Section 1 - Introduction

This report describes the development and analysis of concept alternatives that would accommodate the projected aviation activity and facility requirements identified in the Draft *Projections of Aeronautical Activity*[1] and the Draft *Demand/Capacity Analysis & Facility Requirements*[2] for the Inaugural Airport Program (IAP) at South Suburban Airport (SSA). The IAP is a proposal by the Illinois Department of Transportation (IDOT) for the planning, design, and construction of a start-up airport at the SSA site in eastern Will County, Illinois. This report contains separate analyses developed to identify alternatives for the following airport development elements: Airfield, Landside Access, and Passenger Terminal Facilities. Alternatives have been identified for the IAP that are planned to occur from the Date of Beneficial Occupancy (DBO), the opening day of the Inaugural Airport, through DBO+5, or the end of the fifth year after DBO. Consideration has also been given for facilities required through the twenty-year forecast period, or DBO+20. In addition, airfield terminal and landside access alternatives were analyzed for the ultimate phase of potential development at SSA.

Previous planning studies completed by IDOT for SSA examined the potential future need for an air carrier facility in the Chicago region capable of accommodating four simultaneous precision instrument approaches, as discussed in the Draft *Demand/Capacity Analysis & Facility Requirements* Report. An ultimate plan for SSA was developed and analyzed during the *Phase 1 Engineering Study*[3]. The major planning objectives considered by IDOT in developing the potential future ultimate airport development were:

- Meet future regional aviation demand;
- Ensure adequate capacity to satisfy potential regional aviation demand;
- Ensure operational efficiency;
- Operate the future airport in an environmentally sensitive and responsible manner; and
- Build a safe and secure airport.

These planning goals were re-validated by IDOT as important guidelines for the development of the concept alternatives contained in this report, which started with the validation of the preferred airfield alternative identified in the *Phase 1 Engineering Study*. As stated in the Draft *Demand/Capacity Analysis & Facility Requirements*[4], IDOT is preserving the option of constructing an airport capable of handling up to four simultaneous precision instrument approaches under All-Weather conditions. In order to ensure that development of the IAP would not preclude the future potential development of a parallel runway system capable of handling four simultaneous precision instrument approaches under All-Weather conditions, alternatives for the ultimate airfield concept were analyzed first.

Thus, this report begins with an evaluation of the ultimate airfield and landside concept alternatives relative to the *Phase I Engineering Study* (see Section 2). The report then proceeds to identify and evaluate alternatives for the major design components of the airfield, passenger terminal and landside access. Once each of these facets are evaluated and compared, the resultant preferred alternatives first

[1] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.
[2] Draft *Demand/Capacity Analysis & Facility Requirements for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, March 2005.
[3] *Summary Draft, Phase 1 Engineering Report,* Illinois Department of Transportation, September 1997.
[4] Draft *Demand/Capacity Analysis & Facility Requirements for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, March 2005.

create the basis for the preferred ultimate airport concept (post-DBO+20) and subsequently the preferred Inaugural airport concept (DBO+5). In a presentation to the Local Advisory Group (see Appendix, Exhibit 50) the sponsor demonstrated the process by which alternatives are identified, evaluated, ranked and a preferred concept selected for each component of the airport. The presentation further shows how the sponsor selected the best components into an overall master plan concept that optimizes all facets of the airport. This report will include a preferred airport concept for the Intermediate airport (DBO+20) also. All three phases of the airport will include discussion of the concept alternatives for support/ancillary facilities such as air cargo, corporate/general aviation, ATCT and other functions based on the requirements contained in the Demand/Capacity and Facility Requirements report.

1.1 Background

During the ongoing development of the IAP SSA Master Plan, IDOT has received input through its public involvement process. In addition, the Abraham Lincoln National Airport Commission (ALNAC) and the County of Will, Illinois (County) have provided to IDOT their proposed airport development plans. Besides providing technical input, both of these entities have approached IDOT about being an airport co-sponsor.

The County has indicated that they will follow IDOT's lead throughout the master planning and environmental process and to date has not proposed specific concepts for the ultimate or inaugural airport. ALNAC, on the other hand, has developed very specific concepts for the inaugural airport, which were submitted to IDOT as an alternative for consideration. Their alternative is commercially based and proposes to accomplish development through a public-private partnership to be financed with private equity and bonds, and no federal Airport Improvement Program (AIP) funds.

ALNAC is a local airport authority that was formed through an Intergovernmental Agreement between its constituent members, comprised of 32 Illinois municipalities located within the Chicago region. ALNAC publicly solicited private entities to build and finance a commercial airport at the site approved by FAA in their Record of Decision on the Tier 1 Environmental Impact Statement[5]. After evaluation of proposals submitted in response to their solicitation, ALNAC selected the joint venture of SNC-Lavalin America/LCOR Inc. as its private development partner.

ALNAC and its private partners submitted a comprehensive airport alternative concept to IDOT in July 2004. Due to their financing proposal, ALNAC believes that their alternative offers the flexibility to provide for optimum land utilization, maximize cost-efficiencies and create better long-term planning for their private capital and investors, as well as the airport's commercial stakeholders and tenants.

ALNAC's proposal is analyzed and compared to all other alternatives in this report, addressing the ultimate airport concepts along with the inaugural airport airfield, passenger terminal facilities and landside access concepts. The ALNAC proposal includes some variances from the other concept alternatives analyzed, such as runway length, which are discussed in the text. Some elements of the ALNAC proposal may seem to be "outside the envelope" for typical airport master planning; however, ALNAC believes their alternative makes better commercial sense from the perspective of the private sector.

[5] *Record of Decision for Tier 1: FAA Site Approval and Land Acquisition by the State of Illinois, Proposed South Suburban Airport, Will County, Illinois*, FAA, July 2002.

Section 2 – 1998 Phase 1 Engineering Study

2.1 *Phase 1 Engineering Study* Airfield Concept Alternatives

Over the past fifteen years IDOT, the Airport Sponsor, conducted extensive studies for development of a new supplemental airport in the Chicago region. SSA was originally proposed as a regional solution to relieve the constraints of Chicago's air transportation system and to accommodate projected unmet demand. The initial purpose of this action aimed to enhance the aviation capacity in the Chicago region and safely accommodate the projected air traffic activity. The results of these intense efforts were summarized and presented in the *Summary Draft, Phase 1 Engineering Report* and an Environmental Assessment[6] published by IDOT in 1998.

