

The facility requirements chapter identified the infrastructure needed to support the long-term forecast demand at the Springfield-Beckley Municipal Airport. The alternatives chapter will review the options available to meet this long-term demand. Since the Ohio Air National Guard (OANG) has identified the existing general aviation terminal area as a preferred location for their expansion needs, in addition to the primary need to accommodate growth in aviation activity, the financial and operational feasibility of relocating the general aviation terminal area will also be examined in this chapter.

While the facility requirements have been based on the aviation forecasts, development alternatives must allow for flexibility to accommodate changing facility requirements during the 20-year planning period. The alternatives analysis for the Springfield-Beckley Municipal Airport is divided into two categories: improvements needed to increase the utility of the airport regardless of the general aviation terminal development plans, and improvements to the general aviation terminal area development and supporting infrastructure. Four areas of analysis are used to address the two categories of improvements.

- Airport location alternatives
- Airport utility alternatives
- General aviation terminal area location alternatives
- Preferred general aviation terminal area location layout alternatives

AIRPORT LOCATION ALTERNATIVES

Federal Aviation Administration (FAA) Advisory Circular 150/5070-6A, Airport Master Plans recommends that two specific alternatives be reviewed for all airports: the “no action” alternative and new airport development.

No Action Alternative

The no action alternative essentially keeps the airport in its present configuration and does not provide for any improvements to existing facilities. In most cases, the no action scenario is not considered prudent. While it maintains the existing infrastructure, it does not allow for any improvements to incorporate new technology or to provide competitive facilities. The no action alternative is not considered viable for the Springfield-Beckley Municipal Airport because the need for some improvements to increase the overall utility of the airport has already been identified in the facility requirements analysis.

New Airport Development

The second alternative suggested for consideration by the FAA is relocating aviation services to a new site or another existing airport. This consideration needs to take into account both the military operations and the general aviation operations at Springfield-Beckley Municipal Airport.

Relocate Aviation Service to New Site

Relocation of a facility such as Springfield-Beckley Municipal Airport is a very complex and expensive alternative. Development of a new airport requires major financial investment and extensive, usually undeveloped, land area. The potential for impacts on wildlife habitat, wetlands, farmland and cultural resources is generally higher than at an existing site with remaining development capacity. A new airport site also duplicates the investment in airport facilities and the access and infrastructure that supports them, requiring the construction of an entirely new airfield; as well as general aviation, military and ground access facilities. Utilities have to be extended to a new site, and the potential for airspace complications is increased by a new airport facility being placed in the area's airspace system.

Virtually the entire cost of new airport development requires financing by taxes and the aviation industry as a whole. It is not fiscally responsible for airport users to be required to pay for a new airport facility in Springfield given the level of development of the current facility. Thus, new airport development is not considered a viable alternative for Springfield-Beckley Municipal Airport.

Since one of the focuses of the master plan process is on how to accommodate both general aviation and military development at the Springfield-Beckley Municipal Airport, the question has been raised whether the general aviation users and military users could be better served at separate facilities.

Relocate Military Operations

The alternative of keeping general aviation at the Springfield-Beckley Municipal Airport and relocating the OANG has been reviewed and found not to be viable. The OANG has invested more than \$62 million into their Springfield base over the last nine years. This investment has been made in part because of the airfield infrastructure as well as the available capacity at the airport. Duplicating this investment at a new facility is not cost-effective when the Springfield-Beckley Municipal Airport meets their operational needs. The OANG flight operations are best served by remaining at the Springfield-Beckley Municipal Airport.

Relocate General Aviation Operations

The alternative of keeping the OANG at Springfield-Beckley and relocating general aviation operations to an existing or new general aviation airport has also been considered and found not to be viable. The general aviation fleet mix at Springfield-Beckley Municipal Airport includes large corporate aircraft such as the Gulfstream IV and V. These aircraft need at least 5,500 feet of runway length and preferably an instrument landing system (ILS) to support their operations. The FAA recommends providing aviation facilities within 30 minutes driving time of the final destination, approximately 25 nautical miles. The Airport Inventory chapter reviewed the existing general aviation airports within 25 nautical miles of Springfield-Beckley Municipal. None of these general aviation airports currently provide the infrastructure to support operations by the large corporate aircraft using the Springfield-Beckley Municipal Airport. The general

aviation airport with the best facilities within 25 nautical miles is Dayton-Wright Brothers and it only has 5,000 feet of runway and a localizer nonprecision instrument approach.

Since none of the existing general aviation airports meet the full demands of the Springfield-Beckley Municipal Airport users, another alternative is for the general aviation operations to be relocated to a new facility. To put the magnitude of developing a new general aviation airport into perspective, costs associated with the development of a new general aviation airport in Bellefontaine, Ohio are summarized here for comparison. This new airport replaces a constrained field that was unable to be upgraded to meet FAA standards. The construction of this new general aviation airport is estimated to cost approximately \$10 million. The resulting airport will have a 5,000-foot by 100-foot runway, parallel taxiway, aircraft parking apron, combined administration building/aircraft maintenance hangar, snow removal equipment storage building, relocated fuel farm, auto parking and 18 t-hangars. There is also a time cost involved with developing a new airport. Most new airports take at least 10 years from initial site selection to work through the master plan, environmental assessment, public input, and land acquisition process before the airport can be constructed and opened to traffic.

The “corporate class airport” being developed in Bellefontaine will **not** provide the same level of facilities available at the Springfield-Beckley Municipal Airport nor will it be able to accommodate all of the corporate aircraft using the Springfield-Beckley Municipal Airport. To provide airfield

facilities with one runway of at least 5,500 feet (preferable 6,500 feet), a precision approach, parallel taxiway to meet the needs of all the large corporate users, a terminal building, maintenance facilities, FBO facilities, avionics shop, Egairo hangar, Alligator Air hangar, 61 t-hangars, and transient and local apron space is likely to cost approximately triple the initial development of Bellefontaine or about \$30 million. Thus, given the current level of development at the Springfield-Beckley Municipal Airport, it is not fiscally responsible to develop a separate aviation facility in the Springfield area to serve only general aviation.

Airport Location Summary

Since it is neither fiscally responsible nor prudent to develop relocate either the general aviation facilities or the OANG to a new site, other development alternatives will be considered to meet the long-term needs of both general aviation and the OANG at the Springfield-Beckley Municipal Airport.

AIRPORT UTILITY ALTERNATIVES

The issue of whether or not the general aviation terminal area should remain in its existing location is a primary consideration for the long-term development at the Springfield-Beckley Municipal Airport. There are, however, a number of incremental airfield improvements that will increase the utility of the airport regardless of the preferred alternative for the general aviation terminal area. The utility or efficiency alternatives examined in this section relate to the airfield facilities comprised of runways, taxiways, navigational aids, and marking and lighting.

Runways

To maximize the margin of safety of the Springfield-Beckley Municipal Airport runway system two improvements have been identified:

- Work with OANG to minimize impact of arresting barrier systems of Runway 6-24 Runway Safety Area (RSA).
- Remove crops from, regrade, and seed Runway 15 and 33 RSAs beyond the ends of the runway.

Both Runway 6-24 and Runway 15-33 provide adequate runway length to serve their respective users. The Facility Requirements chapter identified that the only shortcomings of the runway environments are meeting FAA's RSA standards on Runway 6-24 and Runway 15-33. The City, in cooperation with the OANG, has completed several projects to upgrade the Runway 6-24 RSA to FAA standards. The only Runway 6-24 RSA shortcoming that has not yet been addressed is minimizing the impact of the arresting barrier systems.

As identified in the previous chapter, the greatest difference in the arresting barrier systems from the FAA standards for joint use airports appears to be the slopes on the concrete deck sheave and the numerous objects above the engine pit. While the arresting barrier system is considered fixed by function due to military need, the OANG is conducting a study of potential improvements to these systems. The City should coordinate with the OANG to establish a construction schedule for feasible improvements to the arresting barrier system.

The primary shortcoming in the Runway 15-33 RSA appears to be the close proximity of crops beyond both ends of the runway. Crops should be eliminated from all RSA areas, as well as Runway Object Free Areas (ROFAs). These areas should then be graded to FAA RSA standards and seeded to be able to support an aircraft in the event of an overrun. As a part of this grading and seeding, the small portion of the abandoned haul road remaining in the Runway 33 RSA should be eliminated.

Taxiways

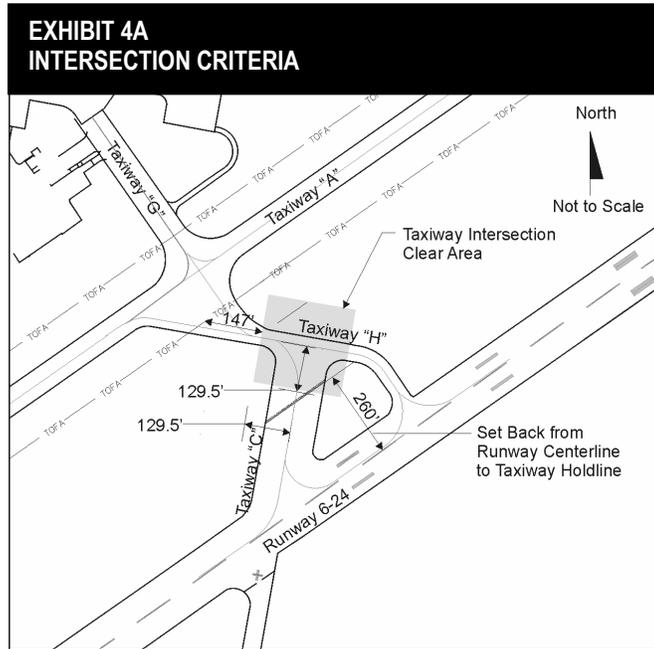
Given the improvements to Taxiway A, there is only one recommended taxiway improvement alternative:

- Simplify the Taxiway C/H intersection with Runway 6-24.

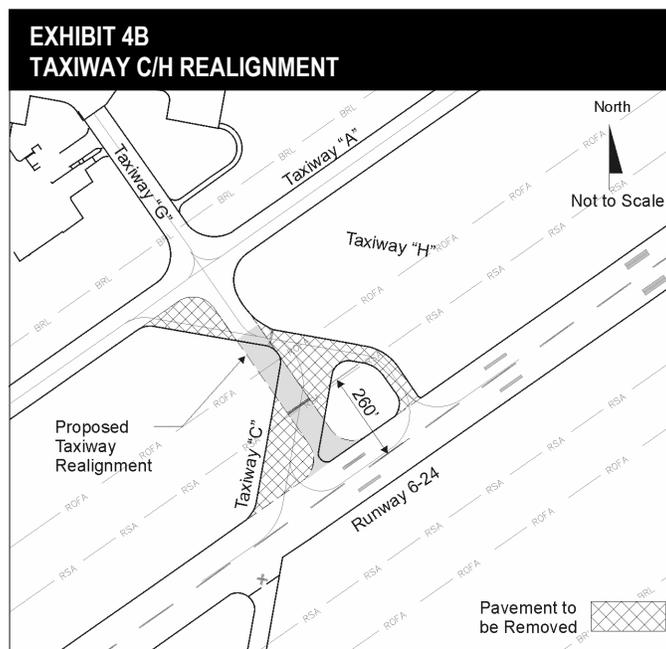
The existing holdline on Taxiway C/H is located on Taxiway H before its intersection with Taxiway C. A concern has been expressed that if a large aircraft is holding on Taxiway H, it could interfere with taxiing on Taxiway A. *FAA Advisory Circular 150/5340-1H, Standards for Airport Markings*, details the holdline requirements for runway-to-taxiway intersections and taxiway-to-taxiway intersections. On Runway 6-24 the taxiway holdline is located 260 feet from the runway centerline. For taxiways serving ARC D-IV aircraft, the taxiway-to-taxiway holdline is 129.5 feet from the centerline of crossing taxiway. There is not enough space for a holdline on Taxiway C to meet both the runway centerline to taxiway centerline requirements and taxiway-to-taxiway intersection requirements. The existing holdline on Taxiway H

is the closest allowable location. As shown on **Exhibit 4A**, an aircraft up to 147 feet long should be able to hold on Taxiway H without interfering with taxiing movements on Taxiway A.

Since relocating the Taxiway C/H holdline is not feasible, another alternative is to reconstruct this runway intersection so that the connector is a continuation of Taxiway G, as shown in **Exhibit 4B**.



Source: FAA Advisory Circular 150/15240-1H, Standards for Airport Markings.



Source: Aerofinity, Inc., 2004.

This alternative would eliminate the taxiway/taxiway intersection and simplify the runway/taxiway intersection, which should increase the margin of safety. In addition, if development is ever located on the south side of Runway 6-24, this taxiway could be extended to provide cross-field access.

Navigational Aids

Navigational aids (navaids) increase the utility of the Springfield-Beckley Municipal Airport by providing aircraft the ability to access the airfield in poor weather conditions. The precision Instrument Landing System (ILS) provides good approach capability to the airport. It is complemented by a nonprecision VOR (very high frequency omnirange) to Runway 6.

While this provides good access to the primary runway, the crosswind runway is served only by visual approaches, which include the circling maneuvers off the approaches to Runway 6 and 24. The anticipated availability of low-cost Global Positioning System (GPS) should provide up to precision approach capability. This section will review navaid enhancements that are reasonable to plan for at the Springfield-Beckley Municipal Airport.

Runway 24

To protect and maximize the utility of the precision approach to Runway 24, the following improvements are recommended:

- Monitor the State's plans for SR 794 for an opportunity to remove its penetration to the Runway 24 precision approach surface.
- Work with the landowner within the Runway 24 aviation easement area to remove the tree obstruction.

- Acquire more of the Runway 24 RPZ in fee as opportunity and funding allow.

Runway 6-24 presently has a precision ILS approach to Runway 24 with minimums of ½ mile visibility and 250-foot ceiling. A precision approach provides both horizontal and vertical guidance that allows for lower approach minimums. The lowest minimums for a Category I ILS with approach lights are ½ mile visibility and 200-foot ceiling. The Obstruction Chart (OC), published by the U.S. National Oceanic and Atmospheric Administration (NOAA) for airports with a precision approach, identifies trees and SR 794 located off the end of Runway 24 as obstructions. The presence of these obstructions requires increased ceiling minimums of 250-feet.

