



CHAPTER 5 - ALTERNATIVES OF AIRPORT DEVELOPMENT

5.01 Background

The master planning process defines the facility requirements of the airport to handle the forecast demand. After facility requirements have been determined, a series of alternative solutions to satisfy these needs are identified and tested. This chapter describes and evaluates alternative plans for proposed development at Cuyahoga County Airport. The purpose of this analysis is to develop a complement of airport facilities that can realistically accommodate the demands imposed upon the airport.

Alternatives to be considered include options for maintaining existing runway length (which is currently 5,102 feet). Several additional options consider providing additional runway lengths of 5,500 feet and 6,000 feet. Landside development opportunities are considered for general aviation and terminal area development. Section 5.05 at the end of this chapter summarizes and describes the recommended alternative and its principal benefits.

5.02 Evaluation Criteria

The alternative plans have undergone a comparative evaluation process using qualitative and quantitative factors. Ideally, the evaluation process would express all factors involved in terms of a common quantitative measure, such as dollar value or number of homes impacted by sound. Because of the difficulties inherent in expressing certain factors in quantifiable terms, the evaluation process must rely on the use of both quantitative and qualitative measures.

The alternatives evaluation process considered the following five categories as a basis for individual evaluation as well as for comparison purposes:

- Airport Design Standards
- Environmental Impacts
- Development Costs
- Facility Requirements
- Implementation Feasibility.



5.02-1 Airport Design Standards

FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, identifies the design standards to be maintained at the Airport. These design criteria provide a guide for airport designers to assure a reasonable amount of uniformity in airport landing facilities. Any criteria involving widths, gradients, separations of runways, taxiways, and other features of the landing area must necessarily incorporate wide variations in aircraft performance, pilot technique, and weather conditions. The FAA design standards provide for uniformity of airport facilities and also serve as a guide to aircraft manufacturers and operators with regard to the facilities that may be expected to be available in the future. Examples of improvements based on airport design standards would include the removal of an obstruction to air navigation, the grading of a runway safety area, or the addition of a parallel taxiway (to improve the aircraft traffic flow, limiting the time an aircraft must spend on the runway, both before takeoff and after landing).

SAFETY AREAS

Runways are surrounded by defined rectangular surface areas known as “runway safety areas.” These areas should have slopes ranging from 1% to 5% and, as discussed in FAA AC 150/5300-13, should be graded and free of obstructions to “enhance the safety of airplanes which undershoot, overrun, or veer off the runway, to minimize the probability of serious damage to airplanes accidentally entering the area, and to provide greater accessibility for fire fighting and rescue equipment during such incidents.” The applicable runway safety area (RSA) dimensions for Runway 6-24 are 500 feet wide centered on the runway centerline and 1,000 feet beyond each runway end.

OBJECT FREE AREAS

Runways are also surrounded by defined rectangular areas known as runway object free areas (ROFA). The ROFA must be clear of objects except those whose location is fixed by function. The purpose of the ROFA is to provide safe and efficient operations at the Airport. The applicable ROFA dimensions for Runway 6-24 are 800 feet wide centered on the runway centerline and 1,000 feet beyond each runway end.

RUNWAY TO TAXIWAY CENTERLINE SEPARATION DISTANCE

The runway to parallel taxiway centerline separation standard, for a precision instrument runway at an Airport Reference Code D-II airport, is 400 feet. This distance is related to airplane physical characteristics (such as wingspan) and is meant to ensure safe operations of aircraft on or near the active runway.



RUNWAY PROTECTION ZONES

The runway protection zone (RPZ) is an area beyond the runway end, trapezoidal in shape and centered on the extended runway centerline, with dimensions dependent upon the type of aircraft and approach visibility minimums associated with that runway end. The FAA recommends that airport owners exercise control of activities within the RPZs, preferably by acquiring sufficient property interest, through fee simple or aviation easement purchase. Land uses prohibited within the RPZ include residences and places of public assembly.

5.02-2 Environmental Impacts

This criterion is used to rate the airfield development alternatives on how they would affect the airport environment and the airport community. An environmental review of the possible impacts associated with each of the alternatives was undertaken as part of the rating process. This review included assessing how the environment could be affected by the proposed development, and to what degree (e.g., acres of wetlands impacts). Chapter 2 included a preliminary review of potential areas of environmental concern in the vicinity of the Airport.

5.02-3 Development Costs

This criterion is used to rate the runway development alternatives based on probable development cost.

5.02-4 Facility Requirements

This criterion is used to rate the runway development alternatives based on ability to satisfy the facility requirements identified in Chapter 4. Facility requirements are developed from an analysis of the demand and capacity requirements, and from geometric and other standards governing the design of airport components. Specific projects associated with the airfield development alternatives that are required to meet existing and future demand at the Airport include:

- Additional runway length
- Full length parallel taxiway
- Runway and taxiway edge lighting
- Full RSA standards
- Land and/or easement acquisition.



5.02-5 Implementation Feasibility

This criterion answers the question: What is the likelihood that this alternative will be implemented? The preferred development alternative must have the ability to be implemented through logical phases that meet the Airport's increasing requirements to the year 2025. Therefore, each alternative is rated on its feasibility for implementation, considering both quantitative and qualitative factors. These include factors such as the urgency of the need to address deficiencies and safety concerns, the degree of environmental impacts, community receptiveness, feasibility of needed land acquisition, and the sponsor's willingness to bear the development cost (along with funding from the FAA).

5.03 Airfield Development Alternatives

Analysis of various runway configurations at Cuyahoga County Airport is a critical element of this Master Plan Update study. Following the compilation of data for the inventory and forecast phases of the study effort and the selection of a design aircraft (background for determining facility requirements), thirty-five airfield development concepts, in addition to the No-Build alternative, were proposed for evaluation to assess the advantages and disadvantages of each. These options were developed as a result of meetings and discussions with the Airport's Technical and Community Advisory Committees, seven focus groups representing specific areas of interest and concerns, representatives of the Federal Aviation Administration, the Cuyahoga County Department of Development, and Airport management and staff.