A significant part of the study was the analysis and evaluation of airfield alternatives. A number of runway concept alternatives for the ultimate airport were developed and tested to determine the most suitable airfield layout at SSA.[7] A key component of the analysis for the ultimate runway system focused on potential capacity. The Federal Aviation Administration (FAA) has published capacity calculations in Advisory Circular (AC) 150/5060-5, Change 2[8], which establishes that independent parallel runways provide greater capacity than dependent runways. Independent runways are defined as parallel runways that have a minimum separation distance of 4,300 feet (two parallel runways) or 5,000 feet (more than two parallel runways) in order to serve simultaneous arriving aircraft during CAT III weather conditions[9].

The proposed runway concept alternatives were developed based on review of meteorological information, regional wind patterns, general airspace configuration and off-airport land use compatibility. Previous airspace simulation studies conducted as part of the Illinois-Indiana Regional Airport Program (I-IRAP) determined that a primary runway configuration consisting of parallel east-west runways had the least impact on existing arrival and departure procedures at O'Hare International Airport (ORD) and Midway International Airport (MDW). Other important factors that influenced the selection of the preferred airfield were dictated by policy considerations such as:

- Provision for maximum capacity by accommodating four simultaneous precision instrument approach procedure runways; and
- Minimization of environmental and land use impacts.

Pursuant to Council of Environmental Quality (CEQ) regulations, an environmental document shall consider all reasonable alternatives to the proposed action including the No Build Alternative. The following alternatives, summarized below, were identified and evaluated in the Phase I Engineering Study and Environmental Assessment[10] and are discussed at length in the Environmental Assessment document[11]:

- ***Alternative 1*** included four parallel staggered runways in an east-west orientation and two crosswind runways in a northwest-southeast orientation

[6] *South Suburban Airport Environmental Assessment,* Illinois Department of Transportation, February 1998.
[7] *Selection of the Recommended Runway Configuration,* South Suburban Airport Phase 1 Engineering Study, TAMS Consultants Inc., January 9, 1996.
[8] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[9] A CAT III Instrument Landing System (ILS) allows aircraft to land using Instrument Flight Rules (IFR) approaches when the cloud ceiling is less than 100 feet and visibility is less than ¼-mile.
[10] Phase I Engineering Study and Environmental Assessment - "Selection of Recommended Runway Configuration"; prepared by TAMS January 1996;
[11] South Suburban Airport Environmental Assessment Volume I Chapter 3 – February 27, 1998;

(see **Exhibit 2-1**). This concept provided for two simultaneous precision instrument approaches either using the two inner east-west parallel runways (6,600-foot separation) or the two crosswind runways (23,900-foot separation).

- ***Alternative 2*** included eight primary runways: four east–west parallel runways and four crosswind runways in a northwest-southeast direction (see **Exhibit 2-2**). This concept provided for four simultaneous precision instrument approaches using the crosswind runways (12,800-foot separation between the inner crosswind runways and 5,000-foot separation between the inner and outer crosswind runways). However, it only provided two simultaneous precision instrument approaches on the east-west parallel runways.

- ***Alternative 3*** included four runways in a northwest-southeast orientation and two runways in an east-west orientation. Similar to Alternative 2, it provided simultaneous precision instrument approaches and accommodated quadruple operations (see **Exhibit 2-3**) on the crosswind runways.

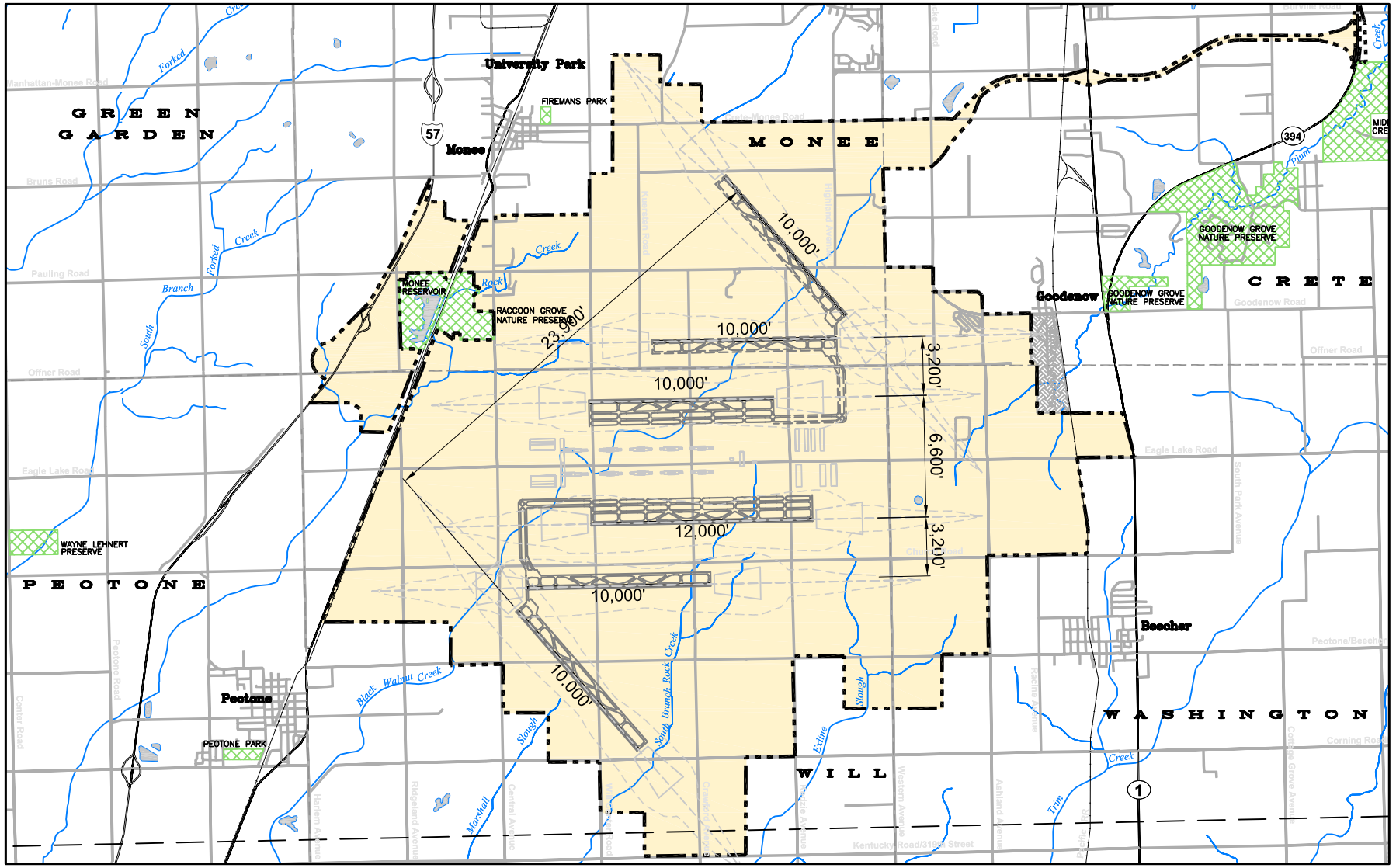
- ***Alternative 4*** included two sets of four parallel east-west runways; one set of four-parallel runways would be used for approaches and the other set for departures, connected by a central taxiway system (see **Exhibit 2-4**). This concept provided for four simultaneous precision instrument approaches using either the east set of four parallel runways or the west set of four parallel runways.