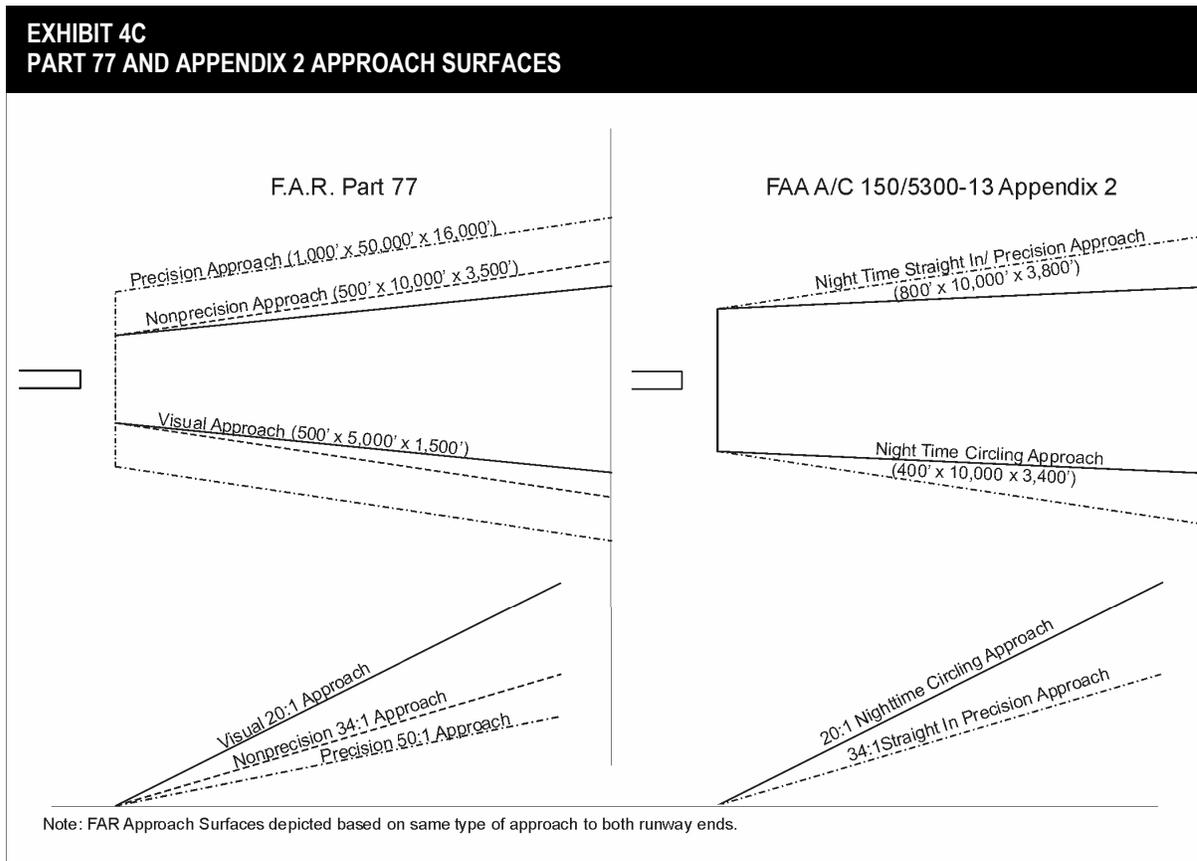
Field surveys of the runway approaches have been conducted as a part of the master plan process. Three sets of regulations/guidelines govern the approach surfaces.

- *Federal Aviation Regulations (FAR) Part 77* determines what is an obstruction.
- *U.S. Terminal Instrument Procedures (TERPS)* governs the clearance required for the establishment of an instrument approach.
- *FAA Advisory Circular 150/5300-13, Appendix 2* establishes the clearance for runway threshold siting.

Providing a clear FAR Part 77 approach slope is ideal; however, the FAA recognizes that there are locations where it is not feasible to relocate or remove certain obstructions but safe approaches can still be maintained. *FAA Advisory Circular 150/5300-13, Airport Design, Appendix 2*, specifies alternate approach surfaces that must be clear.

These Appendix 2 surfaces are generally based on the TERPS standards used to establish an instrument approach. **Exhibit 4C** depicts plan and profile view of applicable FAR Part 77 and Appendix 2 surfaces. The Runway 24 survey verified that a portion of SR 794 penetrates the

50:1 (50 feet horizontally for each 1 foot vertically) FAR Part 77 approach slope. When evaluating a non-interstate roadway FAR Part 77 requires that 15 feet be added to the roadway elevation to represent the height of a truck on the road.



Source: Federal Aviation Regulations (FAR) Part 77, FAA Advisory Circular 150/5300-13, Airport Design.

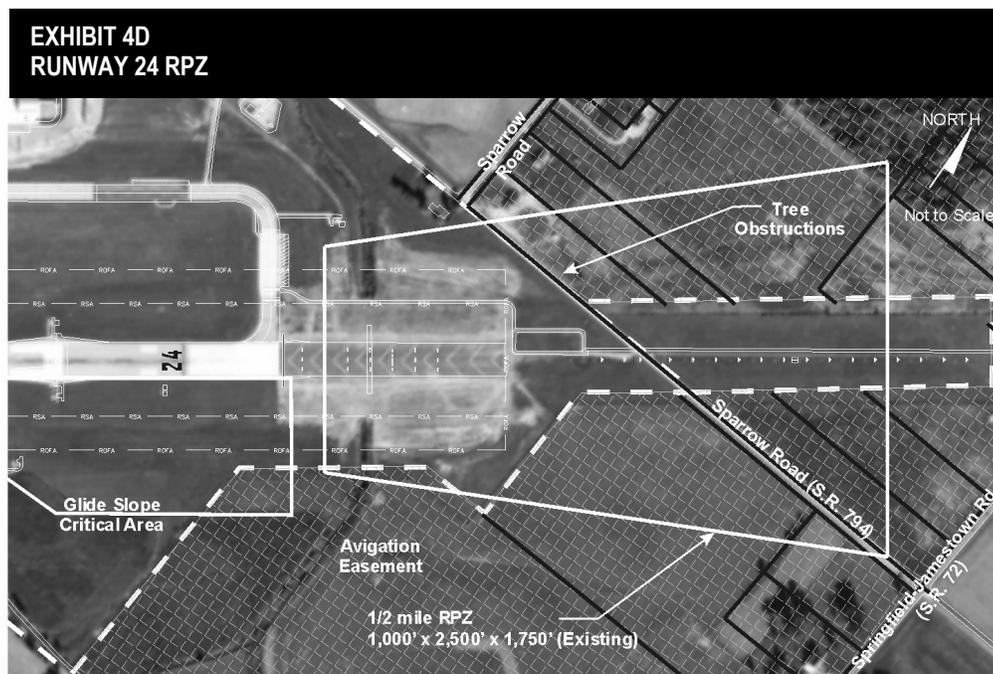
The Appendix 2 surface for a precision approach uses a 34:1 slope (34 feet horizontally for each 1 foot vertically). SR 794 is clear of the required Appendix 2 surface. SR 794 would need to be lowered to obtain the lowest minimum for the ILS approach. It is recommended that if SR 794 is being rehabilitated or otherwise modified in the future, the City should work with the State to ensure the approach penetration of the roadway is not increased and, preferably, eliminated.

The other obstruction identified in the Runway 24 approach is a tree that penetrates both the FAR Part 77 50:1 and Appendix 2 34:1 approach slopes. The tree obstruction is across SR 794 from the airport, but within the aviation easement area, as shown on **Exhibit 4D**. It is recommended that the

City work with the owner of the property to remove the tree obstruction.

In addition to the FAR Part 77 and Appendix 2 approach surfaces, the Runway Protection Zone (RPZ) for Runway 24 has been reviewed. The RPZ is an area off the runway end that enhances the protection of people and property on the ground.

FAA Policy and Procedures Memorandum 5300.1B, Runway Protection Zone and Airport Object Clearing Policy states: "Airport owner control over Runway Protection Zones will enhance the protection of people and property on the ground. Such control includes clearing the Runway Protection Zone area (and maintaining them clear) of incompatible objects and activities."



Source: 1991 Springfield-Beckley Municipal Airport Layout Plan; FAA Advisory Circular 150/15300-13, Airport Design; Aerofinity, Inc., 2003.

Incompatible land uses include, but are not limited to, uses which might create glare and misleading lights, residences, fuel handling and storage facilities, smoke generating activities, places of public assembly (i.e., churches, schools, hospitals, office buildings, shopping centers, stadiums, recreational facilities etc.), waste disposal sites (i.e., open dumps, landfills, composting, sludge disposal, effluent spraying, waste water treatment lagoons, etc.), storm water retention or detention basins, creation of wetlands, uses which might impede visual and electronic navigaids, and uses that attract wildlife.

Airport owners should control the property within all Runway Protection Zones. The sponsor must have property interest satisfactory to the FAA in the required Runway Protection Zones for the primary runway and any secondary runway if that runway is involved in a grant project. Runway Protection Zone areas without proper control should be included in a project for acquisition of the necessary property interest. In the event acquisition of the Runway Protection Zones is not feasible, the FAA must approve a satisfactory plan for Runway Protection Zone control. This plan should be based on analysis of alternative airport configurations (which may include site evaluations), environmental considerations, cost of fee acquisition and legal constraints. The analysis should identify current Runway Protection Zone activities and contain a financial comparison of continued present use to potential reuse of the land. The Airport Layout Plan (ALP) is the required vehicle for documenting the sponsor's property acquisition plan for implementing the FAA Runway Protection Zone policy. The sponsor's intentions, including acquisition timing and the ability to acquire, control, and clear each Runway Protection

Zone must be clearly reflected in the ALP report/Master Plan report or on the ALP.

Springfield-Beckley Municipal Airport does not own all of the Runway 24 RPZ in fee, as shown on **Exhibit 4D**. While there is an avigation easement for the balance of the RPZ not owned by the airport, it appears this easement does not preclude the development of incompatible uses. Homes have been developed on property under the easement, but outside the actual RPZ. As opportunity and funding allows, it is recommended that the City purchase or otherwise control the property within the RPZ to provide additional protection for the airport.

Runway 6

To protect and increase the utility of Runway 6, the following improvements are recommended:

- Work with Runway 6 avigation easement property owner(s) to remove existing tree obstructions.
- Preserve space to support a GPS-based precision approach with $\frac{3}{4}$ mile visibility to Runway 6, if found compatible with regional airspace.
- Complete property interest in RPZ on north side of Jackson Road.
- Acquire more of the Runway 6 RPZ in fee as opportunity and funding allow.

Runway 6 presently has a nonprecision approach with minimums of 428-foot ceiling and 1-mile visibility. Since a nonprecision approach only provides horizontal guidance, its minimums are higher than a precision approach. With the advances in GPS technology that are anticipated to allow for low-cost precision approaches, the

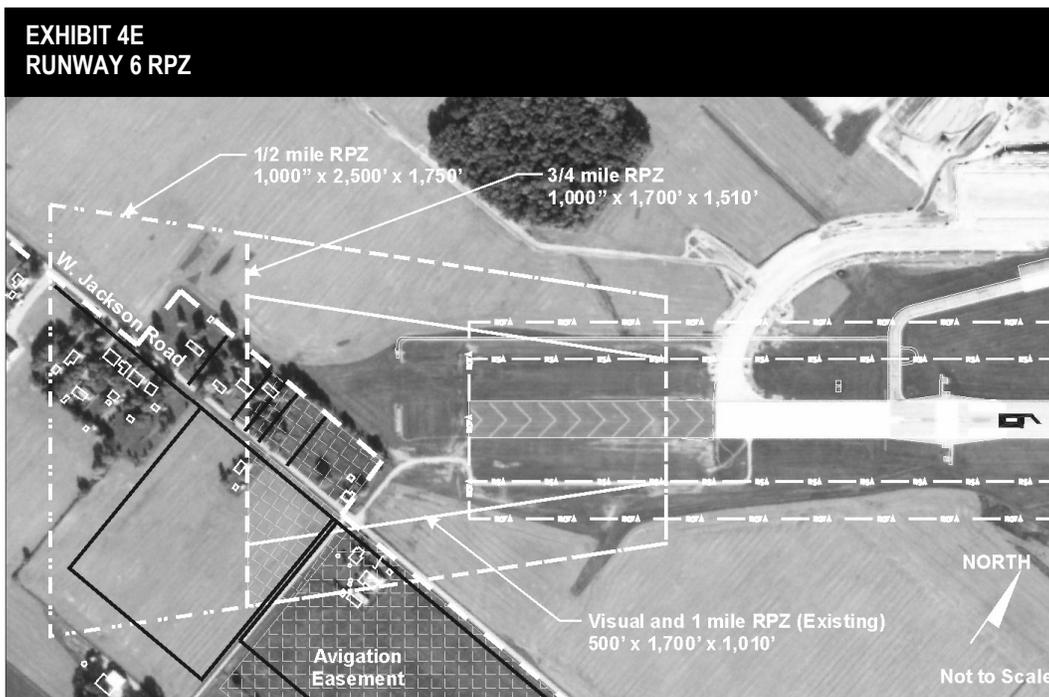
potential to support a precision approach to Runway 6 has been examined. When considering an improved approach, three criteria need to be examined:

- Clear areas around the runway
- Runway protection zone off the end of the runway
- Approach surface

Since Runway 24 already supports a precision approach, the appropriate clear areas for a precision approach already exist around Runway 6-24. Changing from an approach with 1-mile visibility to one with either $\frac{3}{4}$ -mile or $\frac{1}{2}$ -mile visibility increases the size of the RPZ, as shown in **Exhibit 4E**. To obtain $\frac{1}{2}$ -mile visibility for a precision approach, a Medium Intensity Approach Lighting

System with Runway Alignment Indicator Lights (MALSR) must be installed. Without this approach lighting system the best visibility minimums for a precision approach are $\frac{3}{4}$ -mile.

Upgrading from the existing nonprecision approach to a precision approach with $\frac{3}{4}$ -mile visibility keeps the RPZ over airport owned property or within an existing aviation easement, with one small exception on the north side of Jackson Road for both the existing and $\frac{3}{4}$ -mile RPZ. The area in which the airport currently does not have property interest is one of the areas identified in the 1992 *Master Plan* for airport acquisition. This area contains four homes, two of which are within the existing RPZ. One additional home, within the easement area on the south side of Jackson Road is not within the existing RPZ, but would be within the $\frac{3}{4}$ -mile RPZ.



Source: 1991 Springfield-Beckley Municipal Airport Layout Plan; FAA Advisory Circular 150/15300-13, Airport Design; Aerofinity, Inc., 2003.

Reducing the visibility minimums to less than $\frac{3}{4}$ -mile with the installation of a precision approach and MALSR increases the RPZ size by 30 acres, of which 20 acres is outside existing airport property and not protected by an existing aviation easement. In addition, within this area are six homes that are considered incompatible development in a RPZ. To minimize increasing the incompatible development within the RPZ, it is recommended that any approach to Runway 6 be limited to $\frac{3}{4}$ -mile visibility. However, as opportunity and funding allow, it is recommended that the City purchase or otherwise control the property within the RPZ to provide additional protection for the airport.

In addition to the runway environment being able to support a precision approach, the regional airspace also needs to be able to support an additional precision approach. Coordination through the FAA will be needed to identify whether the regional airspace could support a precision approach to Runway 6 without impacts on surrounding airports.

The alternatives analysis of the *1992 Master Plan* report also recommended preserving the airspace for a precision approach to Runway 6; however, this recommendation was not included on the associated Airport Layout Plan.

The obstruction survey for Runway 6 identified that four trees currently penetrate the FAR Part 77 34:1 nonprecision approach slope. The trees are clear of the required Appendix 2 20:1 (20 feet horizontally for each 1 foot vertically) approach slope. Two of these trees are located on airport property and should be cleared immediately. Two of these trees are located within the aviation

easement area, and the City should work with the property owner to trim or remove the trees.

Nine tree obstructions identified by the approach survey would need to be removed to establish a precision approach. Six of the trees are located within airport property and could be removed. The two trees within the aviation easement area are the same trees that penetrate the nonprecision approach that should be removed in the near future. The other tree is within the RPZ area identified for acquisition. Acquisition of this area or coordination with the property owner should allow for its removal.

Runway 33

To protect and increase the utility of Runway 33, the following improvements are recommended:

- Continue to pursue near-term nonprecision approach and work with the Runway 33 aviation easement property owners to remove the tree obstructions when established.
- Preserve space to support a GPS-based precision approach with $\frac{3}{4}$ -mile visibility, if found compatible with regional airspace.
- Acquire more of Runway 33 RPZ in fee as opportunity and funding allow.

