Section 8.0 – Selection of Inaugural Airport Passenger Terminal Concept

The Inaugural Airport passenger terminal facilities alternatives analysis focused on different concepts for the passenger terminal, aircraft aprons, taxiways, terminal frontage roads and parking facilities. The draft *Demand/Capacity Analysis & Facility Requirements for the Inaugural Airport Program*[1] report recommends a passenger terminal between 85,000 and 168,000 square feet in size with between 4-5 aircraft gates under the low case forecast scenario and 9-12 aircraft gates under the high case forecast scenario. For purposes of the terminal facility alternatives analysis, passenger terminal concepts for the base case forecast scenario (127,000 square foot terminal with 6-9 aircraft gates), were used. Consideration for the facilities required for the first 20 years of operation (DBO+20) was also factored into the analysis, since the Inaugural Airport passenger terminal should be capable of being expanded to meet the needs of SSA through DBO+20.

8.1 Inaugural Airport Passenger Terminal Alternatives

The Inaugural Airport passenger terminal alternative concepts and analysis focused on siting the passenger terminal complex north of the primary runway (09-27), consistent with the preferred ultimate airport concept. In addition, previously identified airport landside access alternatives were taken into consideration in determining the best location for the Inaugural Airport passenger terminal.

Seven different terminal configuration concept alternatives were identified for the Inaugural Airport terminal facility. The seven concept alternatives were derived from terminal complex studies of the potential ultimate airport. These alternatives were developed based on FAA guidelines and terminal concepts from AC 150/5300-13 *Airport Design* and AC 150/5360 *Planning and Design Guidelines for Airport Terminal Facilities*. A broad range of existing terminal concepts at various domestic and international airports were also analyzed in order to identify exemplary operating airport terminal prototypes to assist in the process of developing the Inaugural Airport terminal concept. Special attention was paid to developing passenger terminal concepts that would not only provide the best terminal location for the IAP, but would also lend itself to future expansion through DBO+20 while minimizing potential disruption to aircraft operations. Each passenger terminal alternative concept is briefly discussed below.

Alternative A1, as shown in **Exhibit 8-1**, was developed based on primary landside access originating from the west. It features:

- West only main airport entrance
- West passenger terminal oriented perpendicular to the primary runway

Alternative A2, shown in **Exhibit 8-2** was proposed by ALNAC. It features:

- West only main airport entrance
- West passenger terminal oriented perpendicular to the west end of the primary runway (corresponding to Alternative F in Section 6.1)

Alternative C1, shown in **Exhibit 8-3**, features:

- West only main airport entrance
- Central passenger terminal oriented perpendicular to the primary runway

[1] Draft *Demand/Capacity Analysis & Facility Requirements for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, March 2005.

Alternative C2, shown in **Exhibit 8-4**, features:

- West only main airport entrance
- Central passenger terminal oriented parallel to the primary runway

Alternative D1, shown in **Exhibit 8-5**, features:

- West only main airport entrance
- Central passenger terminal oriented parallel to the primary runway

Alternative D2, shown in **Exhibit 8-6**, features:

- West main airport entrance
- East passenger terminal oriented parallel to the primary runway