Key issues examined for each alternative include airport safety improvements, current and potential aircraft operations, siting navigational equipment, land acquisition, noise impacts, road relocations required and traffic impacts, preliminary environmental review, and financial considerations. Selection of a preferred alternative is essential to determine additional airside and landside facility requirements.

This section presents alternative improvement scenarios for the airfield. A runway length analysis, provided in Section 4.09-2 of the August 2005 *Airport Master Plan Update Phase 1* report, examines the existing limitations and required facilities for accommodating the design aircraft (the family of business jets included in **Table 5-1** below) that operate at Cuyahoga County Airport. Based upon the user data, for the business jets using Cuyahoga County Airport with the destinations served, the existing runway length is a constraint on their ability to operate. At a length of 6,000 feet, the critical aircraft needs would be substantially met. Additional runway length would provide operators with an increased safety margin and more efficient operations by reducing the number of diversions and extra fuel stops, making Cuyahoga County Airport capable of handling tenants' operational needs in a wider range of weather conditions.



**TABLE 5-1
RUNWAY LENGTH REQUIREMENTS AT MEAN MAXIMUM DAILY TEMPERATURE (81.4° F)**

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

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

² 30° C wet runway

³ ½" slush

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

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

⁶ Includes all operations by HS125 aircraft types.

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

Source: Cuyahoga County Airport corporate operators, 2005.

The analysis of the runway development alternatives generally includes the following:

- A description of each runway alternative and associated taxiway development, identifying any required land acquisition,
- Evaluation of the feasible alternatives, including an analysis of impacts associated with each alternative, and
- Recommendation and justification for a preferred runway alternative.

The following sections describe the proposed development for each of the alternatives. **Figures 5-1 through 5-36** (included in this chapter following the description of each alternative) illustrate each of the airfield alternative concepts that were considered. All of the airfield development alternatives include a full length parallel taxiway, associated lighting, and required pavement markings, in accordance with FAA AC 150/5300-13, Change 9, for an Airport Reference Code of D-II.



The following assumptions and guidelines were applied for each of the development alternatives:

- For each alternative, assume all grades will be to FAA standards.
- For all but the No Action alternative, assume the stopway will be removed.
- For master planning purposes, assume that dimensions for runway object free areas (ROFAs) as well as runway safety areas (RSAs) must be standard (even though, for some alternatives, an FAA modification of standard (MOS) for the small triangular area of non-compliant ROFA at the Runway 6 end could avoid losing 100 feet of runway at that end).
- For all but the No Action alternative, assume that the runway centerline-to-taxiway centerline dimension must be standard (i.e., 400 feet).
- Dimensions for P and R are the same (per FAA AC 150/5300-13, Change 8, Table 3-3, footnote 5). Therefore, if P (RSA length) is 600 feet prior to landing, then R (ROFA length) is 600 feet prior to landing. When the assumption is that the RSA dimension will be 600 feet prior to landing, then the RSA and ROFA must be 1,000 feet on the rollout end of the runway (i.e., there will be different thresholds for the runway). This places the runway environment in a position that declared distances may be applied to meet the applicable airport design standards.
- A standard engineered materials arresting system (EMAS) installation, proposed for some of the alternatives, requires a 350-foot length (275-foot bed length and 75-foot lead-in). A standard EMAS provides a level of safety, primarily for aircraft overruns, that is generally equivalent to a full RSA built to the dimensional standards in FAA AC 150/5300-13. It also provides an acceptable level of safety for undershoots.
- The landing length listed in the table for each runway alternative is the landing distance available (LDA); the takeoff length is the accelerate-stop distance available (ASDA) as defined in Appendix 14 of FAA AC 150/5300-13. *Landing distance* is defined as the distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors. *Landing distance available (LDA)* is the length of runway declared available and suitable for satisfying landing distance requirements. *Accelerate-stop distance* is defined as the distance to accelerate from brake release to takeoff decision speed and then decelerate to a stop, plus safety factors. The *accelerate-stop distance available (ASDA)* is the length of runway plus stopway declared available and suitable for satisfying accelerate-stop distance requirements.



- The following criteria were used in order to lay out the alignment of the roads affected by the various alternatives: The minimum radius of a curve on Richmond Road and White Road was assumed to be 500 feet, and 400 feet on Bishop Road. This value is in line with the area speed limits and road classifications. When possible, the radius of each curve was increased in order to give a smoother transition to the modified alignment. Generally, vehicular traffic flows better and accident rates are reduced when the radius of a curve is increased. Without detailed elevation information, vertical curvature was not considered. In the alternatives where a realigned road met an existing road, the intersection was made to be perpendicular. This is standard highway design practice to minimize the number of accidents caused by the limited or obstructed sight distance that can occur at a skewed intersection.

Table 5-2, Matrix for Comparing Airfield Development Alternatives, presents the data that has been developed for comparison of the airfield alternatives. The matrix provides a means of reviewing and comparing the probable project costs and environmental impacts for the proposed airfield development alternatives. Scores for each of the five evaluation criteria, on a scale of one (lowest or worst) to five (highest or best), and scoring totals are provided for those alternatives for which noise modeling and project cost estimates have been prepared.

Noise modeling has been completed for the No Action alternative, for Alternative 8, the declared distances alternative for maintaining the existing runway length, and for ten additional alternatives, each of which provides the 6,000-foot runway length identified in the facility needs analysis.

Figure 5-37, the Environmental Inventory Map, depicts areas of environmental concern in the vicinity of the Airport. The mapping includes wetlands, floodplains, public recreation areas, and historic resources.