- ***Alternative 5*** is similar to Alternative 4 but minimized the taxiing distances and practically eliminated the taxiway system altogether (see **Exhibit 2-5**). This concept also provided for four simultaneous precision instrument approaches using either the east set of four parallel runways or the west set of four parallel runways.

- ***Alternative 6*** consisted of six parallel runways and provided quadruple simultaneous precision instrument approaches. Two of the six runways were centrally located between quad pairs and were designated as departure-only runways. A short crosswind runway (14-32 orientation) was also included (see **Exhibit 2-6**).

- ***Alternative 7*** included a converging runway airfield consisting of six (three pairs) non-intersecting runways in a triangular layout (see **Exhibit 2-7**). This concept provided for two simultaneous precision instrument approaches using either the two inner east-west parallel runways (7,400-foot separation), the two northwest-southeast crosswind runways (20,300-foot separation), or the two northeast-southwest crosswind runways (20,300-foot separation).

- ***Alternative 8*** included six non-intersecting runways in an airfield layout similar to the existing runway configuration at O'Hare International Airport (ORD) (see **Exhibit 2-8**). This concept provided for two simultaneous precision instrument approaches using the two inner east-west parallel runways (8,400-foot separation), the two northwest-southeast crosswind runways (12,400-foot separation), or the two northeast-southwest crosswind runways (12,400-foot separation).



