs are to upgrade the airfield to meet current FAA standards, preserve the existing pavements, and explore the potential to accommodate at least a 6,000-foot runway to better serve the existing users. On the landside, the most important facility needs are to provide space to expand the hangar and apron facilities. In examining alternatives to accommodate additional hangar and apron space, consideration should be given to making best use of the existing Airport property. This may mean some redevelopment of facilities in alternate locations on the Airport to better serve similar categories of airside and landside uses.

4.02 Cleveland Reliever System

Cuyahoga County Airport is part of the National Plan of Integrated Airport Systems (NPIAS), a federal system of airports designed to meet the needs of the national air transportation system. Cuyahoga County Airport is also a reliever airport in the regional air transportation system serving the Cleveland area. Reliever airports provide general aviation aircraft with an alternative to using a busy commercial service airport. Current FAA standards require that a general aviation (GA) airport must, in addition to providing reliever functions, have at least 100 based aircraft in order to be designated as a reliever airport.

Cleveland Hopkins International is the primary commercial service airport for the region. The 1990 Cleveland Airport Reliever Study identified five airports serving as reliever airports to Cleveland Hopkins International, shown on **Figure 4-1**.

- Cuyahoga County (reliever with 5,102’ by 100’ runway with precision approach)
- Burke Lakefront (reliever with 6,198’ by 150’ runway with precision approach and 5,197’ by 100’ runway with visual approach)
- Lorain County Regional (reliever w/ 5,002’ x 100’ with precision approach)
- Medina Municipal (general aviation w/ 3,556’ x 75’ with nonprecision approach and 2,867’ by 50’ runway with visual approach)
- Willoughby Lost Nation (general aviation w/ 5,028’ x 100’ with nonprecision approach and 4,272’ by 100’ runway with visual approach)



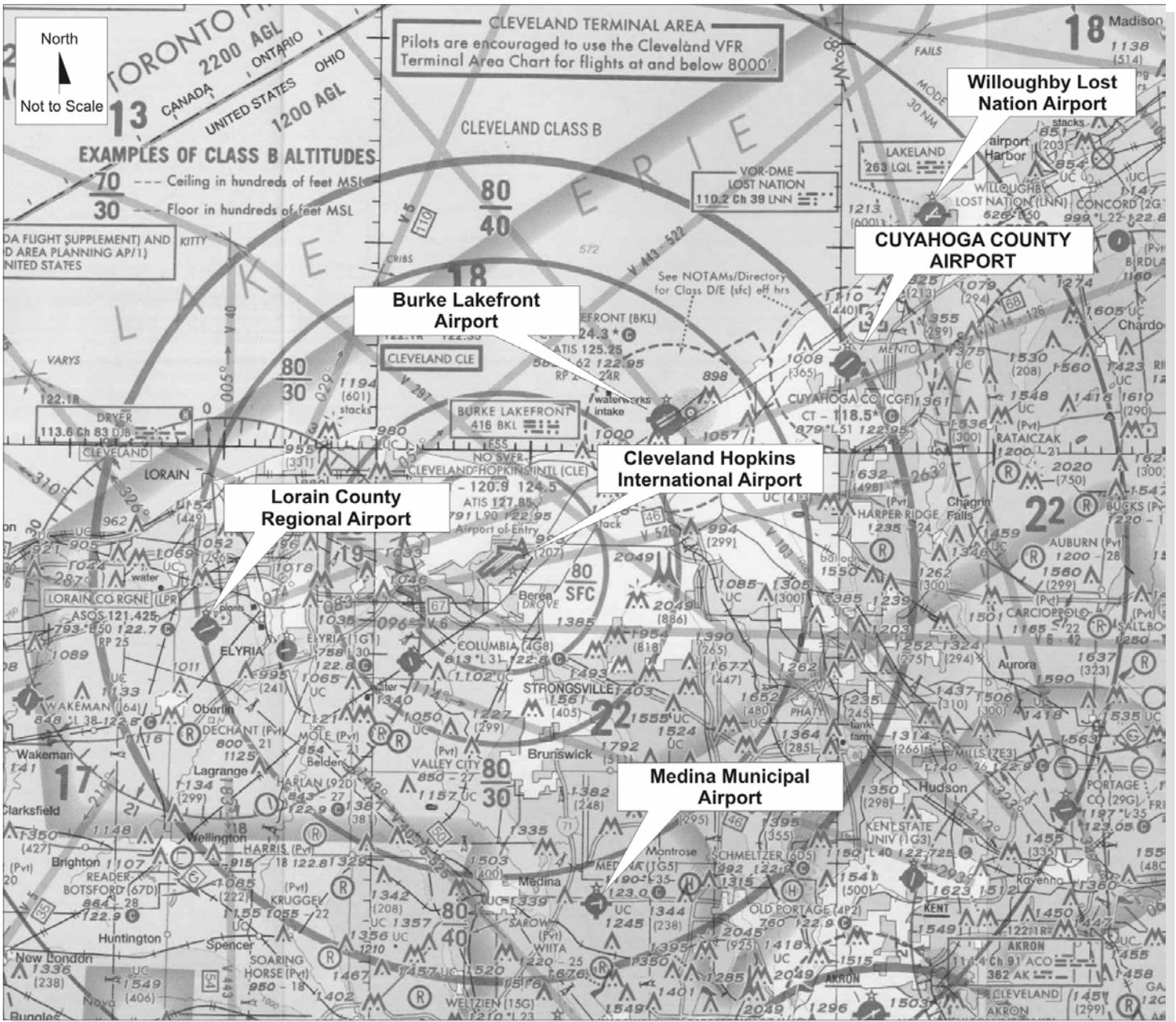
The concept of reliever airports emerged with the introduction of large air carrier jet aircraft in the late 1960s and early 1970s, when Congress and the FAA became concerned about the mixing of smaller GA aircraft with the new air carrier jet fleet. The concerns arose from:

- Wake turbulence from large air carrier jets caused several GA aircraft accidents.
- To avoid wake turbulence from large air carrier jets, controllers had to increase the separation between aircraft, resulting in reduced runway capacity.
- An alternative to increased aircraft separation was established to separate arrival and departure streams, leading to separate runways for general aviation aircraft.
- Most major airports either did not have the real estate to construct another set of runways for general aviation, or the construction was cost prohibitive.
- This resulted in lower acceptance rates and reduced capacity at commercial service airports at a time when the introduction of large air carrier jet aircraft caused passenger traffic to grow at record rates.

The solution selected through national policy was to create a separate airport system for general aviation aircraft in major metropolitan areas, in order to remove or greatly reduce the number of smaller and slower aircraft in the large air carrier jet traffic flow. The *Airport and Airway Development Act of 1970* set the stage for the evolution of reliever airports.

Under the Act, federal funds became available for the first time for Airport System Planning and Development. Sponsors of major airports were encouraged to develop reliever airports with facilities to attract general aviation users to relocate. As an incentive for the users, reliever airport facilities and services were to be equal to or better than those found at the primary airport. The FAA recommends an airport be within 30 minutes driving time. The reliever system that encircles Cleveland Hopkins International makes it possible for an aircraft operator to land closer to the final destination, providing the closest aviation facilities meet their operational requirements.

The airports in the Cleveland reliever system have different airfield assets and serve varying types of users. Generally, airports with at least 5,000 feet of runway length are considered capable of accommodating business jets, although some smaller business jets can use a lesser runway length. An airport with a 6,000-foot runway can better accommodate business jets in wet or slippery conditions. Also, an airport with a precision instrument approach (giving vertical and horizontal guidance to the pilot with minimums as low as ½ mile visibility and 200-foot ceiling) provides greater all weather capability than an airport limited to a nonprecision approach (giving only horizontal guidance with minimums of 1 mile visibility and 500-foot ceiling.)



Source: Detroit Sectional Aeronautical Chart 69th Edition. NOT FOR NAVIGATION



Cuyahoga County Airport
Airport Master Plan Update
Cleveland Area Airports
Figure 4-1



Because of the proximity of each airport within the region and differing airfield assets, the airports providing reliever functions in the Cleveland area should be considered as a system, not as substitutes for one another. For example, while Lorain County Regional in the western portion of the region has similar airfield assets as Cuyahoga County, it does not provide a ready substitute because of its distance from Cleveland’s eastern suburbs. Also, while aircraft from Cuyahoga County may use Burke Lakefront as an alternate airport when inclement weather conditions preclude access to Cuyahoga County, some aircraft at Burke Lakefront cannot use Cuyahoga County’s shorter runway.

4.03 Historical Perspective

In developing a future vision for Cuyahoga County Airport, it is important to understand the history of its current facilities. As the *Cuyahoga County Airport, Robert D. Shea Field History and General Information* describes, in December 1946, Cuyahoga County purchased the Curtiss Wright Field, opening the field as an airport in May 1950. In 1956, the first master plan was prepared, identifying the facilities needed to support private and business aviation. The first runway was built in 1959 at 3,000 feet long and 75 feet wide. It was extended to 4,000 feet by 100 feet with a parallel taxiway in 1962. The master plan in the 1960s identified a future runway length of 5,130 feet, supporting instrument landings under all weather conditions to accommodate the business aircraft at the airport. Most of this master plan extension was accomplished in 1970 when the runway was extended to 5,100 feet. In 1970 with high traffic volumes, the County purchased a mobile control tower and opened one of the only “non-federal” control towers at that time in the United States. The FAA took over the control tower on May 15, 1971. In 1972/73 the FAA installed a complete instrument landing system for all weather operations and a new control tower. The most recent improvement to the runway was in 1990 with the construction of the 500-foot stopway at the south end of Runway 24.

In 1963, business aviation development at Cuyahoga County Airport began with the Ohio Aviation Company, which brought flight training and aircraft sales and service to the Airport as a Beech Aircraft Distributor. With the arrival of Ohio Aviation Company to provide fixed based operator (FBO) service, the County ceased providing the line service and fueling of aircraft. Beckett Enterprises took over the Ohio Aviation leasehold in 1987.

Also in 1963, the Bede Aviation Corporation, later known as American Aircraft, began construction of light sport aircraft. At its peak, American Aircraft employed more than 200 people and had plant facilities of 100,000 square feet. Mercury Aviation, a Cessna Aircraft Dealer, developed on the Airport in 1968. Mercury later expanded their facilities with two additional hangars, one of which was leased to Reliance Electric Company. Corporate Wings acquired Mercury Aviation and its associated leasehold in 1992, and continues to provide FBO services at the Airport. TRW established corporate flight operations at Cuyahoga County Airport in 1969.



Eaton Corporation and Diamond Shamrock constructed hangar facilities in 1975. National City Corporation took over the Shamrock hangar in 1996. The one hangar located off Airport property, but with through-the-fence privileges paid for with landing fees, was constructed in 1978. It is now occupied by Swagelok’s corporate flight department.

The CC Hangar Corporation constructed 42 T-hangar units in 1987. These T-hangars are now operated by Zomar Group. Corporate Wings expanded its leasehold with construction of a new hangar and office space as well as acquisition of the Reliance Electric hangar in 1998. In addition in 1998, Corporate Wings added the operation of fraction ownership aircraft. The fractional ownership business grew into a separate operation known as Flight Options. In 2003, Raytheon Aircraft acquired ownership of Flight Options.

