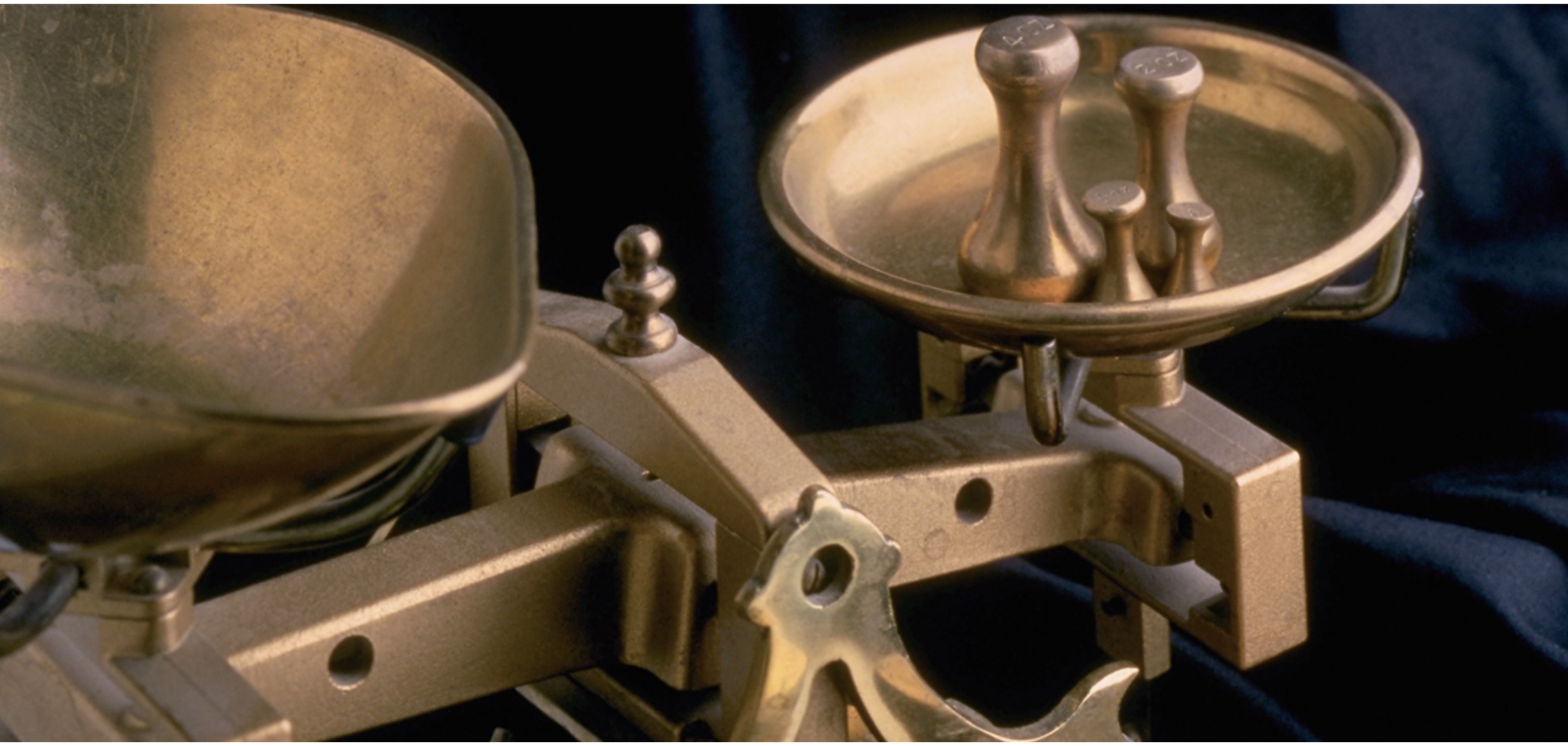
SouthSuburbanAirport

Airport Master Plan



Facility Requirements Report

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Section 1 – Introduction

The purpose of this report is to analyze and present the Inaugural Airport Program (IAP) facility requirements needed to meet aviation demand as presented in the draft report *Projections of Aeronautical Activity for the Inaugural Airport Program* dated May 11, 2004 (2004 Forecast Report)[1] and as updated by the *South Suburban Airport Forecasts 2009: Verification of 2004 Forecasts, dated January 15, 2010 (2009 Forecast Report)*[2]. This *Facility Requirements* report focuses on aeronautical needs required during the IAP. The IAP is an initiative by the Illinois Department of Transportation, Division of Aeronautics (IDOT Aeronautics) to plan, design, construct and operate a new airport at the South Suburban Airport (SSA) site in eastern Will County, Illinois. The SSA site was approved as a feasible location for an airport by the Federal Aviation Administration (FAA) in their Tier 1 Environmental Impact Statement (Tier 1-EIS) Record of Decision (ROD) dated July 12, 2002. See **Exhibit 1-1: Location Map,** in Appendix B**.**

The FAA has issued guidance for the development of airport master plans in FAA Advisory Circular 150/5070-6B[3]. FAA Advisory Circular *150/5300-13*[4] *Airport Design Manual* and associated FAA documents were used as guidelines for developing the IAP facility requirements.

This facility requirements report builds on the 2009 Forecast Report, to identify what aeronautical facilities will be needed at Date of Beneficial Occupancy-Fifth Year After Opening Day (DBO+5) to accommodate demand at SSA. It also estimates needed facilities over the course of the 20-year planning period to DBO+20. A brief discussion regarding airport facility expectations, beyond DBO+20 is included for planning purposes.

As indicated in the 2004 Forecast Report, "*Forecasts include a level of uncertainty and need to compensate for that uncertainty by developing flexible airport plans, allowing the decision makers to accelerate or defer projects as needed*"[5]. In recognition of this, three forecast scenarios were developed for the IAP, based on different assumptions concerning how and when activity might develop at the proposed airport. Forecast scenarios were updated in the 2009 Forecast Report. These are labeled *Low Case, Base Case* and *High Case*, and form the basis of the facility requirements analysis contained in this chapter. Accordingly, facilities required to meet each of the different forecast scenarios will be identified and discussed.

The time period for the IAP is defined as the first five-year planning period for SSA, from the first complete year of operation (defined as Date of Beneficial Occupancy or DBO+1) through the fifth year of operation (DBO+5). While this report focuses on the IAP, it also identifies potential airport facilities beyond the IAP through an intermediate master plan period of 20 years (DBO+6 to DBO+20). Major topics analyzed and discussed in this report include airport classification, airfield facility requirements, passenger and cargo facility requirements, support/ancillary facility requirements and ground transportation facility requirements.

The Tier-1 ROD identifies SSA as a supplemental airport to serve the Chicago region which would provide improved access to air transportation service in the south suburban market area. As demand requires, the airport would initially serve as an origin-destination (O&D) airport with low cost air carrier passenger and charter service as well as air cargo. IDOT Aeronautics long-term plan for SSA includes space to accommodate four independent arrival runways to provide for maximum flexibility as a supplemental airport.

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[1] Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport, prepared for the Illinois Department of Transportation, May 2004 (2004 Forecast Report).
[2] South Suburban Airport Forecast 2009: Verification of 2004 Forecasts, prepared for the Illinois Department of Transportation, January 15, 2010 (2009 Forecast Report).
[3] FAA, Advisory Circular 150/5070-6B, *Airport Master Plans*, May 2007.
[4] FAA, AC 150/5300-13, Airport Design up to Change 15, December, 2009.
[5]. Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport, prepared for the Illinois Department of Transportation, May 2004 (2004 Forecast Report).

This paragraph provides an update on the SSA project boundaries and development in the airport footprint since the approval of the Tier 1 Record of Decision (Tier-1-ROD). The site is located between the Villages of Monee (northwest), University Park (north), Crete (northeast), Beecher (southeast), and Peotone (southwest). The SSA Inaugural and Ultimate boundaries identified in the Tier 1-ROD are shown in **Exhibit 1-2: IAP Layout Facilities/Boundary,** in Appendix B. Since the approval of the Tier 1-ROD, IDOT Aeronautics determined that SSA and a portion of what is now referred to as the Illiana Expressway, are both important transportation projects with independent utility. This determination led to the revision of the northern SSA boundary and a reduction in the acreage of the Ultimate Airport footprint as shown in **Exhibit 1-3: IAP and Ultimate Airport Boundaries,** in Appendix B. **Exhibit 1-3** also shows the land reduction impact of moving most of the environmental mitigation to offsite locations as per subsequent FAA guidance.

The initial phase called the "Inaugural Airport" currently consists of approximately 5,400 acres within the Ultimate footprint. The IAP boundary identified in the Tier 1-ROD (**Exhibit 1-2**) showed a minimalistic land footprint. The Tier 1 Inaugural footprint included severed land parcels and divided some farming operations. When IDOT initiated land acquisition procedures in 2001, it was the State's policy to acquire whole parcels to the greatest extent possible. As the Master Plan and Tier 2 Environmental Impact Statement (Tier 2-EIS) processes continue, there could be further adjustments to the Ultimate and Inaugural airfield boundaries.

Also, since the Tier 1-ROD was approved, Mr. James Bult, a private citizen, acquired the privately-owned, open to the public airfield formerly known as Sanger Field. This facility is located within the northeastern portion of the Tier 1 approved IAP Boundary and was renamed Bult Field. The airport owner subsequently redeveloped Bult Field and the facility now has a 5,000 ft long concrete paved runway with a complete parallel taxiway, aircraft parking and aircraft hangar space for over 130 aircraft. The airfield was redeveloped using IDOT Aeronautics criteria and not to FAA airport design criteria. This report will identify Bult Field as the general aviation/corporate aviation facility.

The Tier 1-ROD confirmed the IAP airport boundary as well as the Ultimate Master Plan boundary (**Exhibit 1-2)**. One of the purposes for preparing the *Selection of IDOT Preferred Inaugural Airport Configuration Report*[6] (2008 Report) was to build on the Tier 1-ROD, collate actions taken by IDOT Aeronautics to determine public input to the future airport configuration and to outline future goals for SSA. The other goals stated in that report include containment of the Day/Night Noise Level (DNL) 65 noise contour on airport property and establishing that the general aviation/corporate runway would serve as the airport's General Aviation (GA) facility until decommissioned.[7]

[6] Selection of IDOT Preferred Inaugural Airport Configuration, prepared by Earth Tech Inc. for the Illinois Department of Transportation, March 7, 2008.
[7] *The Selection of IDOT Preferred Inaugural Airport* prepared by Earth Tech for the Illinois Department of Transportation, March 7, 2008, pg. 13.

Section 2 - FAA Airport Reference Codes

The Airport Reference Code (ARC), as defined in FAA Advisory Circular *150/5300-13-Airport Design,* is used to classify an airport and determine the FAA airport planning criteria to which the airport must comply. As stated in the FAA's Advisory Circular, the ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport. The ARC is based on two components. The first is an operational characteristic called the Aircraft Approach Category, (aircraft arrival air speed in knots), which is depicted by a letter. This classification includes Categories A to E, with "A" corresponding to the slowest speed and E to aircraft with the fastest approach speeds. The second component, depicted by a Roman numeral is the Airplane Design Group (ADG), which is defined by the aircraft's wingspan. The combination of the two components defines the ARC for the airport (i.e., B-II or D-IV). For example, aircraft identified by the moniker C-III or small are single-aisle, narrowbody aircraft whereas aircraft D-IV and larger are generally dual-aisle, widebody aircraft.

Table 2-1: FAA Airport Reference Code System provides the FAA criteria for the ARC system, relating airport design criteria with the operational and physical characteristics of the most demanding aircraft expected to operate at that airport.

Airport planners need to identify the most demanding aircraft group that is expected to use the airport on a regular basis in order to determine the airport ARC. *FAA Order 5100.38B, Airport Improvement Handbook,* states that the critical aircraft should have at least 500 annual itinerant operations. Once a critical design aircraft has been identified, the ARC design criteria for the airport can be defined (See **Table 2-1**).

Presently the largest passenger aircraft is the Airbus A380 with a wingspan of 261 ft 6 inches; it is classified as ADG VI. The largest existing cargo aircraft is the Antonov 225, with a wingspan of 290 ft; it is the largest aircraft in the world and there is only one operational aircraft in existence.[8]

Table 2-1: FAA Airport Reference Code System

Aircraft Approach Category	Aircraft Approach Speed (knots)	Aircraft Design Group	Aircraft Wingspan (ft)
A	Less than 91	I	Less than 49
B	91 or more but < 120	II	49 but < 79
C	121 or more but < 141	III	79 < 118
D	141 or more but < 166	IV	118 < 171
E	166 or more	V	171 < 214
		VI	214 < 262

Source: FAA Advisory Circular 150/5300-13, Airport Design Manual, Change 15, December 2009.

2.1 - Proposed IAP Fleet Mix

The 2009 Forecast Report identifies the anticipated aircraft fleet for air passenger, air cargo, and general aviation and documents the methodology used. This information will be used for the preparation of facility requirements.

2.1.1 – Fleet Mix Assessment by Forecast Scenario

The proposed fleet mix will be assessed by scenario to identify the design standard to be used for SSA for IAP and Intermediate scenarios. The following series of tables, three each per scenario, identify the potential fleet mix for the Low Case, Base Case and High Case forecast scenarios from the 2009 Forecast Report for DBO+1 , DBO+5, and estimates for DBO+20 for air passenger (Pax) and air cargo aircraft (A/C). The types of aircraft identified in these tables are expected to arrive and depart at least once per weekday, which meets the FAA criteria of 500 annual itinerant operations used to determine the ARC. In

[8] http://www.antonov.com/index.html;jsessionid=agYntUuXpaO9.

terms of the passenger aircraft, several additional representative models are shown as options for potential service at SSA; the 2009 Forecast Report includes three: the Boeing 737-700, Boeing 717-100, and the Bombardier CRJ-900. The exception is the Low Case passenger scenario where the anticipated initial passenger service to SSA is initially by aircraft of the MD-80 series.

Low Case Forecast Scenario - In DBO+1, aircraft in the ARC C-III category are expected to operate under the Low Case forecast scenario (See **Table 2-2: IAP Potential Aircraft Fleet Mix, DBO+1, Low Case Forecast Scenario**). In DBO+5, airplanes within the categories ARC C-II and ARC C-III are expected (See **Table 2-3: IAP Potential Aircraft Fleet Mix, DBO+5, Low Case Forecast Scenario**). By DBO+20, the largest aircraft that is forecast to operate is the ARC D-V for air cargo purposes with no change in the largest passenger aircraft category (See **Table 2-4: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, Low Case Forecast Scenario**).

Table 2-2: IAP Potential Aircraft Fleet Mix, DBO+1, Low Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs.)
MD-80 (Pax)	C-III	107.8	147.7	29.5	149,500
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-3: IAP Potential Aircraft Fleet Mix, DBO+5, Low Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-400C (Pax)	C-III	94.8	119.6	36.6	150,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
B737-800F (A/C)	C-III	117.7	110.4	41.7	174,200

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-4: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, Low Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
A320 (Pax)	C-III	111.9	123.3	39.1	145,505
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-400C (Pax)	C-III	94.8	119.6	36.6	150,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
B737-700F (A/C)	C-III	117.7	110.4	41.7	171,000
B757-300F (A/C)	D-IV	124.8	155.3	44.5	270,000
B767-300F (A/C)	D-IV	156.1	180.3	52.0	407,000
A300-600F (A/C)	D-IV	147.1	177.5	54.4	378,600
B737-800F (A/C)	C-III	117.7	110.4	41.7	174,200

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Base Case Forecast Scenario. Under the Base Case forecast scenario, ARC C-III aircraft are expected to be operating regularly at SSA through DBO+5 providing commercial passenger services. By DBO+5, an ARC D-IV aircraft, the Boeing 767-300F will be operating. From this point, the largest aircraft operating at SSA will be air cargo aircraft. **Table 2-5: IAP Potential Aircraft Fleet Mix, DBO+1, Base Case Forecast Scenario; Table 2-6: IAP**

Potential Aircraft Fleet Mix, DBO+5, Base Case Forecast Scenario; and **Table 2-7: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, Base Case Forecast Scenario**; provide examples of these prospective aircraft and their characteristics.

The 2009 Forecast Report does not develop a specific forecast for the Base Case Scenario for DBO+20 per se, but assumes there is a range of potential activity between the Low Case and High Case scenarios. For purposes of these facility requirements, an "average" of the two scenarios or the mid-range was used.

Table 2-5: IAP Potential Aircraft Fleet Mix, DBO+1, Base Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B737-700 (Pax)	C-III	117.7	110.4	41.7	171,000
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
B737-700F (A/C)	C-III	117.7	110.4	41.7	171,000

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-6: IAP Potential Aircraft Fleet Mix, DBO+5, Base Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs.)
A300-600F (A/C)	D-IV	147.1	177.5	54.4	378,600
A319 (Pax)	C-III	111.9	111.0	38.7	166,500
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-700F (A/C)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
B757-200F (A/C)	D-IV	124.1	155.3	45.1	255,000
B767-300F (A/C)	D-IV	156.1	159.2	52.9	407,000
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
EMB-190 (Pax)	C-III	94.3	118.1	34.7	110,900

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-7: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, Base Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
B737-700F (A/C)	C-III	117.7	110.4	41.7	171,000
B757-200F (A/C)	D-IV	124.8	155.3	44.5	270,000
B767-300F (A/C)	D-IV	156.1	180.3	52.0	407,000
A300-600F (A/C)	D-IV	147.1	176.8	54.7	364,000
MD-11F (A/C)	D-IV	170.5	202.2	57.5	600,300
A350-900F (A/C)	D-V	205.3	194.4	54.2	583,000
B787-900F (A/C)	D-V	197.0	206.0	56.0	545,000

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

High Case Forecast Scenario. Under the High Case forecast scenario, SSA will be served by ARC C-III at DBO+1 with ARC D-IV operating prior to DBO+5. As with the other scenarios, it is anticipated that D-IV aircraft (or larger) that would operate at SSA are air cargo aircraft. The 2009 Forecast Report also indicates that in this high scenario, ARC D-V aircraft would have more than 500 annual operations at SSA by the end of the planning period in DBO+20. Examples of these potential aircraft and their characteristics are identified in **Table 2-8: IAP Potential Aircraft Fleet Mix, DBO+1, High Case Forecast Scenario; Table 2-9: IAP Potential Aircraft Fleet Mix, DBO+5, High Case Forecast Scenario;** and **Table 2-10: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, High Case Forecast Scenario**.

Table 2-8: IAP Potential Aircraft Fleet Mix, DBO+1, High Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
B737-700F (A/C)	C-III	117.7	110.4	41.7	171,000
B737-800 (A/C)	C-III	117.5	129.6	41.2	174,200

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-9: IAP Potential Aircraft Fleet Mix, DBO+5, High Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
CRJ700	C-II	76.3	106.8	24.1	77,000
CRJ900	C-II	76.3	119.4	24.1	84,500
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
B737-800F (A/C)	C-III	117.5	129.6	41.2	174,200
B757-300 (A/C)	D-IV	124.1	155.3	45.1	270,000
B767-300F (A/C)	D-IV	156.1	180.3	52.9	407,000
A300-600F (A/C)	D-IV	147.1	177.5	54.4	378,600
A350-900F(A/C)	D-V	205.3	194.4	54.2	583,000
B787-900F (A/C)	D-V	197.0	206.0	56.0	545,000

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. *ARC – Airport Reference Code.

Table 2-10: Intermediate Potential Aircraft Fleet Mix, DBO+6 to DBO+20, High Case Forecast Scenario

Aircraft	ARC*	Maximum Wingspan (ft)	Length (ft)	Tail Height (ft)	Maximum Takeoff Weight (lbs)
A320 (Pax)	C-III	111.9	123.3	39.1	145,500
B717 (Pax)	C-III	93.3	124.0	29.8	121,000
B737-700 (Pax)	C-III	117.5	110.4	41.7	154,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
CRJ900 (Pax)	C-II	76.3	119.4	24.1	84,500
B737-800 (Pax)	C-III	117.5	129.6	41.2	174,200
B757-300F (A/C)	D-IV	124.8	155.3	44.5	270,000
B767-300F (A/C)	D-IV	156.1	180.3	52.0	407,000
A300-600F (A/C)	D-IV	147.1	176.8	54.7	364,000
MD-11F (A/C)	D-IV	170.5	202.2	57.5	600,300
A350-900F (A/C)	D-V	205.3	194.4	54.2	583,000
Boeing B787-900F (A/C)	D-V	197.0	206.0	56.0	545,000

Source: Airplane Characteristics for Airport Planning Manuals from Aircraft Manufacturers. Source data for the A350-900 is http://www.aerospace-technology.com/projects/a350wxb/specs.html

2.1.2 Design Aircraft by Forecast Scenario

Table 2-11: Design Aircraft by Planning Scenario provides a summary of aircraft forecast to be operating more than 500 operations annually per planning scenario.

In summary, the recommended ARC for IAP is ARC D-IV. Whereas, most of the commercial aircraft expected to be operating at SSA by DBO+5 will be under the ARC C-III designation in both the Base and High Case forecast scenarios, the largest aircraft operating at that time is forecast to be ARC C-IV. By DBO+20, both the Base and High Case forecast scenarios indicate that potential ARC D-V aircraft.

Table 2-11: Design Aircraft by Planning Scenario

Planning Scenario	Low Case	Base Case	High Case
IAP (DBO – DBO+5)	C-III	D-IV	D-V
Intermediate (DBO+6 – DBO+20)	D-IV	D-V	D-V

2.2 - Proposed IAP Schedule

The following tables: **Table 2-12: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, Low Case Forecast Scenario; Table 2-13: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Low Case Forecast Scenario; Table 2-14: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, Base Case Forecast Scenario; Table 2-15: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Base Case Forecast Scenario; Table 2-16: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, High Case Forecast Scenario;** and **Table 2-17: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario** present a potential commercial airline schedule for SSA during its first five years of operation, for the Low, Base and High Case forecast scenarios for the 4th quarter of years DBO+1 and DBO+5. The prospective airline schedules are based on the aviation forecasts included in the 2004 Forecast Report[9].

To develop the potential airline schedule, IDOT Aeronautics used the typical trends that airlines follow to provide service to business and leisure markets. The commercial aircraft fleet mix used for this exercise is identical to the one included in both aviation forecast reports, the original 2004 and updated 2009 forecast versions. The aircraft models are examples of the airplanes that could be used to serve those markets, and correspond to the number of seats per aircraft and load factors presented in the forecast report for each of the forecast scenarios.

Table 2-12: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, Low Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
6:30PM	LAS	NV	Las Vegas	A320	7:12PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport code column with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-13: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Low Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:30PM)*	WS+	DC	Washington/Baltimore CMSA	CRJ900	6:50AM
(8:45PM)*	NY+	NY	New York CMSA	B717	7:00AM
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
(9:00PM)*	LA+	CA	Los Angeles CMSA	B737-700	8:20AM

[9] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Table 2-13: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Low Case Forecast Scenario

9:10AM	NY+	NY	New York CMSA	B717	10:00AM
10:30AM	WS+	DC	Washington/Baltimore CMSA	CRJ900	11:15AM
10:45AM	PHX	AZ	Phoenix	A320	11:30AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
3:15PM	NY+	NY	New York CMSA	B717	4:00PM
5:40PM	LA+	CA	Los Angeles CMSA	B737-700	6:25PM
6:30PM	LAS	NV	Las Vegas	A320	7:12PM
6:40PM	PHX	AZ	Phoenix	A320	7:25PM
6:45PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	7:30PM
7:45PM	NY+	NY	New York CMSA	B717	8:30PM
Cargo Aircraft					
4:00AM			Domestic	B737-700F	10:00PM
4:30AM			Domestic	B737-700F	10:30PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport code column with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-14: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, Base Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
10:30AM	PHX	AZ	Phoenix	A320	11:15AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
6:30PM	LAS	NV	Las Vegas	A320	7:12PM
Cargo Aircraft					
4:00AM			Domestic	B737-700F	10:00PM
4:30AM			Domestic	B737-700F	10:30PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-15: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Base Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:30PM)*	WS+	DC	Washington/Baltimore CMSA	CRJ900	6:50AM
(8:45PM)*	NY+	NY	New York CMSA	B717	7:00AM
(9:00PM)*	ATL	GA	Atlanta	CRJ900	7:10AM
(9:20PM)*	BOS	MA	Boston CMSA	EMB-190	7:20AM
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
(10:00PM)*	SFO+	CA	San Francisco/Oakland CMSA	B737-700	8:00AM
(9:00PM)*	LA+	CA	Los Angeles CMSA	B737-700	8:20AM
(10:00PM)*	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	8:25AM
9:10AM	NY+	NY	New York CMSA	B717	10:00AM
10:00AM	BOS	MA	Boston CMSA	EMB-190	10:45AM
10:30AM	PHX	AZ	Phoenix	A320	11:15AM
10:30AM	WS+	DC	Washington/Baltimore CMSA	CRJ900	11:15AM
10:30AM	ATL	GA	Atlanta	CRJ900	11:20AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
3:10PM	NY+	NY	New York CMSA	B717	4:00PM
4:00PM	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	4:44PM

Table 2-15: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, Base Case Forecast Scenario

5:35PM	LA+	CA	Los Angeles CMSA	B737-700	6:25PM
6:00PM	ATL	GA	Atlanta	CRJ900	6:45PM
6:05PM	SFO+	CA	San Francisco/Oakland CMSA	B737-700	6:48PM
6:15PM	BOS	MA	Boston CMSA	EMB-190	7:00PM
6:30PM	LAS	NV	Las Vegas	A320	7:12PM
6:40PM	PHX	AZ	Phoenix	A320	7:25PM
6:50PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	7:30PM
7:15PM	NY+	NY	New York CMSA	B717	8:00PM
Cargo Aircraft					
4:00AM			Domestic	B737-700F	10:00PM
4:30AM			Domestic	B737-700F	10:30PM
10:00AM			Domestic	B737-700F	11:30PM
10:30AM			Domestic	B737-700F	12:30PM
2:00PM			International	A300-600F	3:45PM
4:00PM			International	B767-300F	6:00PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-16: IAP Potential Aircraft Schedule, 4th Quarter DBO+1, High Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
10:30AM	PHX	AZ	Phoenix	A320	11:15AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
5:40PM	LA+	CA	Los Angeles CMSA	B737-700	6:25PM
6:30PM	LAS	NV	Las Vegas	A320	7:12PM
Cargo Aircraft					
4:00AM			Domestic	B737-700F	10:00PM
4:15AM			Domestic	B737-700F	10:15PM
4:30AM			Domestic	B737-700F	10:30PM
2:00PM			International	A300-600F	3:45PM
4:00PM			International	B767-300F	6:00PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT, 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-17: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:10PM)*	DTW	MI	Detroit CMSA	EMB-190	6:45AM
(8:30PM)*	WS+	DC	Washington/Baltimore CMSA	CRJ900	6:50AM
(8:45PM)*	NY+	NY	New York CMSA	B717	7:00AM
(9:00PM)*	ATL	GA	Atlanta	CRJ900	7:10AM
(9:10PM)*	MSP	MN	Minneapolis/St. Paul	CRJ700	7:15AM
(9:20PM)*	BOS	MA	Boston CMSA	EMB-190	7:20AM
(9:25PM)*	DEN	CO	Denver	CRJ900	7:35AM
(9:40PM)*	DFW	TX	Dallas/Ft. Worth CMSA	EMB-190	7:50AM
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
(10:00PM)*	SFO+	CA	San Francisco/Oakland CMSA	B737-700	8:00AM
(9:00PM)*	LA+	CA	Los Angeles CMSA	B737-700	8:20AM
(10:00PM)*	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	8:25AM

Table 2-17: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
9:10AM	NY+	NY	New York CMSA	B717	10:00AM
10:00AM	BOS	MA	Boston CMSA	EMB-190	10:45AM
10:30AM	PHX	AZ	Phoenix	A320	11:15AM
10:30AM	WS+	DC	Washington/Baltimore CMSA	CRJ900	11:15AM
10:35AM	ATL	GA	Atlanta	CRJ900	11:20AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
11:40AM	MSP	MN	Minneapolis/St. Paul	CRJ700	12:25AM
12:40AM	LA+	CA	Los Angeles CMSA	B737-700	1:33PM
2:15PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	3:00PM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
3:15PM	NY+	NY	New York CMSA	B717	4:00PM
4:00PM	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	4:44PM
5:00PM	DTW	MI	Detroit CMSA	EMB-190	5:50PM
5:05PM	DEN	CO	Denver	CRJ900	5:55PM
5:10PM	DFW	TX	Dallas/Ft. Worth CMSA	EMB-190	5:55PM
5:15PM	MSP	MN	Minneapolis/St. Paul	CRJ700	6:00PM
5:40PM	LA+	CA	Los Angeles CMSA	B737-700	6:25PM
5:55PM	ATL	GA	Atlanta	CRJ900	6:45PM
6:00PM	SFO+	CA	San Francisco/Oakland CMSA	B737-700	6:48PM
6:15PM	BOS	MA	Boston CMSA	EMB-190	7:00PM
6:25PM	LAS	NV	Las Vegas	A320	7:12PM
6:40PM	PHX	AZ	Phoenix	A320	7:25PM
6:45PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	7:30PM
7:15PM	NY+	NY	New York CMSA	B717	8:00PM
Cargo Aircraft					
4:00AM			Domestic	B737-700F	10:00PM
4:15AM			Domestic	B757-200F	10:15PM
4:30AM			Domestic	B737-700F	10:30PM
10:00AM			Domestic	B757-400F	11:30PM
10:15AM			Domestic	B757-400F	12:00PM
10:30AM			Domestic	B757-400F	12:30PM
2:00PM			International	A300-600F	3:45PM
3:00PM			International	B767-300F	4:45PM
4:00PM			International	B767-300F	6:00PM

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004. IDOT, 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

2.3 - Proposed IAP Design Aircraft

Based on the aviation forecasts, potential aircraft fleet mix, and synthetic schedule, the most demanding aircraft at SSA during the IAP with more than 500 operations on an annual basis are expected to be the following:

- Low Case Forecast Scenario - planning criteria is passenger aircraft with an ARC C-III (i.e., B737-800 and A320).
- Base and High Case Forecast Scenarios - planning criteria is air cargo aircraft with an ARC D-IV (i.e., B767-300 and A300-600F).
- For DBO+20, the passenger aircraft criteria remains an ARC C-III (B737-800) whereas the air cargo aircraft toward the end of the Base Case scenario, aircraft larger than the B767-300 could operate, i.e., D-V aircraft such the A350 -900F or the B787-900F, with approximately 450 annual operations. These same two D-V aircraft are the design aircraft for the High Case scenario, forecast at 600 annual operations.

Thus, based on the information discussed above, the IDOT Aeronautics will use an ARC designation of D-IV in preparing the Master Plan, Airport Layout Plan and subsequent planning documents for the IAP but plan for the flexibility of accommodating a D-VI aircraft ultimately by using Group VI design criteria.

Section 3 – IAP and Intermediate Airfield Facility Requirements

3.1 Fleet Mix Operating Within the SSA Envelope and Runway Orientation

The determination of runway orientation and configuration is predicated on the meteorological conditions at an airport location. Meteorological data used in airport planning includes wind speed and direction for runway orientation, ceiling and visibility for approach and navigational aids, and temperature for runway length requirements. Runways are aligned to permit operations into the wind and minimize crosswinds. In the United States (U.S.), FAA policy is that:

> *"Under ideal conditions aircraft takeoffs and landings should be conducted into the wind. However, other conditions such as delay and capacity problems, runway length, available approach aids, noise abatement and other factors may require aircraft operations to be conducted on runways not directly aligned into the wind."*[10]

Wind and weather conditions in conjunction with existing airspace configuration are essential components that help to determine the best orientation of new runways at any airport. As a general rule, the runway coverage and orientation at an airport is dictated by the prevailing wind direction and velocity. The most desirable runway orientation is the one that provides the largest wind coverage and the minimum crosswind components[11] and provides at least 95 percent coverage for aircraft using the facility. Wind coverage typically represents the percentage of time during the year that crosswind components are below an acceptable velocity. The crosswind component is defined as the resultant vector that acts at a right angle to the runway.[12] The maximum allowable crosswind component depends not only on the size of the aircraft but also on its approach speed as well as pavement condition.

3.1.1 - Fleet Mix Operating Within the SSA Envelope

For SSA, it is anticipated that the majority of aircraft operating at the airport will be jet aircraft, both commercial and corporate. General aviation aircraft that would be operating on the commercial runway will be those that require more than 5,000 ft of runway, operate under Instrument Flight Rules (IFR), or those that require Category I[13] (CAT I) instrumentation. Those general aviation aircraft that can operate on less than 5,000 ft of runway and operate under Visual Flight Rules (VFR) would continue to use the general aviation/corporate runway.

Table 3-1: IAP and Intermediate Operations Forecast for Use in Facility Requirements (Base Case Only) breaks down the total operations forecast in terms of commercial passenger, commercial cargo, and general aviation operations that are forecast for the "SSA envelope" defined as the combination of activity occurring on the commercial runway and general aviation/corporate runway.

Table 3-1: IAP and Intermediate Operations Forecast for Use in Facility Requirements (Base Case Only)

Operational Category	DBO+1	DBO+5	DBO+20
Commercial Passenger (Revised Using Updated Load Factors for DBO+20)	2,400	16,200	86,650
Commercial Air Cargo	800	1,800	5,050
Commercial & General Aviation (Operations Requiring > 5,000 ft)	1,500	1,600	1,800
Commercial & General Aviation IFR Operations	10,300	11,200	13,000

[10] FAA Order 8400.9, *National Safety and Operational Criteria for Runway Use Programs*, November 9, 1981.
[11] FAA, AC 150/5300-13, *Airport Design,* Includes change 15, December 31, 2009.
[12] Ibid.
[13] Category 1 provide for IFR approaches when ceiling is 200 ft or less and runway visual range of 2,400 ft.

Table 3-1: IAP and Intermediate Operations Forecast for Use in Facility Requirements (Base Case Only)			
Total Operations on Commercial Runway	15,000	30,800	106,500
General Aviation/Corporate Runway VFR Operations	28,200	30,600	35,200
Total Operations - SSA Envelope	43,200	61,400	141,700

The breakdown of total general aviation operations within the SSA envelope was developed using information from the 2008 FAA Aerospace Forecasts[14] and a more detailed citing of FAA 2008 data in the 2008 General Aviation Manufacturers Association (GAMA) Statistical Handbook 2009.[15] The following parameters were used based upon evaluation of the information from these two reports to determine the disaggregation:

If:

- 3.67 percent of the U.S. general aviation fleet is turbojet/large turboprop discounting aircraft classified as lighter-than-air, instructional, aerial apps, aerial operations, aerial other, other work, sight see, air medical, and other; and,
- General aviation itinerant operations filing flight plans at U.S. airports is 29.6 percent of all general aviation operations at FAA and contract control towers.

*Then using a DBO+1 example from **Table 3-1**:*

- It is assumed that 3.67 percent of general aviation operations within the SSA envelope are turbojet/large turboprop operations and will require a runway of 5,000 ft or greater and will operate on the commercial runway (1,500 operations); and,
- 29.6 percent of general aviation operations within the SSA envelope are instrument operations (11,800 of 40,000 operations) and that number (11,800 operations) minus the number requiring a runway of 5,000 or greater (1,500 operations) are the other general aviation operations that will use the commercial runway (10,300 operations);

Therefore:

- General aviation operations at SSA are calculated as those operations within the SSA envelope in the two categories above (11,800 operations) with the remaining operations (28,200), labeled VFR operations in **Table 3-1**, allocated to the general aviation/corporate runway.

3.1.2 - Runway Orientation

This subsection addresses wind issues relative to the operations of aircraft within the SSA envelope and their relevance in determining the preferred runway orientation.

During the preparation of site selection for the SSA, much attention was given to meteorology and identification of the preferred runway orientation. IDOT included on the master plan team a certified meteorologist to assist with evaluation of meteorological information and install wind monitors at each of the five candidate sites being considered for the new airport's location. Once a preferred site had been selected, four of the wind monitors were moved to the site for purposes of gathering site specific information. Ultimately, 86,770 weather observations from the Chicago Midway International Airport (MDW) were used in the meteorological analysis due to its proximity. An exhaustive list of wind and flying weather conditions were performed. This information was summarized and published in the compendium document for the 11th Conference on Applied Climatology and presented by the authors at their annual conference which was held

[14] 2008 FAA Aerospace Forecasts: Fiscal Years 2009-2025, prepared by the U.S. Department of Transportation, Federal Aviation Administration, Aviation Policy and Plans.

[15] From FAA Data Base, Table 2.1 of the GAMA Statistical Handbook 2009, http://www.scribd.com/doc/27136625/General-Aviation-Statistical-Book-2009, Pp. 32-38.

in Dallas, Texas, 1999.[16] The full article from the publication is provided in **Appendix C: Meteorological Analysis.** This appendix also provides detailed information that was developed for the SSA initially. The weight based approach has also been used for determining the wind coverage for Cleveland-Hopkins International Airport and Aeropuerto Internacional Juan Santamaría, San José, Costa Rica.

Table 3-2: Operating Assumptions for Various Aircraft Weights During Certain Weather and Visibility Conditions to Crosswind Speeds in Knots describes the allowable crosswind component for various aircraft categories. While the fleet mix anticipated to be operating at SSA was much larger at the time the original weight based wind rose was calculated, the same categories of aircraft apply and the same assumptions relative to them apply. **Table 3-2** provides the crosswind component assumptions used in that report.[17]

Table 3-2: Operating Assumptions for Various Aircraft Weights During Certain Weather and Visibility Conditions to Crosswind Speeds in Knots

Aircraft Weight	VFR	Wet IFR	Wet	Freezing & Frozen Precipitation	CAT III*
Greater than 60,000	20	N/A	15	10	10
30,000# to 60,000#	20	N/A	15	10	10
12,500# to 30,000#	20	15	13	10	10
Less than 12,500#	16	13	10	5	10

*Note: CAT III weather conditions exist when the decision height is 100 ft or less and runway visual range of 700 ft or less.

A series of varying runway configurations were reviewed to determine the best combination of runways that would provide the greatest wind coverage for this site. For SSA, research prepared by IDOT during the site selection and master plan phases of the work in the early 1990's determined that the two best orientations are 090°/270°and 140°. **Table 3-3: Percent Utilization Analysis for Crosswinds <=20 and <=13 Knots**[18] provides information for the two primary wind orientations as well as the composite for 20 and 13 Knots.

Table 3-3: Percent Utilization Analysis for Crosswinds <=20 and <=13 Knots

Runway Configuration at 20 Knots	VFR	IFR	Below 700/2	All Weather
090/270	98.97%	99.43%	99.57%	99.34%
140/320	99.45%	99.38%	99.69%	99.45%
090/270 & 140/320	99.85%	99.86%	99.90%	99.84%
Runway Configuration at 13 Knots	**VFR**	**IFR**	**Below 700/2**	**All Weather**
090/270	91.42%	92.91%	95.41%	91.59%
140/320	92.02%	93.56%	95.59%	92.37%
090/270 & 140/320	97.04%	97.95%	98.80%	97.12%

The FAA publishes detail guidance for airport development in *Advisory Circulars.* FAA Advisory Circular 150/5300-13 states that crosswind runways are not required when the selected runway orientation provides 95 percent wind coverage for all aircraft that *frequently use the runway* (emphasis added). Specifically the guidance states:

[16] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January, 1999, pp. 121-126.

[17] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January 1999, Table 1- Operating Assumptions for Various Aircraft Weights During Certain Weather and Visibility Conditions to Crosswind Speeds in Knots, pg. 122.

[18] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January 1999, Table 2- Percent Utilization Analysis for Crosswinds <=20 and <=13 Knots, p. 124.

The most desirable runway orientation based on wind is the one which has the largest wind coverage and minimum crosswind components. Wind coverage is that percent of time crosswind components are below an acceptable velocity. The desirable wind coverage for an airport is 95 percent. The value of 95 percent takes into account various factors influencing operation and the economics of providing the coverage. The data collection should be with an understanding of the objective, i.e., to attain 95 percent usability.[19]

Accordingly, the SSA meteorological analysis was based on the premise that 95 percent of all aircraft that would use the airport would need to operate on a runway configuration that satisfied the wind conditions 95 percent of the time. This paper will continue to apply that assumption to all operations occurring within the SSA envelope, i.e., the commercial runway and the general aviation/corporate runway.

Table 3-4: Weight Based Meteorological Analysis Percent Coverage Runway 09/27 provides information from *Table 3: Weight Based Meteorological Analysis Coverage* in the *Advanced Use of Meteorological Data in the Selection of Runway Configuration report*[20]. This table indicates the information derived for the runway orientation 09/27 only. The purpose of this table is to conclude the percent annual wind coverage associated with different classes of aircraft as determined by weight. The importance of this information is to identify not just wind coverage of a runway orientation but the application of that wind coverage to the specific types of aircraft that would be using the runway. The theory is that the larger the fleet mix is in terms of weight, the greater the ability of a particular runway orientation to accommodate that fleet mix. **Table 3-4** provides an analysis of wind coverage for the primary runway orientation at SSA, i.e., 090°/270°, for specific aircraft weight categories that are defined in the table.

Table 3-4: Weight Based Meteorological Analysis Percent Coverage Runway 09/27

Time of Aircraft Operations	Group A: > 60,000# & 30,000-60,000#	Group B: > 12,500# to 30,000#	Group C: < 12,500#
Total Daily Operations	97.41%	96.80%	91.32%
Day, 6:01 AM 8:00 PM	97.36%	96.77%	91.32%
Night, 8:01 PM – 6:00 AM	96.24%	97.85%	N/A

The aircraft weight-based categories established in **Table 3-4** are used to determine the wind coverage for the commercial runway that would be constructed with an orientation of 090°/270°. This runway orientation is analyzed further in **Table 3-5: IAP and Intermediate Weight Based Fleet Mix Comparison for SSA-DBO+1, DBO+5, and DBO+20.** From the analysis and based upon the aircraft that would be accommodated by the commercial runway, over 95 percent of all operations can operate by DBO+5. Since the goal is to be able to accommodate all operations, whether commercial or general aviation/corporate, the fleet size is forecast to grow such that 95 percent of all operations on the airfield can be accommodated by DBO+20. It is for this reason that the evaluation concludes that a singular runway orientation, Runway 09/27, will suffice to meet the objective of accommodating 95 percent of all aircraft that would use the airport and satisfy wind conditions 95 percent of the time. Therefore, there is no compelling need to plan for a crosswind runway. This analysis revalidates the previous weight-based analysis in the Phase I Engineering Study[21] and corroborates the findings of the IAP Tier 1-ROD. IDOT Aeronautics' conclusion is that a crosswind runway is not required in the Ultimate Airfield Master Plan.

[19] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January 1999, pg. 121.

[20] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January 1999, Table 3 – Weight Based Meteorological Analysis Percent Coverage (Year 2001), pg. 125.

[21] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.

In addition, **Exhibit 3-1: GA Airport Distance Map,** in Appendix B**,** shows the location of regional general aviation/corporate airports with crosswind runways that could accommodate the less than 5 percent of operations that may not be able to be accommodated. These airports which include Lansing Municipal Airport (IGQ), Greater Kankakee Airport (IKK), and Lewis University airport (LOT), circumnavigate SSA. The assertion that airports in proximity to SSA could accommodate the flights that might not be able to land at SSA during adverse wind conditions was corroborated during the Phase I Engineering Study[22] when several advisory committees were formed. One of them was a General Aviation Committee which included GA experts and industry representatives from throughout Illinois. The prevailing opinion of the experts involved in the discussion was that once commercial operations at SSA reached a certain level of activity, GA pilots would most likely choose to fly to other airports due to the complexity of operating simultaneously with larger aircraft. In addition, the committee concluded that there are several "reliever-like" airports located around the SSA site, such as IGQ and IKK (specifically named by the committee) that GA aircraft could land if they were unable to land at SSA.

Table 3-5: IAP and Intermediate Weight Based Fleet Mix Comparison for SSA-DBO+1, DBO+5 and DBO+20

Runway Scenarios		Weight Based Categories*			Total Operations for Runway(s)	Total Weight Based Operations Accommodated	Percent Coverage Weight Based Operations
		Group A: > 30,000#	Group B: 30,000# > x > 12,500#	Group C: < 12,500#			
		>13 knots 97.41%	>13 knots 96.80%	>13 knots 91.32%			
Commercial Runway							
Operations	DBO+1	3,200	1,500	10,300	15,000		
Weight Based	DBO+1	3,117	1,452	9,406		13,975	93.17%
Operations	DBO+5	18,000	1,600	11,200	30,800		
Weight Based	DBO+5	17,534	1,549	10,228		29,311	95.17%
Operations	DBO+20	91,700	1,800	13,000	106,500		
Weight Based	DBO+20	89,325	1,742	11,872		102,939	96.66%
Commercial Runway and General Aviation							
Operations	DBO+1	3,200	1,500	38,400	43,100		
Weight Based	DBO+1	3,117	1,452	35,067		39,636	91.96%
Operations	DBO+5	18,000	1,600	41,800	61,400		
Weight Based	DBO+5	17,534	1,549	38,172		57,255	93.25%
Operations	DBO+20	91,700	1,800	48,200	141,700		
Weight Based	DBO+20	89,325	1,742	44,016		135,083	95.33%

Note: *Weight Based Operations for a Group Type Equals Operations for a Group Type Multiplied by the Wind Coverage For the Group.
Murray &-Trettel, Inc. and TAMS, 1996. IDOT, 2010.

3.2 - IAP Airfield Peak Hour Analysis

Determining the average annual capacity of a runway system requires extensive analysis that includes many factors, such as an airport's physical environment – elevation, temperature, meteorology, and airspace – the fleet mix operating at the airport, the geometry of the layout of the runway and taxiway system, the airfield interface with the terminal system, and other factors. However, a key determinant is the ability of the airfield to accommodate traffic during the peak hour which is the parameter that this evaluation will focus on.

[22] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.

Table 3-6: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario brings forward information from the 2004 Forecast Report for air passenger activity and updates the cargo fleet mix based upon the 2009 Forecast Report.

Table 3-6: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario

Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:10PM)*	DTW	MI	Detroit CMSA	EMB-190	6:45AM
(8:30PM)*	WS+	DC	Washington/Baltimore CMSA	CRJ900	6:50AM
(8:45PM)*	NY+	NY	New York CMSA	B717	7:00AM
(9:00PM)*	ATL	GA	Atlanta	CRJ900	7:10AM
(9:10PM)*	MSP	MN	Minneapolis/St. Paul	CRJ700	7:15AM
(9:20PM)*	BOS	MA	Boston CMSA	EMB-190	7:20AM
(9:25PM)*	DEN	CO	Denver	CRJ900	7:35AM
(9:40PM)*	DFW	TX	Dallas/Ft. Worth CMSA	EMB-190	7:50AM
(9:45PM)*	MCO	FL	Orlando	B737-800	7:50AM
(10:00PM)*	SFO+	CA	San Francisco/Oakland CMSA	B737-700	8:00AM
(9:00PM)*	LA+	CA	Los Angeles CMSA	B737-700	8:20AM
(10:00PM)*	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	8:25AM
9:10AM	NY+	NY	New York CMSA	B717	10:00AM
10:00AM	BOS	MA	Boston CMSA	EMB-190	10:45AM
10:30AM	PHX	AZ	Phoenix	A320	11:15AM
10:30AM	WS+	DC	Washington/Baltimore CMSA	CRJ900	11:15AM
10:35AM	ATL	GA	Atlanta	CRJ900	11:20AM
11:00AM	LAS	NV	Las Vegas	A320	11:45AM
11:40AM	MSP	MN	Minneapolis/St. Paul	CRJ700	12:25AM
12:40AM	LA+	CA	Los Angeles CMSA	B737-700	1:33PM
2:15PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	3:00PM
2:20PM	MCO	FL	Orlando	B737-800	3:10PM
3:15PM	NY+	NY	New York CMSA	B717	4:00PM
4:00PM	MIA+	FL	Miami/Ft. Lauderdale CMSA	A319	4:44PM
5:00PM	DTW	MI	Detroit CMSA	EMB-190	5:50PM
5:05PM	DEN	CO	Denver	CRJ900	5:55PM
5:10PM	DFW	TX	Dallas/Ft. Worth CMSA	EMB-190	5:55PM
5:15PM	MSP	MN	Minneapolis/St. Paul	CRJ700	6:00PM
5:40PM	LA+	CA	Los Angeles CMSA	B737-700	6:25PM
5:55PM	ATL	GA	Atlanta	CRJ900	6:45PM
6:00PM	SFO+	CA	San Francisco/Oakland CMSA	B737-700	6:48PM
6:15PM	BOS	MA	Boston CMSA	EMB-190	7:00PM
6:25PM	LAS	NV	Las Vegas	A320	7:12PM
6:40PM	PHX	AZ	Phoenix	A320	7:25PM
6:45PM	WS+	DC	Washington/Baltimore CMSA	CRJ900	7:30PM
7:15PM	NY+	NY	New York CMSA	B717	8:00PM
Cargo Aircraft					
4:00AM			Domestic	B737-800	10:00PM
4:15AM			Domestic	B757-700	10:15PM
4:30AM			Domestic	B737-700	10:30PM
10:00AM			Domestic	B757-400	11:30PM
10:15AM			Domestic	B757-400	12:00PM
10:30AM			Domestic	B757-400	12:30PM
2:00PM			International	A300-600	3:45PM

Table 3-6: IAP Potential Aircraft Schedule, 4th Quarter DBO+5, High Case Forecast Scenario					
Arrival Time	Airport Code	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
3:00PM			International	B767-300	4:45PM
4:00PM			International	B767-300	6:00PM

Source: IDOT, 2010. *Times in parentheses indicate aircraft parking overnight to be used for AM departures. Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Peak hour estimates for aircraft operations and air passengers were prepared for the various scenarios and target years using the flight schedule developed for SSA to DBO+5 as well recognizing typical trends of airports with similar characteristics to the activity levels expected at SSA. The US DOT T-100 data were used to estimate the typical patterns of the peak month for various levels of activity at representative US commercial airports, and based upon their experience, IDOT consultants developed assumptions from knowledge of other US airports with similar trends. **Table 3-7: IAP and Intermediate Annual Commercial Aviation Activity** presents the forecasts.

Table 3-7: IAP and Intermediate Annual Commercial Aviation Activity

Planning Horizon	Annual Enplaned Passengers			Annual Commercial Aircraft Operations		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
DBO+1	19,575	125,091	169,398	360	2,400	3,400
DBO+5	471,056	709,101	967,662	9,800	16,200	23,500
DBO+10	1,265,000	Not Forecast	2,308,000	25,100	Not Forecast	50,300
DBO+20	2,200,000	Not Forecast	6,100,000	43,500	Not Forecast	120,000

Source: IDOT, 2010.

Normally the peak hour ratios drop gradually along with the traffic growth as it begins to even out more during more periods of the day. This assumption has been taken into consideration when estimating the peak hour for SSA. The analysis has also considered the flight schedules for DBO+1 to DBO+5 when estimating the activity at peak periods. The study has also assumed the demand will be an unconstrained demand, so there will not be capacity limitations for the airport facilities. The analysis estimates the peak month, the peak month average day (PMAD) and the peak hour. **Table 3-8: IAP and Intermediate Peak Month Commercial Aviation Activity** and **Table 3-9: IAP and Intermediate Peak Hour of PMAD Commercial Aviation Activity** present the peak month and the peak hour activity for domestic commercial passengers and operations. Peak hour figures are the primary fact at estimating the size of airport facilities to accommodate the demand.

Table 3-8: IAP and Intermediate Peak Month Commercial Aviation Activity

Planning Horizon	Peak Month Enplaned Passengers			Peak month Commercial Aircraft Operations		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
DBO+1	0	12,822	17,363	0	229	325
DBO+5	47,577	70,910	95,799	926	1,507	2,162
DBO+10	125,235	Not Forecast	226,184	2,322	Not Forecast	4,628
DBO+20	215,600	Not Forecast	591,700	4,002	Not Forecast	10,920

Source: IDOT, 2010.

Table 3-9: IAP and Intermediate Peak Hour of PMAD Commercial Aviation Activity

Planning Horizon	Peak Hour Enplaned Passengers			Peak Hour Commercial Aircraft Operations		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
DBO+1	132	238	245	1	4	4
DBO+5	303	445	591	5	9	12

Table 3-9: IAP and Intermediate Peak Hour of the PMAD Commercial Aviation Activity						
DBO+10	734	949	1,163	13	17	21
DBO+20	1,153	2006	2,859	20	34	47

Source: IDOT, 2010. Note: Aviation activity forecasts in the 2009 Forecast Report identified the low and high case scenarios only for years after DBO+10 to constitute a range of potential activity. Values represented in the table for the Base Case Scenario for DBO+10 and DBO+20 are averages of the Low Case and High Case Scenarios.

Table 3-10: IAP and Intermediate General Aviation Activity Peak Hour of the PMAD is an estimate of GA peak activity for various scenario years. Estimates for the GA peak month were assumed to be similar to that for commercial operations. The peak hour was estimated at 10 percent of the peak month average week day. For Scenario Years DBO+1, DBO+5, and DBO+10, it was assumed that GA operations on the commercial runway was a subset of all GA operations within the SSA envelope as described above in **Section 3.1**. However, peak hour estimates for DBO+20 are inclusive of all general aviation activity within the SSA envelope.

Table 3-10: IAP and Intermediate General Aviation Activity Peak Hour of the PMAD

Planning Horizon	Peak Month Average Week Day Operations			Peak Hour of the Average Weekday		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
DBO+1	32	39	39	3	4	4
DBO+5	36	42	42	4	4	4
DBO+10	70	81	89	7	8	9
DBO+20	137	160	184	14	16	18

Source: IDOT, 2010. Note: Aviation activity forecasts identified the low and high case scenarios for years after DBO+10 to constitute a range of potential activity. Values represented in the table for the Base Case Scenario for DBO+10 and DBO+20 are averages of the Low Case and High Case Scenarios.

During the Phase I Engineering Study IDOT designed a preliminary airspace plan for the SSA to determine if it could be integrated within the existing Chicago region airspace structure. This preliminary airspace plan was designed after holding several meetings with FAA officials to discuss this specific issue. The preliminary assumption used for the airspace analysis was that departures at SSA would be sequenced after departing aircraft from MDW and ORD[23]. **Exhibit 3-2: Proposed IAP Airport Approach and Departure Flight Tracks,** in Appendix B, depicts the proposed preliminary airspace structure and routes assumed by IDOT Aeronautics for both west and east air traffic flow configurations. Based on the wind roses and analysis described in Section 3.3, annual air traffic flows at SSA should be approximately 62 percent westerly flow and 38 percent easterly flow under All-Weather conditions.

In view of the peak hour operational statistics for both commercial and general aviation, it is likely that two runways will be needed by DBO+20. **Exhibit 3-3: Proposed Intermediate Airport Approach and Departure Flight Tracks,** in Appendix B**,** presents a probably scenario that will be revisited in Chapter 4 – Alternatives Development and Evaluation.

3.3 - Runway Requirements

Table 3-1 shows that at DBO+5, SSA will have 61,400 annual operations. Runway capacity for the aircraft mix expected at SSA in DBO+5 is approximate 168,000 annual operations. **Table 3-1** also indicates that the DBO+20 forecast expect 141,700 annual operations. Based on the above forecasts, additional runway capacity is not needed at DBO+5. However, planning criteria contained in FAA Advisory Circular 150/5060-5, Change 2 states that an airport should, at a minimum, initiate planning studies for capacity enhancements anytime the existing aircraft operational levels approach 60 percent of the runway/airfield capacity. This tenet will necessitate an airport capacity planning study and master plan prior to DBO+20 and potentially the construction of an additional runway.

[23] Summary Draft, *Phase I Engineering Report: South Suburban – A Supplemental Airport for the Chicago Region*, Illinois Department of Transportation by TAMS Consultants, Inc., September 1997.

At the beginning of this report it was noted that for facility planning purposes, an assumption was made that the existing general aviation/corporate aviation facilities, which are within the approved Tier 1-ROD boundaries, would be retained. In 1997, FAA conducted an airspace determination study on the first SSA Airport Layout Plan (ALP). One of the premises of that study assumed that Sanger Field (now renamed Bult Field), which at the time had very limited facilities, would be acquired and closed at DBO. This assumption was based on the need to have single control of the airspace structure above the new commercial airport. As previously noted, a private owner purchased Sanger field and upgraded facilities to handle general aviation and corporate aviation aircraft. A review of the use and/or disposition of the existing general aviation/corporate aviation facilities at DBO will be discussed in the Alternatives Development and Evaluation Report of the SSA Master Plan.

3.3.1 - Design Aircraft

FAA guidelines specify that in determining the primary runway length at an airport "*either the family of airplanes having similar performance characteristics or a specific airplane needing the longest runway*"[24] with at least 250 annual arrivals (500 operations) should be considered. The most demanding aircraft that is expected to operate at an airport is typically referred to as the "design aircraft" or "critical aircraft".

The aviation forecasts assume that the commercial passenger aircraft fleet mix during the IAP will primarily consist of narrow body and regional jet aircraft. The largest passenger aircraft expected to operate regularly at SSA during this phase will probably serve short- to medium-stage range markets (i.e., B737-800 or A320). During the last decade, the airline industry has significantly increased the use of regional jets (such as Embraer and Bombardier regional jet families). These aircraft generally handle low-density, short and medium-range markets and are included in the SSA fleet mix potential.

The forecasts anticipate that aircraft such as B757-300, B767-300 and A300-600 could be used for all-cargo operations within the DBO+5 timeframe. By DBO+20, aircraft in the ARC D-V category could be operating at the airport (A350-900F or B787-900F). **Table 2-5** and **Table 2-7** identify these representative aircraft.

Based on the aviation forecasts and potential aircraft fleet mix, the most demanding aircraft are expected to be the following during the IAP and the 20-year master planning time frame:

- Low Case Forecast scenario – B737-800 and A320 (ARC C-III);
- Base and High Case Forecast scenarios, DBO+5 – B767-300 and A300-600 (ARC D-IV);
- Base and High Case Forecast scenarios, DBO+20 – B787-900F and A350-900F (ARC D-V).[25]

3.3.2 - Runway Length

According to the guidelines outlined in FAA Advisory Circular 150/5325-4A, runway lengths must be determined based on several variables, including aircraft type, flight stage lengths, airport elevation, ambient temperature, runway gradient, and runway conditions, such as dry or varying forms of wet pavement to include freezing and frozen conditions. Each of these will be addressed briefly below.

The forecast aircraft fleet mix for SSA in DBO+1, DBO+5, and through DBO+20, is summarized in the preceding section.

For the most part, the SSA will serve domestic passenger markets in initial years as the air cargo service segment slowly grows. By DBO+5, the most demanding aircraft operating at SSA will be air cargo. Air cargo

[24] FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, January 1990.

[25] It should be noted that while the Base Case scenario for DBO+20 does include the A350 and B787, an actual operations forecast was not prepared for this scenario, only for the Low and High Cases. No Base Case was developed since it was anticipated that the number of operations for the DBO+20 Base Case would be within a range between the Low and High Cases. However, if one averaged the two, there would be approximately 450 annual operations for the Base Case DBO+20 scenario for these large air cargo D-V aircraft.

will be the design aircraft from that point forward. Initial international segments likely will be to Europe. However, the aviation forecast indicates that long haul Asian markets are the key markets for consideration in the planning process beyond DBO+5. **Table 3-11: Primary Air Cargo Markets for Prospective SSA Service** lists potential air cargo markets that could be served by SSA over the 20-year master plan period.

Table 3-11: Primary Air Cargo Markets for Prospective SSA Service

Chicago to:	Nautical Miles (Rounded)	Statute Miles (Rounded)
Buenos Aires, Argentina	4,800	5,600
Sydney, Australia	8,000	9,200
Santiago, Chile	4,600	5,300
Hong Kong, China	6,800	7,800
Shanghai, China	6,200	7,100
Frankfurt, Germany	3,800	4,300
Tokyo, Japan	5,500	6,300
Moscow, Russian Federation	4,300	5,000
Singapore, Singapore	8,200	9,400
Dubai, United Arab Emirates	6,300	7,200
Ho Chi Minh City, Vietnam	7,600	8,700

Other factors also must be considered in evaluating the runway length to adequately accommodate operations of the most demanding aircraft. FAA's guidelines[26] state that the airport elevation is the highest point on an airport's usable runway expressed in feet above sea level which for SSA is 761 ft above Mean Sea Level. The airport reference temperature is the monthly mean of the daily maximum temperatures of the hottest month of the year. For SSA, this reference temperature is 84.7ºF[27].

The runway length analysis examines the critical aircraft expected to operate in the first five years of airport operation as well as through the 20-year master plan period. The current fleet[28] of several U.S. air carriers, including passenger and cargo, was reviewed in order to determine the required runway lengths for various aircraft models with their associated engine types. In addition, new generation aircraft being developed and that would reasonably expected to be online in the not-too-distance future, such as the Boeing 787-900 or the Airbus A350-900, are also included. Appropriate Airplane Characteristics from Airport Planning Manuals and aircraft manufacturer's websites regarding new generation aircraft were consulted to adequately estimate the runway length as well as the aircraft manufactures' websites regarding new generation aircraft. However, neither Airbus nor Boeing would provide any specific information regarding the potential runway length requirements for their new generation aircraft.[29]

Taking into consideration the parameters identified above for runway length calculations, the runway length calculations for the projected fleet mix are presented in **Table 3-12: Maximum Runway Length Requirements for Representative Aircraft Models Forecast to Operate at SSA.**

[26] FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, January 1990.
[27] Processed from 30 years of hourly observations collected by NOAA between the years 1971 and 2000 at Midway International Airport and archived by NOAA.
[28] JP Airlines - Fleets International, Edition 2003/04, Bucher & Co, Publikationen, Zurich, Switzerland, April 2003.
[29] Interviews and email correspondence with Airbus and Boeing conducted during the period October 29, 2010 through November 8, 2010.

Table 3-12 – Maximum Runway Length Requirements for Representative Aircraft Models Forecast to Operate at SSA				
Aircraft	**Engine**	**Maximum Takeoff Weight (lb)**	**Maximum Range (nm) Zero Fuel Weight**	**Takeoff Length (ft)**
EMB145-LR	AE3007	48,500	1,500	7,400
CRJ-701-LR	GE CF34-8C5	77,000	1,950	6,100
B717-200	Not specified	121,000	2,100	8,000
B737-800	CFM56-7B24	174,200	3,100	10,600
B737-800	CFM56-7B26	174,200	3,100	8,500
B737-800	CFM56-7B27	174,200	3,100	8,000
B757-300	RB211-535E4	270,000	2,300	10,200
B757-300	RB211-535E4B	270,000	2,300	9,000
B767-300	CF6-80A-80A2	350,000	2,300	9,800
B767-300	JT9D-7R4D/7R4E	352,000	2,300	11,200
B767-300ER	CF6-80C2B4, PW4056, RB211-524G	407,000	4,100	11,500
B767-300	CF6-80A/80A2	346,000	2,300	9,400
B767-300	CF6-80C2-B6, PW4060, RB211-524H	407,000	4,100	9,800
A350-900F	BR Trent XWB	657,000	8,000	Not Available
B787-900F	Not specified	545,000	8,000-8,500	Not Available
B777-200LR	GE90-110B1L	766,000	7,000	11,500
B747-400F	CF6-80C2B1	875,000	5,600	11,800

Source: Various *Airplane Characteristics for Airport Planning Manuals* from aircraft manufacturers. Notes: Airport elevation is 761 feet above mean sea level. Runway Length is the runway length required for a runway with 0% gradient, and a mean maximum daily temperature of the hottest month, 84.7-degrees. Takeoff Weight includes Operating Empty Weight + Payload + Fuel.

Table 3-13: IAP Runway Length Requirements, DBO+5 and **Table 3-14: Intermediate Runway Length Requirements, DBO+20** present a summary of the runway length requirements for the three forecast scenarios, based on the take off-requirements of the projected critical aircraft for which there are forecast 500 or more annual operations.

The most demanding aircraft considered in this analysis was the B767-300 with engine types of CF6-80C2-B4, PW4056, or RB211-524G which requires an 11,500 foot long runway at maximum takeoff operational weight (MTOW). For purposes of the 2009 Forecast Report, all air cargo operations forecasts assumed aircraft operate at 90 percent load factor or approximately MTOW.

Table 3-13: IAP Runway Length Requirements, DBO+5				
Forecast Scenario	**Critical Passenger Aircraft**	**Runway Length (ft)**	**Critical Cargo Aircraft**	**Runway Length (ft)**
Low Case	B737-800, A320	7,800; 8000	B737-800F (various engine types)	9,000 (average of three models, longest 10,600 ft)
Base Case	B737-800, A320	7,800; 8000	B767-300ER (various engine types)	10,300 (average of five models, longest 11,500 ft)
			A300-600	9,800
High Case	B737-800, A320	7,800; 8000	B767-300ER*	10,300 (average for B767 models);

Source: IDOT, 2010. *It is possible that the B787-900F or the A350-900F could operate at SSA in the High Case scenario, DBO+5. However, the 2009 Forecast assumes only 291 operations by such aircraft.

Table 3-14: Intermediate Runway Length Requirements, DBO+20				
Forecast Scenario	**Critical Passenger Aircraft**	**Runway Length (ft)**	**Critical Cargo Aircraft**	**Runway Length (ft)**
Low Case	B737-800, A320	7,800; 8000	B737-800F (various engine types)	9,000 (average of three models, longest 10,600 ft)

Table 3-14: Intermediate Runway Length Requirements, DBO+20

Forecast Scenario	Critical Passenger Aircraft	Runway Length (ft)	Critical Cargo Aircraft	Runway Length (ft)
Base Case	B737-800, A320	7,800; 8000	B767-300ER (various engine types)*	10,300 (average of five models, longest 11,500 ft)
			A300-600	9,800
High Case	B737-800, A320	7,800; 8000	B767-300ER, B787-900, A350-900	10,300 (average of five models, longest 11,500 ft) **

Source: IDOT, 2010. *It is possible that the B787-900F or the A350-900F could operate at SSA in the Base Case scenario, DBO+20. While no specific forecast for such category was prepared, the average of the Low and High forecast DBO+20 scenarios is 450 annual operations by such aircraft. **Runway length requirements not yet available from Airbus for the Airbus A350 or from Boeing for the B787.

From **Table 3-14**, the critical air cargo aircraft requirements for departures at maximum takeoff weight range from 9,000 ft to 11,500 ft under the three different forecast scenarios for DBO+5 and DBO+20.

As mentioned above, the specific model of aircraft identified as the critical aircraft for design for SSA during the IAP phase is the B767-300. There are five models of this aircraft that could operate at SSA listed in **Table 3-12**. These aircraft models have runway length requirements ranging from 9,400 to 11,500 ft. The average of the five models is 10,300 ft.

Using all previous analyses, IDOT Aeronautics has determined the DBO IAP runway length is 9,500 ft. This conservative approach, takes into consideration the previously discussed average runway length potential of 10,300 ft. This analysis points to the need to include additional grading and drainage actions to 10,300 ft by DBO+5.

Section 3.1.2: Runway Orientation establishes that the inaugural runway will have an east-west orientation, Runway 09/27. For safety and operational purposes, a full-length, parallel taxiway with connecting exit taxiways at strategic locations is recommended. Provisions for high-speed exit taxiways should also be included, but may not be implemented until aviation demand requires them. To ensure efficient aircraft operation beyond the study period, it will be advantageous to plan separations to allow the development of a future dual taxiway system to separate the taxiing of arriving and departing aircraft adjacent the terminal complex.

3.3.3 - Runway/Taxiway Separation

Although the Boeing 767-300 and Airbus A300-600 are the largest aircraft expected to operate during the IAP, the runway/taxiway separation criteria applicable to Aircraft Design Group VI was considered for the Runway 09/27. However since this is a new facility, it is prudent to provide for runway/taxiway separation standards applicable to ADG VI to facilitate future airfield conversion should aviation activity conditions demand it. ADG VI aircraft require runway widths of 200 ft, runway shoulder widths of 40 ft, parallel runway to taxiway centerline separation of 600 ft, taxiway width of 100 ft, and taxiway shoulder width of 40 ft. There are also some differences in safety areas and object free areas. As the airfield planning progresses, provisions for ADG VI will be considered in the layout of these facilities.

Table 3-15: SSA Airport Design Criteria is a summary of the runway/taxiway dimensions and the separation criteria required for Runway 09/27 which is planned to serve Airplane Design Group IV (IAP). This separation criteria will also provide the flexibility for accommodating Airplane Design Group VI (Ultimate).

Table 3-15: SSA Airport Design Criteria

Facility	Airplane Design Group IV	Airplane Design Group VI
Runway Width	150	200
Runway Length	10,300	12,500[30]
Runway Protection Zone Length (CAT 1)	2,500	2,500
Runway Protection Zone Inner Width (CAT 1)	1,000	1,000
Runway Protection Zone Outer Width (CAT 1)	1,750	1,750
Runway Safety Area Width	500	500
Runway Safety Area (RSA) Length beyond Runway End	1,000	1,000
Runway Blast Pad Width	200	280
Runway Blast Pad Length	200	400
Runway Object Free Area (OFA) Width	800	800
Runway Object Free Area Length beyond Runway End	1,000	1,000
Runway Precision Object Free Zone (POFZ) Width	800	800
Runway Precision Object Free Zone (POFZ) Length	200	600
Runway Shoulder Width	25	60
Runway to Parallel Taxiway Centerline Separation	400	600[31]
Taxiway Width	75	100
Taxiway Shoulder Width	25	40
Taxiway Object Free Area Width	259	386
Taxiway Safety Area Width	171	262
Taxiway Centerline to Parallel Taxiway Centerline	215	324

Source: AC 150/5300-13, Incorporation of Consolidation Changes, December 31, 2009.

3.4 - Airport Navigational and Visual Aids (NAVAIDS) and Air Traffic Control

3.4.1 – Introduction

Still in the planning process are new technologies for air navigation, air traffic control and telecommunications that will probably be available in the next few years, as part of the new Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) program.[32] The program is expected to become available between 2010 and 2015 and will provide better worldwide coverage.[33] A key part of this system includes the Global Positioning System (GPS), consisting of several communication satellites orbiting the Earth with receptors at strategic locations on the ground to receive their signals and transmit to flying aircraft. This system has been in place since 2005. The proposed new system, which is known as the Future Air Navigation System (FANS) will significantly increase the airspace capacity since separation between flying aircraft could be considerably reduced, allowing a higher degree of flexibility for aircraft operations. With the FANS system, the augmentation of GPS signals could meet required navigational specifications. The augmentation will ensure integrity, availability, accuracy and continuity of air traffic service.

[30] A runway length of 12,500 feet was approved by ICAO at Beijing Capital International Airport by ICAO for the A380, flightsafety.org/asw/july07/asw_july07_p46-49.pdf. "Just Wide Enough", p.49, http://www.google.com/search?hl=en&safe=active&rlz=1R2ADRA_enUS390&q=FAA+criteria+for+runway+shoulder+width+for+A-380+2010&btnG=Search&aq=f&aqi=&aql=&oq=&gs_rfai= .

[31] Airports such as San Francisco International Airport and John F. Kennedy International Airport have FAA modifications to standards (MOS) for operating A380 aircraft, ADG Group VI, in terms of runway and shoulder width, taxiway width and shoulder width, and other standards. The FAA also has published Engineering Briefs (EB) to address such issues in advance of revising Advisory Circulars. Criteria in this table are those that currently exist.

[32] Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) Conference 2010 www.afceaboston.com/.../cnsatm2010/CNSATM_University_Booklet_2010.pdf

[33] Implementation anticipated by 2018, J. Randolph Babbitt, FAA Administrator, FAA's NexGen Implementation Plan, 2010, www.faa.gov/nextgen/media/ngip_3-2010.pdf

For the aviation industry, two levels of augmentation have been defined – wide area and local area. The Wide Area Augmentation System (WAAS)[34] will meet these specifications for route and terminal airspace navigation, non-precision and Category I precision approaches. A Ground Based Augmentation System (GBAS) will permit Category II and Category III precision approaches. The timeframe for implementation of WAAS and GBAS is indeterminate but remains the top priority of the FAA.

The long-term goal of the aviation industry is to completely replace Instrument Landing Systems (ILS) with GPS for precision approaches. As long as the conditions are adequate in their approaches and surroundings, all airports could have precision approaches at reasonable costs. The new system will also provide more flexibility on approach procedures. Since ILS only allows linear approaches in the final stages, GPS is anticipated to provide more flexibility in the final descent of aircraft.

SSA should be equipped with adequate navigational and visual aids to meet the projected aviation demand and expected weather conditions. The discussion herein addresses the current technology, but it can be assumed that some of the equipment will be replaced with new devices associated with the new CNS/ATM technology.

It is important that areas in the vicinity of all navigational and visual aids facilities should be protected and kept clear of any natural or man-made objects that could interfere or affect the equipment signals and operation. The protection of these areas is mandatory for safe operations at the airport. The Federal Aviation Regulations (FAR) Part 77[35] surfaces should also be protected (See **Section 3.4.4: Protecting the Airport Environs**). The ALP will show the areas that need to be protected for the main navigational aids following FAA criteria.

Since SSA is forecast to handle a sizable number of air carrier operations during the IAP, it is expected that the primary runway will eventually have an ILS CAT I at both approach ends. The ILS assists pilots of properly equipped aircraft in landing safely under all weather minimums. It provides pilots with electronic guidance for aircraft alignment, descent gradient, and position until visual contact confirms the runway location and alignment. The ILS establishment and siting criteria are outlined in FAA Order 6750.16D, *Siting Criteria for Instrument Landing Systems*, February 2005.

As discussed in **Section 3.1: Fleet Mix Operating with the SSA Envelope and Runway Orientation**, 63 percent of the operations are expected to occur on the 27 end of the runway and 37 percent are expected to occur on the 09 end of the runway on an annual basis. Under IFR conditions, the split of operations is approximately equal (48.4 percent on the 27 end and 51.4 percent on the 09 end). Since the majority of operations will occur on the 27 end of the runway, it is recommended that an ILS be initially installed on that end of the runway.

3.4.2 Requirements for NAVAIDS and Air Traffic Control Facilities

NAVAIDS installed at an airport depend upon the local weather conditions of the area where the new airport is situated, the level of aviation activity and types of airspace obstructions in the surroundings. **Table 3-16: General Summary of Recommended Airport NAVAIDS & Air Traffic Control** and **Table 3-17: IAP Summary of Recommended Airport NAVAIDS & Air Traffic Control (DBO+1 to DBO+5)** present a preliminary list of navigational aids, visual aids, meteorological facilities and Airport Traffic Control Tower (ATCT) proposed at SSA on opening day and through DBO+5 (See also Appendix D: Airport Traffic Control). Ultimately, this planning analysis considers that the level of aviation activity may significantly increase and the predominant arriving runway(s) could become precision approach CAT II or III. Therefore, the proposed development should facilitate the required upgrades without causing major interruptions of the airport operation. In addition to runway and taxiway lighting, apron areas should be equipped with apron floodlights to assist night-time ramp activity.

[34] FAA, Satellite Navigation, http://gps.faa.gov/index.htm, 2004.
[35] FAA, FAR Part 77, *Objects Affecting Navigable Airspace*, April 1971.

Table 3-16: General Summary of Recommended Airport NAVAIDS & Air Traffic Control	
NAVAID	**Equipment Function Description**
ATCT – Airport Traffic Control Tower	Controls flight operations within the airport's designated airspace.
Rotating Beacon	Indicates location of an airport.
VOR – Very High Frequency Omni-Directional Rangefinder	Emits VFR azimuth data over 360 degrees for non-precision instrument approach procedures.
NDB – Non-Directional Beacon	Provides directional guidance to be used as an aid to final non-precision approaches.
LLWAS – Low Level Wind Shear Alert	An automated system to detect hazardous wind shear events and provide warnings to air traffic controllers.
AWOS – Automated Weather Observation System	Recording instruments that measure cloud height visibility, wind speed, temperature, dew points, etc.
ASR – Airport Surveillance Radar	Provide air traffic controllers information regarding the location of an aircraft within 60 nautical miles of the airport.

Source: IDOT, 2010.

ASR may not be required on opening day since SSA falls within the Chicago Air Route Traffic Control Center (ZAU) airspace. This would be determined by the FAA at the time. An ASR could be established at SSA if the relative benefits, measured in terms of delay reduction or safety, are sufficient enough to warrant installation of such a facility at SSA. Delay reduction and safety benefits are calculated based on the aircraft fleet mix, number of instrument operations by type of operation (air carrier, air taxi, general aviation and military), and IFR weather occurrences. FAA Order 7031.2C, *Airway Planning Standard Number One* outlines the methodology involved in determining the eligibility of establishing an ASR at airports.

Table 3-17: IAP Summary of Recommended Airport NAVAIDS & Air Traffic Control - DBO+1 to DBO+5	
NAVAID	**Equipment Function Description**
ATCT – Airport Traffic Control Tower	Controls flight operations within the airport airspace structure.
Instrument Landing System Category I, including a Glide Slope, Localizer and Outer Marker Required for Category I	Provides instrument guidance during weather conditions when visibilities are not less than ½ mile and ceiling not less than 200 feet. The ILS provides vertical & horizontal guidance & marks a specific point along the approach path.
Precision Approach Path Indicator (PAPI)	Provides visual approach slope guidance.
Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)	Provides visual guidance on final approach during night and low visibility conditions.
NDB – Non-Directional Beacon	Provides directional guidance to be used as an aid to final non-precision approaches.
High Intensity Runway Edge Lights (HIRL)	Defines runway edges and length necessary for precision instrument approaches.
Wind Cones	Provides visual wind direction and velocity.
Medium Intensity Taxiway Edge Lights (MITL)	Defines taxiway edges and length.

Source: IDOT, 2010.