8.2 Evaluation of Inaugural Airport Passenger Terminal Alternatives

8.2.1 Inaugural Airport Passenger Terminal Alternatives Evaluation Criteria

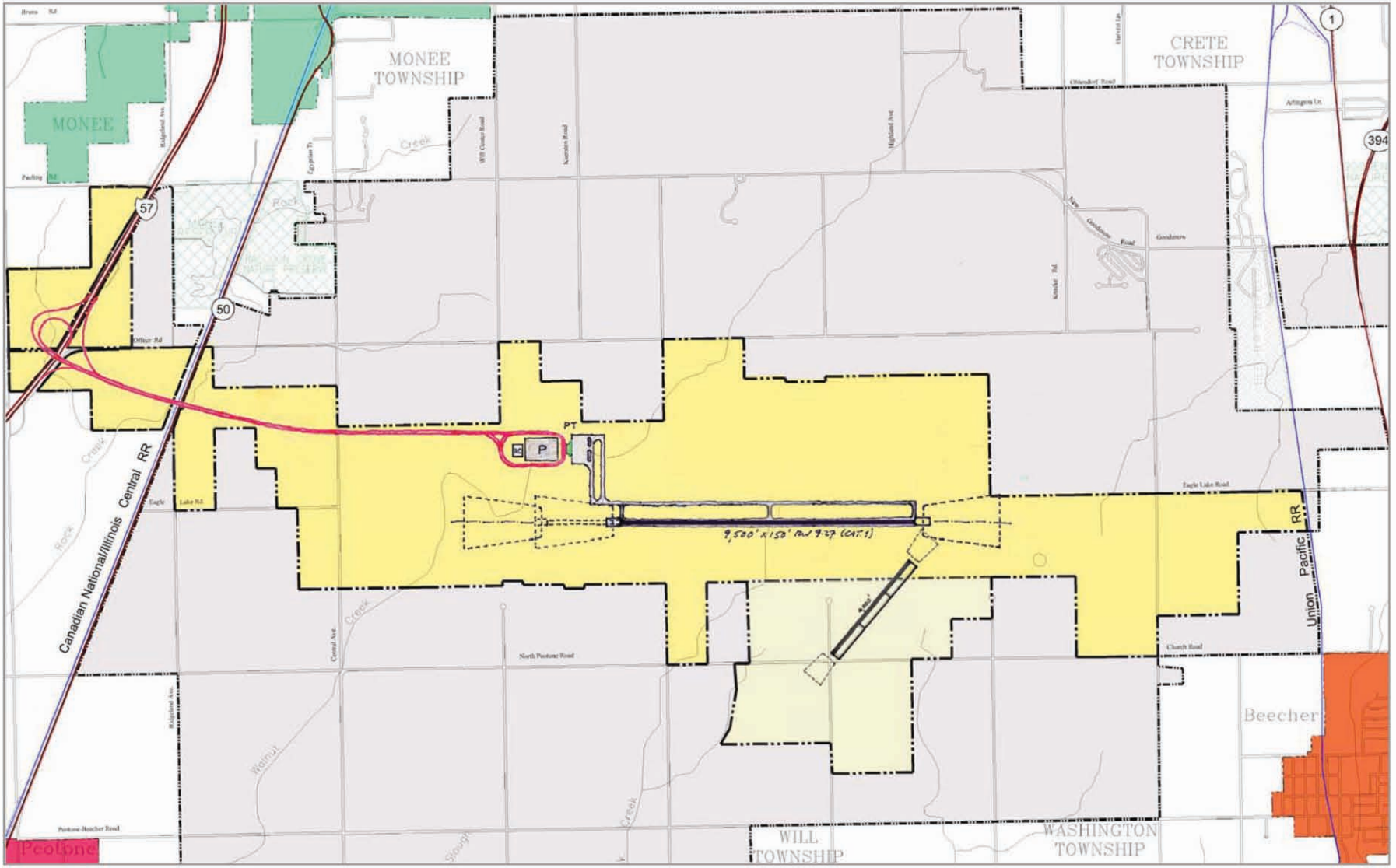
The Inaugural Airport passenger terminal alternatives were examined and evaluated based on a number of criteria that are listed and defined in **Table 8-1**. A short description of how each evaluation criteria was used to evaluate the alternatives is also provided.

Table 8-1
Inaugural Airport
Passenger Terminal Alternatives Evaluation Criteria

No.	Criteria	Definition
1	**Ability to maximize airfield operational efficiency**	• Ability of terminal location to minimize taxiing distance and time and aircraft circulation conflicts • Ability of terminal location to minimize conflicts of aircraft taxiing to and from the terminal
2	**Ability to expand into potential ultimate airport terminal**	• Ability of a terminal concept to provide the required 250[2] gates in the ultimate development phase to balance the airfield capacity
3	**Compatibility with preliminary ultimate concept**	• Ability of a concept to fit within the preliminary ultimate airport concept (airfield and access)
4	**DBO+20 expansion potential**	• Ability of terminal location to minimize DBO+20 taxiing time (aircraft departures) • Ability of inaugural terminal to be logically expanded to accommodate DBO+20 demand
5	**Proximity to I-57/IL-50**	• Ability of the terminal location to minimize passenger access distance from I-57/IL-50
6	**Ability to avoid and/or minimize impacts on natural resources**	• Impacts to wetlands • Impacts to floodplains • Impacts to water resources • Impacts to prime farmlands
7	**Ability to avoid and/or minimize social impacts**	• Population displacement
8	**Comparison of relative costs**	• Compares relative costs of each terminal location/concept

Source: TAMS, an Earth Tech Company, 2004.

[2] Capacity estimates identified that ultimate number of gates needed to accommodate the long term passenger projections would be approximately 250 gates. This number was derived from the theoretical operational capacity of the preferred ultimate airport airfield.