The establishment of a nonprecision approach to Runway 33 was one of the *1992 Master Plan* recommendations and the airport has requested it from the FAA. For an ARC C-II runway serving aircraft that weigh more than 12,500 pounds, as Runway 15-33 serves, the clear areas required around the runway remain the same size for a visual or nonprecision approach. Also, the RPZ size remains the same for visual and nonprecision approaches with not lower than 1-mile visibility.

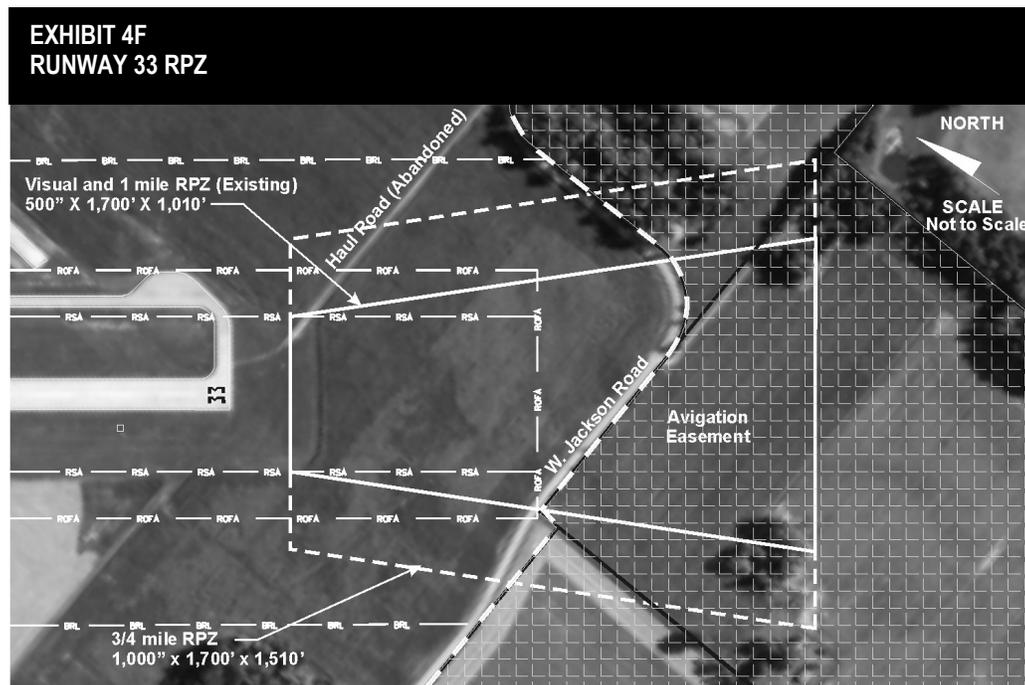
The primary difference between visual and nonprecision approaches is in the FAR Part 77 approach slope. It changes from 20:1 for a visual approach to 34:1 for a nonprecision approach. The Runway 33 approach survey did not identify any obstructions to the existing FAR Part 77 20:1 visual or Appendix 2 approach surface, which is more restrictive in some areas than the FAR Part 77 surface because the runway supports nighttime circling approaches.

For a nonprecision approach, the approach survey identified four tree obstructions to the Part 77 approach surface, one of which is also an obstruction to the nonprecision Appendix 2 approach surface. All of the tree obstructions are located south of Jackson Road off airport property, but they are within the aviation easement area. If a nonprecision approach is approved for Runway 33, the City will need to work with the property owners to remove at least the Appendix 2 tree obstructions.

In addition to the requested nonprecision approach, with anticipated GPS based low-cost precision approaches, the potential to support a precision approach on Runway 33 has been examined. When upgrading from a visual or nonprecision

approach to a precision approach, there is a change in the clear areas around the runway. FAR Part 77 specifies a primary surface, centered on the runway centerline that should be at or below the elevation of the runway centerline. For a visual or nonprecision approach on Runway 33, the primary surface is 500 feet wide centered on the runway centerline. For a precision approach this increases to 1,000 feet wide. There is sufficient clear area around Runway 15-33 to support the primary surface for a precision approach. Another standard for clear areas is the required setback from the runway centerline to taxiways and aprons. With the location of Taxiway E, 300-foot runway centerline to taxiway centerline separation, Runway 15-33 can support a precision approach, but limited to not lower than $\frac{3}{4}$ -mile visibility. Therefore, any consideration of an approach to the crosswind runway should be limited to not lower than $\frac{3}{4}$ -mile visibility.

There is an increase in the size of the RPZ when changing from a visual or nonprecision approach with 1-mile visibility, to an approach with $\frac{3}{4}$ -mile visibility, as shown in **Exhibit 4F**. While the RPZ increases in size, it remains within an existing aviation easement for Runway 33.



Source: 1991 Springfield-Beckley Municipal Airport Layout Plan; FAA Advisory Circular 150/15300-13, Airport Design; Aerofinity, Inc., 2003.

There is also a change in the approach slope. For a precision approach the FAR Part 77 approach slope is 50:1 and required Appendix 2 approach slope is 34:1. Both of these surfaces contain numerous trees that would need to be cleared to support a precision approach. It is recommended that, if compatible with the surrounding airspace, the airport should preserve the airspace to support a GPS-based precision approach to Runway 33 in the future. While the airport appears to have at least the minimum RPZ protection through its avigation easement, it should be recognized that obstruction removal would be needed for the establishment of the approach. Also, as opportunity and funding allows, it is recommended that the City purchase or otherwise control the property within the RPZ to provide additional protection for the airport.

Runway 15

To protect and increase the utility of Runway 15, the following improvements are recommended:

- Acquire property interest, fee-simple where feasible, for off-airport RPZ.
- Preserve space to support nonprecision approach with 1-mile visibility, if found compatible with regional airspace.

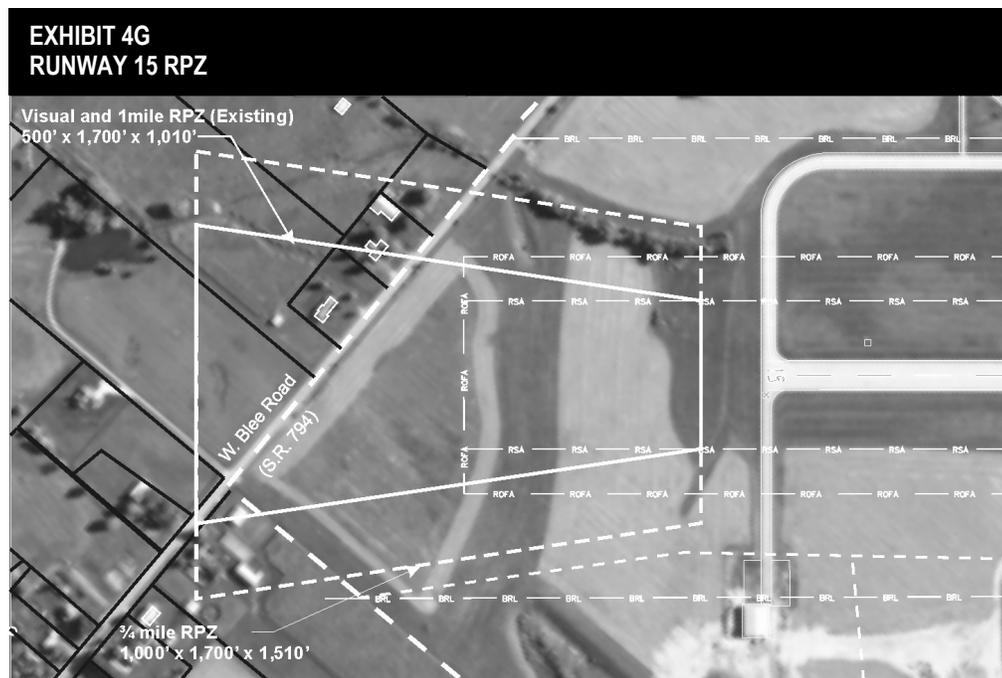
If a nonprecision approach is established to Runway 33, the airport also intends to request a nonprecision approach to Runway 15, as recommended in the 1992 Master Plan. As with Runway 33, the clear areas required around the runway remain the same for a visual or nonprecision approach. Also, the RPZ size remains the same for visual and nonprecision approaches with not lower than 1-mile visibility.

However, as shown in **Exhibit 4G**, the airport does not have any property interest in the existing Runway 15 RPZ that extends off airport property and there are two homes within the existing RPZ. The airport should acquire at least an aviation easement over the off-airport RPZ area, preferably a fee simple interest with removal of the incompatible structures.

The primary change from a visual to nonprecision approach is in the FAR Part 77 approach slope that increases from 20:1 for a visual approach to 34:1 for a nonprecision approach. The Runway 15 approach survey identified one tree obstruction to the existing FAR Part 77 visual approach surface that was clear of the existing Appendix 2 approach

surface. This tree is located within airport property and should be removed. For a nonprecision approach, the approach survey identified that there would be two tree obstructions that would need to be removed, the one on airport property identified for the existing approach and one across State Road 794. This tree removal should be included in the acquisition of property interest in the off-airport RPZ area.

The capability to support a precision approach on Runway 15 has also been examined. As discussed above for Runway 33, Runway 15-33 has the necessary clear areas around the runway to support a precision approach with not lower than $\frac{3}{4}$ -mile visibility.



Source: 1991 Springfield-Beckley Municipal Airport Layout Plan; FAA Advisory Circular 150/15300-13, Airport Design; Aerofinity, Inc., 2003.

There is, however, an increase in the size of the RPZ when changing from a visual or nonprecision approach with 1-mile visibility to an approach with $\frac{3}{4}$ -mile visibility, as shown in **Exhibit 4G**. Increasing the size of the RPZ would add one additional home to the RPZ that is defined as incompatible development in the RPZ. There is also a change in the approach slope. For a precision approach the FAR Part 77 approach slope is 50:1 and the required Appendix 2 approach slope is 34:1. Numerous trees as well as a utility poles and TV antenna would need to be cleared to support the more restrictive precision approach surfaces. In addition, the extended FAR Part 77 precision approach surface for Runway 15 would overlap with the extended FAR Part 77 precision approach surface for Wright-Patterson Air Force Base, which is likely to be viewed by the FAA as incompatible use of airspace.

To minimize the existing incompatible development within the RPZ and be more compatible with the surrounding airspace, it is recommended that space be preserved to support only a nonprecision approach to Runway 15 with 1-mile visibility. Technological advances may still allow for an improved nonprecision approach. In *FAA Advisory Circular 150/5300-13, Airport Design, Appendix 16*, the FAA has established standards for an Approach Procedure with Vertical Guidance (APV). A nonprecision APV could provide minimums as low as a 350-foot ceiling and 1-mile visibility without approach lights. An APV approach is anticipated to be provided by GPS technology and allow for both vertical guidance and horizontal guidance.

Marking and Lighting

The only marking or lighting improvement recommended is to upgrade the markings on Runway 15-33 to meet the requirements of any nonprecision or precision approach(es) when established to the runway.

Runway 6-24

FAA funding was received to rehabilitate the high intensity runway lighting system (HIRLs) on Runway 6-24 in 2005. When this is complete, this lighting system should be adequate through the planning period.

Runway 6-24 is marked with precision approach markings on both ends of the runway. Therefore, no changes to the markings will be necessary to support a precision approach on Runway 6. Periodic maintenance of the markings will be needed to keep them in good condition.

Runway 15-33

Runway 15-33 is served with medium intensity runway lights (MIRLs). A new lighting system was installed when the runway was rehabilitated and its width reduced in 1994/1995. Runway lighting systems typically have about a 20-year life expectancy and rehabilitation may be required near the end of the 20-year planning period. MIRLs are required for a nonprecision approach and are also acceptable for a precision approach. The existing MIRLs, with four lights on each side of the runway end, meet the requirements to support a nonprecision or precision approach.

Runway 15-33 has only basic markings. The establishment of a nonprecision or precision approach will require an associated upgrade in runway markings for at least that end of the runway.

Taxiways

Overall the taxiway lighting systems on the airport are older and require a high level of on-going repair. It is anticipated that the taxiway lighting systems will need to be rehabilitated within the planning period.

Airport Utility Alternatives Summary

A number of airport utility alternatives have been reviewed, and some have been identified for implementation to increase the utility of the airfield regardless of the long-term general aviation terminal area development. In summary the recommended improvements include:

- Work with OANG to minimize impact of arresting barrier systems on Runway 6-24 RSA.
- Remove crops from, grade, and seed Runway 15 and 33 RSAs beyond the ends of the runway.
- Modify Taxiway C/H intersection to provide perpendicular connector to Runway 6-24 as a continuation of Taxiway G.
- Monitor SR 794 plans for opportunity to remove its penetration from Runway 24 precision approach surface. Work with easement property owner to remove tree obstruction. Acquire more of Runway 24 RPZ in fee as opportunity and funding allow.
- Preserve space to support a GPS-based precision approach with ¾-mile visibility to Runway 6 if found compatible with surrounding airspace. Complete property interest in Runway 6 RPZ north of Jackson Road. Acquire more of Runway 6 RPZ in fee as opportunity and funding allow.
- Continue to pursue near-term establishment of nonprecision approach to Runway 33. Preserve space to support GPS-based precision approach with ¾ mile visibility to Runway 33 if found compatible with surrounding airspace. Upgrade runway markings to meet requirements of the type of new approach established. Acquire more of Runway 33 RPZ in fee as opportunity and funding allow.
- Preserve space to support nonprecision approach to Runway 15 with 1-mile visibility if found compatible with surrounding airspace. Upgrade runway markings to meet requirements of the type of new approach established. Acquire property interest, fee-simple where feasible, for off-airport Runway 15 RPZ area.
- Rehabilitation of taxiway lighting systems to reduce on-going repair demands.

**GENERAL AVIATION TERMINAL
AREA LOCATION ALTERNATIVES**

The Springfield-Beckley Municipal Airport offers good general aviation terminal area facilities, with undeveloped land within the existing terminal area. However, the OANG has also identified the general aviation terminal area as the preferred location to expand their facilities. The OANG interest in the terminal area stems from the need for additional expansion area and the need to clear their force protection zone (area around the OANG base that should be clear of publicly accessible spaces and right-of-ways to allow the base to be defended.) With the dual interest in the existing general aviation terminal area, the City has deferred further development of terminal facilities until compatible long-term development plans can be established for the City and OANG.

To allow the City to assess the financial and operational feasibility of relocating the general aviation terminal area, this alternatives analysis identifies viable locations on the airport to support a general aviation terminal area. Constraints and controls within the viable areas, potential layouts for viable locations, and preliminary estimates of development costs to provide facilities equivalent to the existing terminal area are evaluated.