3.4.3 Intermediate (DBO+6 to DBO+20) Airport NAVAIDS and Visual Aids

Navigational Aids, Telecommunication and Air Traffic Control. In addition to the navigational and visual aids (NAVAIDS) requirements for the IAP, the future runway is planned to have CAT II or CAT III precision approaches on at least one runway end. Because ILS only allows linear final approaches, the long-term goal of the aviation industry is to completely replace ILS with GPS for precision approaches. As mentioned above, one of the FAA's goals for enhancing air traffic safety and capacity is to implement the following aviation system augmentation programs as soon as legislatively possible.

Beyond DBO+5, NAVAIDS installed at SSA will depend upon the local weather conditions, the level of aviation activity and types of airspace obstructions in the surrounding area. As presented in more detail in **Appendix C - Table C-4: Monthly Occurrences of Ceiling/Visibility Conditions at MDW,** the weather conditions recorded at MDW show that CAT II conditions occurred 0.6 percent of the year and CAT III conditions occur 0.3 percent of the year. A cost-benefit analysis will be performed to determine if the installation of CAT II/III approach equipment and lighting is warranted. This planning analysis considers that provisions for CAT II (or CAT III) instrument precision approaches on at least one end of the future runway will provide best coverage for these conditions.

Table 3-18: Intermediate Summary of Additional Airport NAVAIDS & Other Facilities – DBO+6 to DBO+20 and **Table 3-19: Intermediate Summary of Additional Runway NAVAIDS & Other Facilities – DBO+6 to DBO+20** present a preliminary list of additional NAVAIDS and other facilities proposed at SSA by DBO+20. In addition to runway and taxiway lighting, the apron area should be equipped with apron floodlights to assist ramp activity at night.

The ILS siting and design process should follow criteria outlined in FAA Order 6750.16C, *Siting Criteria for Instrument Landing Systems*. The areas in the vicinity of all navigational and visual aids facilities at SSA should be protected and kept clear of any natural or man-made objects that could interfere or affect the equipment signals and operation. The protection of these areas is mandatory for safe operations at an airport.

Table 3-18: Intermediate Summary of Additional Airport NAVAIDS & Other Facilities – DBO+6 to DBO+20

Facility	Equipment Function Description
ASDE –Airport Surveillance Detection System	Provides line-of-site coverage of the entire aircraft movement area during reduced visibility periods.
GPS - Global Positioning Landing System	Receptors placed at strategic locations will transmit runway approach information and coordinates signals to flying aircraft via communication satellites.

Source: IDOT, 2010.

Table 3-19: Intermediate Summary of Additional Runway NAVAIDS & Other Facilities – DBO+6 to DBO+20

Future Runway 09R-27L
Instrument Landing System CAT II (or CAT III) with Glide Slope, Localizer, Inner Marker Beacon Required for CAT II (and CAT III); or GPS Landing System
Touchdown, rollout and midpoint RVR required for CAT II runways longer than 8,000 feet and for CAT III runways.
Precision Approach Path Indicator (PAPI)
Approach Lighting System with sequencing flashing lights (ALSF-2) required for CAT II and CAT III.
High Intensity Runway Edge Lights (HIRL)
Runway Centerline Lights
Touchdown Zone Lights
Airport Surface Detection Equipment – Model X
Surface Movement Guidance and Control System
High Intensity Taxiway Edge Lights (HITL)
Taxiway Centerline Lights
Wind Cones

Source: IDOT, 2010.

3.4.4 Protecting the Airport Environs

For all airports and particularly for commercial airports in fast-pace growth urbanizing areas, it is essential to protect the approach and departure surfaces for all runways from encroachment by natural or man-made features. Fast-paced growth, increasing energy costs, and locations relative to major transportation arteries, such as SSA will be are areas subject to future in-fill and high-rise development.

There are two types of regulations that protect airport environs. One is off-airport land use regulation and the other is a different form of off-airport land use regulation that governs only the heights to structures. Through FAA grant agreements, the FAA requires that airport sponsors do all that they can do to protect these surfaces by using of their local police power and the consideration of land use regulation. [36] Typically, protection of the approach and departure surfaces takes the form of airport zoning which is granted by the states through its enabling legislation.

Off-airport land use regulation generally addresses the locations of various types of land use which could be adversely impacted by noise, for example, residential areas and other noise sensitive land uses. While it is not often that such regulations can be enacted without some controversy, it is essential to begin planning now for such an eventuality if at all possible as potential noise sensitive uses will increase in proximity to the airport from year to year in this part of Will County Already, the airport location is snug between five communities – Monee, University Park, Crete, Beecher, and Peotone.

The other type of legislation to govern the height of structures in proximity to an airport is less controversial but covering a wider area. Off-airport land use regulations generally govern the kinds of development that is permissible to be located within noise sensitive areas identified by the airport's prospective noise contours as established within the master plan or recent environmental documentation. Height regulations essentially govern only heights of objects in the imaginary surfaces associated within and beyond an airport's boundaries, extending for several miles. IDOT, Division of Aeronautics has the authority to enact Airport Hazard Zoning regulations to protect the airspace structure of the SSA.

There are three types of airspace surfaces that are recommended to be governed by height regulations. These are Part 77-*Imaginary Surfaces* (commonly referred to as simply Part 77 surfaces), Part 77.23 *Surfaces* (commonly referred to as Terminal Instrument Procedures or TERPS), and Part 121 *One Engine Inoperative Surfaces* (OEI). These surfaces have complex descriptions and vary from airport to airport depending upon an airport's runway instrumentation. **Appendix D: Airport Imaginary Surfaces Established by Height Regulations** presents definitions of the surfaces that would be involved in consideration of height regulations.

[36] "Assurances: Airport Sponsors," http://www.faa.gov/airports/alaskan/airports_resources/media/airport_sponsor_assurances.pdf

Section 4 – IAP and Intermediate Passenger Terminal Facility Requirements

As described in the *2009 Forecast Verification of 2004 Forecast Report*, the IAP is planned to serve the primary service area surrounding the airport site. In accordance with FAA planning policies and recommendations, the report pays close attention to the need to adopt a flexible approach in planning the airport to accommodate the inherent unpredictability of demand and to respond to the ever-changing conditions of the air transportation market. The proposed development should provide the flexibility to expand facilities without affecting the regular operation of the airport.

The passenger traffic demand patterns at a commercial airport normally have considerable variations on a monthly, daily and hourly basis. The peak periods are those times when the greatest aviation demand is placed upon airport facilities. Determining the peak demand periods is essential for sizing the passenger facility requirements for the Master Plan. The following section includes a discussion of the peak period demand forecasts.

4.1 - Methodology for Estimating the Peak Period Demand

For estimating the peak hour demand at commercial airports, the FAA recommends a number of sources such as historical records, the Official Airline Guide (OAG) and airport traffic control tower counts. Since SSA is not yet operational, the analysis has examined airports with similar activity levels and trends to those expected to take place during the IAP to determine potential peak activity characteristics. Manchester Airport (MHT), Dayton International (DAY), and T.F. Green International Airport (PVD) were examined since they currently have air passenger activity characteristics similar to those expected at SSA during the IAP.

The study reviewed the U.S. Department of Transportation (DOT) *Onboard T-100/T-3*[37] statistics to determine the ratio of the peak month activity to the annual activity, as well as typical peak month load factors at these airports. The two main variables considered were Peak Month Average Day (PMAD) and the Peak Hour of the PMAD for both passenger activity and aircraft operations.

The annual passenger forecasts for the first five years of activity at SSA were developed using an assumed daily airline schedule, based on the number of passenger aircraft departures per day, average seats per departure and load factors.[38] The peak hour forecasts presented in the following section were generated from these numbers.

In the case of DBO+10 and DBO+20, the study has estimated the peak hours taking into consideration that the peak hour tends to even out with respect to annual activity levels when the traffic grows. Therefore, the ratios between peak hour and annual passengers for DBO+10 and DBO+20 are lower than for DBO+5.

4.1.1 - PMAD Domestic Passenger Activity – DBO+1 through DBO+5

Table 4-1: IAP and Intermediate Commercial Aviation Activity at SSA Peak Hour of the PMAD presents the PMAD expected passenger aircraft departures as developed for the various forecast scenarios from DBO+1 through DBO+5 and 20 including the low, base and high scenarios for the first five years of operation and low and high ones for the following years for all operations, domestic and international. The activity at peak hours were derived based on typical trends of other US airports with similar characteristics and level of activity to SSA.

[37] The tables combine domestic T-100/ T-3 segment data by U.S. air carriers, and contain nonstop segment data by aircraft type and service class for passengers transported, freight and mail transported, onboard passengers available seats, departures, load factor Bureau of Transportation Statistics, U.S. Department of Transportation

[38] *SSA 2009 Forecast Verification of 2004 Forecast Report*, prepared for the Illinois Department of Transportation May 2010.

Table 4-1: IAP and Intermediate Commercial Aviation Activity at SSA Peak Hour of the PMAD						
Planning Horizon	Peak Hour Enplaned Passengers			Peak Hour Aircraft Operations		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
DBO+1	132	238	245	1	4	4
DBO+5	313	445	591	5	9	11
DBO+10	734		1,246	13		23
DBO+20	1,153		3,112	20		51

Source: IDOT 2010

The analysis has also taken into account international passenger activity for the High Case Scenario in DBO+10 and DBO+20. **Table 4-2: Intermediate International Commercial Passenger Activity Peak Hour of the PMAD** provides the expected peak hour of the international passenger activity for High Case Scenario of DBO+10 and DBO+20. Domestic and international passenger activities are not necessarily concurrent which is reflected in the analysis. Both passenger types can share most of the terminal facilities except for arrivals since the international passengers have to go through immigration and have a separate baggage claim area and customs. However, domestic and international passengers can share the same hold rooms for departures. Some of the departure lounges could have swing gates with access to sterile corridors to allow arriving international passengers to go to passport control.

Table 4-2: Intermediate International Commercial Passenger Activity Peak Hour of the PMAD		
Planning Horizon	Peak Hour Enplaned Passengers	Peak Hour Operations
DBO+10	210	3
DBO+20	348	5

4.2 - Aircraft Gate Requirements

The IAP passenger terminal facility requirements reflect the "start-up" phase of the airport planning timeframe from the DBO through DBO+5. Facility requirements have been developed for the Low, Base and High Case forecast scenarios.

The requirements for aircraft gate facilities have been determined from an analysis of the 2009 Forecast Report. The potential aircraft schedules, described in Section 2.3, have been used as a reference to determine the types of commercial passenger aircraft that need to be accommodated.

For this analysis, the typical air carrier aircraft assumed is an ADG III narrowbody aircraft with a capacity of 150 passengers (families of B737 and A320). The typical regional aircraft assumed is an ADG II with a maximum seating capacity of 70 passengers (Bombardier CRJ 700 and Embraer 170). Larger regional jets follow into ADG III such as CRJ 900 and EMB 195. An average load factor of 85-90 percent has been assumed for air carrier and commuter operations at peak hours.

Since flight schedules at SSA were developed for DBO+1 through DBO+5, it is possible to estimate the number of gates required to accommodate the demand because the schedule provides the activity at peak periods. The proposed passenger flight schedules only include ADG III airplanes except for Bombardier CRJ 700, which is an ADG II aircraft. The flight schedules have been compared using the Horonjeff formula[39] to estimate the number of aircraft gates:

$$N = \frac{VT}{U}$$

[39] Robert Horonjeff and Francis McKelvey, Planning and Design of Airports; 4th Edition, McGraw-Hill, New York, 1994.

Where:

N = gates required
V = design-hour volume for arrivals or departures (aircraft/hr)
T = weighted mean stand occupancy time (hr)
U = gate utilization around 0.5 or 0.6 for exclusive gate strategy

The analysis assumed an average occupancy time of 45 minutes per stand for DBO+5 because all airplanes are narrow body and regional jets. A similar criterion was used for international flights since most of the aircraft will be narrow body, as most of the international destinations are expected to be in Canada, Mexico and the Caribbean. **Table 4-3: IAP Summary of Aircraft Gate Requirements – DBO+1 And DBO+5** provides the estimates of passenger aircraft gates for the Low, Base and High Case Scenarios.

Table 4-3: IAP Summary of Aircraft Gate Requirements - DBO+1 and DBO+5

Operations/Gates	DBO+1			DBO+5		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
Regional Aircraft	1	1	1	1	2	3
Narrowbody	1	2	2	3	4	5
Total	2	3	3	4	6	8

Sources: SSA 2009 Forecast Verification of 2004 Forecast Report prepared for the Illinois Department of Transportation, May 2010. Robert Horonjeff and Francis McKelvey, Planning and Design of Airports.

For DBO+10 and DBO+20, the study anticipated there will not be appreciable changes in the average seating configuration of the passenger aircraft fleet serving SSA and consisting of primarily narrow bodies and regional jets. **Table 4-4: Intermediate Summary of Aircraft Gate Requirements – DBO+10 and DBO+20** presents the number of passenger aircraft gates required to accommodate the expected demand.

Table 4-4: Intermediate Summary of Aircraft Gate Requirements - DBO+10 and DBO+20

Operations/ Gates	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Regional Aircraft	6	9	9	21
Narrowbody	10	20	17	40
Widebody	N/A	N/A	N/A	3
Total	16	29	26	64
International Gates	Not Anticipated	4	Not Anticipated	6

Sources: SSA 2009 Forecast: Verification of 2004 Forecast Report prepared for the IDOT, May 2010 Robert Horonjeff and Francis McKelvey, Planning and Design of Airports.

4.3 - Aircraft Apron Requirements

The aircraft apron must be planned to provide great operational flexibility and facilitate future expansions without interfering with the regular operations of the airport. The future expansion should be done in a logical manner, whenever the demand requires it. For the IAP, the apron should have aircraft parking positions for narrowbody and regional jet passenger aircraft passenger terminal, based on the aviation forecast and recognizing the potential for remote overnight stands per the schedule.

As already mentioned, most of the regional jet airplanes considered in the analysis are part of ADG III, which includes aircraft with wingspans between 79 ft and up but not including 118 ft. The largest regional jet is the Embraer 190/195 which has a wingspan of 94.3 ft. The planning module should be 109.3 ft wide to include the wingtip clearance of at least 15 ft to comprise all the regional jets. The depth of the regional aircraft should include 25 feet clearance of the aircraft nose to the building as well the maximum slope of 1:12 for the loading bridge to meet the requirements of the Americans with Disabilities Act (ADA).

The narrowbody airplanes considered in the analysis are in ADG III, which includes aircraft with wingspans between 79 and up to but not including 118 ft. The airplane planning module should be 132.9 ft wide to include the wingtip clearance of at least 15 ft to comprise all the airplanes within the group. The depth of the regional aircraft should include 25 ft clearance from the aircraft nose to the building as well as the maximum slope of 1:12 for the loading bridge to meet the requirements of the ADA.

According to the IATA Airport Development Reference Manual[40](IATA Manual), the aircraft parking apron should be planned to facilitate the access of ground service equipment (GSE) to the aircraft. The apron area should include areas to park the GSE equipment and have GSE service road with two twelve-foot wide lanes. Adequate separations should be provided to allow aircraft to back off from their parking positions into the apron taxiways/taxilanes. The analysis has taken into consideration that larger aircraft are expected to operate later in the planning period; hence, the design should consider them to accommodate them properly when they start flying to SSA.

For DBO+10 and DBO+20, some aircraft parking positions should be able to accommodate Group V aircraft such as B-777, B787, A-340 and A350. For Group V, the wingspan goes from 171 feet up but not including 214 feet. The wingtip clearance should be 25 ft. It is important to locate the widebody aircraft in places that do not affect the apron taxilanes leading to the aircraft parking positions due to their length. The loading bridges should meet the requirements for ADA.

4.4 - Passenger Terminal Requirements

4.4.1 - Passenger Terminal Functional Area Requirements

The SSA Master Plan has prepared terminal facility requirements following the guidelines defined by the Transportation Research Board (TRB) ACRP[41] Report 25: Airport Passenger Terminal Planning and Design[42] which strive to address the new security regulations and new terminal facilities such as baggage screening system and the check-in kiosks.

The TRB Model has been developed taking into consideration the typical flow of passengers throughout the terminal passenger facilities. The TRB Model does not include all the areas of the passenger terminal; hence, the analysis has included some IATA formulas for the baggage claim area, and some other accepted formulas by the aviation industry to estimate support areas The areas and equipment are from TRB ACRP Report 25 unless noted.

IAP passenger terminal functional area requirements have been prepared for the Low, Base and High Case Forecast Scenarios. For DBO+10 and DBO+20, the scenarios considered are low and high. These preliminary area requirements are subject to further detailed analysis in subsequent phases of the planning and design process.

A discussion of the planning requirements for each functional area of the passenger terminal follows, and **Table 4-23: IAP Summary of Passenger Terminal Minimum Requirements – DBO+5** and **Table 4-24: Intermediate Summary of Passenger Terminal Minimum Requirements – DBO+10 and DBO+20** summarize the results.

[40] *Airport Development Reference Manual*, 9th Edition, January 2004, IATA, Montreal, Canada
[41] ARCP Airport Cooperative Research Program
[42] ACRP Report 25; Airport Passenger Terminal Planning and Design, Transportation Research Board, Washington, DC, 2010

4.4.2 - Passenger Ticketing and Check-in

Reflecting current passenger service trends in the airline industry, it is anticipated that the passenger terminal will have both full-service and automated self check-in kiosks. The kiosks could be either remotely located from the Airport Ticket Office (ATO) counter in the check-in lobby or throughout the terminal. Pre-ticketed passengers may check-in either at the enplanement curb-front, the ticket counter or the departure gate.

The ticketing and check-in lobby is expected to have an overall depth of approximately 60 ft from the face of ticket counters to the face of the terminal building including 25 ft for passenger queues. The layout and the number of ticket counter positions are typically based on the number of peak hour enplaning passengers, the number of airlines and the percentage of passengers checking in at the ticket counter, at kiosks and at the curbside or going directly to the gate. Since this information is not available at SSA, certain general planning parameters have been assumed.

The analysis has supposed an average check-in processing rate of 2.5 minutes per passenger in the ticket counters and 1.5 minutes for the kiosks. The evaluation has supposed that 45 percent of the passengers will use the ticket counters, 45 percent the kiosks and 10 percent the curbside. The analysis has estimated that 50 percent of the passengers will arrive in a 30 percent of the peak period demand. Benchmark waiting times for ticket counters is 10 minutes, for the kiosks 2 minutes and for the curbside 5 minutes.

Based on these assumptions, the terminal building will require 5-9 ticket counters, 4 to 9 kiosks and 1-2 curbside positions on DBO+5. The model has assumed the average width of ticket counters is 5 ft. The overall depth of the central ticket counter area is assumed to be 10 ft including the ticket counter, customer service work area and baggage belt.

The check-in area should include the airline office space, counter area, the active check-in zone, the counter queue, the kiosk area and cross circulation. **Table 4-5: IAP Check-in Area – DBO+5** lists the check-in requirements for the Low, Base and High Cases for DBO+5.

Table 4-5: IAP Check-in Area – DBO+5

Passenger Terminal Elements	Low Case	Base Case	High Case
Number of ticket counters	5	7	9
Number of Check-in Kiosks	5	7	9
Number of Curbside Check-in	1	2	2
Total Check-in Area/ Ticketing Area (ft^2)	2,900	4,130	5,250

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-6: Intermediate Check-in Area – DBO+10 and DBO+20 presents the check-in requirements for DBO+10 and DBO+20 using the same assumptions as for DBO+5.

Table 4-6: Intermediate Check-in Area - DBO+10 and DBO+20

Passenger Terminal Elements	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Number of ticket counters	12	19	18	44
Number of Check-in Kiosks	11	19	18	42
Number of Curbside Check-in	3	4	4	9
Total Check-in Area/ Ticketing Area (ft^2)	6,900	11,100	10,500	27,600

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

4.4.3 - Passenger Security Inspection

The analysis follows the guidelines of the Department of Homeland Security and the Transportation Security Administration (TSA). All departing passengers terminal will have to go through security screening before accessing the secure area of the passenger terminal. Proven state-of-the-art equipment will be used to check passengers, employees and crews. The equipment will include X-rays, magnetometers, full body scanners and others. The expected maximum throughput is 175 per lane in one hour, which is about 21 seconds per person. **Table 4-7: IAP Security Screening – DBO+5** lists the space requirements include areas for the queuing line and the checkpoint area for the Low, Base and High Case at DBO+5.

Table 4-7: IAP Security Screening – DBO+5

Passenger Terminal Elements	Low Case	Base Case	High Case
Number of Screening Lanes required	3	4	5
Total Security Screening Area (ft^2)	2,630	3,500	4,380

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-8: Intermediate Security Screening – DBO+10 and DBO+20 presents the expected security screening requirements for DBO+10 and DBO+20.

Table 4-8: Intermediate Security Screening - DBO+10 and DBO+20

Passenger Terminal Elements	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Number of Screening Lanes required	6	9	9	21
Total Security Screening Area (ft^2)	5,300	7,900	7,900	19,300

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

4.4.4 - Passenger Concourses

After completing the security-screening, passengers will enter the secure area of the terminal building that will link to the departure lounges. The concourses are either single loaded (gates on one side) or double loaded (gates on both sides). The corridor width is a function of single/double loading, the presence of moving sidewalks, level of passenger traffic and hubbing activity. The concourse corridors should be at least 45 feet wide to allow the installation of moving walkways when the demand will justify it. The passenger concourse will include support facilities, commercial concessions, restrooms and access to the hold Rooms.

When the corridors have telephone, water fountains, vending machines or billboards and some adjacent activities, Flight Information Display Systems (FIDS) can effectively reduce the width of the corridor. They should be taken into account when programming circulation space.

4.4.5 – Departure Lounges

The departure lounges should be designed to accommodate the expected largest aircraft parking there. Normally, departure lounges share space to allow flexibility and have a better use of the available space. The departure lounges should be planned to provide a waiting area for 80 percent of the aircraft passenger capacity with room for 80 percent of the passengers to be seated and 20 percent standing. Seated passengers are allotted 15 square ft per passenger whereas standing passengers are allotted ten square ft.

The departure lounges are expected to have check-in podiums and boarding/deplaning corridor which acts as an extension of the boarding bridge. For general planning purposes, the customer service agent podium should have one position for regional jet aircraft and two for narrowbody jet aircraft (up to 150 seats). **Table 4-9: Typical Gate Departure Lounges** depicts average aircraft seating capacities and hold room sizes, and **Table 4-10: IAP Departure Lounges (ft^2) – DBO+5** presents the departure lounge areas for the low, base and high scenarios for DBO+5. Even though the area required for circulation will depend upon the proposed hold room layout, **Table 4-10** shows an estimated area for circulation. Areas will be available for commercial concessions, restrooms and other services.

Table 4-9: Typical Gate Departure Lounges

Aircraft Type	Seats	Area (sf)
Medium Regional Jets	50	1,010
Large Regional Jet	75	1,360
Narrowbody	145	2,460
Large Narrowbody B757	185	3,160
Widebody B787 and A350	280	4,490
Jumbo B-747, B-777 and A-330	400	6,490

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-10: IAP Departure Lounges (ft^2) - DBO+5

Passenger Terminal Elements	Low Case	Base Case	High Case
Large Regional Jet	1	2	3
Narrow bodies	3	4	5
Hold Room Area	8,740	12,560	16,380
Circulation Area	27,000	31,500	38,000

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-11: Intermediate Departure Lounges (ft^2) – DBO+10 and DBO+20 presents the projected departure lounge and circulation requirements for DBO+10 and DBO+20 based on the SSA aviation forecasts.

Table 4-11: Intermediate Departure Lounges (ft^2) - DBO+10 and DBO+20

Aircraft Type	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Large Regional Jet	5	9	9	21
Narrow bodies	8	17	15	37
Large Narrowbody	1	3	2	3
Widebody	N/A	N/A	N/A	3
Hold Room Area	29,600	63,500	55,500	142,500
Circulation Area	67,500	126,000	108,000	225,000

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB. N/A Not Anticipated.

4.4.6 - Baggage Claim Area

The Baggage Claim Area requirements are primarily based on the peak hour arriving O&D passengers, the concentration of the arriving passengers within a 20 minute time period, and the ratio of checked baggage per passenger. For the IAP, it is estimated that approximately 50 percent of passengers will arrive within a 20-minute period.

For domestic flights, the majority of passengers usually arrive at the baggage claim area before their bags have been unloaded onto the baggage claim units. Therefore, the baggage claim units should be sized for the number of passengers waiting for baggage since most of the baggage is claimed on the first go-around of the baggage claim unit.

At IAP, baggage claim units should adequately handle large narrowbody (B757) and widebody aircraft (B767, A-340) as well as allow to be used simultaneously by several flights. For commercial passenger aircraft operations, baggage storage capacity on the claim unit is not a primary consideration. Therefore, flat-plate direct feed units are recommended. The recommendation for adequate queuing and circulation for the baggage claim area is 35 square ft per linear foot of claim device.

The total amount of retrieval and peripheral areas is determined by the number of passengers expected to be near the claim unit and the desired level of service. The minimum recommended depth is 15 ft for retrieval and peripheral areas. The minimum separation between adjacent claim units should be 30 ft. The retrieval area should be free of columns, bag cart racks and other structures. The minimum separation distance between claim units should be 15 to 20 ft.

Additional areas should be provided outside of the peripheral area to accommodate access to the claim area, circulation to ground transportation counters (rental cars, public transportation and others), seating areas for greeters and for passengers waiting for transportation pickup, commercial concessions and others. In order to estimate the size of the peripheral area, the study has used IATA (International Air Transport Association) formulas[43] to estimate the area, which are the following

Widebody Aircraft

$$BC = \frac{(PHP * PWB * CDW)}{(60 * NWB)}$$

Narrowbody aircraft

$$BC = \frac{(PHP * PNB * CDN)}{(60 * NNB)}$$

Where:

PHP = Number of terminating peak hour passengers
PWB= Proportion of passengers arriving in widebody aircraft
PNB = Proportion of passengers arriving in narrowbody aircraft
CDW = Average claim occupancy time for widebody aircraft in minutes. It is assumed to be 45 minutes
CDN = Average claim occupancy time for narrowbody aircraft in minutes. It is assumed to be 20 minutes
NWB = Number of Passengers per widebody aircraft at 80% load factor
NNB = Number of Passengers per narrowbody aircraft at 80% load factor

The area in front of the claim units provides the section where the passengers can wait and collect their luggage. The peripheral area is normally used to wait for an opening to the front of the unit, a passenger waiting for someone else who is getting the luggage, to park the cart and/or to circulate through the area. For Level of Service C, the retrieval and peripheral area should be 17 square ft per occupant[44]. The analysis has assumed ⅔ of the peak hour are concentrated in the area at one time.

Table 4-12: IAP Domestic Baggage Claim Area – DBO+5 depicts the claim frontage required, estimated using a TRB formula, the number of baggage claim units and retrieval and peripheral area.

Table 4-12: IAP Domestic Baggage Claim Area - DBO+5

Passenger Terminal Element	Low Case	Base Case	High Case
Total Claim Frontage Required (ft)	108	154	204
Baggage Claim Units	1	2	2
Minimum Retrieval and Peripheral Area (ft^2)	3,880	5,520	7,100

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB. IATA Airport Development Reference Manual

[43] *Airport Development Reference Manual*, 9th Edition, January 2004, IATA, Montreal, Canada.
[44] Ibid

Table 4-13: Intermediate Domestic Baggage Claim Area – DBO+10 and DBO+20 presents the expected baggage claim for DBO+10 and DBO+20; including the claim frontage, number of claim units and the minimum retrieval and peripheral area.

Table 4-13: Intermediate Domestic Baggage Claim Area – DBO+10 and DBO+20

Passenger Terminal Element	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Total Claim Frontage Required (ft)	253	401	401	986
Baggage Claim Units	2	4	4	10
Minimum Retrieval and Peripheral Area (ft^2)	8,900	14,000	13,900	34,500

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB. IATA Airport Development Reference Manual

Other areas associated with baggage claim to be considered are the following:

- *Baggage Claim Off-Load Areas* include the portion of a flat plate, direct feed baggage claim unit adjacent to the inbound baggage roadway, on which the arriving baggage is placed on the feed conveyor for a remote fed baggage claim unit. This area would accommodate the offload lanes for a baggage train of four baggage carts or dollies.

- *Baggage Train Circulation area* includes the lanes and common use maneuvering areas. Typically, a 10-15 percent area allowance of all baggage handling areas should be allocated for baggage train circulation areas.

The calculations of these two areas will be part of the airline activities.

4.4.7 - Federal Inspection Services/ Customs and Border Protection

As already mentioned in this report, the SSA High Case Forecast Scenario for DBO+10 and DBO+20 includes international flights, mainly to Canada, Mexico and the Caribbean. Therefore, the airport must have Federal Inspection Services (FIS) and will be supported by Customs and Border Patrol (CBP). The agency is responsible for inspecting all international passengers, luggage and air cargo. After the passengers disembark from their international flights, they must walk through a sterile corridor to reach FIS and could interact with other passengers, visitors or unauthorized airline employees after they have completed the CBP inspection. The corridor should be for single direction passenger flow and, depending on the distance from the gate to the inspection area, provision of moving walkways may be appropriate.

The CBP inspection facilities are sized based on their throughput of passengers per hour. The CBP suggests a steady rate of 100 passengers per double booth per hour to estimate the number of units required to handle the demand. However, the incoming flow to FIS will depend on several variables including the arriving times of flights, the distance between the gates and the inspection area, the speed the arriving passengers normally walk and so on.

The study has used the FIS/CBP model of TRB ACRP *Report 25 - Airport Passenger Terminal Planning and Design* which strives to address these issues in order to better represent the actual flow patterns of passengers arriving to FIS. The FIS/CBP model is designed to estimate the passenger queue length, space requirements and passenger delay time for primary processing, baggage claim requirements, and the time baggage claim can be used. The IATA guidelines and formulas have been used to estimate the number of units required and retrieval and peripheral area.

The primary inspection area should be about 120 feet deep which includes 75 feet for queuing, 14 feet for standard double booth, 7 feet distance from the booths to the holding line for waiting passengers and 12 feet circulation at both sides of the line. The width between the booths should be 11 ft-6 inches. For the baggage claim, the analysis has assumed every arriving passenger will have 1.5 check-in bags and the bags will arrive to the claim area before the passengers get there.

Table 4-14: Intermediate Domestic Baggage Claim Area – DBO+10 and DBO+20 presents the FIS/CBP requirements for the High Case Scenario for DBO+10 and DBO+20.

Table 4-14: Intermediate Domestic Baggage Claim Area - DBO+10 and DBO+20

Baggage Claim Element	High Case Scenario	
	DBO+10	DBO+20
Arriving International Passengers	210	348
Number of Double Booths Required	3	4
Primary Inspection Area Required (ft^2)	4,100	5,500
Total Claim Frontage Required (ft)	405	405
Baggage Claim Units	1	1
Minimum Retrieval and Peripheral Area (ft^2)	2,500	4,000

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB. IATA Airport Development Reference Manual

4.4.8 - Concessions

The IAP passenger terminal concessions area will include commercial concessions providing different types of services to the traveling public. A comprehensive Concessions Marketing Plan and Concessions Space Program should be developed to provide a full range of services to passengers and other users of the terminal. Commercial concessions have become a very important source of revenue to airports; therefore, the passenger terminal will have a variety of stores and services available to the traveling public and other users. It is anticipated the Concessions space will include at least:

- Ground Transportation Services including rental car companies, limousines, vans and buses
- Food and Beverage Service
- News, Gift and Specialty Shops
- Banking, ATM
- Concessions Storage and Loading Docks

Concessions should be located in both the public and secure areas of the passenger terminal building. The commercial concessions and service areas should be located in areas convenient to passengers waiting for their flights. The preliminary concession area estimates have been obtained from the textbook Planning and Design of Airports[45]. The manual recommends a ratio of 20 square ft per 100 typical peak hour passengers. This ratio for commercial concession areas might be revisited at the time of terminal design since Airport Sponsor nowadays strive to generate more non-aeronautical revenues to maintain the aeronautical rates and charges competitive to attract airlines to operate at their facilities. **Table 4-15: IAP Commercial Concessions (ft^2) – DBO+5** estimates the commercial concession areas for the Low, Base and High Cases for DBO+5.

Table 4-15: IAP Commercial Concessions (ft^2) - DBO+5

	Low case	Base Case	High Case
Commercial Concessions	12,000	17,000	22,000

Source: Robert Horonjeff and Francis McKelvey, Planning and Design of Airports.

[45] Robert Horonjeff and Francis McKelvey, Planning and Design of Airports; 4th Edition, McGraw-Hill, New York, 1994.

Using the same formula, the study has estimated the commercial concession areas for DBO+10 and DBO+20, and the results are presented in **Table 4-16: Intermediate Commercial Concessions (ft^2) – DBO+10 and DBO+20.**

Table 4-16: Intermediate Commercial Concessions (ft^2) - DBO+10 and DBO+20

Passenger Terminal Elements	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Commercial Concessions	27,000	45,000	42,000	113,000

Source: Robert Horonjeff and Francis McKelvey, Planning and Design of Airports.

4.4.9 - Baggage Screening

The Aviation and Transportation Security Act (ATSA) requires that all checked baggage has to be screened for explosives. IAP is expected to have Explosive Detection Systems (EDS) from DBO+1. The system is anticipated to include the standard three level TSA protocols for checked baggage inspection systems (CBIS). The First Level screens all luggage that fit through the EDS machines. All suspected bags are subject to Level 2, in which TSA staff review the images obtained during Level 1 scan of the suspected luggage and clear any bags whose status could be determined visually. This process is known as on-screen resolution (OSR) which allows the constant flow of bags through the scanning system until a decision is made. The bags that cannot be addressed properly on Level 2, as well the luggage that cannot go through an EDS machine due to their size go to Level 3. In Level 3, the bags are open and are inspected manually with an Explosive Track Detection (ETD) device. The small number of bags that do not pass Level 3 screening are either resolved or disposed of by the local law enforcement authorities.

The screening is expected to be carried out in secure rooms. The TRB model estimates the number of devices and stations required and minimum areas required for the TSA screening process. The analysis assumes that 60 percent of the passengers will check in bags carrying an average of 1.5 pieces. This evaluation assumes 4 percent of the total bags are over- and odd sized, 20 percent of check-in luggage has to go through Level 2, 50 percent of Level 2 screening has to be manually inspected and includes a 10-minute surge factor that changes with the level of traffic. The anticipated throughput capacity of the EDS is 450 bags per hour. **Table 4-17: IAP Baggage Screening – DBO+5** depicts the baggage screening requirements for the Low, Base and High Case Scenarios of DBO+5.

Table 4-17: IAP Baggage Screening – DBO+5

Passenger Terminal Elements	Low Case	Base Case	High Case
Number of Level 1 EDS units required	1	2	2
Number of Level 2 Stations Required	1	1	2
Number of Level 3 Units Required	2	2	2
Total Baggage Screening Area (ft^2)	1,040	1,840	1,880

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-18: Intermediate Baggage Screening – DBO+10 and DBO+20 depicts the baggage screening requirements for the Low and High Case Scenarios of DBO+10 and DBO+20.

Table 4-18: Intermediate Baggage Screening - DBO+10 and DBO+20

Passenger Terminal Elements	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Number of Level 1 EDS units required	2	3	3	7
Number of Level 2 Stations Required	2	3	2	5
Number of Level 3 Units Required	3	4	4	8
Total Baggage Screening Area (ft^2)	2,000	2,900	2,900	6,700

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

4.4.10 - Baggage Make-up Area

The baggage make-up area includes the make-up units (manual or automated), the cart/container staging areas and baggage tug/cart maneuvering area. The system selected will depend on the number of airlines, the terminal configuration, operating procedures (common or exclusive use) and size of the terminal complex. The number of carts/containers per flight is based on the aircraft size. Typically one container could hold 50 to 75 seats of aircraft capacity, and a cart or LD3 container has the capacity of 40-50 bags[46].

The baggage make-up area requirements should be based on the total Equivalent Aircraft (EQA) of gates in use, the average number of departures per gate in the make-up period and the likely number of staged carts/containers required for the passenger aircraft. Normally for domestic flights the make-up starts two hour previous to departure and may be up to four hours for international flights.

The size of the baggage make-up area will depend on the type of make-up units (index belts, re-circulating make-up units, sort piers) and where the systems are exclusive or common use. The model has assumed 600 square ft of area per cart/ container, which is a good ratio for individual airlines. The model has considered a 10 percent of additional allowance for baggage tug circulation.

At opening day (DBO), the airlines probably could process its own baggage handling using manual methods. However, as the airport develops over time, automated, centralized baggage handling systems will probably be required. **Table 4-19: IAP Baggage Make-Up – DBO+5** presents the baggage make-up area requirements for DBO+5.

Table 4-19: IAP Baggage Make-Up Area - DBO+5

Baggage Make Up Area Requirements	Low Case	Base Case	High Case
Equivalent Aircraft	3.0	4.5	6
Total Make-up Area (ft^2)	5,400	8,100	10,800

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Based on the commercial passenger forecasts, the analysis has estimated the baggage make up area for Low and High Case Scenarios for DBO+10 and DBO+20, and **Table 4-20: Intermediate Baggage Screening – DBO+10 and DBO+20** depicts the expected requirements.

Table 4-20: Intermediate Baggage Screening - DBO+10 and DBO+20

Baggage Make Up Area Requirements	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Equivalent Aircraft	8.0	14.0	14	30.0
Total Make-up Area (ft^2)	13,800	27,000	24,000	59,400

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

4.4.11 – Airline Support Facilities

The airline support facilities in the passenger terminal complex normally include administrative offices, passenger reservation and lounges, storage areas for valuable or outsized luggage, flight operations and crew ready rooms, cabin services and aircraft maintenance, ramp support, air freight and mail pickup and delivery, and outbound baggage makeup and inbound baggage transfer and conveyance system. For this analysis, the baggage makeup area will be treated separately. The textbook Planning and Design of Airports of Horonjeff and McKelvey recommend a ratio of 50 square ft per 100 peak hour passengers. **Table 4-21:**

[46] ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB

IAP Airlines Support Facilities (ft^2) – DBO+5 details the airline support facilities area designated for the Low, Base and High Cases for DBO+5.

Table 4-21: IAP Airlines Support Facilities (ft^2) – DBO+5

Airline Support Facilities	Low case	Base Case	High Case
Airline Activities	28,000	41,000	60,000

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

Table 4-22: Intermediate Airline Support Facilities (ft^2) – DBO+10 and DBO+20 depicts the expected airline support requirements for the Low and High Case Scenarios for DBO+10 and DBO+20.

Table 4-22: Intermediate Airline Support Facilities (ft^2) - DBO+10 and DBO+20

Airline Support Facilities	DBO+10		DBO+20	
	Low Case	High Case	Low Case	High Case
Airline Activities Area	67,000	113,000	105,000	283,000

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB.

4.4.12 - Summary of Areas of Terminal Building

Table 4-23: IAP Summary of Passenger Terminal Minimum Requirements – DBO+5 depicts the summary of all terminal areas considered in the analysis plus additional areas needed for HVAC, electricity and building structure for the DBO+5 Low, Base and High case scenarios. These figures represent the minimal technical requirements for the forecast estimates, and it could vary depending upon the proposed terminal layout.

In general, the terminal area at IAP should be conceptualized as a highly efficient and cost effective, Low Cost Carrier, startup facility that would:

- Be sustainably planned, designed, constructed and managed;
- Have a pleasant design, modest, and context sensitive;
- Comprise a small, compact, minimal footprint;
- Use a "lean pull" development concept where capacity is developed based on specific demand. It would initially start with as small a footprint as possible and grow in response to demand so there will be no unused or wasted capacity;
- Minimize initial cost and rents;
- Provide common use facilities, Internet Provider based plug-and-play, open to any airline rather than exclusive use;
- Maximize gate utilization and minimize turnaround time;
- Be highly functional and efficient in terms of passenger flow, baggage handling, and ramp operations.
- Have simple, straightforward, logical passenger flow as well as minimize passenger dwell time;
- Minimize walking distances (parking and curb front to aircraft);
- Minimize vertical transitions (fewest possible changes of level);
- Be open and transparent for ease of orientation and wayfinding;
- Use all possible means to streamline security processing;
- Minimize tug distances for baggage handling;
- Reduce turn around and block times, minimize taxi distance and fuel burn;
- Have fully-automated, self-service, flow-through passenger processing;
- Minimize check-in counters;
- Use modular building systems planned and designed to be readily expanded, or replaced, if necessary; and,
- Use highly durable, low maintenance materials while maximizing recycled and reusable content.

Table 4-23: IAP Summary of Passenger Terminal Minimum Requirements - DBO+5			
Terminal Planning Elements	**Low Case**	**Base Case**	**High Case**
Regional Jet Gates	1	2	3
Narrowbody Jet Gates	3	4	5
Ticketing/ Check-in Area (ft^2)	2,900	4,130	5,250
Security Inspection (ft^2)	2,630	3,500	4,380
Departure Lounge (ft^2)	8,740	12,560	16,380
Departure Lounge Circulation (ft^2)	27,000	31,500	38,000
Baggage Claim Area	3,880	5,520	7,100
Airline Activities	28,000	41,000	60,000
Baggage Screening Area by TSA (ft^2)	1,040	1,840	1,880
Baggage Make-up Area (ft^2)	5,400	8,100	10,800
Commercial Concessions	12,000	17,000	22,000
Subtotal (ft^2)	91,590	125,150	165,790
HVAC (15%)(ft^2)	13,700	18,800	24,900
Electrical (10%)(ft^2)	9,200	12,500	16,600
Subtotal (ft^2)	114,490	156,450	207,290
Structure (5%) (ft^2)	5,700	7,800	10,400
Total Terminal Area (ft^2)	120,190	164,250	217,690

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB IATA Airport Development Reference Manual.

Table 4-24: Intermediate Summary of Passenger Terminal Minimum Requirements – DBO+10 and DBO+20 depicts the minimum terminal facility requirements for the low- and high-case forecast scenarios for DBO+10 and DBO+20.

Table 4-24: Intermediate Summary of Passenger Terminal Minimum Requirements - DBO+10 and DBO+20				
Passenger Terminal Elements	**DBO+10**		**DBO+20**	
	Low Case	**High Case**	**Low Case**	**High Case**
Regional Jet Gates	6	9	9	21
Narrowbody Jet Gates	10	18	17	40
Widebody Aircraft	Not anticipated	Not anticipated	Not anticipated	3
Ticketing/Check-in Area (ft^2)	6,900	11,100	10,500	27,500
Security Inspection (ft^2)	5,300	7,900	7,900	19,300
Departure Lounge Area (ft^2)	29,600	63,500	55,500	142,500
Departure Lounge Circulation (ft^2)	67,500	126,000	108,000	252,000
Baggage Claim Area (ft^2)	8,900	14,000	13,900	34,500
FIS/CBP International Arriving (ft^2)	0	6,600		9,500
Airline Activities (ft^2)	67,000	126,000	105,000	283,000
Baggage Screening Area by TSA (ft^2)	2,000	2,900	2,900	6,700
Baggage Make-up Area (ft^2)	13,800	27,000	24,000	59,400
Commercial Concessions(ft^2)	27,000	45,000	42,000	113,000
Subtotal (ft^2)	228,000	430,000	369,700	947,400
HVAC (15%)(ft^2)	34,200	64,500	55,500	142,200
Electrical (10%)(ft^2)	22,800	43,000	37,000	94,800
Subtotal (ft^2)	285,000	537,500	462,200	1,184,400
Structure (5%)(ft^2)	14,300	26,900	23,100	59,200
Total Terminal Area (ft^2)	299,300	564,400	485,300	1,243,600

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB IATA Airport Development Reference Manual.

4.5 - Terminal Curb Front Requirements

The IAP passenger terminal access road should be designed to handle the number of vehicles arriving to the curbside of the passenger terminal building. The study has used the TRB model[47] which estimates the curbside requirements based on the peak 15-minute demand of the peak hour. The basic parameters for the analysis are the peak hour passenger forecasts[48], the expected modal split used by passengers and well wishers/ greeters and anticipated dwell times.

The evaluation considered the low-, base- and high-cases scenarios to estimate the curbside requirements for DBO+5. The analysis used the TRB ACRP Report 25: Airport Passenger Terminal Planning and Design, which has been utilized to estimate the requirements of several passenger terminal facilities.

In order to estimate the modal split, the study referred to the TRB ACRP Synthesis 5 Airport Ground Access Mode Choice Models[49], which presents the results of relatively recent ground access surveys done at different commercial airports in North America, including Boston Logan International Airport (BOS), Chicago O'Hare International Airport (ORD), Chicago Midway International Airport (MDW), Miami International Airport (MIA), Oakland International Airport (OAK), Portland International Airport (PDX), Norman Mineta San Jose International Airport (SJC) and Toronto Lester Pearson International Airport (YYZ). The air passenger surveys estimated the modal split to the above mentioned airports and a summary is presented in **Table 4-25: Air Passenger Modal Split at Various Commercial Airports in North America**. The last column presents an approximate average of all airports included in the evaluation. Passengers and visitors using private vehicles that go to the parking facilities, rental cars and public transit will not be using the curbside in front of the terminal building. For rental cars, the study has considered shuttle service to pick-up and drop off passengers.

Table 4-25: Air Passenger Modal Split at Various Commercial Airports in North America

Terminal Curb Elements	BOS	ORD	MDW	MIA	OAK	PDX	SJC	YYZ	Average
Private vehicle - drop off	21%	22%	27%	45%	42%	36%	49%	45%	36%
Private vehicle - parked	11%	15%	22%	13%	21%	24%	17%	13%	17%
Rental car	17%	12%	13%	28%	15%	19%	19%	9%	17%
Taxi	19%	18%	15%	6%	3%	4%	7%	24%	12%
Limousine	7%	14%	10%	2%	2%	2%	1%	0%	5%
Hotel/Airport Express	11%	9%	4%	6%	5%	8%	4%	6%	7%
Schedule Bus/Limo	4%	0%	0%	0%	12%	0%	2%	2%	3%
Public Transit- Subway	6%	4%	6%	<1%	0%	6%	0%	1%	3%
Charter bus	3%	0%	0%	0%	0%	1%	0%	0%	<1%
Other* (including local bus)	1%	5%	4%	0%	<1%	0%	1%	0%	1%
TOTAL*	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: ACRP Synthesis 5 Airport Ground Access Mode Choice Models. *May not add up exactly due to rounding.

The following terminal curb assumptions have been made

- The analysis used the default values of ACRP Report 25: Airport Passenger Terminal Planning and Design for curbside dwell times. The evaluation also assumed the same dwell times for vehicles in the departure and arrival curbsides.
- The vehicle occupancy parameters were estimated using the guidelines of TRB Special Report 25 Airport Landside Capacity[50].
- The same criteria were used for all scenarios for DBO+5, DBO+10 and DBO+20.

[47] ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB
[48] Peak Hour passengers are shown in Tables 2-17.
[49] ACRP Synthesis 5 Airport Ground Access Mode Choice Models: A Synthesis of Airport Practice, Airport Cooperative Research Program, Transportation Research Board, Washington, DC, 2008
[50] Special Report 215: Measuring Airport Landside , TRB, 1987.

- The analysis assumed there will be an average of one visitor for eight passengers (ratio 1:8).

The curb front capacity analysis was performed for the peak 15-minute demand. **Table 4-26: Average Vehicle Activity at Curb Front** depicts the modal split, the average vehicle length, dwell times and number of persons per vehicle.

Table 4-26: Average Vehicle Activity at Curb Front

Type of Car	Percentage	Average Vehicle Length (ft)	Average Dwell Time	Average Number of Persons Per Car
Private Auto	58%	22	3.0	1.9
Rental Car Shuttle	11%	50	2.0	4.0
Taxis	19%	22	1.5	2.0
Limousines	5%	50	2.0	4.0
Hotel Shuttles	1.5%	50	2.0	4.0
Airport Shuttles	1.5%	40	2.0	8.0
Buses	2%	50	2.0	12
Others	2%	30	2.0	4.2

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB

Table 4-27: IAP Peak 15-Minute Curb Front Demand (ft) – DBO+5 presents the peak 15 minute curb front demand of low-, base- and high-case scenario for DBO+5.

Table 4-27: IAP Peak 15-Minute Curb Front Demand (ft) - DBO+5

Vehicle Type	Low Case		Base Case		High Case	
	Departure Curb (ft)	Arrivals Curb (ft)	Departure Curb (ft)	Arrivals Curb (ft)	Departure Curb (ft)	Arrivals Curb (ft)
Private Auto	78	78	115	115	152	152
Rental Car Shuttle	24	24	32	32	42	42
Taxis	13	13	18	18	24	24
Limousines	10	10	16	16	20	20
Hotel Shuttles	2	2	6	6	8	8
Airport Shuttles	3	3	3	3	5	5
Buses	4	4	6	6	8	8
Others	2	2	2	2	4	4
Total	136	136	198	198	263	263

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB

It is anticipated that the terminal frontage road will have at least four lanes to accommodate DBO+5 projected curbside demand. The inner-lane should provide parking and maneuvering space for vehicles that will drop off/ pick up the passengers. This lane tends to be wider than the other ones because people open car doors, and the passengers are dealing with their luggage, either unloading or loading to/from the vehicles. The through lanes usually have throughput capacity from 600 to 900 vehicles per hour[51]. All commercial vehicles are assumed to use the inner lane. As already stated, some of the private cars will circulate the curb front road while a considerable percentage will go directly to the parking facilities. Double parking is expected to occur during peak hour activity. Enforcement should be implemented to ensure vehicles do not remain at the curbside for extended periods. Delivery and armored vehicles and garbage collection trucks will drive to the loading docks and should not drive through the terminal curb frontage.

[51] Robert Horonjeff and Francis McKelvey, Planning and Design of Airports; 4th Edition, McGraw-Hill, New York, 1994.

Tables 4-28: Intermediate Peak 20-Minute Curb Front Demand (ft) – DBO+10 and **4-29: Intermediate Peak 20-Minute Curb Front Demand (ft) – DBO+20** depict the curbside lengths for Low and High Case Scenarios for DBO+10 and DBO+20. As already mentioned, the analysis used the same criteria as for DBO+5.

Table 4-28: Intermediate Peak 20-Minute Curb Front Demand (ft) - DBO+10

Vehicle Type	Low Case		High Case	
	Departure Curb	Arrivals Curb	Departure Curb	Arrivals Curb
Private Auto	190	190	300	300
Rental Car Shuttle	60	60	98	98
Taxis	30	30	48	48
Limousines	26	26	40	40
Hotel Shuttles	6	6	10	10
Airport Shuttles	5	5	8	8
Buses	10	10	16	16
Others	5	5	7	7
Total	332	332	527	527

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB

Table 4-29: Intermediate Peak 20-Minute Curb Front Demand (ft) - DBO+20

Vehicle Type	Low Case		High Case	
	Departure Curb	Arrivals Curb	Departure Curb	Arrivals Curb
Private Auto	298	298	737	737
Rental Car Shuttle	90	90	220	220
Taxis	48	48	117	117
Limousines	40	40	96	96
Hotel Shuttles	10	10	24	24
Airport Shuttles	8	8	19	19
Buses	16	16	36	36
Others	7	7	18	18
Total	517	517	1,267	1,267

Source: ACRP Report 25; Airport Passenger Terminal Planning and Design, TRB

Section 5 – IAP and Intermediate Support/Ancillary Facility Requirements

The SSA is expected to have the following support/ancillary facilities on opening day (DBO):

- Air Cargo Facilities;
- General Aviation Facilities;
- Aircraft Rescue and Fire Fighting (ARFF) Facilities;
- Fuel Storage Facility;
- Aircraft and Airfield Pavement Deicing Facilities;
- Airfield Maintenance Center Facilities;
- Airport Utilities
- Ground Support Equipment
- Service Roads and Security Access.

5.1 - Air Cargo Facility Requirements

The air cargo facilities should accommodate the projected cargo activity through the evaluated planning period. IDOT believes that SSA will be attractive to air cargo carriers and freight forwarders for the following reasons:

- The SSA site is located in the largest metropolitan area in the central U.S.;
- Chicago has a large O&D cargo market currently being serviced by the ORD and the Chicago/Rockford International Airport (RFD);
- Chicago is a major international port of entry for the U.S.;
- The SSA site can provide easy access to a significant portion of the U.S. population;
- In the last few years, significant major road and rail distribution centers and manufacturers have been established in Will County (one adjacent to the airfield's boundary), and serve as centers for distribution of their products throughout the U.S. and Europe.

The 2009 Forecast Report[52] estimated the expected air cargo activity at SSA and cargo aircraft fleet. **Table 5-1: IAP Air Cargo Aviation Activity Forecasts – DBO+1 and DBO+5** depicts the projected air cargo activity for SSA during the IAP and **Table 5-2: Intermediate Cargo Aviation Activity Forecasts – DBO+20** presents the expected air cargo demand - short tonnage and aircraft operations – for DBO+20. The study considers there is a strong potential for international activity as depicted in both tables.

Table 5-1: IAP Air Cargo Aviation Activity Forecasts - DBO+1 and DBO+5

Aeronautical Forecast	Low Case		Base Case		High Case	
	DBO+1	DBO+5	DBO+1	DBO+5	DBO+1	DBO+5
Air Cargo Operations						
Domestic	0	894	785	1,309	1,295	2,281
International	0	0	0	486	730	1,161
Total Air Cargo Operations	0	894	785	1,795	2,025	3,442
Air Cargo Short Tonnage						
Domestic	0	16,500	15,140	32,700	22,360	49,400
International	0	0	0	27,100	33,860	69,200
Total Cargo Short Tonnage	0	16,500	15,140	59,800	56,220	118,600

Sources: SSA 2009 Forecast Verification of 2004 Forecast Report.

[52] Ibid.

Table 5-2: Intermediate Air Cargo Aviation Activity Forecasts - DBO+20		
Aeronautical Forecast	**Low Case**	**High Case**
Air Cargo Operations		
Domestic	2,100	4,000
International	1,300	2,700
Total Air Cargo Operations	3,400	6,700
Cargo Short Tonnage		
Domestic	46,200	96,800
International	99,900	253,700
Total Cargo Short Tonnage	146,100	350,500

Source: IDOT, 2010.

5.1.1 - Air Cargo Facility Sizing Methods

Cargo facilities are a challenge to size at a planning level due to their individual nature and specialized space requirements for different types of commodities. This is due to the different requirements for different types of goods (perishable products, high value items, express packages hazardous materials, etc.). There are also many different layout possibilities and various levels of automation for inventory and processing of cargo, resulting in completely different facilities needs.

IATA, in its Airport Development Reference Manual[53], provides some major guidelines to develop the cargo terminal and associated facilities. It is important to understand how the new cargo facility is expected to operate and how incoming commodities will be handled. It is critical to keep in mind the cargo terminal will probably handle domestic and international cargo, so there should be separate facilities for arriving cargo. The IATA Manual states the location and width of the airside access doors are very important. The method used to calculate the requirements is a rule of thumb based on accepted industry standards. The space required is a function of the facility's proposed processing capability. For planning purposes, IATA recommends the following spatial requirements for estimating the size of cargo facilities:

- 0.5 short tons per square foot for low automation (mostly manual)
- 1.0 short tons per square foot for average level of automation
- 1.6 short tons per square foot for high level of automation

In the case of IAP, the analysis assumed an average level of automation, which is 1.00 short tons per square foot.

The SSA air cargo facilities should provide the flexibility to handle different types of products, since the air cargo activity will ultimately be market-driven. **Table 5-3: IAP Air Cargo Terminal Requirements – DBO+5** depicts the cargo terminal requirements for the IAP, based on the aviation forecasts.

Table 5-3: IAP Air Cargo Terminal Requirements - DBO+5			
Sizing Method	**Cargo Tonnage Forecast, DBO+5**		
	Low Case	**Base Case**	**High Case**
Air Cargo Short Tonnage	16,500	59,800	118,600
Size of Air Cargo Terminal (ft^2)	16,500	59,800	118,600

Source: IATA *Airport Development Reference Manual*

The cargo facility should be able to expand easily without affecting the regular activity in that area of the airport, including the airside and landside of the cargo area. The air cargo activity could become one of the

[53] *Airport Development Reference Manual*, 9th Edition, January 2004, IATA, Montreal, Canada.

main aviation activities at SSA, taking into consideration the extensive railway and roadway network that exist and is expected to be near the proposed airport site, facilitating the ground transportation to different destinations in Central U.S..

For DBO+10 and DBO+20, the cargo terminal facility requirements are detailed in **Table 5-4: Intermediate Air Cargo Aviation Activity Forecasts – DBO+10 and DBO+20**.

Table 5-4: Intermediate Air Cargo Aviation Activity Forecasts - DBO+10 and DBO+20

Aviation Forecasts	DBO+20	
	Low Case	High Case
Air Cargo Short Tonnage	146,100	350,500
Size of Air Cargo Terminal (ft^2)	146,100	350,500

Source: IATA *Airport Development Reference Manual*

5.1.2 - Air Cargo Apron

The air cargo fleet mix was defined and described in the 2009 Forecast Report. According to the IATA Manual, the cargo ramp area normally is four to five times larger than the cargo terminal area. It should include aircraft parking positions, internal taxilanes, airside roads, ground service equipment parking and processing areas on the apron.

There should be at least 120 ft between the aircraft nose and airside façade of the cargo terminal[54], including 60 ft for staging area, 40 ft for cargo road and 20 ft for unit loading area. If the cargo is loaded or unloaded from the nose of the aircraft, another 53 ft should be added, but it is more common the airplanes are loaded from their side.

The largest cargo aircraft expected in the IAP will be Boeing 767-300 (length of 180 ft, 3 inches) and Airbus 300-600 (length of 177 ft, 5 inches). Therefore, the aircraft parking area should have at least a depth of 300 ft. for IAP. However, larger cargo airplanes are expected to operate later in the planning period; hence, more depth should be provided to ensure they can be accommodated properly. The aviation forecasts have considered that the largest aircraft expected to fly to SSA within the evaluated period will be the B787 and A350. The longest versions of the two aircraft models will be the B787-900 and A350-1000 with lengths of 206 ft and 243 ft, 9 inches respectively. The depth between the cargo building(s) and the aircraft parking restriction line should be at least 364 ft.

The apron taxilane centerline should be at least 138 ft wide from the aircraft parking restriction line to allow ADG V aircraft to taxi through the area with no restrictions. **Table 5-5: IAP Air Cargo Apron Positions – DBO+5** presents the number of air cargo apron positions. The analysis has followed the IATA guidelines that a typical turnaround time is of 4 to 7 hours per aircraft since SSA is not expected to be a cargo hub, but more a spoke operation.

Table 5-5: IAP Air Cargo Apron Positions - DBO+5

Air Cargo Apron Criterion	Low Case	Base Case		High Case	
Airplane Design Group	III	III	IV	III	IV
Positions Required	2	2	2	4	3

Source: IDOT, 2010.

[54] *Airport Development Reference Manual*, 9th Edition, January 2004, IATA, Montreal, Canada

Table 5-6: Intermediate Air Cargo Apron Positions – DBO+20 depicts the expected number of all cargo aircraft positions for DBO + 20 for the Low and High Case Scenarios. In DBO + 20, the international cargo is anticipated to become the more predominant of the two activities.

Table 5-6: Intermediate Air Cargo Apron Positions - DBO+20

Air Cargo Apron Criterion	Low Case			High Case		
Airplane Design Group	III	IV	V	III	IV	V
Positions Required	3	3	2	4	5	3

Source: IDOT, 2010.

The IATA Manual recommends the cargo facility should have at least three airside doors; each entrance should be 16 ft wide and 16 ft high to allow side-loaded pallets and dollies and the wider self-transported dollies. Landside truck doors should be 13 ft high and 10 ft wide. The height of building will depend on the level of mechanization and automation of the cargo operation. The depth of the building should range between 210 to 300 ft providing room for truck loading/ unloading and handling storage.

Room should be reserved to facilitate future expansion of the facility. Offices, technical service areas and special storage facilities should be located in areas that do not affect the normal cargo operation. In order to facilitate the cargo flow and allow future expansion, it is recommended that all offices are located on the mezzanine level above the landside dock area. It is critical to discuss the layout of the cargo facility with the potential tenants before designing it to ensure the building satisfies the requirements for their operation.

Another important issue mentioned in the IATA Manual is the dwell times of incoming and outgoing shipments at the warehouse area because they will affect the size of the facility. IATA recommends considering the following issues when planning and designing the new cargo facilities:

- The suggested site should provide room to expand the cargo complex beyond the master plan and work properly with other airport facilities. For instance, the passenger terminal apron should be nearby to facilitate the transfer of cargo to and from the belly of passenger aircraft.
- The proposed cargo site should not infringe with normal airside operations and should have adequate separations from runways, taxiways and navigational aids to accomplish FAA standards.
- The aircraft parking apron associated with the cargo facility should be able to handle all-cargo/ freight aircraft parked at peak periods and be easily expanded in the future.
- There should be a good airside road linking the cargo center with the passenger terminal apron to facilitate the transfer of cargo to and from the belly of passenger aircraft. The roads should be designed to withstand heavy loads, 40 ft usable width to allow wide loads, and relative flat gradients.
- The area adjacent to the cargo apron should be used only for cargo processing facilities.
- Other cargo related facilities such as agents/forwarders, bonded stores, customs offices, other facilities and free trade zones should be accommodated on the landside of the complex, without affecting negatively cargo flows, traffic and parking.
- Good off- and on-airport ground access to the new cargo terminal with proper loading areas, truck and automobile parking and maneuvering should be provided. The truck docking and parking should have at least 115 ft and 72 ft of depth respectively.
- The utilities and telecommunications should be adequate to support the normal cargo operations.
- Freight forwarders should have direct access to the apron.

The planning of the proposed air cargo facilities for the IAP needs to be able to accommodate the different needs of the following potential users:

- Air express or airfreight;
- Freight forwarders with on/off-airport site requirements and apron access;

- All-cargo freight operations;
- International air cargo; and
- Commercial air carrier belly cargo.

A subsequent section of the master plan addresses development alternatives and will describe the ground access to the air cargo facilities at IAP.

5.2 - General Aviation Facility Requirements

Chapter 4 of the 2009 Forecast Report discusses the GA activity at airports near SSA which effectively become a future reliever airport system for SSA. Furthermore, IAP is not expected to have an impact on operations at nearby GA airports. A previous study[55] has determined that a Class C airspace structure, if implemented at SSA, would have a minimal effect to most GA aircraft passing through the area. Most overflights are currently conducted at altitudes above the maximum elevation of Class C airspace. Pilots could also plan to circumvent the area.

The existing General Aviation/Corporate airfield, which is included in the IAP, provides a Fixed Base Operator (FBO). The GA facilities include a passenger terminal/administrative building, public and employee parking, aircraft parking apron and corporate and T-hangars. According to the Forecast Report, the GA facility had 87 based aircraft in 2009 and has absorbed many local GA aircraft from other airfields and includes a few aircraft from small, privately owned airstrips which have closed over the last few years, mainly due to urban development.

The analysis primarily used the FAA AC 150/5300-13 guidelines to estimate the GA aircraft parking requirements, including apron and hangars:

- Corporate Jets and Turbo props require on average 600 square yards per aircraft;
- Multi-engine aircraft require on average 450 square yards per aircraft;
- Single-engine piston and light-twin engine aircraft which normally park at T-Hangar require about 300 square yards per aircraft; and,
- Apron requirements for itinerant demand are calculated based on a ratio of 360 square yards per aircraft.

All based aircraft will be located at hangars; single- and small-twin engines in T-hangars while the larger multi-engine, turboprops, turbo jets and helicopters will be at corporate hangars. An area will be provided in the parking apron for itinerant aircraft. The number of apron aircraft positions will be based on a typical peak day departures. The estimated GA parking requirements will be based on the planning assumptions already discussed and are shown in **Table 5-7: IAP General Aviation Requirements – DBO+5**. Itinerant rotorcraft could be located within these apron parking spaces.

Table 5-7: IAP General Aviation Requirements - DBO+5

Apron Criterion	Single Engine	Multi Engine	Turboprops/ Turbojets	Total
Low Case				
Based aircraft parked on Hangars	80	10	5	95
Average Parking Area per Aircraft (yds^2)	300	450	600	N/A
Hangar Area Requirements (yds^2)	24,000	4,500	3,000	31,500
Itinerant Aircraft	42	10	5	57
Average Tie down Parking Area				360
Tie Down Area (yd^2)				20,520
Base Case				
Based aircraft	87	11	6	104
Average Parking Area per Aircraft (yds^2)	300	450	600	N/A
Parking Area Requirements (yds^2)	26,100	4,950	3,600	34,650

[55] *General Aviation Impact Report,* Infinite Computer Technologies in association with TAMS Consultants, Inc., 1995.

Table 5-7: IAP General Aviation Requirements - DBO+5				
Apron Criterion	**Single Engine**	**Multi Engine**	**Turboprops/ Turbojets**	**Total**
Itinerant Aircraft	45	11	6	62
Average Tie down Parking Area				360
Tie Down Area (yd^2)				22,320
High Case				
Based aircraft	93	12	7	112
Average Parking Area per Aircraft (yds^2)	300	450	600	N/A
Parking Area Requirements (yds^2)	27,900	5,400	4,200	37,500
Itinerant Aircraft	48	12	7	67
Average Tie down Parking Area				360
Tie Down Area (yd^2)				24,120

Source: IDOT, 2010. N/A = Not Applicable

The analysis has assumed a ratio of one (1) automobile parking space per T-hangar. For corporate hangars, the number of parking will depend on the size of the facility. For instance, the rule of thumb is for a 60' by 60'hangar assume 7 parking spaces; for a hangar of 80' by 80', ten parking spaces. The GA terminal associated with the FBO could have 100-125 parking spaces. Therefore, the number of automobile parking spaces will depend on the proposed facilities, which will be financed by a third party. For IAP, the GA facilities are expected to remain.

Table 5-8: Intermediate General Aviation Requirements – DBO+20 presents the general aviation requirements for DBO+20. The study has used similar assumptions to estimate the facilities and areas as for DBO+5.

Table 5-8: Intermediate General Aviation Requirements - DBO+20				
Apron Criterion	**Single Engine**	**Multi Engine**	**Turboprops/ Turbojets**	**Total**
Low Case				
Based aircraft parked on Hangars	87	12	7	106
Average Parking Area per Aircraft (yd^2)	300	450	600	N/A
Hangar Area Requirements (yd^2)	26,100	5,400	4,200	35,700
Itinerant Aircraft	45	12	7	64
Average Tie down Parking Area				360
Tie Down Area (yd^2)				23,040
High Case				
Based aircraft	116	16	12	144
Average Parking Area per Aircraft (yd^2)	300	450	600	N/A
Parking Area Requirements (yd^2)	34,800	7,200	7,200	49,200
Itinerant Aircraft	58	16	12	86
Average Tie down Parking Area				360
Tie Down Area (yd^2)				30,960

Source: IDOT 2010. N/A = Not Applicable.

5.3 - Aircraft Rescue and Firefighting Facilities

The Federal Aviation Regulations *(FAR) Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D*, establishes guidelines and criteria regarding the facility requirements for aircraft rescue and firefighting (ARFF) services at an airport serving commercial aircraft with a seating capacity of more than nine passenger seats.

Paragraph 139.315 defines ARFF facility index classification based on aircraft length operating at the airport and the number of daily departures. Paragraph 139.317 lists the minimum rescue and firefighting requirements for each of these indexes, which are depicted in **Table 5-9: Summary of ARFF Equipment Requirements – (FAR Part 139)**. Part 139 also stipulates that the largest aircraft size category with an average of five or more daily departures determines the ARFF index. There are two types of ARFF vehicles to be considered, one carrying extinguishing agents and another carrying water with the commensurate quantity of aqueous film forming foam agent (AFFF). The extinguishing could be either 500 pounds of sodium-based dry chemical, halon 1211, or clean agent; or 450 lbs. of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gallons for simultaneous dry chemical and AFFF application.

Table 5-9: Summary of ARFF Equipment Requirements - FAR Part 139

Airport Index	Aircraft Length (ft)	Vehicles Required		Agents	
		With Extinguishing Agents	With water and AFFF	Dry Chemicals (lb) or dry chemicals with water and AFFF	Water (lb)
B	At least 90 but less than 126	1	1	✓	1,500
C	At least 126 but less than 160	1	2	✓	3,000
D	At least 160 but less than 200	1	2	✓	4,000
E	At least 200 ft	1	2	✓	6,000

Source: Federal Aviation Regulation (FAR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D*.

The fire vehicles carrying water and AFFF should have the proper amount of AFFF to mix with twice the water required to be carried by the vehicle. The vehicles transporting the dry chemical, halon 1211 or clean agent should meet minimum discharge rates for the equipment installed, for a hand line 5 pounds per second and for a turret 16 pounds[56].

The largest commercial aircraft expected to operate at SSA during the IAP are the A300-600 (177 ft, 6 inches) and B767-300 (180 ft, 3 inches). Based on the size of the expected largest aircraft at IAP, the airport's ARFF index should be Index D. However, since these airplane models are expected to average less than five daily departures, the IAP ARFF requirements will be Index B for Low Case Scenario and Index C for Base and High Case Scenarios. Thus, the minimum number of aircraft rescue and fire fighting vehicles required during the IAP is two to three. See **Table 5-10: IAP Summary of ARFF Index by Average Daily Departures – (DBO+5).** The vehicles should have 500 pounds of dry chemicals and 1,500 pounds of water to meet the criteria for Index B and 500 pounds of dry chemicals and 3,000 pounds of water to meet the criteria for Index C.

Table 5-10: IAP Summary of ARFF Index by Average Daily Departures - DBO+5

Forecast Level	Average Daily Departures (Commercial Aircraft)				
	Index A < 90’	Index B 90’ < 126’	Index C 126’ < 159’	Index D 159’ < 200’	Index E ≥ 200’
Low Case	0	15	2	0	0
Base Case	0	25	4	2	0
High Case	0	34	6	3	0

Source: IDOT, 2010.

In its Paragraph 139.319, the FAR Part 139 specifies the airport rescue and firefighting vehicles response time to every emergency should be:

> “Within 3 minutes from the time of the alarm, at least one airport rescue and firefighting vehicle shall reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post, or reach any other specified point of comparable distance on the movement area which is available to air carriers, and begin application of foam, dry chemical, or halon 1211.”
>
> “Within four minutes from the time of the alarm, all other required vehicles shall reach the point specified in the previous paragraph from their assigned post and begin application of foam, dry chemical, or halon 1211”

[56] FAR Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*

The National Fire Protection Association (NFPA) - in its *Guide for Aircraft Rescue and Fire Fighting Operations (NFPA 402)*[57] - recommends the same criteria as stated within FAA Part 139. The ARFF vehicles should have a maximum response time of three minutes from the time that an emergency occurs at an airport. This response time is based upon previous experiences with aircraft fires. The other vehicles should arrive no more than one minute after the first responding vehicle has arrived to the scene of the accident. Based on this response time criterion, the ARFF facility should be located equidistant from the ends of the runway. The response time from this location should be around 90 seconds (1.45 minutes) for IAP, well below the required three-minute criterion.

For DBO+20, the largest aircraft operating at SSA are expected to be aircraft such as B787 and A350 with regular air cargo operations to international destinations. Both aircraft have length of more than 200 ft, so they will be classified as Index E. The study anticipates there will be at least five operations per day for both low- and high-case scenarios. Hence, SSA should be classified as an ARFF Index E with one vehicle carrying the extinguishing agents and two vehicles carrying the water and AFFF agents.

5.4 Fuel Farm

The fuel farm is expected to have aboveground tanks and should be readily accessible to the terminal area. Fuel storage requirements were calculated based on the probable aircraft types and flight ranges as stated in the 2009 Forecast Report. The analysis assumed that every aircraft operating at SSA would fuel up before departing.

Table 5-11: IAP Expected Fuel Consumption, Commercial Aircraft – 4th Quarter of DBO+1 and **Table 5-12: IAP Expected Fuel Consumption, Commercial Aircraft – 4th Quarter of DBO+5** provides estimated fuel storage capacity requirements for the IAP. IDOT Aeronautics assumes that the fuel farm should hold the equivalent of five days of demand.

Table 5-11: IAP Expected Fuel Consumption, Commercial Aircraft - 4th Quarter of DBO+1

Destination / Aircraft	Distance (nm)	Fuel Required (gal)	Low Case		Base Case		High Case	
			Daily Departures	Total Gallons	Daily Departures	Total Gallons	Daily Departures	Total Gallons
150 seat Passenger Aircraft								
Phoenix	1,250	3,700	0	0	1	3,700	1	3,700
Las Vegas	1,320	3,900	1	3.900	2	7,800	2	7,800
Orlando	830	2,400	1	2,400	2	4,800	2	4,800
132 seat Passenger Aircraft								
San Francisco	1,620	3.600	0	0	0	0	0	0
Los Angeles	1,520	3,400	0	0	0	0	1	3,400
Daily Passenger Fuel Consumption			2	6,300	5	16,300	6	19,700
Cargo Aircraft								
B737-700	1,200	2,800	0	0	2	5,600	3	8,400
A300-600	2,000	11,800	0	0	0	0	1	11,800
B767-300	4,000	15,400	0	0	0	0	1	15,400
Daily Cargo Fuel Consumption			0	0	2	5,600	5	35,600
Daily Aircraft Fuel Consumption				6,300	7	21,900	11	55,300
Demand of 5 days				44,100	N/A	153,300	N/A	387,100

Source: IDOT, 2010. The amount of required fuel was estimated from the appropriate Airplane Characteristics for Airport Planning Manuals. N/A = Not Applicable.

Table 5-12: IAP Expected Fuel Consumption, Commercial Aircraft - 4th Quarter of DBO+5

Destination / Aircraft	Distance (nm)	Fuel Required (gal)	Low Case		Base Case		High Case	
			Daily Departures	Total Gallons	Daily Departures	Total Gallons	Daily Departures	Total Gallons

[57] NFPA 402: Guide for Aircraft Rescue and Fire Fighting, 2008 Edition, National Fire Protection Association, Quincy, Massachusetts

Table 5-12: IAP Expected Fuel Consumption, Commercial Aircraft - 4th Quarter of DBO+5								
Destination / Aircraft	Distance (nm)	Fuel Required (gal)	Low Case		Base Case		High Case	
			Daily Departures	Total Gallons	Daily Departures	Total Gallons	Daily Departures	Total Gallons
150 seat Passenger Aircraft								
Phoenix	1,250	3,700	2	7,400	2	7,400	2	7,400
Las Vegas	1,320	3,900	2	7,800	2	7,800	2	7,800
Orlando	830	2,400	2	4,800	2	4,800	2	4,800
132 seat Passenger Aircraft								
San Francisco	1,620	3600	0	0	2	7,200	2	7,200
Los Angeles	1,520	3,400	2	6,800	2	6,800	3	10,200
117 seat Passenger Aircraft								
New York	625	1,500	4	6,000	4	6,000	4	6,000
Miami	1,000	2,400	0	0	2	4,800	2	4,800
90 seat Passenger Aircraft								
Washington	510	1,200	3	3,600	3	3,600	4	4,800
Boston	745	1,800	0	0	3	5,400	3	5,400
Atlanta	480	1,100	0	0	3	3,300	3	3,300
Dallas	675	1,600	0	0	0	0	2	3,200
70 seat Passenger Aircraft								
Detroit	200	400	0	0	0	0	2	800
Minneapolis	325	600	0	0	0	0	3	1,800
Denver	785	1,600	0	0	0	0	2	3,200
Daily Passenger Fuel Consumption			0	36,400	25	57,100	36	70,700
Cargo Aircraft								
B737-700	1,200	2,800	2	5,600	2	5,600	2	5,600
B757-200	1,500	4,900	0	0	2	9,800	4	19,600
A300-600	2,000	11,800	0	0	1	11,800	1	11,800
B767-300	4,000	15,400	0	0	1	15,400	2	30,800
Daily Cargo Fuel Consumption			2	5,600	6	42,600	9	67,800
Daily Aircraft Fuel Consumption			N/A	42,000	31	99,700	45	138,500
Demand of 5 days			N/A	210,000	N/A	498,500	N/A	692,500

Source: IDOT, 2010. The amount of required fuel was estimated from the appropriate Airplane Characteristics for Airport Planning Manuals, except for the Regional Jets, which were based on the criteria of 117-seat aircraft. N/A = Not Applicable.

For general aviation operations, the analysis used the 2008 General Aviation Statistical Database & Industry Outlook[58] prepared by the General Aviation Manufacturers Association (GAMA). The report provides the average number of hours flow by piston, turboprop, turbojet and rotorcraft in the U.S. as well the average number of gallons of fuel per hour for every type of aircraft considered to be part of the general/corporation aviation fleet. The evaluation assumed an average 380 operations per based aircraft based at the airport to estimate the number of gallons per operation. **Table 5-13: IAP Expected Fuel Consumption, General/Corporate Aviation – DBO+5** depicts the expected average number of gallons per departure at SSA and the expected amount of fuel needed for IAP. Piston aircraft will require Avgas (100 Low Lead fuel[59]) while turboprop and turbojet will need Jet Fuel to operate.

Table 5-13: IAP Expected Fuel Consumption, General/Corporate Aviation - DBO+5				
Aircraft Type	Average Fuel Per Departure	Low Case	Base Case	High Case
Piston Aircraft	4	344	360	376
Turbot prop	120	1,920	2,160	2,400
Turbojet	162	648	972	1,296
Rotorcraft	44	352	440	528
Total		*3,264*	*3,932*	*4,600*

[58] 2008 General Aviation Statistical Databook & Industry Outlook prepared by the General Aviation Manufacturers Association, 2009
[59] 100LL Avgas, is a 100-octane fuel, rated by the severe Motor Octane Number (MON) method ('LL' stands for 'low-lead').