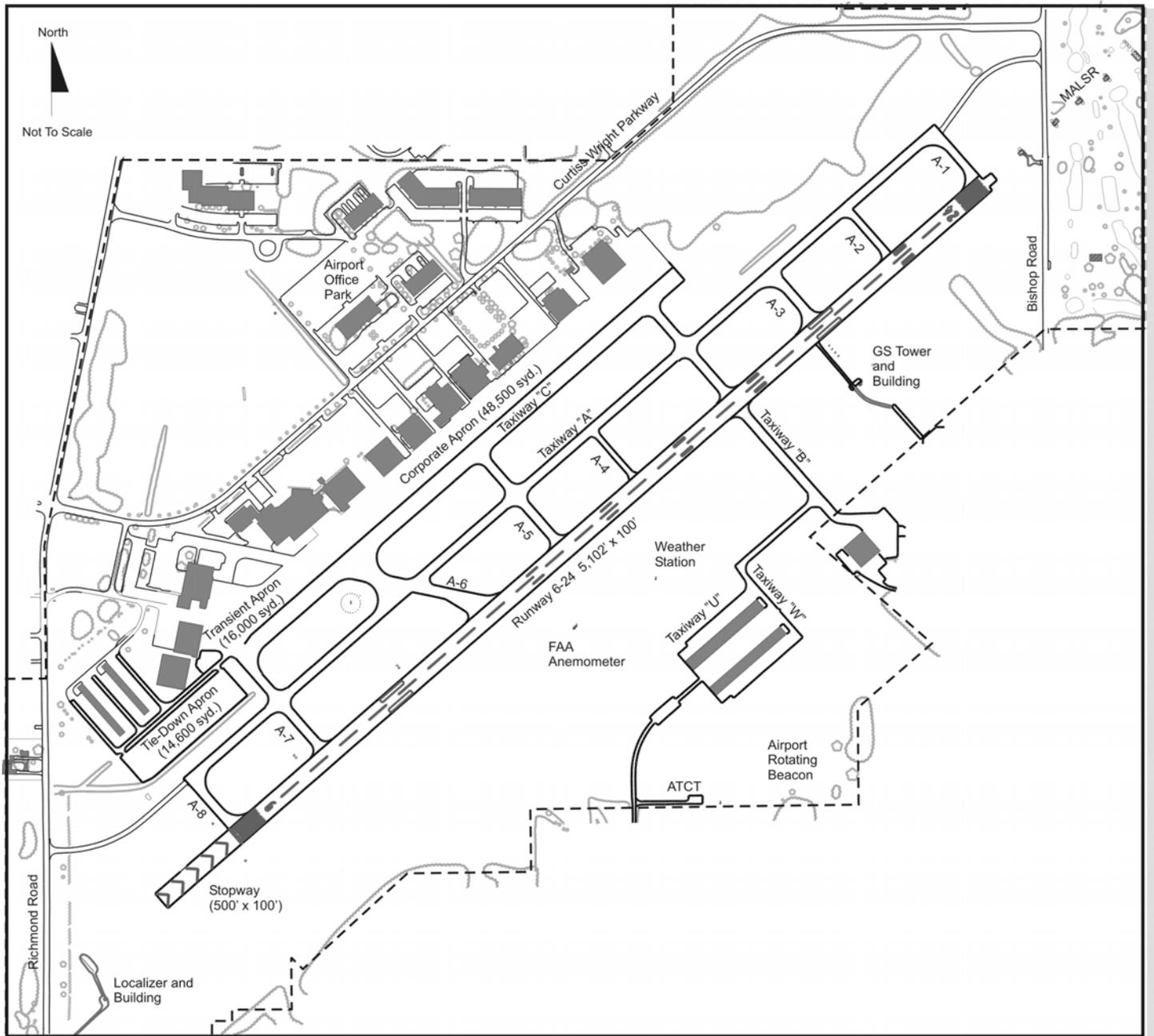
In 1999, Beckett Aviation sold its fixed base operation to Eagle Wings. Beckett pioneered the business of corporate aircraft management and operated one of the nation’s largest fleet of corporate aircraft. Corporate Wings acquired Eagle Wings and their operations in 2003. Corporate Wings completed construction of an additional hangar in 2004 and currently is the sole provider of FBO services at Cuyahoga County Airport.¹

The airfield and landside facilities combine to provide a valuable aviation facility serving the eastern portion of the Cleveland area. The airfield facilities at Cuyahoga County Airport were developed to serve airport users, with aircraft ranging from single engine aircraft to business jets. Landside facilities have grown to include 16 hangar facilities and apron areas that accommodate more than 200 based aircraft.

Figure 4-2 shows existing airport facilities at Cuyahoga County Airport.

As Cuyahoga County Airport evolved in response to its users, so too have the FAA design standards evolved in response to newer more demanding aircraft. When the airfield facilities at Cuyahoga County Airport were expanded in the 1970s, the FAA classified aircraft based on their landing weight. The two classifications used were utility (propeller driven aircraft of 12,500 pounds maximum gross weight and less) and transport (aircraft more than 12,500 pounds maximum gross weight). These classifications were then further divided into basic (smaller aircraft within each classification) and general (larger aircraft within the classification). With the corporate operations of business jets, Cuyahoga County Airport was classified as a transport airport. The FAA had separate design standards for airports serving only utility aircraft (*FAA Advisory Circular (AC) 150/5300-4 Utility Airports – Access to National Transportation*) from those serving transport aircraft (*FAA AC 150/5300-6, General Aviation Basic and General Transport Airports* issued in 1969 and revised as 6A in 1981.)

¹The Cuyahoga County Airport, Robert D. Shea Field History and General Aviation Information brochure, Cuyahoga County, Ohio, 2004.



Cuyahoga County Airport
Airport Master Plan Update
Existing Airport Facilities
 Figure 4-2



In the 1980s, the FAA adopted a new classification system called Airport Reference Code (ARC) to group aircraft based on wingspan and approach speed for design standards. The FAA first incorporated the use of ARC in *FAA AC 150/5300-12, Airport Design Standards – Transport Airports* published in 1983 to replace *FAA AC 150/5300-6A*. In 1989, with the use of ARC, the FAA then consolidated the utility and transport design standards into one advisory circular *FAA AC 150/5300-13, Airport Design*, which has been updated with eight changes since its original publication.

Starting with *FAA AC 150/5300-6A*, an extended runway safety area with the length twice its width was introduced. A runway safety area (RSA) is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. For an airport serving business jets (formerly transport airports) with a precision approach, the extended RSA length is 1,000 feet beyond the runway end or the length of the stopway, if longer than 1,000 feet. *FAA A/C 150/5300-13* further revised the RSA to extend 1,000 feet beyond the stopway, if present. Up through *FAA AC 150/5300-6*, the previous standard for a RSA at a transport airport with a precision approach was 500-foot wide RSA extending only 200 feet beyond the runway end, which via a modification to design standards the RSA could be as short as 100 feet.

Due to new FAA standards, many airports across the country were suddenly out of compliance. To address that issue the FAA grandfathered the existing, now nonstandard RSAs until significant runway improvements were made. The system of grandfathering nonstandard RSAs continued until 1999.

In October 1999, after several RSA incidents, the FAA published *FAA Order 5200.8, Runway Safety Area Program* (hereafter referred to as RSA Order), requiring the runway safety areas be evaluated and a plan established to upgrade any nonstandard runway safety areas to current FAA standards. The RSA Order outlines a nationwide effort to upgrade the RSAs at all federally obligated airports (airports that have received federal grant funding) to enhance the safety of the national air transportation system. There is a requirement that a non-standard RSA cannot be modified without a study to determine the most workable and financially feasible alternative to meet current FAA standards. The results of the study are reviewed by the FAA, which issues a determination identifying the improvements that should be implemented.

Since the issuance of the RSA Order, when the FAA funds a runway project that involves construction, reconstruction (including overlays) or significant expansion, the nonstandard RSAs will be required to be upgraded per the airport's RSA determination. The need to have a RSA determination before receiving any additional runway funding has led to the preparation of a Runway Safety Area Study (RSA Study) as part of this Master Plan Update for Cuyahoga County Airport. The implementation of the RSA findings, once approved by the FAA, must be incorporated into the overall plan for the Airport.



4.04 Assessment of Facility Needs

The purpose of the facility requirements analysis is to review the facilities that are in place, compare them to the current FAA design and planning standards, and to identify facilities which will be needed at the Airport to continue to support general aviation. This section focuses on the aviation facilities at the Airport, including both airside and landside facilities. It addresses airside facilities including runway, taxiway, navigational aids, marking, and lighting. It also addresses the landside facilities including the aircraft hangars, aircraft parking apron, fuel facilities, administrative facilities, ground access, and auto parking. There are also a few other facility needs that have been classified as "Other" since they are not clearly airside or landside issues. These include security, wildlife control, and aircraft noise control. The facility needs analysis will not include the business park on the Airport property.

The future facilities needs have been identified using two methods: qualitatively, based on information learned through the inventory of Airport facilities, focus group meetings, and a pilot survey; and quantitatively, by applying the planning and design standards established by the FAA to the aviation forecasts accepted by the FAA for the Airport. The items identified in the facility requirements will be further assessed in an airport alternatives analysis as part of the overall master planning process. As part of the alternatives analysis, consideration should be given to the benefits and cost of potential development.

4.05 Airport Reference Code

In order to plan airfield facilities to accommodate the current and projected users, an Airport Reference Code (ARC) must be determined for the Airport. According to *FAA Advisory Circular 150/5300-13, Airport Design*, the ARC is a system used to relate airport planning and design criteria to the operational and physical characteristics of the aircraft intended to use the airport.

A combination of two codes is used to develop the ARC. The first code, Aircraft Approach Category, relates to the approach speed (landing speed) of an aircraft. The second code, Airplane Design Group, pertains to the design group determined by the wingspan of an aircraft. The ARC is based upon the aircraft or combination of aircraft with the highest approach speed code and the greatest wingspan that use or are anticipated to make substantial use of the airport. Per *FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, substantial use means 500 or more annual itinerant operations. An operation is defined as a takeoff or a landing by an aircraft.



Table 4-1 summarizes various aircraft approach categories and airplane design groups.

**TABLE 4-1
ARC CHARACTERISTICS**

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

Source: FAA Advisory Circular 150/5300-13, Airport Design

4.06 Critical Design Aircraft

An examination of the existing users and airport reference code information reveals that business jets are the largest aircraft making substantial use of the Airport. Hourly operations data for the week of September 7 to 13, 2003 indicated that 21% of the operations were conducted by business jets. For 2003, this amounts to approximately 14,600 annual jets operations (0.21 x 69,540 total operations), well exceeding the FAA definition of substantial use (500 annual operations).

Based business jet aircraft range from Cessna Citations (ARC B-I/II) to Gulfstream IV (D-II) as shown in **Table 4-2**. Combining the highest common approach speed of the based business jets (approach category D) with the largest wingspan (design group II) results in a planning ARC of D-II for Cuyahoga County Airport. The FAA design standards for ARC C-II and D-II aircraft are the same; therefore, it is recommended that ARC D-II be used for facility planning at Cuyahoga County Airport. This also correlates with the published instrument approach procedures that include minimums for up to approach category D aircraft.



**TABLE 4-2
2004 BASED AIRCRAFT – CRITICAL AIRCRAFT**

| | |
|------------------------|-------------|
| Lear 55 | C-I |
| Challenger | C-II |
| Hawker 800XP | C-II |
| Beechjet 400A | B-I |
| Gulfstream IV | D-II |
| Falcon 50 | B-II |
| Lear 45 | C-I |
| Citation Jet | B-I |
| Citation II | B-II |
| Citation III | B-II |
| Citation V | B-II |
| Legacy EMB-135 | C-II |
| Recommendation: | D-II |

Source: Cuyahoga County Records, Aerofinity, Inc., 2005.

