CHAPTER 3 FACILITY REQUIREMENTS

The Springfield-Beckley Municipal Airport has a long history of supporting both civilian general aviation and the Ohio Air National Guard (OANG) operations for the benefit of both types of users. Both the City and OANG have been assessing their long-term needs to develop a clear vision and strategy for their future. The first step in identifying the vision for general aviation is to use the aviation forecasts developed in the previous chapter to determine what facilities are needed to accommodate general aviation demand over the 20-year planning period. Although Springfield-Beckley Municipal Airport already has good facilities in place, the purpose of this chapter is to identify improvements that will increase the overall utility of the airport.

Physical facility needs have been identified using two methods: qualitatively based on the information learned through the inventory and users survey process and quantitatively through the application of planning standards established by the Federal Aviation Administration (FAA).

This chapter first summarizes the findings of the users survey process, so they can be used in conjunction with the aviation forecasts to determine future facility requirements. Next, the Airport Reference Code (ARC) for the largest aircraft regularly using the airport is identified. The ARC is used to determine the design standards for the airport facilities. Then the physical facility requirements for both airside and landside development is examined. Airside facilities include the runway (capacity and infrastructure), taxiway, navigational aids, marking and lighting. Landside facilities include the aircraft parking apron areas, aircraft hangars, fueling facilities, administrative facilities, ground access, and auto parking.

USERS SURVEY

It is often helpful to employ more than one method to determine facility needs. For Springfield-Beckley Municipal Airport, in addition to identifying aviation forecasts, user surveys were distributed to based aircraft owners and transient users. Also, existing airport businesses were contacted to identify facility needs.

The users survey was mailed to all the based aircraft owners, to a list of regular transient users compiled by the fixed base operator (FBO), and distributed to other general aviation pilots through the FBO. The survey was conducted during November 2002. About 70 surveys were distributed and 27 surveys were returned. The survey forms could either be returned to Sunbird Aviation, the FBO; the airport manager or returned postage-paid to Aerofinity, Inc, the master plan consultants.

In summary, the users survey process identified a need for hangar improvements, both in terms of t-hangars as well as a large hangar that could be available to overnight corporate operators. There is a desire for improved t-hangar space; however, the rental rates identified through the survey process at the range aircraft owners are willing to pay are more in line with the existing hangars than with the rates that would need to be charged to develop new t-hangars. The airfield facilities were rated well, and there was some recognition that they are the result of the OANG's presence at the airport. However, with the OANG's presence, there was an expressed concern that airport management is less

focused on general aviation than some users desire. The existing instrument landing system (ILS) is an important asset for the airport, but additional instrument approaches, particularly to the crosswind runway, were requested. Copies of the questionnaire along with a summary of the survey responses are included in **Appendix B**.

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. At some airports, separate ARCs are determined for different facilities if only a portion of the aircraft operating at the airport use the facilities. This is the case at Springfield-Beckley Municipal Airport. All of the aircraft operating at the airport use the primary runway and its associated facilities; the crosswind runway, its associated facilities and the general aviation terminal area are used only by general aviation aircraft.

A combination of two codes is used to develop the ARC. The first code, Aircraft Approach Category, relates to the approach 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 expected to use the airport on a regular basis. The FAA currently defines a "regular basis" as 500 operations per year, with an operation consisting of a takeoff or landing. **Exhibit 3A** summarizes the aircraft approach category and airplane design group.

EXHIBIT 3A
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

Primary Runway Airport Reference Code

Runway 6-24 is the primary runway. It is used by all aircraft at the airport. The aircraft using the airport with the highest approach speed are the F-16s, which is a category E aircraft per information from the OANG. The F-16s conduct 13,000 to 15,000 annual operations. While the F-16 has a high approach speed, it has very short wings falling within Design Group I.

The aircraft using the airport with the largest wingspan are the transient military aircraft: C-130 (132'-7" wing span), KC-135 (130'-10" wing span) and C-141 (160' wing span). All three of these aircraft are in Design Group IV. It is estimated they conduct less than 20 operations per month, or less than 240 annual operations.

Combining these most demanding aircraft yields an ARC of E-IV. FAA design standards use the classifications of A/B and C/D. There are no FAA established standards in *FAA Advisory Circular 150/5300-13, Airport Design*, for category E aircraft. Therefore, for planning purposes for Runway 6-24 and associated facilities, the ARC of D-IV is recommended. This is the same ARC that was used for the primary runway in the *1992 Master Plan*.

Crosswind Runway Airport Reference Code

Only general aviation aircraft use the crosswind runway and civilian general aviation terminal facilities. General aviation users are comprised of two groups of users: based aircraft and transient users.

The largest typical based aircraft are the turboprop aircraft. These aircraft include a Pilatus (ARC B-II), AeroCommander (ARC B-I) and Metroliner (ARC B-I). In addition, there is a Mig-21, former military aircraft, based at the airport. Similar to the F-16s it has a high approach speed and short wingspan, and would operate on the primary runway.

Transient users range from single-engine piston aircraft to corporate jets. Corporate aircraft that use the airport on a regular basis include Hawker 800 (ARC C-II), Gulfstream III/IV/V (ARC C-II/D-II), Falcon 200/900 (ARC B-II), Sabre 60/70 (ARC B-I/C-I), Challenger (ARC C-II) and Citation Bravo (ARC B-II). The transient users represent the most demanding general aviation aircraft using the airport on a regular basis. On average there are at least seven larger transient aircraft that use the Springfield-Beckley Municipal Airport on a weekly basis. This translates to at least 728 annual operations (2 operations per aircraft multiplied by 7 aircraft multiplied by 52 weeks per year) by large corporate aircraft. The large transient corporate aircraft are the most demanding general aviation aircraft using the airport. Taking into account all the operations by the large transient aircraft, results in an ARC of C-II for the crosswind runway and terminal area. This is the same ARC that was used for the crosswind runway in the *1992 Master Plan*.

The t-hangar portion of the terminal area accommodates predominately single-engine and twin-engine piston aircraft in Design Group I. Therefore, the t-hangar taxilanes could be sized to only Design Group I standards. **Exhibit 3B** summarizes the applicable ARCs for facilities at the Springfield-Beckley Municipal Airport.

EXHIBIT 3B
APPLICABLE ARC FOR
SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT

Facility	ARC
Runway 6-24 (Primary Runway)	D-IV
Runway 15-33 (Crosswind Runway)	C-II
Terminal Area Transient Apron/Corporate Hangars	C-II
Terminal Area T-Hangars	B-I

Source: Aerofinity, Inc., 2002

AIRFIELD REQUIREMENTS

Having identified the critical aircraft and associated ARCs, this portion of the facility requirements analysis uses that quantitative information along with qualitative information to review the airfield facilities. It identifies areas where further analysis of improving the airfield facilities at the Springfield-Beckley Municipal Airport should be undertaken during the alternatives analysis portion of this planning process.