TAMS an *Earth Tech* Company

N

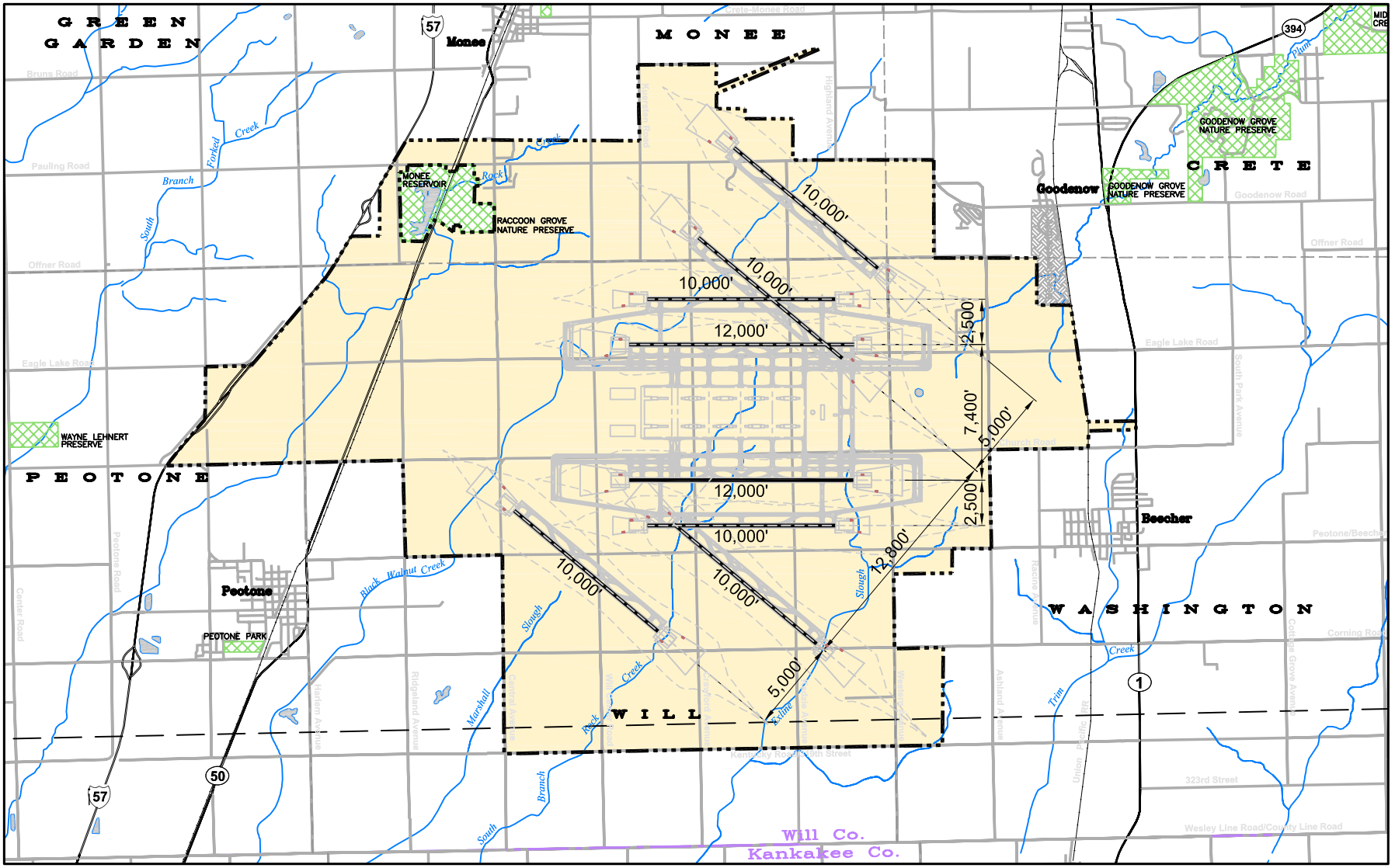
0 5,000 10,000 ft

Legend

- *PROPOSED AIRPORT BOUNDARY*
- *PROPOSED AIRPORT RUNWAY*
- *65 DNL NOISE CONTOUR*
- *PARK LAND*
- *OPEN WATER*
- *LANDFILL (CLOSED)*

1998 Phase I Engineering Study
Airfield Concepts
Alternative 1

Exhibit 2-1



TAMS an Earth Tech Company

N

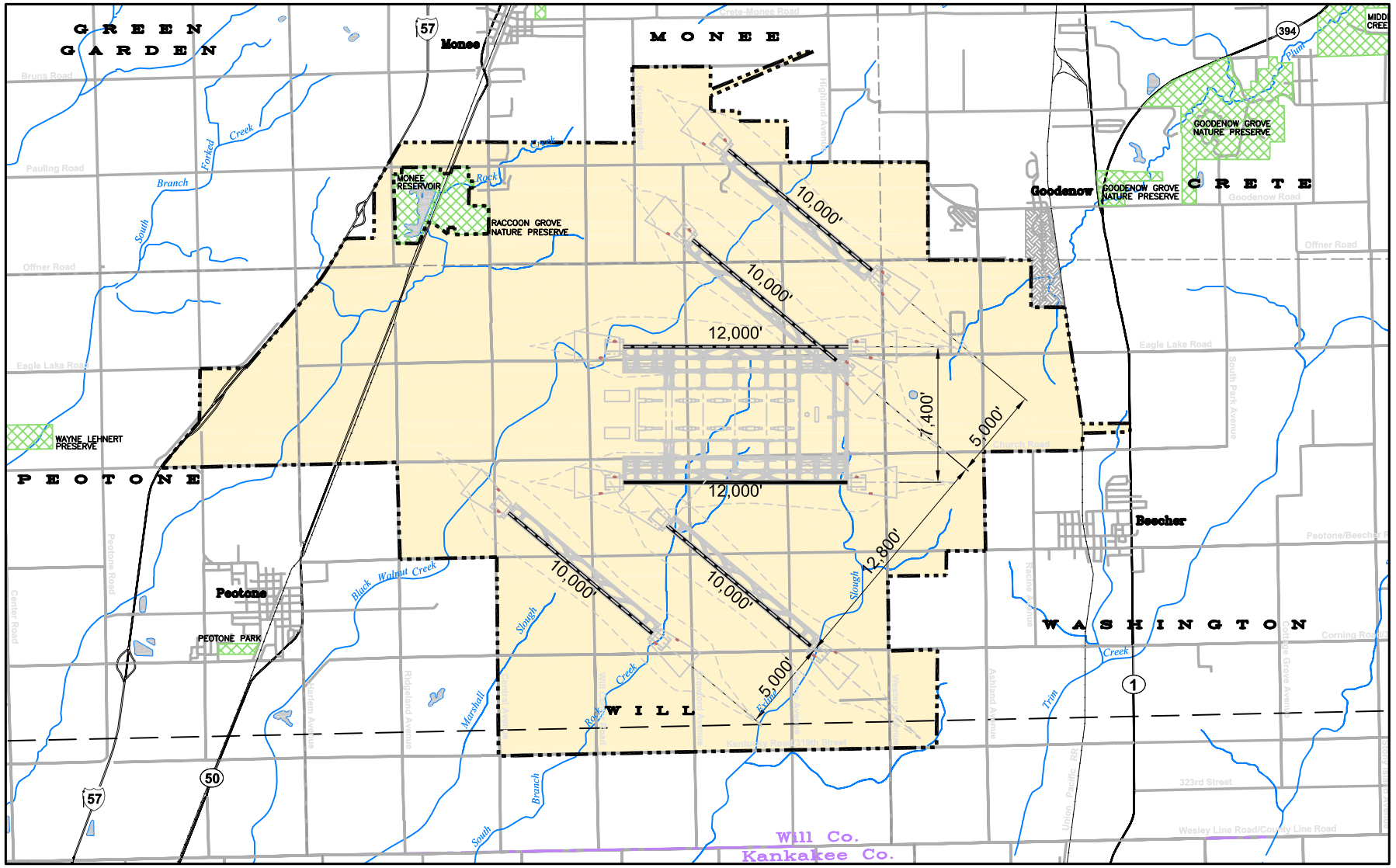
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 2