Table 5-13: IAP Expected Fuel Consumption, General/Corporate Aviation - DBO+5				
Aircraft Type	**Average Fuel Per Departure**	**Low Case**	**Base Case**	**High Case**
5-Day Demand Av Gas		1,720	1,800	1,880
5-Day Demand Jet Fuel		14,600	17,860	21,120

Source: IDOT, 2010.

In the first five years of operation, fuel trucks could serve air carrier aircraft at the gate. However, the main passenger and cargo apron areas should have at least provisions for future underground fuel lines. These fuel lines should have all the proper protection and monitoring devices to avoid any detrimental environmental impact should fuel leakages occur.

The fuel farm is expected to have state-of-the-art facilities and equipment to provide appropriate services and levels of safety. The fuel farm should be able to expand to properly handle the aviation demand at SSA. Best practices should be used to protect the facilities, including foam injection facilities, water spraying cooling systems, suitable portable and handheld extinguishing equipment and devices and fire alarms.

Drain systems should be provided to collect fuel if there is a spillage in the facility. The drains should be strategically located to protect against any potential environmental contamination in the surrounding areas, particularly in the subsoil. Furthermore, the facility should have a system to treat contaminated water, especially oily water using oil/water interceptors before it is discharged to the drainage system. Current technology detects the presence of oil in the water and stops potential contamination of the water system. This system could help to contain spillage in the case of tank rupture.

The facility should have good ground access from the landside for truck fuel delivery. There should also be access roads for fire trucks and other vehicles in the event of a fire or other types of emergencies

For DBO+20, the study has estimated the fuel consumption for commercial aircraft operations by calculating the average number of gallons per departure for the High Case scenario of DBO+5 and uses that ratio for forecast departures of the Low and High Case scenarios for DBO+20. The routes could be somewhat different but the analysis assumed the consumption average should be about the same because it is expected there should be some balance between short, medium and long-range flights throughout the planning period. **Table 5-14: Intermediate Expected Fuel Consumption Commercial Aircraft – DBO+20** provides the estimates of daily fuel consumption for Low Case and High case scenarios for DBO+20. The expected average fuel consumption per departure should be about 3,100 gallons.

Table 5-14: Intermediate Expected Fuel Consumption Commercial Aircraft - DBO+20				
Fuel Demand Time Period	**Low Case**		**High Case**	
	Daily Departures	**Expected Fuel Consumption**	**Daily Departures**	**Expected Fuel Consumption**
Average Day	66	204,600	180	558,000
Five Day Demand		1,023,000		2,790,000

Source: IDOT, 2010.

Table 5-15: Intermediate Expected Fuel Consumption, General Aviation/Corporate Aviation – DBO+20 presents the fuel consumption for DBO+20 for general aviation and corporate aviation.

Table 5-15: Intermediate Expected Fuel Consumption, General Aviation/Corporate Aviation - DBO+20			
Aircraft Type	**Average Fuel per Departure**	**Low Case**	**High Case**
Piston Aircraft	4	366	440
Turbot prop	120	2,640	2,880

Table 5-15: Intermediate Expected Fuel Consumption, General Aviation/Corporate Aviation - DBO+20			
Turbojet	162	1,296	2,916
Rotorcraft	44	616	880
Total		4,888	7,116
5-day Demand Av Gas		1,830	2,200
5-day Demand Jet Fuel		22,160	33,380

5.5 - Aircraft Deicing Facilities

The FAA requires that airports where icing conditions take place regularly in the winter months have commercial deicing facilities. In the Chicago region, typically where icy conditions occur annually[60] (temperatures below 32° F), deicing facilities are required. During the IAP, aircraft deicing could be done at the gate and at remote pads near the runway thresholds. The facilities will meet the taxiway/taxilane separation criteria for ADG V, keeping in mind the new airport is expected to accommodate larger aircraft in the future. There should be a bypass taxiway to ensure unrestricted aircraft access to and from the runway. The deicing facilities should have the systems and procedures to properly dispose of the glycol used to remove the ice from the aircraft fuselage. The facility should follow the guidelines of FAA AC 150/ 5300-14B, *Design of Aircraft Deicing Facilities*[61].

5.6 - Airport Maintenance Center Facilities

The Airport Maintenance Center (AMC) will include offices, workshops, storage areas and equipment related to the upkeep of all airfield and other airport facilities in order to ensure the safe and efficient operation of the airport, such as ground maintenance, snow removal, deicing trucks, mowing and other equipment. The AMC will also need an area to store spare parts. Parking provisions for all vehicles will be included in the conceptual planning and design of these facilities. An area should be reserved for the AMC that includes a building for the maintenance staff, warehouses for equipment and spare parts, parking for maintenance vehicles and employee automobiles.

The facility will also include the snow and ice control equipment and materials. FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*[62] provides guidelines for the site selection and design of buildings used to store and maintain airport snow and ice control equipment and for storage of approved materials.

It is beneficial to provide the area with good ground access, separate from the main airport access. The proposed location should be in the public area, near a checkpoint to the airport secure areas.

5.7 - Airport Utilities

The airport will require several utility services including electricity, gas, water, wastewater, drainage, stormwater runoff and phone and telecommunications. **Exhibit 5-1: Existing Utility Map** in Appendix B**,** is a composite map of the existing primary utilities within the vicinity of SSA. The map depicts the power lines including the existing secondary power lines and potential service connections within the airport site. The following sections describe the existing utility network near the SSA property boundary.

Power – Two transmission lines are located north and south of the airport's ultimate boundary. To the north, an aerial transmission electrical line runs approximately three-quarter miles north of Crete-Monee Road; and to the south a 234.5 kV electrical line runs north of Kennedy Road/319th Street.

[60] From ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport.
[61] FAA Advisory Circular 150/5300/14B, Design of Aircraft Deicing Facilities, February 2008.
[62] FAA AC 150/5220-18, Building for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials. September 2007.

Natural Gas – A Northern Illinois Natural Gas Company eight-inch main line extends north along Western Avenue to the intersection of Offner and Western and then north along Knacke Road.

Water – The area within the inaugural airport boundary is currently supplied by private water wells. Consumer's Illinois Water Company is the local water company providing service near the airport site. In addition, public wells serve several of the surrounding communities.

Wastewater – There is no common collection system or treatment plant serving the airport property.

Telephone – Currently AT&T has a fiber optic line and a Coaxial Cable line that run east to west along North Peotone Road/Church Road. There are plans to extend the new fiber optic communication lines north from the intersection of Church Road and Will Center Road. AT&T also has switching stations in the Villages of Crete and Monee.

5.7.1 - Power Supply

In 2004, several meetings were held with representatives of the main power provider in the area, Commonwealth Edison, to estimate the preliminary minimum electrical loads required for the IAP under the Low, Base and High Case forecast scenarios. From those discussions, Commonwealth Edison is expected to provide at least one 34.5kV electrical substation (ESS) on the airport. The airport should be provided electrical service from two independent power sources to ensure redundancy. In addition, the airport should have several substations to help deliver power to the different airport facilities. The power distribution system should be provided in underground ducts, feeding utility network distribution centers located throughout the airport site. Each network center should transform the power from 34.5kV to 480V. **Table 5-16: IAP Preliminary Electrical Load Summary** provides the preliminary electrical load requirements. The estimates will be refined when the airport facilities are designed.

Table 5-16: IAP Preliminary Electrical Load Summary

Demand Load Areas	Forecast DBO+5		
	Low Case	Base Case	High Case
Building Loads (kva)	650	1,187	1,759
Landside Loads (kva)	757	1,131	1,520
Airside Loads (kva)	491	770	1,132
Equipment Loads (kva)	1,822	2,596	3,745
Total Electrical Loads (kva)	3,720	5,684	8,156

Source: TAMS, an EarthTech Company, 2004. Note: kva = kilovolt-amperes.

This study has also performed a basic benchmark analysis obtaining the power consumption of Knoxville McGhee Tyson Airport (TYS) with a similar level of existing passenger traffic as SSA IAP. The Metropolitan Knoxville Airport Authority has provided the data at TYS since January 2000. According to their statistics, the amount of electricity used is relatively consistent through the years with an average of 12,500 Kw per year. The power consumption depends more on the size and types of facilities than the aviation traffic. For instance, annual enplaned passengers in the evaluated period went from 512,000 to 912,000, and the amount of consumed energy used was relatively consistent throughout the evaluated period. It is important to point out the TYS passenger terminal building had a major expansion and improvement program, which was completed in 2000 and could be considered as a more energy efficient building.

From the beginning, SSA should have sustainable sources of energy to optimize the utilization of available resources in the region and will save significantly in operation costs in the long run. The design of airport buildings should use the latest technology to make them more efficient and reduce the amount of power required for the regular operation.

The airport should have emergency generators in the event that sources providing electricity have a service disruption. The generators should provide power to the most important facilities at the airport such the ATCT NAVAIDS and essential services in the passenger terminal building and other facilities.

In order to have a preliminary idea of the amount of electricity that the airport could require at IAP, the study has reviewed the power consumption of Knoxville McGhee Tyson Airport (TYS) with similar level of traffic as IAP. The Metropolitan Knoxville Airport Authority, provided consumption of various utilities used at TYS) since January 2000. According to the statistics, the amount of electricity used is relatively consistent through the years with an average of 12,500 kilowatts per year. The power consumption depends more on the size and types of facilities more than the aviation traffic. For instance, annual enplaned passengers in the evaluated period went from 512,000 to 912,000, and the amount of energy used is pretty consistent throughout the evaluated period. The TYS passenger terminal building had a major expansion and improvement program, which was completed in 2000 and could be considered as a relatively efficient building from the energy standpoint.

From the beginning, SSA should have sustainable sources of energy to optimize the utilization of available resources in the region and will save in operation costs in the long run. The design of airport buildings should use the latest technology to make them more efficient and reduce the amount of power required for the regular operation.

It is important the power company – Commonwealth Edison- provides adequate level of electricity with at least two independent sources to ensure redundancy if possible. The airport should have several substations to help deliver the power to the different airport facilities. The power distribution system should be done with underground ducts, feeding utility network distribution centers located throughout the airport site.

For planning purposes, the study has assumed IAP should need about 12,000 kilowatts for DBO+5. In the following years, depending on the proposed expansion and improvement programs the consumption is expected to increase.

The airport should have emergency generators in the event that regular sources providing electricity have a service disruption. The generators should provide power to the most important facilities at the airport such the air traffic control tower, navigational and visual aids and essential services in the passenger terminal building and other facilities.

5.7.2 - Water Supply

Water supply requirements were estimated using the enplanement projections presented in the 2009 Forecast Report. A study gathered statistics for several years of water consumption from various U.S. airports including Baltimore-Washington International (BWI), BOS, LAX, Seattle-Tacoma International (SEA) and Ronald Reagan Washington National Airports (DCA). The data indicated a trend of 20 gallons of water consumption per enplaned passenger, which was used for this analysis. **Table 5-17: IAP Water Supply Requirements – DBO+5** presents the required estimated water supply for each of the three forecast scenarios.

Table 5-17: IAP Water Supply Requirements - DBO+5

Planning Criterion	IAP Enplanement Forecasts		
	Low Case	Base Case	High Case
Annual Enplanements	471,000	709,000	968,000
Peak Month Average Day Enplaned Passengers	1,565	2,333	3,151
Daily Water Requirements (gallons)	31,300	46,660	63,020

Source: IDOT, 2010.

Aqua Illinois, Inc. indicated that local requirements for commercial fire flow are 5,000 gallons per minute. It would be prudent to have a separate tank from potable water that could help with fire fighting.

For DBO+20, the expected water demand at SSA is provided in **Table 5-18: Intermediate Water Supply Requirements – DBO+20**.

Table 5-18: Intermediate Water Supply Requirements - DBO+20		
Planning Criterion	Low Case	High Case
Annual Enplanements	2,200,000	6,100,000
Peak Month Average Day Enplaned Passengers	7,092	19,464
Daily Water Requirements (gallons)	141,840	389,280

Source: IDOT, 2010.

The airport will require a dependable water supply including water tanks that could hold at least one-day demand. The following options could be considered as alternative water supplies for the airport:

- In coordination with Aqua Illinois, Inc., install a water main along Western Avenue to the east side of the airport site delivering Grant Park well water through Beecher to University Park.
- In coordination with the Village of University Park and Aqua Illinois, Inc., install a water main along Illinois Route 50 from Manteno to University Park delivering water from Kankakee River.
- Reach a long-term agreement with the Villages of Monee or University Park to supply an estimated 58,000 gallons of potable water per day for the IAP. This will probably require the airport to rely on a set of wells near Monee to ensure redundancy. Since Aqua Illinois, Inc. has assisted the Village of University Park in applying for a grant for a proposed 24-inch water main from University Park to the Illinois Diversatech Campus in Manteno, Illinois, a cost sharing of the 24-inch water main may reduce costs.
- Reach a long-term agreement with the Village of Beecher to supply an estimated 58,000 gallons of potable well water per day.
- Develop wells on airport property and a water treatment plant for the airport.

5.7.3 - Sanitary Wastewater Treatment Requirements

Sanitary wastewater is normally about 85 percent of the consumed potable water, which will be about 17 gallons per enplaned passenger. Sanitary waste from aircraft toilets are normally treated separately due to the added chemicals. The wastewater generated by the airport could be either treated at a facility developed by at the airport or a municipal wastewater treatment plant. **Table 5-19: IAP Sanitary Wastewater Treatment Requirements – DOB+5** presents the sanitary wastewater treatment requirements for the Low, Base and High Case forecast scenarios.

Table 5-19: IAP Sanitary Wastewater Treatment Requirements - DBO+5			
Planning Criterion	**Low Case**	**Base Case**	**High Case**
Peak Month Average Day Enplaned Passengers	1,565	2,333	3,151
Daily Sanitary Wastewater Treatment (gallons)	26,095	39,661	53,567

Source: IDOT, 2010.

Table 5-20: Intermediate Sanitary Wastewater Treatment Requirements – DBO+20 shows the expected wastewater demand at SSA as follows:

Table 5-20: Intermediate Sanitary Wastewater Treatment Requirements - DBO+20		
Planning Criterion	**Low Case**	**High Case**
Peak Month Average Day Enplaned Passengers	7,092	19,464
Daily Sanitary Wastewater Treatment (gallons)	120,564	330,888

Source: IDOT, 2010.

5.7.4 - Drainage System

A drainage and stormwater system will be included in the proposed development. The airside and landside facilities and buildings will generate substantial runoff due to pavement and roofs; hence, the drainage and stormwater systems will be important to prevent localized pondong. It should follow the guidelines of the FAA AC 150/5320-5C, Surface Drainage Design[63].

5.7.5 – Data Transmission / Information Technology (IT) Resources

A modern airport and its associated terminal, offices, operations facilities, and public spaces should include a wide array of telecommunications and IT resources. Beyond basic phone and internet access, SSA must be able to accommodate a host of other data technologies that have become commonplace and are expected to become more prevalent in the future.

A robust and adaptable IT infrastructure is an essential component to ensure an efficient, capable, reliable, and secure environment for data transmission. It should be noted that new technologies are constantly being refined and developed to make data transmission and storage faster and more economical. Therefore, some of the systems that will be employed at SSA may not be available for discussion at this time.

Network Hardware - Data storage and transmission hardware (servers, switches, routers, etc.) should be initially sized to allow for an acceptable level of growth before requiring upgrade/replacement. Network hardware should be housed in a secure, climate-controlled location inaccessible to the general public and non-essential staff. Major components should have battery-backup and/or a standby generator and data should be backed up at appropriate intervals. The backed-up data should be stored in a fire/flood/shock proof location off-site. Internet-based back-up is becoming common and might be used as a secondary back-up method if data security can be ensured. The network equipment necessary for SSA can be largely housed in a main network data center, however ancillary support facilities may require their own sub-centers depending on the type and nature of the facility.

SSA's Local Area Network (LAN) should be high-bandwidth (CAT6, CAT7, or industry-standard at the time) and capable of handling large amounts of data with minimal lag, interference, or packet loss.

Data Transmission - To move data on/off site, SSA will most likely have a redundant main data transmission line. Depending on the projected data transfer requirements, this could be handled via fiber optic line, gigabit ethernet over copper, more traditional T1, T2, T3 lines, etc. On-site vendors may be serviced by the airport's Local Area Network (LAN) or may use Digital Subscriber Line (DSL), cable, Fiber To The Business (FTTB), etc.

Wireless & Cellular - Wireless data and voice transmission is crucial to the successful daily operations of any major organization and is now an expected service for the traveling public. To facilitate wireless data and voice transmission, it could be expected that SSA will provide both secure and open Wi-Fi hotspots, potential cellular telephone boost/repeater stations inside the terminal core, WiMAX capability throughout the entire airfield, and/or other wireless resources.

[63] FAA AC 150/5320-5C, Surface Drainage Design, September 2006

Telephone - Telephone service is a necessity, but the means by which voice communications are transmitted could include traditional phone lines, Voice over Internet Protocol (VoIP), Wide Area Telephone Service (WATS) digital transmission, cellular integration, or a combination of these or other methods.

Entertainment / Information - While the use of internet-based entertainment such as internet protocol television (IPTV), streaming radio and custom music stations is rapidly gaining popularity, it is anticipated that SSA will have existing transmission methods available as well (Cable, Satellite, over-the-air, etc.). Also, Flight Information Display System (FIDS), passenger information displays and advertisements that are generated either in-house or through an infotainment service contract will require a significant amount of bandwidth. Depending on the origin of the stream, this data may be carried either through the airport's LAN or may utilize dedicated transmission lines.

Adaptability / Expandability - Other facets of terminal and airport operations should be factored in when providing the physical space and cabling required for telecommunications/IT. For example, it may be most economically and operationally efficient to route the wiring for items like fire alarms, CCTV, secure dedicated transmission lines for the TSA, FAA or airport security, building automation wiring, passenger information audio/video, either in the same conduit space or possibly even over the same data transmission lines themselves depending on the systems in place and the technology available at the time of design. Additional power should be available in the data center and throughout the terminal to allow for future IT hardware upgrades and additions. As a rule, all IT subsystems should be designed and implemented in manner that allows for expansion, upgradeability, as well as for transition to newer technologies as they develop.

5.8 - Aircraft Maintenance Repair Overhaul Facilities

The airport is not expected to have aircraft maintenance repair overhaul (MRO) facilities during the IAP years. However, the airlines should provide basic maintenance services in the apron area for aircraft. The airport should reserve an area for a MRO development, in the future, which is expected to be done either by an airline or a independent third party. The area should have direct access to the airside facilities and have adequate separation from the runway and taxiway system to not infringe with regular airport operations of the airport. The type of development will be the responsibility of the consortium that will develop the facility.

The IATA Manual provides some guidelines about the maintenance facilities. The major issues to be considered are:

- Adequate distance from the passenger terminal complex;
- The facilities should not impact future expansion of the passenger terminal facility;
- Adequate space should be available to allow aircraft to maneuver in and out of the hangars;
- Ability to handle the scheduled aircraft maintenance requirements; and,
- Noise generated by maintenance activity (it is expected a facility could operate 24 hours).

5.9 - Ground Support Equipment

GSE includes the vehicles and equipment providing service to the parked aircraft between flights. The GSE includes among others towing tractors, air conditioning units, air start units, baggage tugs, belt loaders, catering trucks, cleaning vehicles fuel hydrant dispenser, ground power unit, pallet/container loader and lavatory and potable water vehicles.

According to the IATA Manual, GSE should be parked in areas adjacent to the aircraft parking apron in order to be readily available when they are required, ensuring an efficient operation. The storage areas, which should be well delineated, should be properly sized to accommodate all equipment used on a regular basis to serve the parked aircraft in that section of the apron area.

The type, number and method of operation of GSE will vary from airport to airport, and airline to airline. Therefore, in order to understand the local needs, it is important to discuss the requirements with the major airlines and airport ground handlers. With the appropriate apron layout, services and facilities, the GSE can operate within the overall dimensions of the aircraft and recommended clearances for apron airplane movement.

Some of the vehicles should be parked near the apron areas that they are going to serve, while others should be farther away, but not too distant. The passenger terminal is expected to have adequate areas for parking GSE near their areas of activity to optimize the apron operations.

The new airport will also need to have facilities providing maintenance and repair to the GSE equipment and vehicles. The facility is not expected to serve other airport equipment, such as fuel trucks, maintenance vehicles, surface sweepers and cleaners. The GSE maintenance facilities should be near the passenger terminal complex with direct airside access and landside access to facilitate the delivery of spare parts.

5.10 - Service Roads and Security Access

The airport should have a secure airside service roadway system, linking all Air Operations Areas (AOA). The proposed secure roadway layout will strive to minimize the crossing of active airside facilities. As already mentioned, the study has recommended the inclusion of a 25 ft wide apron service road to facilitate access to parked aircraft.

The airport should have access controls to AOA and other restricted areas of the airport such as certain areas of the passenger terminal building and landside. There should be manned gates at strategic locations to ensure if people are authorized to have access to restricted areas. State-of-the-art technologies should be implemented to regulate the access to restricted areas. The Code of Federal Regulations – Part 1542, Airport Security, of the U.S. TSA provides the guidelines for accessing secure areas of an airport.

The airport should have a security fence around the perimeter of the AOA area and other secure areas. TSA requires a chain-link fence of at least 7 ft high – preferably 8 ft – plus one or more coils of stranded barbed wire which may be angled outward at a 45 degree incline from the airside to deter intruders. This fencing system is considered the most economical solution to secure airside facilities and provides clear visibility for security patrols. The gates that provide access to the airside should open at least 90 degrees and be manufactured of materials similar to the fence. The gates adjacent to the public streets should be guarded by security staff to prevent unauthorized access to the AOA. The TSA document of *Recommended Security Guidelines for Airport Planning and Construction*[64] provides recommendations and guidelines for fencing around an airport.

A secure service road should be located around the perimeter fence for additional security of the airport facilities. This secure service road could be used for the maintenance of airside facilities and navigational and visual aids. Both sides of the fence should remain clear to enhance security effectiveness. The fence should not be able to be climbed and there should only be minimal landscape on both sides of the fence.

[64] Recommended Security Guidelines for Airport Planning and Construction, United States Transportation Security Administration, Washington, DC, June 2006.

Section 6 – IAP Ground Transportation Facilities

6.1 - Existing Ground Transportation Network

The existing ground transportation network serving the future SSA site includes provisions for both major roadway facilities and commuter train service. **Exhibit 6-1: Existing Ground Transportation Network,** in Appendix B**,** illustrates the existing ground transportation network around the airport site. The following is a brief description of the existing major ground transportation facilities in the area:

Interstate 57: I-57 is part of the Federal Highway Administration's (FHWA) National Interstate and Defense Highway System and it provides a direct north-south link between Chicago, Illinois and southeast Missouri, where it terminates at I-55. I-57 is located approximately two miles to the west of the SSA site. The interstate is access controlled and it carries two-lanes of traffic in each direction. There are two existing interchanges on I-57 in the vicinity of the project; the Manhattan–Monee Road interchange (mile marker 335) is located near the north end of the airport site and the Peotone–Wilmington Road interchange (mile marker 327) is located near the south end of the airport site. Located within this 8-mile segment of roadway are a truck weigh station and a rest area.

Illinois Route 50: IL-50 is a marked state highway that runs parallel to I-57 in the vicinity of the airport site. It is located approximately two-thirds of a mile to the east of the interstate along the west side of the airport site. IL-50 currently carries two-lanes of traffic in each direction and it is a major arterial roadway for cars and trucks in the region.

Illinois Route 394: IL-394 is a four-lane (two-lanes in each direction) divided highway that is located adjacent to the northeast corner of the airport boundary. IL-394 runs in a north-south direction and provides direct connections from I-94, I-80 and U.S. Route 30 to the north to its terminus at Illinois Route 1. IL-394 is a controlled access major arterial roadway that carries significant truck traffic for the region.

Illinois Route 1: IL-1 runs in a north-south direction along the east side of the airport site and is designated as a Strategic Regional Arterial (SRA). The roadway consists of one lane of traffic in each direction with paved shoulders. IL Route 1 is a heavily used truck route for the region.

In addition to the existing roadway network, there are two railroad lines that run adjacent to the SSA site:

Canadian National Railway: The Canadian National's freight rail line runs from Chicago south to (New Orleans) Champaign, Illinois passing the airport site along the west side of IL Route 50. The Metra Electric Line currently runs scheduled commuter passenger service on the Canadian National right-of-way from downtown Chicago to University Park, which is located approximately 8 miles north of the airport site.

Union Pacific Railroad: The Union Pacific Railroad has existing freight tracks that run from Chicago to St. Louis, these tracks run along the east side of the airport site through the Villages of Crete and Beecher.

6.2 - Future Roadway and Rail Improvements

6.2.1 - CMAP Go To 2040 Regional Comprehensive Plan

In October 2010, the Chicago Metropolitan Agency for Planning (CMAP), the region's metropolitan planning organization, published the recommended 2040 plan for the region. Their report entitled **Go To 2040 Comprehensive Regional Plan,** identified the following recommended roadway and rail improvements for the areas surrounding the future airport. **Exhibit 6-2: CMAP Go To 2040 Priority Projects** and **Exhibit 6-3: CMAP Go To 2040 Unconstrained Projects,** in Appendix B**,** identify the Priority and Unconstrained projects recommended in the plan.

Go To 2040 Priority Projects include**:**

I-294/I-57 Interchange **--** The I-294 at I-57 Interchange project calls for a full interchange at the juncture of these two interstates for improved accessibility to and from the south suburbs and also for improved north-south regional travel. Improvements will also be made to connecting arterials at the new interchange. The Tollway lists this project as a component in their Congestion Relief Program.[65] The Tollway and IDOT completed an environmental assessment of the project in August 2008.

I-80 Add Lanes **--** On I-80, two (one each direction) lanes are proposed to be added from US 30 east to US 45 to serve traffic utilizing I-355 north and east-west cross-county traffic. This will complete the widening of I-80 from the Grundy County Line (River Road) to I-294, providing capacity in the corridor to serve demand from the recently-completed I-355 extension.

Unconstrained Go To 2040 Projects include**:**

I-57 Add Lanes **--** This project would add one lane in each direction to I-57 in eastern Will County, from I-80 south to the proposed SSA. Project Planning for this project is in an early stage.

I-80 Add/Managed Lanes **--** This project would add a lane to I-80 through southwestern Cook and Will Counties, from I-294 to the Grundy County line. This may be considered as a managed lane over some or all of its length. This project is in an early stage of planning. (Improvements to a shorter segment of I-80, from US 30 to US 45 in Will County, are in the fiscally constrained portion of **Go To 2040 Report**).

IL 394 **--** This project would add lanes to IL 394 from I-80 south in southern Cook and Will Counties, and convert the roadway from an arterial to an expressway. Local officials in the area have expressed concern about the effect of the conversion of the roadway to an expressway on nearby economic development. This project should be examined to determine if operational alternatives to expressway conversion are available. Per FHWA regulations, conversion of the facility to an expressway may not advance to Phase II engineering unless the project is fiscally constrained. However, any operational or arterial-based improvements may occur at any time.

Illiana Expressway **--** This project would create a new expressway from I-65 in Indiana to I-55 in Illinois, passing east-west through central Will County. The next step in development of the Illiana Expressway is funding for Phase I engineering and is included within the fiscally constrained project list. The inclusion of engineering costs for the Illiana on the fiscally constrained project list demonstrates the region's support for its continued development. The project's construction costs are on the fiscally unconstrained list. On June 9, 2010, the Governor of Illinois signed legislation authorizing IDOT to "enter into one or more public private agreements with one or more contractors to develop, finance, construct, manage, and/or operate the Illiana Expressway on behalf of the state."

Prairie Parkway **--** This project would create a new expressway between I-88 and I-80 in Kane and Kendall Counties. Phase I engineering for this project has been completed, and Federal earmarks to cover a portion of project costs have been received, but funding is insufficient to construct the entire project. However, one element of this project, involving a bridge over the Fox River in Yorkville to connect US 34 and IL 71, has independent utility and can be completed with the earmarks received. This project element may be pursued at any time. For the remainder of the project, corridor preservation activities should be continued in order to preserve a transportation corridor in this area for future use.

I-80 to I-55 Connector **--** This project would connect the Illiana Expressway (which has a western terminus at I-55) and Prairie Parkway (which has a southern terminus at I-80). It is contingent on the completion of these other projects.

[65] http://www.illinoistollway.com/portal/pg.?_pg._id=133,1399545&_dad=portal&_schema=PORTAL

***Metra Electric Extension* --** This project would extend Metra Electric service to the proposed SSA in Will County from its current terminus in University Park, as well as create a new rail yard facility. Supportive land use planning should accompany this and other transit extension projects.

***Metra SouthEast Service Corridor* --** This project would create a new rail line that provides service to communities in southern Cook and northern Will Counties. It has been undergoing Alternatives Analysis by Metra, and the identification of a Locally Preferred Alternative is in process. The project should remain a fiscally unconstrained project until such time as a Locally Preferred Alternative is accepted by the FTA and the project demonstrates financial feasibility. The Alternatives Analysis work should include: detailed cost estimates; a demonstration of the financial capacity to cover the capital and operating costs; and a financial commitment detailing the availability of state and local funds to match Federal New Starts funds. Also, innovative financing options should be explored.

6.2.2 - Will County 2030 Transportation Plan

The **Will County 2030 Transportation Plan** is a multi-modal plan that provides transportation solutions for the county. This unconstrained plan provides recommendations without considering institutional priorities or agency fiscal limitations. The plan also includes a subset of the unconstrained project list that received a high ranking based on prioritization criteria to make efficient use of currently identified funds. **Exhibit 6-4: Will County Fiscally Constrained Projects and Exhibit 6-5: Unconstrained Roadways Projects,** in Appendix B**,** identify the Fiscally Constrained and the Unconstrained Roadways projects recommended in the plan.

Fiscally Constrained Will County 2030 Plan Projects:

Two roadway extension projects are shown in the Fiscally Constrained Plan in the vicinity of SSA. Both projects would provide improved connectivity between I-57 and the communities east of IL 50. The first project is an extension of Manhattan-Monee Road east of IL 50 and then south to Crete-Monee Road. The second is a one-mile connection that will complete a continuous roadway from Wilmington, through Peotone, to Beecher.

Unconstrained Will County 2030 Plan Projects:

In addition to the projects described in the **Go To 2040 Plan**, the Will County Unconstrained Roadways plan calls for widening of several east-west roadways in the vicinity of SSA, including Manhattan-Monee Road, Pauling Road, and Wilmington-Peotone Road. A new 4-lane roadway, known as the **Beecher Bypass** is also identified in the **Will County 2030 Transportation Plan.** This project calls for the construction of a bypass highway around the west side of Beecher, Illinois. The Beecher Bypass would be located on the east side of the airport site and it would shift the truck-traffic that currently uses IL Route 1 away from the center of the village to a new road located to the west of town. Preliminary plans indicate that this would be a four-lane facility.

The Will County 2030 Transportation Plan also calls for improvements to the commuter rail system in the vicinity of SSA. **Exhibit 6-6: Unconstrained Commuter Rail Projects** identifies an extension of the Metra Electric line to Peotone with potential new stations constructed along the route. **Exhibit 6-6** also identifies the potential new Metra southeast service line to Beecher.

6.3 - Existing Roadways Operating Conditions

In general, the existing roadway network around the site operates at an acceptable level of service. The four main roadways in the area are: I-57, IL-50, IL-394 and IL-1. Each of these roadways runs in a north-south direction along the eastern and western edges of the SSA site. The following is a brief description of the existing operations on these roads:

Interstate 57: I-57 currently carries approximately 36,000 vehicles per day (Annual Average Daily Traffic (AADT)) in the segment between the Manhattan-Monee Interchange and the Peotone-Wilmington Road Interchange. The operations along the interstate and at the Wilmington-Peotone Road Interchange are acceptable. In the fall of 2010, IDOT completed improvements to the Manhattan-Monee Road Interchange.

IL Route 50: IL-50 currently carries between 6,000 to 9,000 vehicles per day AADT on the segment adjacent to the airport. Presently no operational deficiencies have been identified for this roadway segment.

IL Route 394: IL-394 currently carries 8,700 vehicles per day AADT immediately north of the airport site; this volume increases to approximately 22,600 vehicles per day AADT in the area south of U.S. Route 30 and to 37,6000 vehicles per day AADT to the north of U.S. 30. No operational deficiencies have been identified at the southern terminus of IL-394.

IL Route 1: IL-1 currently carries 8,700 vehicles per day AADT along the eastern boundary of the airport site and through the center of Beecher, Illinois. A significant portion of the existing traffic on IL-1 is truck traffic that has had negative impacts on the Village of Beecher. A bypass roadway along the west side of Beecher's limits has been recommended in the **Will County 2030 Transportation Plan** to mitigate the impacts of truck traffic through downtown Beecher.

6.4 - Inaugural Airport Access

Access to the Inaugural Airport was studied to determine if the existing local roads could accommodate the projected airport traffic or whether an interchange with I-57 would be required during the IAP. To perform this analysis, IDOT and FHWA required the development of an Access Justification Report (AJR), which used 2030 projected traffic information. Since IDOT designs roadways based on the projected traffic 20 years after construction, the year 2030 was used assuming that DBO roughly corresponds to the year 2010.

The Chicago Area Transportation Study (CATS), now part of CMAP, developed traffic projections for 2030 for the SSA. The traffic projections developed by CATS incorporated the latest socio-economic information and growth trends for Will County as developed by the Northeastern Illinois Planning Commission (NIPC) based on 2000 census data.

Traffic for the Inaugural Airport through DBO+5 was developed as a percentage of the year 2030 projected traffic volumes. The 2030 traffic volumes were reduced proportionately based on projected enplanements at the airport at DBO and DBO+5. In addition, traffic projections for 2010 and 2020 developed by IDOT for planned improvements at the existing I-57 Manhattan-Monee Road Interchange and the proposed I-57 Interchange at Stuenkel Road was considered in the development of traffic for the SSA project.

In the year 2030, CATS estimated that there will be approximately 24,000 vehicles entering and 24,000 vehicles exiting a proposed I-57 interchange for SSA from the north and 4,000 vehicles entering and 4,000 vehicles exiting the same interchange from the south on an average day. Of these 28,000 vehicles, it was projected that 50 percent (14,000) of these vehicle's destinations would be the terminal area and 50 percent (14,000) would be to the future support areas such as rental car facilities, employee parking etc. It was assumed that 10 percent of the AADT would be used for the peak hour traffic resulting in a total of 2,800 inbound vehicles and 2,800 outbound vehicles on the I-57 SSA interchange during the peak hours of the day.

The projected enplanements for DBO+5 (assumed year 2015) are between 14.5 and 21 percent of the projected enplanements for the year 2030, depending on whether the High or Low long-range enplanement forecast is used. Conservatively, 20 percent of the year 2030 traffic was selected for DBO+5 traffic. This resulted in a total of 5,600

(4,800 to/from the north and 800 to/from the south) vehicles per day entering and exiting the SSA site on an average day. For consistency purposes, 10 percent (480 to/from the north and 80 to/from the south) of the AADT was assumed during the peak hour.

IDOT also considered a "No Build" alternative for the SSA Interchange on I-57, which would utilize the existing I-57 interchanges that are located to the north and south of the proposed interchange as the access points to the SSA site. This would require traffic to use the existing Manhattan-Monee Road interchange for access to the airport from the north and the existing Wilmington-Peotone Road interchange for access to the airport from the south. Traffic could then be routed to the entrance to the airport via IL Route 50.

As previously discussed, approximately 86 percent of the traffic to the SSA is generated from north of the airport and the remaining 14 percent of the traffic is generated from south of the airport. The existing Wilmington-Peotone Road interchange has the capacity to handle the additional traffic (800 vehicles per day in 2015 and 4000 vehicles per day in 2030) associated with SSA. However, the existing Manhattan-Monee Road interchange will be near capacity levels by the year 2010. The "No Build" alternative would increase the amount of traffic on this interchange as well as the intersection of Manhattan-Monee Road at IL Route 50 by approximately 4,800 vehicles per day in 2015 and as much as 24,000 additional vehicles per day in the year 2030. Neither of these locations can operate safely or efficiently with this additional traffic.

In the 2004 estimates, the existing Manhattan-Monee Road interchange breaks down operationally during the AM and PM peak hours, specifically on the ramps that exit from and enter to the north. IDOT has plans to improve the geometry of this interchange in an effort to increase the overall capacity. Traffic for DBO (2010) was used as the basis of the improvements. IDOT's project report for the Manhattan-Monee Road interchange improvements indicates that in the year 2010 several of the ramps will operate at a Level of Service (LOS) of D and the northbound I-57 entrance ramp from Manhattan-Monee Road will operate at a LOS of E during the PM peak hour. These operational levels are based on the assumption that there will be a new interchange to the SSA site on I-57. Adding traffic to the Manhattan-Monee interchange in the event that the "No Build" alternative is selected would result in poorer LOS than is already projected and would cause increased delays at the interchange. Based on this analysis, it is likely that an interchange at I-57 is required during the IAP to accommodate the projected traffic generated by an airport operating at the SSA site.

6.5 - Projected Traffic Volumes

CATS, now CMAP, generated traffic projections for the major roadways that surround the future airport. The projections were for the year 2030 and assumed that neither a proposed extension of I-355 between I-80 and I-57 nor the IL-394/I-57 connector road would be built by 2030. This assumption along with the enplanement forecasts[66] resulted in the following future traffic volumes, also shown on **Exhibit 6-7: Estimated 2030 Annual Average Daily Traffic,** in Appendix B:

Airport Entrance Road: The projected AADT varied from 52,000 vehicles on the segment between I-57 and the eastern leg of IL-50 to 34,000 vehicles up to the future terminal building.

Interstate 57: The projected AADT on I-57 is 94,000 vehicles between the Manhattan-Monee Road interchange and the SSA Entrance Road interchange. The AADT to the south between the Airport Entrance Road interchange and the Peotone-Wilmington Road interchange is 58,000 vehicles.

IL Route 50: The projected AADT for IL Route 50 along the western boundary of the airport is approximately 26,000 vehicles per day.

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[66] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

IL Route 394: The projected AADT for IL Route 394 near the northeastern boundary of the airport is approximately 48,000 vehicles per day.

IL Route 1: The projected AADT for IL Route 1 along the eastern boundary of the airport is approximately 34,000 vehicles per day.

6.5.1 - Projected Peak Traffic

The projected peak hour traffic volume for the SSA roadway system in 2030 was estimated to be approximately 10 percent of the AADT for each roadway. This translates into approximately 1,700 vehicles on the airport entrance road at the terminal curb front during the peak hour of the average weekday.

6.6 - Public Parking

At opening day, the IAP will include a surface parking facility with expansion potential to allow the construction of a parking garage to meet the short-term and long-term parking demand and the ready pick-up/return of rental cars beyond the first five years of airport development.

Some sources[67] suggest that for planning purposes at small or non-hub airports, approximately one parking space per 500-700 enplaned passengers is required. This parking demand analysis estimates that on opening day a range of 40 to 340 parking spaces will be necessary. The demand for public parking is anticipated to increase to between 940 and 1,900 total spaces at DBO+5. It is expected that at DBO+1, passenger parking will be surface parking, which could be segregated into short-term, long-term and economy parking. If practical, the long-term and short-term parking lots should be located across from the terminal building to provide maximum convenience to airport passengers. Rental car pick-up/drop off service could initially be accommodated within a designated parking facility for the IAP.

6.7 - Employee Parking

FHWA/FAA recommends a ratio of 250-400 employee parking spaces per million annual enplaned passengers (MAP)[68]. For planning purposes the employee parking requirements were modeled based on a ratio of 400 parking spaces per MAP. This initial parking demand analysis shows that at opening day, the employee parking requirements will include between 8 and 68 spaces. Future employee-parking demand was assumed to increase proportionally to passenger activity growth. Employee parking could be accommodated initially in the vicinity of the terminal area. When the demand for public parking increases, the employee parking lot can be moved to a remote lot and free courtesy shuttles could be offered. A summary of parking requirements at SSA through the five-year planning horizon is shown in **Table 6-1: IAP Summary of Parking Requirements**.

Table 6-1 IAP Summary of Parking Requirements

Parking Facility	Low Case		Base Case		High Case	
	DBO+1	DBO+5	DBO+1	DBO+5	DBO+1	DBO+5
Public Parking[69]	40	940	250	1,420	340	1,900
Employee Parking[70]	8	190	50	280	68	390
Total	48	1,130	300	1,700	408	2,290

Source: TAMS, an Earth Tech Company, 2004.

[67] *Intermodal Ground Access – A Planning Guide*, FAA/FHWA, 1996.
[68] Ibid.
[69] Calculated at 1 space per 500 annual enplaned passengers.
[70] Calculated at 400 parking spaces per 1 million annual enplaned passengers.

6.8 - Rental Car Facility

Available rental car information from airports such as Dallas Love Field, Dayton International[71], Reno Cannon, and Ontario International Airports, indicated that depending on the type of rental car operation (independent or consolidated), the existing ratio of ready return spaces ranges from 40 to 100 ready return spaces per MAP. The total rental car area at these facilities ranges between 2.1-3.9 acres per MAP. For planning purposes, these ratios were used to project the rental car requirements at SSA through DBO+5 as shown in **Table 6-2: IAP Summary of Rental Car Facility Requirements**. However, additional market research will be required to more accurately project the rental car demand and supply at SSA.

Table 6-2 IAP Summary of Rental Car Facility Requirements

Rental Car Facility	Low Case		Base Case		High Case	
	DBO+1	DBO+5	DBO+1	DBO+5	DBO+1	DBO+5
Ready Return Spaces	1 – 2	20 – 50	5 – 13	20 – 70	7 – 17	40 – 100
Total Rental Car Area (ac)	0.1	1.0 – 1.8	0.25 – 0.5	1.5 – 2.8	0.35 – 0.7	2.0 – 3.8

Source: IDOT, 2010.

[71] *Dayton Airport - Master Plan Update Study*, 1999; *Dallas Love Field - Master Plan Update Study*, 2001.

Section 7 – Summary of IAP Facility Requirements

The facility requirements for the IAP at SSA are derived from the 2009 Forecast Report. Based on the forecasts contained in that report, the analysis in Section 2.0 of this report, and the projected air cargo fleet, which includes ADG IV aircraft, IDOT recommends that the airport be designed to ARC D-IV standards at IAP. However, separation distances for runway/taxiway and similar criteria should be designed to ARC D-VI standards to remain flexible in the future. **Table 7-1: IAP Summary of Facility Requirements - DBO+5** summarizes the major facility requirements for the Low, Base and High Case forecast scenarios for the IAP only, as discussed in the previous sections.

Table 7-1 IAP Summary of Facility Requirements - DBO+5

Facility	Low Case	Base Case	High Case
Commercial Runway including a full parallel taxiway (09/27) (ft)	9,000	9,500	10,300
Primary Runway Width (ft)	150	150	150
Primary Taxiway Width (ft)	75	75	75
Runway-Parallel Taxiway Centerline Separation (ft)	600	600	600
General Aviation/Corporate Runway	5,000	5,000	5,000
Airport Traffic Control Tower	Yes	Yes	Yes
Precision Instrument Landing System (ILS)[72]	CAT I	CAT I	CAT I
Passenger Aircraft Gates – Regional Jets	1	2	3
Passenger Aircraft Gates – Narrowbody Jets	3	4	5
Passenger Terminal (sf)	120,000	164,000	218,000
Passenger Terminal Curb Frontage (lf)	270	400	525
Cargo Aircraft Positions	2	4	7
Air Cargo Area (sf)[73]	80,000	300,000	600,000
General Aviation/Corporate Aviation Aircraft Positions	95	104	112
General Aviation/Corporate Aviation Aircraft Area (sf)[74]	52,000	57,000	62,000
Jet Fuel Storage (gallons)	210,000	500,000	600,000
100LL Fuel Storage (gallons)[75]	1,700	1,800	1,900
Water Supply (gallons)	31,000	47,000	63,000
Sanitary Wastewater Treatment (gallons)	26,000	40,000	54,000
Interchange with I-57	Yes	Yes	Yes
Public Parking Spaces	940	1,400	1,900
Employee Parking Spaces	190	280	390
Rental Car Area (sf)	78,000	122,000	165,000

Source: TAMS, an Earth Tech Company, 2004 and IDOT 2010.

[72] Initially on Runway 27, eventually on both ends of Runway 09/27.
[73] Includes warehouse, airside apron, truck docks, and parking.
[74] Includes aircraft parking areas, apron area, hangars, tie down areas and public parking.
[75] 100LL Avgas is a 100-octane fuel for GA aircraft.

Section 8 – Ultimate Airport Facility Requirements (Beyond DBO+20)

8.1 - Introduction

This section addresses potential facility requirement needs for the period beyond DBO+20. It is a contingency exercise to preserve the vision of IDOT for development of an additional high capacity airport to serve the Chicago region in the 21st Century. Starting with the *Chicago Airport Capacity Study* in 1988, it has always been recognized that a new supplemental airport should have the potential to become a major airport.[76] The following briefly documents the events leading to the current position of IDOT regarding the long range future of SSA.

In 2002, the FAA issued a ROD for the Tier 1-EIS on site approval and land acquisition by the State of Illinois for the proposed SSA in eastern Will County. The ROD stated, "These actions are necessary to preserve the option of developing a potential, future air carrier airport to serve the greater Chicago region as determined necessary and appropriate to meet future aviation capacity needs in the region[77]." IDOT Aeronautics, whose responsibilities include planning for the future transportation needs of the citizens of Illinois, is preserving the option of constructing an airport capable of handling up to four simultaneous precision instrument approaches under All-Weather conditions, as originally described and evaluated in the Tier 1-EIS. The need for an airport capable of handling four simultaneous precision instrument approaches in All-Weather conditions may or may not materialize at SSA in the future. However, considering the expense and time it takes to expand existing airports that are surrounded by urban and suburban development, (i.e., Lambert-St. Louis International Airport (STL), Hartsfield-Jackson Atlanta International Airport (ATL), Minneapolis-St. Paul International Airport (MSP), BOS), IDOT Aeronautics considers it prudent to preserve this option for an ultimate airport configuration, if demand and market conditions in the future warrant expansion.

This IDOT Aeronautics' policy follows the recommendations of an FAA sponsored study on planning multi-airport systems[78] developed more than a decade ago. The study focused on when and under what circumstances it is desirable to invest in a supplemental airport in a metropolitan area. It examined multi-airport systems worldwide, the state of the airline industry at the time, the viability of new airports in a multi-airport system, the distribution of traffic between airports in a multi-airport system, and the effects of hubbing. The report stated that aviation traffic is highly variable due to its sensitivity to a broad range of unpredictable innovations that alter the cost, and thus the attractiveness, of aviation traffic, and defines aviation traffic as a commodity whose demand is derived from, and thus especially sensitive to, changing economic conditions.[79] IDOT Aeronautics considers this statement to still be valid today.

The FAA sponsored study concluded that:

> "The development of second airports to serve a metropolitan region must, to be effective, be part of a long-term strategy of dealing with the uncertainties of future aviation traffic, especially as it regards hubbing operations. Because of these risks, the most reasonable strategy may be to expand at primary hub airports while simultaneously establishing the option of developing secondary airports to serve some of the traffic origination from the region[80]."

In June 2004, the FAA released a report entitled *Capacity Needs in the National Airspace System, An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*. This study examined 291

[76] *Chicago Airport Capacity Study*, prepared for the Illinois Department of Transportation, Indiana Department of Transportation and Wisconsin Department of Transportation, Peat Marwick Main & Co., 1988.
[77] *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, Great Lakes Region, July 2002.
[78] *Planning Multi-Airport Systems in Metropolitan Regions in the 1990s*, prepared for the FAA by Dr. Richard de Neufville, Massachusetts Institute of Technology, April 12, 2000.
[79] Ibid.
[80] *Planning Multi-Airport Systems in Metropolitan Regions in the 1990s*, prepared for the FAA by Dr. Richard de Neufville, Massachusetts Institute of Technology, April 12, 2000.

commercial service airports in 223 metropolitan areas across the U.S., to determine if the long-term capacity of the aviation system matched forecasts of demand. The methodology employed in the study included modeling current and future capacity, modeling future airport demand, and estimating future performance in terms of Annual Service Volume (ASV) and delay[81]. Each airport and metropolitan area was evaluated for capacity needs in 2003 (baseline), 2013 and 2020. The study identified five airports, including ORD, where additional capacity was already needed in 2003. Furthermore, the FAA anticipated that ORD and the Chicago region will need additional capacity by 2013, although the analysis for 2013 did not include the proposed improvements contained in the O'Hare Modernization Program (OMP).

As part of the several forecasts developed for the SSA, noted in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program* and inherent in the 2009 Forecast Report, forecasts of aviation activity incorporate consideration of varying levels of risk analysis through the identification of factors that would result in exceeding the base forecast demand (high scenario) or factors that would result in not achieving the base forecast demand (low scenario). Forecasts for SSA developed in the mid-1990s indicated that future demand for air travel in the Chicago region would require substantial additional airfield infrastructure, anywhere from four to six runways within the next 30 years. These forecasts originally assumed that ORD would not be expanded. With the creation of OMP in 2001, a portion of this additional projected demand could be accommodated at ORD. IDOT Aeronautics supports the planned improvements at ORD. However, there is still uncertainty about the timing and extent of improvements that will be made at ORD and the other existing Chicago area airports. Because of this uncertainty and the essential requirement that the Chicago region maintain its ability to accommodate air activity in the highly competitive world market place, IDOT Aeronautics believes it is prudent to continue to preserve the option of developing additional airfield capacity at SSA.

The ultimate airport footprint, delineated by IDOT Aeronautics in the Phase 1 Engineering Study[82] and in the FAA's Tier 1-EIS, identified an airport boundary encompassing approximately 24,000 acres for a potential new air carrier airport in eastern Will County, Illinois. The land requirements for the site were based on the area required for proposed airport facilities, support/ancillary facilities, surface transportation facilities and environmental mitigation, but were primarily determined by the proposed ultimate runway configuration for the airport.

Previous sections of this report have identified facilities required at SSA to meet the aeronautical forecasts detailed in the draft Projections of Aeronautical Activity for the IAP[83] and through DBO+20. Because no forecasts beyond DBO+20 can currently be developed with any level of confidence, estimates of the potential level of activity and associated facility requirements for the ultimate development of SSA in this document are entirely based on the assumptions used in the Phase 1 Engineering Study[84] and FAA's Tier 1-EIS[85].

8.2 - Ultimate Airport Classification

The ARC for the ultimate airport will depend on the actual fleet mix utilizing SSA in the future. As stated in Section 2.2 – Proposed Fleet Mix, the largest passenger aircraft anticipated to serve SSA through DBO+20 is the A350-900F or the B-788-900F, ADG D-V. Consistent with previous planning in the Phase I Engineering Report, the ultimate airport classification is an ADG VI aircraft which is now known to be represented by the Airbus A380.

The current commercial aircraft with the fastest approach speeds are included in Category D, which includes approach speeds from 141 knots to just less than 166 knots. The maximum approach speed of the A380 is

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[81] *Capacity Needs in the National Airspace System: An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*, Federal Aviation Administration and the MITRE Corporation's Center for Advanced Aviation System Development, June 2004.

[82] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

[83] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.

[84] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

[85] *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, Great Lakes Region, July 2002.

approximately 152 knots[86], which will also put it into Category D. IDOT Aeronautics is not aware of any future commercial aircraft that anticipates having approach speeds greater than 166 knots. Thus, in order to accommodate the most demanding aircraft anticipated to be in the fleet beyond DBO+20, the ultimate plan for SSA should allow for an ARC of D-VI.

8.3 - Ultimate Airfield Demand/Capacity Analysis

As stated in Section 8.1, the ultimate airfield is being planned to accommodate up to four simultaneous precision instrument approaches under All-Weather conditions. This section discusses the aircraft operation activity levels required to occur at SSA before additional runways beyond the Intermediate phase are planned, designed and constructed.

The FAA capacity calculations contained in AC 150/5060-5, Change 2[87] established 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 ft (two parallel runways) or 5,000 ft (more than two parallel runways)[88] in order to serve simultaneous arriving aircraft during CAT III weather conditions[89]. To estimate the hourly capacity of various runway configurations and the annual service volume (ASV) for long-range planning at SSA, the typical diagrams presented in the FAA AC 150/5060-5, Change 2 were used. This FAA Advisory Circular does not discuss the capacity of three or four independent parallel runways; thus, the hourly capacity of runway systems with more than two independent parallel runways is an extrapolation by IDOT of the data contained in the Circular.

The long held rule-of-thumb ratio for planning purposes relative to annual demand to ASV was used in estimating the need for additional runway capacity. FAA Order 5090.3C[90] states that capacity development should be recommended when activity levels approach 60 to 75 percent of annual capacity. When the ratio of annual demand to ASV is greater than or equal to 0.8, it is an indication that an airport may need additional capacity[91] in place. These ratios has been applied to the theoretical capacity of the various airfield configurations discussed below, in order to identify approximate operational levels when planning for additional runways should occur.

8.3.1 - Two Parallel Runway Airfield Capacity Analysis

The inaugural runway was oriented in an east-west configuration (09-27), as discussed in **Section 3.1** FAA Order 5090.3C recommends that new runways should preferably be parallel to the primary runway and that they should be the same length and strength, if they are serving the same aircraft. To achieve maximum airfield capacity, the second runway should be planned for simultaneous independent departures.[92] Thus, it is recommended that any additional air carrier runways at SSA also be oriented in the same direction, parallel to the inaugural primary runway proposed for construction during the IAP.

A second runway should be planned when operations reach an annual level of 126,000 and constructed by the time SSA reaches 80 percent of the ASV capacity (i.e., 168,000 annual operations). FAA Advisory Circular 150/5060-5, Change 2, indicates that two independent parallel runways can accommodate between 315,000 to 370,000 annual operations, depending on the mix of aircraft present at an airport.

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[86] *A380 Airplane Characteristics for Airport Planning AC, Preliminary Issue*, Airbus S.A.S., January 2004.
[87] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[88] Precision Instrument Approaches require electronic navigational aids and monitoring equipment, air traffic control, and approach procedures. Any reduction of separation of 5,000 feet for simultaneous operations requires special high update radar, monitoring, and other equipment, FAA Advisory Circular 5300/13, Incorporates Changes 1-15, Paragraph 208 (a) (1) and Paragraph 208 (a) (3).
[89] ILS CAT III provide for IFR approaches when ceiling is 100 ft or less and runway visual range of 700 ft or less.
[90] FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 2000.
[91] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[92] FAA Order 5390.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 2000.

Table 8-1: Capacity of Two Parallel Runway Airfield summarizes the capacity of different configurations of a two parallel runway airfield. The mix index, VFR and IFR conditions and the calculation of ASV are explained in Section 3.2.

Table 8-1: Capacity of Two Parallel Runway Airfield

Runway Configuration	Mix Index (%)	VFR (ops/hr.)	IFR (ops/hr.)	ASV (ops/yr.)
Independent (4,300' or greater separation)	81 - 120	111	105	315,000
	121 – 180	103	99	370,000
Dependent (700' to 2,499' or greater separation)	81 - 120	105	59	315,000
	121 - 180	94	60	340,000
Dependent (2,499' to 4,299' or greater separation)	81 - 120	111	70	300,000
	121 – 180	103	75	365,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.

8.3.2 - Three Parallel Runway Airfield Capacity Analysis

A ratio of annual demand to ASV of 0.8 or higher is an indication that an airport may need additional capacity and planning for additional capacity should begin when activity reaches 60 to 75 percent of annual capacity. Thus, planning for a third runway at SSA should start when operational levels reach a level of 189,000 to 222,000 annual operations. A third parallel independent runway would increase the SSA airfield capacity to approximately 740,000 annual operations per IDOT's estimate. The capacity range of different three parallel runway airfield configurations is presented in **Table 8-2: Capacity of Three Parallel Runway Airfield**.

Table 8-2: Capacity of Three Parallel Runway Airfield

Runway Configuration	Mix Index (%)	VFR (ops/hr.)	IFR (ops/hr.)	ASV (ops/yr.)
Three Independent[93] (5,000' or greater separation)	121 – 180	206	198	740,000
Two Independent (4,300' or greater separation) One Dependent (700' to 2,499' separation)	121 – 180	146	120	645,000
Three Dependent (700' to 2,499' or 2,500' to 4,299' greater separation)	121 – 180	146	75	385,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995. TAMS, an Earth Tech Company, 2004.

8.3.3 - Four Parallel Runway Airfield Capacity Analysis

Planning for a fourth runway at SSA should start when operational levels reach a level of 444,000 annual operations, or 60 percent of the annual capacity. IDOT estimates that a fourth independent parallel runway would increase the SSA airfield capacity to approximately 1.1 to 1.3 million annual operations. The range of capacity for different four parallel runway airfield configurations is presented in **Table 8-3: Capacity of Four Parallel Runway Airfield**.

Table 8-3: Capacity of Four Parallel Runway Airfield

Runway Configuration	Mix Index (%)	VFR (ops/hr.)	IFR (ops/hr.)	ASV (ops/yr.)
Four Independent (5,000' or greater separation)	121 – 180	222-270	210-225	1,100,000-1,300,000
Two Independent (4,300' or greater separation) Two Dependent (700' to 2,499' separation)	121 – 180	243-265	212-219	1,050,000-1,200,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995. TAMS, an Earth Tech Company, 2004.

93 Estimated.

8.3.4 - Six Parallel Runway Airfield Capacity Analysis

The ultimate airfield development phase anticipates that SSA could expand to a six-runway airfield consisting of four independent and two dependent parallel runways. The projected runway capacity of the ultimate airfield is shown in **Table 8-4: Capacity of Six Parallel Runway Airfield.**

Table 8-4: Capacity of Six Parallel Runway Airfield

Runway Configuration	Mix Index (%)	VFR (ops/hr.)	IFR (ops/hr.)	ASV (ops/yr.)
Four Independent (5,000' or greater separation) Two Dependent (700' to 2,499' separation)	121 – 180	292	240	1,460,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995. TAMS, an Earth Tech Company, 2004.

8.4 - Ultimate Airfield Facility Requirements

8.4.1 - Runway Orientation and Configuration

To obtain quadruple simultaneous precision instrument approaches, the runway system needs to consist of parallel runways with a minimum separation of 5,000 ft between runways. FAA AC 150/5300-13, *Airport Design*, states that multiple parallel runways need at least 5,000 ft separation to operate independently in Category III visibility conditions. In addition to these four parallel runways, two dependent runways for departures during VFR conditions could be added between the northern and southern pair of independent runways.

8.4.2 - Proposed Ultimate Airspace Classification

Any additional runways and operations will need to undergo airspace analysis at the appropriate time, to ensure that they do not adversely impact other airport operations in the area. In addition, if the level of operations reaches 300,000, of which at least 50 percent are air carrier operations, the Airspace Classification for SSA would need to be evaluated to determine if it should be upgraded from Class C to Class B. FAA Order 7400.2E, Procedures for Handling Airspace Matters[94] establishes the following criteria for considering an airport as a candidate for a Class B airspace designation:

- The primary airport serves at least 5.0 million passengers enplaned annually; or
- The primary airport has a total airport operations count of 300,000 (of which at least 240,000 are air carriers and air taxi); and,
- The Class B designation will contribute to the efficiency and safety of operations, and is necessary to correct a current situation or problem that cannot be solved without a Class B designation.

Exhibit 8-1: Potential Class B Airspace Structure at SSA, in Appendix B, illustrates one way a Class B Airspace structure could be developed for SSA, in conjunction with the existing ORD and MDW airspace. In addition, an east-west VFR flyway could remain between MDW and SSA airspace for GA operations below 3,600 ft. However, the feasibility of any ultimate airspace structure for SSA would depend on ATC procedures and operations within the Chicago airspace and would need to be determined by FAA at the appropriate time.

8.4.3 - Airfield Requirements

The airfield requirements for the ultimate airport will be based on design criteria for ARC D-VI, as stated in Section 8.2. The two most demanding aircraft expected to be operating beyond DBO+20 are the Boeing 747-400 and the Airbus 380. Under maximum takeoff weight, with a stage length of 6,500 nautical miles, ambient

[94] FAA Order 7400.2E, Procedures for Handling Airspace Matters, includes Change 1, effective March 12, 2009; Change 2, effective August 27, 2009; and Change 3, effective April 8, 2010, Section 2-Class B Airspace Standards, 15-2-1 Criteria.

temperature of 90ºF, and an airport elevation of 780 ft, the Boeing 747-400 requires a runway length of 12,000 ft[95]. This is approximately the distance to two of the primary air cargo markets that SSA could potentially serve, i.e., Dubai International Airport (DXB) and Shanghai Pudong International Airport (PVG).[96] Under standard conditions, the Airbus 380 requires a runway length of approximately 10,000 ft[97]. Thus, the ultimate airport runway configuration should provide for the possibility of two 12,000-ft runways, one on either side of the terminal area, while the other runways would be a maximum of 10,000 ft in length.

Table 8-5: Summary of Runway Planning Requirements – Ultimate Airport lists runway and taxiway facility dimensions that comply with ARC D-VI design criteria.

Table 8-5: Summary of Runway Planning Requirements – Ultimate Airport

Facility	Airplane Design Group IV Dimensions (ft)
Runway Width	200
Runway Length	10,000-12,000
Runway Protection Zone Length (CAT III)	2,500
Runway Protection Zone Inner Width (CAT III)	1,000
Runway Protection Zone Outer Width (CAT III)	1,750
Runway Safety Area Width	500
Runway Safety Area (RSA) Length beyond Runway End	1,000
Runway Object Free Area (OFA) Width	800
Runway Object Free Area Length beyond Runway End	1,000
Runway Precision Object Free Zone (POFZ) Width	800
Runway Precision Object Free Zone (POFZ) Length	600
Runway Shoulder Width	60
Parallel Runway to Parallel Taxiway Centerline Separation	600[98]
Taxiway Width	100
Taxiway Shoulder Width	40
Taxiway Object Free Area Width	386
Taxiway Safety Area Width	262
Taxiway Centerline to Parallel Taxiway Centerline	324

Source: FAA Advisory Circular 150/5300-13, Incorporates through Change 15, December 31, 2009.

To enhance runway capacity, all air carrier runways could also have perimeter taxiways. Requiring aircraft to stop before taxiing across active runways results in major delays at high activity airports and also increases the chances for runway incursions. Routing and directing aircraft along taxiway routes that cross active runways is a major contributor to ground traffic controller workload. For these reasons, it is recommended that space be preserved for the potential long term development of perimeter taxiways that would allow aircraft to taxi around active runways. However, it should be noted that, to date, few airports in the U.S. have perimeter runways due to the additional taxiing costs that they cause and no airport has the length of perimeters proposed by SSA.[99]

[95] *747-400, Airplane Characteristics for Airport Planning,* Boeing Commercial Airplanes, December 2002.
[96] See also Section 3.3.2: Runway Length, Table 3-11 Primary Air Cargo Markets for Proposed SSA Service.
[97] *A380, Airplane Characteristics for Airport Planning AC, Preliminary Issue,* Airbus S.A.S., January 2004.
[98] SFO Proposed Modifications for A380 Runway, BaljitBoparaiSFO.pdf, requested 500 feet as a Modification to Standard for SFO. This table reflects current ADG Group VI standards recognizing that there are ongoing discussions at various airports throughout the U.S. regarding changes to some of these standards, for example runway and shoulder width requirements for the A380 that may be incorporated into future revisions of AC 150/5300-13.
[99] Interview with Carlos Ortiz, Planning Manager, Houston Airport System, October 28, 2010. The Houston Airport System is preparing a preliminary engineering report of four potential runway alternatives as part of an ongoing Environmental Impact Statement. There are two options for consideration of future Runway 09R-27L, a runway with quadruple simultaneous approach capability, one with a 5,000-foot separation and one with a 7,000-foot separation. While the master plan called for perimeter taxiways, due to cost considerations for both alternatives, the preliminary engineering report is only considering connection with Runway 09L-27R (existing Runway 9-27) via a mid-runway north/south dual parallel taxiway connection between full parallel taxiways to runways.

If constructed, perimeter taxiways would need to be designed and located so that all aircraft using them would remain outside of all runway safety areas, object free areas and TERPS surfaces. When perimeter taxiways cross the extended centerlines of runways, aircraft approaching or departing those runways must be able to clear other aircraft taxiing on the perimeter taxiways. The standard precision instrument approach slope is 50:1 for 50,000 ft from the runway end. The standard departure slope is 34:1. The maximum tail height of the A380 is 79 ft. To provide clearance for approaches over aircraft with this tail height assuming the runway and taxiway elevations are the same, the perimeter taxiway centerline must be at least 4,200 ft from the end of the runway. If a runway is used solely for departures, this distance may be reduced to 2,920 ft. These distances would be even greater if the airport were to consider One Engine Inoperative Surfaces (OEI) (See **Appendix D: Airport Imaginary Surfaces Established by Height Regulations**).

8.4.4 - Airport NAVAIDS

To minimize flight delays and cancellations, larger commercial service airports use Category III (CAT III) precision instrument approach systems. The ultimate airfield should be designed so that all parallel air carrier runways used for landings could have CAT III precision instrument approach systems, or their equivalent. All CAT III runway approaches would include the navigation aids and lighting equipment identified in **Table 8-6: Summary of Runway NAVAIDS & Other Facilities – Ultimate Airport**. Anticipated terminal navigational aids are listed in **Table 8-7: Summary of Airport NAVAIDS & Other Facilities – Ultimate Airport.**

Table 8-6: Summary of Runway NAVAIDS & Other Facilities – Ultimate Airport

NAVAID	Equipment Function Description
Instrument Landing System Category III Glide Slope Localizer Inner and Outer Marker Required for Category III	Provides instrument guidance during weather conditions when visibilities are less than ½ mile or ceiling is less than 100 ft. Provides vertical guidance. Provides horizontal guidance. Marks specific points along the approach path.
Runway Visual Range (RVR) Instrumentation (Touchdown, Midpoint and Rollout) Required for CAT III.	Measures visibility along specific stretches of the runway.
Precision Runway Monitors (PRM)	Enhances precision of horizontal guidance, may eventually support straight-out departures.
Surface Movement Guidance Control System	A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions.
Precision Approach Indicator Path (PAPI)	Provides visual approach slope guidance.
Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)	Provides visual guidance on final approach during night and low visibility conditions.
High Intensity Runway Edge Lights (HIRL)	Defines runway edges and length necessary for precision instrument approaches.
Touchdown Zone Lights	Defines aircraft touchdown zone, required for CAT III
Wind Cones	Provides visual wind direction and velocity.
High Intensity Approach Lights with Sequenced Flashers (ALSF-2)	Provide additional visual guidance on final approach in low visibility conditions and t night.
Medium Intensity Taxiway Edge Lights (MITL)	Defines taxiway edges and length.
Taxiway Centerline Lights	Defines taxiway alignment: they provide better guidance to pilots than edge lights

Source: IDOT, 2010.

Table 8-7: Summary of Airport NAVAIDS & Other Facilities – Ultimate Airport	
NAVAID	**Equipment Function Description**
ATCT – Airport Traffic Control Tower	Controls flight operations within the airport's designated airspace
Rotating Beacon	Indicates location of an airport
TVOR-DME – Terminal Very High frequency Omnirange Distance Measuring Equipment	Emits VFR azimuth data over 360 degrees for non-precision instrument approach procedures; DME signals provide distance to the airport
Non-Directional Beacon	Provides directional guidance to be used as on aid to final non-precision approaches.
LLWAS – Low Level Wind Shear Alert	An automated system to detect hazardous wind shear events and provide warnings to air traffic controllers
AWOS – Automated Weather Observation System	Recording instruments that measure cloud height, visibility, wind speed, temperature, dew point, etc.
ASR – Airport Surveillance Radar	Provide air traffic controllers information regarding the location of an aircraft within 60 nautical miles of the airport.
SSR – Secondary Surveillance Radar	In combination with an ASR, or by itself, identifies air traffic within a specific airspace.
ASDE – Airport Surface Detection Equipment	Enhance visual observation of surface traffic during low visibility

Source: TAMS, an Earth Tech Company, 2004.

8.5 - Ultimate Passenger Terminal Facility Requirements

8.5.1 - Aircraft Gate Requirements

The Phase 1 Engineering Study identified a potential passenger terminal complex consisting of 120 gates, 80 for domestic operations and 40 for international operations[100]. The number and types of gate modules will be determined at an appropriate future time, as necessary.

8.5.2 - Aircraft Apron Requirements

The aircraft apron requirements are based on a theoretical mix of aircraft and aircraft gates required during peak periods. The assumptions used for the ultimate aircraft apron requirements are listed in **Table 8-8: IAP Peak Aircraft and Gate Front Requirements**.

Table 8-8: Peak Aircraft and Gate Front Requirements – Ultimate Airport					
FAA Aircraft Design Group	**Maximum Wingspan (ft)**	**Wingtip Clearance (ft)**	**Gate Front (ft)**	**Number of Aircraft**	**Total Front (ft)**
Domestic					
III(A)	89	25	114	9	1,026
III(B)	118	25	143	42	6,006
IV	171	33	204	20	4,080
V	214	33	247	2	494
VI	262	33	295	1	295
Total Domestic				**74**	**11,901**

[100] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

Table 8-8: Peak Aircraft and Gate Front Requirements – Ultimate Airport

International					
IV	171	33	204	21	4,284
V	214	33	247	16	3,952
VI	262	33	295	3	885
Total International				40	9,121
Grand Total				11,901	21,022

Source: *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

8.5.3 - Passenger Terminal Functional Area Requirements

Estimates of gross ultimate passenger terminal functional area requirements were made during the Phase 1 Engineering Study. It was estimated that the main passenger terminal might require approximately 1.8 million square ft, domestic satellites 1.2 million square ft and an international satellite 550,000 square ft for a grand total of 3.5 million square ft[101]. The ultimate passenger terminal should include appropriate space for the functional areas discussed in Sections 4.4 and 8.5.4.

8.5.4 - Terminal Curb Front Requirements

Terminal curb front requirements were determined during the Phase 1 Engineering Study based on the estimates used to calculate peak gate requirements and peak hour passenger levels[102]. It was estimated that the ultimate terminal departures curb front would need approximately 1,500 linear ft and the ultimate terminal arrivals curb front would need approximately 2,300 linear ft.

8.6 - Ultimate Support/Ancillary Facility Requirements

8.6.1 - Air Cargo Facility Requirements

An "order of magnitude" estimate of cargo operations that could ultimately occur at SSA was calculated as part of the Phase 1 Engineering Study. It was estimated that approximately 17,600 annual all-cargo operations could occur if demand required. Based on this level of operations, the total tonnage shipped (both as belly cargo and in dedicated freight aircraft) was estimated at 931,200 tons and the total space requirements for handling that tonnage was estimated to be approximately 910,000 square ft.[103]

Air cargo could be accommodated in the central area core, thus giving cargo and passenger aircraft comparable access to the runway system. There would also be large tracts of land around the periphery of the airport available to accommodate a large cargo operation such as an air freight hub if demand warranted.

8.6.2 - General Aviation Facility Requirements

A general aviation facility could be located in the central core or to one side of the airfield, to accommodate any type of general aviation activity. If supported by demand, the complex could include a full service fixed base operation. Hangar storage could also be accommodated.

8.6.3 - Aircraft Rescue and Fire Fighting Facilities

Based on the ARFF operational requirements and response time established by FAR Par 139, Certification and Operations: Land Airports Serving Certain Air Carriers, the airport would need at least two, and potentially

[101] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.
[102] Ibid.
[103] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

five, ARFF stations in order to meet the emergency response time requirements, as discussed in Section 5.3. The ultimate number and location of ARFF facilities would be determined in the future, as warranted.

8.6.4 - Fuel Storage Facility

The fuel storage facilities would have aboveground tanks with state-of-the-art cooling systems designed to provide a separate, sterile environment. On-airport underground fuel lines would have proper protection and monitoring to avoid any leakage and would provide fuel to the passenger and cargo terminal areas. The fuel farm would provide fuel storage for at least seven days of demand.

8.6.5 - Aircraft and Airfield Pavement Deicing Facilities

As the airport expands, appropriate deicing facilities including provisions for a treatment and recycling system will be provided.

8.6.6 - Airfield Maintenance Center Facilities

The ultimate size and location of airfield maintenance center facilities will be determined at the appropriate time in the future, as the airfield expands. Sufficient space exists within the central core area or in the northern and southern airfield for these facilities.

8.6.7 - Airport Utilities

Utilities would include electrical, heating, air conditioning, telephone, gasoline or natural gas (or both), water and wastewater. Power supply stations, emergency power plants, a wastewater treatment plant and a central plant capable of distributing heating and air conditioning to all airport facilities could be provided and sized according to demand.

8.6.8 - Service Roads and Security Access

A secure airside service roadway system, linking all AOA's, should be provided. The proposed alignment should strive to minimize the crossing of active airside facilities. An apron service road should be included to facilitate the access to parked aircraft. Access to the AOA will be restricted, and entrance will be only allowed at certain locked or continuously manned gates. State-of-the-art technologies could be implemented to regulate the access to the AOA and secure areas of the airport. The access will follow the guidelines defined in the Code of Federal Regulations – Part 1542, *Airport Security*, of U.S. TSA, which has replaced Federal Aviation Regulation Part 107, *Airport Security*.

8.7 - Ultimate Ground Transportation Facilities

8.7.1 - Future Roadway and Rail Improvements

As the region around SSA grows in population, households and employment, the regional roadway and rail network will also expand. Since current transportation planning for the area only goes out to 2040 (discussed in **Section 6.2**), it is difficult to predict what other roadway and rail improvements will occur beyond this timeframe. The ultimate airport should have provisions for both western and eastern access to the airport, as well as a transit system, whether by road, rail or people mover, to move passengers from one side of the airport to the other.

8.7.2 - Projected Traffic Volumes

CMAP[104] generated traffic volumes for an ultimate SSA during the Phase 1 Engineering Study. These traffic volume estimates assumed that an off-airport east-west connector road would exist to move traffic from one side of the airport to the other and allow traffic to enter the airport from two locations.

Airport Entrance Road: The projected AADT along the airport entrance road to I-57 is 63,200.

Interstate 57: The projected AADT on I-57 is 149,800 vehicles between the Manhattan-Monee Road interchange and the SSA entrance road interchange. The AADT to the south between the Airport entrance road interchange and the Peotone-Wilmington Road interchange is approximately 152,000 vehicles.

IL Route 50: The projected AADT for IL Route 50 along the western boundary of the airport is approximately 52,000 vehicles per day.

IL Route 394: The projected AADT for IL Route 394 near the northeastern boundary of the airport is approximately 160,000 vehicles per day.

IL Route 1: The projected AADT for IL Route 1 along the eastern boundary of the airport is approximately 86,000 vehicles per day.

8.7.3 - Parking Requirements

Estimated parking requirements for the ultimate airport will depend on the type of activity that develops at SSA in the future. The Phase 1 Engineering Study estimated that the ultimate airport could have substantial parking needs, as illustrated in **Table 8-9: Summary of Parking Requirements – Ultimate Airport**.

Table 8-9: Summary of Parking Requirements – Ultimate Airport

Facility	Number of Spaces
Short-Term Parking	7,800
Long-Term Parking	9,600
Employee Parking	11,000
Rental Car Parking	17,100
Total Parking	45,500

Source: *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

8.8 - Summary of Ultimate Airport Facility Requirements

It is anticipated that SSA could be developed to provide maximum long-term capacity by providing quadruple simultaneous precision instrument approaches. The ultimate airport could have six parallel runways in an east-west orientation. The distance between the four independent runways should be a minimum 5,000 ft. A dependent (departure only) runway could be centered between each quad runway pair (2,500 ft from the centerline of each of the quad runways).

The previous sections of the Facility Requirements report have identified facilities required at SSA to meet the aeronautical forecasts detailed in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*[105]. Because no forecasts beyond DBO+20 can be developed with any level of confidence, estimates of the potential level of activity and associated facility requirements for the ultimate development of SSA are entirely based on the

[104] Then called the Chicago Area Transportation Study (CATS).

[105] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.

assumptions used in the Phase 1 Engineering Study[106] and FAA's Tier 1-EIS[107]. **Table 8-10: Summary of Facility Requirements-Ultimate Airport** presents the possible facility requirements for this planning horizon.

Table 8-10 Summary of Facility Requirements –Ultimate Airport

Facility	Unit
Number of Parallel Runways	6
First Runway (9-27) Lengths (ft)	10,000
Additional Runway Lengths (ft)	10,000 and 12,000
Runway Width (ft)	200
Taxiway Width (ft)	100
Runway-Parallel Taxiway Centerline Separation (ft)	600
Airport Traffic Control Tower (ATCT)	Yes
Instrument Landing System (ILS)	CAT III
Passenger Aircraft Gates – Domestic Gates	80
Passenger Aircraft Gates – International Gates	40
Passenger Terminal (sf)	3,500,000
Passenger Terminal Curb Front (ft)	3,800
Air Cargo Area[108] (ac)	Demand Driven
General Aviation/Corporate Aviation Area[109] (sf)	Demand Driven
Public Parking Spaces	17,400
Employee Parking Spaces	11,000
Rental Car Area Spaces	17,100

Source: TAMS, an Earth Tech Company (2004); IDOT, 2010.

[106] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.
[107] *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, Great Lakes Region, July 2002.
[108] Includes warehouse, airside apron, truck docks, and parking.
[109] Includes aircraft parking areas, apron area, hangars, tie down areas and public parking.