In summary, the runways at the airport are ample in length, wind coverage and marking/lighting. There is a need for some runway safety area improvements, some minor taxiway system improvements and to study improved instrument approach capabilities resulting from new technology. The recent Ohio Department of Transportation's (ODOT) Pavement Condition Index study results should also be used to monitor the pavement condition and program the necessary improvements. Details on the airfield capacity, runways, taxiways, navigational aids (navaids), marking and lighting, and pavement condition are in the following sections.

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, the differences in runway use, aircraft mix, and weather conditions, all of which are considered in the ASV calculation. Per *FAA Advisory Circular 150/5060-5, Airport Capacity and Delay*, the long range planning ASV for Springfield-Beckley Municipal Airport is 195,000 annual operations. The hourly capacity ranges from 57 for Instrument Flight Rule (IFR) conditions to 74 for Visual Flight Rule (VFR) conditions. Detailed capacity calculations are provided in **Appendix C**.

The Federal Aviation Administration (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 2022 high scenario annual operations forecast is 75,900 operations, representing 39 percent of the ASV.

While there may be short periods of time during which delay is experienced at the Springfield-Beckley Municipal Airport when several aircraft want to use the airfield at the same time or during special events, there should be no overall capacity constraints during the planning period. Thus, facility improvements to increase the airfield capacity are not recommended and will not be considered in this master plan update. Accordingly, improvements to maintain the airfield and enhance the overall efficiency of operations will be the focus of this study.

Runways

The present runway system at the Springfield-Beckley Municipal Airport includes Runway 6-24 and Runway 15-33. Runway 6-24 is the longest runway at the airport with a length of 9,009 feet and a width of 150 feet. It is oriented northeast-southwest. Runway 15-33 is the crosswind runway at the airport with a length of 5,499 feet and a width of 100 feet. It is oriented northwest-southeast.

Wind Coverage

Per *FAA Advisory Circular 150/5300-13, Airport Design*, when a runway orientation provides less than 95% wind coverage for any aircraft forecast to use the airport on a regular basis, a crosswind runway is recommended. Wind coverage is defined as the percent of time the crosswind component is at or below the published operating limitations for an aircraft. Smaller, lighter aircraft are the most sensitive to crosswinds.

The 95% wind coverage is computed on the basis of the crosswind not exceeding:

- 10.5 knots for ARC A-I and B-I
- 13 knots for ARC A-II and B-II
- 16 knots for ARC A-III, B-III and C-I through D-III
- 20 knots for ARC A-IV through D-IV

As shown on **Exhibit 3C**, neither Runway 6-24 nor Runway 15-33 alone provides 95% wind coverage for the smaller aircraft (10.5 knots). However, together, these two runways provide more than the recommended 95% wind coverage.

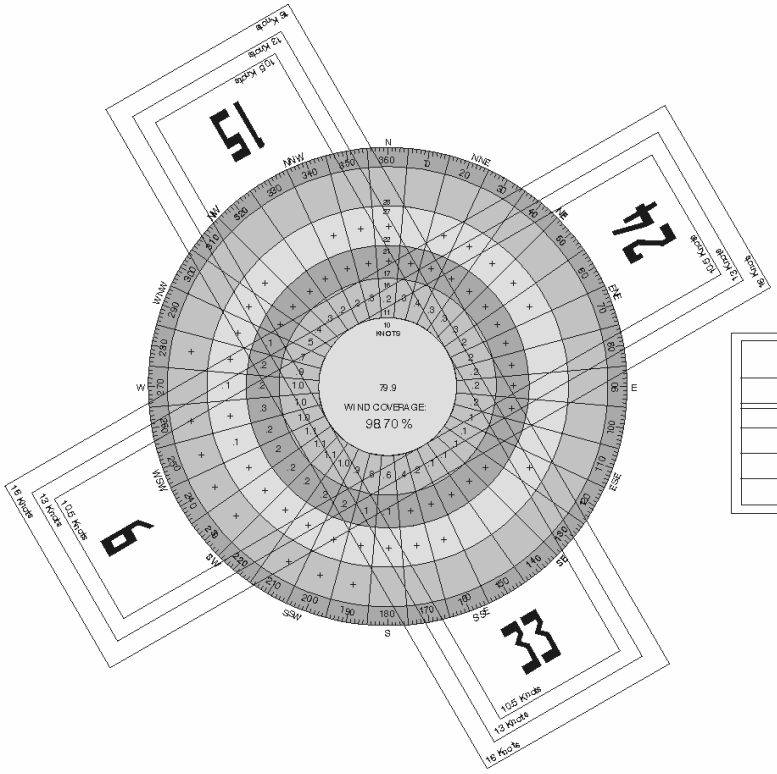
Runway Length

Runway length requirements 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 more than 60,000 pounds only)

These factors are critical because aircraft performance declines as elevation, temperature and runway gradient factors increase.

EXHIBIT 3C
ALL WEATHER WIND COVERAGE AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT



ALL WEATHER WINDROSE

24 HOUR WIND COVERAGE BY RUNWAY

RUNWAY	10.5 Knots	13 Knots	16 Knots	20 Knots
6-24	94.37%	97.54%	99.57%	99.93%
15-33	87.69%	93.06%	97.87%	N/A
COMBINED	98.70%	99.71%	99.96%	N/A

OBSERVATIONS: Wright Patterson Air Force Base
1993-2002
70,946 observations

SOURCE: National Climatic Data Center
Information Services Division
Federal Building
Asheville, NC 28801

The *FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design* has been used as a starting point for reviewing the appropriate runway length. **Exhibit 3D** is a partial printout of the *Airports Design Program, version 4.3B*, for identifying runway length at Springfield-Beckley Municipal Airport using the airport and runway data.

For large aircraft 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. Per *FAA* Advisory *Circular 150/5325-4A*, *Runway Length Requirements for Airport Design*, the typical aircraft classified in the large airplanes 60,000 pounds or less group include the Learjet, Sabreliner, Citation, Falcon, HS-125 and Westwind. These are all common entry and mid-level corporate aircraft.

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. The FAA uses this program as a guideline to determine what they will fund for the development of runway length at general aviation airports. The FAA will consider approval of runway lengths beyond those identified in the *Airport Design Program* if a specific need can be documented based upon user data.

EXHIBIT 3D
RUNWAY LENGTH REQUIREMENTS FOR SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT

Airport and Runway Data		
Airport Elevation		1,052 feet MSL
Mean daily maximum temperature of the hottest month		87.4 F
Maximum difference in runway centerline elevation		14 feet
Length of haul for airplanes of more than 60,000 pounds		500 miles
Runway Length Recommended for Airport Design		
	Dry Runway	Wet Runway
Small Airplanes with less than 10 passenger seats		
75 % of these small airplanes	2,840	2,840
95 % of these small airplanes	3,370	3,370
100 % of these small airplanes	3,990	3,990
Small airplanes with 10 or more passenger seats	4,420	4,420
Large airplanes of 60,000 pounds or less		
75 % of these large airplanes at 60% useful load	4,940	5,500
75% of less large airplanes at 90% useful load	6,750	7,000
100 % of these large airplanes at 60% useful load	5,750	5,760
100 % of these large airplanes at 90% useful load	8,660	8,660
Airplanes of more than 60,000 pounds	Approx. 5,380	Approx. 5,380

Source: Chapter 2 of FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, no changes included.