TAMS an *Earth Tech* Company

N

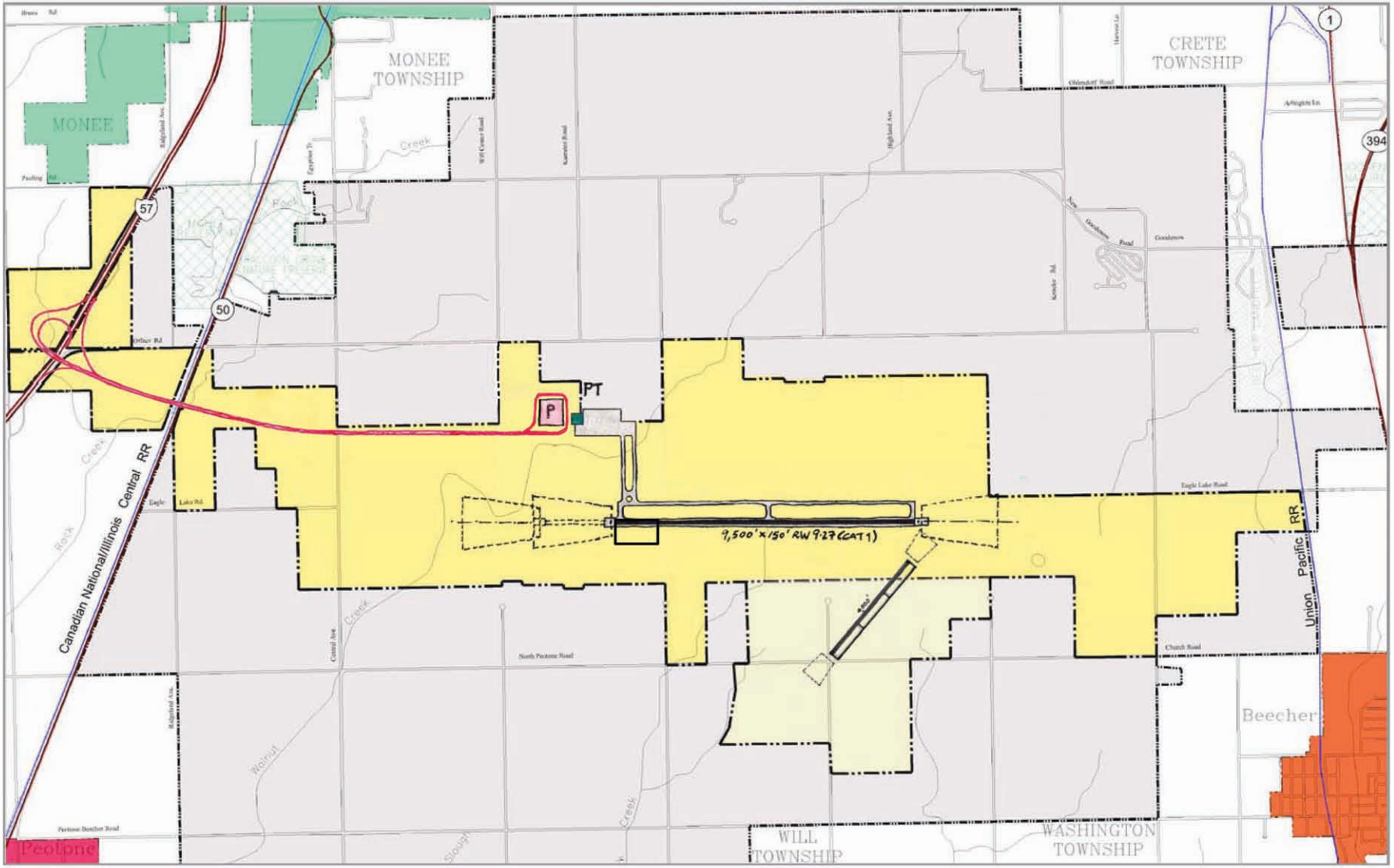
0 3500 7000 ft

Legend

- PROPOSED INAUGURAL AIRPORT BOUNDARY
- ULTIMATE AIRPORT BOUNDARY
- ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY
- PROPOSED AIRPORT RUNWAY
- PASSENGER TERMINAL
- LANDFILL (CLOSED)
- ACCESS ROAD

Inaugural Airport Passenger Terminal Concept
West Inaugural Airport Terminal Facility
Alternative A1