Exhibit 2-2



TAMS an Earth Tech Company

N

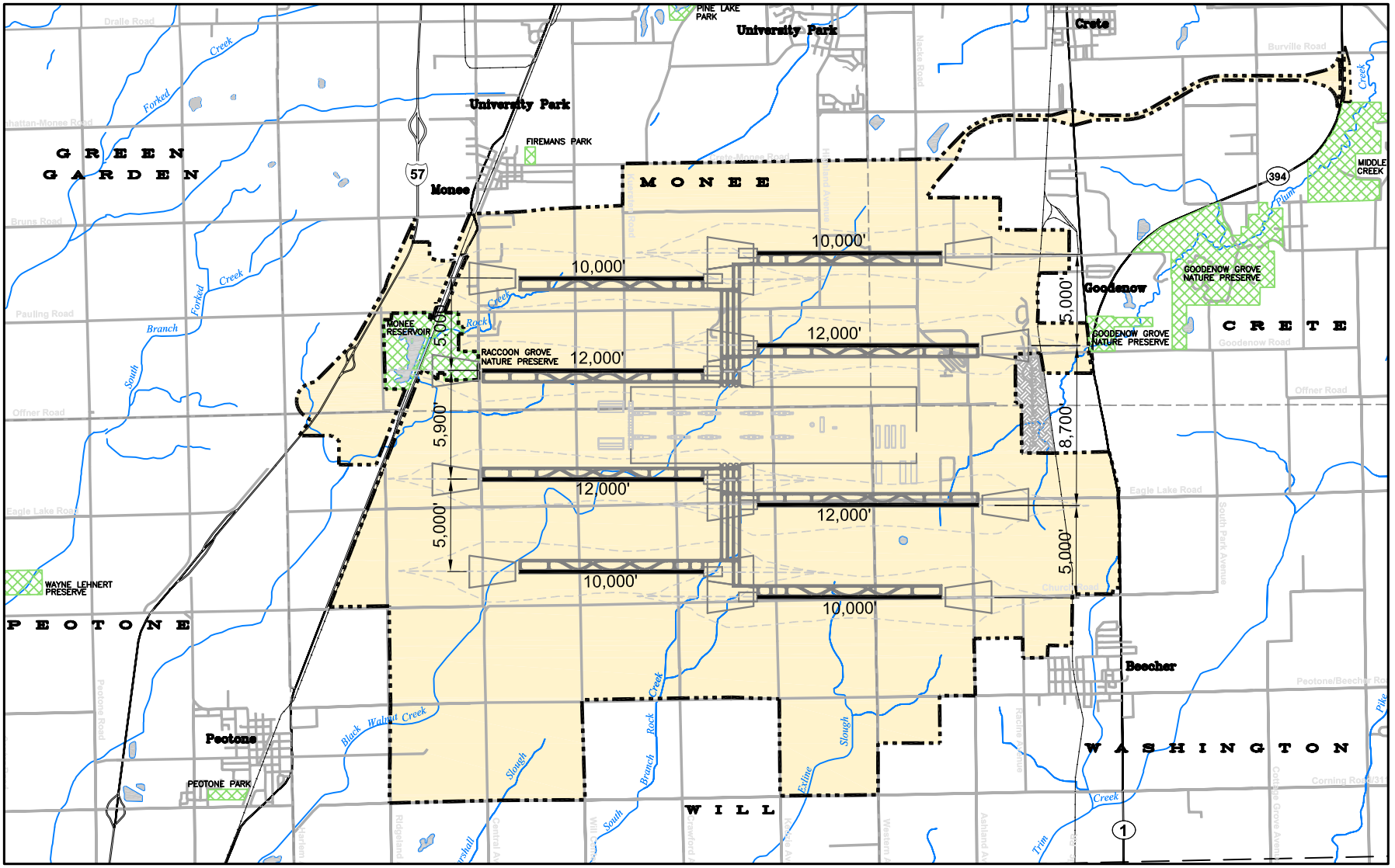
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 3

Exhibit 2-3



TAMS an Earth Tech Company

N

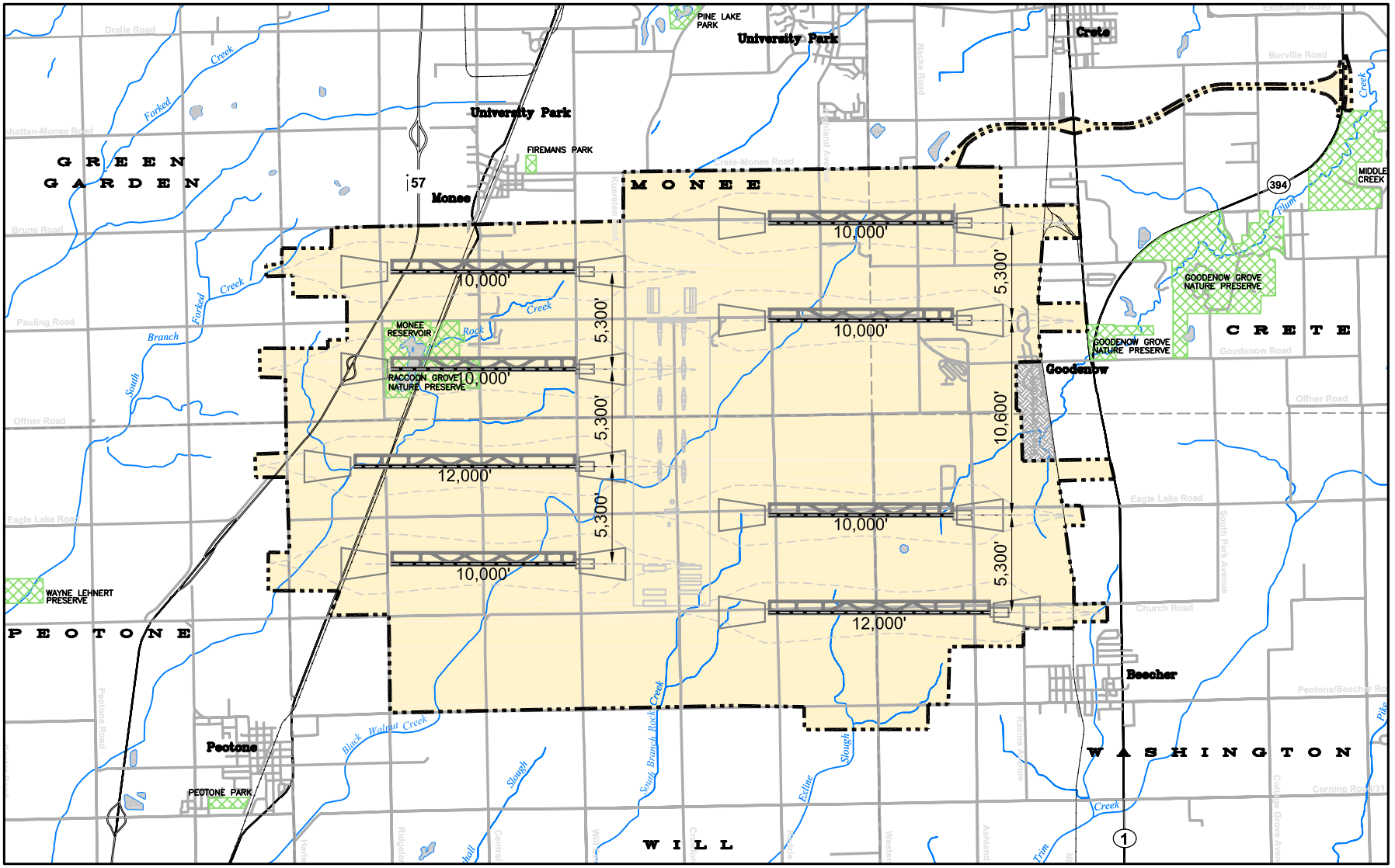
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 4