4.07 User Survey

Three techniques were used to collect data from the existing Airport users to better understand their facility needs. The first was meeting with key Airport users during the inventory process. The second was a focus group meeting with airside tenants. The final technique was a user or pilot survey mailed to all aircraft owners based at Cuyahoga County Airport. The following key issues were raised through the three data collection processes.

- The Airport is conveniently located and close to company leadership with aircraft based at the Airport.
- A 5,000-foot runway length is the bare minimum; anything less would affect business jet operations. The current runway length causes diversions and extra fueling stops. A runway length of at least 6,000 feet would be necessary in order to rectify operational limitations.
- A standard runway safety area is needed to improve the margin of safety at the Airport.
- The runway pavement and other airfield pavements need rehabilitation.
- Winds favor Runway 6 in poor and winter weather. An improved instrument approach to Runway 6 is needed.
- An automated weather system would be helpful to pilots.
- More apron space is needed.
- There is not enough hangar space to meet the general aviation demand. Some of the existing T-hangars are in poor condition.
- Run-ups and night operations are a concern for Airport neighbors. A dedicated run-up area, and possibly an enclosure or hush house would be beneficial.
- There are problems with the Airport signage.
- Additional fixed base operator services and competition is desired.
- Consider addition of U.S. Custom and Immigration Service at the Airport.



- Airport security could be enhanced by more control of flow into and out of the Airport.
- Auto parking is an issue now and will become a bigger issue in the future.
- Wildlife in the Airport vicinity is a concern.
- The community awareness of Airport assets and efforts to minimize noise should be enhanced.

The qualitative information from the user survey processes will be used along with the quantitative data to assess the existing facilities and make recommendations for planning of future facilities.

4.08 Airfield Capacity

Airfield capacity is the measure of the runway system’s ability to accommodate the existing and future demand for airfield operations. Capacity is expressed both as an hourly capacity figure and as an annual figure. Hourly capacity is a measure of the maximum number of aircraft operations that can be accommodated in one hour. Annual capacity is expressed as the Annual Service Volume (ASV) and is a reasonable estimate of an airport’s annual capacity. ASV is dependent on several factors: the hourly capacity, runway use, aircraft mix, and weather conditions, all of which are considered in the ASV calculation.

FAA Advisory Circular 150/5060-5, Airport Capacity and Delay provides the guidance for calculating the ASV. This advisory circular presents two methods for calculating capacity: long-range planning and specific facility assessment. Using Figure 2-1 from *AC 150/5060-5* the long-range planning ASV for Cuyahoga County is 195,000. The hourly capacity ranges from 57 for Instrument Flight Rule (IFR) conditions to 74 for Visual Flight Runway (VFR) conditions. Detailed calculations are provided in **Attachment A**.

The FAA recommends planning for capacity improvements when the Airport’s operations reach approximately 60 percent of the ASV. Construction of the improvements should begin when the Airport’s operations approach 80 percent of the ASV. The 2025 baseline scenario annual operations forecast is 83,150 operations representing approximately 43 percent of the ASV, less than the 60 percent level for planning airfield capacity improvements.

There is a voluntary restriction on operations, the avoidance of nighttime operations between the hours of 11 P.M. and 7 A.M. to minimize aircraft noise impacts on Airport neighbors. The majority of the Airport operations occur during the hours of 7 A.M. to 11 P.M., so there is not a significant impact on airport capacity.

There may be short periods of time during which aircraft experience delays at Cuyahoga County Airport, when several aircraft want to use the airfield at the same time or during special events. However, there should be no overall capacity constraints during the planning period with the existing reliever system. Thus, facility



improvements to increase the airfield capacity are not recommended. However, improvements that would enhance the overall efficiency of operations should still be considered as appropriate.

4.09 Airfield Facilities

The facility requirements analysis uses quantitative information along with qualitative information to review the airfield facilities. It identifies areas where further analysis of improving airfield facilities at the Cuyahoga County Airport should be undertaken during the alternative analysis portion of the planning process.

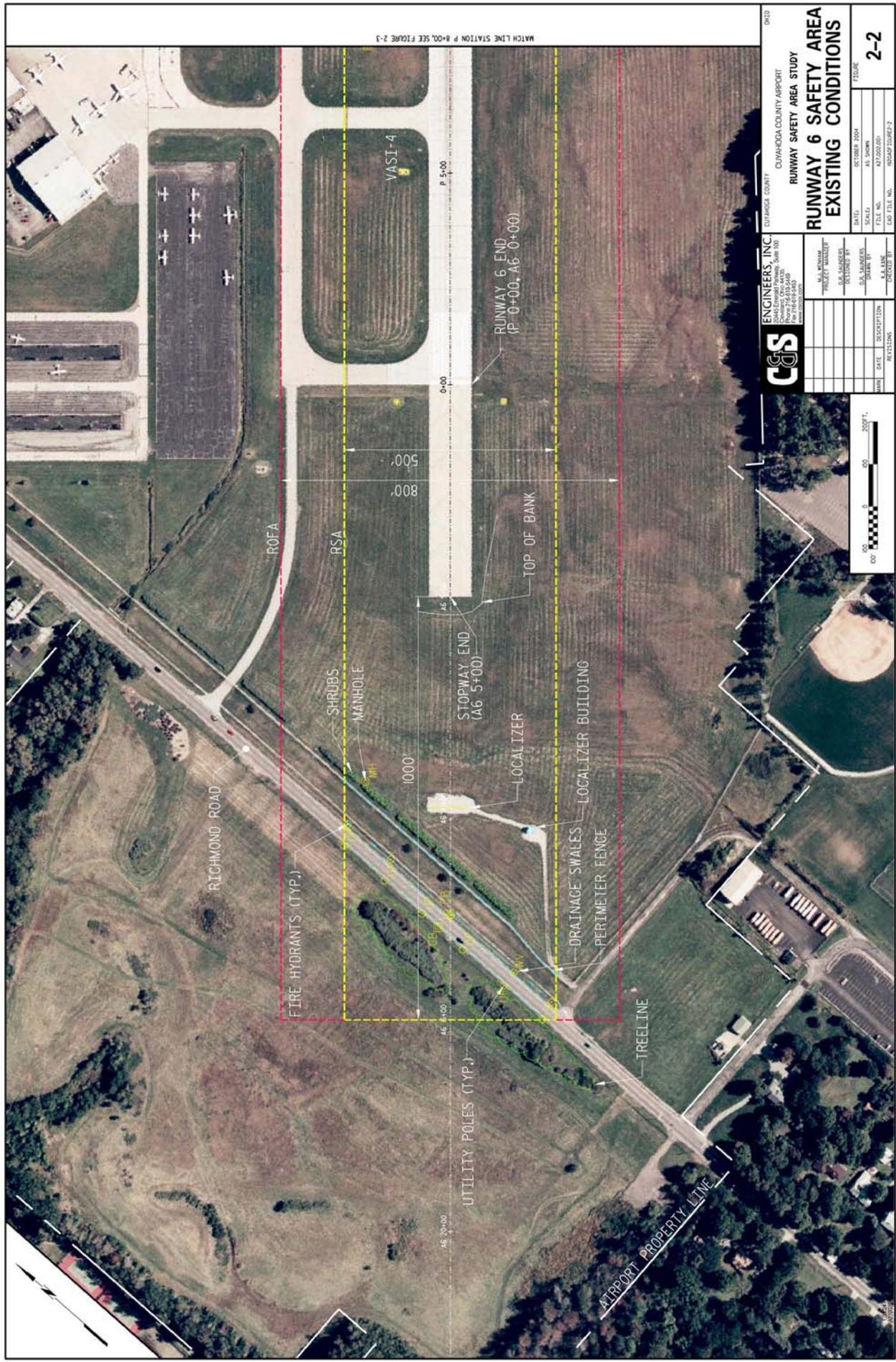
4.09-1 Runway Safety Area

The runway safety area (RSA) is an area centered on the runway centerline that must be cleared and graded to be capable, under normal dry conditions, of supporting airplanes without causing structural damage to the airplanes or injuries to their occupants. The RSA enhances the safety of aircraft that undershoot, overrun or veer off the runway, and provides greater accessibility for fire fighting and rescue equipment during such incident. The RSA is within the “runway object free area” that must be kept clear of objects not required for aircraft ground maneuvering.

At the end of 1999, the FAA embarked on a national undertaking to assess the runway safety areas at all obligated airports in order to provide RSA determinations. The RSA determination for each airport identified whether the RSA met current FAA standards and, if not, what improvements should be made. RSAs that do not meet current FAA standards must be upgraded as a part of any future funding received for runway reconstruction or improvements. The RSAs at Cuyahoga County Airport do not meet current FAA standards.

For ARC D-II design aircraft, FAA standards require the RSA to be 500 feet wide and extend 1,000 feet beyond each end of the runway or stopway, if present. A 500-foot wide RSA at Cuyahoga County Airport extends only about 400 feet beyond the end of the Runway 6 stopway and 125 feet beyond the end of the Runway 24. Existing RSA conditions are depicted in **Figures 4-3, 4-4, and 4-5**. Alternative methods of resolving the RSA deficiencies are being analyzed as part of the Master Plan Update.

RSA improvements are needed to bring Cuyahoga County into compliance with current FAA standards and are needed regardless of any other runway needs that may be identified in this analysis. Constructing the recommended RSA improvements will increase the margin of safety while preserving the existing runway length.



MATCH LINE STATION P+00, SEE FIGURE 2-3

C&S ENGINEERS, INC.
 CUYAHOGA COUNTY
 CIVIL ENGINEERS
 10000 W. 120th Street, Suite 100
 Parma, OH 44129
 Phone 216.895.4400
 Fax 216.895.4401

PROJECT: CUYAHOGA COUNTY AIRPORT
SUBJECT: RUNWAY SAFETY AREA STUDY
DATE: OCTOBER 2004
SCALE: AS SHOWN
FILE NO.: A37.002.001
DWG. FILE NO.: ROAD2-FIGURE-2