Exhibit 8-1



TAMS an *Earth Tech* Company

N

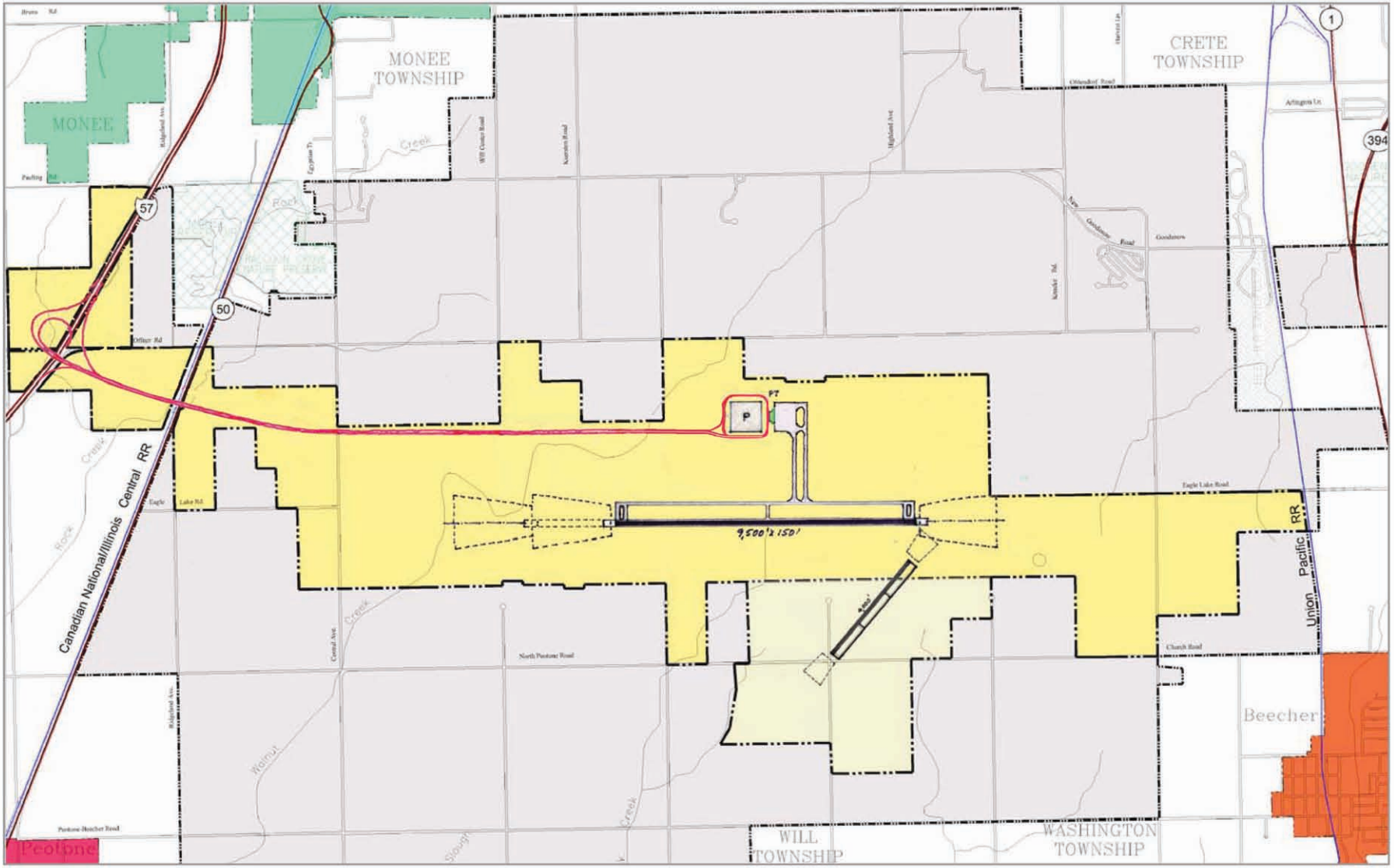
0 3500 7000 ft

Legend

- PROPOSED INAUGURAL AIRPORT BOUNDARY
- ULTIMATE AIRPORT BOUNDARY
- ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY
- PROPOSED AIRPORT RUNWAY
- PASSENGER TERMINAL
- LANDFILL (CLOSED)
- ACCESS ROAD

Inaugural Airport Passenger Terminal Concept
West Inaugural Airport Terminal Facility
Alternative A2 (ALNAC Proposal)

Exhibit 8-2



TAMS an *Earth Tech* Company

N

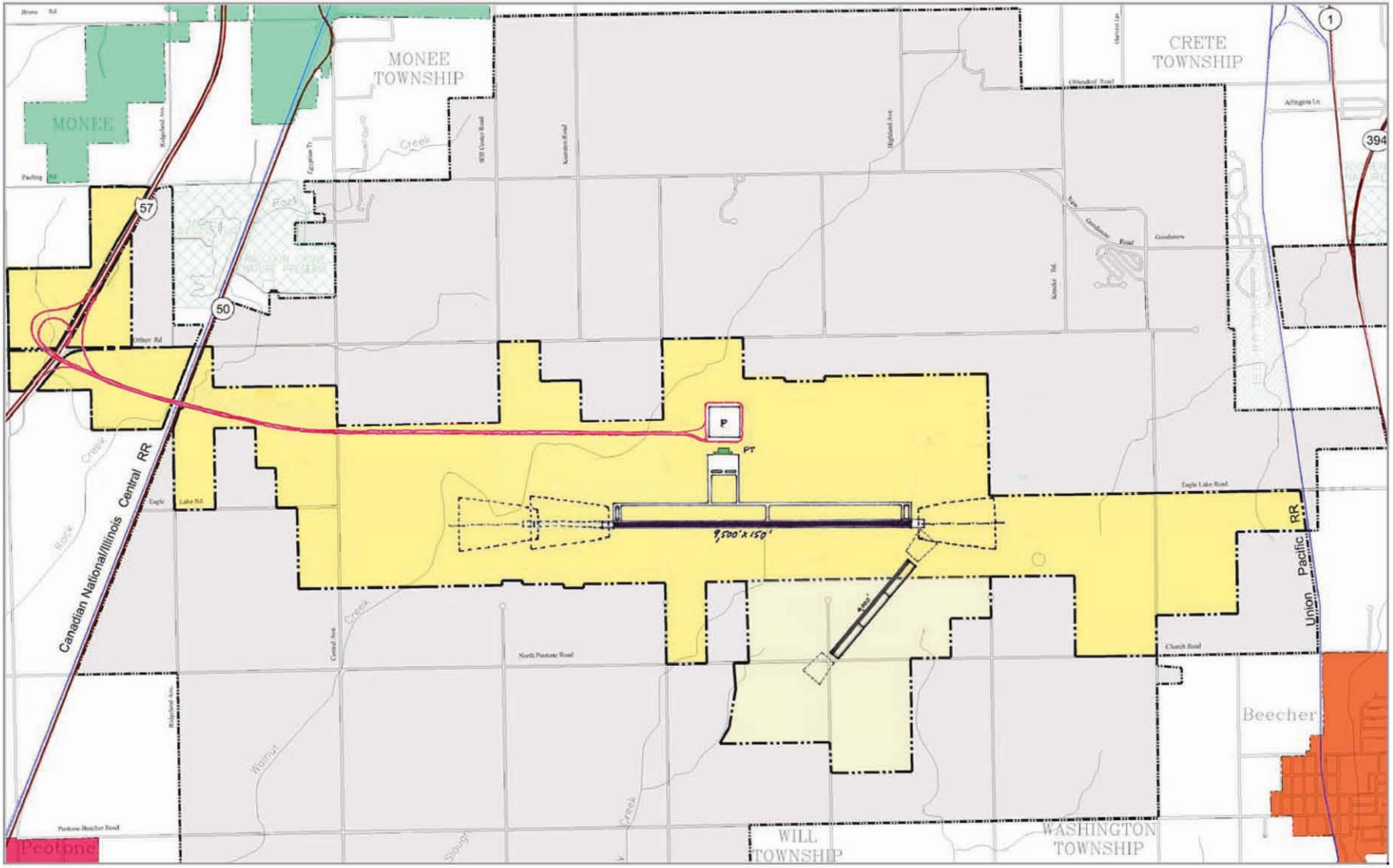
0 3500 7000 ft

Legend

- PROPOSED INAUGURAL AIRPORT BOUNDARY
- ULTIMATE AIRPORT BOUNDARY
- ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY
- PROPOSED AIRPORT RUNWAY
- PARK LAND
- LANDFILL (CLOSED)
- ACCESS ROAD