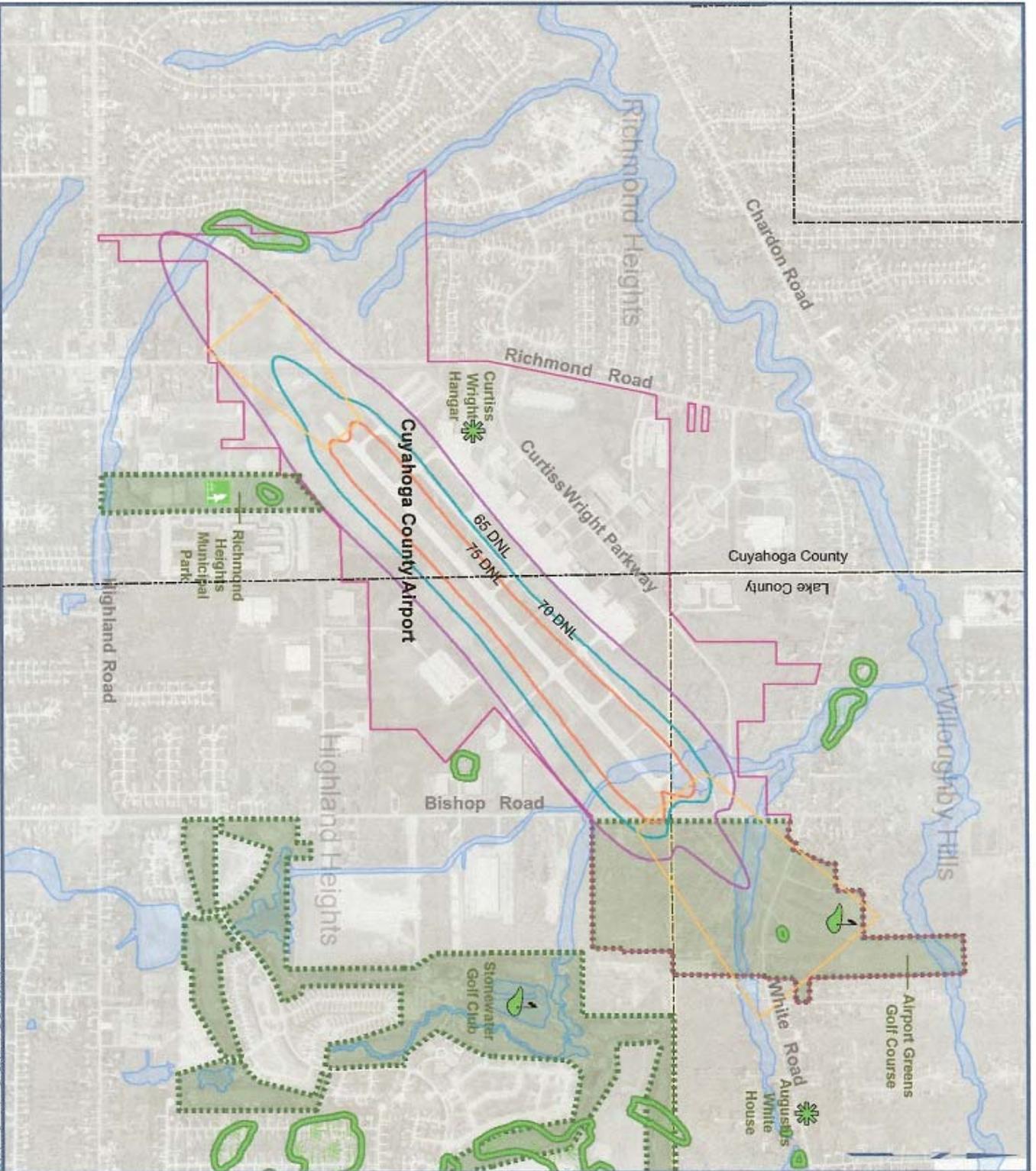


Cuyahoga County Airport Master Plan Update
TABLE 5-2: Matrix for Comparing
Artfield Development Alternatives