As shown in **Exhibit 3D**, the existing primary runway length of 9,000 feet can accommodate all of the general aviation aircraft using the Springfield-Beckley Municipal Airport. In addition, the crosswind runway length of 5,499 feet can accommodate at least 75 percent of the large airplanes weighing less than 60,000 pounds at 60 percent useful load.

The length of the primary runway is also driven by the need to support F-16 operations. The current length of 9,000 feet was developed in partnership with the OANG and is sufficient for these operations. Thus, the existing runway lengths are capable of supporting the activity at the Springfield-Beckley Municipal Airport. No additional runway length will be considered as a part of this master planning effort.

In addition to the runway pavement itself, BAK12/14 aircraft arresting systems have been established approximately 1,000 feet from each end of Runway 6-24, to support the F-16 operations. Also, E5 barrier chain aircraft arresting systems have been established just beyond each end of Runway 6-24 in the paved over-run area.

Runway Safety Area

The FAA has embarked upon a national undertaking to assess the runway safety areas in order to provide runway safety area (RSA) determinations. The 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, providing greater accessibility for fire fighting and rescue equipment during such incidents. The RSA is within the "runway object free area" that must be kept clear of objects not required for aircraft ground maneuvering.

Runway 6-24

A RSA determination was prepared by the FAA on September 18, 2000 for Runway 6-24 at the Springfield-Beckley Municipal Airport. In that determination the FAA identified seven deficiencies that needed improving for the Runway 6-24 RSA to meet the current RSA standards. The FAA standard RSA for ARC D-IV aircraft is 500 feet wide centered on the runway centerline and extending 1,000 feet beyond each runway end. The City has actively worked, including improvements as part of the OANG over-run project during 2001, to resolve the RSA deficiencies. The only remaining item identified is to upgrade the arresting gear systems, which is fixed by function due to military need, to be less obtrusive and minimize their impact on the RSA, The OANG has been studying what other joint use airports have done to minimize the impact of the arresting gear equipment and maintenance roads in the RSA and what improvements would be appropriate for the systems at Springfield-Beckley Municipal Airport.

FAA Advisory Circular 150/5220-9, Aircraft Arresting Systems for Joint Civil/Military Airports, published in 1970, provides guidance on the installation of arresting systems. **Appendix D** contains the FAA standards for BAK 12 systems at

joint use airports. **Exhibit 3E** shows a photograph of a typical BAK 12/14 installation a Springfield-Beckley Municipal Airport. Using the guidance on BAK 12 aircraft arresting systems, the following was noted:

- The deck sheave is located 25 feet from the edge of the runway, matching the FAA standards.
- A concrete housing with sloped sides protects the deck sheave; the grading of this housing does not appear to meet the FAA standards for joint use airports.
- The energy absorption engine is installed in a pit located 75 feet from runway edge.
- There are an exhaust fan, air vent, exhaust stack, air vent hood and pit entrance door that protrude above the pit and are obstacles within the runway safety area. In addition, on the north barriers there is an electric transformer above grade.

Reviewing the FAA standards, it appears that improvements can be made to the BAK12/14 systems to lessen their impact on the runway safety area. The City should work with the OANG and FAA to identify the necessary improvements and develop a time schedule for the OANG to implement the improvements.

EXHIBIT 3E
TYPICAL BAK 12/14 AIRCRAFT ARRESTING SYSTEM
AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT

Source: Aerofinity, Inc., December 2002.

The E5 barrier chain arresting gear systems are located in the paved over-runs beyond the ends of the runway. These systems were subject to a FAA airspace study and approved by the FAA before installation per its October 12, 2001 letter regarding Airspace Case Number 01-AGL-968-NRA with operating revisions in its December 31, 2002 letter.

Runway 15-33

The Runway 6-24 RSA was evaluated by the FAA because it is the airport's certificated runway under Federal Aviation Regulations (FAR) Part 139. The Runway 15-33 RSA is being evaluated as part of this master planning process; however, this evaluation does not include a review of ground compaction or grades in the RSA. The standard RSA for ARC C-II aircraft is 500 feet wide centered on the runway centerline and extending 1,000 feet beyond each end of the runway. *FAA Advisory Circular 150/5300-13, Airport Design*, identifies "for ARC C-II, a runway safety area width of 400 feet is permissible."

The entire Runway 15-33 RSA is within airport property as shown on **Exhibit 3F**. The Runway 15 and 33 VASIs are located within the RSA along the length of the runway. Per the City, both sets of VASIs are on frangible mounts, meeting the RSA requirements.

The first approximately 300 feet of RSA beyond the end of Runway 15 is grass. After the grass, there is an area that has been used for agricultural crops. The first approximately 275 feet of RSA beyond the end of Runway 33 is grass and beyond it is also agricultural field. The full 1,000 feet of RSA beyond the end of the runway should be cleared of objects and graded. This precludes any crops from the RSA.

EXHIBIT 3F
RUNWAY 15-33 SAFETY AREA AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT

Source: Aerofinity, Inc., February 2003.

There is an abandoned haul road south of Runway 33. The first approximately 180 feet nearest Runway 33 has been regraded and seeded. The connection with Jackson Road has been fenced and gated. Approximately 90 feet of the original gravel and asphalt chip haul road remains within a 500-foot wide RSA. The use of a 400-foot wide RSA would virtually eliminate the abandoned haul road from the RSA.

It appears the Runway 15-33 RSA does not meet FAA standards for ARC C-II aircraft due to the crops and a small portion of the abandoned haul road, but it is practicable to improve. The alternatives analysis will identify appropriate improvements for the Runway 15-33 RSAs to meet FAA standards.

The May 2002 Federal Aviation Regulations (FAR) Part 139 certification inspection recommended, "install a 10-foot deer fence around the airport. Although there were no observations of deer, the lack of a complete enclosed fence including the habitat on and surrounding the airport could bring deer onto the airfield. Due to the significant military jet aircraft operations, this fencing project should be given strong consideration." This recommendation will be taken into consideration in the implementation plan for this master plan.

Taxiways

Taxiways are planned and constructed primarily to allow aircraft movement to and from the runway system. Taxiways and taxilanes are provided in the terminal area to facilitate safe movement of aircraft in or near the hangar complexes. 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 taxiways and aircraft parking positions."

The most demanding aircraft using the taxiway system are the Design Group IV military transient aircraft that support the OANG's mission. These aircraft only land and takeoff on Runway 6-24, taxi to the OANG base, and park within the OANG base. A taxiway width of 75 feet is the FAA standard for Group IV aircraft.