Appendix A: Acronyms

Definition of Terms

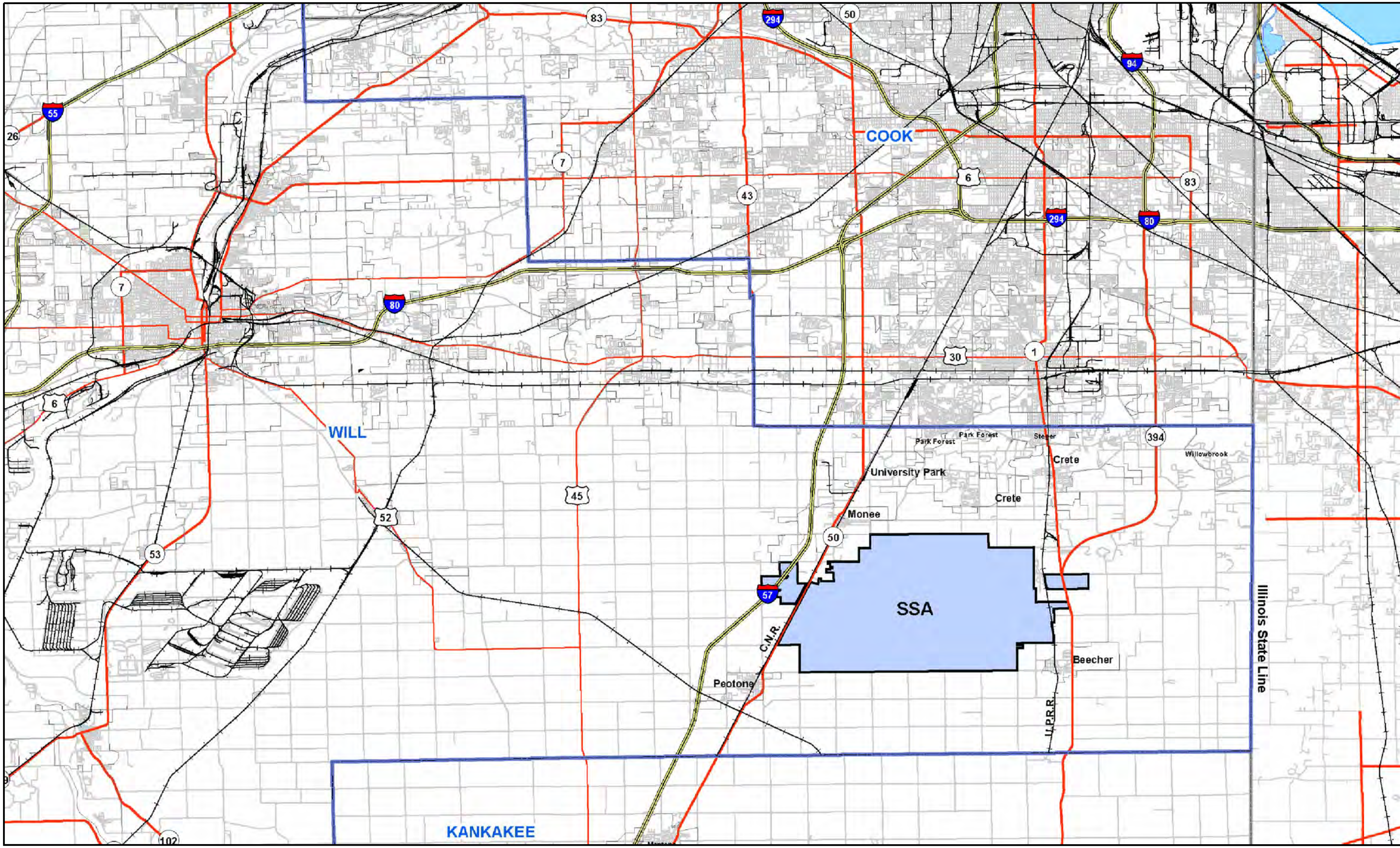
AADT	Annual Average Daily Traffic
ASDE	Airport Surveillance Detection System
ADA	American with Disabilities Act
ADG	Airplane Design Group
AFFF	Aqueous Film Forming Foam
AJR	Access justification Report
ALNAC	Abraham Lincoln National Airport Commission
ALSF-2	Approach Lighting System with sequencing flashing lights
AMC	Airport Maintenance Center
AOA	Air Operations Area
ARC	Airplane Reference Code
ARFF	Aircraft Rescue and Fire Fighting
ASDE	Airport Surveillance Detection System
ASR	Airport Surveillance Radar
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATL	Hartsfield-Jackson Atlanta International Airport
ATSA	Aviation and Transportation Security Act
ATO	Airport Ticket Office
AWOS	Automated Weather Observation System
BOS	General Edward Lawrence Logan International Airport
BWI	Baltimore/Washington International Thurgood Marshall Airport
CAT I	Category I
CAT III	Category III
CATS	Chicago Area Transportation Study
CBIS	Checked Baggage Inspection Systems
CBP	Customs and Border Patrol
CNS/ ATM	Communication Navigation Surveillance/ Air Traffic Management
DAY	Dayton International Airport
DBO	Date of Beneficial Occupancy
DNL	Day/ Night Noise level
DOT	US Dept of Transportation
DSL	Digital Subscriber Line
DXB	Dubai international Airport
EIS	Environmental Impact Statement
EDS	Explosive Detection Systems
EQA	Equivalent Aircraft
ESS	Electrical Substation

ETD	Explosive Track Detection
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FANS	Future Air Navigation System
FBO	Fixed Based Operations
FHWA	Federal Highway Administration
FIDS	Flight Information Display System
FIS	Federal Inspection Services
FTTB	Fiber To The Business
GA	General Aviation
GAMA	General Aviation Manufacturers Association
GBAS	Ground Based Augmentation System
GPS	Global Positioning System
GSE	Ground Service Equipment
HIRL	High Intensity Runway Edge Lights
HITL	High Intensity Taxiway Edge Lights
HVAC	Heating, Ventilating, and Air Conditioning
IAP	Inaugural Airport Program
IATA	International Air Transportation Association
IATA Manual	International Air Transportation Manual
IDOT	Illinois Department of Transportation
IDOT Aeronautics	Illinois Department of Transportation, Division of Aeronautics
IFR	Instrument Flight Rules
IP	Internet Provider
IPTV	internet protocol television
I-IRAP	Illinois-Indiana Regional Airport Program
IGQ	Lansing Municipal Airport
IKK	Greater Kankakee Airport
ILS	Instrument Landing Systems
JOT	Joliet Regional Airport
kva	kilovolt-amperes
LAN	Local Area Network
LLWAS	Low Level Wind Shear Alert
LOS	Level of Service
LOT	Lewis University Airport
MALSR	Medium Intensity Approach Light System with Runway Alignment Indicator Lights
MAP	Million Annual Enplaned Passengers
MDW	Chicago Midway International Airport
MHT	Manchester Airport
MIA	Miami International Airport
MITL	Medium Intensity Taxiway Edge Lights
MRO	Maintenance Repair Overhaul

MSP	Minneapolis-St. Paul International Airport
MTOW	Maximum Takeoff Operational Weight
NAVAIDS	Navigational and Visual Aids
NDB	Non-Directional Beacon
NFPA	National Fire Protection Association
NIPC	Northeastern Illinois Planning Commission
NOAA	National Oceanic and Atmospheric Administration
OAG	Official Airline Guide
OAK	Metropolitan Oakland International Airport
O&D	Origin & Destination
OEI	One Engine Inoperative Surfaces
OMP	O’Hare Modernization Program
ORD	Chicago O'Hare International Airport
OSR	On Screen Resolution
PAPI	Precision Approach Indicator Path
PAX	Air Passenger
PDX	Portland International Airport
PMAD	Peak Month Average Day
PAPI	Precision Approach Path Indicator
PVD	T.F. Green International Airport
PVG	Hampton Roads Executive Airport
RFD	Chicago/Rockford International Airport
ROD	Record of Decision
SJC	Norman Y. Mineta San Jose International Airport
SRA	Strategic Regional Arterial
SSA	South Suburban Airport
STL	Lambert-St. Louis International Airport
TERPS	Terminal Instrument Procedures
Tier 1-EIS	Tier 1 – Environmental Impact Statement
Tier 1-ROD	Tier 1 – Record of Decision
TRB	Transportation Research Board
TSA	Transportation Security Administration
TYS	McGhee Tyson Airport
U.S.	United States
VFR	Visual Flight Rules
VoIP	Voice over Internet Protocol
VOR	Very High Frequency
WAAS	Wide Area Augmentation System
WATS	Wide Area Telephone Service
YYZ	Toronto Pearson International Airport
ZAU	Chicago Air Route Traffic Control Center

APPENDIX B – Exhibits

Exhibit 1-1 – Location Map
Exhibit 1-2 – IAP Airport Layout Facilities/Boundary
Exhibit 1-3 – IAP and Ultimate Airport Boundaries
Exhibit 3-1 – GA Airport Distance Map
Exhibit 3-2 – Proposed IAP Airport Approach and Departure Flight Tracks
Exhibit 3-3 – Proposed Intermediate Airport Approach and Departure Flight Tracks
Exhibit 5-1 – Existing Utility Map
Exhibit 6-1 – Existing Ground Transportation Network
Exhibit 6-2 – CMAP Go To 2040 Priority Projects
Exhibit 6-3 – CMAP Go To 2040 Unconstrained Projects
Exhibit 6-4 – Will County Fiscally Constrained Projects
Exhibit 6-5 – Unconstrained Roadways Projects
Exhibit 6-6 – Unconstrained Commuter Rail Projects
Exhibit 6-7 – Estimated 2030 Annual Average Daily Traffic
Exhibit 8-1 – Potential Class B Airspace Structure at SSA



DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

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SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

LOCATION MAP

SSA MASTER PLAN - FACILITY REQUIREMENTS

EXHIBIT 1-1

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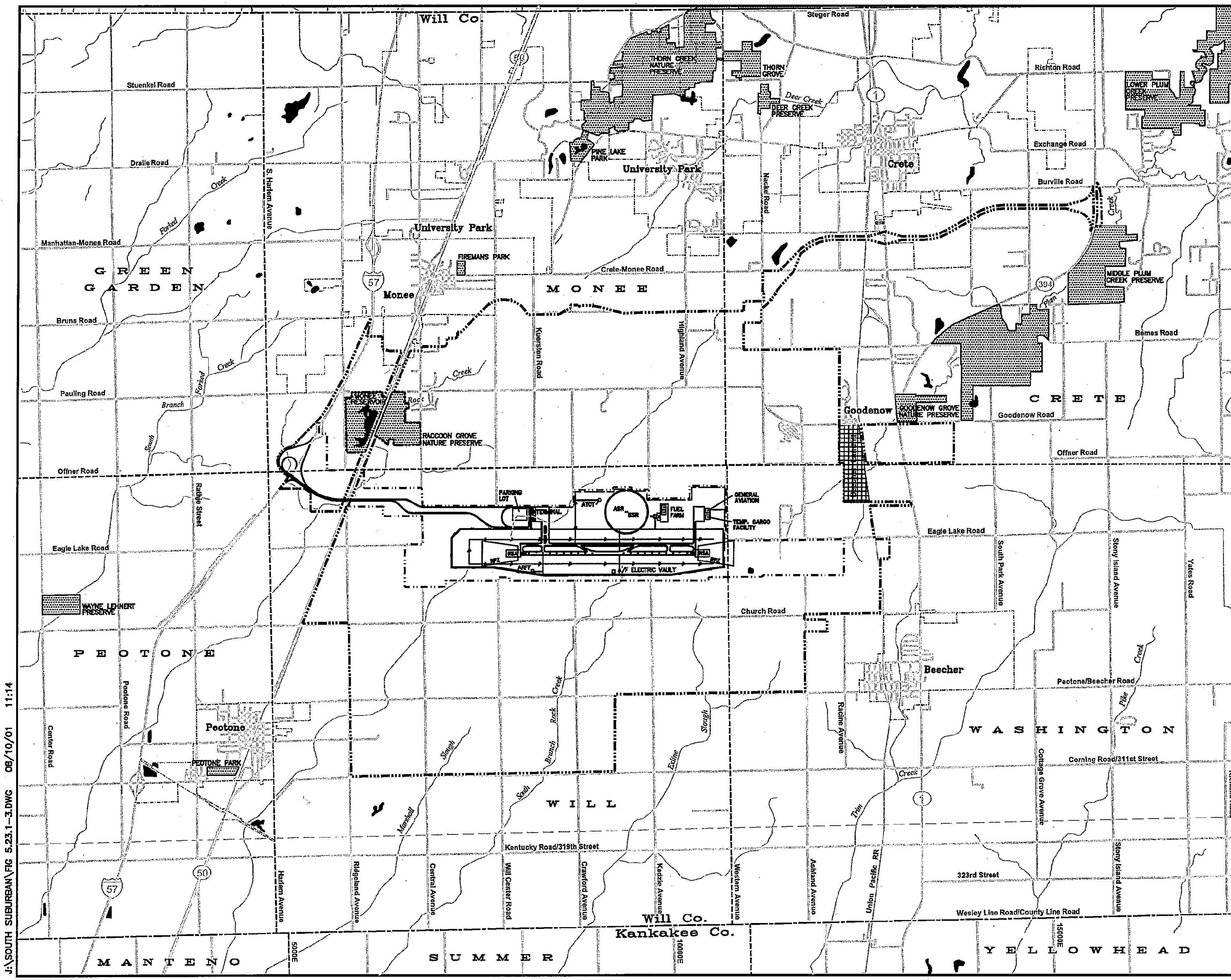

SOUTH SUBURBAN AIRPORT

WILL COUNTY INAUGURAL ALTERNATIVE ASSUMED AIRPORT FACILITIES

Legend

- Inaugural Acquisition Boundary
- Ultimate Acquisition Boundary/ Primary Study Area
- DOT Section 303(c) Land
- Open Water
- Township Boundary
- Village Limit
- High Voltage Power Line
- County Boundary

N

MAGNETIC DECLINATION 1° 48' WEST
ANNUAL RATE OF CHANGE 6.4 WEST

1000 0 1000 Scale in Meters
3000 0 3000 Scale in Feet

Source: Illinois Department of Transportation TAMS Consultants, Inc.

Figure 5.23.1-3

DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

HANSON PROJECT		10A0100
SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

IAP AIRPORT LAYOUT FACILITIES/ BOUNDARY

SSA MASTER PLAN-FACILITY REQUIREMENTS

EXHIBIT 1-2

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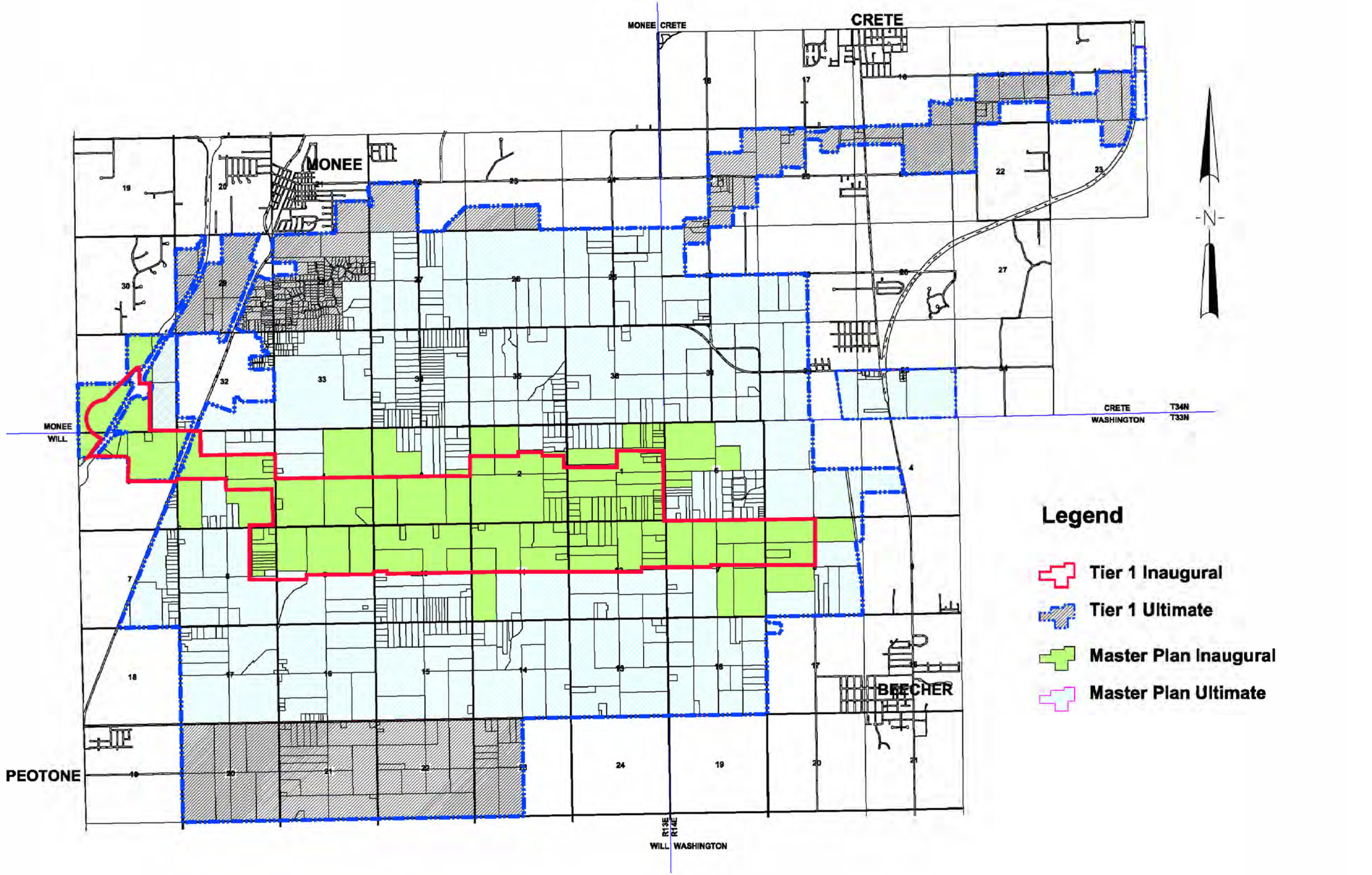

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SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

IAP AND ULTIMATE AIRPORT BOUNDARIES

SSA MASTER PLAN-FACILITY REQUIREMENTS

EXHIBIT 1-3

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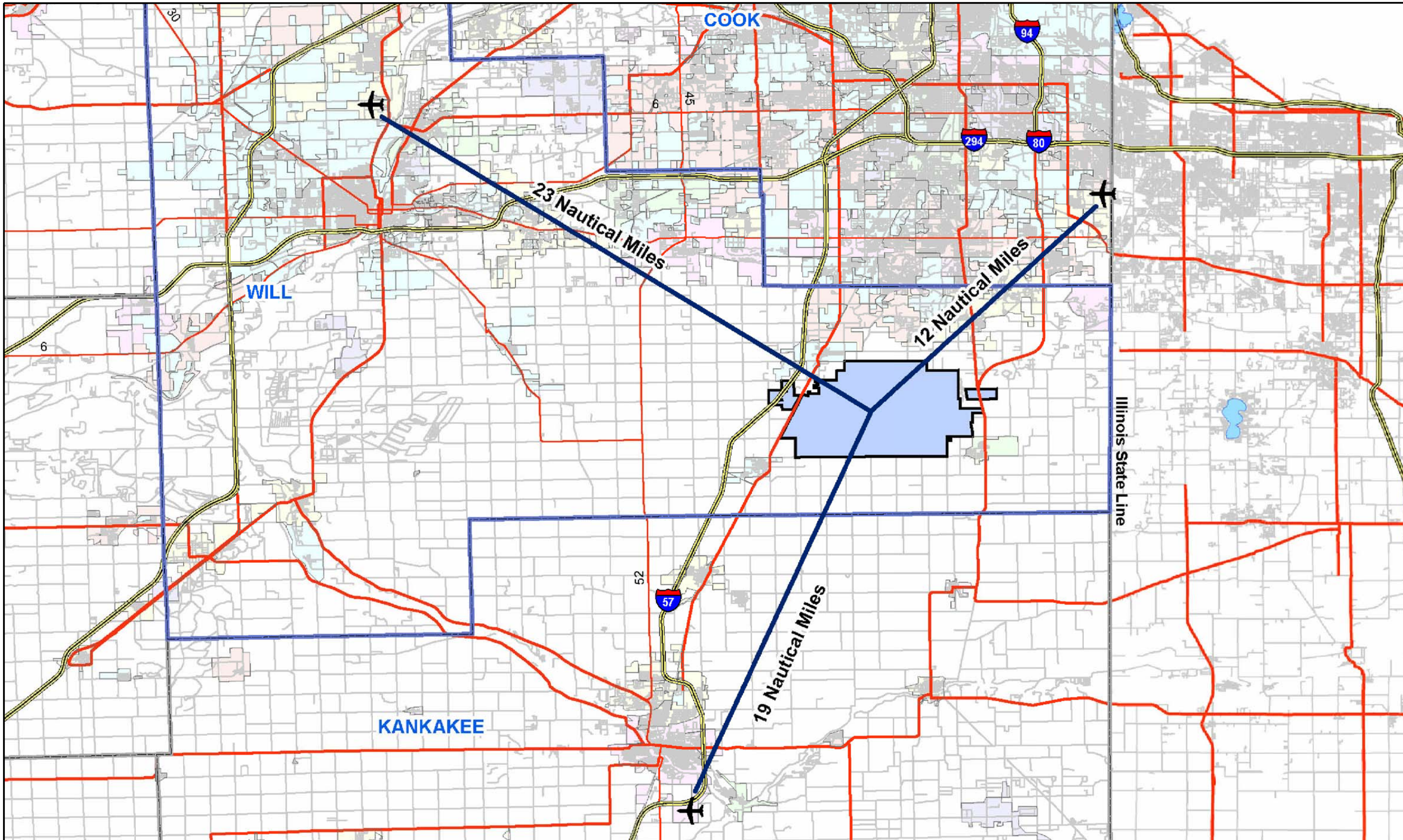

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Illinois Department of Transportation
Division of Aeronautics

HANSON PROJECT		10A0100
SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

GA AIRPORT DISTANCE MAP

SSA MASTER PLAN - FACILITY REQUIREMENTS

EXHIBIT 3-1

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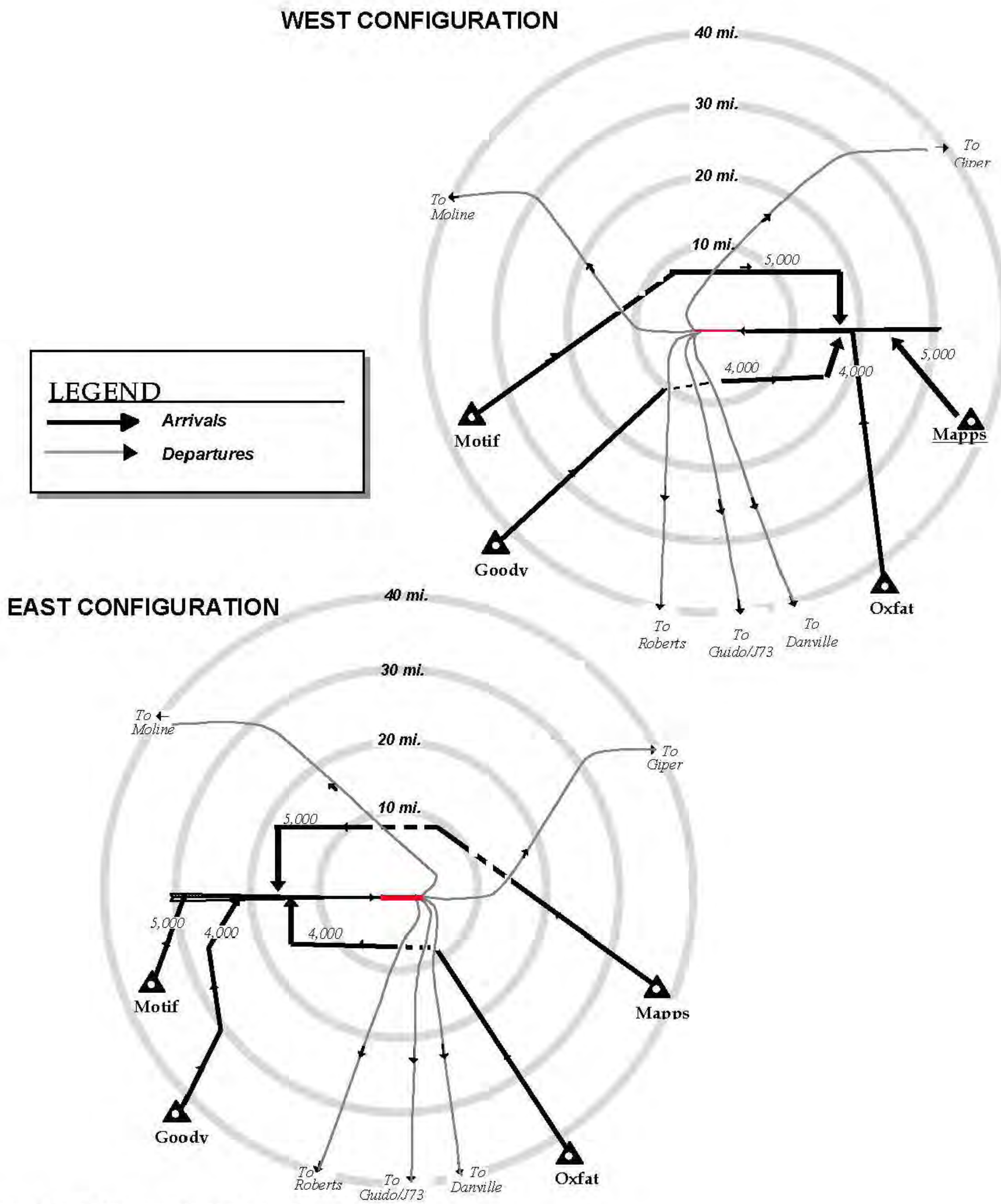
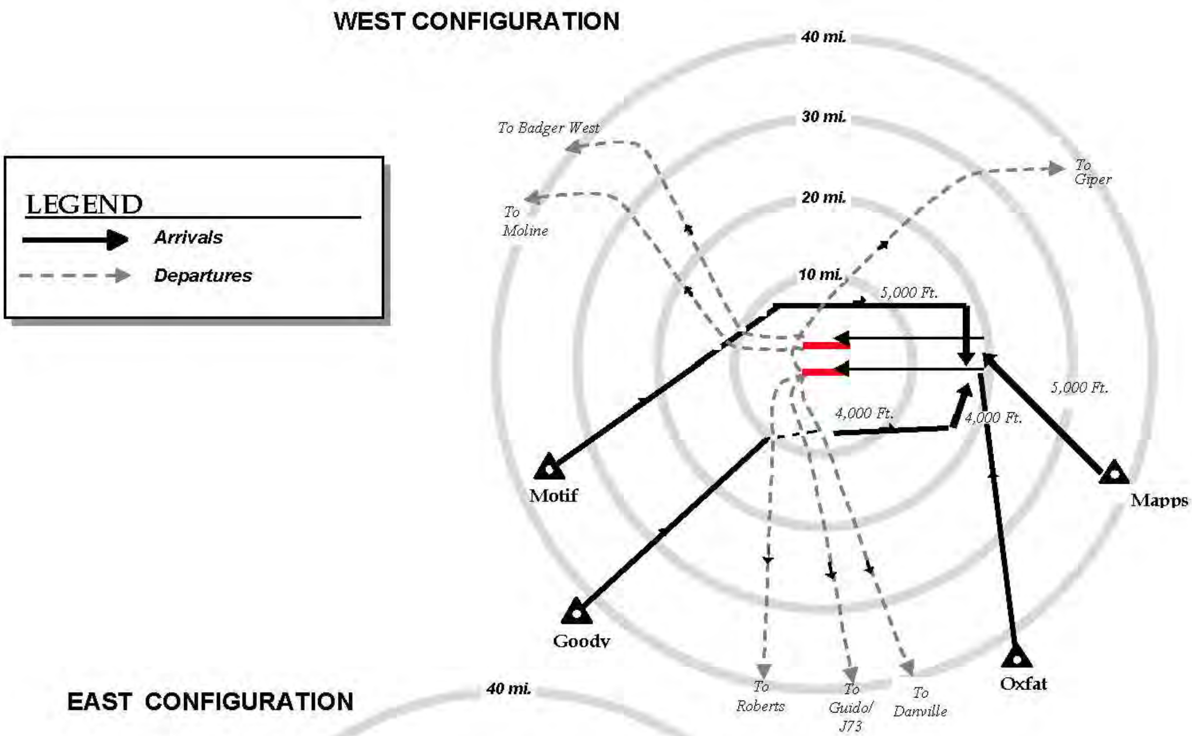
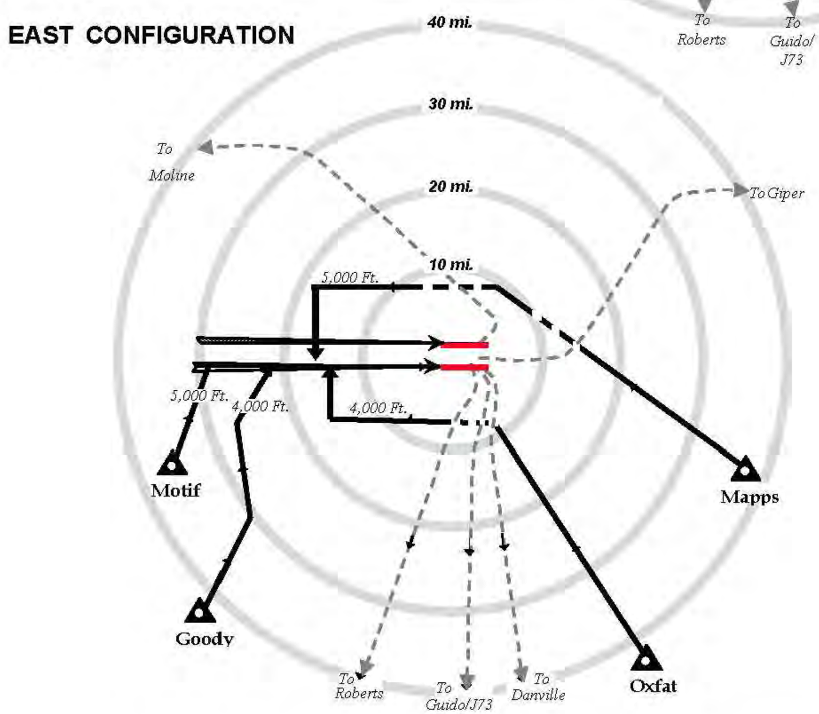


Prepared by: TAMS Consultants Inc, 1997.





Source: *Summary Draft, Phase I Engineering Report*, Illinois Department of Transportation, September 1997.

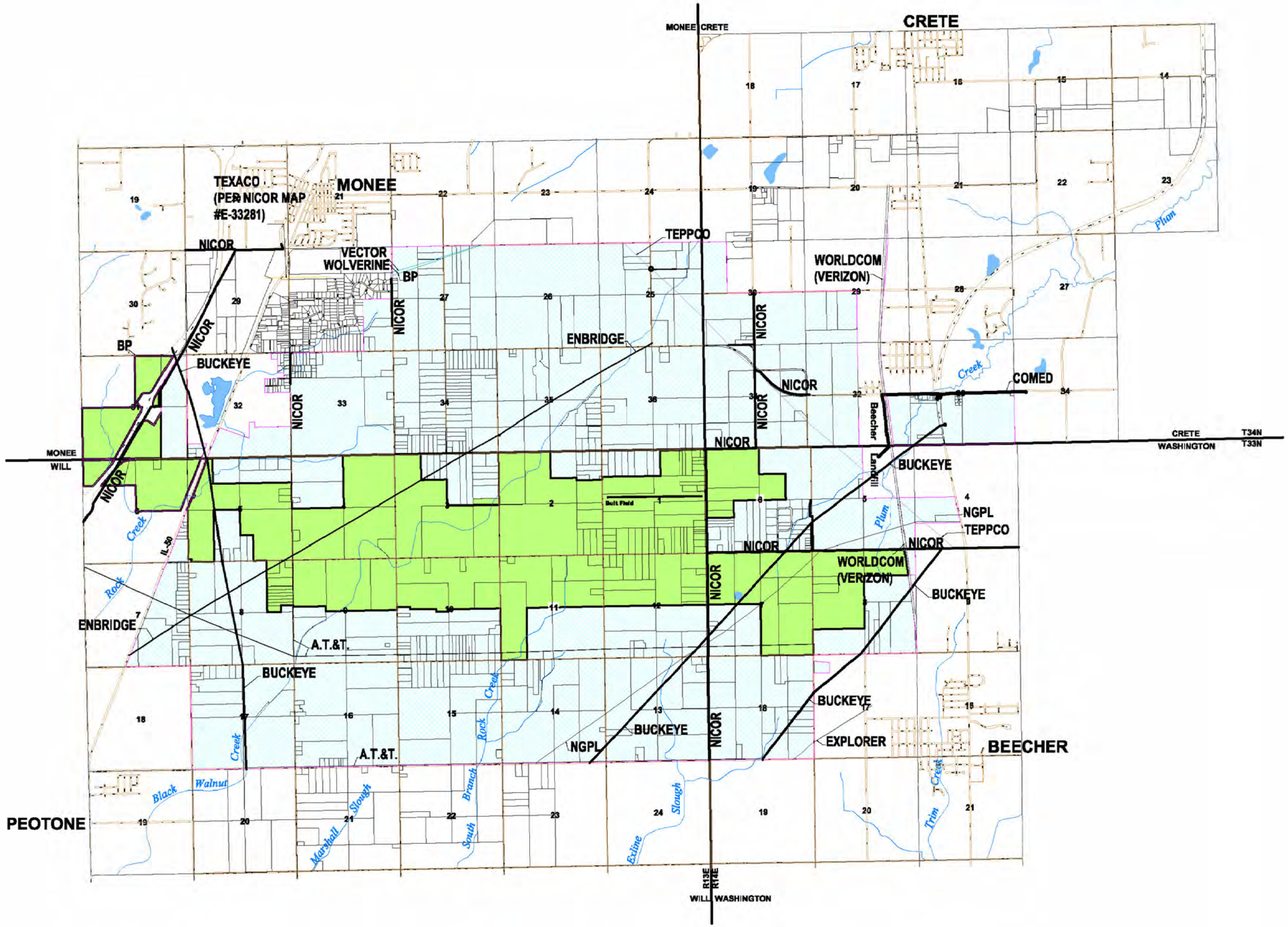
Illinois Department of Transportation
Division of Aeronautics

SouthSuburbanAirport

PROPOSED INTERMEDIATE AIRPORT APPROACH AND DEPARTURE FLIGHT TRACKS

SSA MASTER PLAN FACILITY REQUIREMENTS

EXHIBIT 3-3



DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

HANSON PROJECT		10A0100
SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

EXISTING UTILITY MAP

SSA MASTER PLAN - FACILITY REQUIREMENTS

EXHIBIT 5-1

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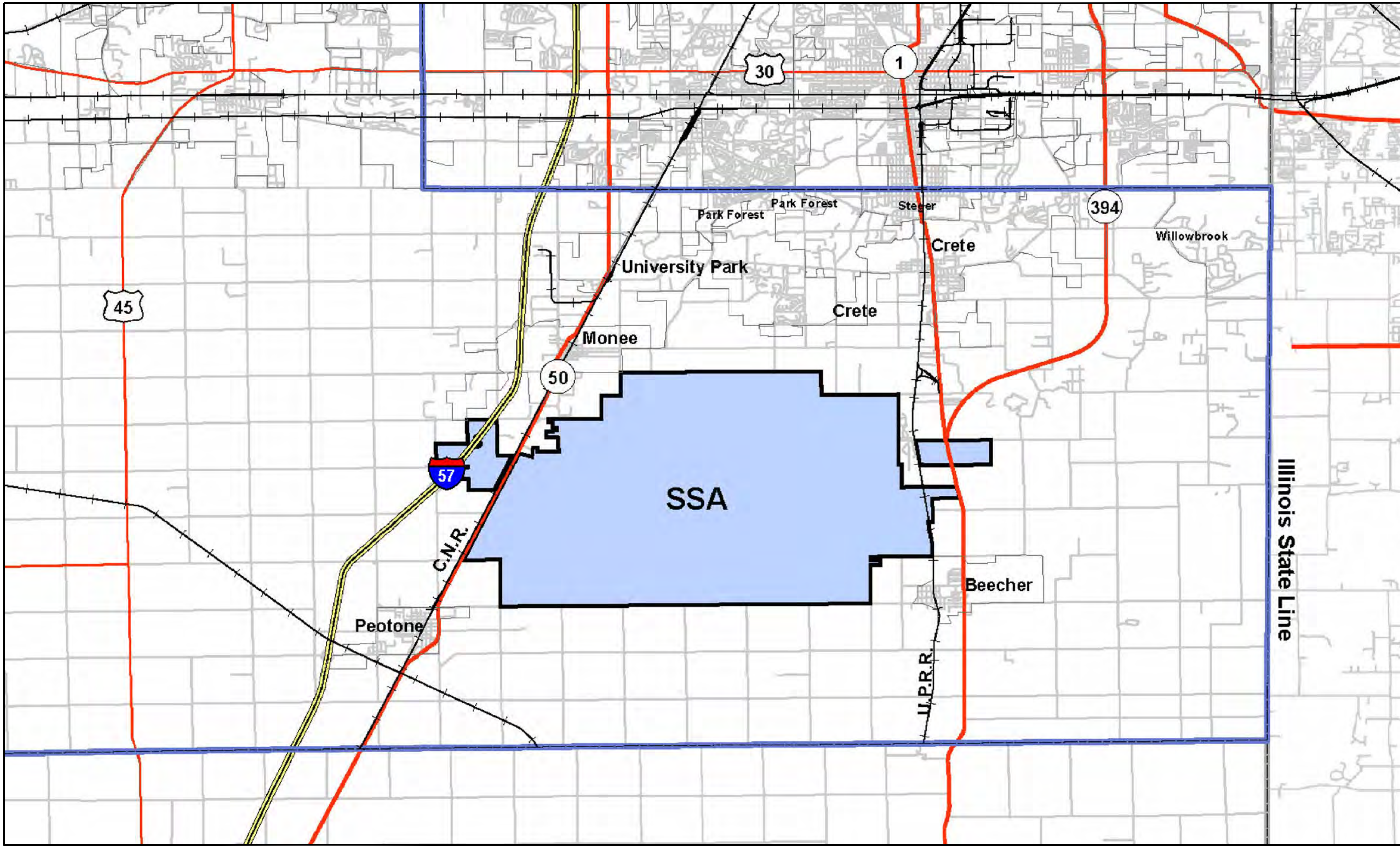

DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

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SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

EXISTING GROUND TRANSPORTATION NETWORK

SSA MASTER PLAN - FACILITY REQUIREMENTS

EXHIBIT 6-1

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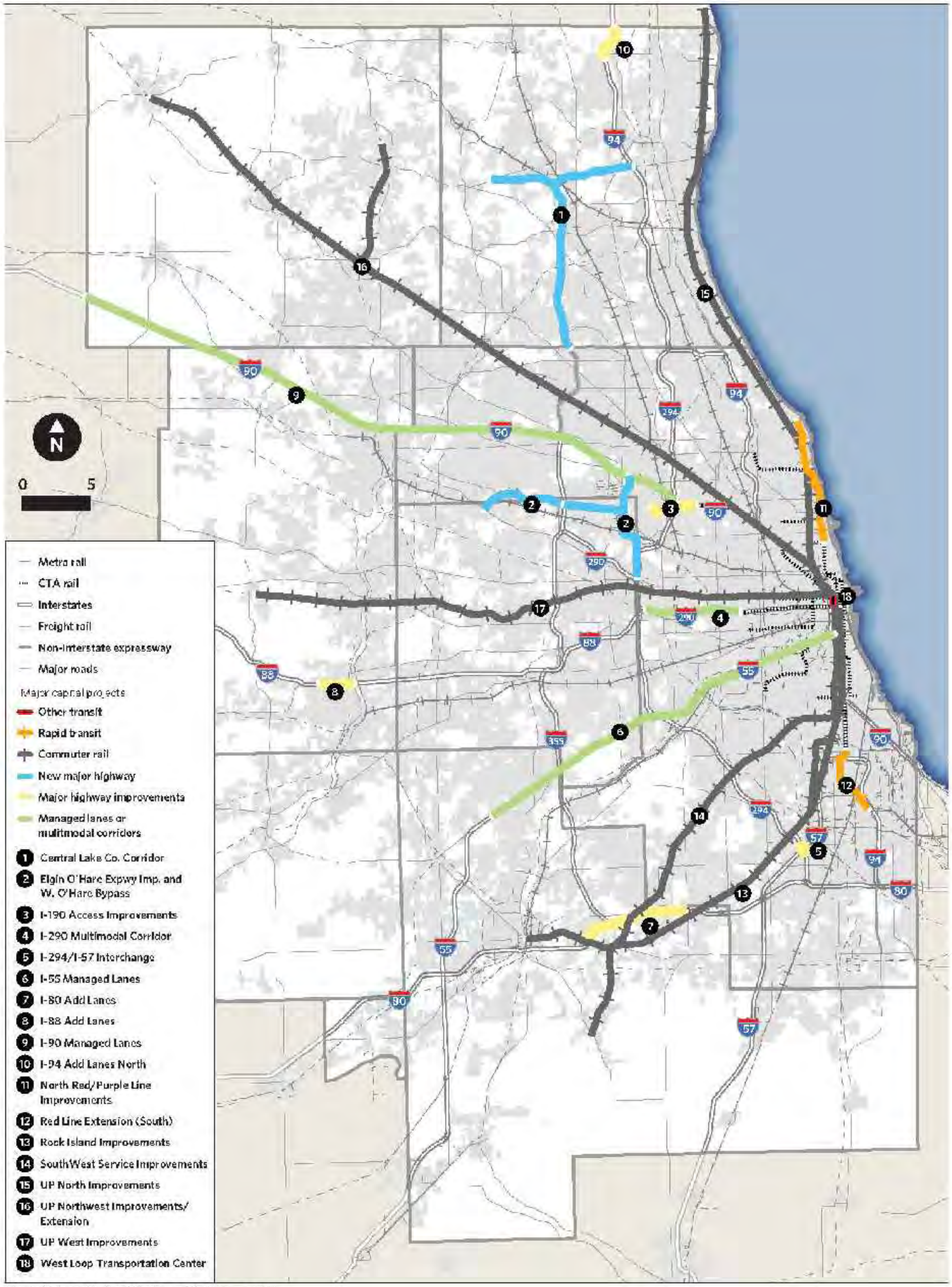
Figure 57. GO TO 2040 fiscally constrained major capital projects



Source: Chicago Metropolitan Agency for Planning, 2010

Illinois Department of Transportation
Division of Aeronautics

SSA SouthSuburbanAirport

CMAP GO TO 2040 PRIORITY PROJECTS

SSA MASTER PLAN FACILITY REQUIREMENTS

EXHIBIT 6-2

Source: Chicago Metropolitan Agency for Planning, 2010

Illinois Department of Transportation
Division of Aeronautics

SouthSuburbanAirport

CMAP GO TO 2040
UNCONSTRAINED PROJECTS

SSA MASTER PLAN
FACILITY REQUIREMENTS

EXHIBIT
6-3

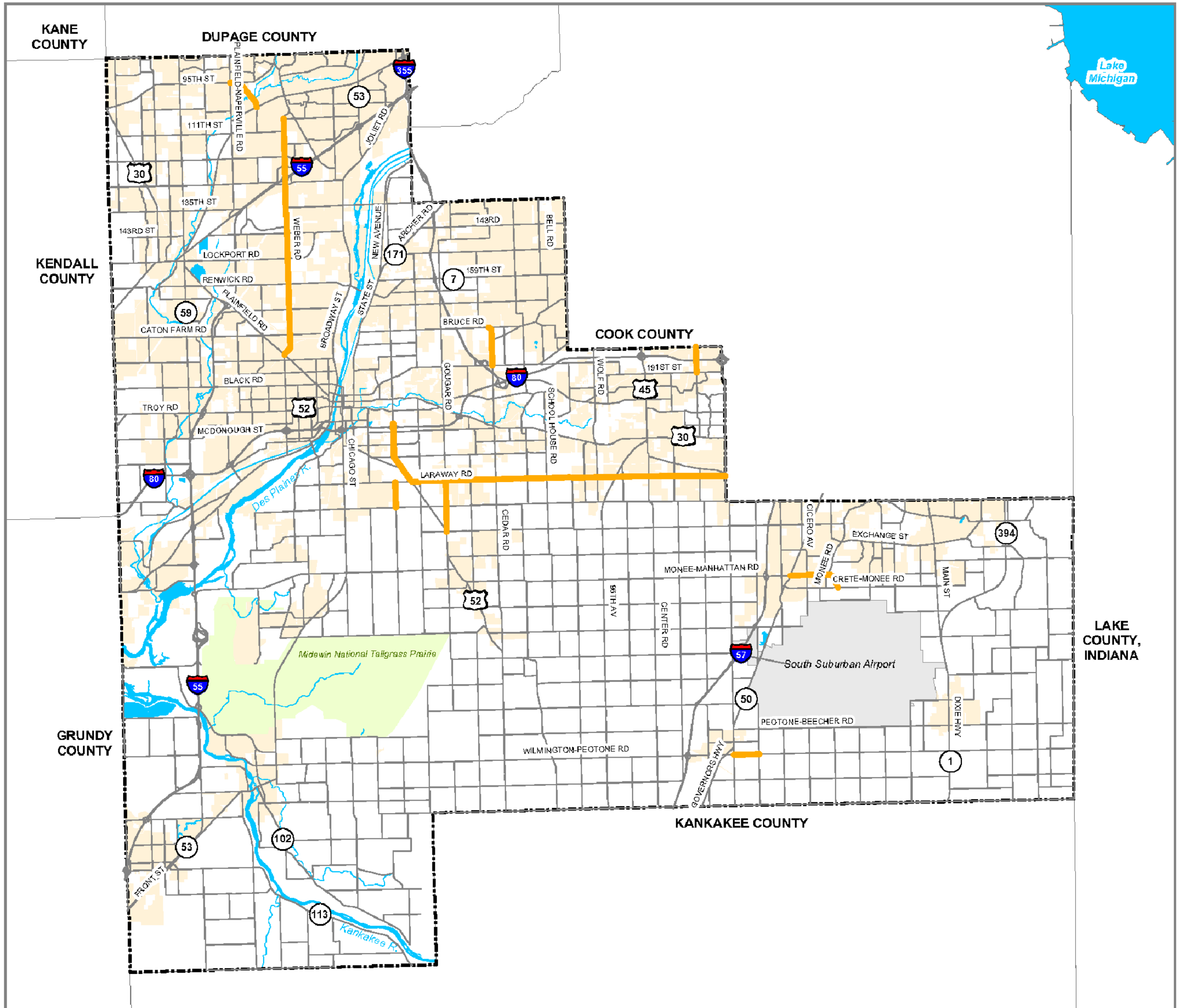


Figure 9-6
Roadway Constrained Plan

WILL COUNTY
2030 TRANSPORTATION PLAN

Legend

Constrained Plan Projects

0 4 8 Miles

Will County 2030 Transportation Plan

CH2MHILL Hutchison Engineering, Inc. VLECIDES SCHROEDER ASSOCIATES, INC.

File Path: J:\WillCountyDepartment\CommonFiles\03_GIS\MapDocs\2006_02_09_FinalReportFigures\Section9\FIGURE_9-6_ConstrainedProjects_ByJurisdiction.mxd, Date: January 22, 2007 2:29:10 PM

DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

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SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

WILL COUNTY FISCALLY CONSTRAINED PROJECTS
SSA MASTER PLAN-FACILITY REQUIREMENTS

EXHIBIT 6-4

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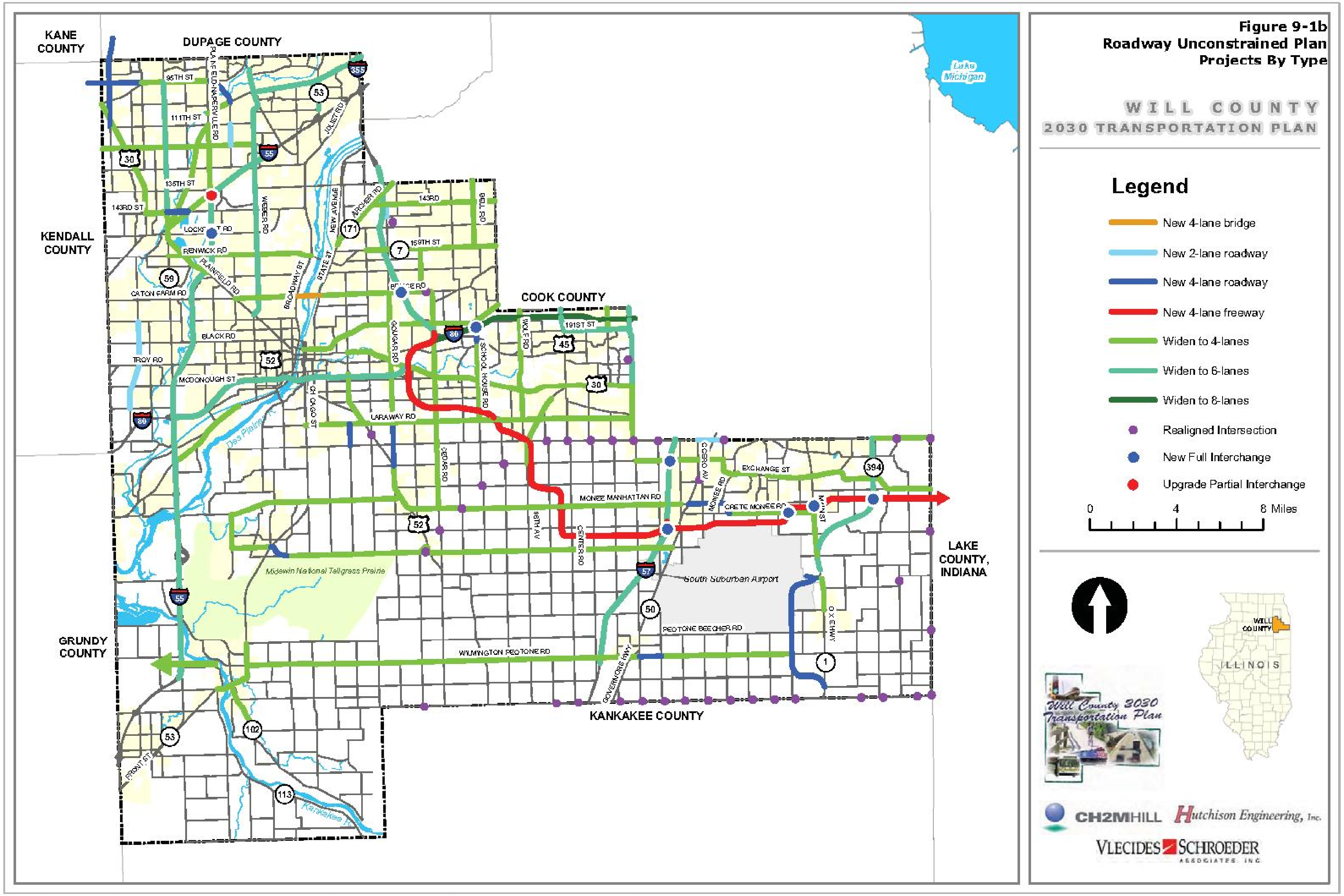

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Illinois Department of Transportation
Division of Aeronautics

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SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

UNCONSTRAINED ROADWAYS PROJECTS

SSA MASTER PLAN-FACILITY REQUIREMENTS

EXHIBIT 6-5

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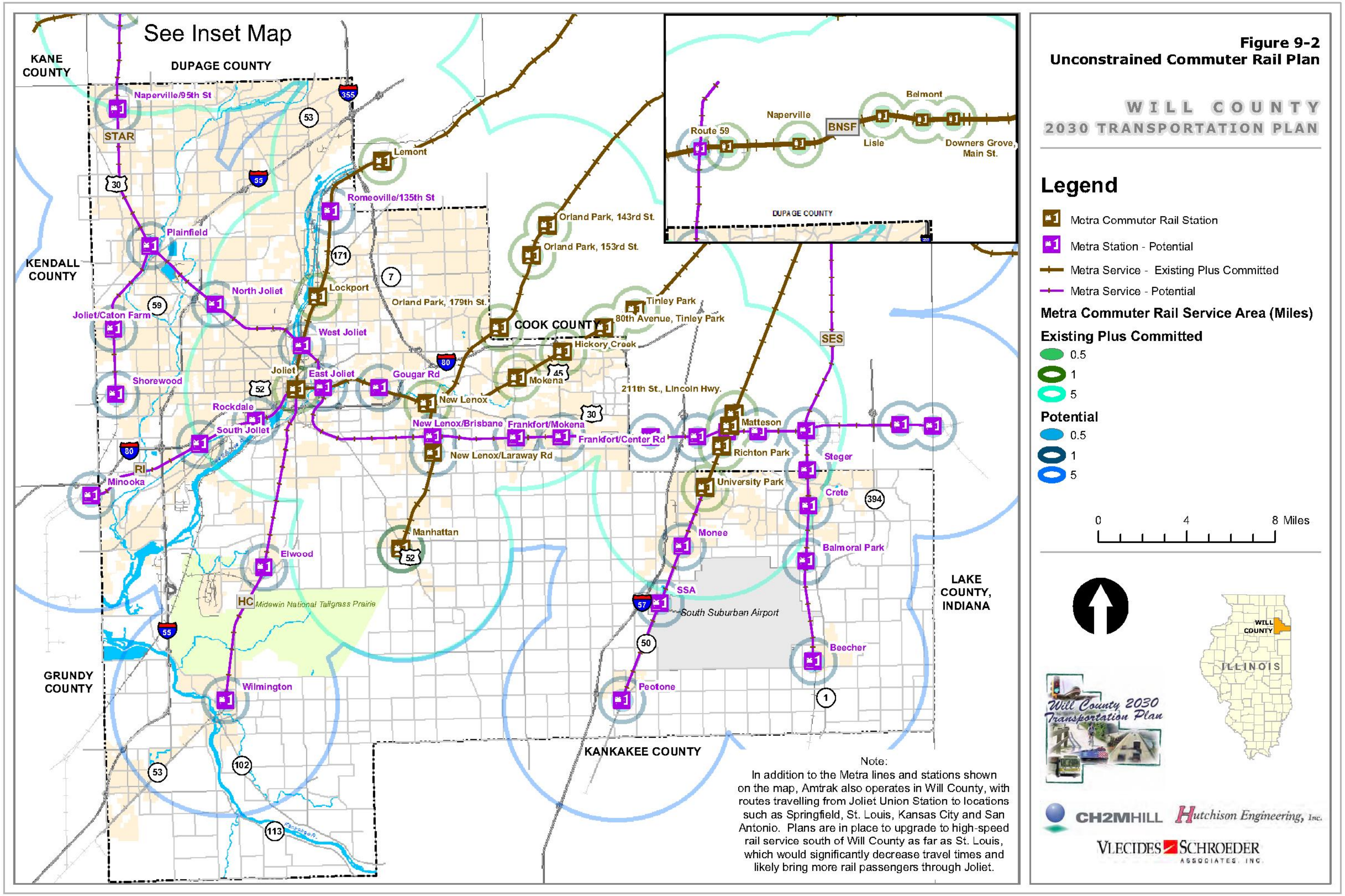

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Illinois Department of Transportation
Division of Aeronautics

HANSON PROJECT		10A0100
SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
DRAWN	JLB2	10/13/10
REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

UNCONSTRAINED COMMUTER RAIL PROJECTS

SSA MASTER PLAN-FACILITY REQUIREMENTS

EXHIBIT 6-6

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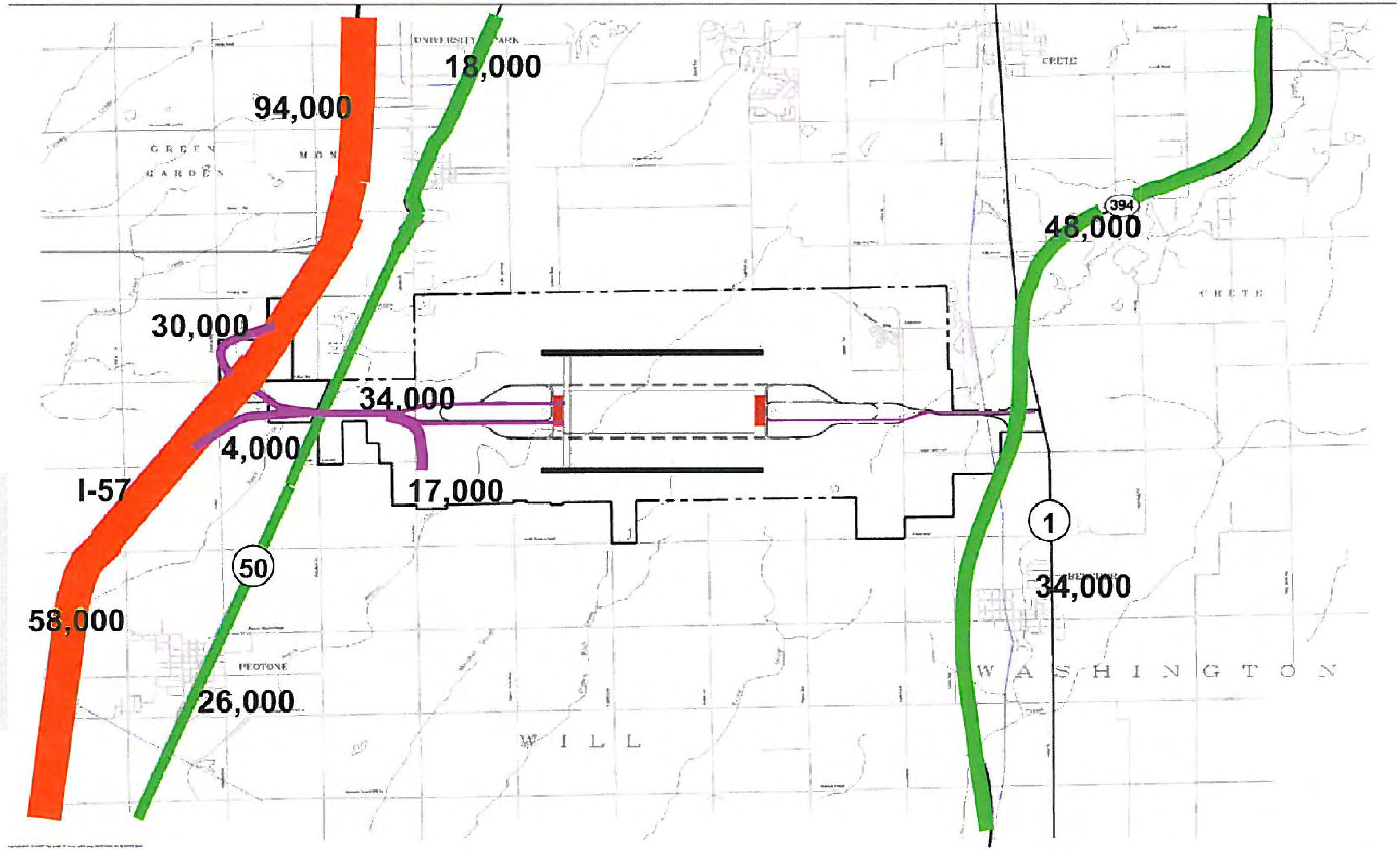

DATE	SOURCE

Illinois Department of Transportation
Division of Aeronautics

HANSON PROJECT		10A0100
SCALE	DATE	12/06/10
LAYOUT	JLB2	10/13/10
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REVIEWED	TSH	10/15/10

SSA SouthSuburbanAirport

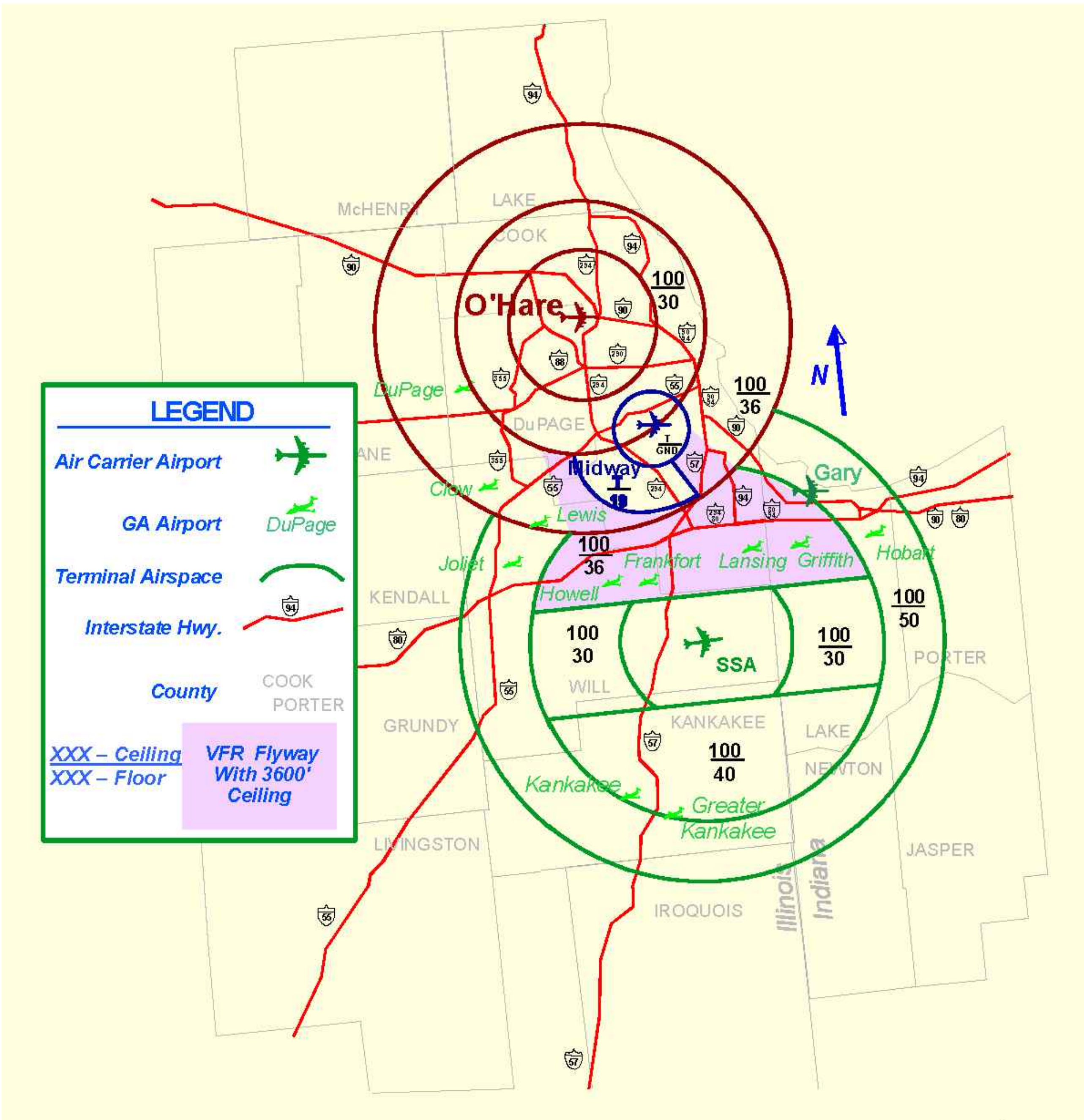
ESTIMATED 2030 ANNUAL AVERAGE DAILY TRAFFIC

SSA MASTER PLAN - FACILITY REQUIREMENTS

EXHIBIT 6-7

DEC 14, 2010 2:02 PM SCHED0827 C:\CAD\FACILITY REQUIREMENTS\EXHIBITS\SSA-EXHIBIT6-7.DWG

Exhibit 8-1
Potential Class B Airspace Structure at SSA



Source: *Summary Draft, Phase I Engineering Report,* Illinois Department of Transportation, September 1997.

Appendix C - Meteorological Analysis

Appendix C - Meteorological Analysis provides information developed for the original SSA wind analysis. It includes a detailed review of all type of aircraft that might use the facility, an in depth review of wind coverage by the several compass orientations studied to determine primary wind coverages, and an evaluation of those wind coverages.

C.1 - Potential Runway Configurations at SSA Site

Potential runway/taxiway system requirements for SSA were examined during the Phase 1 Engineering Study[110], conducted by IDOT from 1994-1998. This process included the comparison of an all-parallel runway system versus airfields with crosswind runways. Based on these parameters, seven alternate airfield configurations were developed and evaluated, as documented in the report *Selection of the Recommended Runway Configuration* (TAMS, 1996). The following seven criteria were employed to analyze and evaluate these alternatives:

- Ability to accommodate future operational demand;
- Ability to accommodate peak demand during CAT III (poorest weather) conditions using quadruple approaches;
- Ability to avoid runway incursions;
- Ability to expeditiously serve all types of aircraft and airfield operations;
- Ability to avoid adversely impacting Chicago regional airspace, to preclude impacts to a general aviation corridor between the proposed airport and Midway Airport, and to minimize potential airspace impacts to nearby reliever airports;
- Ability to minimize potential land use impacts and community disruption; and
- Prove to be cost beneficial.

At that time, FAA criteria stipulated that a minimum 4,300-ft separation distance was required between dual parallel runways and a minimum 5,000-ft separation distance was required for three or more parallel runways planned to serve simultaneous independent arriving aircraft during CAT III weather conditions.[111]

While the alternatives analyzed were for a potential ultimate six-runway site configuration, the determination of the primary runway orientation was also relevant for the IAP runway. The recommended airfield configuration identified in the Phase 1 Engineering Study consisted of six parallel air carrier runways in an east-west orientation, of which four provided quadruple independent approaches and one shorter general aviation/commuter runway in a 14-32 orientation. However, subsequent detailed meteorological evaluations concluded that, given the fleet mix that would operate at the airport, the east-west orientation would accommodate aircraft more than 95 percent of the time and a crosswind runway was needed approximately 2 percent of the time. Therefore, a crosswind runway was not necessary. Nevertheless, it was included for initial planning purposes and for purposes of site investigation environmental consequences.

The inner runway pairs had a 7,400 ft separation distance. The outer runways would be separated from the inboard runways by 5,000 ft. Two runways would be located centrally between the outer and inner runway pairs and would be designated as departure-only runways. These center runways would only be used during VFR conditions (good weather).

The airspace simulation analyses[112] performed for the Phase 1 Engineering Study determined that an east-west airfield configuration had the least impact on the approach and departure procedures for ORD and MDW and nearby reliever airports, and would accommodate four simultaneous independent approach procedures during CAT III weather conditions. In addition, these analyses showed that while a new airport would cause unavoidable land use

[110] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.
[111] CAT III weather conditions exist when the ceiling is 100 ft or less and runway visual range of 700 ft or less.
[112] *Refinement and Update of the Airport and Airspace Simulation Model,* Infinite Computer Technology, 1995.

impacts, the east-west runway configuration would cause fewer potential off-airfield impacts than one with crosswind runways, since takeoffs and landings would occur in only two directions instead of multiple directions.

C.2 - Wind Analysis and Meteorological Conditions at SSA Site

Localized wind and meteorological conditions at an airfield site help determine the ideal runway orientation for an airport. Since no aviation-related weather station was present at or near the SSA site, data from other nearby weather stations was gathered and analyzed to determine wind and meteorological conditions most likely to be present at the airport site. Weather stations did exist at JOT and IKK, but data was not archived at either location until August 2001. In order to adequately characterize wind and meteorological conditions at a particular location, FAA AC 150/5300-13, Airport Design, recommended that at least 10 years of consecutive weather data be analyzed. Therefore at the time, the closest weather station to the SSA site with the requisite available data was MDW. During the Phase I Engineering Study for the SSA (1994-1998), an extensive analysis of MDW wind data was performed. This effort included the preparation of wind and ceiling/visibility data for All-Weather, IFR Conditions[113] and Poor Visibility Conditions (PVC).[114] In addition, an important task was to verify the statistical relevance of:

- The applicability of MDW weather data at SSA; and;
- The statistical difference, if any, between weather data for MDW and ORD.

Historical wind data from the National Oceanic and Atmospheric Administration (NOAA) was imported into the FAA Airport Design Program, from which wind coverage was calculated based on 86,770 weather observations[115]. The analysis concluded that there was no statistical difference between weather data for MDW and ORD.

In addition, IDOT placed anemometers at four different locations in and around the SSA site during the mid-1990's to obtain actual weather data and verify the applicability of the MDW data for one year of comparable data. An analysis of that data indicated that the SSA site's data was similar to data collected at MDW during that one-year time frame. Data collection at the SSA site was halted in 1997, and re-started in 2003, but sufficient data has not been collected at the SSA site to develop site-specific winds and flying weather data over a ten-year period. However, a comparison of wind data from a 21-month period collected at JOT, IKK, MDW and the SSA site was performed. This analysis indicated that the recorded wind speeds at both IKK and JOT are less than those recorded at SSA and MDW, although MDW wind speeds were slightly greater (approximately 0.5 knots) than SSA data. The JOT and IKK observations also had a very high percentage of calm observations during the analyzed timeframe, while calms were much less frequent at MDW and SSA during the same period. Utilizing a conservative approach, IDOT has elected to use weather data from MDW to identify anticipated wind and meteorological conditions at SSA.

As stated in Section 3.1, the Illinois-Indiana Regional Airport Program (I-IRAP) Site Selection Study and the Phase 1 Engineering Study had previously determined that a primary runway configuration with an east-west orientation had the least impacts on arrival and departure procedures for ORD and MDW. In addition, a meteorological analysis using MDW data from 1968 to 1977 determined that an east-west runway configuration exceeded FAA's criteria of at least 95 percent wind coverage, except under 13-knot wind conditions for aircraft weighing less than 12,500 lbs.[116]

As part of the planning for the Inaugural Airport, hourly observations from MDW wind data from 1991 through 2000 were analyzed to validate the previous results from the Phase 1 Engineering Study. That analysis confirmed that an east-west runway orientation would provide greater than 95 percent coverage for the projected fleet mix except for aircraft weighing less than 12,500 lbs. with a 13-knot wind.

[113] IFR conditions exist when the cloud ceiling is less than 1,000 feet and visibility is less than 3 statute miles.
[114] PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than 1 statute mile.
[115] This number represents the number of weather observations for a period of 10 years.
[116] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.

In conjunction with the analysis, all aircraft in the fleet mix were evaluated in terms of the crosswind components under which they might be subject to limited. **Table C-1 Aircraft Types by Allowable Crosswinds** indicates the various aircraft from single engine piston to widebody jets and their allowable crosswinds. **Table C-2 - Aircraft Category and Allowable Crosswind Component** lists the commercial aircraft fleet mix projected to operate at the Inaugural Airport (IAP) at SSA and the allowable crosswind component for these aircraft.

Table C-1: Aircraft Types by Allowable Crosswinds

Aircraft Reference Codes (ARC)	Aircraft Category	Type of Aircraft	Allowable Crosswinds
A-I and B-I	Small General Aviation	Cessna 172, Piper 310	10.5 knots
A-II and B-II	Small General Aviation & Small Turboprops	Beech 1900-C, BAE 31, EMB 110, EMB 120	13 knots
A-III, B-III & C-I through D-III	Regional Jets and Narrowbody Jets	B737-700, 800, 900; A320-200' CRJ700, CRJ900	> 16 knots
A-IV through D-VI	Widebody Jets	B767, B-777, B-747, A380	20 knots

Source: FAA Advisory Circular 150/5300-13, Airport Design Manual, Change 15, December 2009 and Planning Manuals from Aircraft Manufacturers.

Table C-2: Aircraft Category and Allowable Crosswind Component

Aircraft Type	Aircraft Category	Allowable Crosswind Component (Dry Runway)	Allowable Crosswind Component (Wet Runway)
B737-700, 800, 900	C-III	38 knots	29 knots
B717-200	C-III	38 knots	29 knots
A320	C-III	29 knots	20 knots
CJR700	C-II	28 knots	Not Available
CJR900	C-II	22 knots	Not Available
EMB-170	C-III	38 knots	31 knots
EMB-190	C-III	38 knots	31 knots
B767-300F	C-IV	38 knots	20 knots
A300-600F	D-IV	38 knots	20 knots

Source: FAA Advisory Circular 150/5300-13, Airport Design Manual, Change 15, December 2009 and Planning Manuals from Aircraft Manufacturers.

Planning of the runway system for the IAP was governed by FAA standards described in Advisory Circular 150/5300-13, Change 15. The FAA requires that the runway system at an airport provide at least 95 percent wind coverage for all aircraft frequently using the airport. The weight based wind rose analysis concluded that the runway orientation of 090-degrees/270-degrees can accommodate over 95 percent of all aircraft that would potentially use the facility.[117]

C.3 - Wind and Adverse Weather Conditions Analysis

The Phase I Engineering Study[118] performed further meteorological analysis of MDW wind data for various cases, in response to comments that air carrier crosswind runways may be required at SSA. This evaluation is greater than the typical analysis performed to assess required runway alignments. However, it was completed to determine if an east-west runway system at SSA could accommodate at least 95 percent of aircraft operations during various wind and adverse weather conditions, as required by FAA criteria.

[117] *Advanced Use of Meteorological Data in the Selection of a Runway Configuration*, Mark T. Carroll (Murray and Trettel, Inc) and Gary D. Logston (TAMS Consultants), American Meteorological Society, 11th Conference on Applied Technology papers, Dallas, Texas, January, 1999, pp. 121-126.
[118] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996

VFR conditions exist when the cloud ceiling is greater than or equal to 1,000 ft AGL and visibility is greater than or equal to three nautical miles. IFR conditions exist when the cloud ceiling is less than 1,000 ft AGL or visibility is less than three nautical miles. All-Weather conditions refer to factoring the percentage of VFR and IFR conditions together to determine annual wind conditions at a specific location.

In determining the recommended runway configuration, the Phase I Engineering Study also considered two basic crosswind components:

- An allowable crosswind component of 20 knots for large aircraft; and
- An allowable crosswind component of 13 knots for small aircraft.

Table C-3: 13-knot, 16-knot and 20-knot Wind Analysis provides a summary of the crosswind percentages for 13-knot, 16-knot and 20-knot components for five potential runway configurations: 09-27, 14-32, 05-23, a combination of 09-27 and 14-32, and a combination of 09-27 and 05-23 for IFR, VFR and All-Weather conditions. The analysis indicated that a runway configuration with a combination of 09/27 and 05/23 orientations provides the best coverage under VFR, IFR and All-Weather conditions.

Table C-3: 13-knot, 16-knot and 20-knot Wind Analysis

Runway Configuration	VFR	IFR	All Weather
13-knot			
09-27	91.17%	89.84%	91.21%
14-32	85.29%	85.56%	84.69%
09-27 & 14-32	94.33%	94.61%	93.95%
05-23	94.21%	94.92%	94.10%
09-27 & 05-23	**97.93%**	**96.98%**	**97.85%**
16-knot			
09-27	95.65%	94.73%	95.86%
14-32	92.86%	92.43%	93.02%
09-27 & 14-32	97.49%	97.56%	97.71%
05-23	97.44%	97.67%	97.71%
09-27 & 05-23	**99.32%**	**98.88%**	**99.38%**
20-knot			
09-27	99.03%	98.66%	98.89%
14-32	97.86%	97.69%	97.95%
09-27 & 14-32	99.51%	99.49%	99.45%
05-23	99.70%	99.52%	99.40%
09-27 & 05-23	**99.87%**	**99.68%**	**99.84%**

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

Based on the results of the wind and weather analysis, it was concluded that an east-west runway system would provide 91.2 percent wind coverage for 13 knots wind speed and 95.9% for 16-knots in All-Weather conditions. Thus, under certain wind and meteorological conditions, general aviation aircraft weighing less than 12,500 lbs. would not be able to land on Runway 09/27. In addition, any proposed runways at SSA will need to be evaluated by FAA for potential airspace conflicts with other aeronautical facilities in the area.

Along with analyzing wind conditions and wind coverage on the potential runways at SSA, an analysis of visibility minimums was also conducted. **Table C-4 Monthly Occurrences of Ceiling/Visibility Conditions at Chicago Midway** provides more detailed information about six ceiling/visibility conditions recorded at MDW over a 10-year period (1991 and 2000). The results shown in **Table C-4** indicate that CAT I (or lesser) conditions occurred 8.2 percent of the year; CAT II conditions occurred approximately 0.4 percent of the year, and CAT III conditions occurred 0.4 percent of the year.

Table C-4: Monthly Occurrences of Ceiling/Visibility Conditions at MDW						
Month	VFR Conditions[119]	IFR Conditions[120]	MDW Minimums[121]	Visibility Conditions (%)		
				CAT I[122]	CAT II[123]	CAT III[124]
January	78.47%	21.53%	3.57%	18.84%	1.33%	1.64%
February	87.48%	12.52%	1.94%	10.91%	0.86%	0.84%
March	89.15%	10.85%	1.88%	9.56%	1.06%	0.49%
April	90.75%	9.25%	0.52%	9.00%	0.21%	0.15%
May	93.95%	6.05%	0.56%	5.69%	0.35%	0.10%
June	94.85%	5.15%	0.34%	4.91%	0.19%	0.06%
July	96.53%	3.47%	0.12%	3.40%	0.01%	0.06%
August	95.82%	4.18%	0.07%	4.13%	0.04%	0.01%
September	96.21%	3.79%	0.08%	3.71%	0.02%	0.06%
October	94.65%	5.35%	0.20%	5.19%	0.09%	0.10%
November	89.87%	10.13%	1.10%	9.23%	0.50%	0.05%
December	85.06%	14.94%	1.76%	13.72%	0.61%	0.74%
Annual	91.08%	8.92%	1.01%	8.18%	0.44%	0.39%

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

Table C-5 Monthly Distribution of Wet Pavement Conditions provides the percentage of wet pavement by month, based on an analysis of 10 years of data collected from MDW. The greatest wet pavement occurrences recorded were during the cold weather months of November through April. On an annual average these conditions occurred about 9.2 percent of the time.