Alternative	Scoring on scale of 1 (worst) to 5 (best):										TOTAL SCORE					
	Road Relocation Required (length)	Noise Impacts: Residential Units within 65 DNL	Noise Impacts: Institutional Uses within 65 DNL (units)	Noise Impacts: Institutional Uses within 65 DNL (acres)	Total Acreage within 65 DNL	Environmental Impacts: Wetlands (acres)	Environmental Impacts: Floodplains (acres)	Environmental Impacts: Historic Properties	Environmental Impacts: 4(f) Resource Avoidance	Probable Project Costs (millions)		Environmental Impacts	Comply with Airport Design Standards	Satisfy Airport User Needs (Facility Requirements)	Probable Project Costs	Implementation Feasibility
Alt. 1: No Action	0	17	5	0.5	293	0	2	N	Y	-	5	1	1	5	1	13
Alt. 2: Fully Compliant RCMs w/o Extending RW	0	-	-	-	-	0	2	N	Y	-	5	1	1	5	1	17
Alternatives for Maintaining Existing Runway Length (5,102 feet)																
Alt. 3: RW Reorientation and/or Relocation	950'	-	-	-	-	0	9	N	N	-	-	-	-	-	-	-
Alt. 4: RW 6 Shift to West (Relocate Richmond Rd.)	4,080'	-	-	-	-	0	2	N	Y	-	-	-	-	-	-	-
Alt. 5: RW 24 Shift to East (Relocate Bishop Rd.)	4,200'	-	-	-	-	0	4	N	N	-	-	-	-	-	-	-
Alt. 6: RW 24 Shift to East (Tunnel Bishop Rd.)	3,000'	-	-	-	-	0	4	N	N	-	-	-	-	-	-	-
Alt. 7: Road Relocations of Both Runway Ends	5,900'	-	-	-	-	0	3	N	N	-	-	-	-	-	-	-
Alt. 8: Declared Distances	0	17	5	0.7	293	0	3	N	Y	\$6.0	5	1	1	5	1	17
Alt. 9: EMAS of Runway 6 End	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 10: EMAS of Runway 24 End	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 11: EMAS of Both Runway Ends	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 12: Combination of RW 24 Shift to West & RW 6 EMAS	2,050'	-	-	-	-	0	3	N	N	-	-	-	-	-	-	-
Alt. 13: Combination of RW 4 Shift to West & RW 24 EMAS	2,450'	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 14: Combination with Displaced Threshold	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alternatives for Providing 5,500-foot Runway																
Alt. 15: Runway Reorientation and/or Relocation	8,900'	-	-	-	-	0	4	N	N	-	-	-	-	-	-	-
Alt. 16: RW 6 Ext. to West (Relocate Richmond Rd.)	3,950'	-	-	-	-	0	2	N	Y	-	-	-	-	-	-	-
Alt. 17: RW 24 Ext. to East (Relocate Bishop Rd.)	4,900'	-	-	-	-	0	6	N	N	-	-	-	-	-	-	-
Alt. 18: RW 24 Ext. to East (Tunnel Bishop Rd.)	3,000'	-	-	-	-	0	4	N	N	-	-	-	-	-	-	-
Alt. 19: Road Relocations of Both Runway Ends	6,850'	-	-	-	-	0	4	N	N	-	-	-	-	-	-	-
Alt. 20: Declared Distances	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 21: EMAS of Runway 6 End	0	-	-	-	-	0	3	N	N	-	-	-	-	-	-	-
Alt. 22: EMAS of Runway 24 End	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 23: EMAS of Both Runway Ends	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alt. 24: Combination of RW 24 Shift to West and RW 6 EMAS	3,300'	-	-	-	-	0	3	N	N	-	-	-	-	-	-	-
Alt. 25: Combination with Displaced Threshold	0	-	-	-	-	0	3	N	Y	-	-	-	-	-	-	-
Alternatives for Providing 6,000-foot Runway																
Alt. 26: Runway Reorientation and/or Relocation	2,100'	-	-	-	-	0.2	3	N	Y	\$117.4	2	5	5	1	1	14
Alt. 27: RW 6 Ext. to West (Tunnel Richmond Rd.)	1,250'	65	3	2.2	289	0	5	N	Y	\$99.4	1	5	5	3	1	15
Alt. 28: RW 24 Ext. to East (Relocate Bishop Rd.)	7,200'	7	0	0	290	0	8	N	N	\$34.0	3	5	5	3	1	19
Alt. 29: RW 24 Ext. to East (Tunnel Bishop Rd.)	4,950'	7	0	0	290	0	8	N	N	\$43.5	3	5	5	3	4	20
Alt. 30: Road Relocations of Both Runway Ends	8,950'	18	2	1.1	289	0	3	N	N	\$26.1	2	5	5	4	3	19
Alt. 31: Declared Distances	2,900'	6	1	0.3	290	0	5	N	N	\$39.8	3	5	5	3	4	20
Alt. 32: EMAS of Runway 6 End (Tunnel Bishop Rd.)	3,300'	11	1	0.6	289	0	3	N	Y	\$41.6	3	5	5	3	3	19
Alt. 33: EMAS of Runway 24 End	1,250'	22	2	1.6	289	0	3	N	Y	\$37.9	2	5	5	3	3	18
Alt. 34: EMAS of Both Runway Ends	2,450'	11	1	0.6	289	0	5	N	N	\$99.8	3	5	5	4	3	20
Alt. 35: Combination of RW 24 Ext. and RW 6 EMAS	4,300'	11	1	0.6	289	0	5	N	N	\$25.4	3	5	5	4	2	19
Alt. 36: RW 6 Ext. to West (Relocate Richmond Rd.)	3,950'	65	3	2.2	289	0	5	N	Y	\$27.3	1	5	5	4	2	17

NOTE: Land Acquisition Costs include cost to acquire land, standard relocation package costs, and services cost based on most recently updated assessments in Latah County and Cuyahoga County.





Cuyahoga County Airport

Legend

- Historical Resources
- Park
- Golf Course
- 4(f) Resource
- Airport Property Line
- Floodplains
- Wetlands
- Runway Protection Zone
- 65 DNL Noise Contour
- 70 DNL Noise Contour
- 75 DNL Noise Contour

Note:
Noise Contours shown are for year 2025



Figure 5-37
Environmental Inventory Map





Construction costs have been estimated for Alternative 8 and for Alternatives 26 through 36, the eleven alternatives that meet the runway length requirement. These probable construction costs are provided on Table 5-2. Land acquisition, either by easement or fee simple, is proposed within runway protection zones beyond each runway end or where the proposed airport development extends off airport property. **Table 5-3** compares the numbers of parcels and total acreage of affected parcels associated with each of the alternatives for which construction costs have been prepared. For each of these alternatives, the total number of parcels affected and the total of acreage involved are identified by land use category.

**TABLE 5-3
LAND ACQUISITION COMPARISON: AFFECTED PARCELS AND ACREAGE**

Alternatives	8	26	27	28	29	30	31	32	33	34	35	36
Parcels												
Unknown	0	2	0	0	0	0	0	0	0	0	0	0
Commercial	0	4	1	0	0	2	0	0	1	0	0	1
Industrial	0	1	0	0	0	0	0	0	0	0	0	0
Recreational	2	3	0	0	2	2	2	2	0	2	2	0
Residential	6	51	39	42	38	15	34	24	15	20	22	39
Vacant	2	11	1	4	2	4	2	4	1	2	4	1
Institutional	1	1	1	1	1	1	1	1	1	1	1	1
Total	11	73	42	47	43	24	39	31	18	25	29	42
Acreage												
Unknown	0	15	0	0	0	0	0	0	0	0	0	0
Commercial	0	20	3	0	0	5	0	0	3	0	0	3
Industrial	0	26	0	0	0	0	0	0	0	0	0	0
Recreational	1	71	0	0	1	1	1	1	0	5	1	0
Residential	10	40	27	56	46	36	47	41	28	37	45	27
Vacant	8	23	1	17	4	20	4	10	1	8	20	1
Institutional	4	4	1	4	4	4	4	4	4	4	4	1
Total	23	199	32	77	55	66	56	56	36	54	70	32

Source: C&S Engineers, Inc., 2006.