Inaugural Airport Passenger Terminal Concept
Central Inaugural Airport Terminal Facility
Alternative C1

Exhibit 8-3



TAMS an *Earth Tech* Company

N

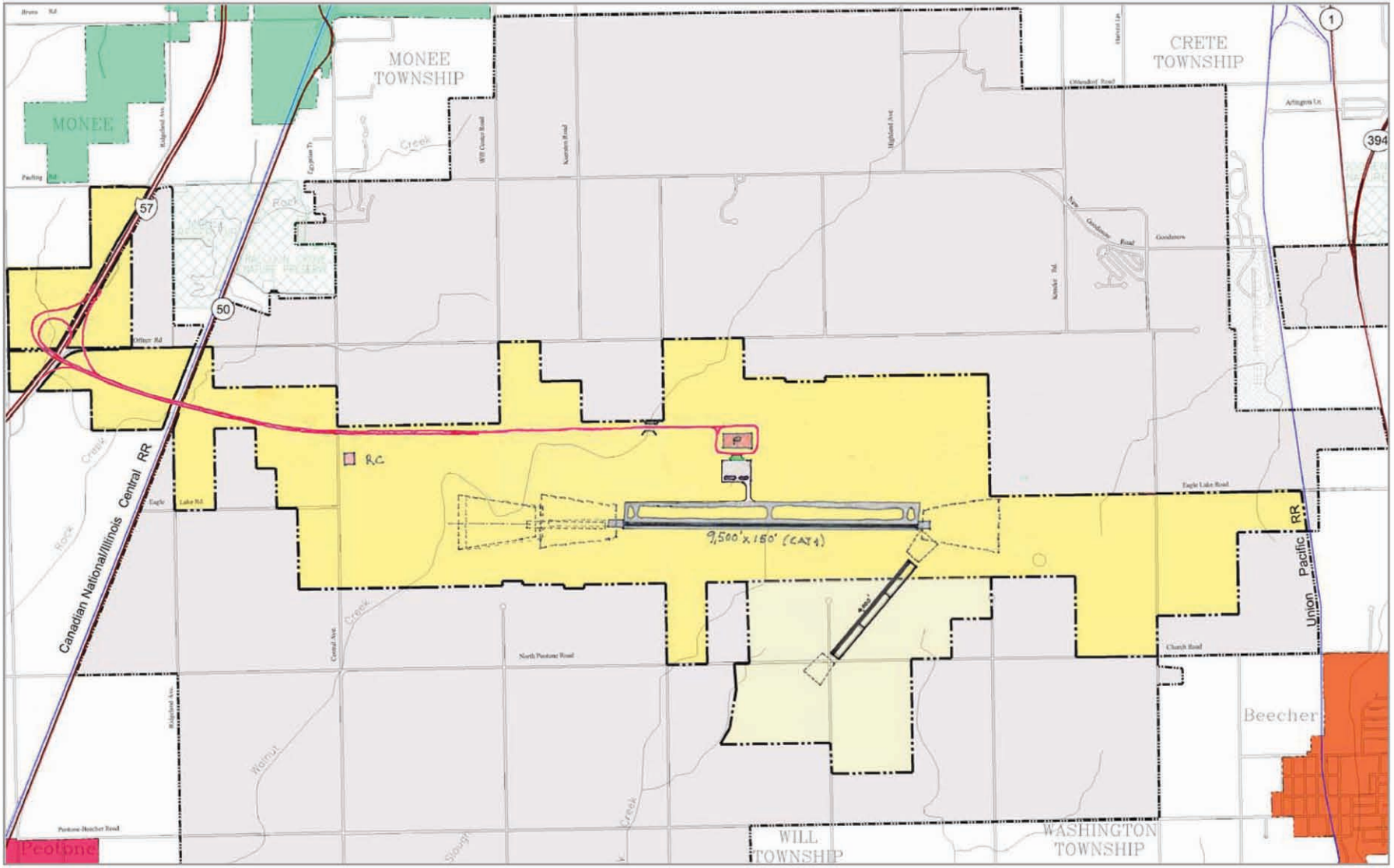
0 3500 7000 ft

Legend

PROPOSED INAUGURAL AIRPORT BOUNDARY	PARK LAND
ULTIMATE AIRPORT BOUNDARY	LANDFILL (CLOSED)
ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY	ACCESS ROAD
PROPOSED AIRPORT RUNWAY	

Inaugural Airport Passenger Terminal Concept
Central Inaugural Airport Terminal Facility
Alternative C2