To support these aircraft and eliminate any need for them to back-taxi on the runway, the OANG undertook a development project to bring the entire length of Taxiway A, the parallel taxiway for Runway 6-24, to Group IV standards. This development program involved widening any portion of Taxiway A not already 75 feet wide and extending it to the end of Runway 6. In association with this improvement, the OANG also constructed an arm/dearm pad near the end of Runway 6. These improvements were completed in 2003.

The FAA taxiway separation standards for Design Group IV are:

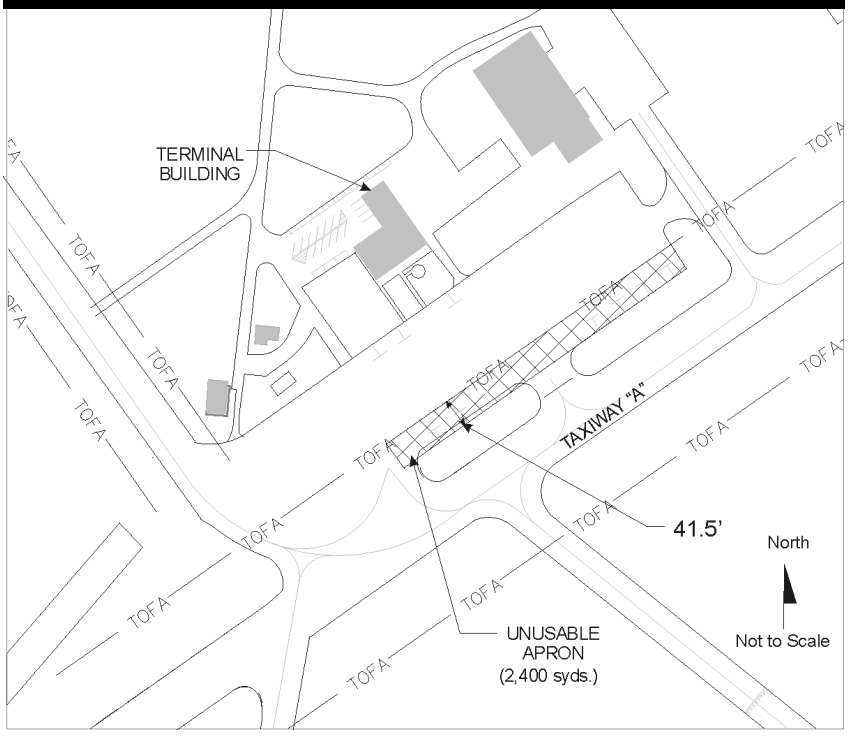
- 400-foot taxiway centerline to runway centerline
- 129.5-foot taxiway centerline to fixed or moveable object
- 112.5-foot taxilane centerline to fixed or moveable object

Taxiway A

Taxiway A centerline is 737 feet from Runway 6-24. It provides more than adequate Group IV taxiway centerline to runway centerline separation. With the completion of the OANG Taxiway A development program, for which all the widening occurring on the outside edge (farthest from runway), the Taxiway A centerline to general aviation parking apron is 88 feet, less than the FAA Group IV standard for taxiway centerline to fixed or moveable objects. To provide a clear Group IV taxiway object free area, 41.5 feet along the edge of the general aviation apron is unusable for aircraft parking, as shown on **Exhibit 3G**. Also, 118 feet of pavement along the edge of the based aircraft apron near Maintenance Hangar #1 is unusable as shown on **Exhibit 3H**.

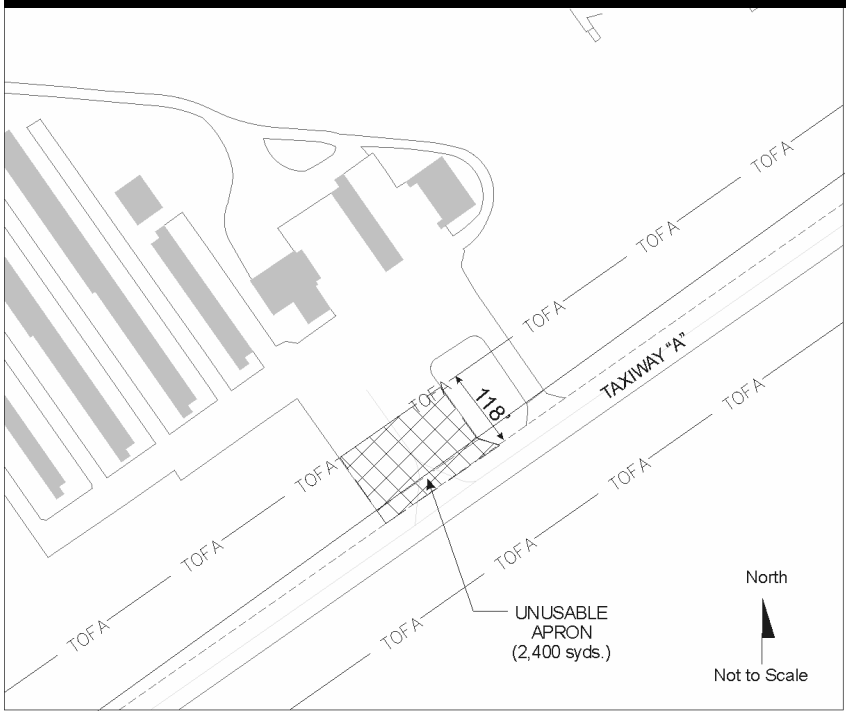
The C-141 is the largest Group IV aircraft using Springfield-Beckley Municipal, with a 160-foot wingspan. If the taxiway centerline to aircraft parking apron separation were based on this critical aircraft instead of all Group IV aircraft a 122-foot separation would be required. This reduces the unusable apron pavement to 34 feet along the edge of the transient apron and 110.5 feet along the edge of the based aircraft apron. *Thus, it is recommended that the Airport request a modification to design standards to allow the C-141 to be used, instead of all Group IV aircraft, for setting the taxiway centerline to general aviation aircraft parking apron clearance, maximizing the utility of the existing apron.*

EXHIBIT 3G
UNUSABLE TRANSIENT APRON AREA WITH TAXIWAY A IMPROVEMENTS AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT



Source: Aerofinity, Inc., 2004.

EXHIBIT 3H
UNUSABLE BASED AIRCRAFT APRON WITH TAXIWAY A IMPROVEMENTS AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT



Source: Aerofinity, Inc., 2004.

Taxiway B

Taxiway B is a connector taxiway between Runway 6-24 and Taxiway A. It is 75 feet wide, meeting Group IV standards. No improvements to this taxiway should be needed.