Exhibit 2-4



TAMS an Earth Tech Company

N

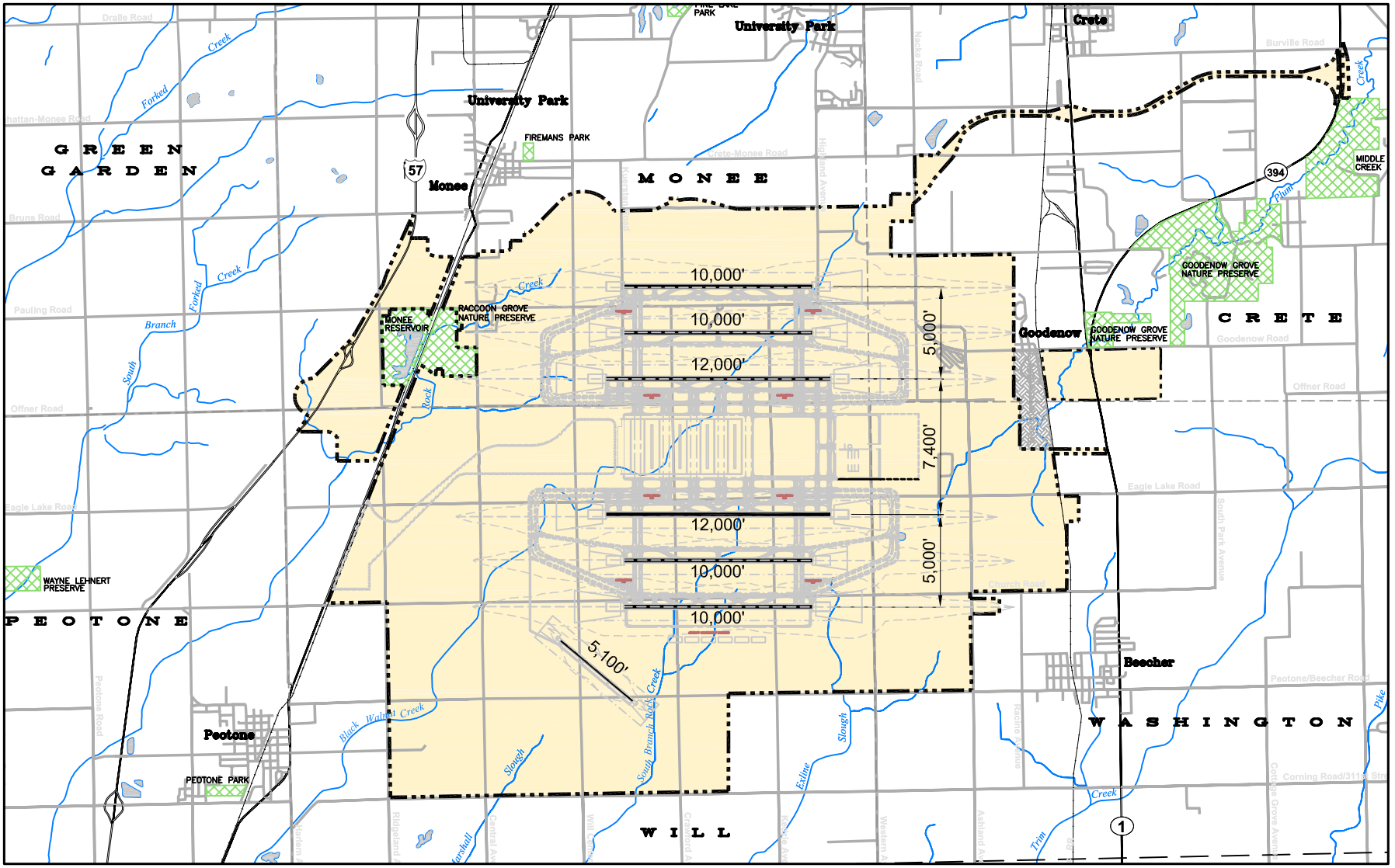
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 5