**Replacement OANG Airport
Traffic Control Tower**

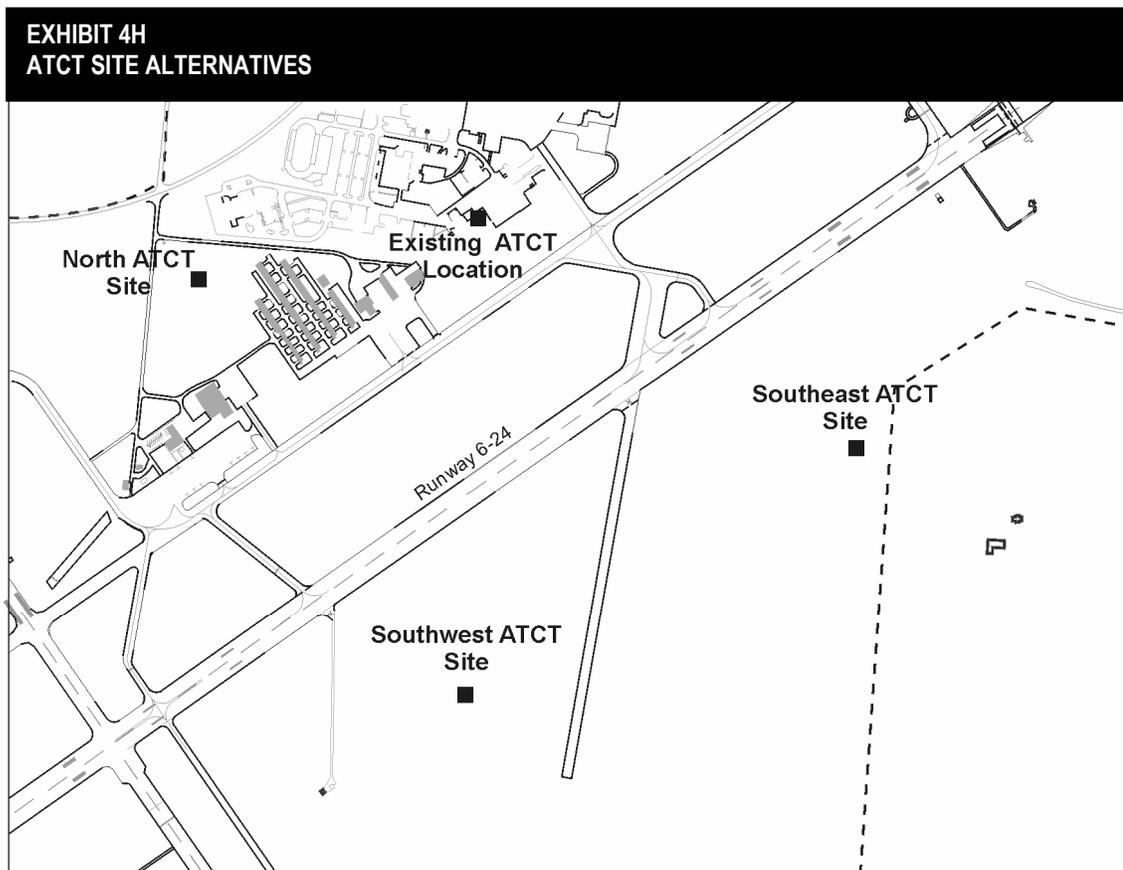
An important factor that affects the areas available for general aviation terminal facilities is a clear line-of-sight view from the Airport Traffic Control Tower (ATCT) of the airfield movement areas. The Springfield-Beckley Municipal Airport has an operating ATCT that is owned and operated by the OANG. Controllers in the ATCT need to be able to see all areas of the airport for which air traffic control services are provided. These areas are classified as “movement areas,” and encompass the runways and parallel taxiway systems including their associated safety areas. Taxilanes, apron areas and hangar areas are considered “nonmovement areas,” meaning aircraft movement in these areas is not provided with air traffic control services. Before an aircraft leaves a nonmovement area, it must contact air traffic control and receive taxiing instructions.

The existing ATCT has an obscured line-of-sight to a portion of Taxiway F caused by Maintenance Hangar #2, which has existed for more than 30 years. This obscured line-of-sight is referred to as a shadow by the FAA. An FAA modification to design standards has been provided for the Maintenance Hangar #2 shadow on Taxiway F.

Due to a lack of space to accommodate equipment modernization, the OANG proposed replacing the existing ATCT at another location on the airport as one of their development projects. To assess the potential impact of the ATCT on the viable areas available for general aviation development, three potential ATCT locations were evaluated, as shown on **Exhibit 4H**. These locations, which

were also reviewed in the OANG's ATCT siting process, are:

- Existing ATCT site
- North of existing t-hangars (preferred site from *June 20, 2001, Statement of Intent for Proposed Construction of New Control Tower at Springfield ANGB, Ohio.*)
- South of Runway 6-24



Source: *Statement of Intent for Proposed Construction of New Control Tower at Springfield ANGB, Ohio, June 20, 2004, OANG; Aerofinity, Inc., 2004.*

A new ATCT would need to have a clear line-of-sight to all controlled airfield movement areas. As part of the evaluation of potential ATCT locations, the potential to relocate Taxiway F closer to Runway 15-33 is also studied. Taxiways E and F serve as the parallel taxiway system for Runway 15-33. Taxiway E is 300 feet runway centerline to taxiway centerline and Taxiway F is 725 feet runway centerline to taxiway centerline from Runway 15-33. Relocating Taxiway F to align with Taxiway E, with 300 feet runway centerline to taxiway centerline separation, would open additional development area in the existing terminal area. As such, the potential benefits of relocating Taxiway F from its existing 725 feet runway centerline to taxiway centerline separation to the minimum allowable 300-foot separation have also been examined for each of the potential ATCT locations.

Appendix F contains an analysis of the ATCT line-of-sight issues for the potential ATCT locations. From this analysis, four key findings were identified and have been incorporated into the review of potential general aviation terminal area locations.

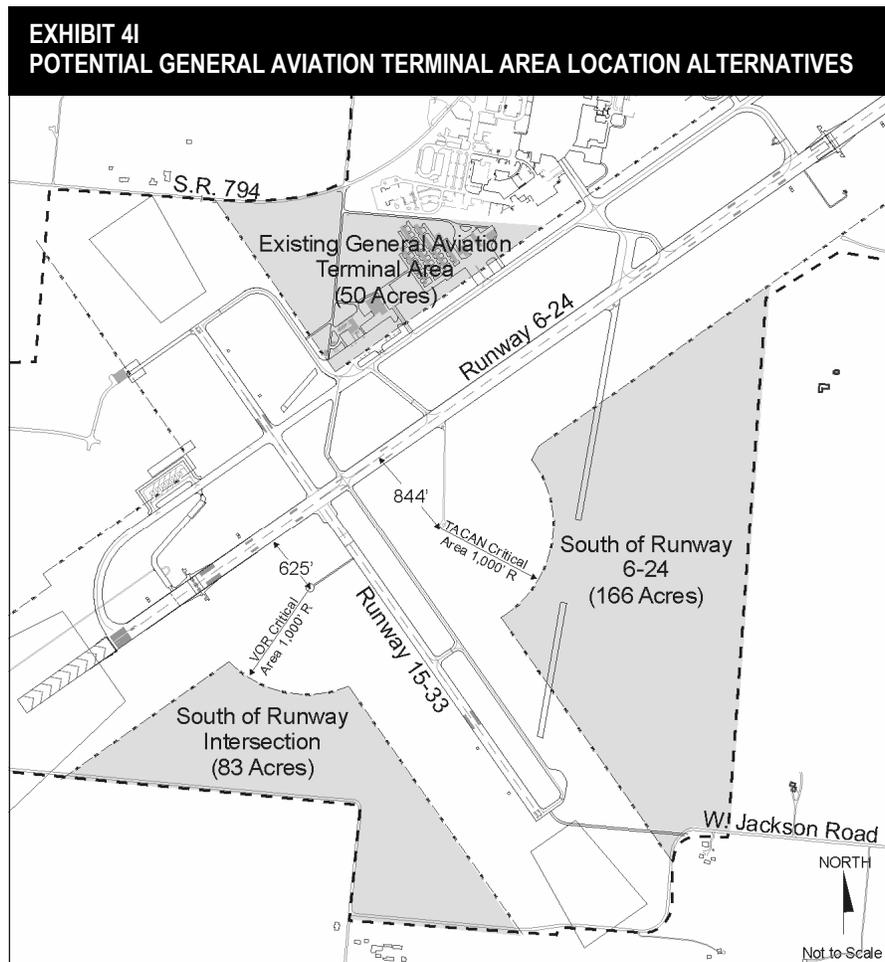
- A replacement ATCT is needed to allow additional substantial development in the existing terminal area. With a replacement ATCT, relocating Taxiway F should also be included in any further development in the existing terminal area to maximize the developable area.
- A north replacement ATCT would provide reasonable allowable heights within the existing terminal area providing it has at least a 100-foot eye height and Taxiway F is relocated. However, it would essentially necessitate the development of a replacement transient apron.
- Any replacement ATCT on the south side of Runway 6-24 should be located near the runway intersection to maximize the available development area on both the north and south side of Runway 6-24.
- The development of general aviation facilities on the south side of Runway 6-24 could be compatible with the existing ATCT, a north replacement ATCT, or a southwest replacement ATCT.

Potential General Aviation Terminal Area Locations

Three alternatives on the airport have been examined as potential locations for a general aviation terminal area, as shown on **Exhibit 4I**:

- Existing general aviation terminal area
- Area south of the runway intersection
- Area south of Runway 6-24

These three areas have been evaluated in two levels of review. The first level is viability. The second level, for those meeting the viability review, is financial feasibility.



Source: 1991 Springfield-Beckley Municipal Airport Layout Plan; Aerofinity, Inc., 2004.

General Aviation Terminal Area Location Viability Review

A list of required and desirable attributes for a general aviation terminal area has been compiled to assess the viability of the three potential terminal areas.

Required

- All terminal facilities together in one location
- Taxiway access to Runway 24 without back-taxiing or crossing a runway
- Good road access

Desired

- Midfield location
- Adjacent to Runway 6-24
- Convenient access to taxiway system
- Minimize drive time to Springfield
- Minimize capital costs
- Space for additional development beyond planning period.

The required attributes will maintain the same level of operational safety and efficiency as provided by the existing terminal area. All of the general aviation facilities need to remain in close proximity for safe and economical operations. This allows the fixed base operator (FBO) to service all the general aviation users and minimizes the need for service vehicles, such as fuel trucks, to operate on or cross runways and taxiways. With the prevailing winds at Springfield-Beckley Municipal Airport, Runway 24 is used approximately 80% of the time. To maintain at least the same margin of safety as the existing terminal area, plans should be developed to assure no need for back-taxi on the runways or for crossing Runway 6-24 to reach the end of Runway 24.

These desirable attributes allow the general aviation area to have good visibility on the airport, particularly from the primary runway, providing ease of use to pilots unfamiliar with the field. There should also be a good interface between the airfield and surface transportation system to allow arriving passengers swift and easy access into Springfield. The airport is just one of the many infrastructure needs of the City. Minimizing capital costs makes development more feasible. Finally, it is desirable for the general aviation terminal area to have the potential to meet the user needs even beyond this master plan's 20-year planning period.

The required and desirable attributes will be used to identify advantages and disadvantages for each of the three potential general aviation development areas.

Expand Existing General Aviation Terminal Area

There are approximately 50 acres within the existing general aviation terminal area, of which approximately 15 acres are developed. There are two drainage swales within this area. While they are not anticipated to preclude construction, they may impact the potential layout, require environmental permits, require additional fill material and increase the construction costs.

Advantages

- Continued use of existing facilities
- Midfield location with good visibility to primary runway
- Adjacent to Runway 6-24
- Immediate access to both parallel taxiway systems without crossing the runways
- Continued access from SR 794 with no change in drive time to Springfield

Disadvantages

- General aviation future expansion somewhat limited
- OANG expansion limited; force protection area still an issue
- Some redevelopment/remodeling and expansion of facilities needed
- Existing transient apron space constrained especially with Taxiway A widening; expansion space may be a long distance from terminal building
- Location of drainage swales may limit development area and/or increase construction costs

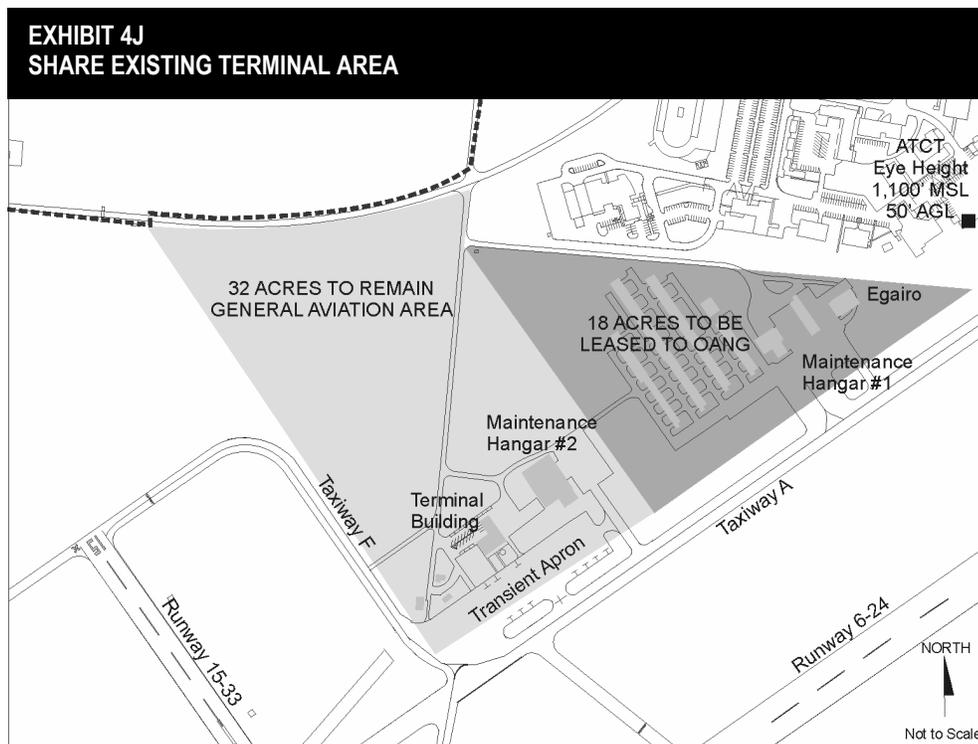
Remaining in the existing terminal area may be a viable alternative for general aviation, but it is not a viable alternative to meet the need of the OANG.

Share Existing General Aviation Terminal Area with OANG (Retain Terminal Building and Maintenance Hangar #2 and Relocate Other General Aviation Facilities)

While the expansion of the existing terminal area is a viable alternative for general aviation, it does not address the OANG's need to clear their force protection area. Therefore, another option to consider is leasing a portion of the terminal area to the OANG and keeping the remainder for general aviation, as shown on **Exhibit 4J**. Under this scenario the existing terminal building, transient apron and Maintenance Hangar #2 would remain

general aviation facilities and continue their present use. The area currently occupied by the t-hangars, Maintenance Hangar #1, and the Egairo hangar would be leased to the OANG, with the facilities located in that area being redeveloped along Runway 15-33. While some of the hangar facilities would need to be relocated, they would stay within the existing terminal area in close proximity to the terminal building and Maintenance Hangar #2 that are not moving.

The users survey process identified the existing economical t-hangar rental rates as one of the attractive features at the airport. If t-hangar rates need to be increased to support new facilities, there may be a short-term decrease in based aircraft.



Source: Aerofinity, Inc., 2004.

This alternative would resolve the force protection area issue within the existing general aviation terminal area and allow some space for OANG expansion. While the existing transient apron would remain within the area being used to support general aviation, an increased portion of the transient apron is unusable to accommodate a clear Group IV taxiway object free area on the widened Taxiway A.

Advantages

- Continued use of some general aviation facilities
- Midfield location
- Access to both parallel taxiway systems without crossing the runways
- Continued access from SR 794 with no change in drive time to Springfield

Disadvantages

- Only terminal building has visibility from primary runway; majority of general aviation facilities will be along crosswind runway
- Redevelopment of all t-hangars, one aviation business hangar and one corporate hangar
- May experience a short-term decrease in based aircraft if higher rental rates are needed to support the new facilities
- General aviation expansion limited
- OANG expansion limited
- Location of drainage swales may limit development area and/or increase construction costs
- Some existing facilities need to be modified to maximize developable area

Continuing to use a portion of the general aviation terminal area to support general aviation, while leasing a portion to the OANG is a viable alternative.