Taxiway C and H

Taxiway C is a portion of the old third runway and is 150 feet wide. Taxiway C, in conjunction with Taxiway H, provides a connecting taxiway between Runway 6-24 and Taxiway A, leading into Taxiway G that serves the OANG base, as shown on **Exhibit 3I**. With the unique taxiway configuration, the existing holdline for Runway 6-24 is located on Taxiway H before its intersection with Taxiway C. A concern has been expressed that a large aircraft holding in this location has the potential to interfere with aircraft movements on Taxiway A. *As a part of the alternatives analysis, options to relocate the holdline markings or reconfigure this taxiway connection will be analyzed.*

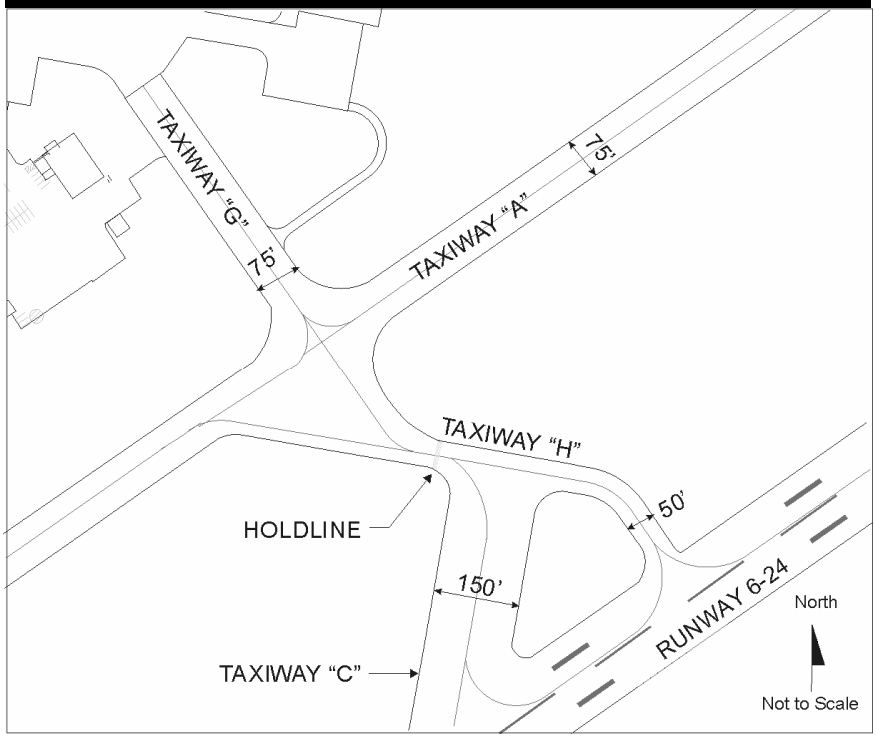
Taxiway D

Taxiway D is a connector taxiway between Runway 5-23 and Taxiway D near the general aviation terminal area. At 50 feet wide, this taxiway is designed to serve general aviation aircraft. This pavement was rehabilitated in 2003.

Taxiway E and F

Taxiway E and F provide a parallel taxiway system for Runway 15-33. The Taxiway E centerline is 300 feet from Runway 15-33 centerline. Taxiway F is 725 feet from Runway 15-33 centerline. The FAA

EXHIBIT 3I
TAXIWAYS C AND H AT SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT



Source: Aerofinity, Inc., 2004.

standard for a taxiway serving ARC C-II is 300 feet for visual runways and runways with not lower than ¾-mile approach visibility minimums. The FAA standard is 400 feet if the runway has lower than ¾ mile approach visibility. Taxiway E and F have adequate runway centerline to taxiway centerline separation for the existing visual approaches to Runway 15-33. They also have adequate separation to support an approach either nonprecision or precision with visibility minimums not lower than ¾-mile.

Taxiway E south of Runway 6-24 is 35 feet wide, matching Design Group II standards. The balance of Taxiway E, including the connector, and Taxiway F are 50 feet wide exceeding the Design Group II standards. Some operators of larger Design Group II business jets request 50-foot wide taxiways to better accommodate the wider wheelbase of their aircraft. There is a hold pad at the Runway 33 end of Taxiway E, enhancing the utility of the taxiway.

Taxiway J

Taxiway J is the connecting taxiway from Runway 15-33 to AirparkOhio. This taxiway was constructed in 2002 and is in good condition.

Navigational Aids

Instrument approaches are critical to airport operations in inclement weather. The better an airport's navigational aids (navaids), the more accessible it will be to the flying public in all weather conditions. Inclement weather is a regular occurrence at Springfield's Midwest location.

Navaids vary in sophistication. The most precise approach currently available is an Instrument Landing System (ILS). 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.

Springfield-Beckley Municipal Airport is served by a Category I (CAT I) ILS with Approach Lighting System with Sequenced Flashers (ALSF-II) on Runway 24. The first 600 feet of the ALSF-II is located in the pavement over-run beyond the runway end. The ALSF-II operates as a Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR) when the Airport Traffic Control Tower (ATCT) is closed. The ILS on Runway 24 has minimums of 250-foot ceiling and ½-mile visibility. The best minimums for a CAT I ILS are 200 feet above ground level (AGL) ceiling and ½-mile visibility, with increases in the minimums due to obstructions (road and trees at Springfield) in the approach path. *The alternatives analysis will examine whether the existing obstructions can be removed to lower the ILS minimums.*

Runway 6 is served by a VOR (Very High Frequency Omnirange) or GPS (Global Positioning System) approach with minimums of 428-foot ceiling and 1-mile visibility. GPS technology is advancing to the point that precision approaches to all runway ends may one day be available at a fraction of today's ILS installation costs. *The alternatives analysis will study the possibility of a precision approach to Runway 6.*

Runway 15-33 serves the general aviation users, who are the most sensitive to crosswinds. Presently all of the approaches to this runway are visual, with the best approach being the visual circling approach off VOR 6 with minimums of 1-mile visibility and 428-foot ceiling, when the ATCT is open. A circling approach is one where the pilot flies the straight-in approach to another runway with published circling minimums. When the pilot reaches the circling minimums, which are generally higher than for a straight-in approach, the aircraft is leveled off and then maneuvered while maintaining visual reference to the runway environment to land on the runway of choice. This maneuver is typically used when the winds favor a runway other than one with a published straight-in approach. This maneuver is demanding, especial in poor weather, as the aircraft is flying low, fairly slow, and needs to stay close to the airport to maintain visual contact with the runway. To improve the access to the crosswind runway, the airport has requested that a nonprecision approach be established to Runway 33. If this effort is successful, a nonprecison approach will also be requested to Runway 15 if it can be established without conflicting with the approach path into Wright Patterson Air Force Base. *The alternatives analysis will study the possibility of supporting up to a precision approach to Runway 15 and/or 33.*

Marking and Lighting

Lighting provides guidance to pilots during nighttime or low visibility conditions. Runway 6-24 is equipped with High Intensity Runway Lights (HIRLs), while Runway 15-33 is equipped with Medium Intensity Runway Lights (MIRL). The May

2002 FAR Part 139 certification inspection identified that one of the HIRL spacing on Runway 6-24 did not meet standards and recommended that in-pavement HIRLs be installed at the intersection to ensure that there is no greater than 200 feet between lights. This improvement was addressed as part of the Runway 6-24 lighting project completed in 2005.