FIGURE 2-2

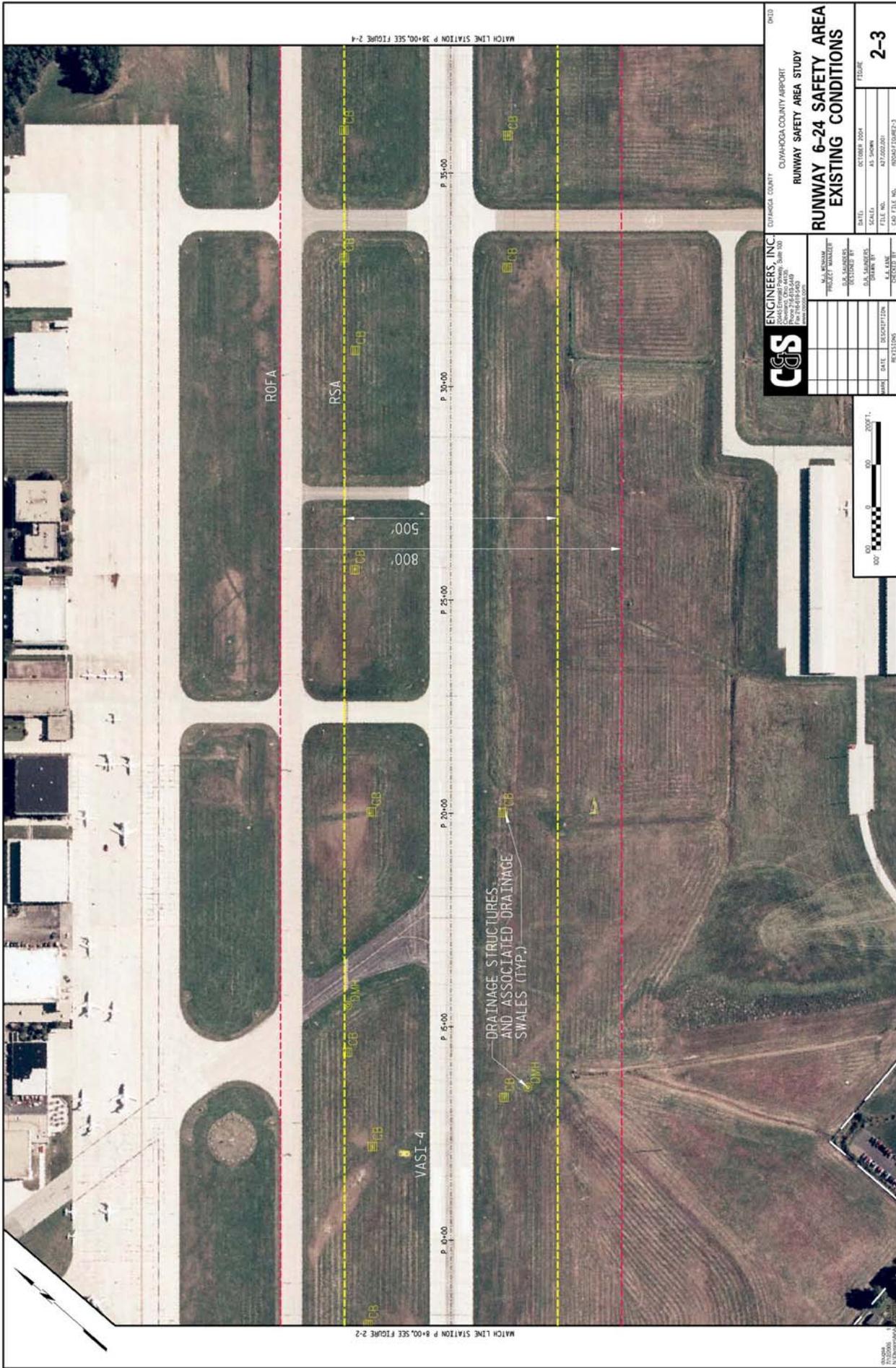
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Cuyahoga County Airport
Airport Master Plan Update
Runway 6 Safety Area Existing Conditions
Figure 4-3

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CUYAHOGA COUNTY
 CUYAHOGA COUNTY AIRPORT
 RUNWAY SAFETY AREA STUDY
**RUNWAY 6-24 SAFETY AREA
 EXISTING CONDITIONS**

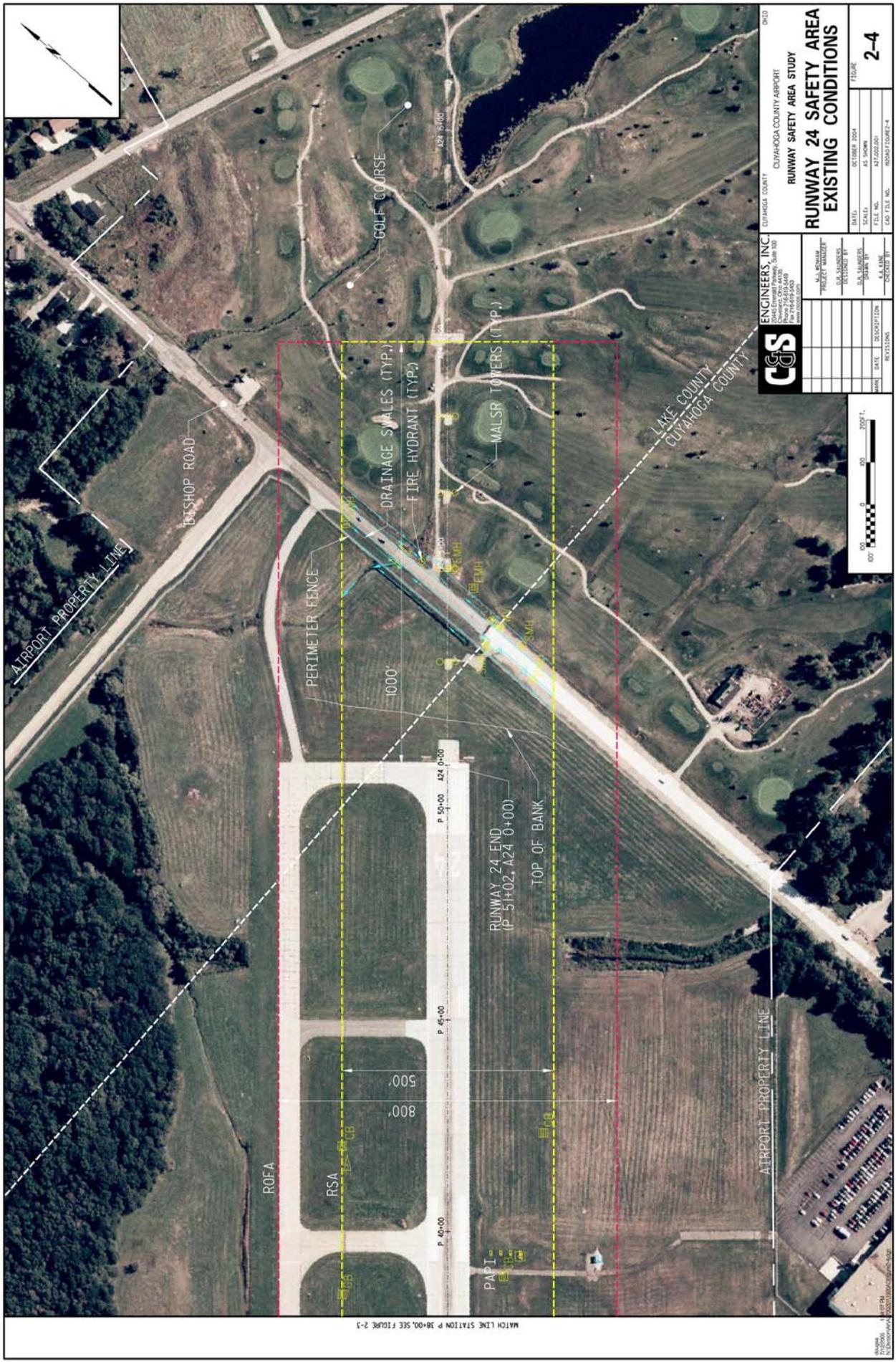
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|---------------|----------------|---------|-----|
| DATE: | OCTOBER 2024 | FIGURE: | 2-3 |
| SCALE: | AS SHOWN | | |
| FILE NO.: | A27202201 | | |
| JOB FILE NO.: | HW002FIGURE2-3 | | |



**Cuyahoga County Airport
 Airport Master Plan Update
 Runway 6-24 Safety Area Existing Conditions
 Figure 4-4**

Current 0



CBS ENGINEERS, INC.
 2044 Central Parkway, Suite 100
 Parma, OH 44134
 Phone: 330.845.4489
 Fax: 330.845.4490

CUYAHOGA COUNTY
 CUYAHOGA COUNTY AIRPORT
 RUNWAY SAFETY AREA STUDY
RUNWAY 24 SAFETY AREA
EXISTING CONDITIONS

| | | | |
|---------------|--------------|--------|-----|
| DATE: | OCTOBER 2004 | FIGURE | 2-4 |
| SCALE: | AS SHOWN | | |
| FILE NO.: | A2700200 | | |
| CAD FILE NO.: | ROADSAFE-F-4 | | |

| NO. | DATE | DESCRIPTION | BY | CHECKED BY |
|-----|------|-------------|----|------------|
| | | | | |
| | | | | |
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| | | | | |
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DATE PLOTTED: 11/17/04
 PLOTTER: HP DesignJet 500C
 CUYAHOGA COUNTY AIRPORT



Cuyahoga County Airport
Airport Master Plan Update
Runway 24 Safety Area Existing Conditions
Figure 4-5



4.09-2 Runway Length

Cuyahoga County Airport is served by one runway, designated Runway 6-24, which is 5,102 feet long and 100 feet wide and is orientated northeast-southwest. There is a 500-foot stopway on the south end of the runway. The stopway cannot be used as runway. However, it can be used by pilots in calculating the accelerate-stop distance available (ASDA) since it provides pavement that aircraft can use to stop. (ASDA is defined as the distance to accelerate from brake release to rotation speed and then decelerate to a stop, plus safety factors.) The stopway length cannot be included in any available landing distance calculations since it is not actually part of the runway pavement, but the runway safety area begins at the end of the stopway and does not include the stopway to provide a clear area beyond the end of an accelerate-stop operation.

To identify the appropriate runway length for the aircraft operating at Cuyahoga County Airport, the FAA general planning guidance is used as a starting point. This FAA guidance is then enhanced by using airport-specific operating information from Cuyahoga County Airport users.

FAA Advisory Circular 150/5325-4A, Runway Length for Airport Design provides planning guidance for runway length based on a combination of aircraft. Using Cuyahoga County's airport elevation (879' MSL), mean maximum daily temperature (81.4° F), and runway elevation change (6 feet) for wet pavements, the FAA's Airports Design Program version 4.2D identifies that 5,500 feet is needed to serve 100 percent of large airplanes weighing 60,000 pounds or less (representative of the business jets regularly using the Airport) at 60 percent useful load. More detailed calculations are provided in **Attachment B**. Since the FAA program uses a combination of aircraft rather than detailed operating specifications, it provides general planning guidance rather than specific runway length requirements.

Corporate operators with business jets conduct more than 14,000 annual operations at the Cuyahoga County Airport. A request for user specific data was sent to the corporate operators at the Airport. Six primary corporate operators, Flight Options, National City, Eaton Corporation, Progressive Insurance, Swagelok and Corporate Wings provided Cuyahoga County Airport specific data. In addition to activity by these based business jet operators, there is also significant transient business jet activity at the Airport.



The corporate users at Cuyahoga County Airport operate under two different sets of regulations depending on the type of operations.

- Federal Aviation Regulations (FAR) Part 91 – General Operating and Flight Rules
- FAR Part 135 – Operating Requirements: Commuter and On-Demand Operations

Part 91 are regulations used to govern private (not-for-hire) operations, although some of the private operators voluntarily apply Part 135 standards to increase the margin of safety of their operations. Fractional ownership operations are conducted under either a special subsection of Part 91 (Subpart K) or Part 135. One of the primary differences between the two regulations is the required runway length for landing. Under Part 135 an aircraft must be fully stopped within 60% of the available runway length or 80% of the available runway length if the airport is an approved Destination Airport in that operator’s manual.

Therefore, a wet or snow-covered runway may prohibit aircraft from landing at CGF, since the available landing length is 3,953 feet, which is less than the 60% requirement. In the winter of 2004/2005, Flight Options, the largest corporate operator at the Airport was able to use CGF for less than 50% of the planned flights. Eaton Corporation also maintains records of diversions and calculated that 88 flights were diverted during the previous year which is 10% of their annual operations. Additional runway length would provide operators with an increased safety margin and more efficient operations by reducing the number of diversions and extra fuel stops, making Cuyahoga County Airport capable of handling tenants operational needs in a wider range of weather conditions.