Land acquisition costs (based upon assessed value provided by local municipalities) and noise mitigation costs have been prepared separately from probable construction costs. Land acquisition costs include the cost to acquire land, standard relocation package costs, and services costs. For this preliminary project cost comparison, it is assumed that all parcels within the RPZs will need to be acquired in fee simple. Costs for noise mitigation assume a per unit cost of \$47,000 (including design, construction, and inspection) for residences within the 65 DNL. **Table 5-4** provides a preliminary project cost comparison and identifies construction, land acquisition, and noise mitigation costs for each of the 12 alternatives.

**TABLE 5-4
PRELIMINARY PROJECT COST COMPARISON (million dollars)**

Alternatives	Construction Cost	Land Acquisition Cost ¹	Noise Mitigation Cost ²	Total Preliminary Project Cost
8	\$3.2	\$2.0	\$0.8	\$6.0
26	\$70.7	\$46.7	n/a	\$117.4
27	\$29.2	\$8.7	\$1.5	\$39.4
28	\$21.4	\$12.4	\$0.2	\$34.0
29	\$32.0	\$11.3	\$0.2	\$43.5
30	\$20.1	\$5.5	\$0.5	\$26.1
31	\$29.3	\$10.3	\$0.2	\$39.8
32	\$34.0	\$7.2	\$0.4	\$41.6
33	\$33.4	\$3.9	\$0.6	\$37.9
34	\$23.3	\$6.1	\$0.4	\$29.8
35	\$18.4	\$6.7	\$0.3	\$25.4
36	\$17.1	\$8.7	\$1.5	\$27.3

¹ Total of assessed value of parcels that are partially or wholly within RPZs and areas of proposed development plus standard relocation package costs and services costs.

² Cost for noise mitigation for noise sensitive uses within the 65 DNL (@ \$47,000 per residential unit)

Note: Totals may vary due to rounding.

Source: C&S Engineers, Inc., 2006.

Thirty-six potential airfield alternatives identified earlier in the study as suitable for evaluation are presented in the following sections.





5.03-1 Alternative 1: No Action

Alternative 1, as illustrated in **Figure 5-1**, would involve no facility alteration or construction of a new runway. This alternative has non-standard safety areas and object free areas on both runway ends. There are no construction costs associated with this alternative which does not comply with current FAA standards.

Alternative 1 is generally described as follows:

- Non-standard RSAs and ROFAs at both runway ends
- 5,102-foot runway length available for takeoffs on Runway 6
- 5,102-foot runway length available for takeoffs on Runway 24

Usable runway length:

	Runway 6	Runway 24
Landing length	5,102'	5,102'
Takeoff length	5,102'	5,102'

Overall length: 5,102'

Does Alternative 1

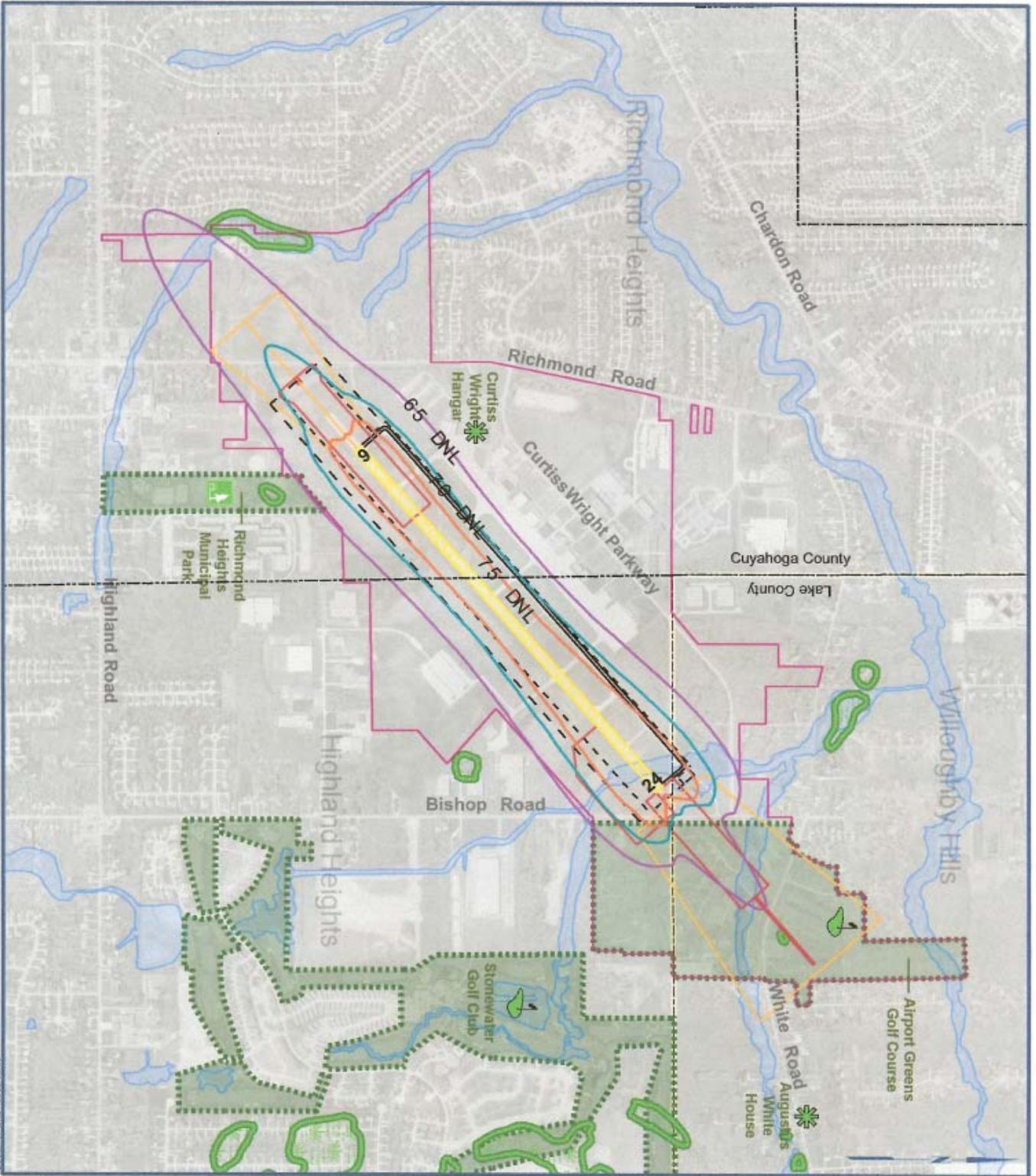
Comply with FAA airport design standards? No