Exhibit 2-5



TAMS an Earth Tech Company

N

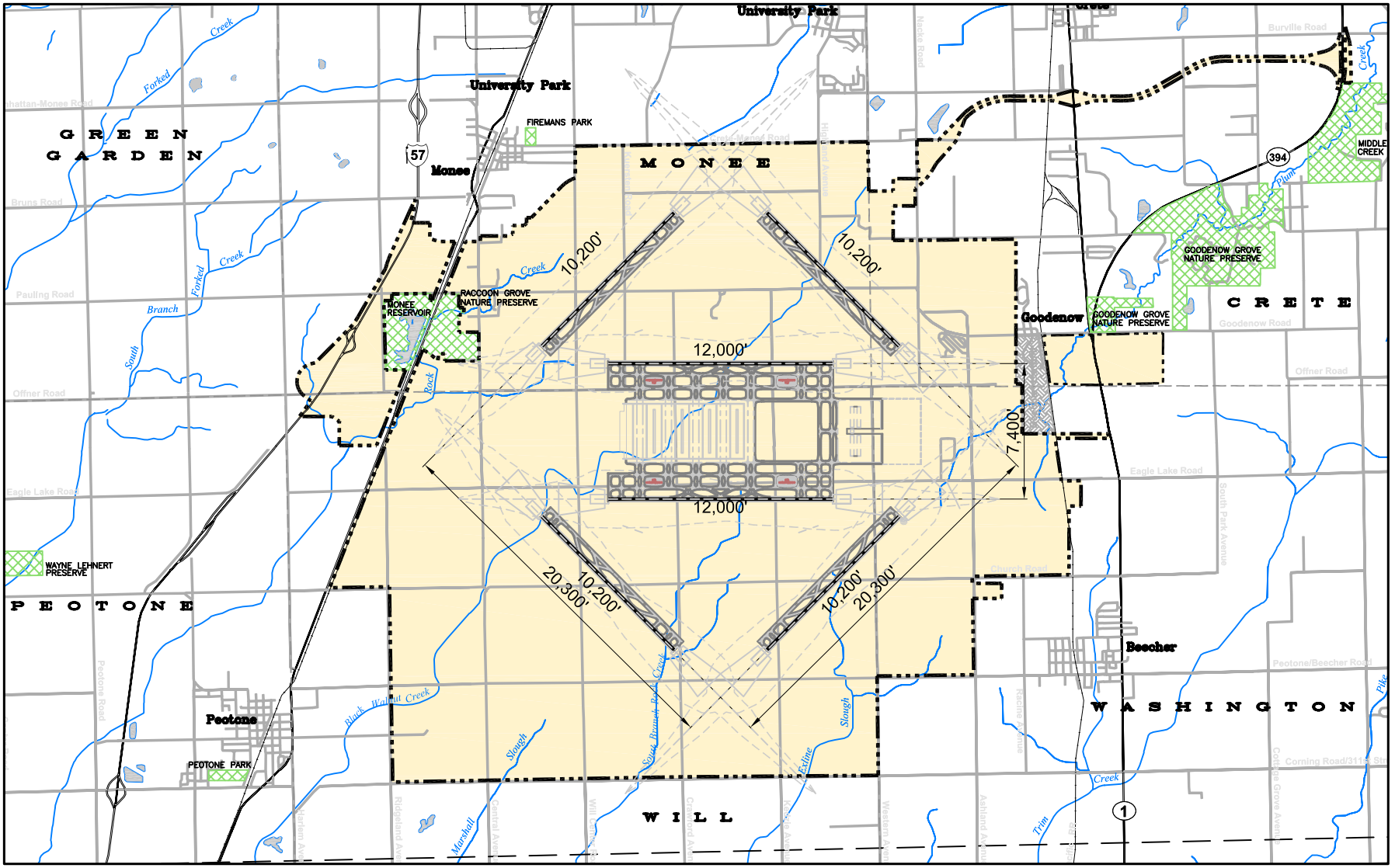
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 6

Exhibit 2-6



TAMS an Earth Tech Company

N

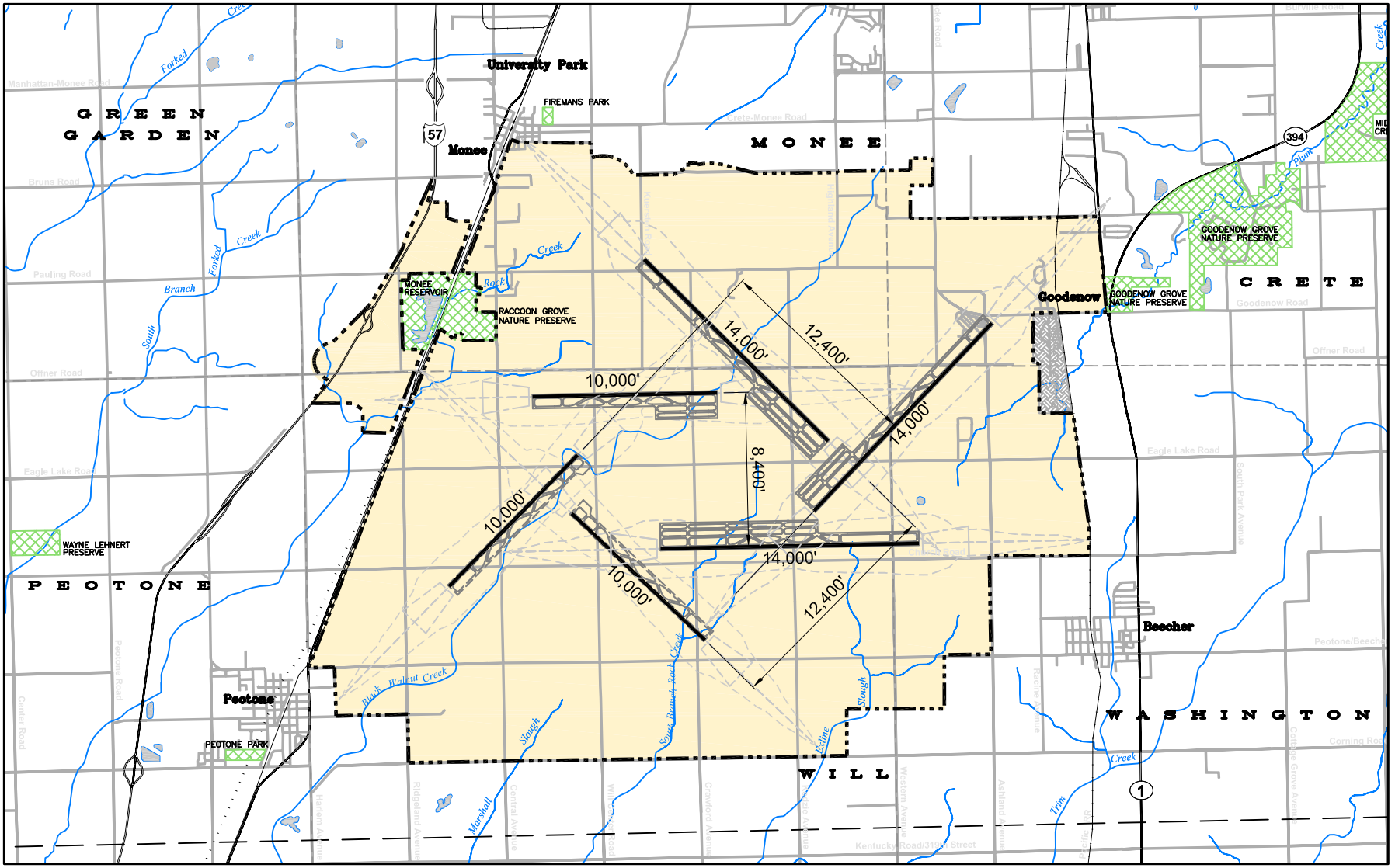
0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 7
(Converging Runway)