Since corporate operators make up a large part of the Airport’s operating revenue stream, it is important to consider the current and future needs of these operators. They not only provide the Airport with a revenue source, but also provide jobs and tax revenue to the local economies. Based upon the user data, for the business jets using Cuyahoga County Airport with the destinations served, the existing runway length constrains their ability to operate, and the FAA’s general planning guidelines for runway length of 5,500 feet will not address their needs, as shown on **Table 4-3**. At a length of 6,000 feet, the critical aircraft needs would be substantially met. Although Cuyahoga County Airport is a constrained site, the alternatives analysis will examine the option to provide a 6,000-foot runway at Cuyahoga County Airport and also blast pads on each runway end.



**TABLE 4-3
RUNWAY LENGTH REQUIREMENTS AT MEAN MAXIMUM DAILY TEMPERATURE (81.4° F)**

| Aircraft | Takeoff Length | Landing Length | 2003 Annual Operations by Type ⁴ |
|---------------------------|--|---|---|
| Hawker 400XP ¹ | 4,735' (max. takeoff weight) | 6,975' (max landing weight wet, Part 135) | 2,660 |
| Citation V Ultra | 5,640' ² | 5,401' ³ | 2,260 ⁵ |
| Hawker 800XP ¹ | 5,850' (max. takeoff weight) | 5,200' (max landing weight, wet, Part 135) | 1,900 ⁶ |
| Lear 45 | 6,000' (maximum takeoff weight for no fuel stop) | 4,900' (max landing weight applying Part 135 standards) | 1,460 |
| Challenger 601 | 5,800' (max. takeoff weight) | | 750 |
| Lear 60 | 6,100' (maximum takeoff weight) | 5,600' (max landing weight ,Part 135) | 400 |
| Citation X ¹ | 6,895' (max. takeoff weight) | 5,800' (max landing weight wet, Part 135) | 230 |

¹ Includes aircraft in the Flight Options long term fleet mix.

² 30° C wet runway

³ ½" slush

⁴ Percentage by type of business jet from IFR Flight Plans to Cuyahoga County Airport, May 2004 to April 2005, fbweb.com, applied to 2003 total operations.

⁵ Includes all operations by Citation 560/56X aircraft types.

⁶ Includes all operations by HS125 aircraft types.

Two of the operators (accounting for approximate 2000 annual operations) are also investigating new aircraft for purchase to operate effectively at Cuyahoga County Airport, one operator would need 5,500 feet to 5,700 feet for a typical operation and the other would need 6,000 feet.

Source: Cuyahoga County Airport corporate operators, 2005.

4.09-3 Taxiways

Taxiways are planned and constructed primarily to allow aircraft movement to and from the runway system. Taxiway and taxilanes are provided in the terminal area to facilitate safe movement of aircraft in or near the hangars. The FAA defines a taxiway as “a defined path established for the taxiing of aircraft from one part of an airport to another.” A taxilane is defined as the “portion of aircraft parking area used for access between taxiway and aircraft parking positions.”

Runway 6-24 at Cuyahoga County Airport is served by a full length parallel taxiway, which is designated as Taxiway A. There are also nine connector taxiways (Taxiways A1 through A8 and B) between the runway and parallel taxiway providing more than ample exit opportunities for landing aircraft. From the parallel taxiway there are four connector taxiways (Taxiways B, A5, A6, and A7) serving the northside terminal area. Taxiway B also extends southeast across the runway to serve the southside hangars. The taxiways are labeled on Figure 4-2.



**TABLE 4-4
FAA TAXIWAY DESIGN STANDARDS FOR GROUP II AIRCRAFT**

| Standard | Group II Design Standards |
|---|----------------------------------|
| Runway centerline to taxiway centerline | 400 feet |
| Taxiway centerline to taxiway centerline | 105 feet |
| Taxiway centerline to fixed or moveable object | 65.5 feet |
| Taxilane centerline to fixed or moveable object | 57.5 feet |
| Taxiway Width | 35 feet |
| Taxiway Edge Safety Margin | 7.5 feet |
| Taxiway Shoulder Width | 10 feet |
| Taxiway Safety Area Width | 79 feet |
| Taxiway Object Free Area Width | 131 feet |
| Taxilane Object Free Area Width | 115 feet |

Source: FAA Advisory Circular 150/5300-13, including Change 8.

The FAA taxiway design standards for Design Group II aircraft are shown in **Table 4-4**.

The existing runway-centerline to taxiway-centerline separation is 375 feet. The FAA standard for Group II aircraft is 400 feet. Per *FAA Advisory Circular 150/5300-13*, the runway-centerline to parallel taxiway-centerline separation distance is such to satisfy the requirement that no part of an aircraft (tail tip, wing tip) on the taxiway centerline is within the RSA or penetrates the obstacle free zone (OFZ). (The OFZ is defined as the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDS that need to be located in the OFZ because of their function in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches.)

Using the FAA Design Program 4.2D for Cuyahoga County Airport, the minimum allowable runway-centerline to parallel taxiway-centerline separation is 289.5 feet. Therefore, it is recommended the County request a modification to design standard to keep the existing runway-centerline to parallel taxiway-centerline separation in place.

There is 288 feet of separation from the parallel taxiway to the apron edge taxiway, Taxiway C. This exceeds the required 105-foot separation. Therefore, if necessary to accommodate additional landside development, the apron could be expanded so long as the apron edge taxiway centerline is at least 105 feet from the parallel taxiway centerline and the aircraft parking is at least 500 feet from the runway centerline.

All of the taxiways at Cuyahoga County Airport are 50 feet wide except for Taxiway A4, which is 30 feet wide and A2, which is 43 feet wide. Taxiway A4 is also the only taxiway on the Airport that uses reflectors instead of lights. All of the taxiways except A4 exceed the required Group II standards. The additional width allows the Airport to better accommodate the business jets that use the Airport. The two taxiways used the least are Taxiways A4 and A2. The alternatives analysis will consider the efficiency



of the existing taxiway system thus examining the uses of all the taxiways. If some of the connector taxiways could be eliminated and still provide the same level of service, it would reduce maintenance costs for the Airport. If this analysis determines that Taxiway A4 should remain in operation, it should be upgraded to meet Design Group II standards.

4.09-4 Airfield Pavement Condition and Strength

Numerous comments were received during the user survey process regarding the poor pavement condition on the runway, taxiways, and aprons. The last significant pavement rehabilitation was funded by a FAA grant in 1983 for the runway and 1989 for the apron. With the sporadic FAA grant funding from 1994 to 2001, pavement maintenance has been deferred and all of the airfield pavements are in poor condition.

The Ohio Department of Transportation (ODOT) completed a pavement condition index study at Cuyahoga County Airport in December 2004 and is the process of preparing a proposed pavement maintenance program. ODOT's recommendations should be used to identify an overall pavement rehabilitation program.

The following is the existing pavement strength for the runway as listed on the FAA 5010 Master Record for Cuyahoga County Airport:

- 43,000 pounds single wheel gear
- 55,000 pounds dual wheel gear
- 100,000 pounds dual tandem gear

The largest based business jets have a maximum takeoff weight approaching 95,000 pounds on dual wheels, if fully loaded. The airfield pavement design process should incorporate the weight, gear type, and frequency of the various types of aircraft using the Airport to identify a representative pavement design. As a part of the any pavement rehabilitation, the fleet mix using the Cuyahoga County Airport on a regular basis should be considered to ensure the design provides adequate pavement strength.

4.09-5 Navigational Aids

Instrument approaches are critical to Airport operations in inclement weather. The more advanced an airport's navigational aid (navaids), the more accessible it is in all weather conditions. Inclement weather is a regular occurrence at Cuyahoga County's midwest location. Navaids vary in sophistication. The most precise system available is an Instrument Landing System (ILS), a type of precision approach. An ILS supplies both horizontal and vertical alignment information to the pilot. Nonprecision approaches offer only horizontal alignment with the runway. An ILS will have lower minimums because of its precision.



Cuyahoga County Airport is served by three published instrument approaches which consist of a precision approach and two nonprecision approaches. The available approaches are listed in **Table 4-5**.

**TABLE 4-5
INSTRUMENT APPROACHES**

| Type of Approach | Classification | Runway Served | Ceiling Minimum | Visibility Minimum |
|------------------|----------------|---------------|-----------------|--------------------|
| ILS | Precision | 24 | 200' | ½ mile |
| LOC Back Course | Nonprecision | 6 | 507' | 1 mile |
| NDB or GPS | Nonprecision | 24 | 481' | ¾ mile |

Source: Jeppesen Airway Manual, Cuyahoga County Approach Plates, August 7, 2004.

Overall, the prevailing winds at Cuyahoga County Airport favor Runway 24, so it is the most frequently used runway operating direction. The ILS to Runway 24 and associated MALSR (medium intensity approach lighting system with runway alignment indicator lights) approach light system, provide an excellent instrument approach to this runway end. However, in poor and winter weather conditions the prevailing winds generally favor Runway 6. Runway 6 is served only by a nonprecision approach using the back course of the localizer (LOC) serving the Runway 24 ILS. Also, there are only runway end identifier lights (flashing strobes at the runway end) and no approach light system to aid a pilot on the Runway 6 end. Thus, in poor weather conditions when the winds favor use of Runway 6, a straight-in approach is available but has the highest minimums of all of the approaches to the Airport. There is a published circling approach from Runway 24 ILS, but the circling minimums are even higher than the Runway 6 LOC back course approach. In addition, flying low and slow to circle the Airport to land on Runway 6 after flying an approach to Runway 24 is a challenging maneuver, even more so when the weather conditions are poor.

When aircraft are not able to access Cuyahoga County Airport in poor weather conditions, they typically divert to Burke Lakefront or Cleveland Hopkins International; both have longer runways, equal or better instrument approaches, and may have somewhat different localized weather. These diversions cost the operator money, the passengers extra time, and potentially cost the Airport revenue from missed fuel sales, etc.

Global Positioning System (GPS) technology is advancing to the point that a precision approach to all runway ends may one day be available at a fraction of today’s ILS costs. Since Cuyahoga County Airport already supports one precision approach, the buildings and other development are set back from the runway to provide the clear areas for a precision approach off the sides of the runway. Some improvements may be needed beyond the end of Runway 6 to accommodate the flatter approach slope that is associated with a precision approach compared to a nonprecision approach. Thus, consideration should be given to upgrading the



approach to Runway 6 to provide lower minimums and, potentially, a precision approach. To get the lowest potential minimums, consideration should also be given to the potential to support a MALSR approach light system on Runway 6.

In addition to the instrument approaches, pilots using Cuyahoga County Airport are also aided by controllers in the FAA Airport Traffic Control Tower (ATCT). The ATCT at Cuyahoga County operates from 7 A.M. to 11 P.M. When the tower is in operation, pilots can receive weather reports from the controllers. However, during the hours the tower is closed, weather information must be obtained from Burke Lakefront or Cleveland Hopkins International. In the user survey process, a number of pilots suggested installing an automated weather recording system at the Airport to provide accurate, up-to-date, around the clock weather information to the pilots. This system could be linked to a radio or navigation frequency as well as a telephone line to allow the information to be accessed in the air or on the ground. The system could be augmented by the controller during operating hours. Cuyahoga County Airport has included an automated weather system in their capital improvement program which is submitted to ODOT and the FAA, and should continue to pursue such a system.