Exhibit 8-4



TAMS an *Earth Tech* Company

N

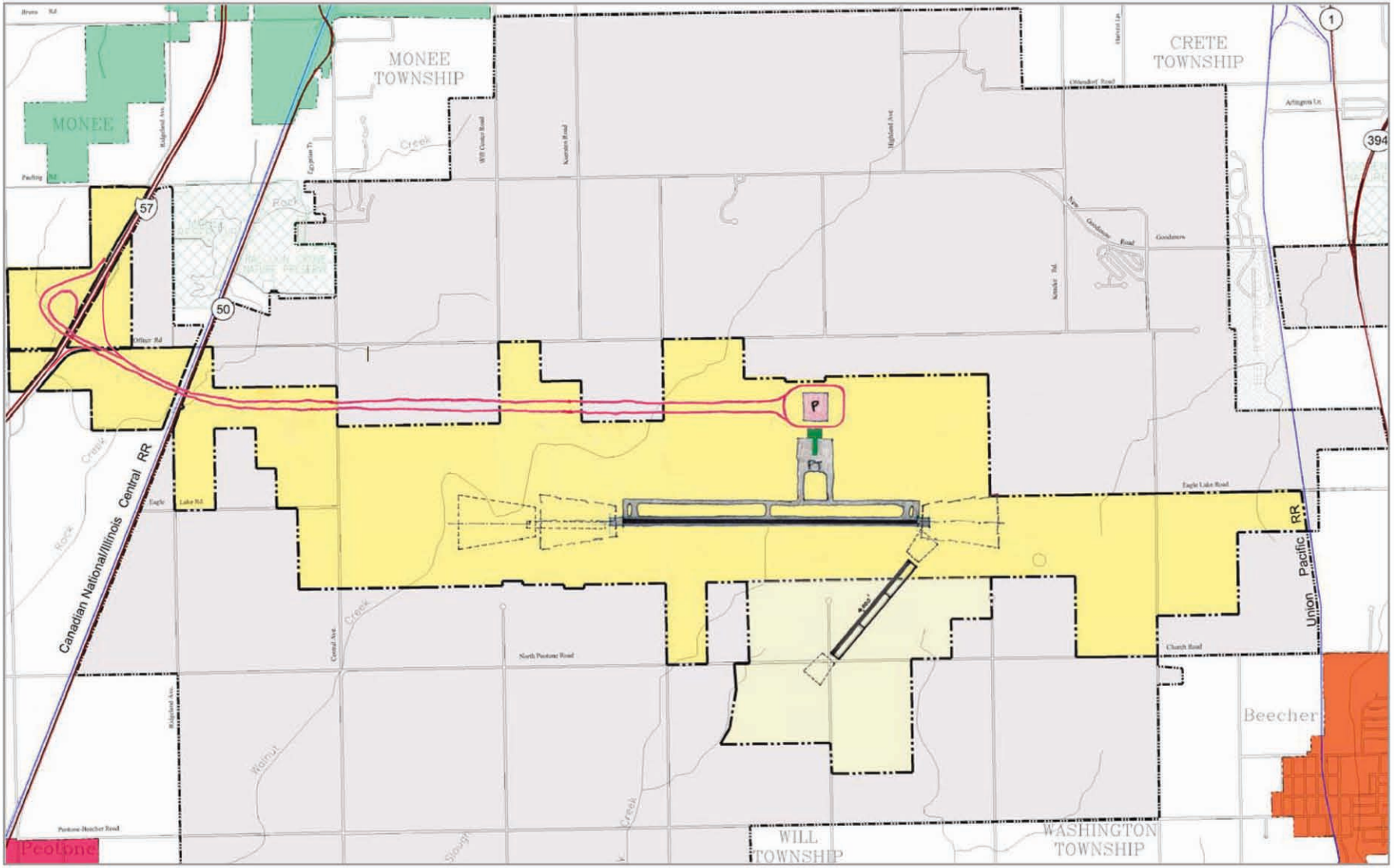
0 3500 7000 ft

Legend

- PROPOSED INAUGURAL AIRPORT BOUNDARY
- ULTIMATE AIRPORT BOUNDARY
- ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY
- PROPOSED AIRPORT RUNWAY
- PARK LAND
- LANDFILL (CLOSED)
- ACCESS ROAD

Inaugural Airport Passenger Terminal Concept
Central Inaugural Airport Terminal Facility
Alternative D1

Exhibit 8-5



TAMS an *Earth Tech* Company

N

0 3500 7000 ft

Legend

- PROPOSED INAUGURAL AIRPORT BOUNDARY
- ULTIMATE AIRPORT BOUNDARY
- ADDITIONAL PROPERTY REQUIRED FOR CROSSWIND RUNWAY
- PROPOSED AIRPORT RUNWAY
- PARK LAND
- LANDFILL (CLOSED)
- ACCESS ROAD

Inaugural Airport Passenger Terminal Concept
East Inaugural Airport Terminal Facility
Alternative D2

Exhibit 8-6

Criteria 1 – Operational Efficiency – This criterion evaluated the ability of an inaugural airport passenger terminal alternative to have efficient airside operations.

Sub-Criteria 1a – *Taxiing Distance/Time* – This sub-criterion evaluated the estimated taxiing distances and times from the terminal gates. Taxiing distances and times were calculated from the passenger terminal to both runway ends (09 and 27). The distances and times were weighted based on the expected yearly percentage of east versus west air traffic flow configurations, and combined to determine taxiing distances and times. For example, if the departure taxi distance to Runway 27 is 8,000 feet and the departure taxi distance to Runway 09 is 5,000 feet, the average departure taxiing distance would be calculated by 8,000 x 0.67 + 5,000 x 0.33[3]. Those alternatives with shorter taxiing distances and times rated higher than those with longer taxiing distances and times.