Table C-5: Monthly Distribution of Wet Pavement Conditions

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
17.31%	11.31%	11.31%	11.43%	7.00%	5.44%	3.56%	4.38%	5.20%	6.93%	12.55%	13.77%	9.16%

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

Table C-6 depicts occurrences of frozen or freezing conditions along with crosswind conditions of both 16 and 20 knots for the east-west concept and a combination of east-west and crosswind runways.[125] For a 16-knot crosswind component in an east-west runway configuration, **Table C-6** indicates that aircraft operations could not be accommodated for an average of 9.6 hours annually. For the 20-knot crosswind component the east-west runway system was not operational for an average of 5.6 hours annually. This represents 0.11 percent and 0.06 percent of the year, respectively.

Table C-6: Monthly Occurrences of Freezing & Frozen Precipitation Not Covered by Runway Orientation

Month	09-27 (hours)	Percent	Combined 09-27 & 05-23 (hours)	Percent	09-27 (hours)	Percent	Combined 09-37 & 05-23 (hours)	Percent
	16 knots				20 knots			
January	2.2	0.29%	1.3	0.18%	1.0	0.13%	0.1	0.01%
February	1.0	0.15%	0.7	0.10%	0.7	0.10%	0.4	0.06%

[119] Ceiling visibility above 1,000 feet; over 3 miles visibility.
[120] Ceiling visibility less than 1,000 feet; below 3 miles visibility.
[121] Ceiling visibility less than 300 feet; below 1-mile visibility.
[122] Ceiling visibility less than 1,000 feet and above 200 feet or visibility between ½ and 3 miles.
[123] Ceiling visibility less than 200 feet and above 100 feet or visibility between ¼ and ½ miles.
[124] Ceiling visibility less than 100 feet or visibility less than ¼ mile.
[125] Wet pavement conditions were assumed to exist when any amount of liquid or frozen precipitation was present.

Table C-6: Monthly Occurrences of Freezing & Frozen Precipitation Not Covered by Runway Orientation								
Month	**09-27 (hours)**	**Percent**	**Combined 09-27 & 05-23 (hours)**	**Percent**	**09-27 (hours)**	**Percent**	**Combined 09-37 & 05-23 (hours)**	**Percent**
	16 knots				**20 knots**			
March	2.9	0.40%	1.1	0.15%	2.0	0.27%	0.6	0.08%
April	1.0	0.14%	0.2	0.03%	0.7	0.10%	0.1	0.01%
May	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%
June	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%
July	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%
August	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%
September	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%
October	0.5	0.07%	0.6	0.08%	0.0	0.00%	0.0	0.00%
November	0.2	0.03%	0.1	0.01%	0.1	0.01%	0.1	0.01%
December	1.9	0.26%	0.7	0.09%	1.1	0.15%	0.4	0.05%
Annual	**9.6**	**0.11%**	**4.8**	**0.06%**	**5.6**	**0.06%**	**1.7**	**0.02%**

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

For icing conditions, the annual averages are 4.8 hours and 1.7 hours at 16 and 20 knots, respectfully, that both an east-west and crosswind runway combination would not accommodate aircraft operations at SSA.

In addition to collecting and processing the meteorological and wind data, the consulting team conducted interviews with airframe and engine manufacturers, airline pilots, and air traffic controllers about the impact of crosswind runways. The information gathered from these discussions also provided data regarding operational requirements of specific aircraft models during various weather conditions. From these deliberations with aviation experts, it was concluded that for particular weather conditions, aircraft weight is the critical factor in determining an allowable crosswind component.

Since aircraft of various weights operate differently in diverse weather conditions, a weight-based approach was developed to assess the impact of meteorological conditions on the runway system. **Table C-7: Allowable Crosswind Component for Various Aircraft Weights** presents the allowable crosswind component for various aircraft weights during certain weather and visibility conditions. These were derived from many interviews with aircraft manufacturers and meet or exceed the wind requirements for aircraft types. This analysis assumes an east-west runway (09/27) 150 ft in width.

Table C-7: Allowable Crosswind Component for Various Aircraft Weights					
Aircraft Weight (lbs)	**VFR (knots)**	**Wet IFR (knots)**	**Wet Pavement (knots)**	**Icy/Freezing Precipitation (knots)**	**CAT III Conditions (knots)**
>60,000	20	Not Available	15	10	10
30,000 - 60,000	20	Not Available	15	10	10
12,500 - 30,000	20	15	13	10	10
< 12,500	15	13	10	5	10

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

As illustrated in **Table C-7**, the operations of aircraft weighing less than 12,500 lbs. can occur on an east-west runway system during All-Weather conditions (with crosswinds of 13 knots or 15 knots), **except**:

- During wet IFR conditions when crosswind component exceeds 13 knots/hour;
- During wet pavement conditions when crosswinds are in excess of 10 knots/hour;

- During icy/freezing weather when crosswinds are in excess of 5 knots/hour; and
- During CAT III conditions when crosswinds are in excess of 10 knots/hour.

In summary, the weight based analysis concludes that , a single primary runway with a 09/27 orientation provides greater than 95 percent wind coverage for all aircraft, but the runway will require a CAT I approach to provide greater than the 95 percent coverage under the ceiling and visibility conditions expected to occur at the airfield site.

Exhibits C-1: All Weather – MDW Windrose, All Weather Wind Coverage; C-2: VFR Weather – MDW Windrose, VFR Wind Coverage; and **C-3: IFR Conditions – MDW Windrose, IFR Wind Coverage**, in Appendix C, depict the MDW wind roses for All-Weather, VFR conditions and IFR conditions, which are the wind roses recommended for use in the planning of SSA. Site-specific wind roses should be developed after 10 years of continuous data is collected at the SSA site.

C.4 - Airspace Structure

Another important component in determining the runway orientation at a new airport site is the existing airspace structure in the region. Airspace analyses[126] conducted in 1995 paid special attention to potential approach and departure routes, which attempted to fit SSA within the existing framework of the complex Chicago airspace while minimizing impacts to the approach and departure routes at ORD, MDW and other major airports in the region. These routes were developed by IDOT and their consultants in close coordination with FAA, but have neither been analyzed nor approved by FAA.

The FAA has divided the national airspace into two general categories, controlled (Classes A through E airspace) and uncontrolled (Class G airspace). Within these two groups, there are a number of categories that determine the flight rules, pilot qualifications and aircraft capabilities required to operate within any section of the airspace. The specific categorization of any area is broadly based on the complexity and density of aircraft movements, the nature of operations conducted within the airspace, safety and the public and national interest.[127]

During the Phase I Engineering Study IDOT designed a preliminary airspace plan for the SSA to determine if it could be integrated within the existing Chicago region airspace structure. This preliminary airspace plan was designed after holding several meetings with FAA officials to discuss this specific issue. The preliminary assumption used for the airspace analysis was that departures at SSA would be sequenced after departing aircraft from MDW and ORD[128]. **Exhibit 3-2: Proposed IAP Approach and Departure Flight Tracks,** in Appendix B, depicts the proposed preliminary airspace structure and routes assumed by IDOT Aeronautics for both west and east air traffic flow configurations. Based on the wind roses and analysis described in Section 3.3, annual air traffic flows at SSA should be approximately 62 percent westerly flow and 38 percent easterly flow under All-Weather conditions.

The Phase 1 Engineering Study also assessed the existing regional GA activity. The results showed that one of the most active general aviation traffic corridors in the U.S. is the east-to-west general aviation corridor located south of Lake Michigan and just east of the Chicago area. A new commercial air passenger airport south of Chicago could ultimately result in additional controlled airspace similar to MDW. A new sector of controlled airspace could hinder general aviation traffic in this corridor requiring GA traffic to circumvent SSA airspace to the south, leading to a significant increase in travel time and trip length for these aircraft, although these potential impacts would most likely occur only if SSA expands beyond the IAP.

Then FAA Order 7400.2E, Change 3, *Procedures for Handling Airspace Matters*, Part 4 stated that the criteria for considering an airport as a candidate for Class C airspace designation is based on factors that include “the volume of

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[126] *Refinement and Update of the Airport and Airspace Simulation Model*, Infinite Technologies in association with TAMS Consultants Inc, 1995.
[127] *2002 Aviation Capacity Enhancement Plan, Building Capacity Today for the Skies of Tomorrow*, Office of System Capacity, Federal Aviation Administration, December 2002.
[128] Summary Draft, *Phase I Engineering Report: South Suburban – A Supplemental Airport for the Chicago Region*, Illinois Department of Transportation by TAMS Consultants, Inc., September 1997.

aircraft or number of enplaned passengers, the traffic density, and the type or nature of operations being conducted". It also establishes the following minimum criteria for Class C airspace designation at an airport:

- The airport must be serviced by an operational ATCT and radar approach control.
- One of the following applies:
  - An annual instrument operations count of 75,000 at the primary airport;
  - An annual instrument operations count of 100,000 at the primary and secondary airports in the terminal hub area; or
  - An annual count of 250,000 enplaned passenger at the primary airport.

The FAA defines Class C airspace as airspace that includes an area within 10 nautical miles radius from the Airport Reference Point (ARP) up to a maximum height of 4,000 ft above the airport elevation. Typically the airspace extends down to the surface within a 5 nautical mile radius of the ARP and no lower than 1,200 ft between the 5 and 10 nautical mile circles. Under all forecast scenarios, SSA during the IAP is expected to handle more than 250,000 enplaned passengers by DBO+5. At such time as activity levels at SSA reach the minimum criteria for Class C airspace designation, the airport sponsor would need to coordinate with FAA to determine if and when such a designation may be warranted. Midway International Airport has Class C Airspace, while O'Hare International Airport, one of the busiest airports in the nation, has Class B Airspace.

C.5 - Proposed IAP Runway Orientation

Based on information developed in the analysis, it was concluded that the fleet mix expected to serve SSA during the IAP would be capable of operating on a primary runway (09/27) and accommodating all aircraft more than 95 percent of the time during All-Weather conditions. It should be noted that it is practically impossible to accommodate 100 percent all-weather activity at any airport. Regardless of the number of runways and their orientation, there will be times when the airport will have to cease all activity temporarily due to inclement weather conditions.

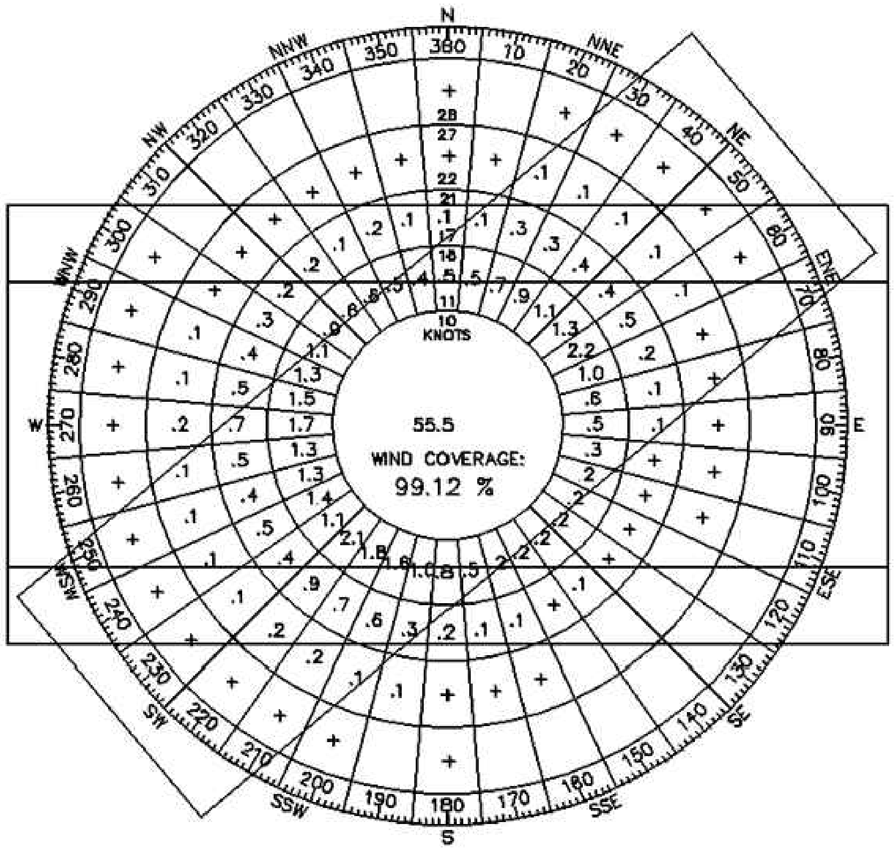
Table C-4: Monthly Occurrences of Ceiling/Visibility Conditions at MDW indicates that IFR conditions exist at the SSA site approximately 9 percent of the time during each year. Thus, for commercial passenger and cargo aircraft, a primary runway with a 09-27 orientation provides greater than 95 percent wind coverage. However, the runway would require a CAT I approach to provide greater than 95 percent coverage under the ceiling and visibility conditions expected to occur at the airfield site. During All-Weather conditions, meteorological data indicate that aircraft should land on the Runway 27 end 62 percent of the year (westerly flow) and on the Runway 09 end 38 percent of the year (easterly flow). During IFR conditions, meteorological data indicates that the split between easterly and westerly flows should be almost equal (51.4 percent easterly flow, 48.4 percent westerly flow).[129]

During the Phase I Engineering Study several advisory committees were formed. One of them was the General Aviation Committee and included GA experts and industry representatives from throughout Illinois.[130] The prevailing opinion of the experts involved in the discussion was that once commercial operations at SSA reached a certain level of activity, GA pilots would most likely choose to fly to other airports due to the complexity of operating simultaneously with large aircraft. In addition, there are several reliever airports located around the SSA site, such as Lansing Municipal Airport and IKK that GA aircraft could land at when adverse winds prevent them from landing on the primary runway at SSA.

[129] Processed from 10 years of hourly observations collected between 1991 and 2000 at Midway International Airport and archived by the National Oceanic and Atmospheric Administration (NOAA), Murray and Trettel, Inc., 2004.
[130] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.

ALL WEATHER – MIDWAY WINDROSE

1991–2000



ALL WEATHER WIND COVERAGE

RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	91.21%	95.86%	98.89%
5/23	94.10%	97.74%	99.40%
COMBINED	97.85%	99.38%	99.84%

Illinois Department of Transportation
Division of Aeronautics

SouthSuburbanAirport

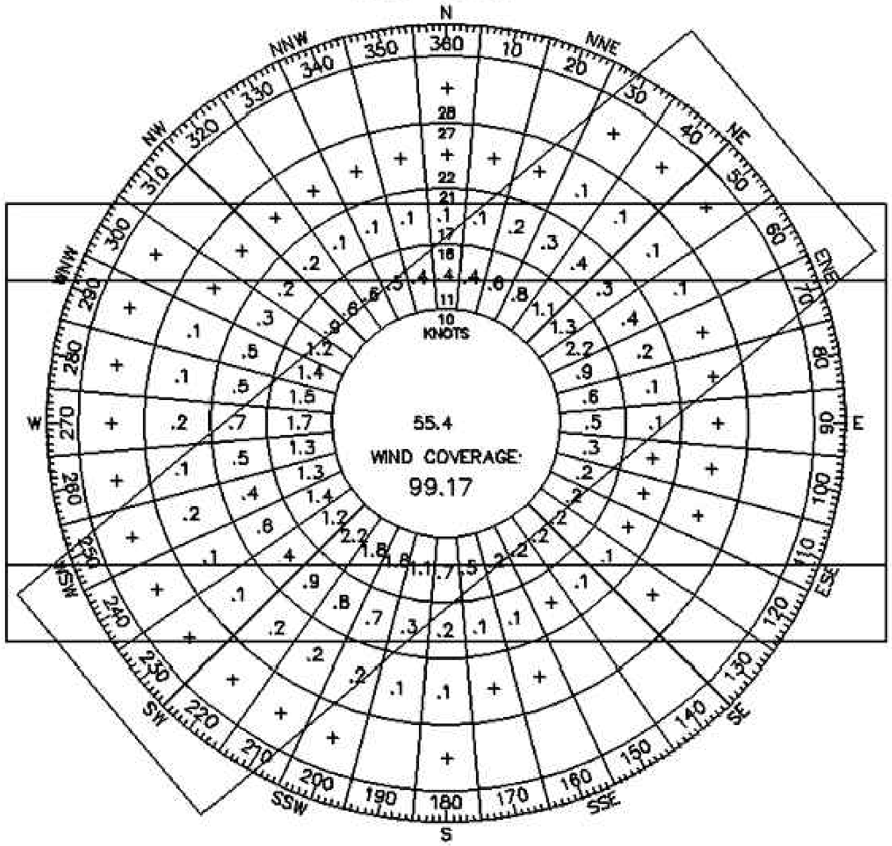
ALL WEATHER - MDW WINDROSE
ALL WEATHER WIND COVERAGE

SSA MASTER PLAN
FACILITY REQUIREMENTS

EXHIBIT
C-1

VFR WEATHER – MIDWAY WINDROSE

1991–2000



VFR WIND COVERAGE

RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	91.17%	95.65%	99.03%
5/23	94.21%	97.44%	99.70%
COMBINED	97.93%	99.32%	99.87%

Illinois Department of Transportation
Division of Aeronautics

SouthSuburbanAirport

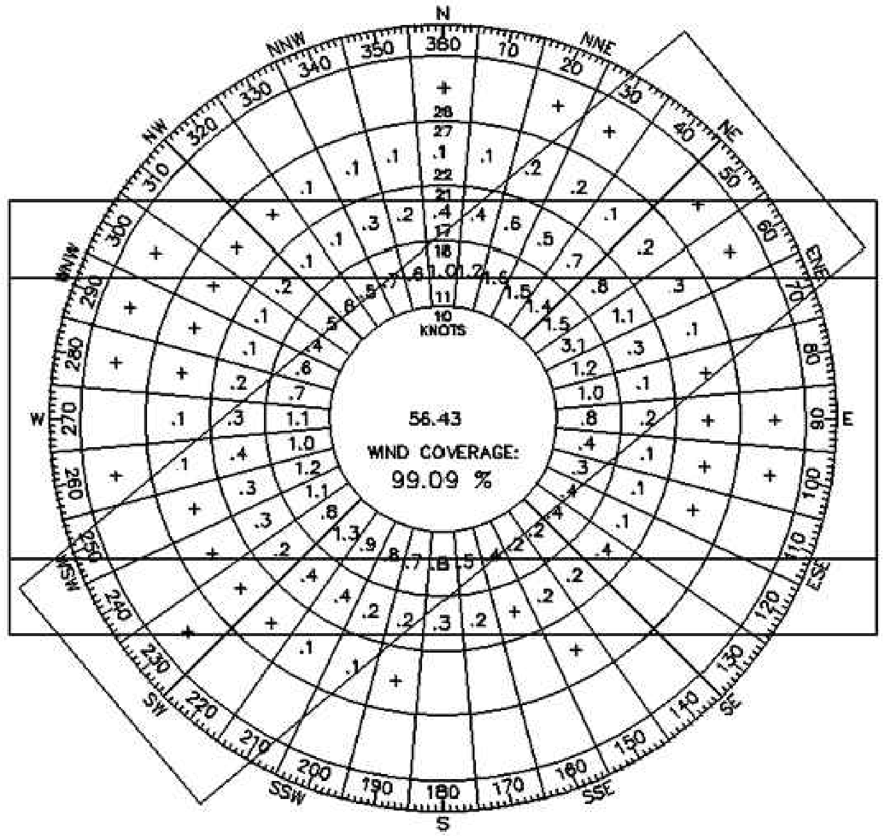
VFR WEATHER - MDW WINDROSE
VFR WIND COVERAGE

SSA MASTER PLAN
FACILITY REQUIREMENTS

EXHIBIT
C-2

IFR CONDITIONS – MIDWAY WINDROSE

1991–2000



IFR WIND COVERAGE

RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	89.84%	94.73%	98.66%
5/23	94.92%	97.67%	99.52%
COMBINED	96.98%	98.88%	99.68%

Illinois Department of Transportation
Division of Aeronautics

SouthSuburbanAirport

IFR CONDITIONS - MDW WINDROSE
IFR WIND COVERAGE

SSA MASTER PLAN
FACILITY REQUIREMENTS

EXHIBIT

C-3

APPENDIX D - Airport Traffic Control

Appendix D – Airport Traffic Control. ATCT is the focal point for controlling flight operations within the airport's designated airspace, as well as all aircraft and vehicle movement on the air operations area (AOA). Since SSA is not an operating airport, there are no applicable FAA criteria for the establishment of an ATCT at DBO. However, the airport sponsor could construct an ATCT at SSA during the IAP without Federal participation, if desired. FAR Part 170, *Establishment and Discontinuance Criteria for Airport Traffic Control Tower Facilities and FAA Order 7031.2C, Airway Planning Standard Number One –Terminal Air Navigation Facilities*, Chapter 4, provides guidelines for determining if an airport would be a candidate for an ATCT facility.

SSA could also be considered for FAA's contract tower program. Any future ATCT facility should meet the FAA's planning and design standards[131] and should be located equidistant from all planned operational areas, particularly the runway ends. The elevation of the tower should be adequate to ensure unobstructed views to all runway approaches, airside and terminal facilities that are under ATCT control. Convenient access by the ATCT personnel and maintenance staff is also important in locating the ATCT facility.

The tower structure design would follow the guidelines described in FAA Order 6480.7C, *Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design Guidelines*.

The FAA classifies ATCT facilities into five main categories, designated by activity levels. The distinction in levels is based on the type (VFR or IFR) and volume of operations, and is used to establish personnel requirements, equipment type, facility complement and rate of growth. There are currently three nominal ATCT design classifications, based on the hourly activity at an airport: Low, Intermediate and Major Activity ATCT facility.

Based on the high long-range projections of hourly operations for DBO+6 to DBO+20, an ATCT at SSA would be categorized as a Low Radar Activity – Level III facility, if this level of operations were achieved by DBO+20. Under the low long-range projections, the level of hourly operations would place a potential ATCT into the Level II Limited Radar Approach category. **Table D-2: ATCT Planning Criteria – DBO+6 to DBO+20** lists the elements that should be considered in planning and design of the ATCT facility under both projections. It is expected that the FAA will conduct its own study at the appropriate time to determine the need, final location and elevation of a potential Air Traffic Control Tower (ATCT). The ATCT that is constructed during the IAP should be ideally located and sized for the DBO+6 to DBO+20 planning horizon.

The ATCT elevation will be determined in accordance with FAA Order 6480.4A, *Airport Traffic Control Tower Siting Process*. At the appropriate time, the FAA would conduct its own study to determine the final location and elevation of the ATCT.

Table D-1: ATCT Planning Criteria – DBO+6 to DBO+20

Case	Activity Radar Level	Air Traffic Control Classification	Control Cab Size (sf)	Tower Height (ft)	Radar/ Automation Equipment	Site Area (sf)	Parking Spaces	Parking Area (sf)	Perimeter and Future Expansion (sf)
Low	Low	II	Over 220	Up to 97	None	4,800	10-40	2,700 to 10,800	Up to 10,000
High	Low	III	Over 350	75-99	ARTS/II/IIA	4,800	10-40	2,700 to 10,800	Up to 10,000

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

[131] FAA Order 6480.7D, *Airport Traffic Control Tower and Terminal Radar Approach Facility Design Guidelines,* August 2004.

Appendix E - Airport Imaginary Surfaces Established by Height Surfaces

Airport Imaginary Surfaces Established by Height Surfaces. There are three types of imaginary airspace surfaces that can be established approach and departure procedures at airports. These are:

- 14 CFR Part 77 *Safe, Efficient Use and Preservation of Navigable Airspace*;
- TERPS, also a described in Part 77 in paragraph 23, *"Standards for Determining Obstructions"*; and,
- One Engine Inoperative Surfaces (OEI) that are identified in FAR Part 121.

E.1 – FAR Part 77 Surfaces

The primary importance of FAR Part 77 *Objects Affecting Navigable Airspace* is that it "establishes standards for determining obstructions in navigable airspace" and also performs aeronautical studies of obstructions to air navigation so-their effect on the safe and efficient use of airspace can be determined.

Analysis of proposed airfield geometry and facilities layout must also take into consideration potential obstructions to the FAR Part 77 Surfaces. Potential obstructions could be due to natural features (hills, terrain conditions) or manmade structures. Objects penetrating the runway primary surface and other aeronautical surfaces could be safety hazards for aircraft operations. Whenever the site does not meet obstruction criteria, airport planners should strive to find solutions in eliminating such hazards, if possible. Zoning policies (as applicable) should also be implemented to avoid the construction of structures that could affect the future development of the airport.

The types of runway approaches will depend on surrounding terrain and the level of activity that the airport could have. Ideally, there are several imaginary airspace surfaces that need to be protected from penetration by natural features and manmade structures in order to ensure a greater level of precision approaches. FAA defines the criteria and various types of imaginary obstruction surfaces of two of the three surfaces discussed in this appendix in FAR Part 77. In Part 77, FAA defines the following surfaces:

Runway Primary Surface: A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 ft beyond each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is 1,000 ft for precision approach runways and 500 ft for visual approach runways.

Runway Approach Surfaces: A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end as identified on **Table D-1: FAR Part 77 Civil Airport Imaginary Approach Surfaces, Dimensions and Slopes**. The slopes of the approach surface shall be measured in the vertical plane containing the runway centerline.

Table E-1: FAR Part 77 Civil Airport Imaginary Approach Surfaces, Dimensions and Slopes

NAVAID	Inner Edge Width (ft)	Outer Edge Width (ft)	First Section Length (ft) & Slope	Second Section Length (ft) & Slopes
Visual Approach	500	1,500	5,000 @ 20:1	N/A
Non-Precision Approach	1,000	4,000	10,000 @ 34:1	N/A
Precision Approach	1,000	16,000	10,000 @ 50:1	40,000 @ 40:1

Source: FAA FAR Part 77, Objects Affecting Navigable Airspace, April 1971.

Runway Transitional Surfaces: These surfaces extend outward and upward at right angles to the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface that project through and beyond the limits of the conical surface extend a distance of 5,000 ft measured horizontally from the edge of the approach surface and at right angles to the runway centerline. The elevation along the side of the approach surface should be equal to the elevation of the approach surface at that point, and along the primary surface it should equal the elevation of the nearest point on the runway centerline or its extension.

Horizontal Surface: A horizontal plane 150 ft above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway and connecting the adjacent arcs by lines tangent to those arcs. In the case of a precision runway, the arcs have a 10,000 ft radius; visual runways have an arc of 5,000 ft.

Conical Surface: A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 ft.

According to FAA guidelines, an approach surface or a transitional surface shall not permit new objects or extensions of existing objects above it except when, in opinion of the proper authority, an existing immovable object would protect the new object or extension. Likewise, the conical surface and the horizontal surface shall not permit new objects or extensions of existing objects above its surface except when, in the opinion of the appropriate authority, an existing immovable object would shield an object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of aircraft operations.

E.2 - TERPS Surfaces

Another one of the FAR Part 77 Surfaces, *Paragraph 77.23: Standards for Determining Obstructions* is the FAA's published standardized methods to help planning and designing safe and efficient instrument flight procedures. These standards official name are the U.S. Standard for Terminal Instrument Procedures (TERPS). Also, TERPS procedures are described in FAA Order 8260.3B[132] and must be considered for obstacle clearance in the final approach on runways with instrument landing systems. These surfaces become especially important after an aircraft is more than 5,000 ft from an airport. Each approach and departure procedure tied to a land-based or air based (Global Positioning System or aircraft navigational aid) has its own specific surface. These can include both precision and non-precision instrument surfaces. If depicted in a three dimensional representation, TERPS can surfaces begin within Part 77 imaginary surfaces but are particularly important abutting them, another ring of surfaces beyond the Part 77 imaginary surfaces if you will. TERPS surface's geometry can be either a geometric plane, like the Part 77 horizontal surface, or a sloped surfaces with side transition slopes like a visual, non-precision, or precision instrument surface. Accordingly, there is a complicated mix of overlapping surfaces associated with an airport. The more runway orientations and approach and departure procedures an airport has, the more complex the interrelated Part 77 Imaginary, TERPS and OEI surfaces become.

Final Approach Area is 50,000 ft long measured outward along the final approach course from a point beginning 200 ft outward from the runway threshold. It is centered on the extended centerline and has a width of 1,000 ft at a point 200 ft from the runway threshold and expands uniformly to a width of 16,000 ft at a point 50,000 ft from the point of beginning. This width further expands uniformly where greater length is required.

Final Approach Obstacle Clearance Surface is an inclined plane, which originates at the runway threshold elevation, 975 ft outward from the Glide Point of Interception and overlies the Final Approach Area. This surface is divided in 2 sections: an inner 10,000-ft section and an outer 40,000-ft section. The slope of the surface changes at the 10,000-ft point. The 50:1 and 40:1 slopes were considered applicable and used in the obstacle analysis of the primary runway.

[132] FAA, *United States Standards for Terminal Instrument Procedures (TERPS)*, Directive No. 8260.3B up to Change 21, June 2009.

Transitional Surfaces are inclined planes with a slope of 7:1, which extend upward from the edge of the final approach area, starting at a height of the applicable final approach surface and extending laterally for a distance of 5,000 ft at right angles to the final approach point.

According to the FAA, no obstacle is permitted to penetrate the final approach or the transitional surfaces. These surfaces were examined for a preliminary obstruction analysis at SSA for the primary east-west runway to ensure that no object would adversely affect the safety of aircraft operations. However, IDOT expects that FAA will require the conduct surveys as defined in FAA Advisory Circular 150/5300-16, -17 and -18.

E.3 - One Engine Inoperative (OEI)

OEI surface is not a Part 77 Surface but it is a mandatory FAA regulated surface cited within the FAR under Part 121. The title of Part 121 is *Operating Requirements: Domestic, Flag, and Supplemental Operations*.[133] These are rules that apply to operators of aircraft providing schedule service.

A key provision of FAR Part 121 is Sec. 121.189 — *Airplanes: Turbine engine powered: Takeoff limitations* in which it states that when an aircraft takes off, the pilot needs to be aware of the aircraft's takeoff weight such that the aircraft will clear all natural or man-made objects by a minimum set feet should it lose an engine right after it passes takeoff decision speed.

One of the complications of understand exact provisions for providing an OEI surface is that it varies from aircraft to aircraft, from engine type to engine type, and with varying temperature and humidity. Practically, a pilot has to calculate his runway length requirements before each and every takeoff in order to understand what he needs to do to take into consideration OEI surfaces.

Because of the almost infinite number of variations of OEI surfaces as each combination of aircraft, loading weights, engine type, runway length requirements and specific takeoff conditions prescribes the needed OEI for that departure, the FAA does not identify specific surfaces for OEI. However, FAR Part 121 requires a pilot to know what they are specifically that that departure under those conditions and to adhere to the requirements when taking off. Therefore, if a particular runway length does not provide the necessary length for the pilot to take off and adhere to Part 121, the pilot must make adjustments. These adjustments usually mean not reduction of maximum takeoff weight, thereby reducing load. Those load penalties may be a combination of fewer passengers on board, less fuel, and less cargo.

For airports, OEI becomes a difficult proposition to deal with. The FAA does not provide specific guidance for what an OEI surface should be and as one can see it can vary widely. Nevertheless, the FAA requires that the surface be adhered to. Therefore, airports can protect the surfaces themselves after they figure out what surface to protect but do so at their own cost, as the cost of purchasing land to protect these surfaces are not federally eligible costs. Or airports can, as they mostly do, leave the calculations up to pilots who impose upon themselves the necessary operating penalties for the departure operation at the time.

So what actually does this mean in terms of spatial allocation, i.e., protection of an OEI surface? Generally, if an object penetrates a FAR Part 77 surface, but does not penetrate a TERPS surface, it is not a hazard. Normally the object can then be constructed as long as it is appropriately marked and provided with obstruction lights. Marked and lighted objects are shown on aeronautical charts. However, the FAA does not look for penetrations to Part 121 when they perform aeronautical studies because they do not identify parameters for OEI surfaces.

The awareness of FAR Part 121 requirements for all parties – Airport Sponsors, airlines, and airline pilots -- is not at all new. Airport Sponsors have long known that these loopholes exist in Federal guidance governing approach and

[133] Index of Part 121 and subparts, Internet http://www.risingup.com/fars/info/121-index.shtml

departure procedure requirements under Part 77. However, although few airports have taken a pro-active approach and enacted local zoning that establishes three-dimensional surfaces off the ends of runways for the purpose of protecting engine out departures.[134]

That begs the question at hand, what surface needs to be protected since each aircraft has a different profile depending upon the circumstances of takeoff. Ideally, the surface would be 100:1 (1 ft vertical rise for 100 ft horizontal) which is the surface the FAA uses to prequalify structures built in the vicinity of every airport in the U.S. in a 4-mile radius according to their FAA Form 7460.[135] Significantly, the Airport Board for the Dallas/Fort Worth International Airport was able to negotiate a 100:1 surface off airport for governing heights when it was constructed in 1964 and that surface remains as the best example in the U.S.. In general such a protected surface would not impose any offloading penalties for the takeoff weight for a B-747-400. For most airports, the B-747-400 is weight limited for particular wind conditions and high ambient temperatures since it is not possible to protect surfaces to that level.

Therefore, what surface is reasonable to protect? Some airports have applied a 75:1 surface while others have applied a 62.5:1 surface. Recently, there was a significant change made to FAA's Advisory Circulars. Change 9 to FAA Advisory Circular 150/5300-13, Airport Design, which established a provision for a 62.5:1 surface for air carrier operations, which was to have taken effect in 2008. This mention was for "informational purposes only", meaning not mandatory or to be considered as Federal regulatory guidance, carrying the possible consideration of getting into a program with airports to protect the surface. However, the mere mentioning of an OEI surface as one that should be recognized opens the door to the FAA for future consideration. This has been a long-standing issue with the FAA and has become an important topic for many airports and many airlines.

The FAA is not silent on the potential issue of regulating the surface. The FAA's "Airport Obstructions Standards Committee" is now said to be looking at this OEI and attempting to identify reasonable standards that will provide protection for FAR Part 121 requirements. Accordingly, the FAA could establish new standards in the future but with no scheduled time line. At the same time, there is much speculation about how long it might be before an OEI surface becomes an FAA regulated surface like Part 77 Imaginary and TERPS. IDOT's consultants indicate that there is considerable speculation about this topic in the industry and how long it might be any becomes definitive from the FAA. Speculation ranges greatly from 5-20 years.

In conclusion, most airports do not have any guidelines for OEI at the present time. The best that typically exists is the standard precision approach 50:1 FAR Part 77 Surface.

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[134] The Dallas/Fort Worth International Airport, Tampa International Airport, Phoenix International Airport, Miami International Airport, George Bush Intercontinental Airport, and the Houston William P. Hobby Airport are examples of airports that provide some type of protection for OEI surfaces.

[135] FAA Form 7460-1, Notice of Proposed Construction or Alteration, downloadable from forms.faa.gov/forms/faa7460-1.pdf

APPENDIX F – Draft Demand/Capacity Analysis & Facility Requirements Report dated March 21, 2005:

This 2010 Facility Requirements report is an update of the ***Demand/Capacity & Facility Requirements for the Inaugural Airport Program for the South Suburban Airport*** prepared by IDOT dated March 21, 2005 and is included in this Appendix for reference purposes. Both the 2005 document and this 2010 chapter update document are the basis for the next chapter of the master plan, ***Chapter 4 - Alternatives Development and Evaluation***. This chapter analyzes updated information requested by the FAA and documents physical changes in conditions which have occurred since 2005.

Airport Master Plan For The
South Suburban Airport Project

DEMAND/CAPACITY ANALYSIS & FACILITY REQUIREMENTS FOR THE INAUGURAL AIRPORT PROGRAM SOUTH SUBURBAN AIRPORT

Prepared By:
TAMS, an Earth Tech Company

Draft

Prepared for the
Illinois Department of Transportation

Monday, March 21, 2005

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Topic **Page Number**

List of Tables

List of Exhibits

Section 1 - Introduction

The purpose of this report is to analyze and present the Inaugural Airport Program (IAP) facility requirements needed to meet aviation demand as presented in the draft report *Projections of Aeronautical Activity for the Inaugural Airport Program* dated May 11, 2004. This *Demand/Capacity Analysis and Facility Requirements* report focuses on the facilities required during the IAP. The IAP is an initiative by the Illinois Department of Transportation (IDOT) to plan, design, construct and operate a new airport at the South Suburban Airport (SSA) site in eastern Will County, Illinois. The SSA site was approved as a feasible location for an airport by the FAA in their Record of Decision (ROD) on the Tier 1 Environmental Impact Statement for South Suburban Airport, dated July 12, 2002.

The Federal Aviation Administration (FAA) has issued guidance for the development of airport master plans and airport design. FAA Advisory Circular (AC) 150/5070-6A[1], in conjunction with AC 150/5300-13[2], and associated FAA documents were used as guidelines for developing the Inaugural Airport facility requirements.

For existing airports, a demand/capacity analysis is typically conducted to correlate the activity forecasts with existing airport facilities and determine what, if any, improvements are required to meet the projected demand. However, since SSA is a proposed new airport, demand will be met by an entirely new facility that will be planned to expand according to market forces. Thus, this report serves a dual role in addressing both demand/capacity and facility requirements for SSA.

As indicated in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, "Forecasts include a level of uncertainty and need to compensate for that uncertainty by developing flexible airport plans, allowing the decision makers to accelerate or defer projects as needed".[3] In recognition of this, three forecast scenarios were developed for the IAP, based on different assumptions concerning how and when activity might develop at the proposed airport. These forecast scenarios, labeled Low Case, Base Case and High Case in the forecast report, form the basis of the facility requirements analysis contained in this report. Accordingly, facilities required to meet each of the different forecast scenarios will be identified and discussed.

The IAP is defined as the first five-year planning period for SSA, from the first year of operation (defined as Date of Beneficial Occupancy or DBO+1) through the fifth year of operation (DBO+5), and while this report focuses on the IAP, it also identifies potential airport facilities beyond the IAP. Major topics analyzed and discussed in this report include airport classification, airfield facility requirements, passenger terminal facility requirements, support/ancillary facility requirements and ground transportation facility requirements.

[1] FAA, Advisory Circular 150/5070-6A, *Airport Master Plans*, June 1985.
[2] FAA, AC 150/5300-13, *Airport Design* up to Change 8, September 2004.
[3] FAA, "Forecasting and Capacity Requirements in an Uncertain Environment", 2002 FAA Commercial Aviation Forecast Conference, Washington, DC, March 12-13, 2002.

Section 2 – IAP Airport Classification

2.1 FAA Airport Reference Codes (ARC)

The Airport Reference Code (ARC) as defined in FAA's Advisory Circular (AC) 150/5300-13, *Airport Design,* is used to classify an airport and determines the FAA airport planning criteria to which the airport must comply. As stated in the AC, the ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport. The ARC is based on two characteristics. The first is an operational characteristic called the Aircraft Approach Category, which is depicted by a letter. This classification includes Categories A to E, with "A" corresponding to the slowest speed and E to aircraft with the fastest approach speeds. The second component, depicted by a Roman numeral is the Airplane Design Group (ADG), which is defined by the aircraft's wingspan. The combination of the two components defines the ARC for the airport (i.e., B-II or D-IV). **Table 2-1** provides the FAA criteria for the Airport Reference Code system, relating airport design criteria with the operational and physical characteristics of the most demanding aircraft expected to operate at that airport.

Airport planners need to identify the most demanding aircraft group that is expected to use the airport on a regular basis in order to determine the airport ARC. FAA Order 5100.38B, *Airport Improvement Handbook,* states that the critical aircraft should have at least 500 annual itinerant operations. Once a critical design aircraft has been identified, the ARC design criteria for the airport can be defined (see **Table 2-1**).

Presently the largest passenger aircraft is the Boeing 747-400 with a wingspan of 213 feet; it is classified as ADG V. The largest existing cargo aircraft is the Antonov 124, with a wingspan of 232 feet; it is the only existing commercial airplane in the ADG VI category. Airbus is in the final design/production stages of its A-380, which is expected to be in service around 2006. This aircraft will be also classified as an ADG VI, with a wingspan of 262 feet and expected approach speeds of 145 knots. Thus, to accommodate an A-380, an airport must meet planning criteria for an ARC of D-VI.

Table 2-1
FAA Airport Reference Code System

Aircraft Approach Category	Aircraft Approach Speed (knots)	Aircraft Design Group (ADG)	Aircraft Wingspan (feet)
A	Less than 91	I	Less than 49
B	91-120.99	II	49-78.99
C	121-140.99	III	79-117.99
D	141-165.99	IV	118-170.99
E	166 or greater	V	171-213.99
		VI	214-262

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, Change 8, September 2004.

2.2 Proposed IAP Fleet Mix

The aircraft fleet mix serving an airport provides guidance for the preparation of facility requirements and operational requirements. Since SSA is a new airport without an existing aircraft fleet, an analysis of the domestic U.S. fleet mix from 1990-2002 was conducted to determine the most likely aircraft fleet expected at the airport, based on the anticipated markets and type of airline operations. This analysis is discussed in Appendix 2 of the draft forecasts for SSA[4]. In addition to examining the U.S. fleet mix, the study assessed the fleet mix at O'Hare International Airport and Midway International Airport to identify fleet mix characteristics in the region. Other U.S. airports that have similar passenger activity levels or types of airline operations that could be expected at SSA during the IAP were also analyzed.

Initial evaluations pointed to a greater potential market for low-cost carriers (LCC) at SSA during its first years of operation. The typical fleet characteristics and average load factors of LCCs were assessed. Low fare airlines tend to keep their aircraft fleet homogenous, which helps to optimize their operation and maintenance costs. Most U.S. domestic LCCs operate aircraft within the 121 to 140-seat range. This aircraft group is also becoming the predominant group for U.S. domestic activity, as shown by historical USDOT T-100 statistics.[5] Thus, most of the scheduled commercial aircraft at IAP are forecasted to be narrow body jets ranging from 101 to 160 seats with some regional jets (37 to 100 seats). This fleet mix is very similar to the fleets existing at supplementary airports predominantly served by LCCs such as Manchester Airport, NH; T.F. Green Providence Airport, RI and Houston-Hobby Airport, TX in 2002.

The draft *Projections of Aeronautical Activity for the Inaugural Airport Program* identified potential markets, frequency of service, aircraft sizes and load factors by destination for the Low Case, Base Case and High Case forecast scenarios from DBO+1 through DBO+5. Using this information a potential fleet mix for each of the scenarios, along with their corresponding aircraft characteristics, is identified and discussed below. The types of aircraft identified in the following tables are expected to arrive and depart at least once per weekday, which meets the FAA criteria of 500 annual itinerant operations used to determine the ARC.

Low Case Forecast Scenario

In DBO+1, aircraft in the C-III category are expected to operate under the Low Case forecast scenario. In DBO+5, airplanes within the categories C-II and C-III are expected. Examples of these aircraft are identified in **Table 2-2** and **Table 2-3**.

Table 2-2
Potential Aircraft Fleet Mix, DBO+1
Low Case Forecast Scenario

Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 737-800	C-III	117.5	129.6	41.2	174,200

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

[4] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.
[5] Onboard Data Base Products (DBP), 2003, courtesy of The al Chalabi Group, Ltd.

Table 2-3 Potential Aircraft Fleet Mix, DBO+5 Low Case Forecast Scenario					
Aircraft	**ARC[1]**	**Maximum Wingspan (feet)**	**Length (feet)**	**Tail Height (feet)**	**Max. Takeoff Weight (pounds)**
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 717	C-III	93.3	124.0	29.8	118,000
Boeing 737-400 (Cargo)	C-III	94.8	119.6	36.6	150,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Bombardier CRJ900	C-II	76.3	119.4	24.1	84,500

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

Base Case Forecast Scenario

Under the Base Case forecast scenario, C-III aircraft are expected to be operating regularly at SSA during DBO+1. Examples of these potential aircraft with their characteristics are identified in **Table 2-4**. By DBO+5, commercial aircraft from categories C-II, C-III and C-IV are expected to operate regularly at SSA. Examples of these prospective aircraft and their characteristics are identified in **Table 2-5**.

Table 2-4 Potential Aircraft Fleet Mix, DBO+1 Base Case Forecast Scenario					
Aircraft	**ARC[1]**	**Maximum Wingspan (feet)**	**Length (feet)**	**Tail Height (feet)**	**Max. Takeoff Weight (pounds)**
Airbus 320	C-III	111.3	123.3	39.1	145,505
Boeing 737-400 (Cargo)	C-III	94.8	119.6	36.6	150,000
Boeing 737-800	C-III	117.5	129.6	41.2	174,200

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

Table 2-5 Potential Aircraft Fleet Mix, DBO+5 Base Case Forecast Scenario					
Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Airbus 300-600 (Cargo)	C-IV	147.1	177.5	54.4	378,600
Airbus 319	C-III	111.9	111.0	38.7	166,500
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 717	C-III	93.3	124.0	29.8	118,000
Boeing 737-400 (Cargo)	C-III	94.8	119.6	36.6	150,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Boeing 757-200 (Cargo)	C-IV	124.1	155.3	45.1	255,000
Boeing 767-200 (Cargo)	C-IV	156.1	159.2	52.9	315,000
Bombardier CRJ900	C-II	76.3	119.4	24.1	84,500
Embraer 190	C-III	94.3	118.11	34.7	110,893

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

High Case Forecast Scenario

Under the High Case forecast scenario, commercial aircraft under the categories C-III and C-IV are expected to utilize SSA during DBO+1. Examples of these potential aircraft and their characteristics are identified in **Table 2-6**. By DBO+5, airplanes under the categories C-II, CIII and C-IV are expected to utilize SSA. Examples of these prospective aircraft and their characteristics are identified in **Table 2-7**.

Table 2-6 Potential Aircraft Fleet Mix, DBO+1 High Case Forecast Scenario					
Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Airbus 300-600 (Cargo)	C-IV	147.1	177.5	54.4	378,600
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 737-400 (Cargo)	C-III	94.8	119.6	36.6	150,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Boeing 767-200 (Cargo)	C-IV	156.1	159.2	52.9	315,000

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

Table 2-7
Potential Aircraft Fleet Mix, DBO+5
High Case Forecast Scenario

Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Airbus 300-600 (Cargo)	C-IV	147.1	177.5	54.4	378,600
Airbus 319	C-III	111.9	111.0	38.7	166,500
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 717	C-III	93.3	124.0	29.8	118,000
Boeing 737-400 (Cargo)	C-III	94.8	119.6	36.6	150,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Boeing 757-200 (Cargo)	C-IV	124.1	155.3	45.1	255,000
Boeing 767-200 (Cargo)	C-IV	156.1	159.2	52.9	315,000
Bombardier CRJ700	C-II	76.3	106.8	24.10	75,000
Bombardier CRJ900	C-II	76.3	119.4	24.1	84,500
Embraer 170	C-III	85.4	98.1	31.9	82,012
Embraer 190	C-III	94.3	118.11	34.7	110,893

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
[1]ARC = Airport Reference Code

In summary, most of the commercial aircraft expected to be operating at SSA by DBO+5 will be under the ARC C-III designation, but both the Base and High Case forecast scenarios also predict that aircraft designated as ARC C-IV will be operating at that time.

2.3 Proposed IAP Schedule

The following tables (**Tables 2-8** through **2-13**) present a potential commercial airline schedule for SSA during its first five years of operation, for the Low, Base and High Case forecast scenarios for the 4th quarter of years DBO+1 and DBO+5. The prospective airline schedules are based on the aviation forecasts prepared in the draft forecast report for SSA.[6]

To develop the potential airline schedule, IDOT used the typical trends that airlines follow to provide service to business and leisure markets. The commercial aircraft fleet mix used for this exercise is identical to the one included in the aviation forecast report. The aircraft models are examples of the airplanes that could be used to serve those markets, and correspond to the number of seats per aircraft and load factors presented in the forecast report for each of the forecast scenarios.

[6] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Table 2-8
Potential Aircraft Schedule, 4th Quarter of DBO+1
Low Case Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
6:30 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-9
Potential Aircraft Schedule, 4th Quarter of DBO+5
Low Case Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:30 PM)	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	6:50 AM
(8:45 PM)	**NY+**	NY	New York CMSA	B-717	7:00 AM
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
(9:00 PM)	**LA+**	CA	Los Angeles CMSA	B-737-700	8:20 AM
9:10 AM	**NY+**	NY	New York CMSA	B-717	10:00 AM
10:30 AM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	11:15 AM
10:45 AM	**PHX**	AZ	Phoenix	A-320	11:30 AM
11:00 AM	**LAS**	NV	Las Vegas	A-320	11:45 AM
2:20 PM	**MCO**	FL	Orlando	B-737-800	3:10 PM
3:15 PM	**NY+**	NY	New York CMSA	B-717	4:00 PM
5:40 PM	**LA+**	CA	Los Angeles CMSA	B-737-700	6:25 PM
6:30 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM
6:40 PM	**PHX**	AZ	Phoenix	A-320	7:25 PM
6:45 PM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	7:30 PM
7:45 PM	**NY+**	NY	New York CMSA	B-717	8:30 PM
Cargo Aircraft					
4:00 AM			Domestic Cargo	B-737-400	10:00 PM
4:30 AM			Domestic Cargo	B-737-400	10:30 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-10
Potential Aircraft Schedule, 4th Quarter of DBO+1
Base Case Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
10:30 AM	**PHX**	AZ	Phoenix	A-320	11:15 AM
11:00 AM	**LAS**	NV	Las Vegas	A-320	11:45 AM
2:20 PM	**MCO**	FL	Orlando	B-737-800	3:10 PM
6:30 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM
Cargo Aircraft					
4:00 AM			Domestic Cargo	B-737-400	10:00 PM
4:30 AM			Domestic Cargo	B-737-400	10:30 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-11
Potential Aircraft Schedule, 4th Quarter of DBO+5
Base Case Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:30 PM)	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	6:50 AM
(8:45 PM)	**NY+**	NY	New York CMSA	B-717	7:00 AM
(9:00 PM)	**ATL**	GA	Atlanta	CRJ900	7:10 AM
(9:20 PM)	**BOS**	MA	Boston CMSA	EMB 190	7:20 AM
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
(10:00 PM)	**SFO**	CA	San Francisco/ Oakland CMSA	B-737-700	8:00 AM
(9:00 PM)	**LA+**	CA	Los Angeles CMSA	B-737-700	8:20 AM
(10:00 PM)	**MIA**	FL	Miami/Ft Lauderdale CMSA	A-319	8:25 AM
9:10 AM	**NY+**	NY	New York CMSA	B-717	10:00 AM
10:00 AM	**BOS**	MA	Boston CMSA	EMB 190	10:45 AM
10:30 AM	**PHX**	AZ	Phoenix	A-320	11:15 AM
10:30 AM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	11:15 AM
10:30 AM	**ATL**	GA	Atlanta	CRJ900	11:20 AM
11:00 AM	**LAS**	NV	Las Vegas	A-320	11:45 AM
2:20 PM	**MCO**	FL	Orlando	B-737-800	3:10 PM
3:10 PM	**NY+**	NY	New York CMSA	B-717	4:00 PM
4:00 PM	**MIA**	FL	Miami/Ft Lauderdale CMSA	A-319	4:44 PM
5:35 PM	**LA+**	CA	Los Angeles CMSA	B-737-700	6:25 PM
6:00 PM	**ATL**	GA	Atlanta	CRJ900	6:45 PM
6:05 PM	**SFO**	CA	San Francisco/ Oakland CMSA	B-737-700	6:48 PM
6:15 PM	**BOS**	MA	Boston CMSA	EMB 190	7:00 PM
6:30 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM
6:40 PM	**PHX**	AZ	Phoenix	A-320	7:25 PM
6:50 PM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	7:30 PM
7:15 PM	**NY+**	NY	New York CMSA	B-717	8:00 PM
Cargo Aircraft					
4:00 AM			Domestic Cargo	B-737-400	10:00 PM
4:30 AM			Domestic Cargo	B-737-400	10:30 PM
10:00 AM			Domestic Cargo	B-757-200	11:30 PM
10:30 AM			Domestic Cargo	B-757-200	12:30 PM
2:00 PM			International Cargo	A-300-600	3:45 PM
4:00 PM			International Cargo	B-767-200	6:00 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-12
Potential Aircraft Schedule, 4th Quarter of DBO+1
High Case Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
10:30 AM	**PHX**	AZ	Phoenix	A-320	11:15 AM
11:00 AM	**LAS**	NV	Las Vegas	A-320	11:45 AM
2:20 PM	**MCO**	FL	Orlando	B-737-800	3:10 PM
5:40 PM	**LA+**	CA	Los Angeles CMSA	B-737-700	6:25 PM
6:30 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM
Cargo Aircraft					
4:00 AM			Domestic Cargo	B-737-400	10:00 PM
4:15 AM			Domestic Cargo	B-737-400	10:15 PM
4:30 AM			Domestic Cargo	B-737-400	10:30 PM
2:00 PM			International Cargo	A-300-600	3:45 PM
4:00 PM			International Cargo	B-767-200	6:00 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

Table 2-13
Potential Aircraft Schedule, 4th Quarter of DBO+5
High Forecast Scenario

Arriving Time	Airport Code[1]	State	Metropolitan Area	Aircraft Type	Departing Time
Passenger Aircraft					
(8:10 PM)	**DTW**	MI	Detroit CMSA	EMB 170	6:45 AM
(8:30 PM)	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	6:50 AM
(8:45 PM)	**NY+**	NY	New York CMSA	B-717	7:00 AM
(9:00 PM)	**ATL**	GA	Atlanta	CRJ900	7:10 AM
(9:10 PM)	**MSP**	MN	Minneapolis/St Paul	CRJ700	7:15 AM
(9:20 PM)	**BOS**	MA	Boston CMSA	EMB 190	7:20 AM
(9:25 PM)	**DEN**	CO	Denver	CRJ900	7:35 AM
(9:40 PM)	**DFW**	TX	Dallas-Fort Worth CMSA	EMB 190	7:50 AM
(9:45 PM)	**MCO**	FL	Orlando	B-737-800	7:50 AM
(10:00 PM)	**SFO**	CA	San Francisco/ Oakland CMSA	B-737-700	8:00 AM
(9:00 PM)	**LA+**	CA	Los Angeles CMSA	B-737-700	8:20 AM
(10:00 PM)	**MIA**	FL	Miami/Ft Lauderdale CMSA	A-319	8:25 AM
9:10 AM	**NY+**	NY	New York CMSA	B-717	10:00 AM
10:00 AM	**BOS**	MA	Boston CMSA	EMB 190	10:45 AM
10:30 AM	**PHX**	AZ	Phoenix	A-320	11:15 AM
10:30 AM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	11:15 AM
10:35 AM	**ATL**	GA	Atlanta	CRJ900	11:20 AM
11:00 AM	**LAS**	NV	Las Vegas	A-320	11:45 AM
11:40 AM	**MSP**	MN	Minneapolis/St Paul	CRJ700	12:25 PM
12:40 PM	**LA+**	CA	Los Angeles CMSA	B-737-700	1:33 PM
2:15 PM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	3:00 PM
2:20 PM	**MCO**	FL	Orlando	B-737-800	3:10 PM
3:15 PM	**NY+**	NY	New York CMSA	B-717	4:00 PM
4:00 PM	**MIA**	FL	Miami/Ft Lauderdale CMSA	A-319	4:44 PM
5:00 PM	**DTW**	MI	Detroit CMSA	EMB 170	5:50 PM
5:05 PM	**DEN**	CO	Denver	CRJ900	5:55 PM
5:10 PM	**DFW**	TX	Dallas-Fort Worth CMSA	EMB 190	5:55 PM
5:15 PM	**MSP**	MN	Minneapolis/St Paul	CRJ700	6:00 PM
5:40 PM	**LA+**	CA	Los Angeles CMSA	B-737-700	6:25 PM
5:55 PM	**ATL**	GA	Atlanta	CRJ900	6:45 PM
6:00 PM	**SFO**	CA	San Francisco/ Oakland CMSA	B-737-700	6:48 PM
6:15 PM	**BOS**	MA	Boston CMSA	EMB 190	7:00 PM
6:25 PM	**LAS**	NV	Las Vegas	A-320	7:12 PM
6:40 PM	**PHX**	AZ	Phoenix	A-320	7:25 PM
6:45 PM	**WS+**	DC	Washington/Baltimore CMSA	CRJ900	7:30 PM
7:15 PM	**NY+**	NY	New York CMSA	B-717	8:00 PM
Cargo Aircraft					
4:00 AM			Domestic Cargo	B-737-400	10:00 PM
4:15 AM			Domestic Cargo	B-757-200	10:15 PM
4:30 AM			Domestic Cargo	B-737-400	10:30 PM
10:00 AM			Domestic Cargo	B-757-200	11:30 PM
10:15 AM			Domestic Cargo	B-757-200	12:00 PM
10:30 AM			Domestic Cargo	B-757-200	12:30 PM
2:00 PM			International Cargo	A-300-600	3:45 PM
3:00 AM			International Cargo	B-767-200	4:45 PM
4:00 PM			International Cargo	B-767-200	6:00 PM

Source: TAMS, an Earth Tech Company, 2004.
Note: Times in parentheses indicate aircraft parking overnight to be used for a.m. departures.
[1]Airport codes with a "+" sign indicates origin/destination to a Consolidated Metropolitan Statistical Area (CMSA), not a specific airport.

2.4 Proposed IAP Airport Reference Code (ARC)

Based on the aviation forecasts, potential aircraft fleet mix, and potential schedule the most demanding aircraft at SSA during the IAP are expected to be the following:

- Low Case Forecast Scenario - planning criteria is ARC C-III (i.e., B-737-800 and A-320).
- Base and High Case Forecast Scenarios - planning criteria is ARC C-IV (i.e., B-767-200 and A-300-600).

Thus, based on the information discussed above, the Illinois Department of Transportation will use an ARC designation of C-IV in preparing the Master Plan, Airport Layout Plan and subsequent planning documents for the IAP.

Section 3 – IAP Airfield Facility Requirements

3.1 Runway Orientation

The determination of runway orientation and configuration is predicated on the meteorological conditions at an airport. Meteorological data used in airport planning includes wind speed and direction for runway orientation, ceiling and visibility for approach and navigational aids, and temperature for runway length requirements.

Runways are aligned to permit operations into the wind and minimize crosswinds. In the United States, FAA policy is that:

> "Under ideal conditions aircraft takeoffs and landings should be conducted into the wind. However, other conditions such as delay and capacity problems, runway length, available approach aids, noise abatement and other factors may require aircraft operations to be conducted on runways not directly aligned into the wind."[7]

Weather and wind conditions in conjunction with existing airspace configuration are essential components that help to determine the best orientation of new runways at any airport. As a general rule, the runway coverage and orientation at an airport is dictated by the prevailing wind direction and velocity. The most desirable runway orientation is the one that provides the largest wind coverage and the minimum crosswind components.[8] Wind coverage typically represents the percentage of time during the year that crosswind components are below an acceptable velocity.

The crosswind component is defined as the resultant vector that acts at a right angle to the runway.[9] The maximum allowable crosswind component depends not only on the size of the aircraft but also on its approach speed as well as pavement condition. **Table 3-1** describes the allowable crosswind component for various aircraft categories.

Table 3-1
Aircraft Types by Allowable Crosswinds

Airport Reference Code (ARC)	Aircraft Category	Type of Aircraft	Allowable Crosswinds (knots)
A-I and B-I	Small GA aircraft	Cessna 172, Piper 310	10.5
A-II and B-II	Small GA and Small Turboprops	Beech 1900-C, BAE 31, EMB 110, EMB 120	13
A-III, B-III and C-I through D-III	Regional Jets and Narrow Body Jets	B-737-700, 800, 900, A-320-200, CRJ700, CRJ900	Greater than 16
A-IV through D-VI	Wide Body Jets	B-767, B-747, B-777, A-380	20

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, up to Change 8, September 2004.

[7] FAA Order 8400.9, *National Safety and Operational Criteria for Runway Use Programs*, November 9, 1981.
[8] FAA, AC 150/5300-13, *Airport Design,* Change 8, September 2004.
[9] Ibid.

Table 3-2
Aircraft Category and Allowable Crosswind Component

Aircraft Type	Aircraft Category	Allowable Crosswind Component (Dry Runway)	Allowable Crosswind Component (Wet Runway)
B-737-700/800/900	C - III	38 knots	29 knots
B-717-200	C - III	38 knots	29 knots
A-320	C - III	29 knots	20 knots
CRJ700	C - II	28 knots	Not Available
CRJ900	C - II	22 knots	Not Available
EMB-170	C - III	38 knots	31 knots
EMB-190	C - III	38 knots	31 knots
B-767-200	C - IV	38 knots	20 knots
A-300-B4	C - IV	38 knots	20 knots

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers; TAMS, an Earth Tech Company, 2004.

Table 3-2 lists the commercial aircraft fleet mix projected to operate at the Inaugural SSA and the allowable crosswind component for these aircraft.

The planning of the runway system for the IAP was governed by FAA standards described in Advisory Circular (AC) 150/5300-13, Change 8. The FAA requires that the runway system at an airport provide at least 95 percent wind coverage for all aircraft frequently using the airport. FAA also recommends that a crosswind runway should be planned when the primary runway is unable to accommodate 95 percent of activity in All-Weather conditions for aircraft regularly using the facility. The following section describes the historical wind and weather conditions at the South Suburban Airport site.

3.1.1 Potential Runway Configurations at SSA Site

The potential runway/taxiway system requirements for the South Suburban Airport were examined during the Phase 1 Engineering Study, conducted by IDOT from 1994-1998. This process included the comparison of an all-parallel runway system versus airfields with crosswind runways. Based on these parameters, seven alternate airfield configurations were developed and evaluated, as documented in the report *Selection of the Recommended Runway Configuration* (TAMS, 1996). The following seven criteria were employed to analyze and evaluate these alternatives:

1. Ability to accommodate future operational demand;
2. Ability to accommodate peak demand during CAT III (poorest weather) conditions using quadruple approaches;
3. Ability to avoid runway incursions;
4. Ability to expeditiously serve all types of aircraft and airfield operations;
5. Ability to avoid adversely impacting Chicago regional airspace, to preclude impacts to a general aviation corridor between the proposed airport and Midway Airport, and to minimize potential airspace impacts to nearby reliever airports;
6. Ability to minimize potential land use impacts and community disruption; and
7. Prove to be cost beneficial.

The FAA criteria stipulates that a minimum 4,300-foot separation distance is required between dual parallel runways and a minimum 5,000-foot separation distance is required for three or more parallel runways planned to serve simultaneous independent arriving aircraft during CAT III weather conditions[10].

While the alternatives analyzed were for a potential ultimate six-runway site configuration, the determination of the primary runway orientation is also relevant the IAP runway. The recommended airfield configuration identified in the Phase 1 Engineering Study consisted of *six* parallel air carrier runways in an east-west orientation, of which *four* provided quadruple independent approaches and one shorter general aviation/commuter runway in an 14-32 orientation. The inner runway pairs had a 7,400 feet separation distance. The outer runways would be separated from the inboard runways by 5,000 feet. Two runways would be located centrally between the outer and inner runway pairs and would be designated as departure-only runways. They would only be used during visual flight rule (VFR) conditions (good weather).

The airspace simulation analyses[11] performed for the Phase 1 Engineering Study determined that an *east-west* airfield configuration had the least impact on the approach and departure procedures for O'Hare International and Midway International Airports and nearby reliever airports, and would accommodate four simultaneous independent approach procedures during CAT III weather conditions. In addition, these analyses showed that while a new airport would cause unavoidable land use impacts, the east-west runway configuration would cause fewer potential off-airfield impacts than one with crosswind runways, since takeoffs and landings would occur in only two directions instead of multiple directions.

3.1.2 Wind Analysis and Meteorological Conditions at SSA Site

Localized wind and meteorological conditions at an airfield site help determine the ideal runway orientation for an airport. Since no aviation-related weather station is currently present at or near the SSA site, data from other nearby weather stations was gathered and analyzed to determine wind and meteorological conditions most likely to be present at the airport site. Weather stations do exist at Joliet Regional Airport (JOT) and Greater Kankakee Airport (IKK), but data was not archived at either location until August 2001. In order to adequately characterize wind and meteorological conditions at a particular location, FAA AC 150/5300-13, *Airport Design*, recommends that at least 10 years of consecutive weather data be analyzed.

The closest weather station to the SSA site with the requisite available data is Midway International Airport (MDW). During the Phase I Engineering Study for the South Suburban Airport (1994-1998), an extensive analysis of MDW wind data was performed. This effort included the preparation of wind and ceiling/visibility data for All-Weather, Instrument Flight Rules (IFR) Conditions[12] and Poor Visibility Conditions (PVC).[13] In addition, an important task was to verify the statistical relevance of:

- The applicability of MDW weather data at SSA; and
- The statistical difference, if any, between weather data for MDW and O'Hare International Airport (ORD).

[10] CAT III weather conditions exist when the ceiling is less than 100 feet and visibility is less than ¼-mile.
[11] *Refinement and Update of the Airport and Airspace Simulation Model,* Infinite Computer Technology, 1995.
[12] IFR conditions exist when the cloud ceiling is less than 1,000 feet and visibility is less than 3 statute miles.
[13] PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than 1 statute mile.

Historical wind data from the National Oceanic and Atmospheric Administration (NOAA) was imported into the *FAA Airport Design Program*, from which wind coverage was calculated based on 86,770 weather observations[14]. The analysis concluded that there was *no statistical difference* between weather data for MDW and ORD.

In addition, IDOT placed anemometers at four different locations in and around the SSA site during the mid-1990's to obtain actual weather data and verify the applicability of the MDW data for one year of comparable data. An analysis of that data indicated that the SSA site's data was similar to data collected at MDW during that one-year time frame. Data collection at the SSA site was halted in 1997, and re-started in 2003, but sufficient data has not been collected at the SSA site to develop site-specific winds and flying weather data over a ten-year period. However, a comparison of wind data from a 21-month period collected at JOT, IKK, MDW and the SSA site was performed. This analysis indicated that the recorded wind speeds at both IKK and JOT are less than those recorded at SSA and MDW, although MDW wind speeds were slightly greater (approximately 0.5 knots) than SSA data. The JOT and IKK observations also had a very high percentage of calm observations during the analyzed timeframe, while calms were much less frequent at MDW and SSA during the same period. Utilizing a conservative approach, IDOT has elected to use weather data from MDW to identify anticipated wind and meteorological conditions at SSA.

As stated in Section 3.1.1, the Illinois-Indiana Regional Airport Program (I-IRAP) *Site Selection Study* and the Phase 1 Engineering Study had previously determined that a primary runway configuration with an east-west orientation had the least impacts on arrival and departure procedures for ORD and MDW. In addition, a meteorological analysis using MDW data from 1968 to 1977 determined that an east-west runway configuration exceeded FAA's criteria of at least 95 percent wind coverage, except under 13-knot wind conditions for aircraft weighing less than 12,500 pounds.[15] Crosswind conditions at an airfield site are examined at different speeds for different aircraft groups. FAA AC 150/5300-13 states:

> "The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-IV."[16]

As discussed in Section 2.4, the proposed ARC for the Inaugural Airport is C-IV, which specifies the design criteria to be used for the most demanding aircraft. However, in terms of wind conditions, an ARC of B-II is recommended for evaluating the potential needs of corporate and general aviation aircraft (13 knots) in addition to evaluating wind coverage for commercial passenger and cargo aircraft (16 and 20 knots).

The wind analysis performed during the I-IRAP *Site Selection Study* indicated that crosswind runways in a northeast/southwest orientation provided the best wind coverage; however, they also resulted in potential airspace conflicts with MDW, while runways in a northwest/southeast orientation had fewer potential

[14] This number represents the number of weather observations for a period of 10 years.
[15] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.
[16] FAA, AC 150/5300-13, *Airport Design* up to Change 8, September 2004.

conflicts.[17] Thus, the Phase 1 Engineering Study determined that a small runway (ARC B-II) with an orientation of 14-32 in combination with the east-west runways would provide greater than 95 percent coverage for aircraft less than 12,500 pounds and 13-knot winds.

As part of the planning for the Inaugural Airport, hourly observations from MDW wind data from 1991 through 2000 were analyzed to validate the previous results from the Phase 1 Engineering Study. This analysis confirmed that an east-west runway orientation would provide greater than 95 percent coverage for the projected fleet mix except for aircraft weighing less than 12,500 pounds with a 13-knot wind.

Table 3-3 shows the percent coverage of all runway orientations at MDW with a 13-knot wind. The results of this analysis indicate that a runway orientation of 05-23 provides the best wind coverage, almost 94 percent, while a runway orientation of 14-32 only provides 85 percent coverage.

Table 3-3
Midway Airport – All Weather Conditions
13-knot Wind Coverage

Runway Orientation	Wind Coverage
18-36	89.13%
01-19	90.34%
02-20	91.53%
03-21	91.80%
04-22	92.43%
05-23	**93.96% ◄**
06-24	93.28%
07-25	93.30%
08-26	91.40%
09-27	91.21%
10-28	89.38%
11-29	87.92%
12-30	85.75%
13-31	84.93%
14-32	84.69%
15-33	84.65%
16-34	85.15%
17-35	86.76%

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

Table 3-4 compares the wind coverage for runway orientations of 09-27, 14-32 and 05-23 for 10.5-, 13-, 16- and 20-knot winds. The data in this table indicate that a runway system with a 09-27 primary and 14-32 crosswind only provides 94 percent coverage with a 13-knot wind, while a runway system with a 09-27 primary and 05-23 crosswind provides almost 98 percent coverage under the same conditions. Thus, the best orientation for a crosswind runway for ARC B-II aircraft at the SSA site appears to be 05-23.

[17] Ibid.

Table 3-4 Summary of All Weather Wind Coverage by Runway Orientation					
Crosswind speed	**Runway 09-27**	**Runway 14-32**	**Runway 05-23**	**Combined 09-27 and 14-32**	**Combined 09-27 and 05-23**
20-knot	98.89 %	97.95%	99.40%	99.45%	99.84%
16-knot	95.86%	93.02%	97.71%	99.74%	99.38%
13-knot	91.21%	84.69%	94.10%	93.95%	97.85%
10.5-knot	82.35%	73.17%	87.36%	88.00%	94.66%

Source: Murray and Trettel, Inc., July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

3.1.3 Wind and Adverse Weather Conditions Analysis

- The Phase I Engineering Study[18] performed further meteorological analysis of MDW wind data for various cases, in response to comments that air carrier crosswind runways may be required at SSA. This evaluation is greater than the typical analysis performed to assess required runway alignments; however, it was completed to determine if an east-west runway system at SSA could accommodate at least 95 percent of aircraft operations during various wind and adverse weather conditions, as required by FAA criteria.

Visual Flight Rules (VFR) conditions exist when the cloud ceiling is greater than or equal to 1,000 feet AGL and visibility is greater than or equal to three nautical miles. Instrument Flight Rules (IFR) conditions exist when the cloud ceiling is less than 1,000 feet AGL or visibility is less than three nautical miles. All-Weather conditions refer to factoring the percentage of VFR and IFR conditions together to determine annual wind conditions at a specific location.

In determining the recommended runway configuration, the Phase I Engineering Study also considered two basic crosswind components:

- An allowable crosswind component of 20 knots for large aircraft; and
- An allowable crosswind component of 13 knots for small aircraft.

Table 3-5 provides a summary of the crosswind percentages for 13-knot, 16-knot and 20-knot components for five potential runway configurations: 09-27, 14-32, 05-23, a combination of 09-27 and 14-32, and a combination of 09-27 and 05-23 for IFR, VFR and All-Weather conditions. This analysis indicates that a runway configuration with a combination of 09/27 and 05/23 orientations provides the best coverage under VFR, IFR and All-Weather conditions.

[18] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.

Table 3-5 13-knot, 16-knot and 20-knot Wind Analysis			
Runway Configuration	**VFR**	**IFR**	**All Weather**
13-knot			
09-27	91.17%	89.84%	91.21%
14-32	85.29%	85.56%	84.69%
09-27 & 14-32	94.33%	94.61%	93.95%
05/23	94.21%	94.92%	94.10%
09/27 & 05/23	**97.93%**	**96.98%**	**97.85%◄**
16-knot			
09-27	95.65%	94.73%	95.86%
14-32	92.86%	92.43%	93.02%
09-27 & 14-32	97.49%	97.56%	97.71%
05/23	97.44%	97.67%	97.74%
09/27 & 05/23	**99.32%**	**98.88%**	**99.38%◄**
20-knot			
09-27	99.03%	98.66%	98.89%
14-32	97.86%	97.69%	97.95%
09-27 & 14-32	99.51%	99.49%	99.45%
05/23	99.70%	99.52%	99.40%
09/27 & 05/23	**99.87%**	**99.68%**	**99.84%◄**

Source: Murray and Trettel, Inc, July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

Based on the results of the wind and weather analysis, it was concluded that an east-west runway system would provide 91.2 percent wind coverage for 13 knots wind speed and 95.9 percent for 16-knots in All-Weather conditions. Thus, under certain wind and meteorological conditions, general aviation aircraft weighing less than 12,500 pounds would not be able to land on Runway 09-27. Data presented in **Tables 3-4** and **3-5** indicate that a crosswind runway in the **05-23** orientations combined with the primary east-west runway would provide the best wind coverage for all aircraft at IAP: 97.9 percent during 13-knot wind conditions and 99.4 percent during 16-knot wind conditions. Any proposed runways at SSA will need to be evaluated by FAA for potential airspace conflicts with other aeronautical facilities in the area.

In addition to analyzing wind conditions and wind coverage on the potential runways at SSA, an analysis of visibility minimums was also conducted. **Table 3-6** provides more detailed information about six ceiling/visibility conditions recorded at MDW over a 10-year period (1991 and 2000). The results shown in **Table 3-6** indicate that CAT I (or lesser) conditions occurred 8.2 percent of the year; CAT II conditions occurred approximately 0.4 percent of the year, and CAT III conditions occurred 0.4 percent of the year.

Table 3-6
Monthly Occurrences of Ceiling/Visibility Conditions at Midway International Airport

Month	VFR Conditions[1] (%)	IFR Conditions[2] (%)	MDW Minimums[3] (%)	Visibility Conditions CAT I[4] (%)	Visibility Conditions CAT II[5] (%)	Visibility Conditions CAT III[6] (%)
January	78.47	21.53	3.57	18.84	1.33	1.64
February	87.48	12.52	1.94	10.91	0.86	0.84
March	89.15	10.85	1.88	9.56	1.06	0.49
April	90.75	9.25	0.52	9.00	0.21	0.15
May	93.95	6.05	0.56	5.69	0.35	0.10
June	94.85	5.15	0.34	4.91	0.19	0.06
July	96.53	3.47	0.12	3.40	0.01	0.06
August	95.82	4.18	0.07	4.13	0.04	0.01
September	96.21	3.79	0.08	3.71	0.02	0.06
October	94.65	5.35	0.20	5.19	0.09	0.10
November	89.87	10.13	1.10	9.23	0.50	0.50
December	85.06	14.94	1.76	13.72	0.61	0.74
Annual occurrences	91.08	8.92	1.01	8.18	0.44	0.39

Source: Murray and Trettel, Inc, July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.
[1]Ceiling visibility above 1,000 feet; over 3 miles visibility.
[2]Ceiling visibility less than 1,000 feet; below 3 miles visibility.
[3]Ceiling visibility less than 300 feet; below 1-mile visibility.
[4]Ceiling visibility less than 1,000 feet and above 200 feet or visibility between ½ and 3 miles.
[5]Ceiling visibility less than 200 feet and above 100 feet or visibility between ¼ and ½ miles.
[6]Ceiling visibility less than 100 feet or visibility less than ¼ mile.

Table 3-7 provides the percentage of wet pavement by month, based on an analysis of 10 years of data collected from MDW. The greatest wet pavement occurrences recorded were during the cold weather months of November through April. On an annual average these conditions occurred about 9.2 percent of the time.

Table 3-7
Monthly Distribution of Wet Pavement Conditions

Jan (%)	Feb (%)	Mar (%)	Apr (%)	May (%)	Jun (%)	Jul (%)	Aug (%)	Sep (%)	Oct (%)	Nov (%)	Dec (%)	Total (%)
17.31	11.31	11.31	11.43	7.00	5.44	3.56	4.38	5.20	6.93	12.55	13.77	9.16

Source: Murray and Trettel, Inc, July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991-2000 at Midway International Airport and archived by NOAA.

Table 3-8 depicts occurrences of frozen or freezing conditions along with crosswind conditions of both 16 and 20 knots for the east-west concept and a combination of east-west and crosswind runways.[19] For a 16-knot crosswind component in an east-west runway configuration, **Table 3-8** indicates that aircraft operations could not be accommodated for an average of 9.6 hours annually. For the 20-knot crosswind component the east-west runway system was not operational for an average of 5.6 hours annually. This represents 0.11 percent and 0.06 percent, respectively, of the year. As depicted, December through

[19] Wet pavement conditions were assumed to exist when any amount of liquid or frozen precipitation was present.

March were the months with the greatest potential for freezing and frozen precipitation when an east-west runway system or a combination of a 09-27 and 05-23 runway system would not be able to accommodate aircraft operations at SSA.

Table 3-8
Monthly Occurrences of Freezing and Frozen Precipitation Not Covered by Runway Orientations

Month	09-27 (hours)	Percent	Combination 09-27 & 05-23 (hours)	Percent	09-27 (hours)	Percent	Combination 09-27 & 05-23 (hours)	Percent
	16 Knots				20 Knots			
January	2.2	0.29	1.3	0.18	1.0	0.13	0.1	0.01
February	1.0	0.15	0.7	0.10	0.7	0.10	0.4	0.06
March	2.9	0.40	1.1	0.15	2.0	0.27	0.6	0.08
April	1.0	0.14	0.2	0.03	0.7	0.10	0.1	0.01
May	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
June	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
July	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
August	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
September	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
October	0.5	0.07	0.6	0.08	0.0	0.00	0.0	0.00
November	0.2	0.03	0.1	0.01	0.1	0.01	0.1	0.01
December	1.9	0.26	0.7	0.09	1.1	0.15	0.4	0.05
Annual	**9.6**	**0.11**	**4.8**	**0.06**	**5.6**	**0.06**	**1.7**	**0.02**

Source: Murray and Trettel, Inc, July 2004. Processed from ten years of hourly observations collected by NOAA between the years 1991 and 2000 at Midway International Airport and archived by NOAA.