Relocate General Aviation Terminal Area South of Runway Intersection

There are approximately 83 acres available for a general aviation terminal area south of the runway intersection, as shown previously on **Exhibit 4I**. However, this site has a number of disadvantages that eliminate it from being a viable alternative. With the location of the terminal VOR (very high frequency omni range navigational aid) and its clear areas, the only access to the primary runway would be near the end of Runway 6. There is not enough space between Runway 6-24 and terminal VOR to accommodate a parallel taxiway without relocating the terminal VOR. Also, to avoid interference with the terminal VOR signal, a 35-foot metal building would need to be 1,670 feet from the terminal VOR. With the available space south of the runway intersection, the general aviation facilities would need to be clustered near the end of Runway 15-33. There is no roadway access available from a state route to this site. The only access would be from Jackson Road, resulting in the greatest increase in travel time from Springfield.

Advantages

- Provides expansion potential for OANG in existing terminal area

Disadvantages

- Facilities would need to be located near the end of Runway 15-33
- Parallel taxiway construction not feasible with terminal VOR

- Runway 24, most common active runway, would require crossing of Runway 15-33
- No access from a state route
- Greatest increase in drive time to Springfield

The disadvantages associated with this area render it not viable for supporting a general aviation terminal area. Therefore, it has been eliminated from further consideration.

Relocate General Aviation Terminal Area South of Runway 6-24

There are approximately 166 acres of existing airport property available for a general aviation terminal area south of Runway 6-24, as shown previously on **Exhibit 4I**. Access to this area could be provided via an upgraded Blee Road from SR 72. The Tactical Air Navigation (TACAN), a military navigational aid located in this area, may preclude a general aviation terminal area from being located at exactly the midfield location, but it can be located near midfield, with good visibility from Runway 6-24. The location of the TACAN, 844 feet from Runway 6-24, allows space for the development of a partial parallel taxiway to Runway 6-24 from the end of Runway 24 to Runway 15-33. This would provide access to Runway 24 without back-taxiing on the runway or crossing an active runway.

The other infrastructure that may need to be located in this area is a replacement OANG Airport Traffic Control Tower (ATCT.) If the OANG's replacement ATCT is located in this area, the OANG has offered to participate in the infrastructure costs (roadway and utilities) to open this area for development. The users survey process identified the existing economical t-hangar rental rates as one of the attractive features at the airport. If t-hangar rates need to be increased to

support new facilities, there may be a short-term decrease in based aircraft.

Advantages

- Midfield location
- Adjacent to Runway 6-24
- Parallel taxiway access could be provided to Runway 24 and connect to Runway 15-33
- Road access could be provided from SR 72, minimizing any increase in drive time to Springfield
- Secondary access could be provided from Jackson Road
- All new development that can be configured to best meet general aviation needs
- Area would have separate identity from OANG
- Good long-term expansion potential for general aviation, additional expansion area could be acquired
- Provides expansion potential for OANG in existing terminal area

Disadvantages

- Requires all new development, additional funding beyond buy-out of existing terminal area by OANG anticipated to be needed
- Construction of partial parallel taxiway on south side of Runway 6-24 needed to maintain existing level of operational safety
- Full parallel taxiway for Runway 6-24 without crossing the runway, cannot be provided without relocation of terminal VOR
- May experience a short-term decrease in based aircraft if higher rental rates are needed to support the new facilities

General Aviation Terminal Area Location Financial Feasibility Review

Combining the viable development areas with the ATCT line-of-sight allowable development height information from Appendix F, results in three potential general aviation development scenarios:

- Remain in existing terminal area with southwest replacement ATCT
- Share existing general aviation terminal area with OANG with north replacement ATCT
- Relocate general aviation terminal area south of Runway 6-24 (southwest ATCT used for most restrictive line-of-sight scenario)

For planning purposes it is assumed that t-hangars will be 20 feet tall at the peak. It is assumed that the corporate hangar facilities will be at least 30 feet tall at the peak. The existing corporate hangar facilities have apron area associated with the hangar. Also, it is desirable for the proposed layout to avoid north or northwest facing doors to avoid winter winds blowing directly into an open hangar.

Remain in Existing Terminal Area with Southwest Replacement ATCT

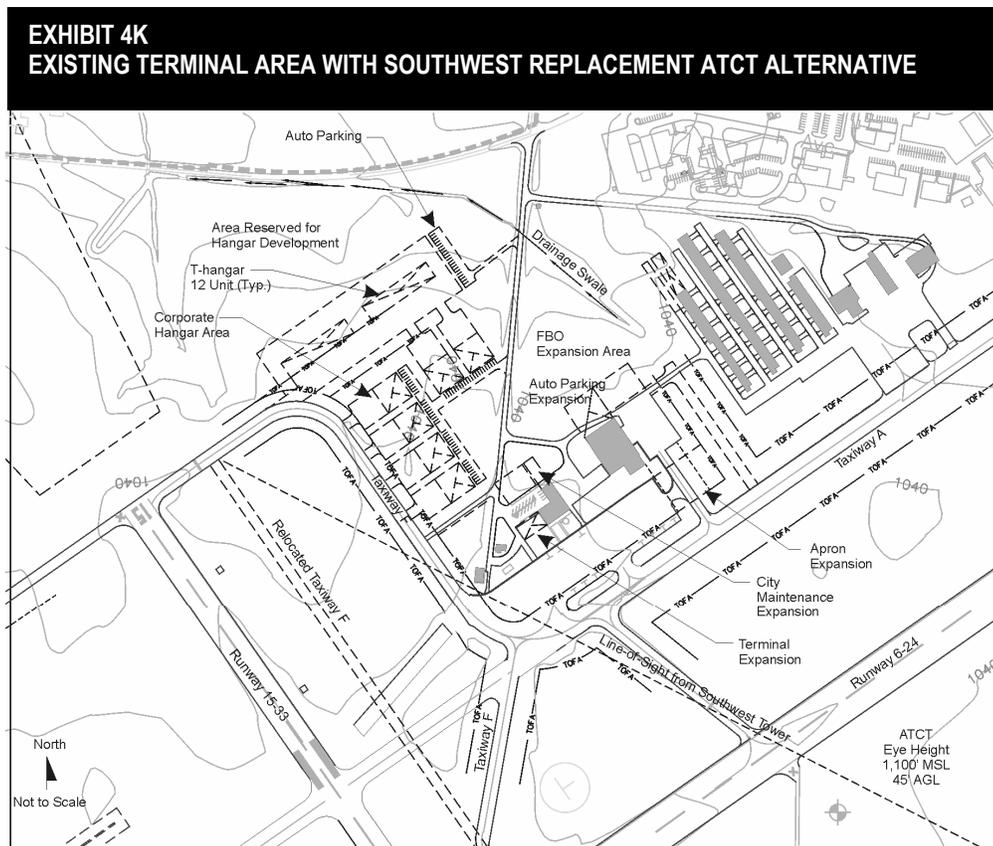
While this alternative would serve general aviation, it would not meet the OANG's objectives.

However, it has been prepared for comparison purposes. It serves as a baseline for examining other general aviation terminal alternatives. It may also assist the OANG in comparing the financial implications of the various potential alternatives to support their long-term needs.

Additional development in the existing terminal area is only feasible with a replacement ATCT. The replacement ATCT location that maximizes the usable development area is south of Runway 6-24 near the runway intersection. Even with this replacement ATCT location, in order to preserve all the existing general aviation development Taxiway F would need to be relocated to 300-foot runway centerline to taxiway centerline separation. As shown in **Exhibit 4K**, an alternative layout is planned to avoid development within the drainage swales to the extent feasible.

In this alternative, the t-hangars are expanded to the extent feasible in their present location. Future expansion of t-hangars would then be accommodated near the end of Runway 15 with access from the parallel taxiway system. Space has been preserved adjacent to Maintenance Hangar #2 for future FBO expansion. However, this area would be served by a new taxiway located

between Maintenance Hangar #2 and the t-hangars to allow expansion of the transient apron adjacent to the existing apron. To avoid development in the drainage swale, additional corporate hangar development would be accommodated along the existing Taxiway F after a replacement taxiway has been constructed closer to Runway 15-33.



Source: Aerofinity, Inc., 2004.

Exhibit 4L summarizes the development costs of this alternative. The estimated costs have been divided into replacement/preservation of existing facilities costs and future expansion to meet the 20-year facility requirements identified in Chapter 3, if they can be accommodated. For planning purposes the facility requirements were identified as:

- 10,000 square feet terminal space
- 8,000 square feet city maintenance space

- 89 t-hangars
- 11 conventional hangars
- 12,000 square yards transient and based apron

Estimating both the replacement/preservation of existing facility and facility requirements build out costs allows both the short-term and long-term costs of accommodating general aviation in a particular location to be assessed.

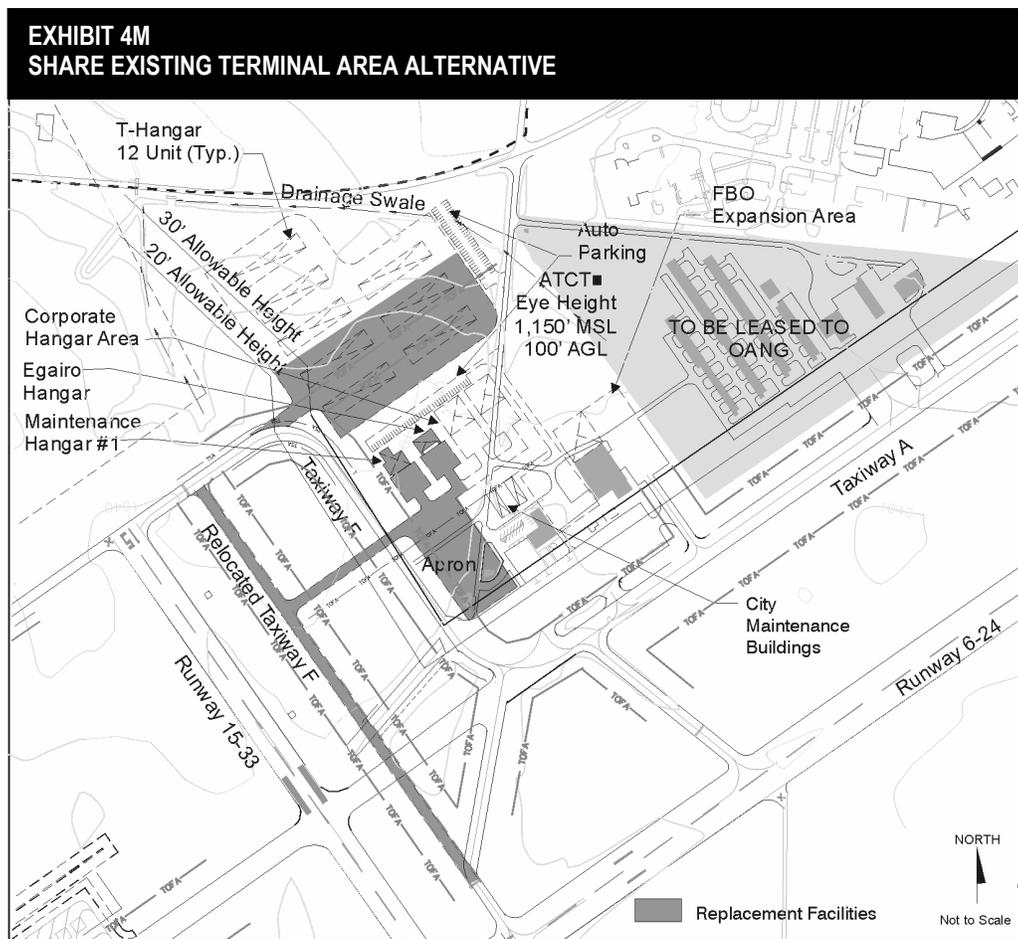
EXHIBIT 4L EXISTING TERMINAL AREA ESTIMATES OF DEVELOPMENT COSTS	
Replacement/Preservation Items	
Relocate Taxiway F	\$ 860,000
Modify FBO taxiway for apron replacement	240,000
Replace unusable transient apron	470,000
Replace oldest t-hangar units (remove 8, build 6)	230,000
Expand t-hangars (add 4 units to row F)	180,000
Replacement Total	\$1,980,000
20-Year Facility Requirements Build Out	
Open T-hangar Expansion Area (24 units, taxilanes, auto parking)	\$1,900,000
Develop Corporate Hangar Site (utilities, access road, parking lots)	340,000
Terminal Building Expansion/Renovation for 10,000 sft facility	1,120,000
Expand City Maintenance Garage (add 4,800 sft)	760,000
Terminal Auto Parking Expansion (9,800 sft)	110,000
Facility Requirements Build Out Total	\$4,230,000
Grand Total	\$6,210,000

Source: Woolpert LLP, 2003.

Share Existing General Aviation Terminal Area with OANG with North Replacement ATCT

This alternative is a middle ground option that allows general aviation to remain within a portion of the existing terminal area, while working to resolve some of the OANG concerns, particularly the force protection area and replacement ATCT in close proximity to the base support services. The primary disadvantage of this alternative is that does not provide the optimum long-term advantages to either general aviation or the OANG.

In this scenario it has been assumed that the OANG will occupy the portion of the existing terminal area currently used by the t-hangars, Maintenance Hangar #1 and the Egairo hangar. It has also been assumed that the preferred replacement ATCT will be the north replacement location. This alternative examines how to provide replacement facilities for the t-hangars, Maintenance Hangar #1, the Egairo hangar and the transient apron that becomes severely restricted by the north replacement ATCT line-of-sight to Taxiway A, as shown on **Exhibit 4M**.



Source: Aerofinity, Inc., 2004.

The area with the best visibility for replacing the transient apron presently contains the electrical vault, OANG weather station and fuel pumps. The electrical vault and OANG weather station would need to be relocated to the vicinity of the airport beacon. The fuel farm and pumps may be able to remain in the existing location if delivery can be accommodated across the existing apron. Also, depending on the use of the pumps it may be desirable to modify them to serve the new transient apron. Space would be reserved by Maintenance Hangar #2 for future expansion of the FBO facilities. A stand-alone maintenance facility for the City's airport maintenance equipment would be constructed to allow auto parking relocation. The existing terminal building would then be remodeled and the existing maintenance space converted into terminal uses.

Part of the purpose of remodeling the existing terminal building is to better connect it to the replacement transient apron. The space between the existing terminal building and maintenance hangar would be used to accommodate auto parking. The replacement hangars for Maintenance Hangar #1 and the Egairo hangar would be constructed with access off an apron edge taxiway. Replacement t-hangars would be constructed toward the end of Runway 15. **Exhibit 4N** summarizes the development costs for these improvements dividing them into replacement costs and future expansion costs. It should be noted that this alternative could not accommodate the forecast facility requirements for corporate hangars in the remaining existing terminal area.