Satisfy Airport user needs (provide sufficient runway length)? No

Should Alternative 1 be considered for further study? Yes

Alternative 1 fails to meet the demonstrated runway length requirements, as discussed above. When a future runway rehabilitation or construction project will be undertaken, all current design standards must be met. In effect, the runway length would be reduced by 100 feet to provide the standard RSA dimensions at the Runway 6 end and by 1,000 feet to provide the standard RSA dimensions at the Runway 24 end. Although Alternative 1 does not meet the project’s needs or purpose of providing 6,000 feet of usable runway and standard safety areas on both ends, it will be retained for further evaluation for comparison purposes.





Cuyahoga County Airport

LEGEND

- Existing runway to remain
- Existing pavement to be removed
- New runway or runway extension
- Site requirements for NAVAIDS
- Runway safety area
- Runway object free area
- Runway protection zone
- Airport property line
- Tunnelled road
- Relocated road
- Wetlands
- Floodplains
- 4(f) Resource
- Golf Course
- Park
- Historical Resources

SUMMARY

- * Non-standard RSAs and ROFAs at both runway ends
- * 5,102-foot runway length available for takeoffs on Runway 6
- * 5,102-foot runway length available for takeoffs on Runway 24
- * Noise contours shown are for Year 2025

Usable Runway Length

Runway	6	24
Landing Length	5,102	5,102
Departure Length	5,102	5,102
Overall Length	5,102	



Figure 5-1
Alternative 1
No Action





5.03-2 Alternative 2: Fully Compliant RSAs without Extending Runway (Reduction in Runway Length)

Alternative 2, as illustrated in **Figure 5-2**, would involve no facility alteration or construction of a new runway. However, this alternative imposes standard safety areas on both runway ends, resulting in a loss of usable runway length. A loss of any additional runway length will further restrict airport operations and adversely affect the airport’s ability to serve effectively in its role as part of the national aviation system. The costs involved for this alternative would be for construction costs associated with reducing the usable runway length (e.g., pavement markings, runway lighting modifications, etc.).

Alternative 2 is generally described as follows:

- RSA grading improvements to meet standards
- Remove stopway
- Runway 6 end moves northeast 100 feet
- Runway 24 end moves southwest 1,000 feet
- Runway length reduced to 4,002 feet
- Standard RSA and ROFA beyond both runway thresholds
- 4,002-foot runway length available for takeoffs on Runway 6
- 4,002-foot runway length available for takeoffs on Runway 24

Usable runway length:

	Runway 6	Runway 24
Landing length	4,002'	4,002'
Takeoff length	4,002'	4,002'

Overall length: 4,002'

Does Alternative 2

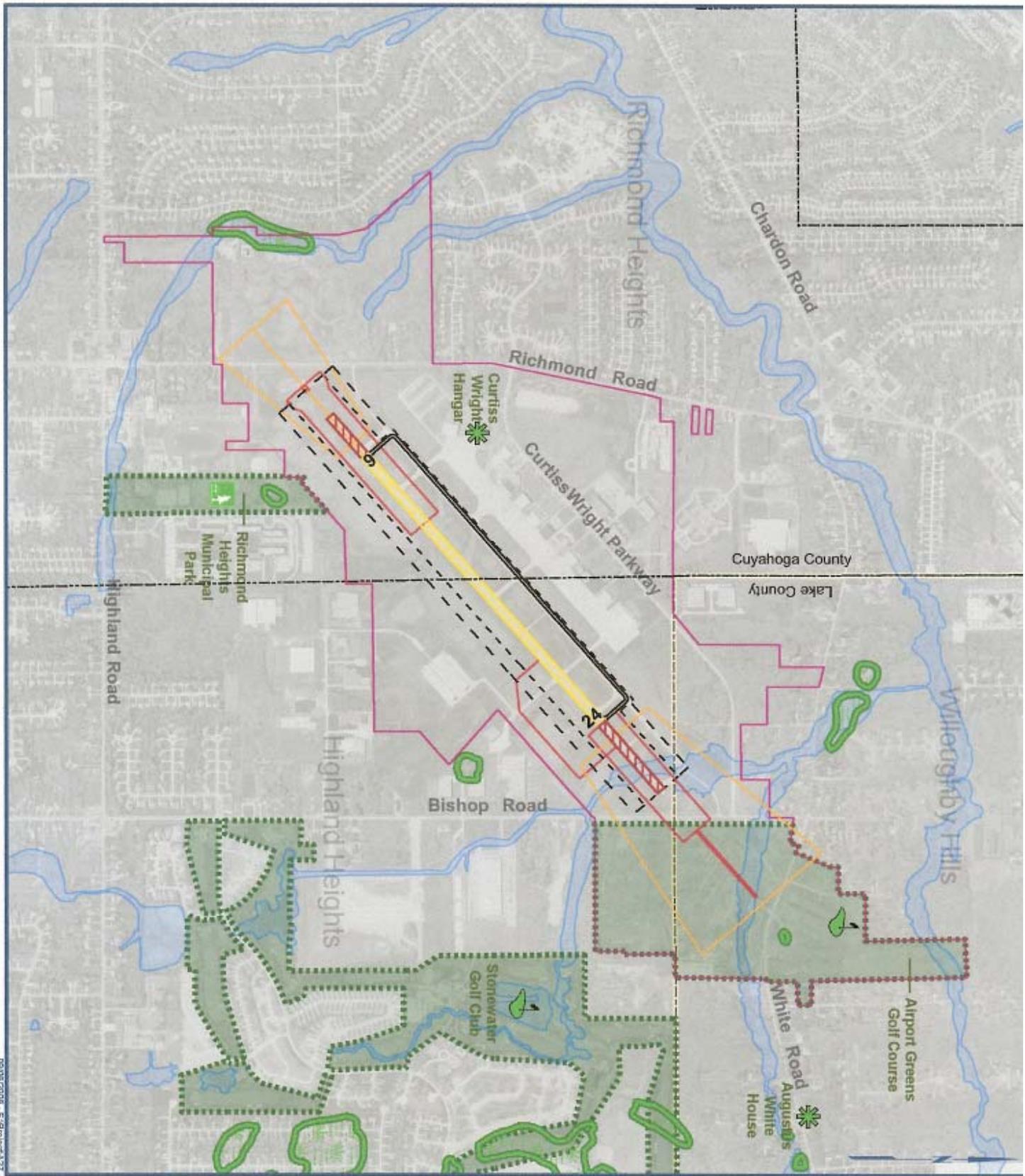
Comply with FAA airport design standards? Yes