For icing conditions, the annual averages are 4.8 hours and 1.7 hours at 16 and 20 knots, respectfully, that both an east-west and crosswind runway combination would not accommodate aircraft operations at SSA.

In addition to collecting and processing the meteorological and wind data, the consulting team conducted interviews with airframe and engine manufacturers, airline pilots, and air traffic controllers about the impact of crosswind runways. The information gathered from these discussions also provided data regarding operational requirements of aircraft during various weather conditions. From these deliberations with aviation experts, it was concluded that for particular weather conditions, aircraft weight is the critical factor in determining an allowable crosswind component.

Since aircraft of various weights operate differently in diverse weather conditions, a weight-based approach was developed to assess the impact of meteorological conditions on the runway system. **Table 3-9** presents the allowable crosswind component for various aircraft weights during certain weather and visibility conditions. These were derived from many interviews with aircraft manufacturers and meet or exceed the wind requirements for aircraft types, as stipulated in FAA Advisory Circular 150/5300-13, Change 8. This analysis assumes an east-west runway (09-27) 150 feet in width.

Table 3-9
Allowable Crosswind Component for Various Aircraft Weights

Aircraft Weight (lbs)	VFR (knots)	Wet IFR (knots)	Wet Pavement (knots)	Icy/Freezing Precipitations (knots)	CAT III Conditions (knots)
Greater than 60,000	20	Not Available	15	10	10
30,000 – 60,000	20	Not Available	15	10	10
12,500 – 30,000	20	15	13	10	10
Less than 12,500	15	13	10	5	10

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

As illustrated in **Table 3-9**, the operations of aircraft weighing less than 12,500 pounds can occur on an east-west runway system during All-Weather conditions (with crosswinds of 13 knots or 15 knots), ***except:***

1. During wet IFR conditions when crosswind component exceeds 13 knots/hour;
2. During wet pavement conditions when crosswinds are in excess of 10 knots/hour;
3. During icy/freezing weather when crosswinds are in excess of 5 knots/hour; and
4. During CAT III conditions when crosswinds are in excess of 10 knots/hour.

In conclusion, for commercial passenger and cargo aircraft, a primary runway with a 09-27 orientation provides greater than 95 percent wind coverage, but the runway will require a CAT I approach to provide greater than 95 percent coverage under the ceiling and visibility conditions expected to occur at the airfield site. A crosswind runway with a 05-23 orientation would be needed to provide greater than 95 percent wind coverage for general aviation aircraft weighing less than 12,500 pounds.

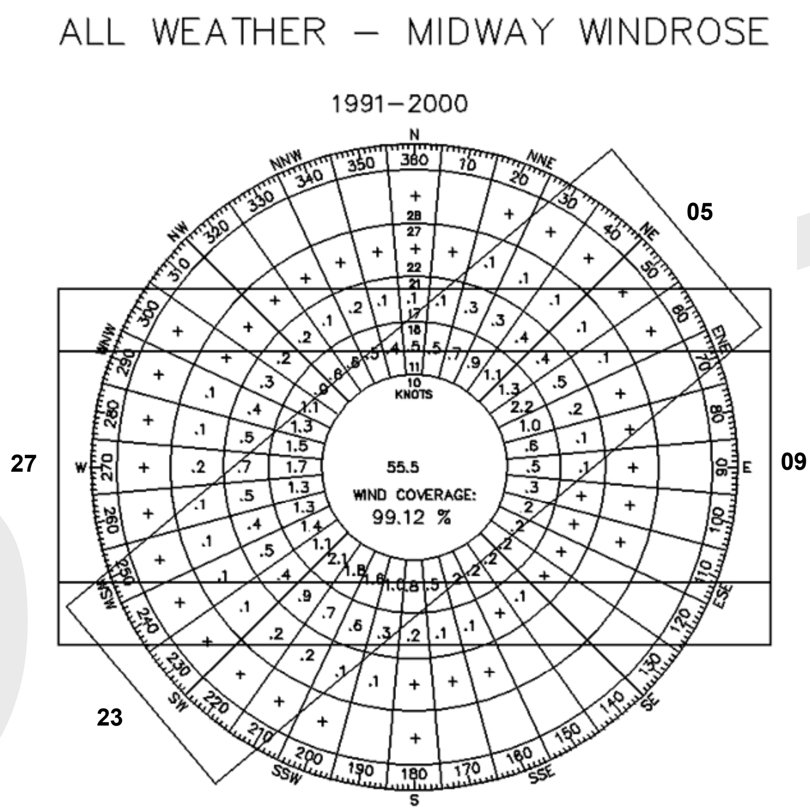
Exhibits 3-1, 3-2, and **3-3** depict the MDW wind roses for All-Weather, VFR conditions and IFR conditions, which are the wind roses recommended for use in the planning of SSA. Site-specific wind roses should be developed after 10 years of continuous data is collected at the SSA site.

3.1.4 Existing Airspace Structure

Another important component in determining the runway orientation at a new airport site is the existing airspace structure in the region. Previously conducted airspace analyses[20] paid special attention to potential approach and departure routes, which attempted to fit SSA within the existing framework of the complex Chicago airspace while minimizing impacts to the approach and departure routes at ORD, MDW and other major airports in the region. These routes were developed by IDOT and their consultants in close coordination with FAA, but have neither been analyzed nor approved by FAA.

[20] *Refinement and Update of the Airport and Airspace Simulation Model*, Infinite Technologies in association with TAMS Consultants Inc, 1995.

Exhibit 3-1
Midway International Airport Wind Rose
All Weather Coverage



ALL WEATHER WIND COVERAGE

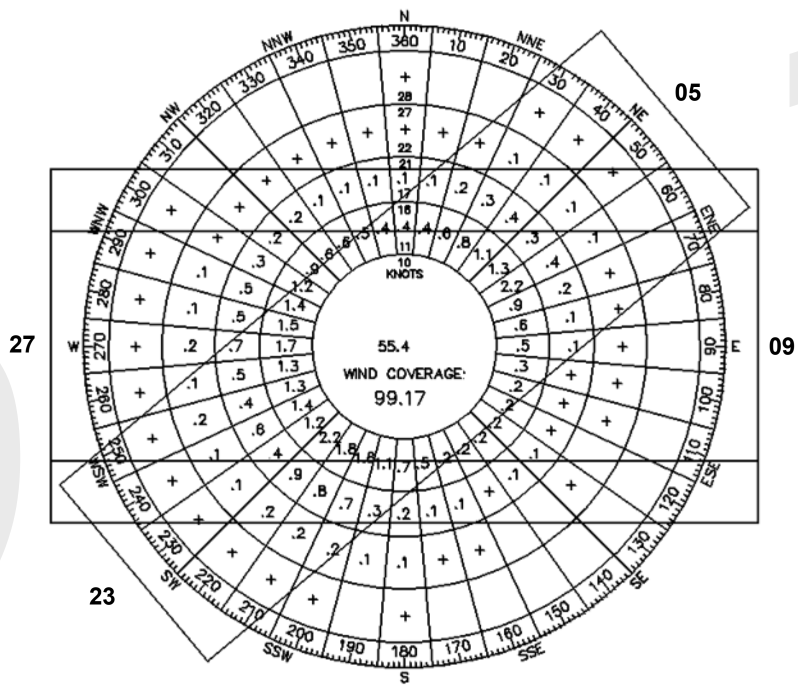
RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	91.21%	95.86%	98.89%
5/23	94.10%	97.74%	99.40%
COMBINED	97.85%	99.38%	99.84%

Source: Processed from 10 years of hourly observations collected between 1991 and 2000 at Midway International Airport and archived by the National Oceanic and Atmospheric Administration (NOAA).
Prepared by: Murray and Trettel, Inc., 2004.

Exhibit 3-2
Midway International Airport Wind Rose
VFR Wind Coverage

VFR WEATHER – MIDWAY WINDROSE

1991–2000



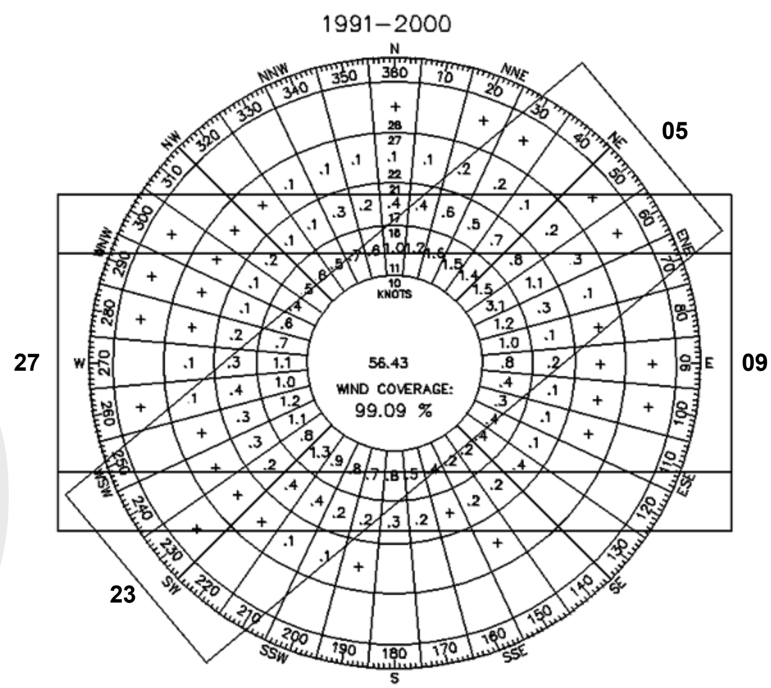
VFR WIND COVERAGE

RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	91.17%	95.65%	99.03%
5/23	94.21%	97.44%	99.70%
COMBINED	97.93%	99.32%	99.87%

Source: Processed from 10 years of hourly observations collected between 1991 and 2000 at Midway International Airport and archived by the National Oceanic and Atmospheric Administration (NOAA).
Prepared by: Murray and Trettel, Inc., 2004

Exhibit 3-3
Midway International Airport Wind Rose
IFR Wind Coverage

IFR CONDITIONS – MIDWAY WINDROSE



IFR WIND COVERAGE

RUNWAY	CROSSWIND COMPONENTS		
	13 Knot	16 Knot	20 Knot
9/27	89.84%	94.73%	98.66%
5/23	94.92%	97.67%	99.52%
COMBINED	96.98%	98.88%	99.68%

Source: Processed from 10 years of hourly observations collected between 1991 and 2000 at Midway International Airport and archived by the National Oceanic and Atmospheric Administration (NOAA).
Prepared by: Murray and Trettel, Inc., 2004.

The FAA has divided the national airspace into two general categories, *controlled* (Classes A through E airspace) and *uncontrolled* (Class G airspace). Within these two groups, there are a number of categories that determine the flight rules, pilot qualifications and aircraft capabilities required to operate within any section of the airspace. The specific categorization of any area is broadly based on the complexity and density of aircraft movements, the nature of operations conducted within the airspace, safety and the public and national interest.[21]

Exhibit 3-4 shows the existing airspace structure around the SSA site, as published in the Chicago Sectional Aeronautical Chart.[22] The SSA site is currently contained within the southern portion of the Chicago Class E Airspace. The airport site is surrounded by the Peotone (EON) VORTAC[23] on the west and the Chicago Heights (CGT) VORTAC on the east, which provide very high frequency navigation signals to aircraft.

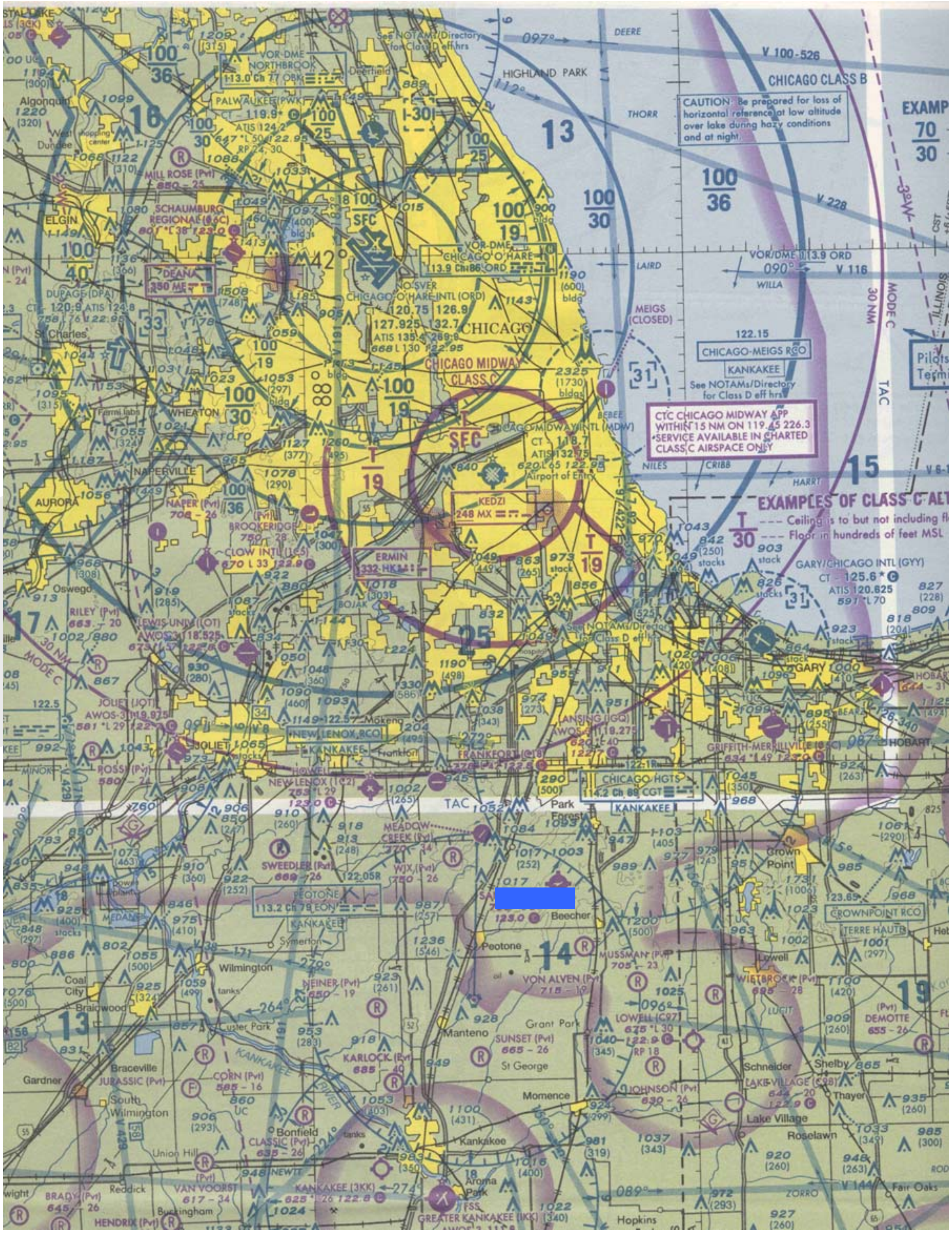
3.1.5 Proposed IAP Airspace Classification

During the Phase I Engineering Study IDOT designed a preliminary airspace plan for the South Suburban Airport to determine if it could be integrated within the existing Chicago region airspace structure. This preliminary airspace plan was designed after holding several meetings with FAA officials to discuss this specific issue. The preliminary assumption used for the airspace analysis was that departures at SSA would be sequenced after departing aircraft from MDW and ORD[24]. **Exhibit 3-5** depicts the proposed preliminary airspace structure and routes assumed by IDOT for both west and east air traffic flow configurations. Based on the wind roses and analysis described in Section 3.1.2, annual air traffic flows at SSA should be approximately 62 percent westerly flow and 38 percent easterly flow under All-Weather conditions.

The Phase 1 Engineering Study also assessed the existing regional General Aviation (GA) activity. The results showed that one of the most active general aviation traffic corridors in the U.S. is the east-to-west general aviation corridor located south of Lake Michigan and just east of the Chicago area. A new commercial air passenger airport south of Chicago could ultimately result in additional controlled airspace similar to MDW. A new sector of controlled airspace could hinder general aviation traffic in this corridor requiring GA traffic to circumvent SSA airspace to the south, leading to a significant increase in travel time and trip length for these aircraft, although these potential impacts would most likely occur only if SSA expands beyond the IAP.

[21] *2002 Aviation Capacity Enhancement Plan, Building Capacity Today for the Skies of Tomorrow*, Office of System Capacity, Federal Aviation Administration, December 2002.
[22] *Chicago Sectional Aeronautical Chart*, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, 68th Edition, May 13, 2004.
[23] VORTAC = Very High Frequency Omnidirectional Range Colocated Tactical Air Navigation.
[24] Summary Draft, *Phase I Engineering Report: South Suburban – A Supplemental Airport for the Chicago Region*, Illinois Department of Transportation by TAMS Consultants, Inc., September 1997.

Exhibit 3-4
Existing Airspace Structure - SSA Site



Location of SSA Inaugural Airport

Source: *Chicago Sectional Aeronautical Chart*, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, 68th Edition, May 13, 2004.

FAA Order 7400.2E, *Procedures for Handling Airspace Matters,* Part 4, Chapter 16 states that the criteria for considering an airport as a candidate for Class C airspace designation is based on factors that include "the volume of aircraft or number of enplaned passengers, the traffic density, and the type or nature of operations being conducted". It also establishes the following minimum criteria for Class C airspace designation at an airport:

1. The airport must be serviced by an operational ATCT and radar approach control.
2. One of the following applies:
    a. An annual instrument operations count of 75,000 at the primary airport;
    b. An annual instrument operations count of 100,000 at the primary and secondary airports in the terminal hub area; or
    c. An annual count of 250,000 enplaned passenger at the primary airport.

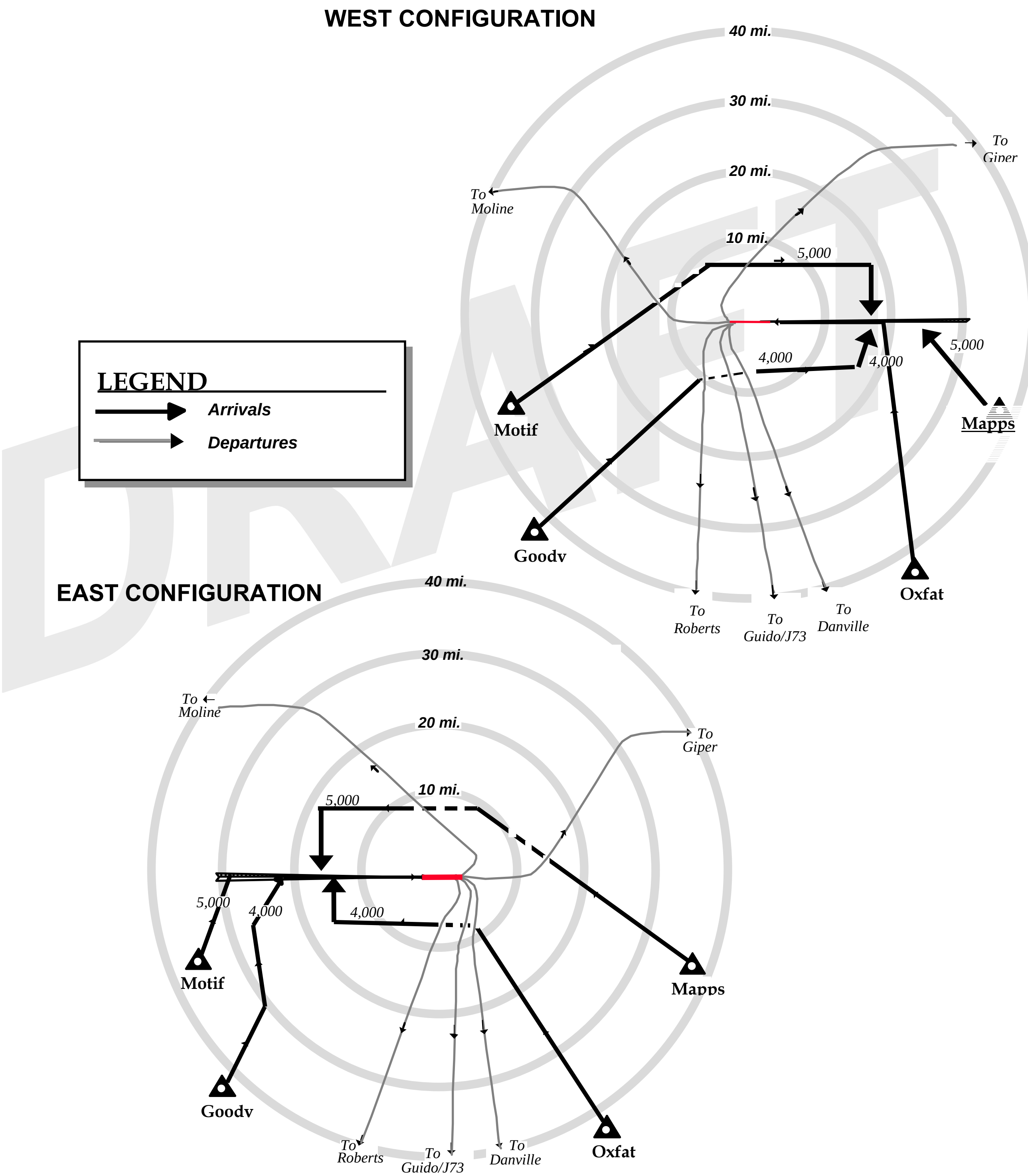
The FAA defines Class C airspace as airspace that includes an area within 10 nautical miles radius from the Airport Reference Point (ARP) up to a maximum height of 4,000 feet above the airport elevation. Typically the airspace extends down to the surface within a 5 nautical mile radius of the ARP and no lower than 1,200 feet between the 5 and 10 nautical mile circles. Under all forecast scenarios, SSA during the IAP is expected to handle more than 250,000 enplaned passengers by DBO+5. At such time as activity levels at SSA reach the minimum criteria for Class C airspace designation, the airport sponsor would need to coordinate with FAA to determine if and when such a designation may be warranted. Midway International Airport has Class C Airspace, while O'Hare International Airport, one of the busiest airports in the nation, has Class B Airspace.

3.1.6 Proposed IAP Runway Orientation

Based on information in **Table 3-4** in conjunction with **Table 3-2** (see pages 18 and 14) it appears that the commercial fleet expected to serve SSA during the IAP would be capable of operating on a primary runway (09-27) more than 95 percent of the time during All-Weather conditions. It should be noted that it is practically impossible to accommodate 100 percent all-weather activity at any airport. Regardless of the number of runways and their orientation, there will be times when the airport will have to cease all activity temporarily due to inclement weather conditions. **Table 3-6** (see page 3-27) indicates that IFR conditions exist at the SSA site approximately 9 percent of the time during each year. Thus, for commercial passenger and cargo aircraft, a primary runway with a 09-27 orientation provides greater than 95 percent wind coverage, but the runway would require a CAT I approach to provide greater than 95 percent coverage under the ceiling and visibility conditions expected to occur at the airfield site. During All-Weather conditions, meteorological data indicate that aircraft should land on the 27 end of the runway 62 percent of the year (westerly flow) and on the 09 end of the runway 38 percent of the year (easterly flow). During IFR conditions, meteorological data indicates that the split between easterly and westerly flows should be almost equal (51.4 percent easterly flow, 48.4 percent westerly flow).[25]

[25] Processed from 10 years of hourly observations collected between 1991 and 2000 at Midway International Airport and archived by the National Oceanic and Atmospheric Administration (NOAA), Murray and Trettel, Inc., 2004.

Exhibit 3-5
Proposed Approach and Departure Flight Tracks - One Runway Configuration



Prepared by: TAMS Consultants Inc, 1997.

A crosswind runway with a 05-23 orientation would be needed to provide greater than 95 percent wind coverage for general aviation aircraft weighing less than 12,500 pounds. The FAA asserts in its AC 150/5300-13 that a runway can provide better wind coverage if its width is greater than that required for various aircraft weight categories. As previously stated, ARC B-II (aircraft weighing less than 12,500 pounds) will have difficulty landing on the primary runway during certain weather conditions. Since the primary runway will be 150 feet wide to meet ADG IV standards, while the required width for ARC B-II is 75 feet, the primary runway should be able to provide better wind coverage than 13-15 knots.

During the Phase I Engineering Study several advisory committees were formed. One of them was the General Aviation Committee and included general aviation (GA) experts and industry representatives from throughout Illinois.[26] The prevailing opinion of the experts involved in the discussion was that once commercial operations at SSA reached a certain level of activity, GA pilots would most likely choose to fly to other airports due to the complexity of operating simultaneously with large aircraft.

The establishment of commercial aviation activity at SSA may take time to develop after the airport opens. Furthermore, some GA facilities such as Sanger Field, will be required to close as a result of the construction and operation of SSA. As indicated in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, GA aircraft currently based at these airports are expected to use SSA during the IAP.

The provision for a visual crosswind (05-23) runway will help accommodate all aircraft classes under most weather and wind conditions. Past studies[27] conducted by IDOT have concluded that the building of a short crosswind runway (4,000 feet) may not be cost–effective when compared to its potential benefit. In addition, there are several reliever airports located around the SSA site, such as Lansing Municipal Airport and Greater Kankakee Airport that GA aircraft could land at when adverse winds prevent them from landing on the primary runway at SSA. However, since IDOT expects that a significant portion of aircraft activity will be generated by general aviation operations during the IAP, a short crosswind runway for general aviation use will be included in the recommended runway configuration for the IAP, based on the findings of the wind analysis discussed in Section 3.1.2.

3.2 IAP Airfield Demand/Capacity Analysis

The purpose of determining the capacity of the proposed airfield is to quantify its ability to accommodate the projected number of aircraft operations. The preliminary airfield capacity of the Inaugural Airport was estimated utilizing the Annual Service Volume (ASV) technique defined in FAA Advisory Circular 150/ 5060-5.[28]

The ASV is a measure striving to establish an annual level of aircraft operations that corresponds to a reasonable or tolerable level of delay. As annual aircraft operations start approaching the airfield ASV, the average delay to each aircraft may rise rapidly whenever significant increases in the level of operations take place, thus reducing the level of service. The delays rise in an exponential

[26] *Selection of the Recommended Runway Configuration*, South Suburban Airport Phase I Engineering Study, TAMS Consultants, Inc., January 9, 1996.
[27] Ibid.
[28] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, September 1983.

manner whenever approaching its theoretical ASV. For long-range planning calculations it is accepted that when annual aircraft operations on the airfield equal its theoretical ASV, the average delay to each aircraft throughout the year is in the order of 4 minutes.[29]

Generally, the theoretical airfield capacity is based on maximum runway utilization consistent with the current air traffic control (ATC) rules and the following factors:

- Percent of arrivals/departures;
- Aircraft mix; and
- Percent of “touch and go” operations.

The ASV is typically estimated based on the particular airfield layout, weather conditions, and the above-mentioned factors. The runway hourly capacity can be determined for both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions. The Advisory Circular provides a number of standard airfield layout diagrams that help determine the theoretical IFR and VFR hourly capacity.

These capacity estimates assume that no airspace limitations would adversely impact flight operations or otherwise restrict aircraft that could operate at the airport. Also the prepared analysis assumed the presence of a full-length parallel taxiway and adequate number of exit taxiways and no runway crossings. The crosswind runway (05-23) was not included in the calculation of ASV since it would only be used during that portion of the year when aircraft weighing less than 12,500 pounds could not land on the primary runway. The aircraft operating at the facility will impact the runway capacity. Heavy aircraft (e.g., B-757-200) weighing more than 255,000 pounds produce wake turbulences. Due to this phenomenon, the separation between operating aircraft must be increased, reducing potential airfield capacity. This becomes more critical when the airport has a wide range of aircraft sizes and weights operating at it. FAA accounts for this by determining a fleet mix index for an airport, calculated by adding the percentage of Aircraft Approach Category C aircraft with three times the percentage of Aircraft Approach Category D aircraft operating at the airport.[30] Therefore, the fleet mix index at the airport is important in calculating the ASV.

The estimated fleet mix index for the Inaugural Airport Program could range between 80 and 103, based on the projected aircraft fleet operating at SSA at DBO+5.[31] The initial evaluation has assumed that most aircraft at SSA will be between 12,500 and 300,000 pounds with a relatively small percentage of small and heavy aircraft. **Table 3-10** provides FAA’s definition of small and heavy aircraft.

[29] Figure 2-2. Average Aircraft Delay for Long Range Planning, FAA AC 150/5060-5, Change 2, *Airport Capacity and Delay*, September 1983.
[30] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, September 1983.
[31] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Table 3-10
Weight–Based Aircraft Classification

Aircraft Type	Aircraft Class	Maximum Takeoff Weight (lbs)
Small	A	Less than 12,500
Medium	B	Greater than 12,500 but less than 60,000
Large	C	Greater than 60,000 but less than 300,000
Heavy	D	Greater than 300,000

Source: FAA AC 150/5060-5, Change 2, *Airport Capacity and Delay*, September 1983.

The theoretical IFR and VFR runway hourly capacities were estimated using FAA AC 150/5060-5, Change 2 and are illustrated in **Table 3-11**.

Table 3-11
Estimated IFR and VFR Runway Hourly Capacities

	VFR	IFR
40% Arrivals	56	50
50% Arrivals	52	49
60% Arrivals	50	47
Average	52	48

Source: TAMS, an Earth Tech Company, 2004.

This evaluation has not assumed regular touch-and-go operations at SSA. To determine the ASV, the weighted average hourly capacity (C_W) of the airfield was calculated. After estimating C_W, a preliminary annual service volume was computed using the following formula:

$$ASV = C_W \times H \times D$$

where:

H = average daily operations in peak month/peak-hour operation in peak month.
D = annual operations/average daily operations in peak month.

Table 3-12 illustrates typical hourly and daily ratios[32] that have been used to estimate the annual service volume for the IAP.

Table 3-12
Typical Hourly and Daily Ratios

Mix Index	Hourly Ratio (H)	Daily Ratio (D)
51-180	11-15	310-350

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, September 1983.

To estimate the IFR and VFR conditions at SSA, weather data from MDW was used as a guideline. The meteorological data recorded at MDW for a ten-year period indicated that 89.2 percent of the year the airport operates under VFR

[32] *Planning and Design for Airports, 4th edition*, R. Horonjeff and F. McKelvey, 1994.

conditions (see **Table 3-4** on page 3-27). The weighted C_w was estimated to be 45 operations per hour.

Based on the assumptions described herein, and using an average for both typical demand ratios, the estimated theoretical Annual Service Volume of the primary east-west runway will be up to 210,000 annual operations. In conclusion, the IAP runway capacity will easily accommodate the projected DBO+5 operational demand of 85,000 annual operations, estimated for the High Case forecast scenario.

3.3 Runway Requirements

3.3.1 Design Aircraft

The FAA guidelines specify that in determining the primary runway length at an airport "either the family of airplanes having similar performance characteristics or a specific airplane needing the longest runway"[33] should be considered. The most demanding aircraft that is expected to operate at an airport is typically referred to as the "design aircraft" or "critical aircraft".

The aviation forecasts assume that the commercial passenger aircraft fleet mix during the IAP will primarily consist of narrow body and regional jet aircraft. The largest passenger aircraft expected to operate regularly at SSA during this phase will probably serve short- to medium-stage range markets (i.e., B-737-800 or A-320). During the past several years the airline industry has significantly increased the use of regional jets (such as Embraer and Bombardier regional jet families). These aircraft generally handle low-density, short and medium-range markets. The forecasts anticipate that aircraft such as B-757-200, B-767-200 and A-300-600 could be used for all-cargo operations.

Based on the aviation forecasts and potential aircraft fleet mix, the most demanding aircraft are expected to be the following during the IAP:

- Low Case Forecast Scenario - B-737-800 and A-320 (ARC C-III)
- Base and High Case Forecast Scenarios - B-767-200 and A-300-600 (ARC C-IV).

3.3.2 Runway Length

According to the guidelines outlined in FAA Advisory Circular 150/5325-4A, runway lengths must be determined based on several variables, including aircraft type, flight stage lengths, airport elevation, ambient temperature and runway gradient. All these factors must be considered in evaluating the runway length to adequately accommodate operations of the most demanding aircraft. FAA's guidelines[34] state that the airport elevation is the highest point on an airport's usable runway expressed in feet above sea level. The airport reference temperature is the monthly mean of the daily maximum temperatures of the hottest month of the year. For SSA, the preliminary estimated airport elevation is approximately 750 feet based on existing topography of the area and the reference temperature used is 84.7ºF[35].

[33] FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, January 1990.
[34] FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, January 1990..
[35] Processed from 30 years of hourly observations collected by NOAA between the years 1971 and 2000 at Midway International Airport and archived by NOAA.

The runway length analysis examines the *critical aircraft* expected to operate in the first five years of airport operation. The current fleet[36] of several U.S. air carriers, including passenger and cargo, was reviewed in order to determine the required runway lengths for various aircraft models with their associated engine types. The appropriate Airplane Characteristics for Airport Planning Manuals were also consulted to adequately estimate the runway length. The fleet mix projected to utilize SSA during the IAP is discussed and presented in Section 2.2. The runway length calculations for the projected fleet mix are presented in **Table 3-13**.

Table 3-13
Maximum Runway Length Requirements for Various Aircraft Models

Aircraft	Engine	Refer. Temp (°F)	Flight range (nm)	85% Payload		100% Payload	
				Take-off Weight (lb)	Runway Length (ft)	Maximum Takeoff Weight (lb)	Runway Length (ft)
B-737-400	CFM56-3C	83	1,750	140,000	7,500	150,000	9,000
B-737-800	CFM56-7B27	83	2,000	165,000	6,800	174,200	7,800
A-320	CFM56	83	2,200	N/A	N/A	169,800	8,000
B-757-200	PW2040	84	3,400	217,000	5,200	255,000	7,600
B-757-300	RB211-535E4	84	2,500	229,500	6,200	270,000	9,500
B-767-200	JT9D-7R4D/7R4E, CF6-80A/80A2	87	2,200	304,000	6,200	315,000	6,400
B-767-200	CF6-80C2B2, PW 4052	87	2,200	304,000	5,800	315,000	6,400
B-767-200 ER	JT9D-7R4D/7R4E, CF6-80A/80A2	87	3,500	324,000	6,800	350,000	8,500
B-767-200 ER	CF6-80C2B2, PW 4052	87	3,500	324,000	7,200	350,000	8,800
B-767-200 ER	CF6-80C2B4, PW 4056, RB211-524G	87	5,000	371,000	8,000	386,000	9,500
A-300-B4-103/ 203	GECF50C2	83	2,100	N/A	N/A	363,000	10,600
A-300-600	GE CF6-80C2	83	2,200	N/A	N/A	375,100	9,800

Source: Various *Airplane Characteristics for Airport Planning* manuals from aircraft manufacturers..
Notes:
1. Airport elevation is 750 feet above mean sea level.
2. Runway Length is the runway length required for a runway with 0% gradient, and a mean maximum daily temperature of the hottest month.
3. Takeoff Weight includes Operating Empty Weight + Payload + Fuel.

[36] JP Airlines - Fleets International, Edition 2003/04, Bucher & Co, Publikationen, Zurich, Switzerland, April 2003.

The draft forecast report[37] assumed that during the IAP, SSA would mainly attract low-cost carriers (LCC). The analysis assumed that the majority of commercial passenger aircraft expected to operate at SSA would be narrow body jets ranging from 101-160 seats, with some regional jets ranging from 37 to 100 seats. The expected cargo aircraft would be B-737-400, B-757, B-767-200, A-300-B4 and A-300-600. Consequently, the inaugural runway length requirements will vary based on the take–off requirements of the critical passenger and cargo aircraft considered for each forecast scenario.

Table 3-14 presents a summary of the runway length requirements for the three forecast scenarios, based on the take off-requirements of the projected critical aircraft. The most demanding aircraft considered in this analysis was the A-300-B4, which requires a 10,600-foot long runway at maximum takeoff operational weight (MTOW), while the A-300-600 requires 9,800 feet[38].

Table 3-14
Inaugural Runway Length Requirements

Forecast Scenario	Critical Passenger Aircraft	Runway Length (ft)	Critical Cargo Aircraft	Runway Length (ft)
Low Case	B-737-800; A-320	7,800; 8,000	B-737-400	9,000
Base Case	B-737-800; A-320	7,800; 8,000	B767-200ER (CF6-80C2B2, PW 4052)	8,800
			A-300-600	9,800
High Case	B-737-800; A-320	7,800; 8,000	A-300-B4	10,600

Source: TAMS, an Earth Tech Company, 2004.

The most demanding aircraft expected to operate at IAP were used to estimate the required runway length. Under the Low, Base and High Case forecast scenarios, a runway length of 8,000 feet will be required to accommodate the projected critical passenger aircraft.

The critical cargo aircraft requirements for departures at maximum takeoff weight range from 9,000 feet to 10,600 feet under the three different forecast scenarios. However, it is important to point out that all-cargo aircraft do not customarily depart at maximum takeoff weight; thus, this study also reviewed the runway length requirements of cargo aircraft with less than 100 percent payload. A review of literature on cargo load factors indicates that average load factors for domestic air cargo range from 53 to 65 percent, while international air cargo load factors range from 66 to 86 percent.[39] Based on the data contained in **Table 3-13**, a runway length of 9,000 feet is recommended under the Low Case forecast scenario and a runway of 9,500 feet is recommended under the Base and High forecast scenarios to meet the requirements of the projected critical cargo aircraft with some minor payload penalties for A-300 aircraft.

[37] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, Appendix 2, prepared for the Illinois Department of Transportation, May 2004.
[38] The Airbus charts included in their Airplane Characteristics for Airport Planning Manuals do not provide adequate information to estimate runway lengths for cases where the payload is less than 100%.
[39] Logistics Today, 2004; Air Cargo Economics, MIT, 2004; International Air Cargo Association, 2004; EVA Airways Corporation, 2004; Swiss International Air Lines, Ltd., 2005; Atlas Air Worldwide Holdings, Inc., 2004.

As already discussed in Section 3.1.5, Proposed IAP Runway Orientation, the inaugural runway will have an east-west orientation (09-27). For safety and operational purposes, a full-length, parallel taxiway with connecting exit taxiways at strategic locations is recommended. Provisions for high-speed exit taxiways should also be included, but may not be implemented until aviation demand requires them. To ensure efficient aircraft operation beyond IAP, it will be advantageous to provide separations to allow the development of a *future dual taxiway* system, to separate the taxiing of arriving and departing aircraft.

Table 3-15 is a summary of the runway/taxiway dimensions and the separations criteria required for Airplane Design Group IV for the primary runway (09-27) and for ADG II for the crosswind runway (05-23).

Table 3-15
Summary of Minimum Runway Planning Requirements

Facility	Dimensions (feet)	
	Airplane Design Group IV	Airplane Design Group II
Runway Width	150	75
Runway Length	9,500	4,000
Runway Protection Zone Length (CAT 1)	2,500	1,000
Runway Protection Zone Inner Width (CAT 1)	1,000	500
Runway Protection Zone Outer Width (CAT 1)	1,750	700
Runway Safety Area Width	500	150
Runway Safety Area (RSA) Length beyond Runway End	1,000	300
Runway Blast Pad Width	200	120
Runway Blast Pad Length	200	150
Runway Object Free Area (OFA) Width	800	500
Runway Object Free Area Length beyond Runway End	1,000	300
Runway Precision Object Free Zone (POFZ) Width	800	N/A
Runway Precision Object Free Zone (POFZ) Length	200	N/A
Runway Shoulder Width	25	10
Runway to Parallel Taxiway Centerline Separation	400	240
Taxiway Width	75	35
Taxiway Shoulder Width	25	10
Taxiway Object Free Area Width	259	131
Taxiway Safety Area Width	171	79
Taxiway Centerline to Parallel Taxiway Centerline	215	N/A

Source: FAA Advisory Circular 150/5300-13, *Airport Design* up to Change 8, September 2004.
N/A = Not Applicable

3.3.3 Runway Width

As indicated in **Table 3-15** the FAA design criteria specify a runway width of 150 feet for ADG IV and 75 feet for ADG II. The standards indicate that 25-foot wide shoulders for ADG IV and 10-foot wide shoulders for ADG II are also required.

3.3.4 Runway/Taxiway Separation

Although the Boeing 767-200 and Airbus A300-600 are the largest aircraft expected to operate during the IAP, the runway/taxiway separation criteria applicable to Aircraft Design Group VI was considered for the primary runway (09-27). It may be prudent to provide for runway/taxiway separation standards applicable to ADG VI, to facilitate future airfield conversion if aviation activity conditions demand it. ADG VI aircraft require runway widths of 200 feet, runway shoulder widths of 40 feet, parallel runway to taxiway centerline separation of 600 feet, taxiway width of 100 feet, and taxiway shoulder width of 40 feet. There are also some differences in safety areas and object free areas. As the airfield planning progresses, provisions for ADG VI will be considered in the layout of these facilities.

3.3.5 Runway Design Standards

To protect both the movement of aircraft on the ground and in transition to takeoff or landing, the FAA has established regulatory requirements pertaining to planning and designing a safe, efficient, and economically feasible airfield. The following paragraphs are a description of the runway safety areas and associated standards as listed in FAA AC 5300-13, *Airport Design*, up to Change 8.

Runway Protection Zone (RPZ) is a trapezoidal area designed to enhance the protection of people and property on the ground and is centered on the extended runway centerline at both ends. The FAA recommends that this area should be kept free of incompatible land uses that create glare or smoke whenever practical. The dimensions (length and width) of the RPZ areas depend on the size of the aircraft expected to operate on that particular runway. For a CAT I precision approach runway serving aircraft approach category C and higher, the inner RPZ should start 200 feet beyond each end of the runway and the inner width should be 1,000 feet. The outer width should be 1,750 feet and length should be 2,500 feet. For a visual approach runway serving aircraft approach category A and B, the inner RPZ should start 200 feet beyond each end of the runway and the inner width should be 500 feet. The outer width should be 700 feet and length should be 1,000 feet.

Runway Safety Area (RSA) is a rectangular area centered on the runway centerline. Primarily, under normal (dry) conditions, it serves the role of supporting an aircraft without causing structural damages to the aircraft or injury to the occupants. For primary runways serving ADG IV the RSA should be 500 feet wide and extend 1,000 feet beyond the runway ends. For runways serving ADG II the RSA should be 150 feet wide and extend 300 feet beyond the runway ends.

Object Free Area (OFA) is a rectangular area centered on the centerline of the runway. No object that protrudes above the elevation of the RSA edge is allowed inside the OFA, with the exception of the objects that are essential to navigation (NAVAIDS). For ADG IV, the OFA should be 800 feet wide and extend 1,000 feet beyond the runway ends; for ADG II, the OFA should be 500 feet wide and extend 300 feet beyond the runway ends.

Precision Object Free Zone (POFZ) is centered on the extended runway centerline*,* beginning at the runway threshold, 200 feet long and 800 feet wide. This area applies to all new authorized instrument approach procedures, with less than ¾-mile visibility and is not required for visual approach runways.

Obstacle Free Zone (OFZ) is a defined volume of airspace centered above the runway centerline. The OFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the centerline. The OFZ clearing standards preclude any taxiing or parked aircraft or object penetration with the exception of essential NAVAIDS. For runways serving large aircraft the OFZ extends 200 feet beyond each runway end and is 400 feet wide; for runways serving ADG II, the OFZ extends 200 feet beyond each runway end and is 250 feet wide. In addition, for runways serving ADG IV, the following also applies:

> *Inner-approach OFZ* is defined as the volume of airspace centered on the approach area. It begins 200 feet from the runway end at the same elevation as the runway threshold and extends 200 feet beyond the last unit of the approach lighting system. It has the same width as the runway OFZ and rises at a slope of 50:1 from the beginning point.
>
> *Inner-transitional OFZ* is defined as the volume of airspace along the sides of the runway OFZ and inner-approach OFZ. It applies to runways with lower than ¾-statute mile approach visibility minimums. For CAT I runways, it begins at the edges of the OFZ and inner-approach OFZ and extends out at a slope of 6:1 out to a height of 150 feet above the established airport elevation.

The appropriate RPZ, RSA, OFA, POFZ, and/or OFZ areas will be provided on the runways.

Appendix 2 of AC 150/5300-13, *Airport Design*, up to Change 8, outlines guidance on locating the runway threshold to meet approach obstacle clearance requirements. Paragraph 5.g.1 and 5.g.2 define the standard surface used to locate a threshold for runways expected to accommodate instrument approaches having visibility minimums less than ¾ statute mile, day or night, as follows:

> ”No object should penetrate the surface that starts at 200 feet out from the threshold and at the elevation of the runway centerline at the threshold, and slopes upward from the starting point at a slope 34:1. The centerline of this surface extends 10,000 feet along the extended runway centerline. This surface extends laterally 400 feet on each side of the centerline at the starting point and increases in width to 1,900 feet on each side of the extended centerline at the far end.”

3.4 Airport NAVAIDS, Visual Aids and Air Traffic Control

3.4.1 Introduction

New technologies for air navigation, air traffic control and telecommunications will probably be available in the next few years, as part of the new Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) program.[40] The program is expected to become available between 2010 and 2015 and will provide better worldwide coverage. This system will include the Global Positioning System (GPS), which will consist of several communication satellites

[40] FAA, National Airspace System – Architecture, FAA Office of System Architecture and Investment Analysis, 1999.

orbiting the Earth with receptors at strategic locations on the ground to receive their signals and transmit to flying aircraft. The proposed new system, which is known as the Future Air Navigation System (FANS) will significantly increase the airspace capacity since separation between flying aircraft could be considerably reduced, allowing a higher degree of flexibility for aircraft operations. With the FANS system, the augmentation of GPS signals could meet required navigational specifications. The augmentation will ensure integrity, availability, accuracy and continuity of air traffic service.

For the aviation industry, two levels of augmentation have been defined - wide area and local area. The Wide Area Augmentation System (WAAS)[41] will meet these specifications for route and terminal airspace navigation, non-precision and Category I precision approaches. A Local Area Augmentation System (LAAS) will permit Category II and Category III precision approaches. The WAAS is expected to be available around 2010 and LAAS after 2015.

The long-term goal of the aviation industry is to completely replace Instrument Landing Systems (ILS) with GPS for precision approaches. As long as the conditions are adequate in their approaches and surroundings, all airports could have precision approaches at relatively reasonable costs. The new system will also provide more flexibility on approach procedures. Since ILS only allows linear approaches in the final stages, GPS is anticipated to provide more flexibility in the final descent of aircraft.

SSA should be equipped with adequate navigational and visual aids to meet the projected aviation demand and expected weather conditions. The discussion herein addresses the current technology, but it can be assumed that some of the equipment will be replaced with new devices associated with the new CNS/ATM technology.

It is important that areas in the vicinity of all navigational and visual aids facilities should be protected and kept clear of any natural or man-made objects that could interfere or affect the equipment signals and operation. The protection of these areas is mandatory for safe operations at the airport. The Federal Aviation Regulations (FAR) Part 77[42] surfaces should also be protected. The Airport Layout Plan (ALP) will show the areas that need to be protected for the main navigational aids following FAA criteria.

Since SSA is forecast to handle a sizable number of air carrier operations during the IAP, it is expected that the primary runway will eventually have an Instrument Landing System (ILS) CAT I at both approach ends. The ILS assists pilots of properly equipped aircraft in landing *safely* under all weather minimums. It provides pilots with electronic guidance for aircraft alignment, descent gradient, and position until visual contact confirms the runway location and alignment. The ILS establishment and siting criteria are outlined in FAA Order 6750.16C, *Siting Criteria for Instrument Landing Systems*, October 1995.

As discussed in Section 3.1.6, under All-Weather conditions, 63 percent of the operations are expected to occur on the 27 end of the runway and 37 percent are expected to occur on the 09 end of the runway on an annual basis. Under IFR conditions, the split of operations is approximately equal (48.4 percent on the 27 end and 51.4 percent on the 09 end). Since the majority of operations will occur

[41] FAA, Satellite Navigation, http://gps.faa.gov/index.htm, 2004.
[42] FAA, FAR Part 77, *Objects Affecting Navigable Airspace*, April 1971.

on the 27 end of the runway, it is recommended that an ILS be initially installed on that end of the runway.

3.4.2 Requirements for Navigational Aids, Visual Aids and Air Traffic Control Facilities

The types of Navigational and Visual Aids (NAVAIDS) installed as part of the IAP depend upon the local weather conditions of the area where the new airport is situated, the level of aviation activity and types of airspace obstructions in the surroundings. **Tables 3-16** and **Table 3-17** present a preliminary list of navigational aids, visual aids and meteorological facilities proposed at SSA on opening day. This planning analysis has considered that in the future, the level of aviation activity may significantly increase and the predominant arriving runway(s) could become precision approach CAT II or III; therefore, the proposed development should facilitate the required upgrades without causing major interruptions of the airport operation. In addition to runway and taxiway lighting the apron area should be equipped with apron floodlights to assist night-time ramp activity.

Table 3-16
Summary of Recommended Airport NAVAIDS, Visual Aids and Air Traffic Control Facilities

NAVAID	Equipment Function Description
ATCT – Airport Traffic Control Tower	Controls flight operations within the airport's designated airspace.
Rotating Beacon	Indicates location of an airport.
VOR – Very High Frequency Omnirange	Emits VFR azimuth data over 360 degrees for non-precision instrument approach procedures.
NDB – Non Directional Beacon	Provides directional guidance to be used as an aid to final non-precision approaches.
LLWAS – Low Level Wind Shear Alert	An automated system to detect hazardous wind shear events and provide warnings to air traffic controllers.
AWOS –Automatic Weather Observation System	Recording instruments that measure cloud height, visibility, wind speed, temperature, dew point, etc.
ASR – Airport Surveillance Radar	Provide air traffic controllers information regarding the location of an aircraft within 60 nautical miles of the airport.

Source: TAMS, an Earth Tech Company, 2004.

An Airport Surveillance Radar (ASR) may not be required on opening day since SSA falls within the Chicago (ZAU) Air Route Traffic Control Center airspace. An ASR could be established at SSA if the relative benefits, measured in terms of delay reduction or safety, are sufficient enough to warrant installation of such a facility at SSA. Delay reduction and safety benefits are calculated based on the aircraft fleet mix, number of instrument operations by type of operation (air carrier, air taxi, general aviation and military), and IFR weather occurrences. FAA Order 7031.2C, *Airway Planning Standard Number One* outlines the methodology involved in determining the eligibility of establishing an ASR at airports.

Table 3-17
Summary of Recommended Runway NAVAIDS, Visual Aids and Other Facilities

NAVAIDS	Equipment Function Description
Instrument Landing System CAT I	Provides instrument guidance during weather conditions when visibility is not less than ½-miles and ceiling not less than 200 feet
Glide Slope	Provides vertical guidance
Localizer	Provides horizontal guidance
Outer Marker Required for CAT I	Marks a specific point along the approach path
Precision Approach Indicator Path (PAPI)	Provides visual approach slope guidance
Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MASLR)	Provides visual guidance on final approach during night and low visibility conditions
High Intensity Runway Edge Lights (HIRL)	Defines runway edges and length necessary for precision instrument approaches
Wind Cones	Provides visual wind direction and velocity
Medium Intensity Taxiway Edge Lights (MITL)	Defines taxiway edges and length

Source: TAMS, an Earth Tech Company, 2004.

Part 77 Surfaces

An analysis of proposed airfield geometry and facilities layout must also take into consideration potential obstructions to the FAR Part 77 surfaces, *Objects Affecting Navigable Airspace*. Potential obstructions could be due to natural features (hills, terrain conditions) or manmade structures. Objects penetrating the runway primary surface and other aeronautical surfaces could be safety hazards for aircraft operations. Whenever the site does not meet obstruction criteria, airport planners should strive to find solutions in eliminating such hazards, if possible. Zoning policies (as applicable) should also be implemented to avoid the construction of structures that could affect the future development of the airport.

The types of runway approaches will depend on surrounding terrain and the level of activity that the airport could have. Around the site, there should ideally be several imaginary airspace surfaces that need to be protected from natural features and manmade structures in order to ensure a greater level of precision approaches. FAA defines the criteria and various types of imaginary obstruction surfaces in FAR Part 77. In this document, FAA defines the following surfaces:

- *Runway Primary Surface:* A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is 1,000 feet for precision approach runways and 500 feet for visual approach runways.

- *Runway Approach Surfaces*: A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end (see **Table 3-18**). The slopes of the approach surface shall be measured in the vertical plane containing the runway centerline.

Table 3-18
F.A.R. Part 77 Civil Airport Imaginary Approach Surfaces, Dimensions and Slopes

Instrument Procedure	Inner Edge Width (ft)	Outer Edge Width (ft)	First Section Length (ft) and Slope	Second Section Length (ft) and Slope
Visual Approach	500	1,500	5,000 20:1	NA
Non-Precision Approach	1,000	4,000	10,000 34:1	NA
Precision Approach	1,000	16,000	10,000 50:1	40,000 40:1

Source: FAA FAR Part 77, *Objects Affecting Navigable Airspace,* April 1971.

- *Runway Transitional Surfaces*: These surfaces extend outward and upward at right angles to the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface that project through and beyond the limits of the conical surface extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline. The elevation along the side of the approach surface should be equal to the elevation of the approach surface at that point, and along the primary surface it should equal the elevation of the nearest point on the runway centerline or its extension.

- *Horizontal Surface*: A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway and connecting the adjacent arcs by lines tangent to those arcs. In the case of a precision runway, the arcs have a 10,000-foot radius; visual runways have an arc of 5,000 feet.

- *Conical Surface*: A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

According to FAA guidelines, an approach surface or a transitional surface shall not permit new objects or extensions of existing objects above it except when, in opinion of the proper authority, an existing immovable object would protect the new object or extension. Likewise, the conical surface and the horizontal surface shall not permit new objects or extensions of existing objects above its surface except when, in the opinion of the appropriate authority, an existing immovable object would shield an object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of aircraft operations.

TERPS Surfaces

In addition to the FAR Part 77 Surfaces, the FAA has published standardized methods to help planning and designing safe and efficient instrument flight procedures. These standards, known as Terminal Instrument Procedures (TERPS), were also consulted for the planning process of the IAP airfield. The surfaces that must be considered for obstacle clearance in the final approach on ILS CAT I runways are defined in Chapter 9, Section 3 of this document[43]:

- *Final Approach Area* is 50,000 feet long measured outward along the final approach course from a point beginning 200 feet outward from the runway threshold. It is centered on the extended centerline and has a width of 1,000 feet at a point 200 feet from the runway threshold and expands uniformly to a width of 16,000 feet at a point 50,000 feet from the point of beginning. This width further expands uniformly where greater length is required.
- *Final Approach Obstacle Clearance Surface* is an inclined plane, which originates at the runway threshold elevation, 975 feet outward from the Glide Point of Interception and overlies the Final Approach Area. This surface is divided in 2 sections: an inner 10,000-foot section and an outer 40,000-foot section. The slope of the surface changes at the 10,000-foot point. The 50:1 and 40:1 slopes were considered applicable and used in the obstacle analysis of the primary runway.
- *Transitional Surfaces* are inclined planes with a slope of 7:1, which extend upward from the edge of the final approach area, starting at a height of the applicable final approach surface and extending laterally for a distance of 5,000 feet at right angles to the final approach point.

According to the FAA, no obstacle is permitted to penetrate the final approach or the transitional surfaces. These surfaces were examined for the obstruction analysis for the primary east-west runway to ensure that no object would adversely affect the safety of aircraft operations. However, IDOT expects that FAA will require the conduct of a Report 405 for obstruction analysis to ensure that required obstacle clearances are instituted.

Airport Traffic Control Tower

The Airport Traffic Control Tower (ATCT) is the focal point for controlling flight operations within the airport's designated airspace, as well as all aircraft and vehicle movement on the air operations area (AOA). Since SSA is not an operating airport, there are no applicable FAA criteria for the establishment of an ATCT at DBO. However, the airport sponsor could construct an ATCT at SSA during the IAP without Federal participation, if desired. FAR Part 170, *Establishment and Discontinuance Criteria for Airport Traffic Control Tower Facilities* and FAA Order 7031.2C, *Airway Planning Standard Number One – Terminal Air Navigation Facilities,* Chapter 4, provides guidelines for determining if an airport would be a candidate for an ATCT facility.

SSA could also be considered for FAA's contract tower program. Any future ATCT facility should meet the FAA's planning and design standards[44] and should be located equidistant from all planned operational areas, particularly the runway ends. The elevation of the tower should be adequate to ensure unobstructed views to all runway approaches, airside and terminal facilities that are under ATCT control. Convenient access by the ATCT personnel and maintenance staff is also important in locating the ATCT facility.

The tower structure design would follow the guidelines described in FAA Order 6480.7C, *Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design Guidelines*. The ATCT elevation will be determined in

[43] FAA, *United States Standards for Terminal Instrument Procedures (TERPS)*, Directive No. 8260.3B, August 1993.
[44] FAA Order 6480.7C, *Airport Traffic Control Tower and Terminal Radar Approach Facility Design Guidelines,* April 1995.

accordance with FAA Order 6480.4, *Airport Traffic Control Tower Siting Criteria.* The FAA would conduct its own study to determine the final location and elevation of the Airport Traffic Control Tower (ATCT) at the appropriate time.

Section 4 – IAP Passenger Terminal Facility Requirements

As described in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, the IAP is planned to serve the needs of the primary air passenger market surrounding the airport site. In accordance with FAA planning policies, the draft report emphasized the need to adopt *a flexible approach* in planning the airport to accommodate the inherent variability of demand and to respond to the ever-changing conditions of the air transportation market.

The passenger traffic demand patterns at an airport exhibit significant variations on a monthly, daily, and hourly basis. The periods of time when the greatest demand is placed upon facilities required to accommodate passenger (and aircraft) movement are known as peak periods. Defining the peak demand forecasts is essential for sizing the passenger facility requirements for the Master Plan. The following section includes a discussion of the peak period demand forecasts.

4.1 Methodology for Estimating the Peak Period Demand

For estimating the peak demand at commercial airports, the FAA recommends the use of a number of sources such as historical records, the Official Airline Guide (OAG) and airport traffic control tower counts. Because air passenger traffic patterns for SSA have not yet been established, airports with activity levels and trends similar to those anticipated to occur during the IAP have been examined to determine potential peak activity characteristics. Manchester (NH), Dayton International (OH), and T.F. Green International Airports, (Providence, RI) were examined since they currently have air passenger activity characteristics similar to those expected at SSA during the IAP.

The U.S. Department of Transportation (DOT) Onboard T-100[45]/T-3[46] and Origin-Destination (O/D) Surveys of Airline Passenger Traffic statistics were examined to determine the ratio of the peak month activity relative to annual activity, as well as typical peak month load factors at these airports. The two peaking characteristics analyzed were: Peak Month Average Day (PMAD) and the Peak Hour of the PMAD for both passenger activity and aircraft operations.

The annual passenger forecasts for the first five years of activity at SSA were developed using an assumed daily airline schedule, based on the number of passenger aircraft departures per day, average seats per departure and load factors.[47] The peak hour forecasts presented in the following section were generated from these numbers.

[45] This table combines domestic and international T-100 segment data by U.S. and foreign air carriers, and contains non-stop segment data by aircraft type and service class for passengers transported, freight and mail transported, available capacity, scheduled departures, departures performed and aircraft hours. Bureau of Transportation Statistics, U.S. Department of Transportation.

[46] This table contains scheduled and non-scheduled passenger and freight information by carrier and airport, and provides such items as departures performed, freight, mail, passengers, U.S. mail, foreign mail, and a domestic/foreign activity indicator. Bureau of Transportation Statistics, U.S. Department of Transportation.

[47] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

4.1.1 Peak Month Average Day Domestic Passenger Activity – DBO+1 through DBO+5

Table 4-1 presents the peak month average day (PMAD) projected passenger aircraft departures as developed for the three forecast scenarios from DBO+1 through DBO+5. The design day activity schedule and the peak hour activity were derived based on the assumptions stated in the forecast report[48] and are shown in **Table 4-2** and **Table 4-3**.

The average number of seats per aircraft, load factors and enplaned passengers are identical to those contained in the forecast report. These estimates were derived based on the assumption that in the first year of operation there would be minimal activity at SSA and that passenger activity would gradually increase during the IAP.

By DBO+5, it is assumed that SSA will have a 16-hour daily schedule (i.e., 6 a.m. to 10 p.m.). For estimating the peak hour demand, it was assumed that peak periods of activity would coincide with arrivals and departures to more business-oriented markets (i.e., New York City, Washington, D.C., and Los Angeles).

Table 4-1
PMAD Daily Schedule Activity Characteristics

Forecast Scenario	DBO+1				DBO + 5			
	Daily Departures	Avg. No. of Seats/ Aircraft	Load Factor (%)	Enplaned Passengers	Daily Departures	Avg. No. of Seats/ Aircraft	Load Factor (%)	Enplaned Passengers
Low Case	2	150	73	219	15	124	77	1,432
Base Case	5	146	73	533	25	116	76	2,204
High Case	6	144	75	648	36	107	75	2,889

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.

Table 4-2
Peak Hour Schedule Activity Characteristics - DBO+1

Forecast Scenario	Peak Hour Departures	Average No. of Seats/Aircraft	Load Factor (%)	Enplaned Passengers
Low Case	1	150	80	120
Base Case	2	150	80	240
High Case	2	150	80	240

Source: TAMS, an Earth Tech Company, 2004.

[48] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Table 4-3 Peak Hour Schedule Activity Characteristics - DBO+5				
Forecast Scenario	**Peak Hour Departures**	**Average No. of Seats/Aircraft**	**Load Factor (%)**	**Enplaned Passengers**
Low Case	3	113	80	271
Base Case	4	118	80	388
High Case	5	112	80	448

Source: TAMS, an Earth Tech Company, 2004.

4.2 Aircraft Gate Requirements

The planning approach for the IAP passenger terminal was to initially define the requirements for a modest passenger terminal complex. It is IDOT's expectation that the passenger terminal will be capable of expanding readily, to meet market-driven future demand for air transportation services. The IAP passenger terminal facility requirements reflect the "start-up" phase of the airport planning timeframe from the Date of Beneficial Occupancy (DBO) through DBO+5. Facility requirements have been developed for the Low, Base and High Case forecast scenarios.

The requirements for aircraft gate facilities have been determined from an analysis of the draft *Projections of Aeronautical Activity for the Inaugural Airport Program.* The potential aircraft schedules, contained in Section 2.3, have been used to determine the types of commercial passenger aircraft that need to be accommodated.

For this analysis, the typical air carrier aircraft assumed is an ADG III narrow body aircraft with a capacity of 150 passengers. The typical regional aircraft assumed is an ADG II regional jet with a seating capacity of 90 passengers. An average load factor of 75-80 percent has been assumed for air carrier and regional operations.

For the purposes of this report, the Annual Gate Utilization Method has been used to estimate aircraft gate requirements. Based on a survey of comparable airports, such as Manchester Airport (NH), annual gate utilization rates of 50,000 to 100,000 annual enplaned passengers per regional jet gate and 125,000 to 150,000 annual enplaned passengers per narrow body jet gate, have been used to establish a range of gates required for the Low, Base and High Case forecast scenarios.

To accommodate the estimated peak hour passenger demand, it has been projected that for DBO+1 one Air Carrier gate will be required for the Low and Base Case forecast scenarios, while two gates would be required for the High Case forecast scenario. For DBO+5, it has been estimated that one regional gate and three to four narrow body gates would be required for the Low Case forecast scenario. Under the Base Case forecast scenario, two to four regional gates and four to five narrow body gates would be required, and for the High Case, four to six regional gates and five to six narrow body gates would be required. The results of this analysis are shown in **Table 4-4**.

Table 4-4
Summary of Aircraft Gate Requirements

Operations/Gates	DBO+1			DBO+5		
	Low Case	Base Case	High Case	Low Case	Base Case	High Case
Regional Jet AEP	0	0	0	35,235	183,465	344,610
Narrow Body AEP	19,600	126,000	169,400	435,827	525,636	623,052
Total AEP	19,600	126,000	169,400	471,000	709,000	968,000
Regional Gates	0	0	0	1	2 – 4	4 – 6
Narrow Body Gates	1	1	1 – 2	3 – 4	4 – 5	5 – 6
Total	1	1	1 – 2	4 – 5	6 – 9	9 – 12

Sources: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004;TAMS, an Earth Tech Company, 2004.
AEP = annual enplaned passengers

4.3 Aircraft Apron Requirements

The aircraft apron has been planned using a modular approach to optimize utilization of the aircraft apron and to provide the greatest possible operational flexibility. Planning for the apron should include the ability to readily expand the terminal complex in a straightforward and logical manner, if future demand for air transportation service at SSA increases. Apron planning modules have been developed for narrow body and regional jet passenger aircraft for the IAP passenger terminal, based on the forecasts.

4.3.1 Regional Jet Aircraft Apron Planning Module

The apron-planning module for regional jet aircraft is based on accommodating the full range of ADG II regional jet aircraft, including the CRJ and ERJ family of aircraft. The apron-planning module for the regional jet aircraft is 101.25 feet in width including the aircraft wing tip-to-wing tip dimension of 76.25 feet plus 15 feet wingtip-to-wingtip clearance. The depth of the regional jet aircraft apron module is 175 feet including the overall length of the regional jet aircraft plus 25 feet clearance at the nose of the aircraft. **Exhibit 4-1** illustrates the regional jet apron planning modules being considered.

4.3.2 Narrow Body Aircraft Apron Planning Module

For the IAP, the apron planning module for air carrier narrow body jet aircraft is based on accommodating ADG III aircraft including the Boeing 717-100 and 200, Boeing 737-100 through 900 aircraft and the Airbus 318, 319, 320 and 321 family of aircraft.

The typical narrow body apron-planning module for air carrier narrow body jet aircraft is 147 feet, 5 inches in width including the aircraft wingspan of 117 feet, 5 inches plus a minimum 15-foot wing-tip-to-wing-tip clearance. The depth of the narrow body module is 222 feet. This includes a setback requirement of 78 feet required for a passenger boarding bridge at a maximum 1:12 slope in accordance with the requirements of the Americans with Disabilities Act (ADA). The narrow body jet apron-planning module is illustrated in **Exhibits 4-2** through **4-4**.

Exhibit 4-1
Regional Jet Apron Planning Module
Bombardier CRJ 200, 700, 900

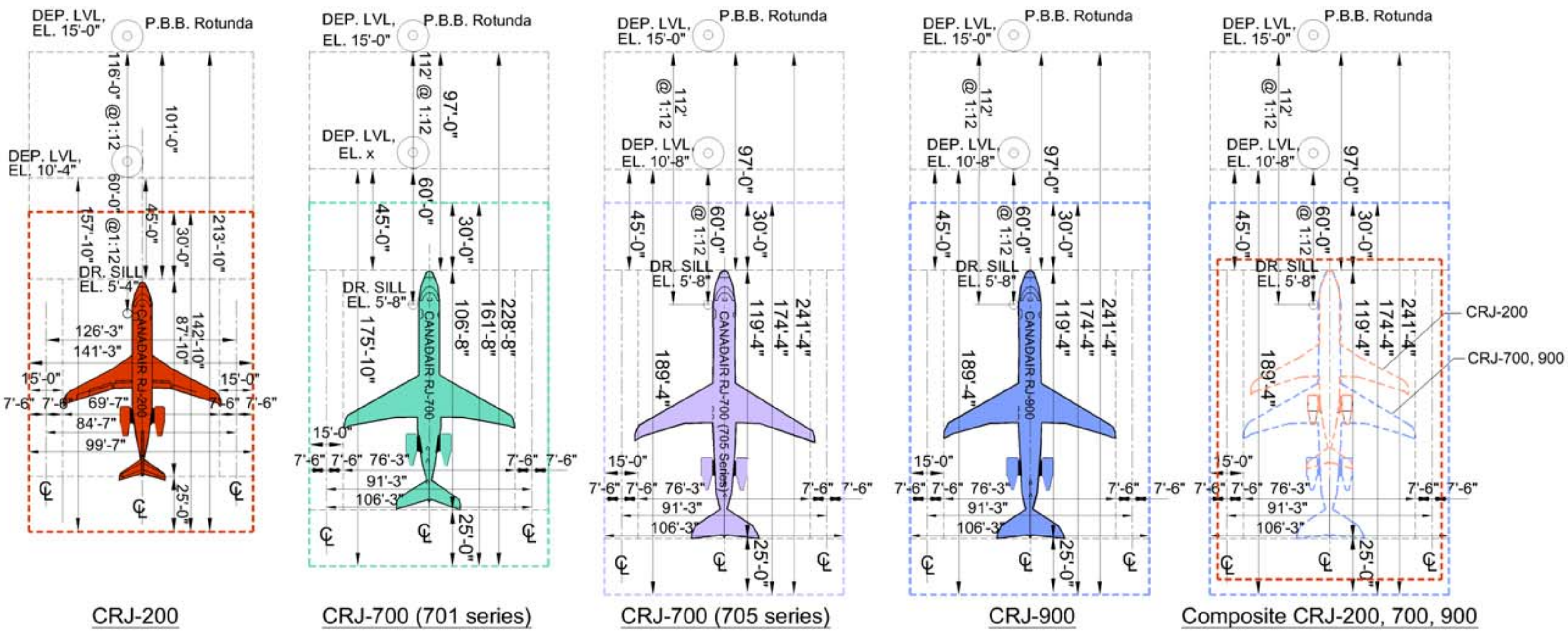
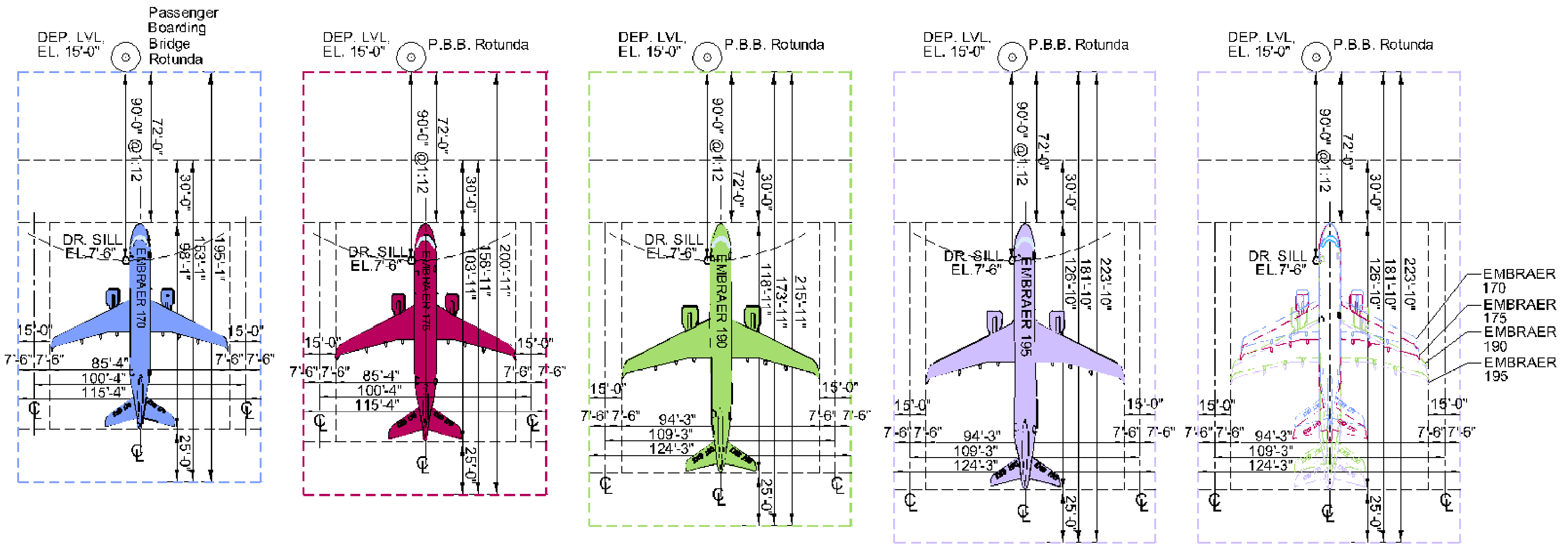


Exhibit 4-2
Small Narrow Body Jet Apron Planning Module
Embraer 170, 175, 190, 195



EMB-170 EMB-175 EMB-190 EMB-195 EMB-170, 175, 190,195, Composite

EMBRAER APRON PLANNING MODULE: EMBRAER 170, 175, 190, 195

Exhibit 4-3
Narrow Body Jet Apron Planning Module
Airbus 320-100, -200; 321 All Models

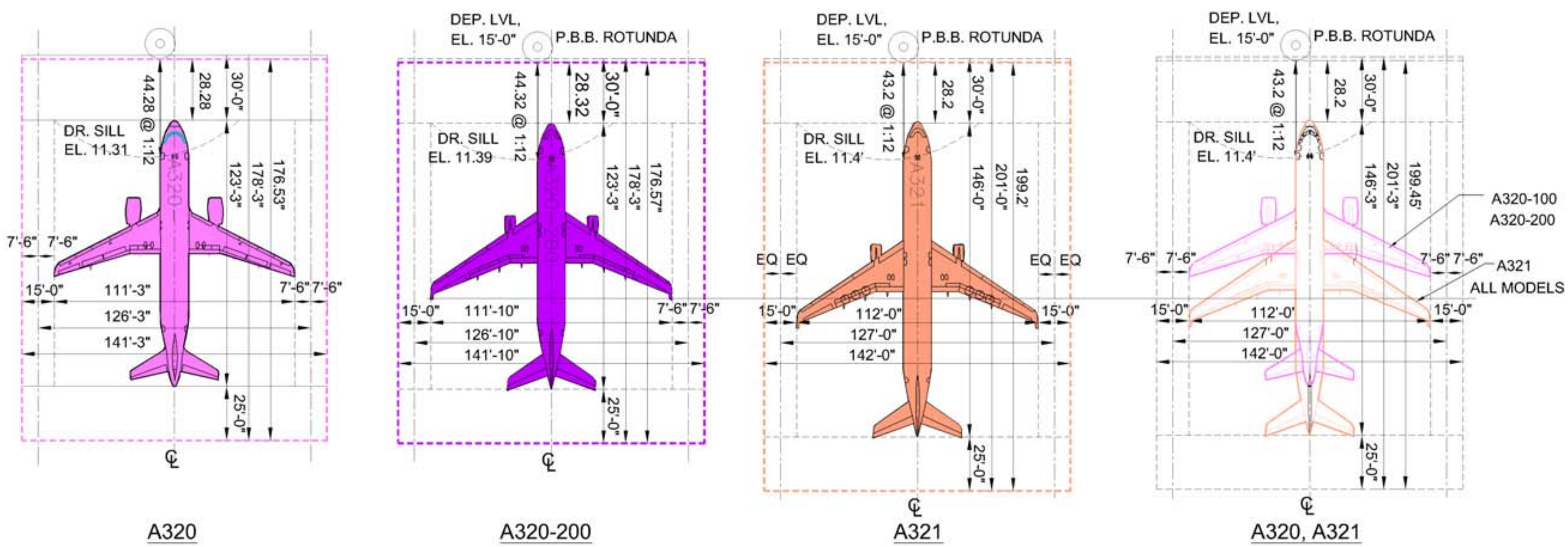
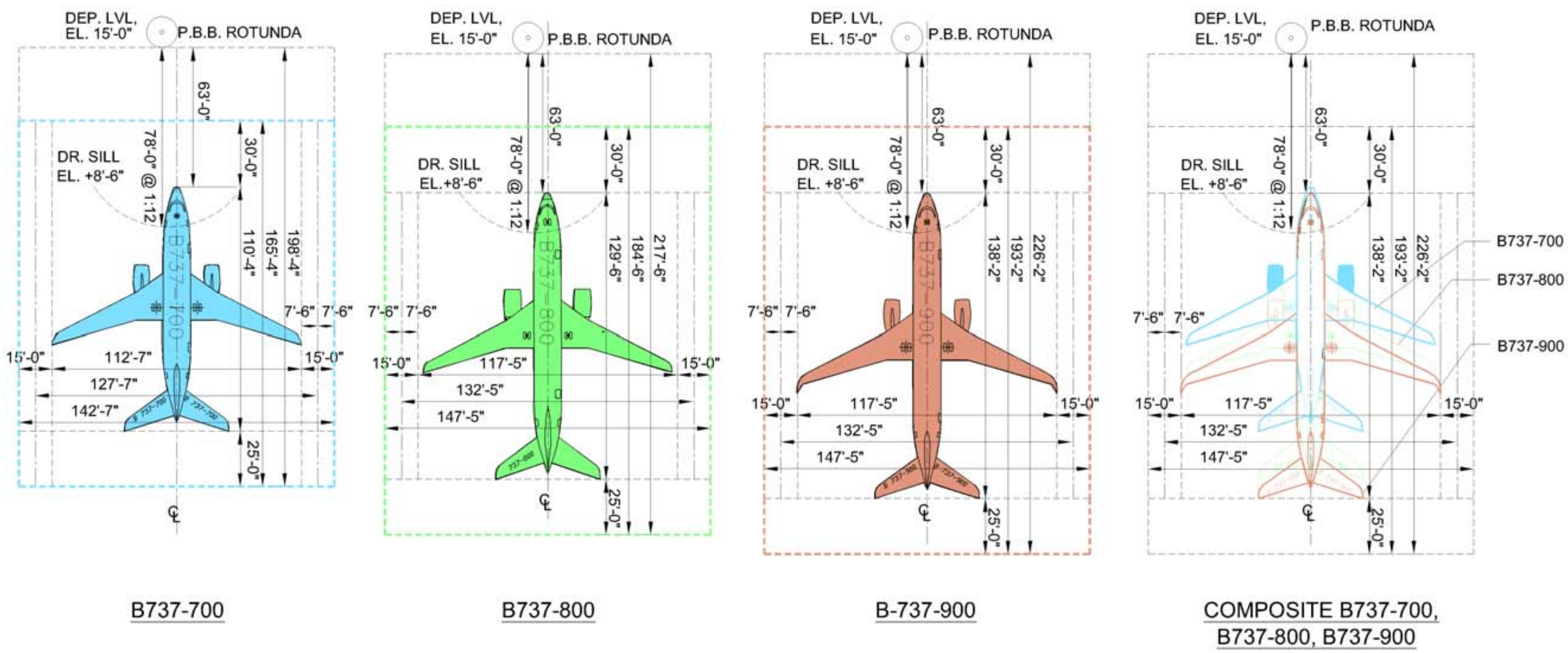


Exhibit 4-4
Narrow Body Jet Apron Planning Module
Boeing 737-700, 800, 900



4.3.3 Aircraft Apron Frontage

To accommodate 1-2 air carrier aircraft in DBO+1, the overall required aircraft apron frontage is approximately 142.5 to 285 feet. To accommodate 4-6 regional jets and 5-6 air carrier aircraft, the overall required aircraft apron frontage is approximately 1,200 to 1,500 feet under the High Case forecast scenario in DBO+5.