EXHIBIT 4N SHARE EXISTING TERMINAL AREA ESTIMATES OF DEVELOPMENT COSTS	
Replacement Items	
Relocate Taxiway F, add taxiway connector	\$1,090,000
Replace unusable transient apron due to line-of-sight (8,900 syd)	890,000
Replace t-hangars (site prep, parking lot, 60 units, taxilane)	3,360,000
Develop corporate hangar site (utilities, access road, parking lot)	380,000
Replace Maintenance Hangar #1 and apron	1,150,000
Replace Egairo hangar and apron	890,000
Relocate weather station (new facility, existing equipment)	260,000
Relocate electrical vault (new building, existing equipment)	240,000
Turn fuel pumps to new apron	30,000
Relocate terminal auto parking	270,000
Construct airport maintenance facility (8,000 sft)	1,320,000
Remodel terminal building (incorporate maintenance space into terminal space)	360,000
Demolition of t-hangars and pavement (5 acres)	390,000
Replacement Total	\$10,630,000
20-Year Facility Requirements Build Out	
Construct additional t-hangars (36 units, taxilane)	\$1,710,000
Expand terminal building (2,500 sft)	440,000
Extend corporate hangar area (taxiway and utilities)	260,000
Facility Requirements Build Out Total	\$2,410,000
Grand Total	\$13,040,000

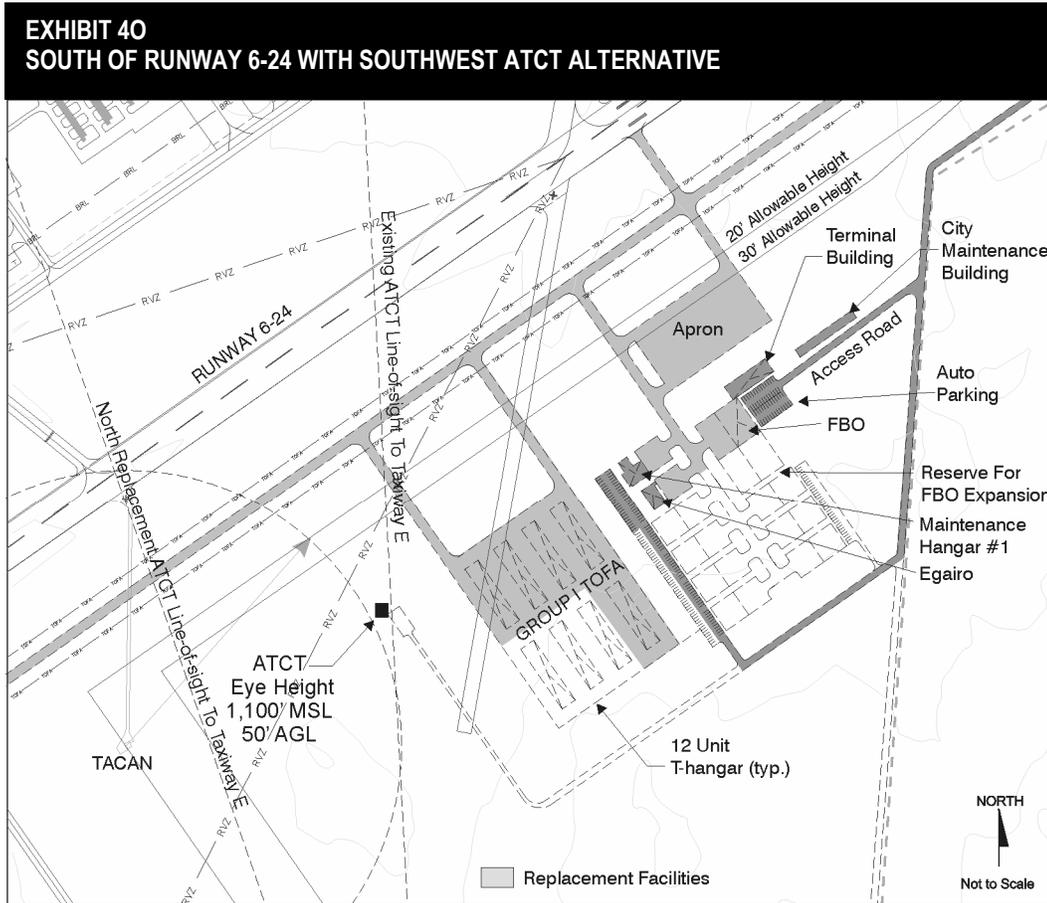
Source: Woolpert LLP, 2003.

Relocate General Aviation Area South of Runway 6-24

This development alternative relocates the general aviation terminal area to the south side of Runway 6-24. The existing ATCT and north replacement ATCT have minimal line-of-sight restrictions in this area. The most restrictive line-of-sight would be from the southwest ATCT location, which has been used as a worst-case scenario. In considering alternative layouts south of Runway 6-24, the following characteristics were incorporated into the plans.

- Terminal building and transient apron near midfield location
- FBO facilities located adjacent to or in close proximity to terminal building
- Like types of hangars grouped together
- Provision for separation of airside access and landside access
- Minimize length of access road
- Provide space for future growth
- Align hangar doors to avoid prevailing winds

Exhibit 40 shows a proposed layout for a general aviation area south of Runway 6-24, with accommodations for a southwest ATCT. This alternative includes the construction of a partial parallel taxiway from Runway 24 to Runway 15-33 to maintain the same operational level of safety as the existing terminal area. All of the hangars have been aligned with the backside of the terminal building to allow a view of the entire airfield from the terminal. FBO development and expansion areas are located in close proximity to the terminal building and could be attached to the terminal building. A separate maintenance facility from the terminal building is planned to accommodate the City's airport maintenance equipment. Corporate hangars, including the replacement Maintenance Hangar #1 and Egairo hangar, would be accessed from the same taxiway serving the FBO facilities, which also provide access to the apron. T-hangars are grouped together with separate access from the parallel taxiway. Both the corporate hangar area and t-hangar areas could accommodate additional expansion beyond that depicted on **Exhibit 40**.



Source: Aerofinity, Inc., 2003.

If the City acquires additional land along Runway 6-24, it should be reserved for future aviation-related development that may be larger than that typically accommodated in the terminal area. If the replacement southwest ATCT is not constructed, the area reserved for its development could be used to support additional hangar development.

Also, the entire layout could be shifted 130 feet closer to the proposed parallel taxiway to accommodate a clear Group IV taxiway object free area instead of the more restrictive set-back needed to provide the clear line-of-sight for the southwest ATCT.

Exhibit 4P summarizes the associated costs of relocating the general aviation facilities to the south side of Runway 6-24. In addition to these costs, the realignment of Taxiway C/H as Taxiway G, discussed under the airfield alternatives (Exhibit 4B), should be constructed to allow easy cross-field access for the new general aviation facilities. The cost estimates have been divided into replacement costs and future expansion.

Two issues have been raised with regard to general aviation development on the south side of Runway 6-24: the potential benefit of relocating the TACAN and the need for acquisition of additional airport property.

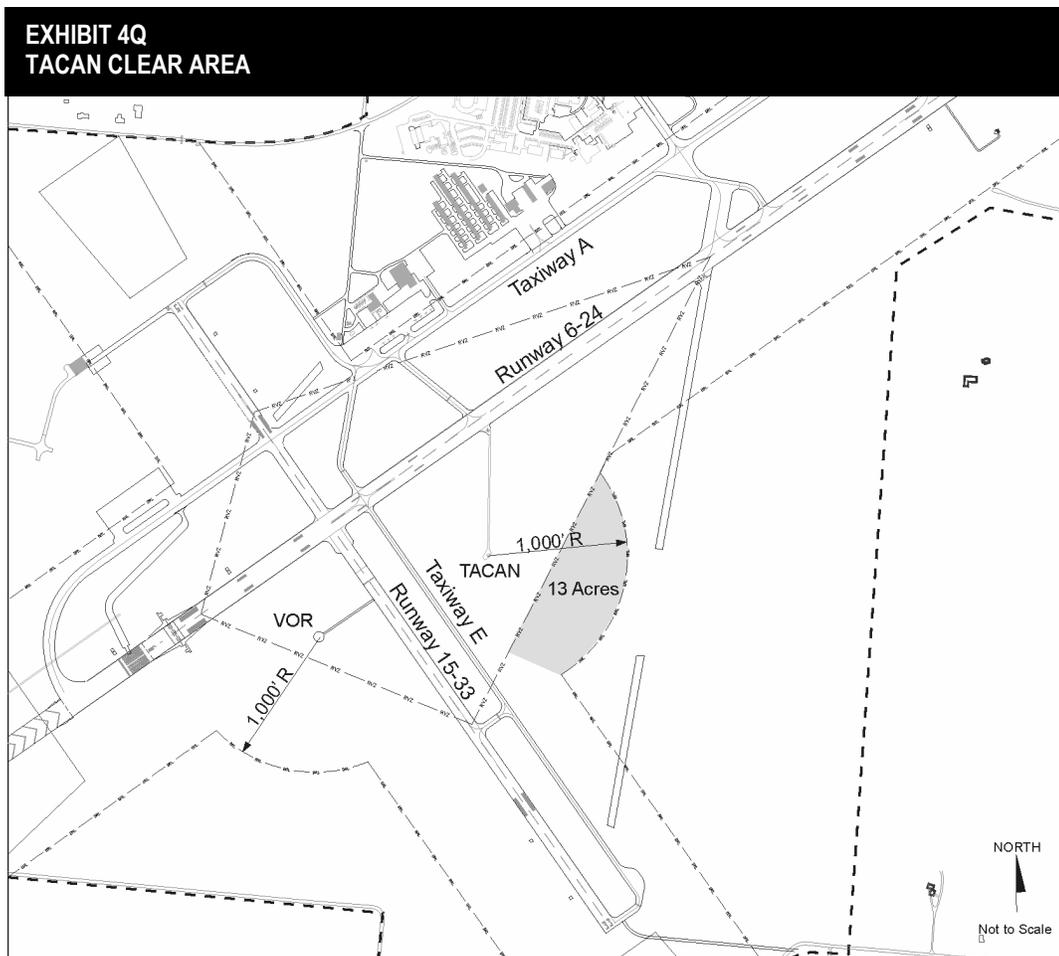
The OANG's TACAN is located near the runway intersection. Its location allows for the partial parallel taxiway, which has been identified as

EXHIBIT 4P TERMINAL AREA SOUTH OF RUNWAY 6-24	
Replacement Facilities	
Overall site grading, drainage, demolition	\$ 630,000
Extend utilities to terminal site	1,930,000
Improve existing Blee Road	210,000
Airport entrance road and hangar access	800,000
Construct partial parallel taxiway	3,150,000
Realign Taxiway C/H	840,000
Construct access and corporate taxiways	950,000
Construct transient apron	1,180,000
Construct t-hangars (site prep, parking lot, 60 units, taxilanes)	3,500,000
Construct electrical vault (new building, relocate equipment)	240,000
Construct aviation fuel farm	320,000
Construct terminal building (10,000 sft)	1,650,000
Construct airport maintenance building (8,000 sft)	1,310,000
Construct replacement Maintenance Hangar #2 and apron	3,030,000
Construct replacement Maintenance Hangar #1 and apron	1,140,000
Construct replacement Egairo hangar and apron	860,000
Demolition existing terminal area (clear 8 acres)	560,000
Replacement Total	\$22,500,000
20-Year Facility Requirements Build Out	
Construct additional t-hangars (36 units, taxilanes)	\$1,730,000
Expand Corporate hangar site (utilities, taxiway, parking lot)	240,000
Facility Requirements Build Out Total	\$1,970,000
Grand Total	\$24,470,000

Source: Woolpert LLP, 2003.

necessary to maintain the same level of operational safety as the existing terminal area, but requires that facility development be set back from the intersection. Coordination with the FAA has identified that it would be feasible to co-locate the TACAN with the FAA's VOR, providing an agreement could be reached between the FAA and OANG with regard to ownership and maintenance of the facilities. If the equipment was available for the co-location, the estimated cost would be approximately \$100,000. However, as shown in **Exhibit 4Q**, the TACAN clear area is not the only controlling factor in this area. Depending on the

ultimate ATCT location, its line-of-sight could pass through this area, potentially being more restrictive than the TACAN clear area. Also, regardless of the ATCT location, a clear Runway Visibility Zone (RVZ) must be maintained around the intersection, allowing the pilot of an aircraft on one runway to see an aircraft on the intersecting runway. There are only 13 acres of TACAN clear area outside the RVZ. Therefore, it does not appear that relocation of the TACAN would provide substantial benefit for development on the south side of Runway 6-24.



Source: Aerofinity, Inc., 2004.

The potential to relocate the terminal VOR in order to be able to provide a full-length parallel taxiway on the south side of Runway 6-24 was also discussed with the FAA. The FAA owns and maintains the terminal VOR. The relocation of a terminal VOR costs approximately \$500,000 to \$750,000 when there are minimal site and environmental constraints. With the FAA's limited budget, it is unlikely the FAA would be willing to relocate the terminal VOR. Therefore, consideration of a general aviation terminal area south of Runway 6-24 has assumed that the terminal VOR would remain in its existing location.

Since a midfield location was identified as a desirable characteristic for a general aviation terminal area, the existing airport property is the most desirable location for this facility. However, to preserve the long-term potential to accommodate additional development, provide a less constrained access route from SR 72 and potentially accommodate additional aviation related business, it would be desirable for the airport to acquire other property that is adjacent to the south side of Runway 6-24 as opportunity and funding allow if this option were chosen.

Preferred General Aviation Terminal Area Location Alternative

The operational efficiency provided by the existing general aviation facilities must be maintained in any preferred alternative. This includes keeping all general aviation facilities in close proximity to one another for economical operations and providing taxiway access to Runway 24 without crossing Runway 6-24.

Three very distinct alternatives have been identified for the long-term general aviation facilities at the Springfield-Beckley Municipal Airport. As previously described, these alternatives range from status quo to all new general aviation facilities. Using information from the preceding analysis, the City conducted further coordination with the OANG to understand the financial feasibility of each general aviation terminal alternative and the OANG's long-term development needs. Based on this coordination, the "share existing terminal area" alternative—relocating the t-hangars, two corporate hangars and associated apron areas—is the most financially feasible alternative for meeting the OANG's development needs and providing adequate facilities for general aviation.

Alternative Selected

Relocating the existing t-hangars and two corporate hangars is a middle ground. It has a greater cost than keeping all of the existing general aviation facilities, but a lower cost than relocating all of them. It also allows the relocation to be phased over a longer time, as the new general aviation facilities will remain in close proximity to the existing facilities. This alternative meets the immediate needs and most of the potential facility requirements for the 20-year planning period. It also results in mostly new general aviation facilities. If general aviation requires more space in the long-term, some corporate hangars may be able to be developed in AirparkOhio. Also, if there is a modification to SR 794, it could allow additional area to be preserved for general aviation development. If the OANG needs additional area in the long-term, the design of the new t-hangars and corporate hangars should allow the structures to be

relocated. Sharing the existing terminal area is the most financially feasible alternative that meets the immediate needs of both general aviation and the OANG.

Alternatives Rejected

Remaining in the existing terminal area has the least financial cost, but may have the greatest long-term lost opportunity cost. While there would be lesser costs associated with replacing the existing facilities under this alternative, the anticipated maintenance costs of the existing older buildings may be higher than for new buildings. Although the existing infrastructure is serving the airport, improvements to these facilities are needed to meet the long-term demand. In addition, any substantial development in the existing terminal area requires a replacement air traffic control tower (ATCT) to eliminate the current line-of-sight constraints. In this alternative, the OANG remains constrained and portions of the general aviation terminal area remain within the OANG's force protection zone. The OANG master plan shows the need to replace the ATCT to accommodate the equipment and controller's needs. Also, to allow the replacement and expansion of the OANG facilities in a timely manner, the master plan shows the relocation of the OANG's petroleum, oil, and lubricant operations (POL) to the existing t-hangar area. Therefore, maintaining the status quo is not feasible.