Sub-Criteria 1b – A*ircraft Taxiway Circulation* – This sub-criterion evaluated the taxiway paths aircraft would take to and from the terminal for both east and west air traffic flows. Those alternatives that exhibited potential conflicts with other arriving and departing aircraft were rated down from those that had no conflicts.

Criteria 2 – Future Gate Capacity – This criterion evaluated the ability of an Inaugural Airport passenger terminal concept to develop into an ultimate concept balancing airfield operations (east-west and north-south) while also providing a minimum number of aircraft gates (250 gates was considered "average").

Criteria 3 – Compatibility with Preliminary Ultimate Concept – This criterion examines whether an alternative is compatible with the selected preferred ultimate landside and airfield concepts and provides optimal operational efficiency. If it was compatible, it received the highest rating; if the alternative was not compatible, it received the lowest rating.

Criteria 4 – DBO+20 Expansion Potential – This criterion was divided into two sub-criteria to rate different aspects of terminal expansion. Each sub-criterion was rated separately and then averaged with the other sub-criteria ratings for each alternative.

Sub-Criteria 4a – *DBO+20 Taxiing Distances* – This sub-criterion evaluated the taxiing distance for departing aircraft from an expanded Inaugural Airport terminal to a dual-parallel east-west runway system. Average departure taxiing distances were calculated using the same assumptions described in Criteria 1. Those alternatives that had an average overall shorter taxiing distance rated higher than those that had an average overall longer taxiing distance.

Sub-Criteria 4b – *Expansion Capability* – This criterion rated each alternative on its ability to expand into a terminal complex capable of accommodating the projected DBO+20 demand. Those alternatives that could expand to meet DBO+20 demand received the highest rating; those that could not be expanded received the lowest.

Criteria 5 – Proximity to I-57/IL-50 – This criterion rated each alternative on distance from I-57/IL-50. Since the main passenger access will be from the west during the inaugural phase, terminal locations that were closest to I-57/IL-50 were rated higher than terminal locations farther from I-57/IL-50.

Criteria 6 – Natural Resource Impacts – This criterion was divided into four sub-criteria to rate different impacts that are of concern to the Federal and state natural

[3] West air traffic flow configurations are estimated to occur 63.7 percent of the year at SSA, while east air traffic flow configurations are estimated to occur 37.7 percent of the year at SSA.

resource agencies, special interest groups and the general public. Each sub-criterion was rated separately and then averaged with ratings from the other sub-criteria for each alternative.

Sub-Criteria 6a – *Minimize Impacts to Wetlands* – Alternatives that would result in fewer impacts to wetlands rated higher than alternatives with greater impacts.

Sub-Criteria 6b – *Minimize Impacts to Floodplains* – Alternatives that would result in fewer impacts to floodplains rated higher than alternatives with greater impacts.

Sub-Criteria 6c – *Minimize Impacts to Water Resources* – Alternatives that would result in fewer impacts to water resources (streams, lakes, etc.) rated higher than alternatives with greater impacts to water resources.

Sub-Criteria 6d – *Minimize Impacts to Prime Farmland* – Alternatives that would result in fewer impacts to prime farmland rated higher than alternatives with greater impacts to prime farmland.

Criteria 7 – Minimize Population Displacement – Alternatives that minimize impacts to homes and residents were rated higher than those that had greater impacts.

Criteria 8 – Relative Cost Comparison – Compares relative costs of each alternative. Alternatives that have higher overall costs ranked lower than alternatives that have lower costs.

8.2.2 Inaugural Airport Passenger Terminal Alternatives Evaluation Matrix

The same methodology employed in evaluating the Inaugural Airport airfield alternatives was used for evaluation of the Inaugural Airport passenger terminal alternatives. Each concept was evaluated and ranked by each criteria identified in **Table 8-1**. A rating scale from 1 to 5 was assigned to each criterion to distinguish differences between each of the alternatives. A score of 5 was considered the best score for a criterion, while a score of 1 was considered the worst.

The alternatives were compared against the seven major criteria developed for this process. **Table 8-2** depicts the results of applying the criteria and ratings to each of the Inaugural Airport passenger terminal concepts. The evaluation worksheet with a more detailed explanation of the rating scale is shown in **Table 8-3**.

8.2.3 Preferred Inaugural Airport Passenger Terminal Alternative

The results in **Table 8-2** show that both western terminal alternates and central terminal alternates are acceptable and superior to the construction of terminal facilities in the eastern part of the Inaugural site. The table shows that Alternative A2 (Exhibit 8-2) and C2 (Exhibit 8-4) are judged to be equal. While Alternative C2 has an edge in airfield operations (taxi distance) and costs criteria, Alternative A2 is superior in compatibility with future master plan, proximity to I-57 and expansion potential. In consideration of the desirability of looking to the future master plan of the airport, IDOT concludes that Alternative A2 is the concept that should be developed.

Based on these results, Alternative A2 was selected as the preferred inaugural terminal alternative and will be used as the base for subsequent alternatives analysis on the remaining Inaugural Airport elements, discussed in the remaining sections.