4.3.4 Aircraft Apron Depth

For DBO+1 through DBO+5, an aircraft apron depth of 275 feet will accommodate the Airbus 318, 319, 320 and 321 and the Boeing 737-700, 800, 900 families of narrow-body aircraft.

4.3.5 Aircraft Apron Service Roadways

The aircraft apron will be planned for optimum service access to all aircraft and the efficient movement of ground service vehicles and equipment. The overall aircraft apron plan includes provisions for a ground service equipment parking area (25 feet in depth) and a two-lane service roadway adjacent to the concourse. The service roadway will include two twelve-foot wide vehicle lanes for a total width of 24 feet. A two-lane service roadway will also be provided behind the aircraft. The service roadway behind the aircraft will have two twelve-foot wide vehicle lanes for a total width of twenty-four feet.

4.3.6 Apron Taxi Lane

In DBO+5, the apron pushback taxi lane will accommodate ADG III aircraft. The taxi lane object free area width will be 162 feet and the distance from the taxi lane centerline to fixed or moveable objects will be 81 feet. Planning for future phases of development when B-757 and larger aircraft may operate at SSA, should allow the aircraft apron to be deepened and the apron pushback taxi lane widened to accommodate larger aircraft. A dual north-south taxiway will be located, providing adequate space between the terminal apron and the dual taxiway to permit deepening the aircraft apron and widening the apron taxi lane without impacting the terminal complex or main taxiway system, if needed in the future.

4.4 Passenger Terminal Requirements

4.4.1 Passenger Terminal Functional Area Requirements

A preliminary estimate of the IAP passenger terminal functional area requirements has been made for the Low, Base and High Case forecast scenarios. These preliminary area requirements are subject to further detailed analysis in subsequent phases of the planning process. A discussion of the planning requirements for each functional area of the passenger terminal follows, and is summarized in **Table 4-5**.

Table 4-5 Summary of Passenger Terminal Functional Area Requirements, DBO+5			
Passenger Terminal Functional Areas	**Low Case**	**Base Case**	**High Case**
Narrow Body Jet Gates	1 – 2	4 – 5	5 – 6
Regional Jet Gates	1	2 – 4	4 – 6
Airline Ticket Counters (sf)	650	975	1,290
Airline Ticket Offices and Support (sf)	1,440	2,150	2,850
Outbound Baggage Room (sf)	2,520	3,750	4,985
Baggage Claim Area (sf)	1,980	2,950	3,915
Airline Operations and Support Space (sf)	2,880	4,300	5,700
Departure Lounges (sf)	6,125	9,125	12,110
Other Airline Support Space (sf)	580	860	1,140
Ticketing / Check-in (sf)	3,175	4,725	6,275
Lobby Waiting Area (Departures) (sf)	2,300	3,425	4,540
TSA Security Office and Support (sf)	750	1,000	1,250
Security Checkpoint – Passenger and Cabin Baggage (sf)	2,000	3,000	3,000
Baggage Claim Lobby (sf)	5,250	7,800	10,370
Food and Beverage Service (sf)	9,900	14,750	19,600
Other Concessions and Terminal Services (sf)	9,900	14,750	19,600
Other Rental Areas (sf)	4,950	7,370	9,790
Circulation Areas (sf)	11,320	16,855	22,390
Sub-total (sf)	*62,970*	*93,785*	*124,555*
HVAC (15%) (sf)	9,445	14,070	18,685
Electrical (10%) (sf)	6,300	9,380	12,455
Sub-total (sf)	*78,715*	*117,235*	*155,695*
Structure (5%) (sf)	3,935	5,860	7,785
Total – Terminal Area (sf)	**85,395**	**127,100**	**167,730**

Source: TAMS, an Earth Tech Company, 2004.

4.4.2 Passenger Ticketing and Check-in

Reflecting current passenger service trends in the airline industry, it is anticipated that both full-service and automated self check-in will be provided centrally in the passenger terminal. Automated self check-in is also anticipated both centrally and distributed throughout the check-in area and curb front. Central ticketing and check-in will be accommodated at linear airline ticket counters. Pre-ticketed passengers may check-in either at the enplanement curb front, the ticket counter or the departure gate.

The ticketing and check-in lobby will have an overall depth of approximately 60 feet from the face of ticket counters to the face of the terminal building including 20 feet for passenger queues. Ticket counter positions are typically based on the number of peak hour enplaning passengers, the number of airlines, the time distribution of passengers arriving at the terminal, and the percentage of passengers checking in at the ticket counter versus going directly to the gate. Because much of this specific information is not available for the specific airline groups that will be providing service at SSA, certain general planning parameters have been assumed, as discussed below. These assumptions are subject to further clarification as the detailed planning of the IAP passenger terminal progresses.

An average check-in processing rate of 2.0-2.5 minutes per passenger has been assumed. It has also been assumed that 10 percent of passengers would check-in at the curb front, 10 percent would have no baggage to check and would check-in at the gate, and 80 percent would check-in at the central ticket counters. With regard to the distribution rate of the arrival of passengers to ticketing and check-in, it has been assumed that between 15 to 20 percent of departing passengers will arrive at ticketing and check-in during the peak 10 minutes and that the peak 10 minutes will occur from 50 to 60 minutes before departure.

Based on these assumptions, it is estimated that 15 to 20 check-in positions will be required in DBO+5. The size and configuration of airline check-in counters vary considerably by airline and location. It has been assumed that the typical central ticket counter position will provide both full service and automated self check-in and that baggage check-in and induction can be accommodated at each position. The typical central check-in position will be 6 feet in width, including the customer service position and a shared baggage well with dual baggage induction belts. The overall depth of the central ticket counter area is assumed to be 10 feet including the ticket counter, customer service work area and baggage belt.

For DBO+5, the required ticket and check-in position frontage is estimated to be approximately 90 to 120 feet.

4.4.3 Security

The IAP passenger terminal will be planned in accordance with the approved policies and protocols of the Department of Homeland Security and the Transportation Security Administration (TSA). Overall, the passenger terminal will be planned for the efficient screening of all passengers and carry-on baggage to prevent the introduction of weapons or explosives into the passenger cabin. It will also be planned for 100 percent screening of checked baggage utilizing explosives detection system (EDS) technology. As of the writing of this report, the policies and protocols of the TSA are still evolving. The development of all relevant TSA airport security policies and protocols will be carefully monitored and will be incorporated in the planning of the IAP passenger terminal. This work will be done in close coordination with the Transportation Security Administration, FAA and IDOT.

4.4.4 Passenger Concourse

After check-in and clearing the passenger security-screening checkpoint, passengers will enter the attached linear concourse. The concourse corridor will be approximately 45 to 55 feet in width to accommodate future moving walkways located centrally in the concourse. The passenger concourse will provide passenger support facilities, concessions and access to the departure lounges, organized linearly along the airside perimeter.

4.4.5 Departure Lounges

The departure lounges are based on the mix of aircraft and the average seating capacity of each class of aircraft. These lounges are located in pairs to allow flexibility of use and sized to accommodate the largest narrow-body design aircraft (i.e., B-737-800 or A-320).

The departure lounges are planned to provide a waiting area for 80 percent of the aircraft passenger capacity with room for 50 percent of the passengers to be seated and 50 percent standing. Seated passengers will be allocated 15 square feet per passenger, while standing passengers will be allotted 10 square feet per passenger.

An average depth of 30 feet with centrally located check-in podiums is planned for the lounges. The depth of the check-in podium and back wall is approximately 8 feet. A deplaning corridor aligned with the boarding bridge door will be provided at 6 feet in width or 180 square feet in area. Each customer service agent position is allocated 5 feet in width. The passenger queue is assumed to be approximately 15 feet deep. Each customer service agent position is allocated approximately 115 square feet of floor area. For general planning purposes, the customer service agent podium positions are assumed to be as follows: one for regional jet aircraft and two for narrow body jet aircraft (up to 150 seats). The average aircraft seating capacities and hold room sizes are noted in **Table 4-6.**

Table 4-6
Average Aircraft Seat Range and Departure Lounge Area

Aircraft Type	Seats	Area (SF)
Regional Jet	90	1,250
Narrow Body	150	1,850

Source: TAMS, an Earth Tech Company, 2004.

4.4.6 Concessions

The IAP passenger terminal concessions area includes all of the commercial revenue generating operations that provide services for the traveling public. A comprehensive Concessions Marketing Plan and Concessions Space Program will be developed to provide the full range of services to passengers and users of the terminal.

It is anticipated that Concessions space will include:

- Ground Transportation Services including rental car companies, limousines, vans and buses
- Food and Beverage Service
- News, Gift and Specialty Shops
- Banking, ATM
- Travel Agencies
- Kitchen and Work Areas
- Concessions Storage and Loading Docks

Concessions will be located both airside and landside. Concessions and service areas will be located adjacent to each pair of departure lounges to provide for convenient access for passengers waiting for their flights.

4.4.7 Airline Support Space

Outbound Baggage Makeup areas include manual or automated baggage make up units, baggage cart and container storage areas, baggage tug and cart circulation areas, and control and administrative support areas.

At DBO, it is anticipated that each airline will probably do its own baggage handling using manual methods. However, as the airport is expanded over time, it is possible that automated, centralized baggage handling systems will be required. The baggage handling systems will be subject to further detailed analysis and evaluation.

Baggage Claim Area requirements are primarily based on the volume of peak hour arriving passengers, the concentration of the arriving passengers, and on the ratio of checked baggage per passenger. For the IAP, it is estimated that approximately 60 to 70 percent of passengers will arrive within a 20-minute period.

The majority of passengers usually arrive at the baggage claim area before their bags have been unloaded onto the baggage claim units. Therefore, the baggage claim units should be sized for the number of passengers waiting for baggage since most of the baggage is claimed on the first cycle of the baggage claim unit.

Typical baggage claim units at larger airports allow for 150-180 linear feet for most airlines. Baggage claim units of this size will adequately handle large narrow body (B-757) and widebody aircraft as well as allow multiple flights to be displayed on a single claim unit. For commercial passenger aircraft operations, baggage storage capacity on the claim unit is not a primary consideration during the IAP. Therefore, flat-plate direct feed units are recommended. The baggage claim area is recommended to be 35 square feet per linear foot of claim device to provide adequate queuing and circulation.

Baggage Claim Off-Load Areas include the portion of a flat plate, direct feed baggage claim unit adjacent to the inbound baggage roadway, on which the arriving baggage is placed on the feed conveyor for a remote fed baggage claim unit. A recommended area of 2,000 square feet per claim device should be provided for the Baggage Claim Off-Load Area. This area would accommodate the offload lanes for a baggage train of four baggage carts or dollies.

Baggage Train Circulation area includes the lanes and common use maneuvering areas. Typically, a 10-15 percent area allowance of all baggage handling areas should be allocated for baggage train circulation areas.

4.5 Terminal Curb Front Requirements

The IAP passenger terminal access is planned as a free flow one-level curb frontage roadway. A manual curb front capacity analysis was performed to estimate frontage requirements for the projected passenger activity levels in DBO+1 and DBO+5. The peak hour passenger forecasts[49] were the basic parameter for this analysis. Both the Base and High forecasts of peak hour passengers were used to evaluate the capacity of the proposed curb front design. The following assumptions were made:

[49] Peak Hour passengers are shown in Tables 4-2 and 4-3.

1. Peak hour vehicles were modeled as follows: fifty percent of private cars were assumed to use the terminal curb front roadway, and fifty percent were assumed to use a parking facility. This assumption was made to avoid overestimating the projected demand for curbside.
2. Mode splits, average curb front dwell times and vehicle occupancy parameters were modeled based on previous studies[50] on curb front vehicle distribution and/or applying the FAA guidelines on typical vehicle occupancy rates. Longer dwell times were assumed at the arrival curbside since typically the demand is greater at the arrival curbside. This information is presented in **Table 4-7**.
3. It is anticipated that shuttle buses will circulate the departure curb front.

The curb front capacity analysis was performed for the peak 20-minute demand. The results of this analysis are illustrated in **Table 4-8**.

Table 4-7
Average Vehicle Activity at Curb Front

Type of Car	Percentage[1]	Average Vehicle Length/Width[2] (ft)	Average Dwell Time[3]	Average No. of Persons per Car
Private cars	73%	L=16’-8”; W=6’-8”	3.0	1.5
Taxi/limos	21%	L=16’-8”; W=6’-8”	2.0	1.25
Shuttles	6%	L=22’-5”; W=6’-8”	5.0	5

Source: TAMS, an Earth Tech Company, 2004.
[1] Average curb front vehicle mode splits.
[2] Average vehicle lengths correspond to design vehicle standards.
[3]Typical average curb dwell times. Source: FAA, AC 150/5360-13, Table 9-1, pg .121.

Table 4-8
Peak 20-Minute Curb Front Demand (DBO+5)

Vehicle Type	Low Case		Base Case		High Case	
	Departure Curb (ft)	Arrivals Curb (ft)	Departure Curb (ft)	Arrivals Curb (ft)	Departure Curb (ft)	Arrivals Curb (ft)
Private Cars	135	163	193	233	223	270
Taxi/ Limos	8	11	10	17	12	19
Shuttles	4	60	7	6	7	6
Total	147	234	210	256	242	295
Effective Linear Demand	381		466		537	

Source: TAMS, an Earth Tech Company, 2004.

[50] *Technical Air Quality Report,* TAMS Consultants, Inc., 1997; *New Terminal Program at Midway Airport,* Barton-Aschman Assoc., 1995.

It is anticipated that the terminal frontage road will be a 3-lane road to accommodate DBO+5 projected curbside demand. The inner-lane (drop-off/pick up lane) will be 10 feet wide and should provide parking and maneuvering space for vehicles that will drop off/pick up their customers. This lane usually has a throughput capacity of 600 vehicles per hour. The through-traffic lanes would have an estimated carrying capacity of 900 vehicles per lane per hour. All commercial vehicles are assumed to use the inner lane. Private cars will also circulate the curb front road, but a significant percentage (50%) was assumed to enter the parking facility. Delivery vehicles, garbage collection trucks, and armored vehicles will be assigned to the loading docks. Double parking might occur during peak hour activity. Curb front management personnel could direct those vehicles towards the less crowded area along the curb front.

It is expected that when the airport begins operation, airport management will optimize the proposed curbside management configuration, to better respond to local traffic demand and patterns.

Section 5 – IAP Support/Ancillary Facility Requirements

The following support/ancillary facilities are anticipated to exist at SSA on opening day (DBO) to accommodate the projected passenger, cargo and general aviation/corporate aviation operations discussed in the draft forecast report[51]:

- Air Cargo Facilities;
- General Aviation Facilities;
- Aircraft Rescue and Fire Fighting (ARFF) Facilities;
- Fuel Storage Facility;
- Aircraft and Airfield Pavement Deicing Facilities;
- Airfield Maintenance Center Facilities;
- Airport Utilities; and
- Service Roads and Security Access.

5.1 Air Cargo Facility Requirements

Air Cargo facilities will be required to accommodate the projected cargo activity through the five-year planning horizon. IDOT believes that SSA will be attractive to air cargo carriers and freight forwarders for the following reasons:

- The SSA site is located in the largest metropolitan area in the central U.S.;
- Chicago has a large O&D cargo market currently being serviced by O'Hare International Airport and Greater Rockford Airport;
- Chicago is an international port of entry; and
- The SSA site can provide access to a large portion of the U.S. population.

The preliminary air cargo facilities proposed at SSA were estimated and sized based on the draft forecasts of air cargo aviation activity[52], an assumed cargo aircraft fleet (see Section 2.2), weekly operations (see Section 2.3), load factors and percentages of express, freight and mail for each aircraft. **Table 5-1** summarizes the forecasted air cargo activity for SSA during the IAP.

[51] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.
[52] Ibid.

Table 5-1
IAP Air Cargo Aviation Activity Forecasts

AERONAUTICAL FORECAST CATEGORY BREAKDOWN BY AVIATION TYPE	*PLANNING HORIZON YEAR*	
	DBO+1	*DBO+5*
High Case Forecast Scenario		
Air Cargo Operations		
Domestic	1,700	3,783
International	902	1,760
Total Air Cargo Operations	2,602	5,543
Air Cargo Instrument Operations	1,301	2,772
Air Cargo Tonnage		
Freight/Express	56,600	128,500
Mail	6,800	17,700
Belly Freight	11,600	48,600
Total Air Cargo Tonnage	75,000	194,800
Base Case Forecast Scenario		
Air Cargo Operations		
Domestic	1,118	2,520
International		931
Total Air Cargo Operations	1,118	3,451
Air Cargo Instrument Operations	559	1,726
Air Cargo Tonnage		
Freight/Express	22,400	78,300
Mail	2,600	9,400
Belly Freight	3,900	15,900
Total Air Cargo Tonnage	28,900	103,600
Low Case Forecast Scenario		
Air Cargo Operations		
Domestic	0	1,262
International	0	0
Total Air Cargo Operations	0	1,262
Air Cargo Instrument Operations	0	631
Air Cargo Tonnage		
Freight/Express	0	25,200
Mail	0	3,000
Belly Freight	0	4,500
Total Air Cargo Tonnage	0	32,700

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, prepared for the Illinois Department of Transportation, May 2004.

5.1.1 Air Cargo Facility Sizing Methods

The preliminary sizing of IAP air cargo facilities has been calculated using the following four methods:

1. The *Total Area Ratio* (TAR) method is a rule of thumb based on industry standards. The total air cargo inbound and outbound tonnage forecasted during the IAP is translated to the total building area required to process the tonnage using a ratio factor (square feet per ton per year).

For planning purposes, the International Air Transport Association[53] (IATA) recommends the following spatial requirements for estimating the size of cargo facilities:

- 1.0 square foot per ton per year for outbound area estimations.
- 1.1 square feet per ton per year for inbound area estimations.

2. The *Functional Capacity* method (annual tons per square foot) is the next least-complicated method to calculate. This facility sizing method is based on a 1993 report *Capacity Evaluation and Design Guidelines Study of Air Cargo Terminals* by the Airport Research Center at the Rhine-Westphalian University of Technology, Germany[54]. The study identified three categories of air cargo terminals by function (Spoke, Hub and Specialized) and their relative capacities. The Spoke Terminal, with no transfer of goods between aircraft but primarily a transfer of goods from trucks to aircraft and vice versa, is the classification applicable to the IAP. Based on this study, the range for a Spoke Terminal is from a high of 1.3943 tons per square foot to a low of 0.5577 tons per square foot.[55]

3. The *Annual Demand Profile* method, "Design Of Middle Technology Freight Terminal" as published in the book *Airport Engineering*[56] provides a more precise method of calculating air cargo facility requirements. A traffic structure is built-up based on the domestic inbound and outbound, import and export tonnage. Then, the peak month, peak day and peak hour traffic is defined and the design requirements are derived from the throughput per square foot of floor area.

4. Another method used to calculate air cargo requirements is the *Planning Factors* method. The air cargo planning factors from the O'Hare Modernization Program (OMP) were used to provide a comparison between a mature modern airport and the IAP. The OMP factors were applied to the IAP air cargo forecasted tonnage to estimate facility requirements.

Air Cargo facilities can be challenging to size at the planning stage. This is due to the different requirements of specific markets and the specialization of space needs for goods (flowers, express packages, high value shipment, hazardous materials, etc.). Cargo operations are unique to the specific operators and industry players. For the IAP, a flexible and moderately sized starter air cargo facility is recommended, since air cargo activity and cargo facility requirements will ultimately be market-driven. **Table 5-2** shows a summary of the four different air cargo sizing methodologies for the IAP, based on the forecasts contained in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*.

[53] *Airport Development Reference Manual,* International Air Transport Association, 8th Edition, 1995.
[54] *Luftfrachtabfertigungsanlagen Planungsgrundlagen,* Airport Research Center at the Rhine-Westphalian University of Technology Aachen, German Airports Association (ADV), Stuttgart, 1993.
[55] Ibid.
[56] *Airport Engineering*, Norman Ashford & Paul Wright, Chapter 11, Air Cargo Facilities, 1992.

Table 5-2 **Air Cargo Warehouse Sizing Summary**			
	Cargo Tonnage Forecast, DBO+5		
Sizing Method	**Low Case** *32,700 tons*	**Base Case** *103,600 tons*	**High Case** *194,000 tons*
Total Area Ratios *(sf)* IATA Ratios	31,650	100,350	185,500
Functional Capacity *(sf)* *Spoke Terminals (tons per sf)* High Efficiency Range 1.3943 Low Efficiency Range 0.5577	 23,450 58,650	 74,300 185,800	 139,150 347,900
Annual Demand Profile *(sf)* *Ashford & Wright*	19,350	61,400	115,350
Planning Factors *(sf)* *OMP - O'Hare applied to IAP*	36,900	116,900	219,650

Source: TAMS, an Earth Tech Company, 2004.

These four sizing methodologies represent a wide spectrum of ways to estimate and calculate the size requirements for an air cargo warehouse facility. To differentiate between the four methodologies, it is important to understand the basis of each method. These methods range from a single air cargo industry flow-of-cargo factor (Total Area Ratio) that represents an average of cargo operations, to a detailed domestic/international demand profile with a specific cargo operation (Annual Demand Profile). The Functional Capacity method provides a range of values for determining when a facility is approaching its capacity in comparison to Spoke Terminals around the world. As shown in **Table 5-2**, the Base Case forecast scenario of the Functional Capacity method ranges from 74,300 square feet to 185,800 square feet. This means that if a highly efficient cargo operation with a 75,000 square foot facility was built and cargo operations approached the DBO+5 forecast of 103,600 tons, the facility would be operating at capacity. Using the Annual Demand Profile method, the Base Case would require a 61,400 square foot facility.

5.1.2 Air Cargo Apron

The air cargo fleet mix was defined and described in the draft forecast report[57] and summarized in Section 2.2 of this report. Based on this fleet, the new airside apron depth should be planned for a range of 205 feet to 263 feet from the face of the air cargo building to the parking limit line at the taxilane to allow for the parking of Boeing 737-400s (aircraft length of 119 feet, 6 inches), Boeing 757-200 (aircraft length of 155 feet, 3 inches) and Airbus 300-600 (aircraft length of 177 feet, 5 inches). This depth provides 60 feet of space between the nose and the face of the building for cargo staging and a 25-foot road for circulation of ramp equipment. Aircraft taxilanes should be a minimum of 208 feet wide (Boeing 767-200 wingspan of 156.1 x 1.2 + 20 feet) to allow for Airbus 300-600 and Boeing 767-200 aircraft access. **Table 5-3** summarizes the air cargo apron position and sizing requirements. All aircraft taxing, circulation and parking is

[57] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.

subject to the rules and regulations of the FAA and TSA regarding line-of-sight from the control tower and other criteria relating to air traffic control and safety.

Table 5-3
Air Cargo Apron Positions and Sizing

	Cargo Tonnage Forecast, DBO+5				
Component	**Low Case** *32,700 tons*	**Base Case** *103,600 tons*		**High Case** *194,000 tons*	
Design Cargo Aircraft	B737-400	B767-200 A300-600	B757-200	B767-200 A300-600	B757-200
Scheduled Lifts per day	2	2	4	3	6
Position Turnover (per day)	1	1	2	1.5	1.5
Positions Required	2	2	2	2	4
Total Apron Positions	2	4		6	
Frontage Width per Aircraft (feet)	150	181	150	181	150
Apron Linear Feet (L.F.) Required	300	362	300	362	600
Total Apron L.F. Required	300 L.F.	662 L.F.		962 L.F.	
Apron Depth *(feet)*	120 + 60 + 25 = 205	178 + 60 + 25 = 263		178 + 60 + 25 = 263	
Total Apron Areas *(sf)*	61,500	174,100		253,000	

Source: TAMS, an Earth Tech Company, 2004.

The planning criteria for the new landside areas should be a minimum 120 feet deep from the truck dock face of the building to the access road right-of-way. The access road should be a minimum of 32 feet wide within a 60-foot wide right-of-way. The truck court area includes loading docks and truck aprons for maneuvering. Individual truck docks should be 12 feet wide and 50 feet deep. There should also be parking for visitors (one space per 3,500 square feet of cargo building) and for employees (one space per 1,000 square feet of cargo building).

The planning of the proposed air cargo facilities for the IAP needs to be able to accommodate the different needs of the following potential users:

- Air express or airfreight;
- Freight forwarders with on/off-airport site requirements and apron access;
- All-cargo freight operations;
- International air cargo; and
- Commercial air carrier belly cargo.

Access to the air cargo facilities during the IAP will be determined through the alternatives analysis and will be depicted on the Airport Layout Plan. Although it is anticipated that in the early years of airport activity there would be few freight forwarders, this type of cargo activity could be easily accommodated in an on-airport cargo facility with direct apron access.

5.1.3 Air Cargo Facility Requirements Summary

The data in **Table 5-4** presents the projected air cargo facility requirements for the IAP. A range of facility requirements (High, Base and Low) is provided. This corresponds with the forecasts of air cargo aviation activity levels contained in the draft forecast report for the IAP.

Table 5-4
Summary of IAP Air Cargo Facility Requirements by Facility Component

Facility Component	Planning-Metric	Recom'd Planning Factor	Forecasted Demand DBO+5 Level			Recommended Facilities		
			Low	Base	High	Low	Base	High
Design Air Cargo Aircraft						B-737-400	B-757-200 B-767-200 A-300-600	B-757-200 B-767-200 A-300-600
Warehouse	*s.f. per peak month on-Airport enplaned tons*	33:1	920 tons	2,900 tons	5,500 tons	33,500 s.f.	106,000 s.f.	199,000 s.f.
Aircraft Positions	*peak hour tons per average maximum tons per movement*	1 : 35 (High)[1] 1 : 28 (Base) 1 : 22.5 (Low)	35 tons	110 tons	210 tons	2 positions	4 positions	6 positions
Airside Apron	*sf per peak hour aircraft position*	Schedule	2 positions	4 positions	6 positions	78,900 s.f.	174,100 s.f.	253,000 s.f.
Truck Dock Area	*Percent of warehouse area (sf)*	98%	33,500 s.f.	106,000 s.f.	199,000 s.f.	32,900 s.f.	104,900 s.f.	195,000 s.f.
Truck Staging	*Stalls per 7,000 sf of building area*	1 : 7,000	33,500 s.f.	106,000 s.f.	199,000 s.f.	5 stalls	15 stalls	28 stalls
Employee Parking	*Stalls per 1,000 sf of building area*	1 : 1,000	33,500 s.f.	106,000 s.f.	199,000 s.f.	33 stalls	106 stalls	199 stalls
Visitor Parking	*Stalls per 3,500 sf of building area*	1 : 3,500	33,500 s.f.	106,000 s.f.	199,000 s.f.	10 stalls	30 stalls	57 stalls
Auto Parking /Access/Circulation	*Percent of warehouse area (sf)*	80%	33,500 s.f.	106,000 s.f.	199,000 s.f.	26,800 s.f.	84,900 s.f.	158,900 s.f.
Other	*Percent of overall facility area (sf)*	15%	172,000 s.f.	469,000 s.f.	805,200 s.f.	25,800 s.f.	70,300 s.f.	120,800 s.f.
Air Cargo Site	*Sum of the cargo facility areas (sf)/(acres)*					198,800 s.f. 4.5 acres	539,300 s.f. 12.5 acres	926,000 s.f. 21.5 acres

Source: TAMS, an Earth Tech Company, 2004.
[1]Tons per peak hour parking position.

5.2 General Aviation Facility Requirements

A number of general aviation (GA) facilities will be affected by the opening of SSA. Chapter 3 of the forecast report[58] discusses the GA facilities located within or outside the IAP boundary, which could be impacted by the opening of the airport. Previous studies[59] determined that a Class C airspace structure, if implemented at SSA, would have a minimal effect to most GA aircraft passing through the area. Most cross-country operations are currently conducted at altitudes above the maximum elevation of Class C airspace, or pilots would plan their itinerary to circumnavigate the area. IDOT believes that SSA will have negligible impact on existing GA VFR operations at airports not directly impacted by construction and operation of SSA, but this will need to be verified by FAA once air traffic control (ATC) procedures are established for SSA.

During the IAP, it is expected that a fixed base operator will be present at the airport. The proposed GA facilities are anticipated to include a passenger terminal/administrative building, public and employee parking, aircraft parking apron and aircraft hangars. It is projected that SSA will attract between 41 and 135 based aircraft during it's first year of operation.[60]

The following assumptions were made in regard to the GA aircraft parking requirements and are based on a typical GA fleet mix[61]:

- Corporate Jets require on average 272 square yards per aircraft;
- Multi-engine aircraft require on average 172 square yards per aircraft;
- Single-engine piston aircraft require about 108 square yards per aircraft; and
- Apron requirements for itinerant demand is calculated based on a ratio of 300 yards per aircraft.

The estimated GA apron area requirements, based on the planning assumptions stated above, are shown in **Table 5-5**. The DBO+5 apron demand was estimated based on the assumption that between seventy-five to eighty percent of the based aircraft would use the apron at one time.

While automobile parking varies greatly for each fixed-based operator (FBO) (based on individual needs, the number of customers, visitors, etc.), a planning ratio of 2.2 parking stalls per peak hour operation was considered adequate for estimating the parking needs of both pilots and passengers. A summary of the estimated public parking needs is shown in **Table 5-6**.

[58] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.
[59] *General Aviation Impact Report,* Infinite Computer Technologies in association with TAMS Consultants, Inc., 1995.
[60] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.
[61] Based on data from commercial airports with similar levels of GA activity (i.e., T.F. Green International and Syracuse International Airports).

Table 5-5
GA Apron Area Requirements (DBO+5)

Aircraft Type	Apron Demand[1] (aircraft)	Average Parking Area per Aircraft (sq. yds.)	Parking Area Requirements (sq. yds.)	Apron Area Requirements (sq. yds.)	Hangared Aircraft (aircraft)	Hangar Requirements[3] (sq. ft.)	Tie Down Area (sq. yds)
Low Case							
Single-engine	30	108	3,240	9,720	10	8,500	684
Multi-engine	2	172	344	1,032	2	3,100	0
Turbojets	2	272	544	1,632	2	5,100	0
Total	34	N/A	4,128	**12,384**	14	20,000[3]	684
Base Case							
Single-engine	65	108	7,020	21,060	22	18,700	1,463
Multi-engine	4	172	688	2,064	4	6,200	172
Turbojets	5	272	1,360	4,080	5	12,750	0
Total	74	N/A	9,068	**27,204**	31	45,200[3]	1,635
High Case							
Single-engine	100	108	10,800	32,400	33	28,000	2,261
Multi-engine	6	172	1,032	3,096	6	9,300	275
Turbojets	7	272	1,904	5,712	7	17,850	0
Total	113	N/A	13,736	**41,208**	46	55,150[3]	2,536

Source: TAMS, an Earth Tech Company, 2004. N/A = Not Applicable

Notes:

1. Assumes that 80% of based single-engine and multi-engine aircraft and 100% of turbines will utilize apron area during PMAD.
2. Assumes an apron area three times larger than actual parking area for aircraft circulation and wingtip clearances.
3. Total Building requirements adjusted by 20% to reflect space for office and maintenance areas.

Table 5-6
GA Public Parking Requirements (DBO+5)

Forecast Level	Annual Operations	Peak Hour Operations	Required Parking (Spaces)	Required Parking Area (sq. ft.)
Low Case	16,800	7	15	6,000
Base Case	36,000	15	33	13,200
High Case	55,600	22	48	19,200

Source: TAMS, an Earth Tech Company, 2004.

5.3 Aircraft Rescue and Firefighting Facilities

Federal Aviation Regulations (FAR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D*, establishes guidelines and criteria regarding the facility requirements for aircraft rescue and firefighting (ARFF) services at an airport serving aircraft with a seating capacity of 30 seats or more.

Paragraph 139.315 sets forth the ARFF facility index determination based on the length of aircraft (as a group) operating at the airport and the number of daily departures. Paragraph 139.317 lists the minimum rescue and firefighting requirements for each of these indexes, which is summarized in **Table 5-7**. FAR Part 139 also stipulates that the largest aircraft size category with an average of five or more daily departures determines the ARFF index.

Table 5-7
Summary of ARFF Equipment Requirements (FAR Part 139)

Airport Index	Aircraft Length (feet)	Vehicles		Agents	
		Light Weight	Self-Propelled	Dry Chemicals (pounds)	Water (pounds)
B	90 – 126	1	1	500	1,500
C	126 – 160	1	2	500	3,000
D	160 – 200	1	2	500	4,000
E	Over 200	1	2	500	6,000

Source: Federal Aviation Regulation (FAR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D*.

The largest commercial aircraft expected to operate at SSA during the IAP are the B-767-200 (159 feet, 2 inches) and the A-300-600 (177 feet, 6 inches). Based on the size of these aircraft it would indicate that the airport's ARFF should be Index D; however, since these aircraft will average less than five daily departures (see **Table 5-8**), the airport’s ARFF would be Index B under the Low and Base Case forecast scenarios and Index C under the High Case forecast scenario during the IAP. Thus, the minimum number of aircraft rescue and fire fighting vehicles required during the IAP is two to three. The vehicles should have the following agents: 500 pounds of dry chemicals and 1,500 pounds of water to meet the criteria for Index B or 500 pounds of dry chemicals and 3,000 pounds of water to meet the criteria for Index C (see **Table 5-7**).

Table 5-8
Summary of ARFF Index by Average Daily Departures (DBO+5)

Forecast Level	Average Daily Departures (Commercial Aircraft)				
	Index A < 90’	Index B 90’ < 126’	Index C 126’ < 159’	Index D 159’ < 200’	Index E >200’
Low Case	0	15	2	0	0
Base Case	0	25	4	2	0
High Case	0	34	6	3	0

Source: TAMS, an Earth Tech Company, 2004.

Paragraph 139.319 of FAR Part 139 specifies the airport rescue and firefighting vehicles response time to every emergency:

> "Within 3 minutes from the time of the alarm, at least one airport rescue and firefighting vehicle shall reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post, or reach any other specified point of comparable distance on the movement area which is available to air carriers, and begin application of foam, dry chemical, or halon 1211."

> "Within 4 minutes from the time of the alarm, all other required vehicles shall reach the point specified in the previous paragraph from their assigned post and begin application of foam, dry chemical, or halon 1211"

In its *Guide for Aircraft Rescue and Fire Fighting Operations (NFPA 402),* 2002 Edition, the National Fire Protection Association (NFPA) recommends that ARFF vehicles should have a *maximum response time of 3 minutes* from the time that an emergency occurs at an airport. This response time is based upon previous experiences in aircraft fires. The other vehicles should arrive no more than one minute after the first responding vehicle has arrived to the scene of the accident. Based on this response time criterion, the ARFF facility should be located equidistant from the ends of the runway. The total response time from this location should be 84 seconds (1.4 minutes), well below the required 3-minute criterion.

5.4 Fuel Storage Facility

The fuel farm (also known as fuel storage facilities) is expected to have aboveground tanks and should be readily accessible to the terminal area. Fuel storage requirements were calculated based on the probable aircraft types and flight ranges as stated in the Draft *Projections of Aeronautical Activity for the Inaugural Airport Program*.[62] It was conservatively assumed that every aircraft operating at SSA would fuel up before departing.

The estimated fuel storage capacity requirements for the IAP, based on the above criteria, are shown in **Table 5-9** and **Table 5-10**. IDOT assumes that the fuel farm should hold the equivalent of seven days of demand.

[62] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Table 5-9
Expected Fuel Consumption, Commercial Aircraft – 4th Quarter of DBO+1

Destination/ Aircraft	Distance (Nautical Miles)	Fuel Required (gallons)	Low Case		Base Case		High Case	
			Daily Departures	Total Gallons	Daily Departures	Total Gallons	Daily Departures	Total Gallons
150-seat Passenger Aircraft								
Phoenix	1,440	3,985	0	0	1	4,000	1	4,000
Las Vegas	1,515	3,985	1	4,000	2	8,000	2	8,000
Orlando	1,005	3,239	1	3,200	2	6,500	2	6,500
132-seat Passenger Aircraft								
San Francisco	1,846	4,075	0	0	0	0	0	0
Los Angeles	1,745	3,925	0	0	0	0	1	3,900
Daily Passenger Aircraft Fuel Consumption			2	7,200	5	18,500	6	22,400
Cargo Aircraft								
B-737-400	1,200	3,582	0	0	2	7,200	3	10,700
A-300-600	2,000	11,516	0	0	0	0	1	11,500
B-767-200	4,000	15,672	0	0	0	0	1	15,700
Daily Cargo Aircraft Fuel Consumption			0	0	2	7,200	5	37,900
Daily Commercial Aircraft Fuel Consumption			2	7,200	7	25,700	11	60,300
Demand of 7 days			N/A	50,400	N/A	179,900	N/A	422,100

Source: TAMS, an Earth Tech Company, 2004. The amount of required fuel was estimated from the appropriate Airplane Characteristics for Airport Planning Manuals.
N/A = Not Applicable

Table 5-10
Expected Fuel Consumption, Commercial Aircraft, 4th Quarter of DBO+5

Destination/ Aircraft	Distance (Nautical Miles)	Fuel Required (gallons)	Low Case		Base Case		High Case	
			Daily Departures	Total Gallons	Daily Departures	Total Gallons	Daily Departures	Total Gallons
150-seat Passenger Aircraft								
Phoenix	1,440	3,985	2	8,000	2	8,000	2	8,000
Las Vegas	1,515	3,985	2	8,000	2	8,000	2	8,000
Orlando	1,005	3,239	2	6,500	2	6,500	2	6,500
132-seat Passenger Aircraft								
San Francisco	1,846	4,075	0	0	2	8,100	2	8,100
Los Angeles	1,745	3,925	2	7,900	2	7,900	3	11,800
117-seat Passenger Aircraft								
New York	733	2,164	4	8,700	4	8,700	4	8,700
Miami CMSA	1,197	3,060	0	0	2	6,100	2	6,100
90-seat Passenger Aircraft								
Washington, DC	612	1,355	3	4,100	3	4,100	4	5,400
Boston	867	1,920	0	0	3	5,800	3	5,800
Atlanta	606	1,342	0	0	3	4,000	3	4,000
Dallas-Ft. Worth	802	1,776	0	0	0	0	2	3,600
70-seat Passenger Aircraft								
Detroit	250	471	0	0	0	0	2	900
Minneapolis	334	629	0	0	0	0	3	1,900
Denver	888	1,671	0	0	0	0	2	3,300
Daily Passenger Aircraft Fuel Consumption			15	43,200	25	67,200	36	82,100
Cargo Aircraft								
B-737-400	1,200	3,582	2	7,200	2	7,200	2	7,200
B-757-200	1,500	5,970	0	0	2	11,900	4	23,900
A-300-600	2,000	11,516	0	0	1	11,500	1	11,500
B-767-200	4,000	15,672	0	0	1	15,700	2	31,300
Daily Cargo Aircraft Fuel Consumption			2	7,200	6	46,300	9	73,900
Daily Commercial Aircraft Fuel Consumption			17	50,400	31	113,500	45	156,000
Demand of 7 days			N/A	352,800	N/A	794,500	N/A	1,092,000

Source: TAMS, an Earth Tech Company, 2004. The amount of required fuel was estimated from the appropriate Airplane Characteristics for Airport Planning Manuals, except for the Regional Jets, which were based on the criteria of 117-seat aircraft.
N/A = Not Applicable

For general aviation operations, an average of 10 gallons of 100LL[63] aviation fuel was estimated per operation based on average GA fuel consumption rates reported at other airports. **Table 5-11** shows the estimated amounts of 100LL aviation fuel required to be stored in the fuel farm during the IAP.

Table 5-11
Estimated 100LL Fuel Storage Requirements (DBO+5)

Forecast Scenario	PMAD Operations	Gallons/PMAD Operation	100LL[1] Fuel Demand (Gal)	7-day Supply (Gal)
Low	31	10	310	2,170
Base	64	10	640	4,480
High	97	10	970	6,790

Source: TAMS, an Earth Tech Company, 2004.
PMAD = Peak Month Average Day
[1]100LL Avgas, is a 100-octane fuel, rated by the severe Motor Octane Number (MON) method ('LL' stands for 'low-lead').

In the first five years of operation, air carrier aircraft will be serviced at the gate by fuel trucks. However, provisions for future underground fuel lines to the main passenger and cargo apron areas should be included. These fuel lines will have proper protection and monitoring devices to avoid any detrimental environmental impact due to leakage. A cost/benefit analysis will be needed to determine the type of fuel supply facilities.

5.5 Aircraft and Airfield Pavement Deicing Facilities

Commercial airlines are required by FAA regulations to ensure that their aircraft are properly deiced prior to take-off. Aircraft deicing facilities are recommended at airports where icing conditions are frequently expected in winter. On average,[64] icy conditions occur approximately 25 days per year (temperatures below 32° F) in the Chicago region and deicing the pavement is necessary. Currently at MDW the airport deicing facilities are sized to service aircraft approximately sixty days a year. It is anticipated that during the IAP, aircraft deicing will occur at the gate. To provide pilots with procedural flexibility and expedite the operations, two remote deicing pads located near both runway thresholds are recommended. These facilities will be laid out in accordance with taxiway/taxilane separation criteria for airplane design group (ADG) IV and the ATCT line-of-site criteria, sized to meet the needs of the most demanding aircraft and mobile deicing vehicles (B-767-200 and A-300-600). Provision for a bypass taxiway should be included to ensure unrestricted aircraft access to and from the runway. The deicing facilities will also include provisions for a treatment and recycling system for runoff.

5.6 Airfield Maintenance Center Facilities

The Airfield Maintenance Center (AMC) will include all equipment related to the upkeep of all airfield facilities in order to ensure the safe and efficient operation of the airport, such as ground maintenance, snow removal, deicing trucks and mowing equipment. The AMC will also need an area to store spare parts. Parking provisions for deicing trucks will be included in the conceptual planning and design of these facilities. A snow-dump site will be designated on the Airport Layout Plan.

[63] 100LL Avgas, is a 100-octane fuel, rated by the severe Motor Octane Number method ('LL' stands for 'low-lead').
[64] Based on historical meteorological records at Midway International Airport from 1968 to 1977.

FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials* explains the planning criteria and methods for calculating the snow and ice control facility requirements. As described in FAA Advisory Circular 150/5220-20, *Airport Snow and Ice Control Equipment*, an annual forecasted operations clearance time and the amount of primary surface area to clear of snow, determine the appropriate snow removal equipment requirement list. The Airfield Maintenance Center facility requirements are derived by first calculating the snow removal equipment list. That list generates the equipment storage areas, the ancillary support areas, and the aisle areas.

5.6.1 Airfield Maintenance Operation - Methodology

Determination of airfield maintenance requirements includes identifying the following four items:

- Annual Operations Clearance Times;
- Primary Surface Area Snow Clearance;
- Snow Removal Rate Requirements; and
- Snow Removal Equipment List.

Annual Operations Clearance Time – the standard for clearance of snow from primary surface areas at commercial service airports with 40,000 or more annual operations is one half-hour, as described in FAA Advisory Circular 150/5200-30A. For annual operations of 10,000 – 40,000, the clearance time is one hour.[65]

Primary Surface Area for Snow Clearance - the Airport Snow Plan sets the priorities for clearing the snow from an airport's primary surface areas. The first priority areas for snow clearance would be the primary runway(s), principal taxiways, high-speed turnoffs, apron areas, firefighters emergency access roads, and NAVAID's. **Table 5-12** lists the primary surface areas that require snow removal.

Table 5-12
Primary Surface Areas to be Cleared of Snow (DBO+5)

Surface Area	Low Case	Base Case	High Case
Assumed Runway Length (feet)	9,000	9,500	9,500
Runway (sf) (150' wide Runway + 25' shoulders)	1,800,000	1,900,000	1,900,000
Taxiways – Including Fillets (sf)	1,222,800	1,285,300	1,285,300
ARFF Pavement (sf)	12,300	12,300	12,300
Aprons (Pax, Cargo, GA) (sf)	800,000	800,000	800,000
Blast Pads (sf)	176,000	176,000	176,000
Firefighter's Emergency Service Roads (sf)	224,600	236,600	236,600
Deicing Pad (sf)	332,200	332,200	332,200
Total Clearance Area (sf)	4,567,900	4,742,400	4,742,400

Source: TAMS, an Earth Tech Company, 2004.

[65] FAA Advisory Circular 150/5200-30A, *Airport Winter Safety and Operation,* Chapter 2, 17a, October 1991.

Snow Removal Rate Requirement - there are two methods to calculate the required rate of snow removal for rotary snowplows selection; one is graphical and the other is mathematical.[66] Using the Rotary Plow Selection Chart, the industry accepted standards are fixed. The mathematical solution provides more flexibility to change the variables such as snow depth, snow density, and rotary plow efficiency. The following criteria for calculation of the required rate of snow removal were used for the selection of rotary snowplows.

- Primary surface areas for snow removal;
- Snow removal operations begin with a one-inch snow depth on runway;
- The operations forecasted for DBO+1 require an 1-hour time clearance;
- The operations forecasted for DBO+5 require an 1/2-hour time clearance;
- An industry accepted standard snow density of 25 lbs/ft[67]; and
- Snowplow efficiency rating of 70 percent.

For DBO+1, the required rate of snow removal is 6,750-7,000 tons per hour. For DBO+5, the required rate of snow removal range is 13,500 to 14,000 tons per hour. **Table 5-13** shows the calculations below.

Table 5-13
Rate of Snow to be Cleared

	Low Case	Base Case	High Case
Runway Length (feet)	9,000	9,500	9,500
Primary Surface Area to be Cleared (sq. ft.)	4,568,000	4,742,500	4,742,500
1” snow depth = Area S.F. x 0.083” = sq. ft.[1]	379,100	393,600	393,600
Cubic ft of snow x 25.0 lb/ft[1] = lbs	9,478,200 lbs	9,840,400 lbs	9,840,400lbs
Pounds of Snow / 0.7 plow efficiency = lbs	13,540,500 lbs	14,057,700 lbs	14,057,700 lbs
DBO+1 clearance / 1 hour = lbs/hr	13,540,500 lbs/hr	14,057,700 lbs/hr	14,057,700 lbs/hr
DBO+5 clearance / .5 hour = lbs/hr	27,081,000 lbs/hr	28,115,400 lbs/hr	28,115,400 lbs/hr
DBO+1 Rate of Snow to be Cleared			
(Pounds per hour/2,000 lbs per ton = tons/hr)	6,750 tons/hr	7,000 tons/hr	7,000 tons/hr
DBO+5 Rate of Snow to be Cleared			
(Pounds per hour/2,000 lbs per ton = tons/hr)	13,500 tons/hr	14,000 tons/hr	14,000 tons/hr

Source: TAMS, an Earth Tech Company, 2004.
[1]FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, October 15, 1992.

Snow Removal Equipment List - **Table 5-14** shows the choice made from a number of combinations of high-speed rotary plows[68] to meet the required rate of snow removal. The number of displacement plows was decided by a ratio of two displacement plows per each rotary plow.

[66] FAA Advisory Circular 150/5200-30A, *Airport Winter Safety and Operation,* Chapter 2, 17a, October 1991.
[67] FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials,* October 1992.
[68] Class IV – 3,000 tons/hr; Class V – 4,000 tons/hr; Class VI – 5,000 tons/hr.

Table 5-14
Snow Removal Equipment List

Vehicle/Unit	Planning Ratios[1]	Area of Unit(s.f.)	Required DBO+1 Units	Required DBO+5 Units	Total Required Equipment Storage (s.f.)
High-Speed Rotary Snow Plow Class V – 4,000 tons/hr Class VI – 5,000 tons/hr	7,000 tons/hr DBO+1 14,000 tons/hr DBO+5	1,000 1,000	1 1	1 2	1,000 2,000
Displacement Plow	2 per Rotary Plow	1,000	4	6	6,000
Air Blast Power Sweeper	1 / 750,000 s.f.	800	2 - 6	2 - 6	1,600 - 4,800
Hopper Spreader 5 – 17 cu yd	1 / 750,000 s.f.	600	2 - 6	2 - 6	1,200 - 3,600
Liquid Spreader 500 – 4000 gal	4,200 gal/Tank	1,000	1	1	1,000
Front End Loader	N.A.	750	1	1	750
Snow Removal Equipment Bays & Storage Area			12 - 20	15 - 23	13,550 - 19,150

Source: TAMS, an Earth Tech Company, 2004 N/A = Not Applicable
[1]FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, October 15, 1992.

5.6.2 Airfield Maintenance Center - Building and Site Requirements

The Airfield Maintenance Center (AMC) requirements for the IAP are listed in **Table 5-15**. The AMC will require about 4.1 acres of site development. This includes 18 parking spaces for employees. The Airfield Maintenance Center will range from approximately 22,500 square feet to 39,000 square feet.

The Airport Maintenance Building consists of three areas; the equipment parking area, the ancillary support areas as defined by FAA AC 150/5220-20 *Airport Snow and Ice Control Equipment,* and the central aisle area. The equipment parking area either is unheated vehicle storage with vehicle pre-heaters or heated to 40 degrees F. This provides off-season vehicle storage, protection of the capital investment in the equipment and an inspection area. The equipment area also includes room for landscaping and other maintenance equipment. The ancillary support area includes the administration and maintenance support areas such as offices, lunch and training rooms, parts storage, lavatories, locker rooms, material storage, service bays and repair bays. The aisle area consists of a 30-foot wide circulation lane, a double loaded corridor of service and support bays, and a large overhead access door at each end of the aisle. **Table 5-16** is a summary of the airport maintenance center size requirements for each of the three forecast scenarios.

Table 5-15
Airfield Maintenance Center Requirements, DBO+5

Area	Planning Factor	Low Case	Base Case	High Case
Maintenance Site Area	1:5.9 (Building/Site Area Ratio)	3.0 acres	4.1 acres	5.2 acres
Employees	N.A.	16	18	29
Employee Parking Spaces	N.A.	16	18	29
Employee Parking Area	400 s.f./space	6,400	7,200	11,600
Building Area	N.A.	22,500 s.f.	30,400 s.f.	38,700 s.f.
Snow Removal Equipment Bays	N.A.	12	15	23
Other Vehicles (Pick-up, Mowing)	1 Other Vehicle to 2.4 Snow Removal Vehicles Ratio	5	6	10

Source: TAMS, an Earth Tech Company, 2004.
N.A. = Not Applicable

Table 5-16
Airport Maintenance Center Size Summary, DBO+5

AMC Area	Low Case (sf)	Base Case (sf)	High Case (sf)
Equipment Parking Area	13,550	16,350	19,150
Ancillary Support Area	3,750	5,750	8,150
Aisle/Circulation Area	5,200	8,300	11,400
Total	22,500	30,400	38,700

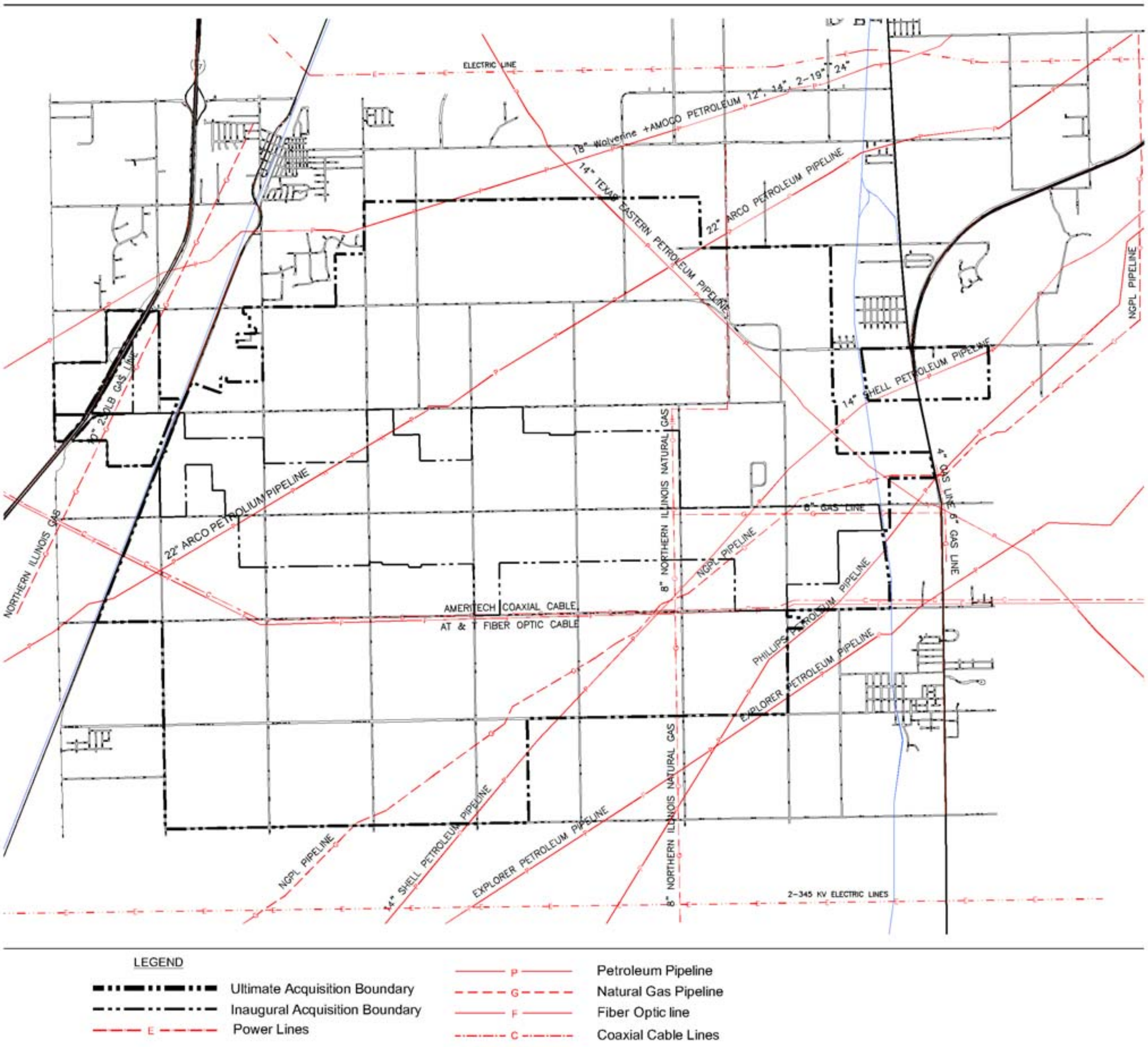
Source: TAMS, an Earth Tech Company, 2004.

5.7 Airport Utilities

The utility infrastructure required for airport operational facilities include: electrical, gas, water, wastewater, drainage, stormwater runoff and communication lines. **Exhibit 5-1** is a composite map of the existing primary utilities in the area within the boundary of the SSA. The map shows the power lines by sectional land area including the existing secondary power lines and service connections within the airport site. The following paragraphs discuss the existing utility network near the SSA property boundary.

Power - There are two main power lines located north and south of the airport's ultimate boundary. To the north there is an aerial power electrical line running approximately three-quarter miles north of Crete-Monee Road and to the south there is a 234.5 kV electrical line running north of Kennedy Road/319th Street.

Exhibit 5-1
Composite Map of Existing Utilities



Natural Gas – There is a Northern Illinois Natural Gas Company 8-inch main line running north along Western Avenue to the intersection of Offner and Western and then bearing north along Knacke Road.

Water – Currently, the area within the inaugural airport boundary is supplied by private water wells. The local water company that has immediate and long-term interest in running water mains through and around the airport site is Consumer's Illinois Water Company. In addition, several of the surrounding communities supply water to their residents from public wells. To date none of these entities service area includes the inaugural airport property.

Sanitary Sewer – There is no common collection system or treatment plant serving the airport property.

Telephone – Currently an AT&T fiber optic line and an Ameritech Coaxial Cable line runs east to west along North Peotone Road/Church Road. There are plans to extend the new fiber optic communication lines north from the intersection of Church Road and Will Center Road. SBC has switching stations in the Villages of Crete and Monee.

5.7.1 Power Supply

Table 5-17 provides the preliminary electrical loads required for the IAP under the Low, Base and High Case forecast scenarios. It is anticipated that Commonwealth Edison will provide a 34.5kV electrical substation (ESS) on the airport. The airport substation will be fed from two independent power distribution substations. The distribution system for electric power on the site is planned to be provided via an underground duct bank, to feed three or four utility network distribution centers located throughout the airport site. Power will be transformed from 34.5kV to 480V at each network center.

Table 5-17
Preliminary Electrical Loads Summary

Demand Load Areas	SSA Forecast DBO+5		
	Low Case	Base Case	High Case
Building Loads (kva)	650	1,187	1,759
Landside Loads (kva)	757	1,131	1,520
Airside Loads (kva)	491	770	1,132
Equipment Loads (kva)	1,822	2,596	3,745
Total Electrical Loads (kva)	3,720	5,684	8,146

Source: TAMS, an Earth Tech Company, 2004.
kva = kilovolt-amperes

5.7.2 Water Supply

The nearest active wells are located west of the Village of Monee, which operates three primary wells at varying depths. Consumer's Illinois Water Company has proposed a 24-inch main extension connecting to near a well point west of Monee, owned by the Village of University Park. In general, Lake Michigan water is not available this far south. Existing water supplies in the area include shallow well water, known for it's excess iron and poor taste; deep well water, known for excess hardness or calcium carbonate; and Kankakee River water, known for water quality associated with surface runoff from adjoining farms.

Area water utilities have had some success mixing shallow well water with deep well water. The airport will require a failsafe water supply including emergency generators to back up water storage pumps and equipment. Any storage towers or tanks must be located clear of runway airspace surfaces. The following options are being studied as alternative water supplies for the airport:

- Negotiate cost sharing with Consumer's Illinois Water Company to pay a portion of the cost to install a water main running along Western Avenue through the east side of the airport site delivering Grant Park well water through Beecher, Illinois to University Park. On-site elevated water storage towers or at-grade tanks are anticipated for emergency fire supply.
- Negotiate cost sharing with the Village of University Park and Consumer's Illinois Water Company to install a 24-inch water main running along Illinois Route 50 from Manteno to University Park delivering Kankakee River water. On-site elevated water storage towers or at-grade tanks are anticipated for emergency fire supply.
- Negotiate a long-term agreement with the Villages of Monee or University Park to supply an estimated 58,000 gallons of good quality well water per day for the IAP. This will require the airport to rely on a set of wells near Monee for redundant water supply. Since Consumer's Illinois Water Company has assisted the Village of University Park in applying for a grant for a proposed 24-inch water main from University Park to the Illinois Diversatech Campus in Manteno, Illinois, a cost sharing of that 24-inch water main may reduce costs.
- Negotiate a long-term agreement with the Village of Beecher to supply an estimated 58,000 gallons of good quality well water per day.
- Develop wells on airport property and a water treatment plant for the airport.

Water supply requirements were estimated from the forecast of enplanements presented in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program* and by using data from Baltimore-Washington International, Logan International, Los Angeles International, Seattle-Tacoma International and Ronald Reagan Washington National Airports. These airports reported annual water consumption data and associated enplanements for various years. From these numbers a water usage per enplanement was calculated for each airport; these rates were then averaged to derive a 20-gallon per enplanement water consumption figure. **Table 5-18** presents the required estimated water supply for each of the three forecast scenarios.

Table 5-18
Water Supply Requirements, DBO+5

	IAP Enplanement Forecasts		
	Low Case	**Base Case**	**High Case**
Annual Enplanements	471,000	709,000	968,000
Peak Month Average Day Enplaned Passengers	1,432	2,204	2,889
Daily Water Requirements (PMAD Enplanements x 20 gallons)	29,000 gallons	44,000 gallons	58,000 gallons

Source: TAMS, an Earth Tech Company, 2004.

The need for a ground-level or elevated water-storage tank connected to the terminal water distribution loop would be studied after determining plans for the two water main extensions planned through and around the airport. The Consumer's Illinois Water Company indicated that local requirements for commercial fire flow are 5,000 gallons per minute. If the source includes equipment, then the airport will assist in verifying redundant primary electric power feeds and back up generators in support of the water plant equipment. The distribution system pipes range in diameter from 6 to 16 inches.

5.7.3 Sanitary Wastewater Treatment Requirements

Sanitary wastewater would be generated by airline passengers and airport employees utilizing terminal and other airport facilities and would require treatment. Sanitary waste from aircraft chemical toilets would also require treatment. Generally, aircraft toilet wastes receive pretreatment prior to being added to the normal sanitary sewage stream. Airport sewage treatment requirements were estimated using projected water supply requirements. It was assumed that sewage treatment demand would be 100 percent of the water supply demand, based on planning estimates used at other U.S. airports. **Table 5-19** presents the sanitary wastewater treatment requirements for the Low, Base and High Case forecast scenarios.

Table 5-19
Sanitary Wastewater Treatment Requirements, DBO+5

	IAP Enplanement Forecasts		
	Low Case	**Base Case**	**High Case**
Daily Water Requirements	29,000 gallons	44,000 gallons	58,000 gallons
Daily Sanitary Wastewater Treatment	29,000 gallons	44,000 gallons	58,000 gallons

Source: TAMS, an Earth Tech Company, 2004.

5.7.4 Storm Sewer System

A drainage and stormwater storage system will be included in the proposed development. Planning and design recommendations will be made after an engineering assessment and a cost/benefit analysis are completed to determine the best alternative for the IAP.

5.7.5 Telephone

SBC Ameritech would provide telephone service through a modern digital switching office with the latest in communication technology, including wide-band data service, wide area WATS lines and medium and high transmission capabilities.

5.8 Service Roads and Security Access

A secure airside service roadway system, linking all Air Operations Areas (AOA), will be provided. The proposed alignment will strive to minimize the crossing of active airside facilities. This analysis recommends the inclusion of a 25-foot wide apron service road to facilitate access to parked aircraft. Access to the AOA will be restricted, and entrance will be only allowed at certain locked or continuously manned gates. State-of-the-art technologies could be implemented to regulate the access to the AOA and secure areas of the airport. Access will follow the guidelines defined in the Code of Federal Regulations – Part 1542, *Airport Security*, of the U.S. Transportation Security Administration (TSA), which has replaced Federal Aviation Regulation Part 107, *Airport Security*.

Section 6 – IAP Ground Transportation Facilities

6.1 Existing Ground Transportation Network

The existing ground transportation network serving the future South Suburban Airport (SSA) site includes provisions for both major roadway facilities and commuter train service. The following is a brief description of the existing major ground transportation facilities in the area:

<u>Interstate 57:</u> I-57 is part of the Federal Highway Administration's (FHWA) National Interstate and Defense Highway System and it provides a direct north-south link between Chicago, Illinois and southeast Missouri, where it terminates at I-55. I-57 is located approximately two miles to the west of the SSA site. The interstate is access controlled and it carries two-lanes of traffic in each direction. There are two existing interchanges on I-57 in the vicinity of the project; the Manhattan–Monee Road interchange (mile marker 335) is located near the north end of the airport site and the Peotone–Wilmington Road interchange (mile marker 327) is located near the south end of the airport site. Located within this 8-mile segment of roadway are a truck weigh station and a rest area.

<u>Illinois Route 50</u>: IL-50 is a marked state highway that runs parallel to I-57 in the vicinity of the airport site. It is located approximately two-thirds of a mile to the east of the interstate along the west side of the airport site. IL-50 currently carries two-lanes of traffic in each direction and it is a major arterial roadway for cars and trucks in the region.

<u>Illinois Route 394</u>: IL-394 is a four-lane (two-lanes in each direction) divided highway that is located adjacent to the northeast corner of the airport boundary. IL-394 runs in a north-south direction and provides direct connections from I-94, I-80 and U.S. Route 30 to the north to its terminus at Illinois Route 1. IL-394 is a controlled access major arterial roadway that carries significant truck traffic for the region.

<u>Illinois Route 1:</u> IL-1 runs in a north-south direction along the east side of the airport site and is designated as a Strategic Regional Arterial (SRA). The roadway consists of one lane of traffic in each direction with paved shoulders. IL Route 1 is a heavily used truck route for the region.

In addition to the existing roadway network, there are two railroad lines that run adjacent to the SSA site:

<u>Canadian National Railroad:</u> The Metra Electric Line currently runs scheduled primarily commuter passenger service on the Canadian National rail lines from downtown Chicago to University Park, which is located approximately 8 miles northwest of the airport site. The Canadian National's rail line continues south to Champaign, Illinois passing the airport site along the west side of IL Route 50.

<u>Union Pacific Railroad:</u> The Union Pacific Railroad has existing freight tracks that run from Chicago to St. Louis, these tracks run along the east side of the airport site through the Villages of Crete and Beecher.

6.2 Future Roadway and Rail Improvements

In October 2003, the Chicago Area Transportation Study (CATS), the region's metropolitan planning organization, published the recommended 2030 plan for the region. Their report titled *2030 Regional Transportation Plan for*

Northeastern Illinois identified the following recommended roadway and rail improvements for the areas surrounding the future airport:

I-355 Extension/South Suburban Connector: The CATS plan recommends a series of extensions to existing Interstate 355. The existing I-355 runs from IL Route 53 in the western suburbs of Chicago to I-55 in the far southwest suburbs. The recommended improvements for I-355 are to extend it from I-55 in a southeast direction to I-80, and then extend it from I-80 east to I-57. This new extension would intersect with I-57 between the Manhattan-Monee Road and Wilmington-Peotone Road interchanges. The final recommended extension to the interstate would continue east from I-57 along the north side of the airport boundary to IL Route 394; this roadway segment is referred to as the IL-394/I-57 connector road.

Interstate 57 Widening: The CATS plan recommends that an additional lane be added in each direction to I-57 from I-80 south to the Peotone-Wilmington Road Interchange. This improvement would increase the total number of lanes on this segment of I-57 from four to six.

IL Route 394 Widening: The CATS plan outlines a plan to add one lane in each direction on IL-394 between I-80/94 to south of the proposed IL-394/I-57 connector road. The plan indicates that IL-394 would be upgraded to meet freeway design criteria (full access control with grade-separated interchanges) from its existing major arterial road design between U.S. Route 30 to south of the IL-394/I-57 Connector Road interchange and it would remain a controlled access arterial between this interchange and IL Route 1.

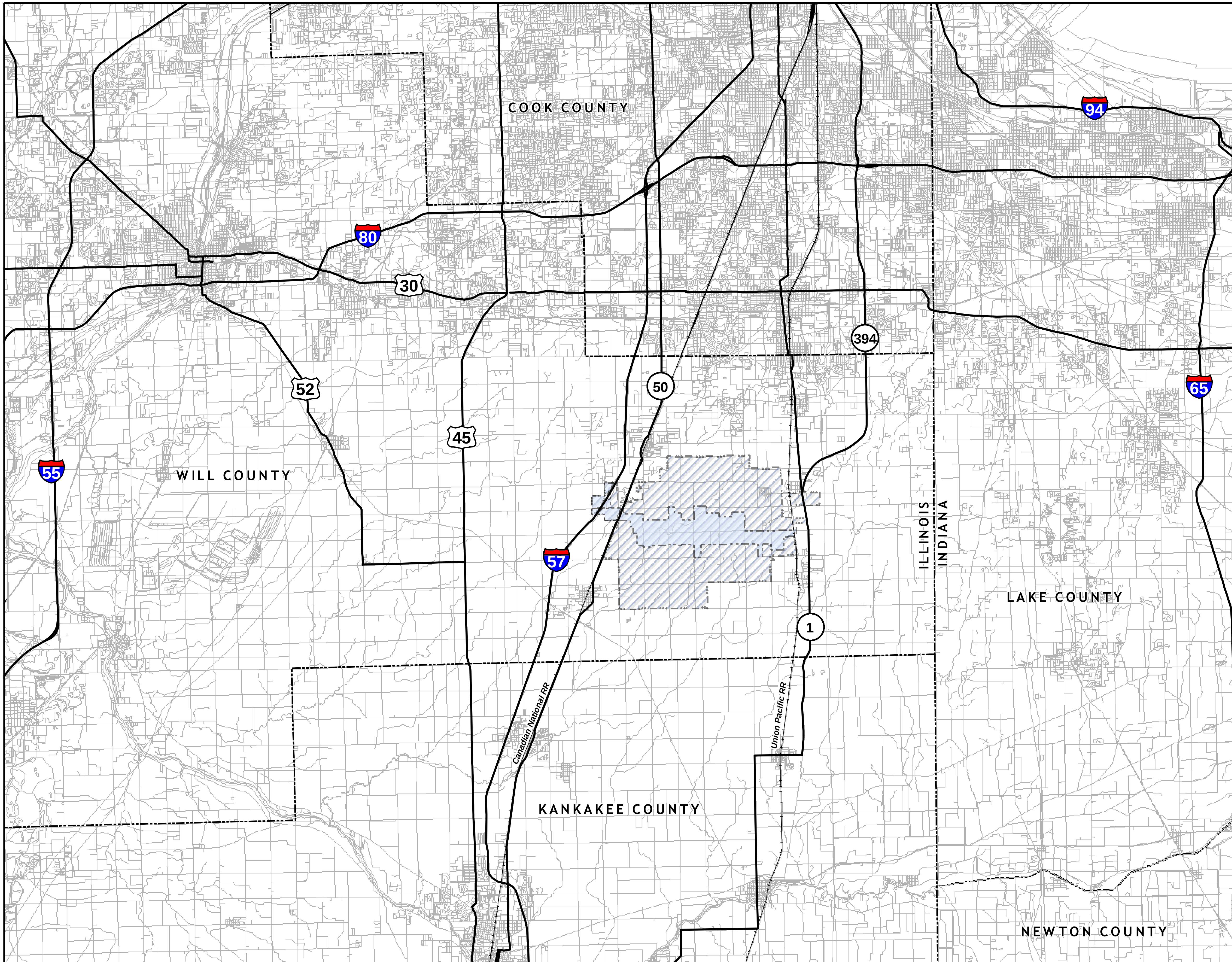
Beecher Bypass: Another project being considered by IDOT is the construction of a bypass highway around the west side of Beecher, Illinois. The Beecher Bypass would be located on the east side of the airport site and it would shift the high truck-traffic that currently uses IL Route 1 away from the center of the village to a new road located to the west of town. Preliminary plans indicate that this would be a four-lane facility.

IL Route 50 Widening: IL-50 currently exists as a four-lane roadway with left-turn channelization at various intersections. Current planning studies indicate that long-term improvements would include the addition of one through lane in each direction, along with the addition of exclusive right-turn lanes at intersections as required.

Metra Electric Extension: The CATS 2030 plan identifies a potential need to extend the Metra Electric District Line from the existing passenger station located in University Park to the proposed SSA site, eight miles to the south. This extension would provide mass transit access for passengers and employees to the airport as well as a direct connection from downtown Chicago to the airport.

Southeast Commuter Rail Service: The CATS 2030 plan includes a proposal to introduce a new commuter rail line that would service southern Cook and northeastern Will Counties. The proposed project calls for a new 33-mile rail line to be installed in existing Union Pacific/CSX Railroad right-of-way. The route would begin in Chicago at the Metra-Rock Island District's LaSalle Street Station and run south to Crete with a possible additional extension south to the airport site.

Exhibit 6-1 illustrates the existing ground transportation network around the airport site.



SOUTH SUBURBAN AIRPORT

MAJOR ARTERIALS

Legend

- Inaugural Acquisition Boundary
- Ultimate Acquisition Boundary
- 55 Interstate Highway
- 50 U.S. Highway
- 394 State Highway

MAGNETIC DECLINATION
1° 48" WEST
ANNUAL RATE OF CHANGE
6.4 WEST

SCALE: Approx. 1" = 20,000'

Source: Illinois Department of Transportation

Exhibit 6-1

6.3 Existing Roadways Operating Conditions

In general, the existing roadway network around the site operates at an acceptable level of service. The four main roadways in the area are: I-57, IL-50, IL-394 and IL-1. Each of these roadways runs in a north-south direction along the eastern and western edges of the SSA site. The following is a brief description of the existing operations on these roads:

Interstate 57: I-57 currently carries approximately 30,000 vehicles per day (annual average daily traffic or AADT) in the segment between the Manhattan-Monee Interchange and the Peotone-Wilmington Road Interchange. The operations along the interstate and at the Peotone-Wilmington Road Interchange are acceptable. IDOT has identified capacity problems with the existing Manhattan-Monee Road Interchange that currently experiences significant delays on ramps that serve the entrance and exit operations to the north. IDOT recently approved a Phase I Engineering Study that included geometric improvements to the existing ramps of this interchange.

IL Route 50: IL-50 currently carries between 7,000 to 9,000 vehicles per day AADT on the segment adjacent to the airport. Presently no operational deficiencies have been identified for this roadway segment.

IL Route 394: IL-394 currently carries approximately 12,000 vehicles per day AADT immediately north of the airport site; this volume increases to approximately 22,000 vehicles per day AADT in the area south of U.S. Route 30 and to 48,000 vehicles per day AADT to the north of U.S. 30. No operational deficiencies have been identified at the southern terminus of IL-394.

IL Route 1: IL-1 currently carries between 8,000 to 8,500 vehicles per day AADT along the eastern boundary of the airport site and through the center of Beecher, Illinois. A significant portion of the existing traffic on IL-1 is truck traffic that has had negative impacts on the Village of Beecher. A bypass roadway along the west side of Beecher's limits has been recommended in the CATS 2030 plan to mitigate the impacts of truck traffic through downtown Beecher.

6.4 Inaugural Airport Access

Access to the Inaugural Airport was studied to determine if the existing local roads could accommodate the projected airport traffic or whether an interchange with I-57 would be required during the IAP. To perform this analysis, IDOT and FHWA required the development of an Access Justification Report (AJR), which used 2030 projected traffic information. Since IDOT designs roadways based on the projected traffic 20 years after construction, the year 2030 was used assuming that DBO roughly corresponds to the year 2010.

The Chicago Area Transportation Study (CATS) developed traffic projections for 2030 for the South Suburban Airport (SSA). The traffic projections developed by CATS incorporated the latest socio-economic information and growth trends for Will County as developed by the Northeastern Illinois Planning Commission (NIPC) based on 2000 census data.

Traffic for the Inaugural Airport through DBO+5 was developed as a percentage of the year 2030 projected traffic volumes. The 2030 traffic volumes were reduced proportionately based on projected enplanements at the airport at DBO and DBO+5. In addition, traffic projections for 2010 and 2020 developed by IDOT for planned improvements at the existing I-57 Manhattan-Monee Road

Interchange and the proposed I-57 Interchange at Stuenkel Road was considered in the development of traffic for the SSA project.

In the year 2030, CATS estimates that there will be approximately 24,000 vehicles entering and 24,000 vehicles exiting a proposed I-57 interchange for SSA from the north and 4,000 vehicles entering and 4,000 vehicles exiting the same interchange from the south on an average day. Of these 28,000 vehicles, it was projected that 50 percent (14,000) of these vehicle's destinations would be the terminal area and 50 percent (14,000) would be to the future support areas such as rental car facilities, employee parking etc. It was assumed that 10 percent of the AADT would be used for the peak hour traffic resulting in a total of 2,800 inbound vehicles and 2,800 outbound vehicles on the I-57 SSA interchange during the peak hours of the day.

The projected enplanements for DBO+5 (assumed year 2015) are between 14.5 and 21 percent of the projected enplanements for the year 2030, depending on whether the High or Low long-range enplanement forecast is used. Conservatively, 20 percent of the year 2030 traffic was selected for DBO+5 traffic. This resulted in a total of 5,600 (4,800 to/from the north and 800 to/from the south) vehicles per day entering and exiting the SSA site on an average day. For consistency purposes, 10 percent (480 to/from the north and 80 to/from the south) of the AADT was assumed during the peak hour.

IDOT also considered a "No Build" alternative for the SSA Interchange on I-57, which would utilize the existing I-57 interchanges that are located to the north and south of the proposed interchange as the access points to the SSA site. This would require traffic to use the existing Manhattan-Monee Road interchange for access to the airport from the north and the existing Wilmington-Peotone Road interchange for access to the airport from the south. Traffic could then be routed to the entrance to the airport via IL Route 50.

As previously discussed, approximately 86 percent of the traffic to the SSA is generated from north of the airport and the remaining 14 percent of the traffic is generated from south of the airport. The existing Wilmington-Peotone Road interchange has the capacity to handle the additional traffic (800 vehicles per day in 2015 and 4000 vehicles per day in 2030) associated with SSA. However, the existing Manhattan-Monee Road interchange will be near capacity levels by the year 2010. The "No Build" alternative would increase the amount of traffic on this interchange as well as the intersection of Manhattan-Monee Road at IL Route 50 by approximately 4,800 vehicles per day in 2015 and as much as 24,000 additional vehicles per day in the year 2030. Neither of these locations can operate safely or efficiently with this additional traffic.