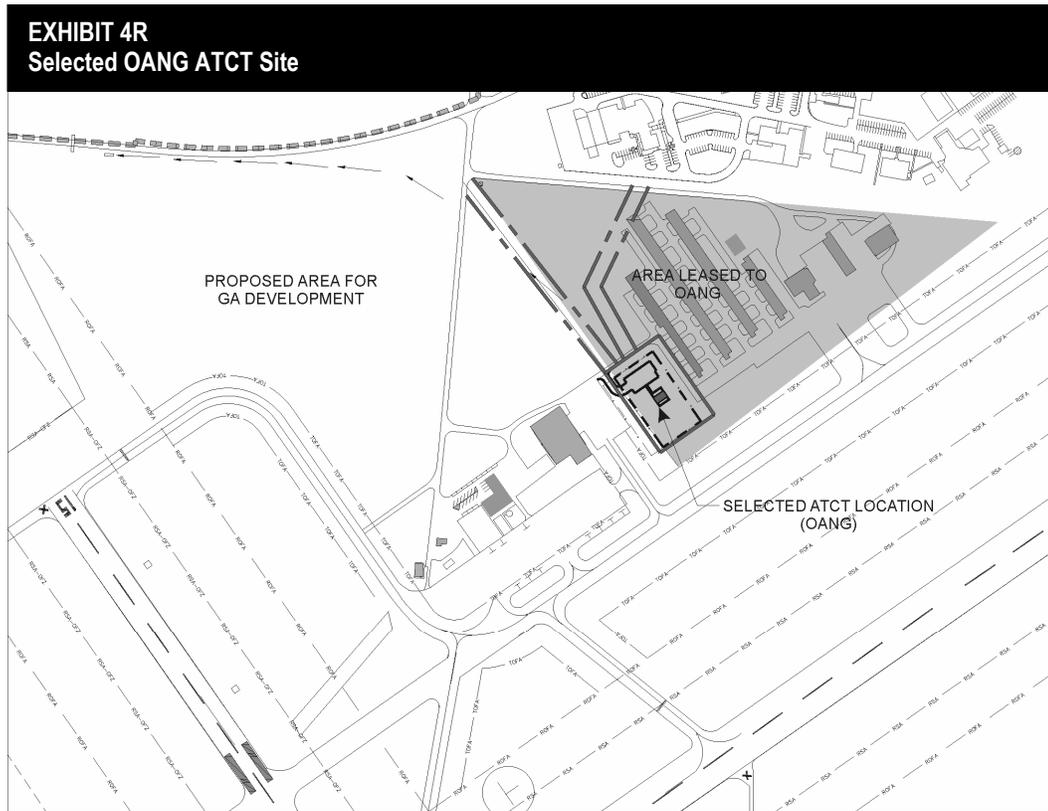
Relocating all the general aviation facilities across Runway 6-24 has the lowest level of lost opportunity, but the highest development cost. The City would have the opportunity to develop a new general aviation area designed to meet the needs of 21st century aviation. Leasing the existing

terminal area to the OANG could provide them with the greatest opportunity to enhance their facilities to maximize that asset for the community. While relocating general aviation across Runway 6-24 would be ideal, funding for extending the utilities and access is not available to open the area for development. Also, funding is not anticipated to be available, at least in the near future, to construct a parallel taxiway that provides the operational efficiency and safety available in the existing terminal area. Therefore, while moving the general aviation facilities across Runway 6-24 would be ideal, it is not economically feasible to meet the immediate development needs.

Final Preferred ATCT Location

Subsequent to the OANG ATCT Siting Study, the OANG conducted additional ATCT analysis, which also considered the information from the initial general aviation terminal area alternatives process. Through this process the OANG identified an additional feasible ATCT location. This location is between the Maintenance Hangar #2 and its apron and the existing t-hangars, as shown in **Exhibit 4R**. In coordination with the City, the OANG selected this final ATCT site as the preferred location for construction of their new ATCT. Construction of the new ATCT started in early 2005.

Being located closer to the runway, an ATCT at this location can be shorter reducing the construction costs. Also, the entrance road to be constructed by the OANG to the new ATCT, would also serve as the new entrance road for the shared general aviation terminal area. This location also allows a portion of the existing transient apron to remain usable.



Source: Aerofinity, Inc., 2004.

Initially, only the ATCT site will be leased to the OANG. As the t-hangars, Maintenance Hangar #1, and Egairo hangar are relocated from the existing t-hangar area, those sites will then be leased to the OANG. This ultimately results in the ATCT site being within a continuous OANG leasehold.

PREFERRED GENERAL AVIATION TERMINAL AREA LAYOUT ALTERNATIVES

After selecting the share existing terminal area as the preferred general aviation terminal area location, three alternative layouts have been considered. These alternative layouts incorporate the line-of-sight constraints for the new ATCT, as discussed in more detail in Appendix F; the assumption that SR 794, or a similar road, will remain in place west of the Peacock Road

intersection for near-term development; and the goal to relocated Taxiway F to align with Taxiway E.

Apron Area Alternatives

Apron replacement/expansion area is one of the most pressing needs in identifying a layout for relocating the general aviation facilities. The current apron space is extremely constrained due to the loss of usable apron area with the widening of Taxiway A. In addition, the current based aircraft parking apron area will be leased to the OANG with the t-hangars and needs to be replaced. Thus, the replacement apron is envisioned to serve both large transient aircraft and locally based aircraft that are stored outdoors. Since the apron is a large facility, its location impacts the layout of the other replacement general aviation facilities and thus,

has been considered first. The following factors were considered in identifying the best location for the additional apron area.

- The apron area should be located in close proximity to the terminal building to accommodate transient aircraft.
- At least 25 feet allowable height should be available on the apron to accommodate airport reference code (ARC) C-II business jets.

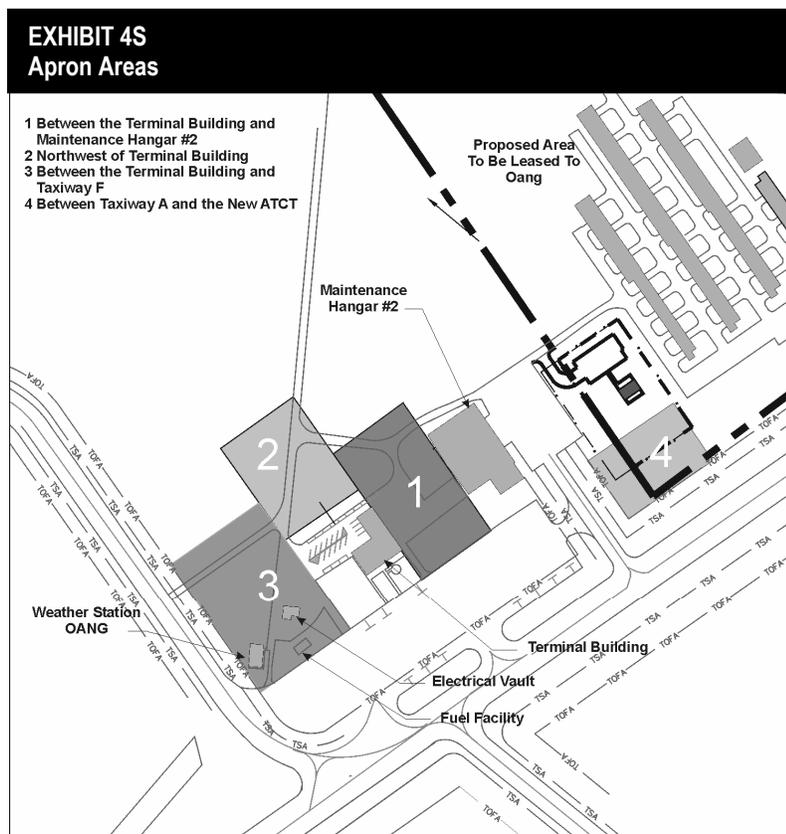
Facility requirements identified the need for up to 12,000 square yards of apron. At least 5,600 square yards of apron is needed immediately to replace the unusable terminal apron due to the

expansion of Taxiway A and to replace the based aircraft apron near the t-hangars that will be leased to the OANG.

Up to 6,500 square yards of terminal apron remain usable with adequate allowable height; although the type of aircraft that should park near the terminal building is limited due to concern with jet blast and the large glass windows of the terminal.

As depicted on **Exhibit 4S**, four alternative locations are identified for the replacement apron area.

1. Between the Terminal Building and Maintenance Hangar #2
2. Northwest of the Terminal Building
3. Between the Terminal Building and Taxiway F
4. Between Taxiway A and the New ATCT



Source: Aerofinity, Inc., 2004.

Replacement Apron Between Terminal Building and Maintenance Hangar #2

As shown on **Exhibit 4S** as Alternative 1, up to 4,800 square yards of apron could be developed between the terminal building and Maintenance Hangar #2, which could be further expanded to the northwest. However, this area is only 182 feet wide. Providing a 115-foot wide ARC C-II taxilane results in only 67 feet of space available for parking aircraft. In addition, with this location City vehicles would still require access to the existing vehicle maintenance bays in the terminal building. This location would also require the airport beacon to be relocated, and a portion of the existing terminal apron would be unusable in order to provide the taxilane access to this new apron area.

Advantages

- Close proximity to terminal building
- Adjacent to existing apron
- Adequate allowable height
- Area could be available immediately

Disadvantages

- Limited gain in additional parking area as ratio of total apron
- Mixing of city vehicles with aircraft to access maintenance bays and park heavy vehicles
- Jet blast could be a concern between the two buildings
- Loss of some existing apron to gain access to expansion area
- Airport beacon would need to be relocated

Replacement Apron Northwest of Terminal Building

Another potential location identified for additional apron area is northwest of the terminal building as shown on **Exhibit 4S** as Alternative 2. This location would be associated with the replacement general aviation facilities. While this location could be sited to provide adequate allowable height, it would not be contiguous with the existing terminal apron and would not be readily visible from the existing terminal building.

Advantages

- Could be sited with adequate allowable height
- Could be constructed on undeveloped land

Disadvantages

- Farther from terminal building
- Not visible from primary runway or terminal building
- Would need to fence for security
- Not adjacent to existing terminal apron
- Not as user-friendly

Replacement Apron Between Terminal Building and Taxiway F

Wrapping the terminal apron around the west side of the terminal building was also examined, as shown in **Exhibit 4S** as Alternative 3.

Advantages

- Close proximity to terminal building
- All apron area would be contiguous
- Taxiway F would become aligned with Taxiway E
- The OANG is planning to relocate their weather station that is in this area to the new ATCT site

Disadvantages

- Would require relocation of the electrical vault and potentially the fuel facilities
- Adequate allowable height for parking ARC C-II corporate aircraft would only be available in this area with the relocation of Taxiway F to a 300-foot separation from Runway 15-33

Replacement Apron Between Taxiway A and New ATCT

The 1992 Airport Layout Plan showed the existing terminal apron being extended farther to the east to provide additional apron area. The area shown on that ALP is now between Taxiway A and the new ATCT site, as shown on **Exhibit 4S**. Presently, this area is proposed to be leased to the OANG with the fencing extending into what would be the apron area. If the fence could be moved closer to the ATCT and the area remains outside the OANG leasehold, some additional apron could be developed. Aside from being a long distance from the terminal building, only 2,900 square yards of additional apron area are gained because of the need to provide a clear taxiway object free area to access the Maintenance Hangar #2 apron and at least 25-foot allowable height. If the ATCT fence cannot be moved back, virtually no apron can be gained. Therefore, this location is not a reasonable alternative.

Advantages

- Area could be available immediately

Disadvantages

- Long distance from terminal building
- Very limited space
- In close proximity to OANG facilities

Apron Expansion Area Selected

The replacement apron area selected by the City is Alternative 3, a wrap around apron in the area between the terminal building and Taxiway F. With the relocation of Taxiway F 425 feet to the southwest, a fully aligned parallel taxiway will emerge for Runway 15-33. This will open up more land for development in the terminal area and provide space to develop the apron area needed to meet the airport users' demands.

Layout of Other General Aviation Replacement Facilities

To maximize the general aviation development potential and minimize the initial development costs, as appropriate, the following goals were identified for the layout of general aviation replacement facilities:

- Retain existing facilities as feasible within the general aviation expansion area, i.e. auto parking, apron area, terminal building, Maintenance Hangar #2
- Continue to preserve space to expand the FBO facilities adjacent to the existing FBO facilities
- Upgrade internal access roads for near-term use, as feasible

While it is desirable to allow space to accommodate the 20-year facility requirements, at a minimum, the general aviation replacement facilities should provide:

- At least 5,600 square yards of apron area
- 61 t-hangar units
- 2 corporate (conventional) hangar facilities

In considering the potential layouts, nested t-hangars, (hangars where the tail and wing sections abut rather than the tail section extending the width of the building) provide the most t-hangar units in the least space and minimize the taxilane that needs to be developed. The nested t-hangars are spaced to accommodate units with both 42- and 44-foot-wide doors. In addition, the use of nested t-hangars allows the potential to use of an end unit up to 54-feet-wide to replace the two larger existing t-hangars. The exact configuration of the future t-hangars will be determined during the design process. In addition, the City uses some of the older t-hangar units for equipment storage. This could be replaced with special end units incorporated as part of the t-hangar buildings, or in a separate equipment storage building. **Appendix G** includes additional detailed information regarding t-hangars from prefabricated t-hangar manufacturers.

Based on the wrap around apron being the preferred development, three alternative layouts have been considered to accommodate replacement and future expansion of general aviation facilities. The three alternatives are as follows:

- Corporate and t-hangars near terminal building
- Corporate hangars closest to terminal building
- Less corporate hangars and more t-hangars

To identify a preferred alternative, the three layouts have been reviewed based on the following four factors.

- Preserving the ability to expand the apron further in the future
- Number of facilities that can be accommodated

- Flexibility of developing facilities before Taxiway F is relocated
- Proximity of new t-hangars to terminal building

Preserving the ability to expand the apron further in the future

Additional apron space is needed immediately to replace the unusable terminal apron due to the Taxiway A widening and to replace the based aircraft apron currently in the t-hangar area. Also, to provide the airport with future flexibility, space should be allotted for further apron expansion to meet the current facility requirements and beyond.

Number of facilities that can be accommodated

There is limited space within the existing terminal area. One of the goals of the alternatives evaluation is to maximize the utility of the terminal area. While there is some space available in Airpark Ohio to accommodate larger corporate hangar development, some corporate tenants will prefer to be located in close proximity to the FBO and the services they provide.

Flexibility of developing facilities before Taxiway F is relocated

While the relocation of Taxiway F has been identified as a short-term goal and is necessary to develop the wrap around apron with a clear line-of-sight, securing funding for this project may be a challenge. The need to relocate the facilities in the t-hangar area may occur before Taxiway F is relocated, so sites for the relocated facilities may need to be available independent of the Taxiway F project.