All of the taxiways except for the Taxiway J serving AirparkOhio on the west side of Runway 15-33 are lighted with medium intensity taxiway lights (MITLs). In the future, if the aircraft movements into and out of AirparkOhio increase, the City may want to consider extending the lighting to Taxiway J.

The runways and taxiways are equipped with lighted guidance signs. In the May 2002 FAR Part 139 certification inspection, it was identified that the green distance remaining signs are nonstandard. The airport received funds to replace them in the 2005 Runway 6-24 lighting project.

Precision runway markings are required for the precision instrument landing system (ILS) approach on Runway 24. At least nonprecision runway markings are required on Runway 6. Both ends of Runway 6-24 are marked as a precision runway, exceeding the minimum requirements and allowing a precision approach to be accommodated on both ends of the runway. The May 2002 FAR Part 139 certification inspection recommended providing solid strip marking on Runway 6-24 to increase their conspicuity.

Currently Runway 15-33 is served only by visual approaches and only requires basic markings. Runway 15-33 is marked as a basic runway with additional 1,000-foot bar markings typically used as a part of nonprecision markings. This exceeds the required minimums and provides additional guidance for the pilots. If a nonprecision approach is established to Runway 15 or 33, at least that end with the approach, will need to be upgraded to provide all the required nonprecision markings. If the alternatives analysis determines that it would be feasible to establish a precision approach on Runway 15 and/or 33, the runway markings would need to be upgraded at the time the precision approach is authorized.

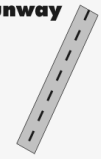
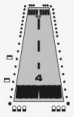
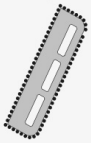
Airfield Pavement Condition

In December 2002, ODOT conducted a Pavement Condition Index (PCI) study at the Springfield-Beckley Municipal Airport. The results of that study are included in **Appendix E**. PCI is a study process that rates the existing condition of the pavements. It is used for programming pavement maintenance and rehabilitation work. From the PCI study, ODOT identified that Taxiway D, Taxiway F, and Taxiway A from the OANG apron to the end of Runway 24 are in the poorest conditions. The airport received a grant from ODOT for rehabilitation of Taxiway D and repairs to Taxiway F. The portion of Taxiway A from the OANG apron to Runway 24 was the only portion of Taxiway A not included in the Taxiway A widening improvements. The City should work with the OANG to program improvements for this portion of Taxiway A in the near future. The other airfield pavements were also assigned a PCI rating, but were not identified for immediate action beyond normal maintenance activities. The PCI information will be used to identify pavement rehabilitation projects that will be needed in the longer-term as a part of the implementation plan.

Airfield Requirements Summary

The airside facilities at the Springfield-Beckley Municipal Airport provide adequate capacity and infrastructure to support the operations at the airport over the planning period. Five incremental improvements have been identified to increase the utility of the airside facilities: improving Taxiway C/H, minimizing the impact of the arresting barriers on the Runway 6-24 RSA, upgrading the Runway 15-33 RSA, evaluating the potential for improving the approaches to Runway 6-24, and establishing straight-in approaches to Runway 15-33. In addition, the PCI study identified rehabilitating the balance of Taxiway A as a near-term need. Also, the May 2002 FAR Part 139 certification inspection recommended installing a 10-foot fence around the airport to minimize attraction of deer to the airport. The recommended airfield facilities are summarized in **Exhibit 3J**. These airfield improvements are recommended regardless of the preferred general aviation terminal development.

EXHIBIT 3J
AIRFIELD REQUIREMENTS

REQUIREMENTS	EXISTING	FUTURE
Runway 	**6-24** 9,009' x 150' **15-33** 5,499' x 100'	**6-24** 9,009' x 150' ***Upgrade Arresting Barriers*** **15-33** 5,499' x 100' ***Upgrade RSA***
Taxiway 	**6-24** Parallel T/W A **15-33** Parallel T/W E and F	**6-24** Parallel T/W A ***Improve Taxiway C/H*** **15-33** Parallel T/W E and F
Navaids 	**6-24** TVOR, TACAN ILS (24), ALSF-II (24) VASI-4L (6, 24) REILs (6) NDB (24), GPS (24) **15-33** VASI-2L (15, 33) REILs (15, 33)	**6-24** TVOR, TACAN ILS (24), ALSF-II (24) VASI-4L (6, 24) REILs (6) NDB (24), GPS (24) ***Potential Improved Approaches*** **15-33** VASI-2L (15, 33) REILs (15, 33) ***Potential Improved Approaches***
MARKING and LIGHTING 	**6-24** PRECISION HIRL **15-33** BASIC MIRL	**6-24** PRECISION HIRL **15-33** ***at least Nonprecision when improved approach is established*** MIRL

Source: Aerofinity, Inc., 2003.

LANDSIDE GENERAL AVIATION REQUIREMENTS

Traditionally the facility requirements process is one of comparing long-term facility needs to existing facilities to identify the deficiencies where additional infrastructure will be needed. However, one of the issues being addressed during this master planning process is the OANG's interest in an expansion program into the existing general aviation terminal area to support their long-term development plans. Therefore, the general aviation landside requirements need to be viewed from two perspectives. The first perspective is the traditional perspective to identify what additional facilities are needed to support long-term general aviation growth within the existing terminal area. The second perspective is to identify what facilities would be needed to replace existing facilities and support long-term general aviation growth at another location on the airport.

Space requirements to be considered for facilities typically associated with general aviation include:

- Aircraft parking aprons
- Aircraft hangars
- Fueling facilities
- Terminal building
- Entrance road and auto parking

Landside general aviation facility requirements have been identified based on the high forecast at the end of the 20-year planning period. **Exhibit 3K** summarizes the forecast aviation activity at the Springfield-Beckley Municipal Airport for the high scenario and the resulting facility requirements. The facility requirements are then described in detail in the sections that follow. These facility requirements have been prepared for the purpose of reserving sufficient area to support general aviation over the planning period. Future construction would correspond closely to actual demand.

Aircraft Hangars

There are two basic types of hangars on the Springfield-Beckley Municipal Airport: t-hangars and corporate or conventional hangars.

T-hangars primarily accommodate the piston-powered aircraft based at the airport. For planning purposes, it has been assumed that 95% of the single-engine piston aircraft and 100% of the twin-engine piston aircraft would be housed in t-hangars. This results in the need to be able to accommodate up to 89 aircraft in t-hangars units over the planning period. It has been assumed that the balance of the single-engine piston aircraft would be divided between based aircraft tie-downs, and co-located with a larger aircraft in a corporate hangar.