4.09-6 Lighting and Marking

Lighting provides guidance to pilots during nighttime or low visibility conditions. Runway 6-24 is equipped with High Intensity Runway Lights (HIRLs). Runway 6-24 is served by PAPIs (precision approach path indicators) on both runway ends that provide visual guidance to a pilot on descent. Runway 6 is served by REILs (runway end identifier lights), which are flashing strobes aimed along the approach path that help the pilot identify the runway environment. Runway 24 is served by a MALSR. With these lighting systems, Runway 6-24 is fully equipped, although an approach lighting system could be added on Runway 6 as discussed under navigational aids.

All of the taxiways are marked with medium intensity taxiway lights (MITL), except Taxiway A4, which is only marked with reflectors. The taxiway lighting system is older than the runway lighting system, and needs to be upgraded. Typically lighting systems have about a 20-year expected life. As a part of any lighting system upgrade, consideration should be given to making the system as energy efficient as possible to reduce the operating costs for the Airport.

The runway and taxiways are also served by a guidance sign system that has evolved over the years. Several years ago the sign faces were revised to meet the updated FAA guidance sign requirements; however, the boxes were not changed. Comments received from the user survey noted that the existing guidance sign system can be confusing and identified the need to make the guidance sign system more user friendly. The development and implementation of a comprehensive signage plan is recommended, and as a part of this plan, making the system more energy efficient will be considered.



Precision runway markings are painted on Runway 24; nonprecision markings are painted on Runway 6. These are the appropriate markings for the existing instrument approaches.

If the approach to Runway 6 is upgraded to a precision approach in the future, the pavement markings serving Runway 6 should also be upgraded. The runway markings are about three years old; however, they have faded much faster than anticipated and will need to be remarked in the near future. Any pavement marking improvements should be done in compliance with *FAA Advisory Circular 150/5340-1J, Standards for Airport Markings*.

4.09-7 Airfield Facility Needs Summary

A number of airfield facility needs have been identified in this analysis. The highest priority needs are upgrading the RSAs and rehabilitating the existing pavements. In order for Cuyahoga County Airport to receive FAA financial assistance with the pavement rehabilitation, under the RSA Order the RSA improvements will need to occur in conjunction with the runway pavement rehabilitation.

After focusing on preserving the existing facilities, the next highest priority is to maximize the utility of the airfield to provide the greatest economic benefit to the surrounding community. To enhance the existing airfield utility, consideration should be given to provide a 6,000-foot runway, an improved instrument approach to Runway 6, and overall airfield signage plan and upgrade. The airfield facility needs are summarized in **Figure 4-6**.

4.10 Landside Facilities

After identifying the airside facility requirements, the next step is to evaluate the landside facility needs. The typical landside facility requirements process involves comparing long-term facility needs (based on the forecast) to existing facilities to identify deficiencies where additional infrastructure will be needed. However, the based aircraft at Cuyahoga County Airport include both traditional and fractional ownership aircraft. Since only about 10 percent of the fractional ownership aircraft addressed to Cuyahoga County Airport are at the Airport at any given time, their facility needs will differ from that of traditional based aircraft. For purposes of estimating future facility requirements, the traditional and fractional ownership aircraft will be addressed separately. The space requirements to be considered in this analysis include:

- Aircraft hangars
- Aircraft parking aprons
- Fueling facilities
- Terminal Facilities
- Entrance Road and Auto Parking



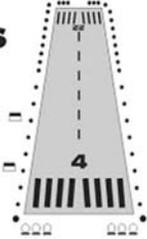
The general aviation landside facility requirements have been identified based on the baseline forecast at the end of the 20-year planning period. The baseline forecast was identified as the preferred forecast and assumes conditions similar to the last five years, with stability in the commercial operations serving the Airport users. A high forecast was prepared to allow the Airport to reserve additional development area if conditions differ from the last five years. The landside facility requirements will be assessed per the baseline forecast. In the alternatives analysis process, the potential to reserve additional space to accommodate up to the high forecast should be considered. The baseline forecast is summarized in **Table 4-6**.

**TABLE 4-6
BASELINE FORECAST SUMMARY**

| | 2003 | 2010 | 2015 | 2020 | 2025 |
|-------------------------------------|---------------|---------------|---------------|---------------|---------------|
| Traditional | | | | | |
| Single Engine | 63 | 71 | 72 | 75 | 77 |
| Multi Engine | 16 | 18 | 18 | 19 | 20 |
| Turboprop | 5 | 6 | 6 | 6 | 6 |
| Jet | 23 | 26 | 26 | 27 | 28 |
| Helicopter | 2 | 2 | 2 | 2 | 2 |
| Traditional Total | 109 | 122 | 125 | 129 | 133 |
| Fractional | | | | | |
| Turboprop | 20 | 20 | 20 | 20 | 20 |
| Jet | 172 | 279 | 361 | 467 | 601 |
| Fractional Total* | 192 | 299 | 381 | 487 | 621 |
| Air Taxi (Itinerant) | 12,170 | 13,450 | 13,781 | 14,222 | 14,614 |
| General Aviation (Itinerant) | 36,508 | 40,352 | 41,344 | 42,667 | 43,843 |
| General Aviation (Local) | 20,862 | 23,058 | 23,625 | 24,381 | 25,053 |
| Total Airport Operations | 69,540 | 76,860 | 78,750 | 81,270 | 83,510 |
| Peak Month | 8,345 | 9,223 | 9,450 | 9,752 | 10,021 |
| Average Day | 278 | 307 | 315 | 325 | 334 |
| Busy Day | 320 | 369 | 378 | 390 | 401 |
| Peak Hour | 34 | 34 | 35 | 36 | 37 |

*Represents total fractional ownership aircraft in fleet; however, only up to 10% anticipated to be present at Cuyahoga County at a given time

Source: Aerofinity, Inc., 2004

| REQUIREMENTS | EXISTING | FUTURE |
|--|--|--|
| <p>Runway</p>  | <p>RUNWAY 6-24 5,102' x 100' 43,000 lbs. (SW) 55,000 lbs. (DW) 100,000 lbs. (DWT)</p> | <p>RUNWAY 6-24 6,000' x 100' Adequate strength for business jet users</p> |
| <p>Taxiway</p>  | <p>RUNWAY 6-24 Full Length Parallel</p> | <p>RUNWAY 6-24 Full Length Parallel Study efficiency of taxiway system</p> |
| <p>Nav aids</p>  | <p>RUNWAY 6 PAPI-4, REILs</p> <p>RUNWAY 24 ILS/DME, MALSR, PAPI-4, NDB or GPS</p> | <p>RUNWAY 6 Improved approach Potential GPS precision Potential MALSR PAPI-4</p> <p>RUNWAY 24 ILS/DME, MALSR, PAPI-4, NDB or GPS</p> |
| <p>Marking and Lighting</p>  | <p>RUNWAY 6 Non-Precision Markings</p> <p>RUNWAY 24 Precision</p> | <p>RUNWAY 6 Upgrade markings as needed to support improved approach</p> <p>RUNWAY 24 Precision</p> |

Source: Aerofinity, Inc., 2005.





4.10-1 Aircraft Hangars

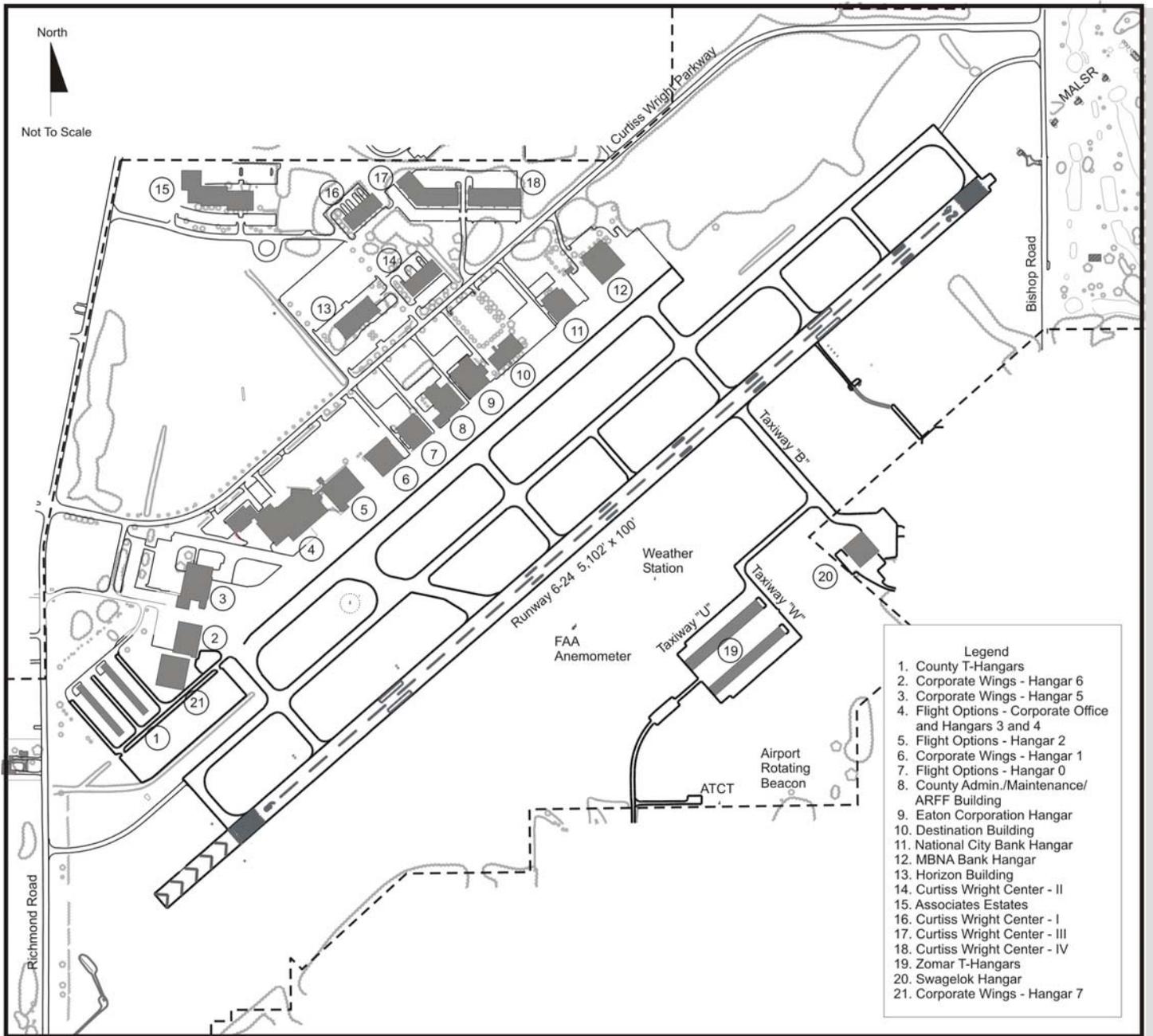
There are 16 hangar buildings at Cuyahoga County Airport as shown on **Figure 4-7**. Four of those buildings house T-hangars, which are used for the storage of single and multi-engine piston aircraft. There are two sets of T-hangars. The 20 older, county-owned T-hangars are located in two buildings northwest of the Runway 6 end. The other 42 T-hangars are the privately owned Zomar Group hangars located in two buildings south of the runway at about the midfield point.

There are 10 hangars that accommodate corporate operators or aviation businesses; for the purposes of this analysis, they are all referred to as corporate hangars. The corporate hangars on the Airport range in size, with some including office and other amenities based on the tenant needs. **Table 4-7** summarizes the corporate hangars on the Airport. Building numbers correlate with Figure 4-7. The other two buildings are the Destination Building and County Administration/Maintenance/ARFF (Airport Rescue and Fire Fighting) Building.