Satisfy Airport user needs (provide sufficient runway length)? No

Should Alternative 2 be considered for further study? No

Alternative 2 fails to meet the facility requirements (i.e., runway length as stated in the Phase 1 Report, page 4-22, and as discussed above). When a future runway rehabilitation or construction project will be undertaken, all current design standards must be met. In effect, the existing runway length would be reduced by 1,100 feet to provide the standard RSA dimensions at both ends of Runway 6-24. Alternative 2 is considered to be an alternative that cannot be justified from a planning perspective and will be dismissed from further consideration.





Cuyahoga County Airport

LEGEND

- Existing runway to remain
- Existing pavement to be removed
- New runway or runway extender
- Site requirements for NAAI/DS
- Runway safety area
- Runway object free area
- Runway protection zone
- Airport property line
- Turned road
- Relocated road
- Wetlands
- Floodplains
- 4(f) Resource
- Golf Course
- Park
- Historical Resources

SUMMARY

- Runway 6 end moves 100 feet NE
- Runway 24 end moves 1,000 feet SW
- Runway length reduced to 4,002 feet
- Standard RSA and ROFA beyond both runway thresholds
- 4,002-foot runway length available for takeoffs on Runway 6
- 4,002-foot runway length available for takeoffs on Runway 24

Usable Runway Length

Runway	6	24
Landing Length	4,002'	4,002'
Departure Length	4,002'	4,002'
Overall Length	4,002'	4,002'



Figure 5-2
Alternative 2

Fully Compliant RSAs
(Reduction In Runway Length)





5.03-3 Alternative 3: Runway Reorientation and/or Relocation

Alternative 3, as illustrated in **Figure 5-3**, would involve a new runway orientation in an east-west alignment that could be constructed partially within the existing airport property boundary.

Alternative 3 is generally described as follows:

- RSA grading improvements to meet standards
- Runway reoriented in east-west alignment
- Standard RSA and ROFA beyond both runway thresholds
- Requires tunneling Bishop Road
- 5,102-foot runway length available for takeoffs on Runway 6
- 5,102-foot runway length available for takeoffs on Runway 24

Usable runway length:

	Runway 6	Runway 24
Landing length	5,102'	5,102'
Takeoff length	5,102'	5,102'

Overall length: 5,102'

Does Alternative 3

- Comply with FAA airport design standards?* Yes
- Satisfy Airport user needs (provide sufficient runway length)?* No

Should Alternative 3 be considered for further study? No

A benefit of a reoriented runway may be to achieve better alignment with prevailing winds or additional runway length. Each of the runway reorientation alternatives (3, 15 and 26) was laid out to accommodate a specific runway length while using existing airport-owned property as much as possible and involving the least environmental impacts. (On each reorientation figure, for the purpose of visually comparing impact areas, the footprint of the affected area for all three runway lengths is shown, with a solid line representing the RPZ at the length under consideration for that alternative, and RPZs ghosted in with dotted lines for the other runway lengths.)

To evaluate wind coverage at various runway orientations, an analysis based upon up-to-date wind data (period covered: 1994-2003) has been prepared in an attempt to determine an optimal orientation; however, it should be noted that this data is for observations taken at Cleveland Hopkins and may have somewhat limited applicability. The results of the analysis demonstrate that improved wind coverage varies according to conditions (i.e., wind coverage at a certain orientation may be better for IFR operations but not for VFR). See the wind analysis table included in





Appendix C for a comparison of wind coverage for existing and reoriented runway alignments. No orientation stood out as generally better under all conditions than the existing.

Construction of a new runway at a different orientation would require a total reconstruction of the runway, parallel taxiway, all connecting taxiways and significant infrastructure modifications, increasing overall project costs dramatically. In addition, it would require the airport to be closed for a minimal period of 18 to 24 months to accommodate the required construction activity. The number of based aircraft that would have to be relocated temporarily would include nearly 200 fractional ownership aircraft and over 100 traditional based aircraft at current levels. Because of the Airport's role as a reliever, an extended temporary closure could adversely affect other airports in the region. The unreasonableness of this alternative is based in part on the significant disruption to the airport's ability to function during the construction phase, and the economic impact to the airport to operate as a business, as well as the resulting economic effects to the community. Finally, this alternative maintains the existing runway length but does not meet the demonstrated runway length requirements discussed earlier.



5.03-4 Alternative 4: Runway 6 Shift to West (Relocate Richmond Road)

Alternative 4, as illustrated in **Figure 5-4**, would maintain the existing runway length. This alternative involves shifting the Runway 6 end to the west and realigning Richmond Road to clear the extended runway safety area and runway object free area.