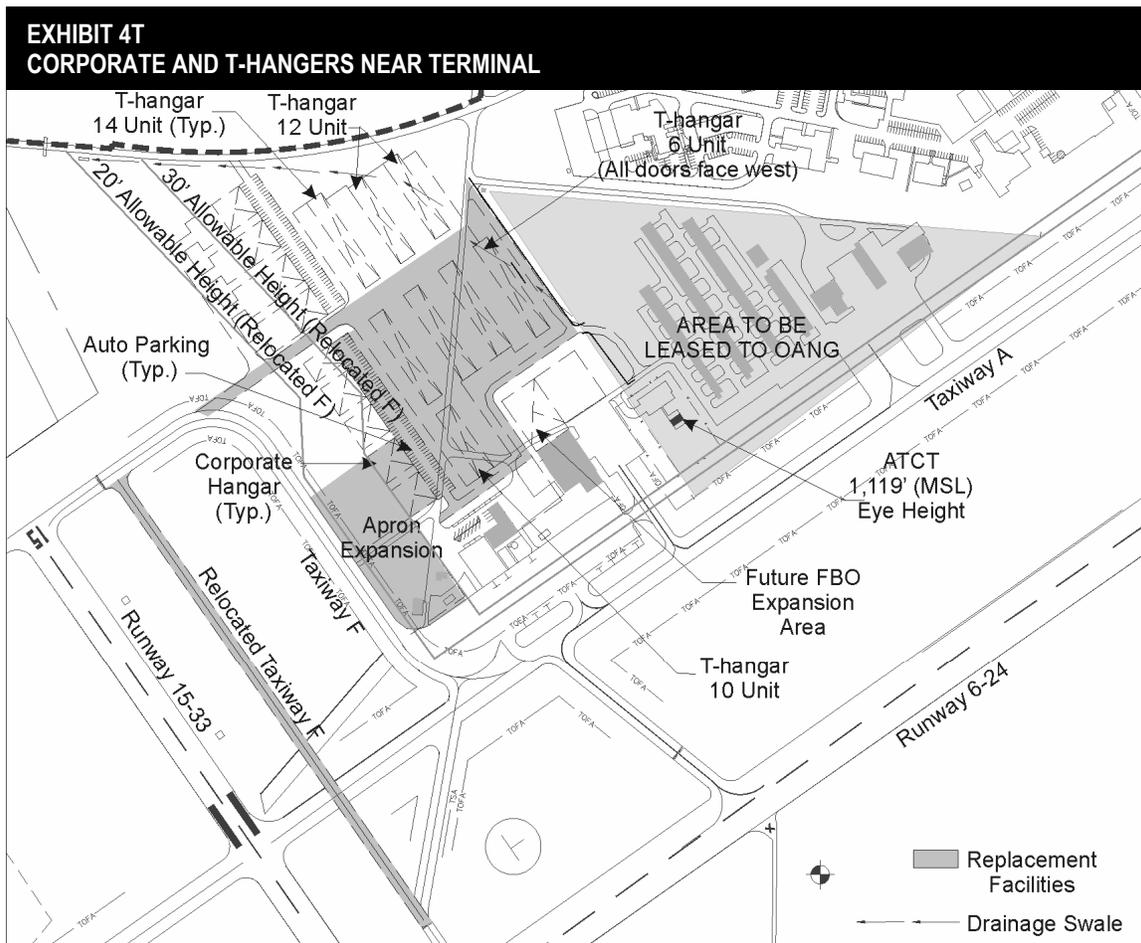
Proximity of new t-hangars to terminal building

Currently the closest t-hangars are located approximately 730 feet from the terminal building such that most tenants drive from the t-hangars to the terminal. It would be desirable to locate the t-hangars closer to the terminal and reduce the mix of vehicular and aircraft traffic.

Corporate and T-Hangars Near Terminal

In this alternative the wrap around apron is extended to provide apron frontage for the development of corporate hangars, as shown on **Exhibit 4T**. A total of 20,500 square yards of apron could be constructed with the relocation of

the weather station, electrical vault and fuel pumps to serve the corporate hangars as well as transient and based aircraft. T-hangars would be constructed to the east of the corporate hangars and taxiway access would be provided by extending the connector taxiway at the end of Runway 15. With this layout, up to 96 t-hangars could be constructed if the drainage swale is relocated along with providing sites for with up to nine corporate hangars. One row of the t-hangars, nearest the entrance road, is shown single sided and is envisioned to contain 6 larger units to accommodate larger twin engine or turboprop aircraft. All of the hangar doors face northeast or southwest. In this layout, the wrap around apron



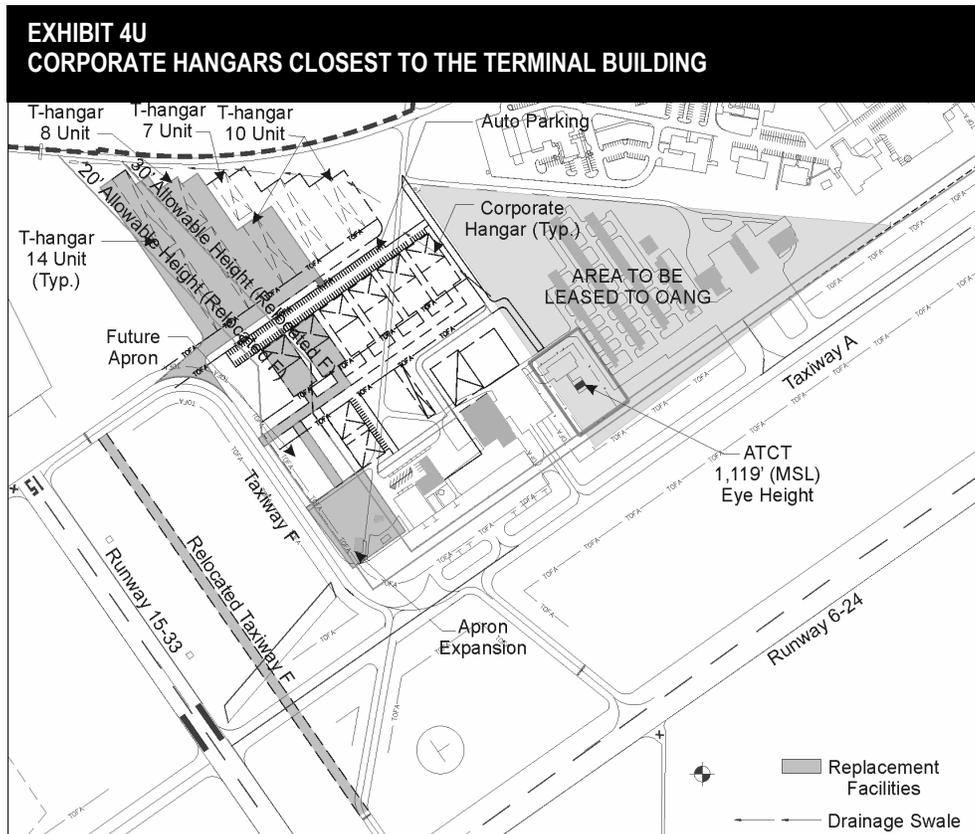
Source: Aerofinity, Inc., 2005.

and the four corporate hangars closest to the terminal building are dependent on the relocation of Taxiway F. One of the advantages of this layout is that both the corporate hangar area and t-hangar area start in close proximity to the terminal building, with the closest t-hangars only 100 feet from the terminal building. With this alternative, any expansion of the terminal building or city maintenance functions would need to occur in the vicinity of the terminal building or be incorporated in future t-hangar development.

hangars with southeast facing doors nearest the terminal building. Space has been preserved to expand the apron to the taxiway serving the corporate hangars, providing up to 12,600 square yards of apron with the relocation of the weather station, electrical vault and fuel pumps. This alternative provides 92 t-hangars, eight corporate hangars plus additional terminal building and City maintenance space can be accommodated. All of the hangar doors in this layout face northeast, southeast or southwest. The wrap around apron and three corporate hangars are dependent on the relocation of Taxiway F.

Corporate Hangars Closest to the Terminal Building

As shown on **Exhibit 4U**, this alternative includes a wrap around apron and additional corporate



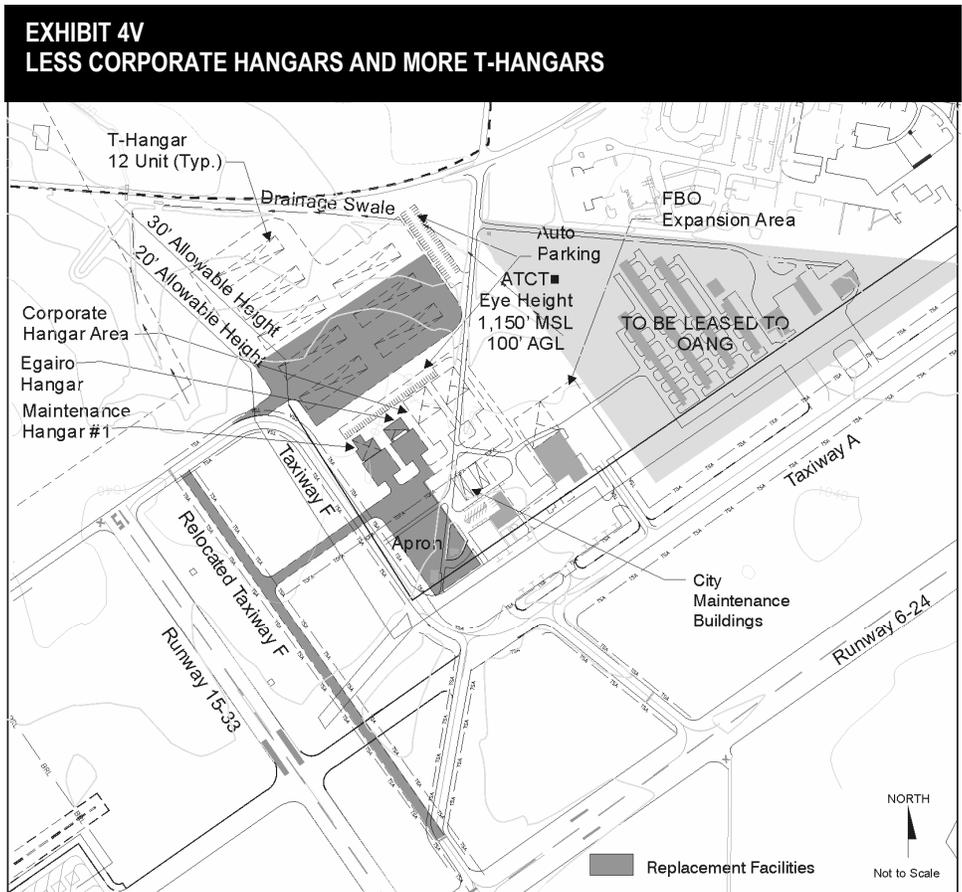
Source: Aerofinity, Inc., 2005.

The t-hangars are located approximately 790 feet from the terminal building, just slightly farther than the existing t-hangars. There is space to construct a stand-alone maintenance facility or expand both the terminal building and maintenance functions in the vicinity of the existing terminal building with this alternative.

Less Corporate Hangars and More T-Hangars

This alternative is shown in **Exhibit 4V** and consists of three corporate hangars constructed closest to the terminal building. The balance of the available development area is planned for t-hangars. This alternative provides up to 8,500 square yards of apron, 134 t-hangars, and three corporate hangars. The corporate hangar doors would face northeast, while the t-hangars doors

face northeast and southwest like the existing t-hangars. With the need to relocate the two corporate facilities currently located in the t-hangar area, there would be only one expansion corporate hangar site available in the general aviation terminal area. All additional corporate hangar development would need to occur in AirparkOhio, which may or may not be in the best interest of the future tenants and FBO. The closest t-hangars would be approximately 460 feet from the terminal building. With this alternative two of the three corporate hangars sites and one of the t-hangar sites along with the wrap around apron are dependent on the relocation of Taxiway F. Any expansion of the terminal building or city maintenance functions would need to occur in the vicinity of the terminal building or be incorporated in future t-hangar development with this alternative.



Source: Aerofinity, Inc., 2005.

Preferred General Aviation Replacement Facilities Layout

To identify the preferred alternative, the four factors that take into consideration the expansion potential and constructability were compared for the three alternatives, as summarized in **Exhibit 4W**. The Corporate and T-hangars Near Terminal and Corporate Hangars Closest to Terminal alternatives best meet the facility requirements forecast for the volume of corporate and t-hangars anticipated in the future. Also, if the OANG would change its plans and the existing t-hangars could remain, a more balanced future expansion would be beneficial. In addition, these alternatives provide the City the most flexibility to accommodate a variety of airport users with t-hangars and corporate hangars in the terminal area or self contained corporate hangar development in AirparkOhio.

Corporate and T-hangars Near Terminal is preferred general aviation terminal development. The City needs to relocate Taxiway F in the short-term to accommodate the wrap around apron expansion that is needed immediately. The relocation of Taxiway F also allows for the corporate hangar development near the terminal in this alternative. One of the primary advantages of this alternative is the ability to locate t-hangars and corporate hangars in close proximity to the terminal. Also, both the Egairo hangar, which also houses a flight school and the Mac Michael Avionics facility need apron area in addition to their actual hangar. Providing easily accessible apron area for the relocation of these two businesses would be easier with this alternative. While the relocation of Taxiway F is necessary, it also provides the most user-friendly alternative for long-term general aviation activity at Springfield-Beckley Municipal Airport.

**EXHIBIT 4W
COMPARISON OF ALTERNATIVES**

	Corporate and T-hangars Near Terminal	Corporate Hangars Closest to Terminal	Less Corporate and More T-hangars
Apron Expansion	Up to 20,500 syd	Up to 12,600 syd	Up to 8,500 syd
Total Facilities	96 t-hangars 8 corporate hangars	92 t-hangars 8 corporate hangars	134 t-hangars 3 corporate hangars
Construction Flexibility	apron and 4 corporate hangars dependent on Taxiway F relocation	apron and 3 corporate hangars dependent on Taxiway F relocation	apron, 2 corporate hangars and 1 t-hangar dependent on Taxiway F relocation
Proximity of T-hangars to Terminal*	100 feet	790 feet	460 feet

*Closest existing t-hangars approximately 730 feet from terminal building
Source: Aerofinity, Inc., 2005.

The estimated development cost for the preferred layout, Corporate and T-hangars Near the Terminal, is shown on **Exhibit 4X**, with replacement and 20-year facility requirements building out identified separately. The drainage swale would need to be rerouted or enclosed to

accommodate the 20-year facility requirements identified for t-hangar development. Another option is for the City to monitor the t-hangar versus corporate hangar development demands. If additional t-hangar development is needed, they could be developed in place of the corporate

EXHIBIT 4X PREFERRED SHARE EXISTING TERMINAL AREA ESTIMATES OF DEVELOPMENT COSTS	
Replacement Items	
Relocate Taxiway F	\$850,000
Relocate electrical vault (new building, existing equipment)	240,000
Extend Entrance Road	200,000
Replace unusable transient apron due to line-of-sight (5,600 syd of parking area)*	720,000
Replace t-hangars (site prep, parking lot, 58 units, taxilane)	3,160,000
Develop corporate hangar site (utilities, access road, parking lot)	290,000
Replace Maintenance Hangar #1 and apron	1,340,000
Replace Egairo hangar and apron	1,050,000
Fence new terminal area	170,000
Construct airport maintenance facility (8,000 sft)	1,310,000
Remodel terminal building (incorporate maintenance space into terminal space)	360,000
Demolition of t-hangars and pavement (5 acres)	390,000
Replacement Total	\$10,080,000
20-Year Facility Requirements Build Out	
Expand south corporate hangar area (apron and utilities)	590,000
Relocate terminal auto parking	220,000
Construct additional t-hangars (14 units, auto parking and access road)	890,000
Develop north corporate hangar area	280,000
Develop north corporate hangar apron	780,000
Construct additional t-hangars (12 units)	670,000
Expand terminal building (2,500 sft)	440,000
Construct additional t-hangars (12 units and drainage swale modification)	780,000
Facility Requirements Build Out Total	\$4,650,000
Grand Total	\$14,730,000

*assumes weather station relocated by OANG to new ATCT site
Source: Woolpert LLP, 2003, Aerofinity, 2005.