**TABLE 4-7
CORPORATE HANGAR FACILITIES**

| Building Number | Tenant | Size | Use |
|------------------------|----------------------------|-------------|-----------------------|
| 2 | Corporate Wings | 20,100 SF | Hangar |
| | Corporate Wings & Milano's | | Hangar and restaurant |
| 3 | Restaurant | 30,780 SF | |
| 4 | Flight Options | 74,560 SF | Office and hangars |
| 5 | Flight Options | 23,380 SF | Hangar |
| 6 | Flight Options | 21,485 SF | Hangar |
| 7 | Flight Options | 19,000 SF | Hangar |
| 9 | Eaton Corporation | 24,640 SF | Hangar |
| 11 | National City Bank | 18,060 SF | Hangar |
| 12 | MBNA | 27,710 SF | Hangar |
| 20 | Swagelok | 17,550 SF | Hangar |
| 21 | Corporate Wings | 24,000 SF | Hangar |

Source: C&S Engineers, December 2003.



Cuyahoga County Airport
 Airport Master Plan Update
Existing Landside Facilities
 Figure 4-7



4.10-2 Traditional Based Aircraft Hangars

All of the traditional based aircraft at Cuyahoga County Airport use one of the three types of storage, including apron tie-downs, as shown on **Table 4-8**.

For the traditional based aircraft, it is estimated that the mix of hangar storage will remain similar, with the exception of the tie-downs. Six of the seven aircraft stored at outdoor tie-downs belong to T&G Flying Club. While a few privately owned aircraft may prefer tie-downs, most that are tied-down do it out of necessity while waiting for hangar space. For facility planning it has been assumed that, as the overall number of aircraft at the Airport increases, the number using tie-downs will remain fairly constant. Thus, single engine aircraft in T-hangars are estimated to increase to 85% while the tie-downs decrease to 5%.

**TABLE 4-8
STORAGE FACILITY USED BY TRADITIONAL BASED AIRCRAFT**

| | Tie-Downs | T-hangars | Corporate Hangars |
|---------------|------------------|------------------|--------------------------|
| Single Engine | 10% | 80% | 10% |
| Multi Engine | | 75% | 25% |
| Turbo Prop | | | 100% |
| Business jet | | | 100% |
| Helicopter | | 100% | |

Source: Cuyahoga County Airport Records, September 2004.

T-HANGARS

The single engine, multi-engine and helicopters at Cuyahoga County Airport all use T-hangar storage. Assuming 85 percent of the single engine, 75 percent of the multi-engine, and 100 percent of the helicopters will be stored in T-hangars over the planning period, there will be a need for at least 82 T-hangars by 2025.

CORPORATE HANGARS

The corporate hangars at Cuyahoga County Airport range both in size and the number of aircraft accommodated in each hangar. Almost 163,000 square feet of hangar space serve the 42 traditional based aircraft (and a restaurant) located in the corporate hangars, or an average of about 3,800 square feet per aircraft, including any associated office space. With up to nine additional aircraft that may desire corporate hangar space, space should be preserved for up to 34,000 square feet of additional corporate hangar space to accommodate traditional based aircraft.



TIE-DOWNS

Since it has been assumed that the majority of the aircraft that will be tied down in the future will belong to the flying club, no additional tie-down space would be needed. The additional space to accommodate aircraft new to Cuyahoga County Airport would be in one of the hangar facilities.

4.10-3 Fractional Ownership Aircraft Hangars

The aviation forecasts of fractional based aircraft addressed to Cuyahoga County Airport show the potential for significant growth. However, based on existing conditions, the forecasts identified that only about 10 percent of the fractional ownership aircraft may be at Cuyahoga County Airport at any given time. While this percentage could change over time as Flight Options, the fractional ownership company, evolves its operations, for planning purposes, it is the best estimate available.

Currently, Flight Options occupies about 139,000 square feet of hangar and associated office space. This space is used for maintenance activities as well as the operations to support the company. The aviation forecasts show the potential for the fractional ownership aircraft addressed to Cuyahoga County Airport to triple. If the existing 10 percent of the fractional ownership aircraft addressed continue to be present at any existing time, up to 280,000 square feet of space should be reserved to accommodate future fractional ownership activity. While this area should be preserved, it should be recognized that the Airport will need to coordinate closely with Flight Options to determine the actual future needs at Cuyahoga County Airport.

4.10-4 Aircraft Parking Aprons

There are three primary apron areas at Cuyahoga County Airport. The first and largest apron area is the 48,500-square-yard apron serving the corporate tenants. The corporate apron area is used by numerous tenants. Each of the corporate hangars along this apron uses the area immediate in front of their facility. This results in about one-third of the corporate apron area being used by Flight Options. Also, T&G Flying Club, with offices in the Administrative Building, ties down their aircraft on the apron in front of that facility.

The second apron area is the 16,000-square-yard transient aircraft parking apron near Corporate Wings. This apron area can accommodate business jet aircraft, and it is used by Corporate Wings to accommodate the larger transient aircraft. The final apron area is the 14,600-square-yard tie-down apron near the county-owned T-hangars, as shown on Figure 4-7. This area is used for privately owned aircraft that are tied-down, as well as to accommodate piston powered transient aircraft.



4.10-5 Traditional Based Aircraft Aprons

Of the areas used to support traditional based aircraft, the primary area that has been identified as constrained is the space available to accommodate larger transient aircraft that use Corporate Wings facilities. This is particularly true since Corporate Wings completed the construction of their new hangar. The transient aircraft using Cuyahoga County Airport can be grouped into two categories: those associated with one of the corporate tenants and others. Those that are directly associated with one of the corporate tenants, supplier or client, use the apron space of that tenant. The other transient operators use the services of Corporate Wings.

Corporate Wings identified a representative group of 12 aircraft that they need to accommodate on a busy day. For planning purposes, the transient apron has been sized without any nesting by identifying the space used by each aircraft, based on its length multiplied by its wingspan. In addition, each aircraft has been allotted its wingspan multiplied by a 115-foot Design Group II taxilane object free area to provide maneuvering space on the apron, as shown in **Table 4-9**.

**TABLE 4-9
AIRCRAFT PARKING AREA NEEDS**

| Aircraft | Wingspan (feet) | Length (feet) | Apron Area* (sq. yards) |
|---------------------------|----------------------------|--------------------------|------------------------------------|
| Corporate Aircraft | | | |
| Global Express | 94.0 | 99.5 | 2,351 |
| Gulfstream V | 93.4 | 96.5 | 2,302 |
| Gulfstream IV | 77.8 | 88.3 | 1,856 |
| Falcon 900 | 63.4 | 66.3 | 1,351 |
| Falcon 50 | 61.9 | 60.8 | 1,277 |
| Challenger 600 | 61.1 | 68.5 | 1,322 |
| Citation Excel | 55.1 | 51.1 | 1,074 |
| King Air 200 | 54.6 | 43.1 | 1,007 |
| Lear 55 | 43.7 | 55.1 | 887 |
| Beechjet | 43.6 | 48.5 | 846 |
| Beechjet | 43.6 | 48.5 | 846 |
| Cessna 310 | 37.1 | 32.0 | 642 |
| TOTAL | | | 15,761 |

*Includes Group II taxilane object free area
Source: *FAA Advisory Circular 150/5300-13*, Aerofinity, Inc., 2005.

To accommodate this busy day mix of aircraft approximately 16,000 square yards of corporate transient apron is needed. This is approximately the same size as the existing apron area; however, the existing apron area also needs to accommodate access to Corporate Wings three large hangars. This results in constrained operations. To provide more usable apron and to accommodate growth in operations, additional apron area is needed. If an area 115-foot wide (Group II taxilane) by 100-foot area (length of large corporate jet) in front of each hangar was dedicated to hangar access an additional 3,800 square yards of apron area would need to be developed to replace





the existing apron. Also, the peak hour operations are forecast to increase about 10 percent over the planning period, so at least an additional 1,600 square yards of corporate transient apron should be provided. The Corporate Wings facilities sit at an angle to the runway environment. Thus, in addition to increasing the apron area at least 5,400 square yards, an analysis should be conducted to determine how to maximize the utility of this area for transient aircraft parking.

Tied-down based aircraft are generally single engine aircraft that are parked closer together. The tied-down aircraft have been allotted 300 square yards per aircraft. Since it has been assumed that private aircraft owners will prefer hangar space, no long-term growth in number of tied-down aircraft is assumed. Thus, the existing tied-down areas should be adequate, although the issue of whether they are situated in the most optimal location should be addressed.

4.10-6 Fractional Ownership Aircraft Apron

Flight Options currently uses about one-third of the corporate apron area or about 16,000 square yards. As discussed under the fractional ownership future hangar needs, the forecasts show a potential for the fractional ownership aircraft addressed to Cuyahoga County Airport to triple. If 10 percent of the fractional ownership aircraft addressed to Cuyahoga County Airport continue to be present at any given time, the apron needs will also triple. Thus, area should be reserved to support an additional 32,000 square yards of apron to serve the fractional ownership aircraft. As with space reserved for future fractional ownership hangar facilities, it should be recognized that the Airport will need to coordinate closely with Flight Options to determine the actual future needs at Cuyahoga County Airport.

4.10-7 Fueling Facilities

All of the aviation fuel facilities on the Airport are privately owned and operated. There are four aviation fuel systems on the Airport. Corporate Wings provides fuel services to locally based and transient aircraft. They have a 15,000 gallon in-ground tank for JetA. This tank is dedicated to serve Flight Options. They also have two 12,000 gallon above ground tanks (one is JetA; the other is 100LL Avgas) on a concrete pad north of the county T-hangars. There is space in this location to add two more tanks.

Flight Options has a fuel system as a part of its facilities and an FBO license, but has not exercised an option for their use. Presently they contract with Corporate Wings for fueling.

Eaton Corporation and National City Corporation each have their own JetA fuel systems. Eaton has one 15,000-gallon tank and National City has two 12,000-gallon tanks.



In addition to the aviation fuel systems, the County has two underground tanks located in front of the Airport administrative building near Curtiss Wright Parkway. One tank holds 4,000 gallons of diesel fuel and the other holds 2,500 gallons of unleaded gas. These tanks serve the county's maintenance vehicles.

Each system has been sized based on the user needs and delivery schedule. With a full service FBO on the field, the County does not provide any fuel services. In the future, it is anticipated that fuel services will continue to be offered by the FBO. However, when preserving areas for future operations, it is recommended that consideration be given to reserving additional space for FBO/Aviation support operations. This space could be used to accommodate FBO expansion for the existing FBO or an additional FBO. It would be beneficial if the location of this expansion area could support future fuel system expansion if needed.

4.10-8 Terminal Building

The terminal building functions are provided by the fixed based operators (FBO) as a part of their hangar facilities. Corporate Wings, the FBO, at Cuyahoga County Airport, leases Hangar 5 from the County and owns Hangar 6 and Hangar 7 located on land leased from the County. Hangar 5 houses an interior shop with office space, fueling, and deicing. Hangar 6 houses maintenance, avionics, aircraft storage, fueling, and leased office space. Hangar 7, completed in December 2004, serves as the terminal for Corporate Wings FBO services including tenant office space, aircraft storage, and fueling. The 12,000 square-foot first-class terminal facility includes a pilot lounge, flight planning, coffee shop, conference rooms, and offices.