Aircraft Parking Aprons

The existing terminal aircraft parking apron serves transient aircraft. It is approximately 9,800 square yards. On a typical day several corporate-sized aircraft are present on this apron, along with some smaller general aviation aircraft. For planning purposes, it has been assumed that 50% of the aircraft on the terminal apron are corporate-sized aircraft (turboprop or turbojet) and 50% are smaller single-engine and twin-engine piston aircraft. A common parking configuration for corporate aircraft on a transient apron is to face all the aircraft in a

EXHIBIT 3K
GENERAL AVIATION (GA) FACILITY REQUIREMENTS FOR SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT

Forecast Data		2002	2007	2012	2017	2022
General Aviation Based Aircraft						
Single Engine		48	78	81	83	85
Multi Engine		5	8	8	8	8
Turbo Prop		6	9	9	9	10
Jet		1	3	3	3	3
TOTAL		60	98	101	103	106
General Aviation Operations						
Local		30,000	31,136	32,088	33,096	34,104
Itinerant		23,500	24,464	25,212	26,004	26,794
TOTAL		53,500	55,600	57,300	59,100	60,900
% Local		56	56	56	56	56
% Itinerant		44	44	44	44	44
Touch & Gos		15,000	15,568	16,044	16,548	17,052
% Transient of Itinerant Operations		40	40	40	40	40
Peaking Characteristics						
Operations in Peak Month		5,885	6,116	6,303	6,501	6,699
Operations Peak Day in Peak Month		197	224	231	238	246
Operations in Design Hour Peak Month		20	22	23	24	25
Annual GA Operations less Touch & Goes		38,500	40,032	41,256	42,552	43,848
Annual Flights		19,250	20,016	20,628	21,276	21,924
Annual Pilots and Passengers		48,125	50,040	51,570	53,190	54,810
Peak Itinerant Operations	Day	87	99	102	105	108
	Hour	9	10	10	11	11
Peak Passengers	Day	109	124	128	131	135
	Hour	11	13	13	14	14
Facility Requirements						
Terminal Building (sft)*		5,000	6,000	7,300	8,600	10,000
Maintenance Space (sft)*		6,000	6,500	7,000	7,500	8,000
Terminal Auto Parking						
Passenger Auto Parking Spaces		48	39	38	42	42
Employee Auto Parking Spaces		--	10	10	10	10
Total Terminal Auto Parking Spaces		48	49	49	52	52
T-hangars (units)		61	82	85	87	89
Conventional Hangars (buildings)		4	10	10	10	11
Apron Area						
Transient (syd)		9,800	10,000	10,000	11,000	11,000
Based (syd)		3,330	600	600	600	900
Other Apron by Conventional Hangars (syd)		4,170	4,000	4,000	4,000	4,000
Total Apron Area		17,300	14,600	14,600	15,600	15,600

**See terminal building discussion that follows*

Source: Aerofinity Analysis, 2002

row in the same direction with space between the wing tips. This allows service vehicles, such as fuel trucks to approach the aircraft and also allows the aircraft to pull in and out under power, whenever possible. Depending upon the apron configuration, a similar parking arrangement may be used for the piston aircraft or they may be parked more closely, "nesting" them by facing them in alternating directions. With its center taxilane, no nesting is used on the current terminal apron.

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 (wingspan 49 feet up to but not including 79 feet) taxilane object free area to provide maneuvering space on the apron. **Exhibit 3L** shows the apron area needed to accommodate some common general aviation aircraft.

EXHIBIT 3L
AIRCRAFT PARKING AREA NEEDS

Aircraft	Wingspan (feet)	Length (feet)	Apron Area* (sq. yards)
Corporate Aircraft			
Gulfstream IV	77.8	88.3	1,758
Canadair 601	64.3	68.4	1,311
Hawker 800	51.4	51.2	949
Lear 55/60	43.8	55.1	827
Citation Bravo	52.2	47.2	941
Piston Aircraft			
Beech Baron	37.8	28.8	605
Cessna 182	35.8	28.1	570

*Includes Group II taxilane object free area
Source: *FAA Advisory Circular 150/5300-13*, Aerofinity, Inc., 2002.

Averaging the corporate aircraft apron size results in approximately 1,220 square yards per aircraft. Averaging the piston aircraft apron size results in approximately 620 square yards per aircraft. Assuming half the aircraft on the apron are corporate and half are piston results in an average of 920 square yards. For planning purposes, this has been rounded to 1,000 square yards per transient aircraft. Tied-down based aircraft are generally single engine aircraft that are parked closer together. The tied-down based aircraft have been allotted 300 square yards per aircraft. Including both transient and based aircraft apron, almost 12,000 square yards of apron area will be needed to accommodate the forecast demand through the planning period. In addition to providing additional apron to support the growth in general aviation, replacement apron for that lost to the Taxiway A object free area should be provided, as the existing apron area is already constrained. Additional apron areas would also be located adjacent to corporate/conventional hangars to serve those hangars.

There are two types of corporate or conventional hangars on the airport: aviation business hangars and corporate aircraft storage hangars. The two types of aviation business hangars on the airport house aircraft maintenance (15,000-square-foot hangar) and avionics services (4,800- square-foot hangar). The corporate aircraft storage hangars are the Egairo hangar, at 4,800 square feet, and the Alligator Air hangar, at 10,000 square feet, the latter being located in AirparkOhio. An additional need for a hangar that could accommodate overnight corporate aircraft has been identified. It

has been assumed that corporate hangars would be used to accommodate forecast growth in turboprop and jet aircraft. Assuming one aircraft per hangar, seven additional corporate hangars may be needed to support the forecast growth in turboprop and jet aircraft over the planning period.

Fueling Facilities

Two 10,000-gallon fuel tanks are used to provide aviation fuel (JetA and 100LL). The size of these tanks should be sufficient through the planning period, as they can accommodate delivery of a full load of fuel by tanker truck. If additional fuel is needed, the frequency of delivery can be increased.

Terminal Building

The existing terminal building is 7,500 square feet, including the three-bay maintenance garage for the City's equipment. Excluding the maintenance bays, the main portion of the terminal building is approximately 5,300 square feet. To identify the future terminal facility needs, the terminal building has been divided into terminal functions and maintenance functions.

Terminal Functions

The main portion of the terminal building houses the following terminal functions:

- Waiting lounge
- Restrooms
- Public phone
- Flight planning
- Pilots lounge/quiet space
- Conference room
- Airport manager's and staff's offices
- Fixed Base Operator (FBO) counter and offices
- Concessions (vending machines)
- Utility rooms
- Storage rooms

The following additional uses have been identified as desirable in the terminal building:

- Expanded airport manager's office space
- Flight training offices/classroom space
- Expanded concessions/kitchenette/restaurant

The FAA advisory circulars provide no clear guidance on the size of a general aviation terminal building. Discussions with the City have identified that while the existing terminal building is serving its intended functions; there is a lack of storage space and expansion potential. The *1992 Master Plan* identified the need for additional storage space for the City and FBO. It also identified the need for an expanded lounge area to accommodate the departure of up to two Sunbird charters with 2 pilots and 15 passengers each. Other terminal buildings at airports accommodating corporate traffic have been reviewed to identify a reasonable terminal building size for planning analysis.