Alternative 4 is generally described as follows:

- RSA grading improvements to meet standards
- Remove stopway
- Extend Runway 6 end 1,000 feet (includes converting 500-foot stopway to runway)
- Close 1,000 feet at Runway 24 end
- Reroute Richmond Road
- Standard RSA and ROFA beyond both runway thresholds
- 5,102-foot runway length available for takeoffs on Runway 6
- 5,102-foot runway length available for takeoffs on Runway 24

Usable runway length:

	Runway 6	Runway 24
Landing length	5,102'	5,102'
Takeoff length	5,102'	5,102'

Overall length: 5,102'

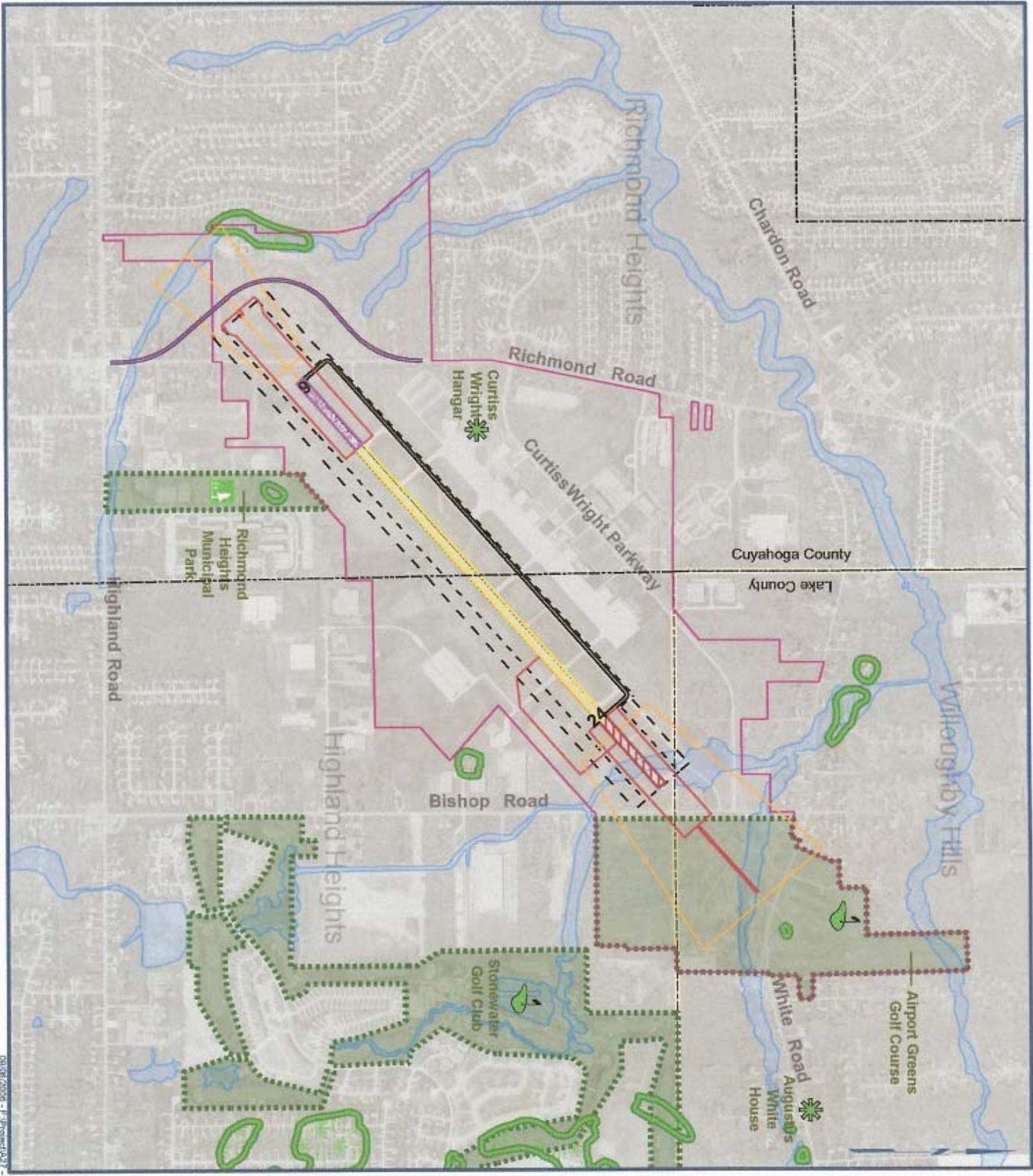
Does Alternative 4

<i>Comply with FAA airport design standards?</i>	Yes
<i>Satisfy Airport user needs (provide sufficient runway length)?</i>	No

<i>Should Alternative 4 be considered for further study?</i>	No
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Alternative 4 fails to meet the demonstrated runway length requirements, as discussed above. Alternative 4 is considered to be an alternative that cannot be justified from a planning perspective and will be dismissed from further consideration.





Cuyahoga County Airport

LEGEND

- Existing runway to remain
- Existing pavement to be removed
- New runway or runway extension
- Site requirements for NAVAIDS
- Runway safety area
- Runway object free area
- Runway protection zone
- Airport property line
- Tunnelled road
- Relocated road
- Wetlands
- Floodplains
- 4(f) Resource
- Golf Course
- Park
- Historical Resources

SUMMARY

- Extend Runway 6 and 1,000 feet (includes converting 500 foot stopway to runway)
- Close 1,000 feet at Runway 24 end
- Reprofile Richmond Road
- Standard RSA and ROFA beyond both runway thresholds
- 5,102-foot runway length available for takeoffs on Runway 6
- 5,102-foot runway length available for takeoffs on Runway 24

Usable Runway Length		
Runway	6	24
Landing Length	5,102'	5,102'
Departure Length	5,102'	5,102'
Overall Length	5,102'	



Figure 5-4
Alternative 4
Runway 6 Shift to West
 (Relocate Richmond Road)