4.10-9 Maintenance/Administrative Functions

The County administration/maintenance and ARFF (Airport Rescue and Fire Fighting) facilities are housed in one 21,136 square foot building, number 8 on Figure 4-7. The northeastern portion of this building was built as an addition that is known as Area B. Area B includes some rental space that houses Design Edge (a graphics business), T&G Flying Club, and Jet Associates (sell planes and lease autos.) Presently the space available is barely enough to accommodate the County's equipment. Space should be reserved to provide additional support facilities. If it is determined that additional maintenance vehicles or personnel require additional space, options should be considered for providing the space needed.



4.10-10 Road Access and Auto Parking

Access to Cuyahoga County Airport and the business park is from Richmond Road and Bishop Road via Curtiss Wright Parkway. Unfortunately, Curtiss Wright Parkway is also being used by the general public as a shortcut between Richmond Road and Bishop Road, increasing the congestion on this road. To preserve the capacity of this road, it is recommended that a means to discourage the general public from using the route as a cut through be investigated.

Just north of the intersection of Curtiss Wright Parkway and Bishop Road is the intersection of White Road with Bishop Road. Congestion has been noted at the White Road intersection that at times impacts the Curtiss Wright Parkway intersection due to their close proximity.

There are numerous auto parking areas serving the landside facilities at Cuyahoga County Airport, as shown on **Table 4-10**. The parking area serving Flight Options is frequently close to capacity, which results in their employees needing to park by Hangar 0 (Building 6 on Figure 4-7), 500 to 600 feet from the main operation. The auto parking for the administrative office is also frequently full. At a minimum, the grass area adjacent to these two facilities should be considered to provide additional parking areas.

**TABLE 4-10
AUTO PARKING FOR AIRFIELD SUPPORT BUILDINGS**

| Building Number | Tenant | Auto Parking Spaces |
|------------------------|--------------------------------|----------------------------|
| 1 | County T-hangars | 52 |
| 2 | Corporate Wings | 54 |
| 3 | Corporate Wings | 148 |
| | Milano's Restaurant | 40 |
| 4 | Flight Options | 112 |
| 5 | Flight Options | 140 |
| 6 | Flight Options | 121 |
| 7 | Flight Options | 26 |
| 8 | Cuyahoga County Administration | 27 |
| 9 | Eaton Corporation | 44 |
| 11 | National City Bank | 26 |
| 12 | MBNA | 30 |
| 19 | Zomar T-hangars | 40 |
| 20 | Swagelok | 30 |
| 21 | Corporate Wings | 48 |

Source: C&S Engineers, Inc., December 2003.



4.10-11 Landside Facility Requirements Summary

This analysis has identified the need to preserve space on the Airport for additional T-hangars, corporate hangars, aircraft parking apron, auto parking, and County administration/maintenance space. The alternatives considered for the landside facility growth should take into account the need for flexibility, as the timing of the development of the landside facilities will be heavily dependent on the users. It should also consider optimizing the space on the Airport, which may include the relocation of some existing facilities to make the highest and best use of the space available on the Airport as well as to best accommodate the users. **Figure 4-8** summarizes the future landside facility needs. While this analysis was conducted for the baseline forecasts, the potential to reserve additional space to accommodate up to the high forecast should be considered in the alternatives analysis process.

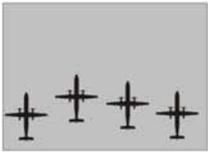
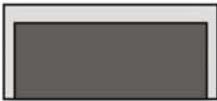
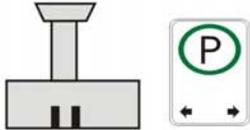
4.11 Other Facility Requirements

There were three other facility needs identified in the user survey process: minimizing run-up noise, control of flow into and out of the Airport, and control of wildlife in the vicinity of the Airport. As part of the aircraft maintenance conducted at the Airport, engine run-ups are necessary. The Airport has worked with the tenants to identify locations for the run-ups that minimize off-Airport noise. Tenants have suggested installing a run-up enclosure or hush house sized to accommodate business jet aircraft. The alternatives analysis should reserve an area on the Airport to accommodate such a noise enclosure. Another service enhancement suggested by corporate users is the addition of U.S. Customs and Immigration Service at the Airport.

Controlling access to the airfield protects the general public from inadvertent entry into areas where aircraft may be operating, and also increases the security for the aircraft operators. Controlling the potential flow or entry of wildlife onto the activity aircraft areas should also be taken into consideration in the Airport's security and wildlife control plans.

4.12 Summary

This analysis identified what facilities should be present at the Cuyahoga County Airport versus what facilities exist to accommodate future activity at the Airport. These facility requirements now need to be put into the context of the local environs. The status quo cannot be maintained. FAA policies require that the RSAs be brought up to current FAA standards. Looking beyond just the improvements that are required, the real question is: What facility improvements should be made to provide the greatest margin of safety for the operators and neighbors while providing the maximum economic return in a community-sensitive manner?

| REQUIREMENTS | EXISTING | FUTURE |
|--|--|---|
| <p>Traditional Based Aircraft Hangars</p>  | <p>Corporate 162,840 sft (7 Buildings)</p> <p>T-Hangars 62 Units</p> | <p>Conventional Reserve 34,000 sft additional</p> <p>T-Hangar at least 82 Units</p> |
| <p>Traditional Based Aircraft Apron Areas</p>  | <p>Corporate 32,500 syds</p> <p>Transient 16,000 syds</p> <p>Based 14,600 syds</p> | <p>Corporate 32,500 syds</p> <p>Transient 21,400 syds</p> <p>Based 14,600 syds</p> |
| <p>Fuel Facilities</p>  | <p>4 Fuel Farms for Aviation 1 Fuel Farm for Maintenance</p> | <p>Reserve additional space for FBO/Aviation support operations</p> |
| <p>Fractional Based Aircraft Space</p>  | <p>Hangar/Office 139,000 sft</p> <p>Apron 16,000 syds</p> | <p>Hangar/Office Reserve up to 280,000 sft additional</p> <p>Apron Reserve up to 32,000 syds additional</p> |
| <p>Terminal Building/ Administration Building/ Auto Parking</p>  | <p>Administration/Maintenance/ARFF 21,136 sft</p> <p>Terminal 12,000 sft (provided by FBO)</p> <p>Auto Parking 938 Spaces</p> | <p>Administration Reserve additional space</p> <p>Terminal Provided by FBO</p> <p>Auto Parking Fill grass areas Reserve for additional space</p> |

Source: Aerofinity, Inc., 2005.





Attachment A

FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay* provides the guidance for calculating an airport’s annual service volume (ASV). This advisory circular presents two methods for calculating capacity: long-range planning and specific facility assessment. The long-range planning method assumes that:

- Arrivals equal departures
- The percent of touch and goes (an aircraft landing followed by a takeoff without the aircraft coming to a full stop) is within the range on the table
- There is a full length parallel taxiway, ample runway entrance and exit taxiways, and no taxiway crossing problems
- There are no airspace limitations that would adversely impact flight operations
- The airport has at least one runway equipped with an instrument landing system (ILS)
- Instrument flight rule (IFR) conditions occur roughly 10 percent of the time
- Approximately 80 percent of the time, the airport is operated with the runway use configuration that produces the greatest hourly capacity

Operations at Cuyahoga County Airport generally meet the above assumptions. Figure 2-1 from *AC 150/5060-5* provides the capacity and ASV for long-range planning. Cuyahoga County Airport has a one-runway configuration. Figure 2-1 uses a mix index to consider the size of aircraft operating at the Airport. C class aircraft weigh 12,500 pounds to 300,000 pounds; D class aircraft weigh more than 300,000 pounds. The business jets generally weigh between 12,500 and 70,000 pounds. These account for almost 30 percent of the operations at Cuyahoga County Airport, so the mix index is in the 21 to 50 range. The percent of touch and goes associated with this mix index is 0-40 percent. The local operations, which include touch and goes, account for approximately 30 percent of the operations at Cuyahoga County Airport, so the correlation is within the given range.

As shown in **Exhibit A-1**, the long-range planning ASV for Cuyahoga County is 195,000. The hourly capacity ranges from 57 for Instrument Flight Rule (IFR) conditions to 74 for Visual Flight Runway (VFR) conditions.

**TABLE A-1
CAPACITY AND ANNUAL SERVICE VOLUME FOR LONG RANGE PLANNING**

| Runway Use Configuration | Mix Index % (C=3D) | Hourly Capacity | | Annual Service Volume Ops/Yr |
|--------------------------|-----------------------|-----------------|-----|---------------------------------|
| | | Ops/Hr VFR | IFR | |
| | 0 to 20 | 98 | 59 | 230,000 |
| | 21 to 50 | 74 | 57 | 195,000 |
| | 51 to 60 | 63 | 56 | 205,000 |
| | 81 to 120 | 55 | 53 | 210,000 |
| | 121 to 180 | 51 | 50 | 240,000 |

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





Attachment B

Runway Length

Cuyahoga County Airport is served by one runway, designated Runway 6-24, which is 5,102 feet long and 100 feet wide and is orientated northeast-southwest. There is a 500-foot stopway on the south end of the runway. Runway length requirements for an airport are based on five primary factors:

- Airport elevation
- Mean daily maximum temperature of the hottest month
- Maximum elevation change in the runway centerline
- Wet or dry pavement
- Stage length of the longest non-stop trip (considered for aircraft weighing more than 60,000 pounds only)

These factors are critical because aircraft performance declines as elevation, temperature, and runway gradient increase. *FAA Advisory Circular 150/5325-4A, Runway Length for Airport Design* provides planning guidance for runway length based on a combination of aircraft. Using Cuyahoga County’s airport elevation, maximum temperature, and elevation change for wet pavements, the FAA’s Airports Design Program version 4.2D identifies that 5,500 feet is needed to serve 100 percent of large airplanes weighing 60,000 pounds or less (representative of the business jets regularly using the Airport) at 60 percent useful load. **Exhibit B-1** is a partial printout from the design program showing this data.

**TABLE B-1
RUNWAY LENGTH REQUIREMENTS**

| Airport and Runway Data | | |
|---|----------------|----------------|
| Airport Elevation | | 879' MSL |
| Mean Daily maximum temperature of hottest month (July) | | 81.4 °F |
| Maximum difference in runway centerline elevation | | 6 feet |
| Length of haul for airplanes of more than 60,000 pounds | | 500 miles |
| Runway Length for Large Airplanes of 60,000 pounds or less | | |
| | Dry Runway | Wet Runway |
| 75% of these large airplanes at 60% useful load | 4,780' | 5,420' |
| 75% of these large airplanes at 90% useful load | 6,280' | 7,000' |
| 100% of these large airplanes at 60% useful load | 5,410' | 5,500' |
| 100% of these large airplanes at 90% useful load | 8,010' | 8,010' |
| Airplanes of more than 60,000 pounds | Approx. 5,320' | Approx. 5,320' |

Source: *Runway Safety Area Study for Cuyahoga County Airport, Draft Final Report*, C&S Engineers, Inc., October 2004.



For business jets weighing less than 60,000 pounds, useful load is the measure sensitive to stage length. The farther an aircraft is flying nonstop, the more fuel it needs onboard at takeoff, thus increasing its percent of total useful load at takeoff. Through the user survey process, the existing Airport users identified the need to operate at more than 60 percent useful load on longer trip lengths. Also the users identified that they are restricted by the runway length when the runway is wet or slippery. Based upon the user data, for the business jets using Cuyahoga County Airport with the destinations served, the critical users have indicated the existing runway length constrains their operations and that the FAA general planning runway length of 5,500 feet will not address their needs. At a length of 6,000 feet, the critical aircraft needs would be substantially met.