Exhibit 2-7



TAMS an *Earth Tech* Company

N

0 5,000 10,000 ft

Legend

- PROPOSED AIRPORT BOUNDARY
- PROPOSED AIRPORT RUNWAY
- 65 DNL NOISE CONTOUR
- PARK LAND
- OPEN WATER
- LANDFILL (CLOSED)

1998 Phase I Engineering Study
Airfield Concepts
Alternative 8

Exhibit 2-8

2.2 Selection Criteria

The *Phase 1 Engineering Study* selection criteria, which were developed in 1998, were reviewed by IDOT for consistency with current FAA guidelines and IDOT policies. The first step of the alternatives evaluation process was a validation process, which reviewed the original set of airfield evaluation criteria and determined if they were still valid in evaluating the ultimate airfield concept. Minor updates in the original criteria were made to be consistent with the current study. **Table 2-1** lists and defines the updated criteria utilized in the 1998 *Phase 1 Engineering Study*.

Table 2-1
1998 *Phase 1 Engineering Study* - Runway Configuration Evaluation Criteria

No.	Criteria	Definition
1	Ability to accommodate 2020 aviation demand	• Selected runway configuration would need to accommodate approximately 775,000 annual operations.
2	Ability to accommodate peak demand during CAT III weather conditions using quadruple approaches	• Develop a runway configuration that could handle peak hour activity with four independent arrival streams during CAT III conditions.
3	Ability to avoid runway incursions	• Develop an airfield taxiway design able to serve an all-parallel runway concept that circumscribes runway critical areas (i.e., a proposed perimeter taxiway system).
4	Ability to provide for balanced airfield operations	• Develop a runway system configuration that would ultimately be able to serve all types of aircraft operations expeditiously, including: 1. Hub and non-hub type operation 2. International operation 3. Cargo hub type operation, and 4. A point-to point operation. • Develop a runway system that would provide for balanced arrival/departure operations for both east and west air traffic flow, as well as a taxiway system that would provide for uninhibited ingress/egress to/from locations on the airfield.
5	Integration and suitability within the existing regional airspace	• Develop an airfield configuration that would fit within the existing framework of the Chicago airspace with the least impact to approach and departure procedures for O'Hare and Midway airports and GA en-route flight patterns.[12]
6	Ability to avoid and/or minimize adverse land use impacts	• Develop an on-airport land-use plan that minimizes potential off-airport impacts (in particular noise). • Define the future airport boundary to encompass the optimal land area needed for airport-related uses (aeronautical and operational) but no more land than is absolutely necessary and minimizes impacts to surrounding land uses.
7	Qualitative cost/benefit	• Comparative cost/benefits analysis of airfield configurations.

Source: *Selection of the Recommended Runway Configuration, South Suburban Airport Phase 1 Engineering Study*, TAMS Consultants Inc., January 9, 1996.

[12] An east/west runway configuration at SSA would fit better with respect to the ORD/MDW runway configurations as well as the present day Chicago area airspace design. All operations at SSA will add aircraft to the south flow out of the Chicago area. During periods of peak traffic flows departing to the south, SSA departures will be sequenced with ORD and MDW departures which the system will have to accommodate procedurally. It is important to note that the ultimate SSA airport design will require large scale changes to the Chicago area airspace, procedures, and routes. This will likely precipitate changes throughout much of the national airspace system.

2.3 Evaluation Matrix

Based on the criteria identified in **Table 2-1** an evaluation matrix was developed to screen the eight airfield concepts. This matrix (shown as **Table 2-2**) lists the eight considered alternatives and compares them against the evaluation criteria.

Table 2-2
1998 *Phase 1 Engineering Study* - Runway Configuration Evaluation Matrix

No.	Criteria	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5[1]	Alt. 6[2]	Alt. 7[3]	Alt. 8[4]
1	Ability to accommodate 2020 aviation demand	Yes	Yes	Yes	Yes	Yes	Yes	No	No
2	Ability to accommodate peak demand during CAT III weather conditions using quadruple approaches	No	No	Yes	Yes	Yes	Yes	No	No
3	Ability to avoid runway incursions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Ability to provide for balanced airfield operations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Integration and suitability within the existing regional airspace	No	No	No	Yes	Yes	Yes	No	No
6	Ability to avoid and/or minimize adverse land use impacts	No	No	No	No	No	Yes	No	No
7	Qualitative cost/benefit	No	No	No	No	No	Yes	No	No

Source: *Selection of the Recommended Runway Configuration, South Suburban Airport Phase 1 Engineering Study*, TAMS Consultants Inc., January 9, 1996.

Notes:
1. Referred to as Alternative 4A in the *Phase 1 Engineering Study*.
2. Referred to as Alternative 5 in the *Phase 1 Engineering Study*.
3. Referred to as Converging Parallel Runway Layout (Modified Joliet Arsenal) Alternative in the *Phase 1 Engineering Study*.
4. "Pinwheel" Alternative submitted to IDOT after completion of the *Phase 1 Engineering Study*.

2.4 Selection of the *Phase I Engineering Study* Preferred Ultimate Airfield Concept

The results of the ultimate airfield evaluation process in the *Phase I Engineering Study* indicate that the only alternative that met all of the applicable criteria was Alternative 6, as shown in **Table 2-2**. This configuration (referred to hereinafter as the Base Concept) consists of a six parallel-runway system with an east-west orientation, of which four would be capable of accommodating simultaneous precision instrument approaches. Provisions for a single crosswind runway in a northwest-southeast direction were also included. The inner runways were

identified as being 12,000 feet long and the outer runways as 10,000 feet long. Of these six, two parallel (middle) runways would be dedicated for departures only. The crosswind runway in the Base Concept was identified as a 5,000-foot long runway to accommodate general aviation and commuter aircraft operations.

After reviewing the criteria and evaluation process used to select the *Phase 1 Engineering Study* preferred ultimate airfield concept, IDOT determined that this alternative (Alternative 6) remained a valid concept and used it as the Base Concept to identify potential refinements to the ultimate airfield. Refinement alternatives to the ultimate airfield concept are discussed and evaluated in the next section.