Table 8-2
Inaugural Airport
Passenger Terminal Alternatives Evaluation Matrix

No.	Criteria	Alternative A1	Alternative A2 (proposed by ALNAC)	Alternative C1	Alternative C2	Alternative D1	Alternative D2
1	**Operational Efficiency**	**1.2**	**1**	**2.2**	**4.5**	**4**	**3.8**
a	*Taxiing Time*	*1.4*	*1*	*1.4*	*5*	*5*	*4.6*
b	*Aircraft Circulation Conflicts*	*1*	*1*	*3*	*4*	*4*	*4*
2	**Future Gate Capacity**	**5**	**5**	**3**	**5**	**1**	**1**
3	**Compatibility with Preferred Ultimate Concept**	**5**	**5**	**3**	**3**	**3**	**3**
4	**DBO+20 Expansion Potential**	**4.0**	**3.5**	**5.0**	**3.0**	**3.0**	**3.0**
a	*Taxiing Distance (DBO+20)*	*3*	*2*	*5*	*1*	*1*	*1*
b	*Expansion Capability*	*5*	*5*	*5*	*5*	*5*	*5*
5	**Proximity to I-57**	**5**	**5**	**2**	**3**	**2**	**1**
6	**Avoid and/or Minimize Adverse Impacts on Natural Resources**	**2.3**	**4.3**	**3.0**	**4.3**	**5.0**	**4.0**
a	*Wetlands*	*4*	*5*	*1*	*4*	*5*	*1*
b	*Floodplains*	*1*	*4*	*5*	*5*	*5*	*5*
c	*Water Resources*	*1*	*4*	*5*	*5*	*5*	*5*
d	*Prime farmland*	*3*	*4*	*1*	*3*	*5*	*5*
7	**Avoid and/or Minimize Population Displacement**	**5**	**5**	**4**	**5**	**5**	**1**
8	**Relative Cost Comparison**	**2.4**	**3.3**	**3.9**	**4.3**	**4.6**	**3.3**
	Total	**29.9**	**32.1**	**26.1**	**32.1**	**27.6**	**20.1**
	Rating	**3.7**	**4.0**	**3.3**	**4.0**	**3.5**	**2.5**

Source: TAMS, an Earth Tech Company, 2004.

Table 8-3
Inaugural Airport
Passenger Terminal Alternatives Evaluation Worksheet

Score	Rating	**Criterion 1a** Taxiing Distance/time	**Criterion 1b** Aircraft Circulation Conflicts/ Delay	**Criterion 2** Future Gate Capacity	**Criterion 3** Compatibility with Preferred Ultimate Concept	**Criterion 4a** DBO+20 Taxiing Distances	**Criterion 4b** Expansion Capability	**Criterion 5** Proximity to I-57/IL-50	**Criterion 6a** Wetlands Impacts	**Criterion 6b** Floodplain Impacts	**Criterion 6c** Minimize Water Resource Impacts	**Criterion 6d** Minimize Prime Farmland Impacts	**Criterion 7** Minimize Population Displacement	**Criterion 8** Relative Cost Comparison
5	**Excellent**	Shortest average taxiing distance to both ends of Runway 9-27	No Conflicts No Delay	Provides highest number of gates	Terminal location is within ultimate terminal area and would provide maximum operational efficiency	DBO+20 terminal location provides for shortest average taxiing distance to ends of runways	Ability to expand to meet DBO+20 demand	Closest to I-57/IL-50	Lowest acreage impacted	Lowest acreage impacted	Lowest stream length impacted	Lowest acreage impacted	Lowest population impacted	Lowest relative cost (all things being equal)
4	**Good**	20 - 39% longer	20 - 39% longer delay time	20 - 39% fewer gates	Terminal location is within ultimate terminal area, and provides good operational efficiency	20 - 39% longer	N/A	20 - 39% farther	20 - 39% greater impact	20 - 39% greater impact	20 - 39% greater impact	20 - 39% greater impact	20 - 39% greater impact	20 - 39% greater cost
3	**Average**	40 -59% longer	40 - 59% longer delay time	40 - 59% fewer gates	Terminal location is within ultimate terminal area, and provides average operational efficiency	40 - 59% longer	N/A	40 - 59% farther	40 - 59% greater impact	40 - 59% greater impact	40 - 59% greater impact	40 - 59% greater impact	40 - 59% greater impact	40 - 59% greater cost
2	**Fair**	60 - 79% longer	60 - 79% longer delay time	60 - 79% fewer gates	Terminal location is within ultimate terminal area, and provides fair operational efficiency	60 - 79% longer	N/A	60 - 79% farther	60 - 79% greater impact	60 - 79% greater impact	60 - 79% greater impact	60 - 79% greater impact	60 - 79% greater impact	60 - 79% greater cost
1	**Poor**	Longest taxiing distance to both ends of Runway 9-27	Most conflicts/ longest delay time	Provides fewest number of gates	Terminal location conflicts with ultimate terminal area	Longest average taxiing distance to runway ends	Unable to be expanded to meet DBO+20 demand	Farthest terminal location from I-57/IL-50	Highest acreage impacted	Highest acreage impacted	Highest stream length impacted	Highest acreage impacted	Greatest population impacted	Highest relative cost

Source: TAMS, an Earth Tech Company, 2004.