Mansfield Lahm Airport

Mansfield Lahm Airport in Mansfield, Ohio is similar to the Springfield-Beckley Municipal Airport in that it is a general aviation airport with large airfield facilities and home to an Ohio Air National Guard unit. Its primary runway is 9,001 feet by 150 feet and the crosswind runway is 6,795 feet by 150 feet. Their terminal building is two stories with a footprint of approximately 5,000 square feet. The first floor contains a baggage area and counter space, restrooms, janitorial supply space, office, pilots lounge, flight planning and historical information on General Lahm. The second floor contains a

conference room, HVAC room and two offices for the airport management.

Porter County Airport
Porter County Airport in Valparaiso, Indiana, opened a new corporate complex/terminal in 1997. Porter County Airport has a 7,000-foot by 150-foot primary runway and 4,000-foot by 75-foot crosswind runway. Porter County operates the fueling and line service at the airport and maintains the airport. The corporate complex/terminal is a joint hangar, terminal building structure. The hangar is 150 feet by 120 feet with a 28-foot door opening sized to accommodate a Gulfstream V. Adjacent to the hangar is a site prepared to accommodate another matching hangar facility in the future.

The attached office structure is 50 feet by 105 feet with two stories. The first story is 5,250 feet and houses the terminal functions including: business office, counter, manager's office, accounting office, open lobby sized for 15-20 people, conference room, galley area, vending machines, restrooms, pilots lounge and flight planning area. The second level is approximately 4,500 square feet with the balance of the space being an open two-story atrium. This space is used for corporate offices or other aviation-related businesses and is still being built out, with approximately 25% of the space currently leased. The complex as presently furnished cost around $2 million to develop and was financed with a revenue bond, with the revenues from the new complex covering a portion of the bond payments.

For general planning purposes, based on the current terminal building footprint and other facilities serving general aviation, it is reasonable to anticipate that 5,000 to 6,000 square feet will be needed in the short term. Space to accommodate up to a 10,000-square-foot terminal facility for terminal functions should be reserved to allow growth over the planning period. A detailed space utilization plan is recommended before any terminal building improvements or new development is undertaken at the Springfield-Beckley Municipal Airport.

Maintenance Functions

The City of Springfield operates and maintains the airfield. To meet the operational and maintenance needs of the large airfield, the City has numerous pieces of equipment at the airport.

Currently, this equipment is stored in the three-bay garage (approximately 2,200 square feet) adjacent to the terminal building, the storage barn north of SR 794 (1,030 square feet), three t-hangar units, and outdoors. The *1992 Master Plan* identified the need for at least another maintenance facility similar in size to the existing three-bay garage. For planning purposes, it would be ideal for all the equipment to be able to be stored under cover to protect it from the weather, as well as have one bay for maintaining the equipment. This results in the need for 6,000 square feet to accommodate maintenance functions in the short term, with growth up to 8,000 square feet over the long term.

Entrance Road and Auto Parking

Access needs to be provided to the general aviation terminal area via a two-lane roadway from a public road. Currently, access to the general aviation terminal area is provided from SR 792, via a tree-lined drive.

There are 48 parking spaces adjacent to the terminal building. During the inventory process, it was noted that additional public parking is often needed. Using the industry accepted average of 2.5 passengers per general aviation aircraft, auto parking requirements have been estimated based on accommodating 2.5 passengers per peak hour itinerant operations, plus 50% to accommodate autos that may be parked for longer periods of time. In addition, provisions to provide auto parking for up to 10 employees based in the terminal building have been included. This results in providing 50 to 60 auto parking spaces near the terminal building. If a restaurant were added to the terminal building, additional parking would be needed to accommodate off-airport restaurant patrons.

At Springfield-Beckley Municipal Airport, additional parking for up to 19 autos is also provided adjacent to the maintenance hangars and Egairo hangar. The employees and customers of their operations use this parking. Based on the parking near existing corporate hangars, six to 10 spaces should be planned near each future corporate hangar.

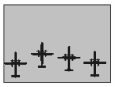
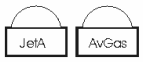
Currently there is no dedicated t-hangar parking. The t-hangar tenants park in or adjacent to their hangars while flying their aircraft. Providing parking facilities for t-hangar tenants and their passengers may be beneficial in the future. This parking can be designed so that control of airside access can be provided if desired, or if required in the future to meet new security requirements that may be imposed. This parking area should be sized to accommodate up to 50% of the based aircraft in the t-hangars. While not all of these aircraft may be in use at any given time, this would provide space for multiple vehicles per aircraft (such as student and instructor or pilot and passengers). Therefore, up to 45 auto parking spaces should be planned to accommodate the t-hangar tenants over the planning period.

Landside Requirements Summary

The Springfield-Beckley Municipal Airport has good general aviation terminal facilities in place. Presently, they are somewhat constrained due to deferred improvements and expansion. The existing general aviation terminal facilities can be improved and expanded to meet the long-term general aviation needs in the present area; however, the OANG has also identified the existing general aviation terminal area as their preferred location to expand. **Exhibit 3M** shows the size of the areas that should be reserved to support general aviation at the Springfield-Beckley Municipal Airport. To efficiently and cost effectively operate the general aviation terminal area with the greatest margin of safety, the facilities need to stay in close proximity to each other. If existing facilities exceed the forecast future facilities, the extra facilities will not be removed. The actual construction of the additional facilities should be based on realized demand.

The alternatives analysis will examine what improvements are needed to stay in the present general aviation terminal area and expand the area to meet the forecast demand. It will also identify the best location for a relocation of the general aviation terminal area and the replacement cost to provide an area equivalent to the existing general aviation terminal area both in terms of facilities and operating efficiency and safety. With this information the City will be able to evaluate and coordinate with the OANG to identify a long-term plan for the general aviation terminal area that is both economically and operationally feasible.

EXHIBIT 3M
LANDSIDE REQUIREMENTS

REQUIREMENTS	EXISTING	FUTURE
Terminal Building 	Terminal Functions 5,300 sft. Maintenance Functions 2,200 sft. (Terminal) 1,020 sft. (Barn) 3 T-hangar Units	Terminal Functions 10,000 sft. Maintenance Functions 8,000 sft.
Auto Parking 	Terminal Parking 48 Spaces	Terminal Parking 52 Spaces
Hangars 	T-Hangars 61 Conventional Hangar 4	T-Hangars 89 Conventional Hangar 11
Apron Area 	Transient 9,800 syds. Based 3,330 syds. Other 4,170 syds.	Transient 11,000 syds. Based 900 syds. Other 4,000 syds.
Fuel Facilities 	JetA (1) 10,000 gal. 100LL (1) 10,000 gal.	JetA (1) 10,000 gal. 100LL (1) 10,000 gal.

Source: Aerofinity, Inc., 2003.