Currently (2004) the existing Manhattan-Monee Road interchange breaks down operationally during the AM and PM peak hours, specifically on the ramps that exit from and enter to the north. IDOT has plans to improve the geometry of this interchange in an effort to increase the overall capacity. Traffic for the year 2010 was used as the basis of the improvements. IDOT's project report for the Manhattan-Monee Road interchange improvements indicates that in the year 2010 several of the ramps will operate at a Level of Service (LOS) of D and the northbound I-57 entrance ramp from Manhattan-Monee Road will operate at a LOS of E during the PM peak hour. These operational levels are based on the assumption that there will be a new interchange to the SSA site on I-57. Adding traffic to the Manhattan-Monee interchange in the event that the "No Build" alternative is selected would result in poorer LOS than is already projected and would cause increased delays at the interchange. Based on this analysis, it is likely that an interchange at I-57 is required during the IAP to accommodate the projected traffic generated by an airport operating at the SSA site.

6.5 Projected Traffic Volumes

CATS has generated traffic projections for the major roadways that surround the future airport. The projections were for the year 2030 and assumed that neither a proposed extension of I-355 between I-80 and I-57 nor the IL-394/I-57 connector road would be built by 2030. This assumption along with the enplanement forecasts[69] resulted in the following future traffic volumes, also shown on **Exhibit 6-2**:

Airport Entrance Road: The projected AADT varied from 52,000 vehicles on the segment between I-57 and the eastern leg of IL-50 to 34,000 vehicles up to the future terminal building.

Interstate 57: The projected AADT on I-57 is 94,000 vehicles between the Manhattan-Monee Road interchange and the SSA Entrance Road interchange. The AADT to the south between the Airport Entrance Road interchange and the Peotone-Wilmington Road interchange is 58,000 vehicles.

IL Route 50: The projected AADT for IL Route 50 along the western boundary of the airport is approximately 26,000 vehicles per day.

IL Route 394: The projected AADT for IL Route 394 near the northeastern boundary of the airport is approximately 48,000 vehicles per day.

IL Route 1: The projected AADT for IL Route 1 along the eastern boundary of the airport is approximately 34,000 vehicles per day.

6.5.1 Projected Peak Traffic

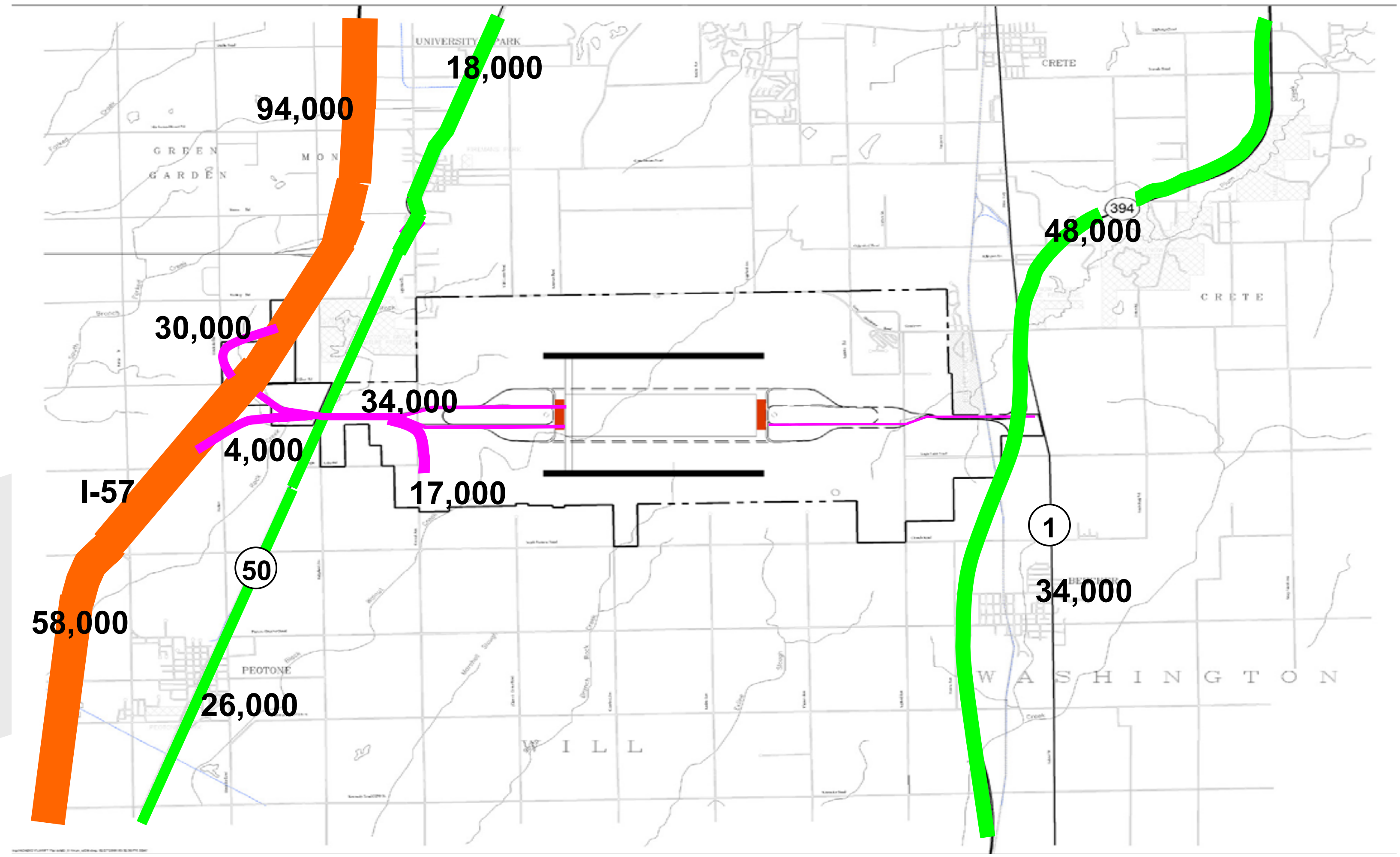
The projected peak hour traffic volume for the SSA roadway system in 2030 was estimated to be approximately 10 percent of the AADT for each roadway. This translates into approximately 1,700 vehicles on the airport entrance road at the terminal curb front during the peak hour of the average weekday.

6.6 Public Parking

At opening day, the IAP will include a surface parking facility with expansion potential to allow the construction of a parking garage to meet the short-term and long-term parking demand and the ready pick-up/return of rental cars beyond the first five years of airport development.

[69] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport*, prepared for the Illinois Department of Transportation, May 2004.

Exhibit 6-2
Estimated 2030 Annual Average Daily Traffic



Some sources[70] suggest that for planning purposes at small or non-hub airports, approximately one parking space per 500-700 enplaned passengers is required. This parking demand analysis estimates that on opening day a range of 40 to 340 parking spaces will be necessary. The demand for public parking is anticipated to increase to between 940 and 1,900 total spaces at DBO+5. It is expected that at DBO+1, passenger parking will be surface parking, which could be segregated into short-term, long-term and economy parking. If practical, the long-term and short-term parking lots should be located across from the terminal building to provide maximum convenience to airport passengers. Rental car pick-up/drop off service could initially be accommodated within a designated parking facility for the IAP.

6.7 Employee Parking

FHWA/FAA recommends a ratio of 250-400 employee parking spaces per million annual enplaned passengers (MAP)[71]. For planning purposes the employee parking requirements were modeled based on a ratio of 400 parking spaces per MAP. This initial parking demand analysis shows that at opening day, the employee parking requirements will include between 8 and 68 spaces. Future employee-parking demand was assumed to increase proportionally to passenger activity growth. Employee parking could be accommodated initially in the vicinity of the terminal area. When the demand for public parking increases, the employee parking lot can be moved to a remote lot and free courtesy shuttles could be offered. A summary of parking requirements at SSA through the five-year planning horizon is shown in **Table 6-1**.

Table 6-1
Summary of Parking Requirements

Parking Facility	Low Case		Base Case		High Case	
	DBO+1	DBO+5	DBO+1	DBO+5	DBO+1	DBO+5
Public Parking[1]	40	940	250	1,420	340	1,900
Employee Parking[2]	8	190	50	280	68	390
Total	48	1,130	300	1,700	408	2,290

Source: TAMS, an Earth Tech Company, 2004.
[1] Calculated at 1 space per 500 annual enplaned passengers.
[2] Calculated at 400 parking spaces per 1 million annual enplaned passengers.

6.8 Rental Car Facility

Available rental car information from airports such as Dallas Love Field, Dayton International[72], Reno Cannon, and Ontario International Airports, indicated that depending on the type of rental car operation (independent or consolidated), the existing ratio of ready return spaces ranges from 40 to 100 ready return spaces per MAP. The total rental car area at these facilities ranges between 2.1-3.9 acres per MAP. For planning purposes, these ratios were used to project the rental car requirements at SSA through DBO+5 as shown in **Table 6-2**. However, additional market research will be required to more accurately project the rental car demand and supply at SSA.

[70] *Intermodal Ground Access – A Planning Guide*, FAA/FHWA, 1996.
[71] Ibid.
[72] *Dayton Airport - Master Plan Update Study*, 1999; *Dallas Love Field - Master Plan Update Study*, 2001.

Table 6-2
Summary of Rental Car Facility Requirements

Rental Car Facility	Low Case		Base Case		High Case	
	DBO+1	DBO+5	DBO+1	DBO+5	DBO+1	DBO+5
Ready Return Spaces	1-2	20-50	5-13	20-70	7-17	40-100
Total Rental Car Area (acres)	0.1	1.0-1.8	0.25-0.5	1.5-2.8	0.35-0.7	2.0-3.8

Source: TAMS, an Earth Tech Company, 2004.

Section 7 – Summary of IAP Facility Requirements

The facility requirements for the IAP at SSA are derived from the draft *Projections of Aeronautical Activity for the Inaugural Program*. Based on the forecasts contained in that report, the analysis in Section 2.0 of this report, and the projected air cargo fleet, which includes ADG IV aircraft, IDOT recommends that the airport be designed to ARC C-IV standards. **Table 7-1** summarizes the major facility requirements for the Low, Base and High Case forecast scenarios for the IAP, as discussed in the previous sections.

Table 7-1
Summary of IAP Facility Requirements, DBO+5

Facility	Low Case	Base Case	High Case
Single Primary Runway[1] (09-27) (ft)	9,000	9,500	9,500
Primary Runway Width (ft)	150	150	150
Primary Taxiway Width (ft)	75	75	75
Runway-Parallel Taxiway Centerline Separation (ft)	400	400	400
Crosswind Runway (05-23) (ft)	4,000	4,000	4,000
Crosswind Runway Width (ft)	75	75	75
Crosswind Taxiway Width (ft)	35	35	35
Crosswind Runway-Parallel Taxiway Centerline Separation (ft)	240	240	240
Airport Traffic Control Tower (ATCT)	Yes[2]	Yes[2]	Yes[2]
Instrument Landing System (ILS)	CAT 1[3]	CAT 1[3]	CAT 1[3]
Passenger Aircraft Gates:			
Regional Jet Gates	1	2 – 4	4 – 6
Narrow Body Jet Gates	3 – 4	4 – 5	5 – 6
Passenger Terminal (sf)	85,400	127,100	167,700
Passenger Terminal Curb Front (feet)	380	470	540
Cargo Aircraft Positions	2	4	6
Air Cargo Area[4] (sf)	200,000	540,000	930,000
General Aviation/Corporate Aviation Aircraft Positions	34	74	113
General Aviation/Corporate Aviation Area[5] (sf)	43,000	96,000	132,000
Jet Fuel Storage (gallons)	353,000	795,000	1,100,000
100LL[6] Fuel Storage (gallons)	2,200	4,500	6,800
Airfield Maintenance Center Area[7] (sf)	130,000	180,000	225,000
Water Supply (gallons)	29,000	44,000	58,000
Sanitary Wastewater Treatment (gallons)	29,000	44,000	58,000
Interchange with I-57	Yes	Yes	Yes
Public Parking Spaces	940	1,400	1,900
Employee Parking Spaces	190	280	390
Rental Car Area (sf)	78,000	122,000	165,000

Source: TAMS, an Earth Tech Company, 2004.
[1]Includes full parallel taxiway.
[2]IDOT recommends an ATCT for SSA. Whether it is an FAA tower, a contract tower or a private facility has yet to be determined.
[3]Initially on Runway 27, eventually on both ends of Runway 09/27.
[4]Includes warehouse, airside apron, truck docks, and parking.
[5]Includes aircraft parking areas, apron area, hangars, tie down areas and public parking.
[6]100LL Avgas is a 100-octane fuel for GA aircraft.
[7]Includes parking, building and storage areas.

Section 8 – Intermediate Facility Requirements (DBO+6 through DBO+20)

8.1 Introduction

This section focuses on identifying and analyzing the facility requirements required to accommodate the long-range projections (DBO+6 through DBO+20) of aeronautical activity expected to occur after completion of the IAP in DBO+5. Detailed air traffic activity forecasts[1] were developed for the IAP (DBO+1 through DBO+5) and form the basis for the IAP facility requirements discussed in Sections 1 through 7 of this report. The IAP forecasts were extrapolated to derive long-range projections of aeronautical activity for SSA through DBO+20.[2] This section identifies the facilities required to meet those long-range projections. However, since currently forecasted activity at SSA is not expected to require the full build-out of the airport, this phase of airport development is labeled intermediate. Section 9 of this report will discuss facility requirements for a potential ultimate airport development phase, beyond DBO+20.

The FAA Advisory Circular 150/5070-6A, *Airport Master Plans,* in conjunction with AC 150/5300-13, *Airport Design,* and associated FAA documents were used as guidelines for developing the Intermediate facility requirements. Major topics analyzed and discussed include airport classification, airfield facility requirements, passenger terminal facility requirements, support/ancillary facility requirements and ground transportation facility requirements.

8.2 Intermediate Airport Classification

8.2.1 Proposed Intermediate Aircraft Fleet Mix

The aircraft fleet anticipated at SSA in DBO+20 is based on an analysis of the long-range projections and activity at airports with similar operations. The assumptions considered in developing the aircraft fleet mix for both the low and high long-range projections include the following:

- The predominant aircraft group for domestic activity is assumed to be narrow body aircraft within the 121- to 140-seat range and the 141- to 160-seat range.
- The typical aircraft expected to operate on international markets would be in the 161- to 180-seat range.
- The average number of seats per aircraft for domestic operations would be 128 seats with a load factor of 65 percent.
- The average number of seats per aircraft for international operations would be 178 seats with a 68 percent load factor.

Low Long-Range Projections

The low long-range projections anticipate air passenger demand to grow to approximately 2.3 million annual passengers by DBO+20. IDOT assumes that aircraft in airport reference code (ARC) category C-III will continue to dominate commercial passenger operations at SSA, while aircraft in ARC categories C-IV and D-IV will perform a small percentage of operations (see Section 2.1 for a discussion of ARC). Examples of these aircraft are identified in **Table 8-1**.

[1] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.
[2] Ibid.

Table 8-1
Potential Aircraft Fleet Mix – DBO+20
Low Long-Range Projections

Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Passenger Aircraft					
Airbus 319	C-III	111.9	111.0	38.7	166,500
Airbus 320	C-III	111.9	123.3	39.1	145,505
Boeing 717	C-III	93.3	124.0	29.8	118,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Boeing 757-200	C-IV	124.9	155.3	44.6	255,000
Boeing 757-300	C-IV	124.9	178.7	44.6	272,500
Bombardier CRJ900	C-II	76.3	119.4	24.1	84,500
Embraer 170	C-III	85.4	98.1	31.9	82,012
Embraer 190	C-III	94.3	118.11	34.7	110,893
Cargo Aircraft					
Airbus 300-600	C-IV	147.1	177.5	54.4	378,600
Boeing 737-400	C-III	94.8	119.6	36.6	150,000
Boeing 757-200	C-IV	124.1	155.3	45.1	255,000
Boeing 767-300 ER	D-IV	156.1	156.1	52.7	345,000

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.

High Long-Range Projections

The high long-range projections estimate that SSA could accommodate 6.7 million annual passengers, including 540,000 international passengers in DBO+20. In addition to operations by aircraft in categories C-III and C-IV, aircraft in categories D-IV and D-V are also expected to utilize SSA. **Table 8-2** presents examples of potential aircraft that could operate at SSA in DBO+20.

In summary, most of the commercial aircraft likely to operate at SSA in DBO+20 are expected to be within the ARC C-III and C-IV designation, but the high long-range projections predict that aircraft with an ARC of D-V could also be using SSA at that point in time, primarily to serve international destinations.

Table 8-2
Potential Aircraft Fleet Mix – DBO+20
High Long-Range Projections

Aircraft	ARC[1]	Maximum Wingspan (feet)	Length (feet)	Tail Height (feet)	Max. Takeoff Weight (pounds)
Passenger Aircraft					
Airbus 319	C-III	111.9	111.0	38.7	166,500
Airbus 320	C-III	111.9	123.3	39.1	145,505
Airbus 330-200	D-V	197.8	191.5	56.4	507,000
Airbus 340-300	D-V	197.8	208.9	55.7	559,000
Boeing 717	C-III	93.3	124.0	29.8	118,000
Boeing 737-700	C-III	117.5	110.4	41.7	154,500
Boeing 737-800	C-III	117.5	129.6	41.2	174,200
Boeing 737-900	C-III	117.5	133.5	41.2	174,200
Boeing 757-200	C-IV	124.1	155.3	45.1	255,000
Boeing 757-300	C-IV	124.1	178.7	44.6	272,500
Boeing 767-200 ER	D-IV	156.1	159.2	52.0	395,000
Boeing 767-300 ER	D-IV	156.1	180.3	52.0	412,000
Boeing 777-200	D-V	199.9	209.1	60.5	506,000
Boeing 7E7-8*	D-V	193.0	182.0	N/A	480,000
Bombardier CRJ900	C-II	76.3	119.4	24.1	84,500
Embraer 170	C-III	85.4	98.1	31.9	82,012
Embraer 190	C-III	94.3	118.1	34.7	110,893
Cargo Aircraft					
Airbus 300-600	C-IV	147.1	177.5	54.4	378,600
Airbus 310-200	C-IV	144.0	153.1	52.4	291,000
Boeing 737-400	C-III	94.8	119.6	36.6	150,000
Boeing 757-200	C-IV	124.1	155.3	45.1	255,000
Boeing 767-200	C-IV	156.1	159.2	52.9	315,000
Boeing 767-300 ER	D-IV	156.1	180.3	52.7	412,000
MD-11	D-IV	169.8	201.3	57.8	602,500

Source: FAA Advisory Circular 150/5300-13 and Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
N/A = Not Available
* More detailed technical information on the B-7E7-8 is not available; Boeing expects to release more information in late 2004.

8.2.2 Proposed Intermediate Airport Reference Code (ARC)

The FAA criteria related to designating an ARC for an airport were discussed in Section 2.1. Based on the information contained in **Table 8-2**, the high long-range projections indicate that the ARC may require upgrading from C-IV to D-V in order to accommodate the largest aircraft anticipated to operate at SSA in DBO+20.

8.3 Airfield Demand/Capacity Analysis

The long-range traffic projections indicate that aircraft operations could rise to between 79,840 and 223,470 annual operations. **Table 8-3** summarizes the total annual operational demand for SSA in DBO+20.

Table 8-3
Summary of Projected Aircraft Operations – DBO+20

Type of Operations	Low Case	High Case
Air Carrier Passenger	56,200	150,000
Cargo	4,740	10,770
General Aviation	18,900	62,700
Total	**79,840**	**223,470**

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

As discussed in Section 3.2, the theoretical capacity of the IAP primary runway (09-27) was calculated using the Annual Service Volume (ASV) technique. The estimated capacity of the inaugural primary runway is approximately 210,000 annual operations. This configuration would easily satisfy the DBO+20 demand for the low long-range projections. However if the high long-range projections materialize, a second runway would most likely be required to be operational before DBO+20.

The ratio of annual demand to ASV[3] is considered a planning guideline utilized to estimate in advance the need for additional capacity. It is generally accepted that when the ratio of annual demand to ASV is 0.8 or above[4] (demand equals at least 80 percent of capacity), it is an indication that an airport may need additional capacity. FAA Order 5090.3C[5] states that capacity development should be planned when activity levels approach 60 to 75 percent of annual capacity. Therefore, planning provisions for a second runway should commence when operations at SSA reach an annual level of 126,000 operations (60 percent of 210,000).

The capacity of a two-parallel runway airfield was estimated using the ASV technique (described in Section 3.2). The crosswind runway (05-23) was not included in the calculation of ASV since it is anticipated to be utilized only during those portions of the year that aircraft weighing less than 12,500 pounds could not use the parallel runway system. **Table 8-4** shows the assumed ratios utilized to calculate the ASV for the high long-range projections.

Table 8-4
Hourly and Daily Ratios, High Long-Range Projections

Mix Index	Hourly Ratio (H)	Daily Ratio (D)
120	12	320

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, December 1995.

[3] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay*, December 1995.
[4] *Capacity Needs in the National Airspace System – An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*, FAA and the MITRE Corporation's Center for Advanced Aviation System Development, June 2004.
[5] FAA Order 5390.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 2000.

It was assumed that most aircraft operating at SSA at DBO+20 would be medium and large aircraft with a relatively small percentage of small and heavy airplanes. This evaluation does not assume regular touch-and-go operations at SSA. Based on these assumptions, the weighted average hourly capacity (C_W) of a two-runway airfield would be 106 operations per hour.

The DBO+20 annual service volume was computed using the following formula:

$$\boxed{ASV = C_W \times H \times D}$$

where:

H = average daily operations in peak-hour operation in peak month; and
D = average daily operations in peak month.

The results indicate that the intermediate two-runway airfield capacity would be approximately 407,000 annual operations. The capacity of the future two-parallel runway airfield would easily accommodate and exceed the total projected DBO+20 operational demand of 223,000 annual operations, estimated under the high long-range projections.

8.4 Intermediate Airfield Requirements

8.4.1 Runway Orientation and Configuration

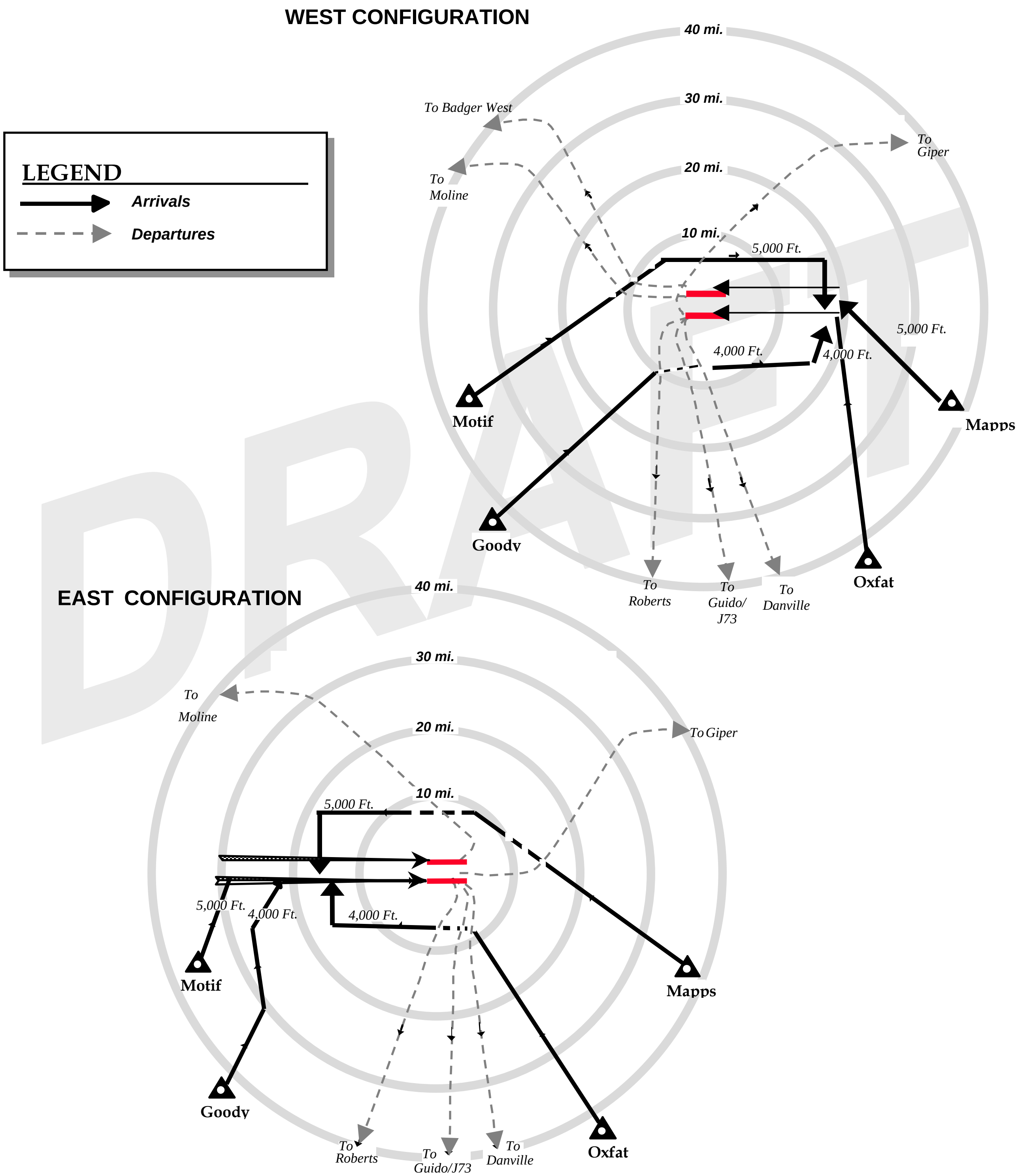
The inaugural runway was oriented in an east-west configuration (09-27), as discussed in Section 3.1. FAA Order 5090.3C recommends that new runways should preferably be parallel to the primary runway and that they should be the same length and strength, if they are serving the same aircraft.[6] To achieve maximum airfield capacity, the second runway should be planned for simultaneous independent departures. Thus, it is recommended that any additional air carrier runways at SSA also be oriented in the same direction, parallel to the inaugural primary runway proposed for construction during the IAP.

8.4.2 Proposed Airspace Classification

FAA Order 7400.2E Part 4, establishes criteria for Airspace Class designation at an airport. These criteria were described in section 3.1.5. As discussed in the draft forecast report[7], by DBO+20 SSA could handle between 2.3 million and 6.7 million enplaned passengers. If SSA reaches this level of activity, it is anticipated that a Class C airspace designation could be established. However, the future airspace classification for SSA will need to be determined in consultation with FAA. **Exhibit 8-1** depicts the proposed approach and departure routes and distances from SSA that may be utilized in DBO+20 (subject to FAA review and approval).

[6] FAA Order 5390.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 2000.
[7] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

Exhibit 8-1
Proposed Approach and Departure Flight Tracks
Two-Runway Airfield Configuration



Source: *Summary Draft, Phase I Engineering Report,* Illinois Department of Transportation, September 1997.

8.4.3 Runway Requirements

As described in Section 3.2.1, the design aircraft is defined as the most demanding aircraft expected to operate at an airport. Based on the long-range projections and projected fleet mix the most demanding aircraft identified for the intermediate phase are shown in **Table 8-5**.

Table 8-5
Critical Aircraft Expected to Operate at SSA in DBO+20

Type of Aircraft	Low Case	ARC	High Case	ARC
Air Carrier Passenger	Boeing 757-300	C-IV	Airbus 330-200; Boeing-777-200	D-V
Cargo	Boeing 767-300 ER; Airbus 300-600	D-IV C-IV	Boeing 767-300ER; MD-11	D-IV

Source: FAA Advisory Circular 150/5300-13; TAMS, an Earth Tech Company, 2004.

8.4.3.1 Runway Separation

The FAA capacity calculations[8] established that independent parallel runways provide superior capacity over dependent runways. To obtain maximum capacity, a second runway should be placed to allow for simultaneous precision instrument approaches. In accordance with AC 150/5300-13, *Airport Design*, a two-parallel runway system must be separated by at least 4,300 feet to achieve simultaneous precision instrument approaches[9]. Thus, it is recommended that the second runway under the high long-range projections be located parallel to the inaugural runway, and at least 4,300 feet apart.

8.4.3.2 Runway Length

Section 3.2.2 summarized the basic criteria considered in determining the runway length at an airport. In essence the most important factor that dictates the length of planned runways are the *critical aircraft* expected to operate on it. **Table 8-6** presents the characteristics of aircraft types expected to be part of the DBO+20 fleet, in addition to those presented in **Table 3-12**.

The fleet-mix analysis anticipates that in DBO+20, large and wide body aircraft would be present at SSA. The low long-range projections assumed the majority of commercial passenger aircraft would be medium body jets ranging from 121 – 141 seats with some regional jets ranging from 41 to 100 seats. The high long-range projections indicate some international passenger activity, which means that airlines could operate widebody aircraft (i.e. B-777-200) on intercontinental flights. The largest expected cargo aircraft would be the MD–11. These aircraft are expected to be used for all-cargo operations and are not expected to depart at maximum take-off weight.

[8] FAA, Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[9] ILS CAT III provide for IFR approaches when the ceiling is less than 100 feet and visibility is less than ¼-mile.

Table 8-6
Maximum Runway Length Requirements for Various Aircraft Models

Aircraft	Engine	Temp (°F)	Flight range (nm)	85% Payload		100% Payload	
				Take-off Weight (lb)	Runway Length (ft)	Maximum Takeoff Weight (lb)	Runway Length (ft)
A-300-600	GECF6-80C2	83	2,200	N/A	N/A	375,100	9,800
A-310-200	GE-CF6-80A3; PW-JT9D-7R4	86	2,600	N/A	N/A	291,000	5,700
A-320	CFM56	83	2,200	N/A	N/A	169,800	8,000
A-321	GECF50C2	83	2,100	N/A	N/A	363,000	10,600
A-330-200	CF6-80E1	86	3,000	430,000	6,500	507,100	10,100
A-340-300	CFM56-5C4	86	6,800	475,000	7,100	559,000	8,800
B-737-400	CFM-56C	83	1,750	140,000	7,500	150,000	9,000
B-737-800	CFM56-7B27	83	2,000	165,000	6,800	174,200	7,800
B-737-900	CFM56-7B27	86	2,500	150,000	5,500	174,000	7,900
B-757-200	RB211-535E4	84	3,400	217,000	5,200	255,000	7,500
B-757-300	RB211-535E4B	84	3,900	229,500	6,200	270,000	8,300
B-767-200	CF6-80A/80A2; JT9D-4D/7R4E	90	5,200	267,000	6,000	315,000	8,200
B-767-300 ER	CF6-80C2-B4, PW4052; RB211-524G	90	6,000	350,000	7,000	407,000	10,800
B-767-300 ER	CF6802-B6; PW4060; RB211-524H	86	6,000	350,000	7,000	407,000	9,300
B-777-200	GE90-110B1	92	5,700	456,500	7,000	537,000	8,200
B-7E7-8*	N/A	86	8,500	408,000	N/A	480,000	N/A
MD-11	CF6-80C2	95	6,000	512,100	7,800	602,500	10,800

Source: Airplane Characteristics for Airport Planning manuals from aircraft manufacturers.
Notes: 1. Airport elevation is 750 ft above mean sea level.
2. Runway Length is the runway length required for a runway with 0% gradient, and a mean maximum daily temperature of the hottest month.
More detailed technical information on the B-7E7-8 is not available; Boeing expects to release more information in late 2004.
N/A = Not Available

Consequently, the second runway length requirements will vary based on the takeoff requirements of the critical passenger and cargo aircraft considered for each scenario. **Table 8-7** presents a summary of the runway length requirements for the two scenarios, based on the takeoff requirements of the projected critical aircraft.

Table 8-7 Runway Length Requirements – DBO+20				
Long-Range Projections	**Critical Passenger Aircraft**	**Runway Length**	**Critical Cargo Aircraft**	**Runway Length**
Low Case	B-757-300	8,300	A-300-600	9,800
High Case	A-330-200	10,100	MD-11	10,800

Source: TAMS, an Earth Tech Company, 2004.

Under the low long-range projections, the single inaugural primary runway would need to be extended to 9,800 feet in order to accommodate the Airbus 300-600. Under the high long-range projections, the single inaugural primary runway would need to be extended to 10,800 feet and the new parallel runway would need to be constructed to 10,800 feet to accommodate the B-767-300ER and MD-11 aircraft. It is recommended that both air carrier runways be the same length; in case one runway is temporarily closed these aircraft could land on the other runway.

8.4.3.3 Runway Width

The low long-range projections for SSA estimate that by DBO+20 the most demanding aircraft will be categorized as ARC D-IV. Airplane Design Group (ADG) IV aircraft require a runway width of 150 feet. Under the high long-range projections, it is anticipated that the most demanding aircraft at SSA will be categorized as ARC D-V; ADG V aircraft also require a runway width of 150 feet.

8.4.3.4 Runway/Taxiway Separation

The Boeing 767-300 ER and Airbus 300-600 are the largest aircraft expected to operate during the intermediate phase under the low long-range projections; both belong to ADG IV. As shown in **Table 3-14**, ADG IV aircraft require a runway/taxiway separation of 400 feet.

Under the high long-range projections, the largest aircraft expected to operate at SSA are the Airbus 330-200 and the Boeing 777-200; the Boeing 777-200 requires a runway/taxiway separation of 500 feet[10].

8.4.3.5 Runway Design Standards

To protect both the movement of the aircraft on the ground and in transition to being airborne or landing the FAA has established regulatory requirements pertaining to planning and designing a safe, efficient, and economically feasible airfield. These surfaces, described in detail in Section 3.2.5, must be considered in planning and designing the future runway(s). Under the high long-range projections, the dimensions of the runway safety areas for a potential second runway will be slightly different than the inaugural primary runway, since it will need to be designed for ADG V. These dimensions are listed in **Table 8-8**. The primary inaugural runway should also be modified to meet these same requirements so that the critical aircraft serving the airport can use either runway.

[10] *777-200LR/-300ER Airplane Characteristics for Airport Planning,* Boeing Commercial Airplanes, October 2004.

Table 8-8
Summary of Minimum Planning Requirements – Second Runway

Facility	Dimensions (feet) Airplane Design Group V
Runway Width	150
Runway Length	10,800
Runway Protection Zone Length	2,500
Runway Protection Zone Inner Width	1,000
Runway Protection Zone Outer Width	1,750
Runway Safety Area Width	500
Runway Safety Area (RSA) Length beyond Runway End	1,000
Runway Object Free Area (OFA) Width	800
Runway Object Free Area Length beyond Runway End	1,000
Runway Precision Object Free Zone (OFZ) Width	800
Runway Precision Object Free Zone (OFZ) Length	200
Runway Shoulder Width	35
Parallel Runway to Taxiway Centerline Separation	500
Taxiway Width	75
Taxiway Shoulder Width	35
Taxiway Object Free Area Width	320
Taxiway Safety Area	214
Taxiway Centerline to Parallel Taxiway Centerline	267

Source: FAA Advisory Circular 150/5300-13, *Airport Design* up to Change 8, September 2004; *777-200LR/-300ER Airplane Characteristics for Airport Planning,* Boeing Commercial Airplanes, October 2004.

8.4.4 Intermediate Airport NAVAIDS and Visual Aids

8.4.4.1 Navigational Aids, Telecommunication and Air Traffic Control

In addition to the navigational and visual aids (NAVAIDS) requirements for the IAP, discussed in paragraph 3.3.1, the future runway is planned to have CAT II or CAT III precision approaches on at least one runway end. Because Instrument Landing Systems (ILS) only allow linear final approaches, the long-term goal of the aviation industry is to completely replace ILS with Global Positioning System (GPS) for precision approaches. As mentioned in Section 3.3.1, one of the FAA's goals for enhancing air traffic safety and capacity is to implement the following aviation system augmentation programs in the next ten to fifteen years:

- *The Wide Area Augmentation System (WAAS)* is a GPS-based navigation and landing system that will provide precision guidance to aircraft at all airports that currently have no precision landing capability. It is expected to be available around 2010.[11]
- *Local Area Augmentation System (LAAS)* is an augmentation to GPS that focuses its service on the airport area (approximately a 20-30 mile radius). LAAS will yield the extremely high accuracy, availability, and integrity

[11] FAA Satellite Navigation System, http://gps.faa.gov/index.htm, 2004.

necessary for Category I, II, and III precision approaches, and will provide the ability for more flexible, curved approach paths. To the present date LAAS demonstrated accuracy is less than 1 meter in both the horizontal and vertical axis.[12] LAAS is expected to be available after 2015.

8.4.4.2 Navigational Aids, Visual Aids and Other Facilities

The future NAVAIDS installed at SSA will depend upon the local weather conditions, the level of aviation activity and types of airspace obstructions in the surrounding area. As discussed in Section 3.1.3, the weather conditions recorded at MDW (**Table 3-4**) show that CAT II conditions occurred 0.6 percent of the year and CAT III conditions occur 0.3 percent of the year. A cost-benefit analysis will be performed to determine if the installation of CAT II/III approach equipment and lighting is warranted. This planning analysis considers that provisions for CAT II (or CAT III) instrument precision approaches on at least one end of the future runway will provide best coverage for these conditions.

Tables 8-9 and **8-10** present a preliminary list of additional navigational, visual aids and other facilities proposed at SSA by DBO+20. In addition to runway and taxiway lighting, the apron area should be equipped with apron floodlights to assist ramp activity at night.

The ILS siting and design process should follow criteria outlined in FAA Order 6750.16C, *Siting Criteria for Instrument Landing Systems*. The areas in the vicinity of all navigational and visual aids facilities at SSA should be protected and kept clear of any natural or man-made objects that could interfere or affect the equipment signals and operation. The protection of these areas is mandatory for safe operations at an airport.

Table 8-9
Summary of Additional Airport Navigational, Visual Aids and Other Facilities–DBO+20

Facility	Equipment Function Description
ASDE – Airport Surface Detection System	Provides line-of-site coverage of the entire aircraft surface movement area during reduced visibility periods.
GPS – Global Positioning Landing System	Receptors placed at strategic locations will transmit runway approach information and coordinates signals to flying aircraft via communication satellites.

Source: TAMS, an Earth Tech Company, 2004.

[12] FAA Satellite Navigation System, http://gps.faa.gov/index.htm, 2004.

Table 8-10 Summary of Additional Recommended Runway Navigational, Visual Aids and Other Facilities – DBO+20
Future Runway (09R/27L)
Instrument Landing System CAT II (or CAT III) Glide Slope Localizer Inner Marker Beacon Required for CAT II (and CAT III) ***OR*** GPS Landing System
Touchdown, rollout and midpoint RVR required for CAT II runways longer than 8,000 feet and for CAT III runways.
Precision Approach Indicator Path (PAPI)
Approach Lighting System with sequencing flashing lights (ALSF-2) required for CAT II and CAT III.
High Intensity Runway Edge Lights (HIRL)
Runway Centerline Lights
Touchdown Zone Lights
Wind Cones
High Intensity Taxiway Edge Lights (HITL)
Taxiway Centerline Lights

Source: TAMS, an Earth Tech Company, 2004.

Part 77 Surfaces

The future runway and associated facilities will take into consideration the FAR Part 77 surfaces, *Objects Affecting Navigable Airspace*. Any objects penetrating the primary surface of the future runway and/or other aeronautical surfaces could be safety hazards for aircraft operations. Imaginary airspace surfaces that must be protected from any natural or man-made obstructions were described in Section 3.3.2. **Table 8-11** lists the standard dimensions of the approach surfaces, mandated by FAA for all instrument precision approach runways that must be clear of any obstacles.

Table 8-11
F.A.R. Part 77 Civil Airport Imaginary Approach Surfaces, Dimensions and Slopes

Instrument Procedure	Inner Edge Width (ft)	Outer Edge Width (ft)	First Section Length (ft) and Slope	Second Section Length (ft) and Slope
Precision Approach	1,000	16,000	10,000 50:1	40,000 40:1

Source: FAA FAR Part 77, *Objects Affecting Navigable Airspace*, April 1971.

According to FAA guidelines, an approach surface or a transitional surface shall not permit new objects or extensions of existing objects above it except when, in opinion of the proper authority, an existing immovable object would protect the new object or extension. Likewise, the conical surface and the horizontal surface shall not permit new objects or extensions of existing objects above its surface except when, in the opinion of the appropriate authority, an existing immovable object would shield an object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of aircraft operations.

TERPS Surfaces

In addition to the FAR Part 77 Surfaces, the FAA has also published standardized methods to help plan and design safe and efficient instrument flight procedures. These standards, known as *Terminal Instrument Procedures (TERPS),* were also consulted for the planning process of the Inaugural runway at SSA, as discussed in Section 3.3.2. According to the FAA, no obstacle is permitted to penetrate the final approach or transitional surfaces. These surfaces would need to be examined to ensure that no object would adversely affect the safety of aircraft operations on a new parallel runway.

Airport Traffic Control Tower Facility (ATCT)

The location and elevation of a potential ATCT at SSA should be adequate to ensure unobstructed views to all runway approaches, airside and terminal facilities that are under ATCT control. Convenient and secure access to the ATCT for personnel and maintenance staff is also important criteria in locating an ATCT facility.

The tower structure design should follow the guidelines described in FAA Order 6480.7C, *Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control Facility Design Guidelines*. The FAA classifies ATCT facilities into five main categories, designated by activity levels. The distinction in levels is based on the type (VFR or IFR) and volume of operations, and is used to establish personnel requirements, equipment type, facility complement and rate of growth. There are currently three nominal ATCT design classifications, based on the hourly activity at an airport: Low, Intermediate and Major Activity ATCT facility.

Based on the high long-range projections of hourly operations for DBO+20, an ATCT at SSA would be categorized as a Low Radar Activity – Level III facility, if this level of operations were achieved by DBO+20. Under the low long-range projections, the level of hourly operations would place a potential ATCT into the Level II Limited Radar Approach category. **Table 8-12** lists the elements that should be considered in planning and design of the ATCT facility under both projections. It is expected that the FAA will conduct its own study to determine the need, final location and elevation of a potential Air Traffic Control Tower (ATCT), if it has not been constructed during the IAP. If an ATCT is constructed during the IAP it should ideally be located and sized for the DBO+20 planning horizon, allowing it to handle operations on the two primary parallel runways, as well as the GA crosswind runway.

Table 8-12
ATCT Planning Criteria – DBO+20

Case	Activity Radar Level	Air Traffic Control Classification	Control Cab Size (sf)	Tower Height (ft)	Radar/ Automation Equipment	Site Area (sf)	Parking		Perimeter and Future Expansion (sf)
							Spaces	Area (sf)	
Low	Low	II	Over 220	Up to 97	None	4,800	10-40	2,700 to 10,800	Up to 10,000
High	Low	III	Over 350	75-99	ARTS II/IIA	4,800	10-40	2,700 to 10,800	Up to 10,000

Source: FAA Order 6480.7C, *Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control Facility Design Guidelines,* April 1995.

8.5 Intermediate Passenger Terminal Facility Requirements

8.5.1 Peak Activity Estimates

8.5.1.1 Methodology for Estimating the Peak Period Demand

The long-range projections[13] at SSA were based on case studies at airports that experienced significant growth between 1992-2000, such as Manchester Airport (MHT), NH; T.F. Green Airport (PVD), Providence, RI; and Dayton International Airport (DAY), OH. Historical annual activity and load factors at these airports were examined to estimate growth in commercial passenger activity at SSA beyond the IAP. DAY in particular was considered a good example because it is located in the Midwest and for each of the last several years had a level of activity of approximately one million annual enplanements. The other two airports were selected because they are supplemental airports for a major metropolitan area (Boston) and have a significant percentage of low-cost carrier activity. They were considered good examples since they have an activity profile similar to that expected at SSA in DBO+20.

Tables 8-13 through **8-15** depict the historical data for these three airports from 1996 to 2002. The trends in activity are particularly interesting in terms of changes in load factors. The data indicates that the average load factors at these airports have increased considerably during this time period.

[13] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

Table 8-13
Manchester Airport
Domestic Peak Month Activity Ratios

Origin	Year	Peak Month – Relative to Year				Annual Averages			
		Trips (%)	Onboard Pax (%)	Load Factor (%)	Avg. Aircraft Seats	Trips	Onboard Pax	Load Factor (%)	Avg. Aircraft Seats
MHT	1996	10.81	9.64	67.31	93.61	7,356	390,283	62.31	85.15
MHT	1997	9.29	9.67	69.62	92.35	7,108	425,043	63.53	94.12
MHT	1998	10.66	12.80	77.88	115.54	10,943	812,173	68.03	109.09
MHT	1999	9.09	10.16	86.29	116.30	14,114	1,246,060	75.41	117.07
MHT	2000	9.55	9.97	84.00	104.55	17,952	1,494,009	74.94	111.06
MHT	2001	9.07	10.83	87.25	118.64	18,012	1,560,640	73.46	117.95
MHT	2002	9.68	10.03	79.84	124.17	18,504	1,545,538	70.57	118.35

Source: USDOT T-100, Onboard Data Base Products (DBP), Dallas, Texas, 2003, courtesy of the al Chalabi Group, Ltd.

Table 8-14
T.F. Green Airport
Domestic Peak Month Activity Ratios

Origin	Year	Peak Month – Relation to the year				Annual Averages			
		Trips (%)	Onboard Pax (%)	Load Factor (%)	Avg. Aircraft Seats	Trips	Onboard Pax	Load Factor (%)	Avg. Aircraft Seats
PVD	1996	10.50	12.66	65.34	116.87	17,801	1,127,489	58.72	107.86
PVD	1997	8.79	9.55	79.03	115.91	22,482	1,895,598	72.64	116.08
PVD	1998	8.82	9.69	80.71	118.89	24,823	2,169,444	73.85	118.35
PVD	1999	9.07	10.08	84.70	119.90	26,212	2,394,402	75.53	120.93
PVD	2000	9.29	9.81	77.55%	113.96	30,390	2,544,099	70.91	118.05
PVD	2001	9.45	10.88	82.71	113.99	32,162	2,601,306	69.77	115.92
PVD	2002	8.96	10.01	77.68	125.60	29,578	2,530,421	68.89	124.18

Source: USDOT T-100, Onboard Data Base Products (DBP), Dallas, Texas, 2003, courtesy of the al Chalabi Group, Ltd.

Table 8-15
Dayton International Airport
Domestic Peak Month Activity Ratios

Origin	Year	Peak Month – Relation to the year				Annual Averages			
		Trips (%)	Onboard Pax (%)	Load Factor (%)	Avg. Aircraft Seats	Trips	Onboard Pax	Load Factor (%)	Avg Aircraft Seats
DAY	1996	8.80	9.33	57.73	92.88	17,265	825,548	51.57	97.87
DAY	1997	9.12	9.41	59.00	86.99	17,216	856,391	56.92	87.40
DAY	1998	9.12	9.41	59.00	86.99	17,216	856,391	56.92	87.40
DAY	1999	8.85	9.29	67.16	82.81	18,413	932,893	59.82	84.69
DAY	2000	9.22	9.79	68.32	82.35	21,053	1,039,643	59.49	83.01
DAY	2001	9.27	10.06	62.41	78.84	20,785	941,702	57.65	78.60
DAY	2002	9.21	9.46	69.47	75.59	19,264	915,820	65.04	73.10

Source: USDOT T-100, Onboard Data Base Products (DBP), Dallas, Texas, 2003, courtesy of the al Chalabi Group, Ltd.

Tables 8-13 through **8-15** indicate that at airports with annual enplanements of 1-2 million per year, the ratio of peak month activity relative to annual activity is approximately 9-10 percent. There is little difference between the number of seats per aircraft departure for the peak months when compared to the annual average for the three airports. The peak month activity projections at SSA were derived assuming peak activity ratios similar to those calculated at these airports. Based on these assumptions the estimated peak month domestic passenger activity at SSA in DBO+20, for both the low and high long-range projections was calculated (see **Table 8-16**).

Table 8-16
Peak Month Domestic Passenger Activity – DBO+20

Long-Range Projections	Annual Enplaned Passengers	Peak Month Ratio	Peak Month (pax)
Low Case	2,226,000	10.0%	222,600
High Case	6,139,000	9.85%	605,000

Source: TAMS, an Earth Tech Company, 2004.

8.5.1.2 Domestic Passenger Peak Activity

The peak month average day (PMAD) passenger activity projections (shown in **Table 8-17**) were derived by dividing the peak month activity by 29.2[14]. The peak hour estimates were developed based on the assumption that in DBO+20 SSA will have a 16-hour daily schedule. It was also assumed that peak hour activity would be 2.1 to 2.5 times higher than the average hour of the peak month. These ratios are derived based on activity at other airports that handle similar levels of passenger activity forecasted for SSA. **Table 8-18** shows the peak hour activity forecasted for DBO+20 at SSA.

[14] The analysis assumed that the level of commercial activity on weekends would be slightly less than weekdays.

Table 8-17 Peak Month Average Day Domestic Passengers – DBO+20		
Long-Range Projections	**Peak Month (pax)**	**PMAD (pax)**
Low Case	222,600	7,620
High Case	605,000	20,720

Source: TAMS, an Earth Tech Company, 2004.

Table 8-18 Peak Hour Activity, Domestic Passengers – DBO+20			
Long-Range Projections	**Average Hour of Peak Month (pax)**	**Peak Hour Ratio**	**Peak Hour (pax)**
Low Case	476	2.5	1,190
High Case	1,295	2.1	2,720

Source: TAMS, an Earth Tech Company, 2004.

As discussed in Chapter 1, Section 9 of the forecast report[15], IDOT assumes that the number of seats per departing aircraft would gradually increase to 130 seats per domestic departure and 150 seats per international departure by DBO+20. The peak hour load factor was assumed to be greater than the annual average load factors recorded at PVD, DAY and MHT, to reflect the higher activity patterns that typically occur during peak periods.

The peak hour domestic passenger aircraft operations were assumed to be about 1.75 times[16] the number of departures. **Table 8-19** presents the domestic peak hour passenger operations forecasted for SSA in DBO+20.

Table 8-19 Peak Hour Domestic Operations – DBO+20					
Long-Range Projections	**Peak Hour Enplaned Pax**	**Aircraft Size (seats)**	**Load Factor**	**Peak Hour Departures**	**Aircraft Operations**
Low Case	1,190	130.0	80%	12	21
High Case	2,720	130.0	80%	26	46

Source: TAMS, an Earth Tech Company, 2004.

8.5.1.3 International Passenger Peak Activity

The long-range projections for SSA anticipate no scheduled international activity by DBO+20 under the low long-range projections, but do forecast scheduled international operations under the high long-range projections. These projections were presented in the forecast report and are summarized in **Table 8-20**.

[15] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.
[16] Based on peak hour activity at other airports.

Table 8-20 International Passenger Activity – DBO+20		
Long-Range Projections	**Enplaned Passengers**	**Aircraft Operations**
High Case	540,000	9,800

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, prepared for the Illinois Department of Transportation, May 2004.

The international peak hour passengers were derived utilizing the same methodology for estimating the domestic passenger peak hour activity *and* assuming that:

1. The international peak hour ratio would be higher than the domestic peak hour ratio since international departures typically have a different peak hour pattern than domestic departures.
2. The average number of seats per international peak hour departure will be higher since the projected DBO+20 aircraft fleet mix includes widebody aircraft.

Tables 8-21 and **8-22** present the DBO+20 international peak hour projections of passenger and aircraft operations for the high long-range projections. **Table 8-23** presents a summary of the domestic and international peak hour activity characteristics for the DBO+20 planning horizon.

Table 8-21 Peak Hour International Passenger Activity – DBO+20						
Annual Enplaned Passengers	**Peak Month Ratio (%)**	**Peak Month (pax)**	**Peak Month Average Day (pax)**	**Average Hour of Peak Month (pax)**	**Peak Hour Ratio (%)**	**Peak Hour Passengers**
544,000	10.6	57,660	1970	123	3.5	430

Source: TAMS, an Earth Tech Company, 2004.

Table 8-22 Peak Hour International Operations – DBO+20					
Long-Range Projections	**Peak Hour Enplaned Pax**	**Avg. Aircraft Seats**	**Load Factor (%)**	**Peak Hour Departures**	**Aircraft Operations**
Low Case	0	0	0	0	0
High Case	430	180	85	3	5

Source: TAMS, an Earth Tech Company, 2004.

Table 8-23 Summary of Peak Hour Activity – DBO+20			
Long-Range Projections		**Aircraft Ops.**	**Enplaned Pax**
Low Case	Domestic	21	1,190
High Case	Domestic	46	2,720
	International	5	430

Source: TAMS, an Earth Tech Company, 2004.

8.5.2 Aircraft Gate Requirements

The planning approach for the Intermediate phase passenger terminal is to expand upon the IAP DBO+5 terminal complex in a logical, modular manner in accordance with projected DBO+20 passenger demand. Passenger terminal facility requirements for DBO+20 have been developed for the low and high long-range projections.

The requirements for aircraft gate facilities have been determined from an analysis of the draft *Projections of Aeronautical Activity for the Inaugural Airport Program.* The types of commercial passenger aircraft that need to be accommodated have been determined from the forecast report, the aircraft fleet mix analysis and the air traffic activity analysis contained in Section 8.1 and Section 8.5.1 of this report. The aircraft to be accommodated in the Intermediate phase include Aircraft Design Groups II, III, IV and V.

For this analysis, the typical regional aircraft assumed is an ADG II regional jet with a seating capacity of 70-90 passengers. The typical ADG III narrow body aircraft has a capacity of 100-150 passengers. The typical ADG IV aircraft has a capacity of 200-225 passengers. An average load factor of 70-75 percent has been assumed for air carrier passenger operations.

As discussed in Section 4.2, the Annual Gate Utilization Method was used to estimate aircraft gate requirements. To accommodate the estimated peak hour passenger demand for DBO+20 under the low case, it is estimated that 3-4 regional gates and 9-11 narrow body gates for a total of 12-15 gates would be required. Under the high case, 8-10 regional gates and 22-27 narrow body gates for a total of 30-37 gates would be required. The results of this analysis are shown in **Table 8-24**.

Table 8-24
Summary of Aircraft Gate Requirements – DBO+20

Enplanements/Gates	Low Case	High Case
Regional Jet AEP	384,100	1,235,615
Narrow Body Jet AEP	1,841,900	5,443,385
Total AEP	**2,226,000**	**6,679,000**
Regional Jet Gates	3-4	8-10
Narrow Body Jet Gates	9-11	22-27
Total	**12-15**	**30-37**

Sources: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004; TAMS, an Earth Tech Company, 2004.
AEP = annual enplaned passengers

8.5.3 Aircraft Apron Requirements

The passenger terminal aircraft apron has been planned using a modular approach to optimize utilization of the aircraft apron and to provide the greatest possible operational flexibility. Planning for the apron provides the ability to readily expand the terminal complex in a straightforward and logical manner, as future demand for air transportation service at SSA increases. Based on the long-range projections, apron-planning modules have been developed for medium body, narrow body and regional jet aircraft. The aircraft gate positions of the passenger terminal apron have been planned to accommodate the full range of aircraft families based on the typical aircraft to be accommodated at each position. This approach will allow airlines to increase or decrease the size of aircraft employed without the need for immediate apron construction.

8.5.3.1 *Regional Jet Aircraft Apron Planning Module*

For the Intermediate phase of development, the apron-planning module for regional jet aircraft is based on accommodating ADG II aircraft including the Bombardier Regional Jets CRJ700 and CRJ900. The apron planning modules for regional jet aircraft have been previously described in Section 4.3.1.

8.5.3.2 *Narrow Body Jet Aircraft Apron Planning Module*

For the Intermediate phase of development, the apron planning module for narrow body jet aircraft is based on accommodating ADG III aircraft including the Boeing 717-100 and 200, Boeing 737-100 through 900 aircraft and the Airbus 318, 319, 320 and 321 family of aircraft. Also, the Intermediate terminal apron area has been planned to accommodate large narrowbody ADG IV aircraft. The apron planning modules for narrow body aircraft have been previously described in Section 4.3.2. The narrow body jet apron-planning module for ADG IV aircraft is illustrated in **Exhibit 8-2**.

8.5.3.3 *Medium Body Jet Aircraft Apron Planning Module*

For the Intermediate phase of development, the apron-planning module for medium body jet aircraft is based on accommodating ADG IV aircraft including the Boeing 767-200 and 300 and the Airbus A-310. The medium body apron-planning modules are shown in **Exhibits 8-3** and **8-4**.

8.5.3.4 *Wide Body Jet Aircraft Apron Planning Module*

For the Intermediate phase of development under the high long-range projections, the wide body jet aircraft-planning module is based on accommodating ADG V aircraft such as the Boeing 777-200 or the 7E7-8. The wide body apron-planning module is shown in **Exhibit 8-5**.

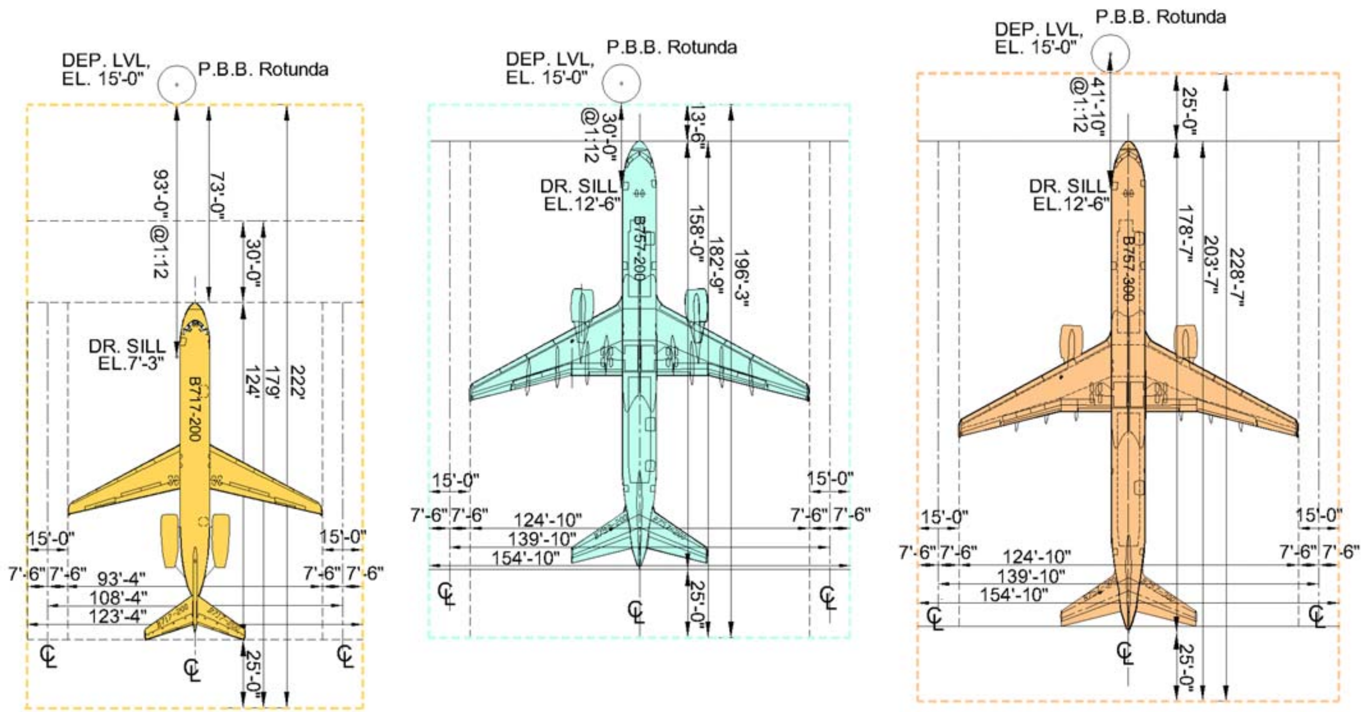
8.5.3.5 *Aircraft Apron Frontage*

Under the low long-range projections for DBO+20, the overall required aircraft apron frontage is approximately 1,400 to 1,500 linear feet to accommodate 3-4 regional jet aircraft and 9-11 narrow body aircraft. Under the high long-range projections for DBO+20, the overall required aircraft apron frontage is approximately 4,700 to 5,200 feet to accommodate 8-10 regional jet aircraft and 22-27 narrow body aircraft.

8.5.3.6 *Aircraft Apron Depth*

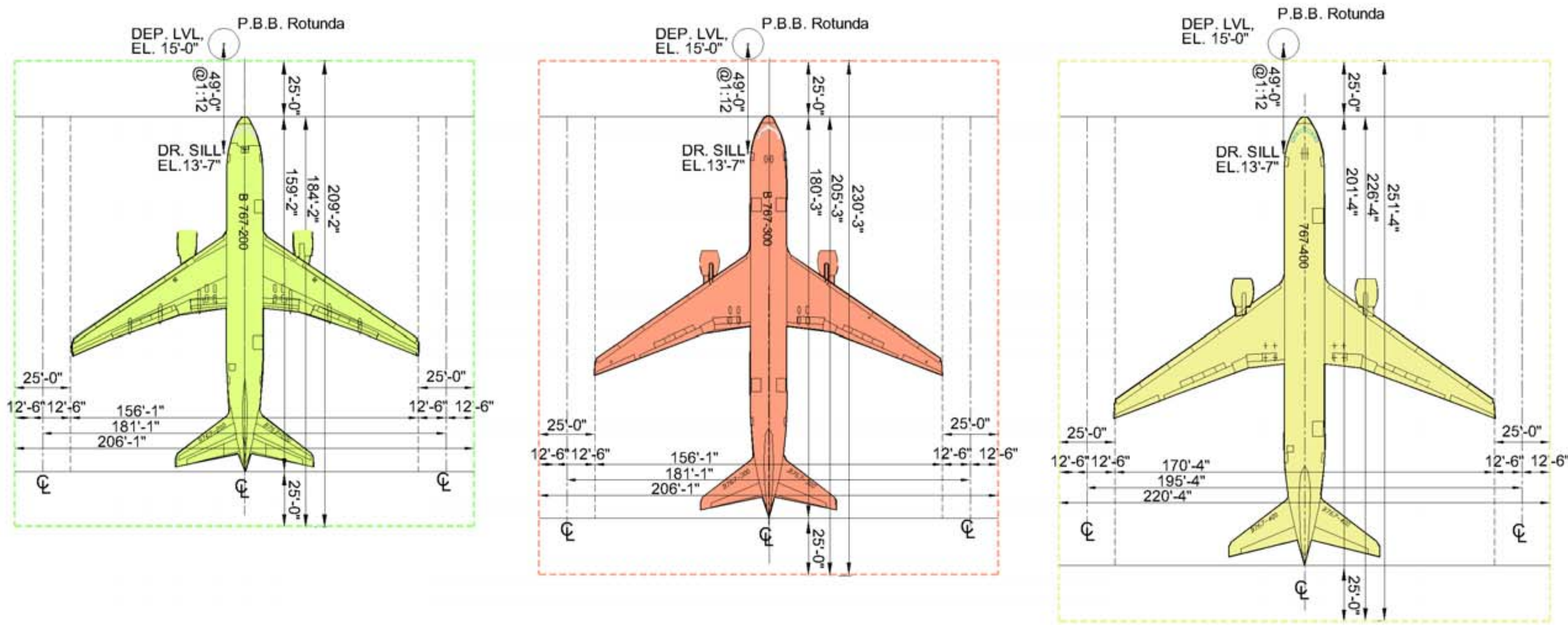
For DBO+20, an aircraft apron depth of 230.2 feet will accommodate the Airbus 310, 318, 319, 320 and 321, Boeing 737-700, 800, 900, 757-200, 300 and 767-200 and 300 families of aircraft. The apron depth takes into consideration the aircraft setback distance from the passenger boarding bridge rotunda to the aircraft door at a 1:12 slope to meet ADA requirements, as well as providing tail clearance of 25 feet to the service road.

Exhibit 8-2
Narrow Body Jet Apron Planning Module
Boeing 717-200, 757-200 and 300



B717-200 B757-200 B757-300

Exhibit 8-3
Medium Body Jet Apron Planning Module
Boeing 767-200, 300 and 400



B767-200, B767-200ER

B767-300, B767-300ER

B767-400, B767-400ER

Exhibit 8-4
Medium Body Jet Apron Planning Module
Airbus 310

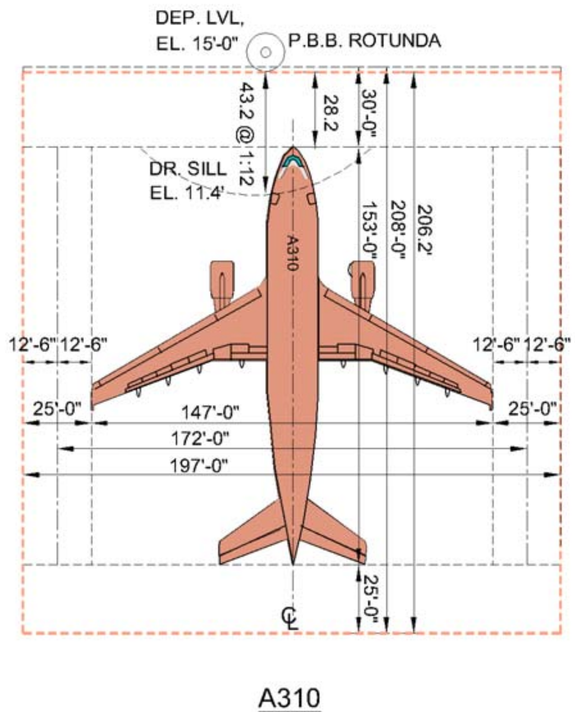
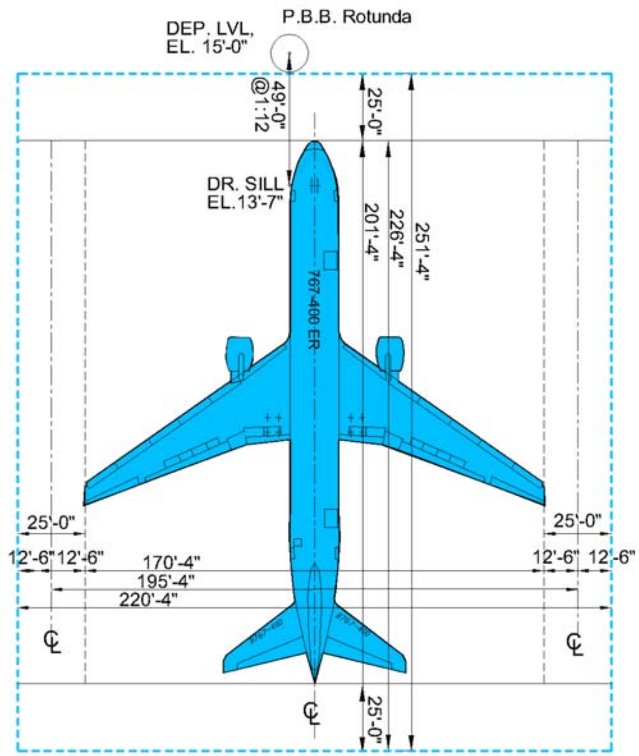
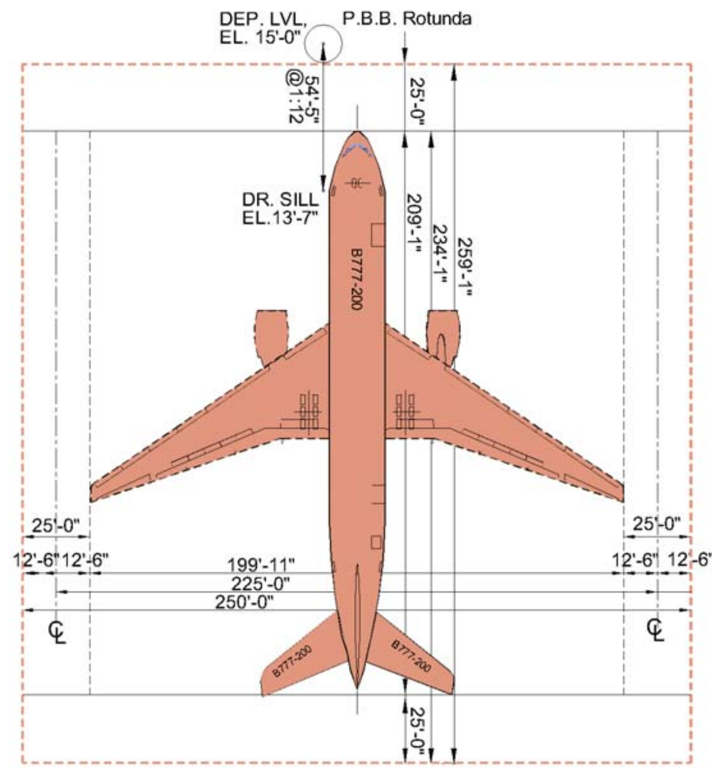


Exhibit 8-5
Wide Body Jet Apron Planning Module
Boeing 767-400ER and 777-200



B767-400ER



B777-200

8.5.3.7 Aircraft Apron Service Roadways

The aircraft apron will be planned for optimum service access to all aircraft and the efficient movement of ground service vehicles and equipment. The overall aircraft apron plan includes provisions for a ground service equipment parking area (25 feet in depth) and a two-lane service roadway adjacent to the concourse. The service roadway will include two twelve-foot wide vehicle lanes for a total width of 24 feet. A two-lane service roadway will also be provided behind the aircraft. The service roadway behind the aircraft will have two 12-foot wide vehicle lanes for a total width of 24 feet.

8.5.3.8 Apron Taxi Lane

In DBO+20, the apron pushback taxi lane will accommodate ADG II, III and IV aircraft under the low long-range projections and ADG II, III, IV and V aircraft under the high long-range projections. The taxi lane object free area width will be 225 feet and the distance from the taxi lane centerline to fixed or moveable objects will be 112.5 feet. In planning for the Intermediate phase of development when B-757 and B-767 aircraft are predicted to operate at SSA, the aircraft apron will be deepened and the apron pushback taxi lane widened to accommodate the larger aircraft that will be operating during this phase of development. In the IAP phase of development, the dual north-south taxiway was located to provide adequate space between the terminal apron and the dual taxiway to permit deepening the aircraft apron and widening the apron taxi lane without impacting the terminal complex or main taxiway system.

8.5.4 Passenger Terminal Functional Area Requirements

A preliminary estimate of the Intermediate passenger terminal functional area requirements has been made for the low and high cases. These preliminary area requirements are subject to further detailed analysis in subsequent phases of the planning process. A discussion of the planning requirements for each functional area of the passenger terminal follows, and is summarized in **Table 8-25**.

8.5.4.1 Passenger Ticketing and Check-in

Reflecting current passenger service trends in the airline industry, it is anticipated that both full-service and automated self check-in will be provided centrally in the passenger terminal. Automated self check-in is also anticipated both centrally and distributed throughout the check-in area and curb front. Central ticketing and check-in will be accommodated at linear airline ticket counters. Pre-ticketed passengers may check-in either at the enplanement curb front, the ticket counter or the departure gate.

Table 8-25
Summary of Estimated Passenger Terminal Functional Area Requirements – DBO+20

Passenger Terminal Functional Areas	Low Case	High Case
Regional Jet Gates	3-4	8-10
Narrow Body Jet Gates	9-11	22-27
Total Jet Gates	12-15	30-37
Airline Ticket Counters (sf)	2,000	5,000
Airline Ticket Offices and Support (sf)	4,250	10,650
Outbound Baggage Room (sf)	7,500	18,650
Baggage Claim Area (sf)	5,850	14,650
Airline Operations and Support Space (sf)	8,500	21,300
Departure Lounges (sf)	18,150	45,300
Other Airline Support Space (sf)	1,700	4,260
Ticketing / Check-in (sf)	9,400	23,500
Lobby Waiting Area (Departures) (sf)	6,800	17,000
TSA Security Office and Support (sf)	TBD	TBD
Security Checkpoint – Passenger and Cabin Baggage (sf)	8,800	18,700
Federal Inspection Services – Immigration, Customs, Agriculture, Fish & Wildlife	N/A	TBD
Baggage Claim Lobby (sf)	15,500	38,800
Food and Beverage Service (sf)	29,350	73,250
Other Concessions and Terminal Services (sf)	29,350	73,250
Other Rental Areas (sf)	14,650	36,650
Circulation Areas (sf)	33,500	83,750
Sub-total (sf)	*195,300*	*484,710*
HVAC (15%) (sf)	29,300	72,700
Electrical (10%) (sf)	19,500	48,500
Sub-total (sf)	*244,100*	*605,910*
Structure (5%) (sf)	12,200	30,300
Total – Terminal Area (sf)	**256,300**	**636,210**

Source: TAMS, an Earth Tech Company, 2004. TBD = To Be Determined; N/A = Not Applicable

The ticketing and check-in lobby will have an overall depth of approximately 60 feet from the face of ticket counters to the face of the terminal building including 20 feet for passenger queues. Ticket counter positions are typically based on the number of peak hour enplaning passengers, the number of airlines, the time distribution of passengers arriving at the terminal, and the percentage of passengers checking in at the ticket counter versus going directly to the gate. Because much of this specific information is not available for the specific airline groups that will be providing service at SSA, certain general planning parameters have been assumed, as discussed below. These assumptions are subject to further clarification as the detailed planning of the IAP passenger terminal progresses.

An average check-in processing rate of 2.0-2.5 minutes per passenger has been assumed. It has also been assumed that 10 percent of passengers would check-in at the curb front, 10 percent would have no baggage to check and would check-in at the gate, and 80 percent would check-in at the central ticket counters. With regard to the distribution rate of the arrival of passengers to ticketing and check-in, it has been assumed that between 15 to 20 percent of departing passengers will arrive at ticketing and check-in during the peak 10 minutes and that the peak 10 minutes will occur from 50 to 60 minutes before departure.

Based on these assumptions, it is estimated that in the low case 30 to 40 check-in positions will be required in DBO+20. In the high case, it is estimated that 80 to 100 check-in positions would be required. The size and configuration of airline check-in counters vary considerably by airline and location. It has been assumed that the typical central ticket counter position will provide both full service and automated self check-in and that baggage check-in and induction can be accommodated at each position. The typical central check-in position will be 6 feet in width, including the customer service position and a shared baggage well with dual baggage induction belts. The overall depth of the central ticket counter area is assumed to be 10 feet including the ticket counter, customer service work area and baggage belt.

For DBO+20, the required ticket and check-in position frontage is estimated to be approximately 180-240 feet in the low scenario. In the high scenario, the required ticket counter frontage is 480-600 feet.

8.5.4.2 *Security*

The Intermediate passenger terminal will be planned in accordance with the approved policies and protocols of the Department of Homeland Security and the Transportation Security Administration (TSA). Overall, the passenger terminal will be planned for the efficient screening of all passengers and carry-on baggage to prevent the introduction of weapons or explosives into the passenger cabin. It will also be planned for 100 percent screening of checked baggage utilizing explosives detection system (EDS) technology. As of the writing of this report, the policies and protocols of the TSA are still evolving. The development of all relevant TSA airport security policies and protocols will be carefully monitored and will be incorporated in the planning of the Intermediate passenger terminal. This work will be done in close coordination with the Transportation Security Administration, FAA and IDOT.

8.5.4.3 *Passenger Concourse*

After check-in and clearing the passenger security-screening checkpoint, passengers will enter the attached linear concourse. The concourse corridor will be approximately 45 to 55 feet in width to accommodate future moving walkways located centrally in the concourse. The passenger concourse will provide passenger support facilities, concessions and access to the departure lounges, organized linearly along the airside perimeter.

8.5.4.4 *Departure Lounges*

The departure lounges are based on the mix of aircraft and the average seating capacity of each class of aircraft. These lounges are located in pairs to allow flexibility of use and sized to accommodate the largest narrow-body design aircraft (i.e., B-737-800 or A-320).

The departure lounges are planned to provide a waiting area for 80 percent of the aircraft passenger capacity with room for 50 percent of the passengers to be seated and 50 percent standing. Seated passengers will be allocated 15 square feet per passenger, while standing passengers will be allotted 10 square feet per passenger.

An average depth of 30 feet with centrally located check-in podiums is planned for the lounges. The depth of the check-in podium and back wall is approximately 8 feet. A deplaning corridor aligned with the boarding bridge door will be provided at 6 feet in width or 180 square feet in area. Each customer service agent position is allocated 5 feet in width. The passenger queue is assumed to be approximately 15 feet deep. Each customer service agent position is allocated approximately 115 square feet of floor area. For general planning purposes, the customer service agent podium positions are assumed to be as follows: one for regional jet aircraft and two for narrow body jet aircraft (up to 150 seats). The average aircraft seating capacities and hold room sizes are noted in **Table 8-26**.

Table 8-26
Average Aircraft Seat Range and Departure Lounge Area

Aircraft Type	Seats	Area (sf)
Regional Jet	70-90	875-1,250
Narrow Body	100-150	1,250-1,850
Medium Body	200-225	2,500-2,800

Source: TAMS, an Earth Tech Company, 2004.

8.5.4.5 Concessions

The passenger terminal concessions area includes all of the commercial revenue generating operations that provide services for the traveling public. A comprehensive Concessions Marketing Plan and Concessions Space Program will be developed to provide the full range of services to passengers and users of the terminal.

It is anticipated that Concessions space will include:

- Ground Transportation Services including rental car companies, limousines, vans and buses.
- Food and Beverage Service
- News, Gift and Specialty Shops
- Banking, ATM
- Travel Agencies
- Kitchen and Work Areas
- Concessions Storage and Loading Docks

Concessions will be located both airside and landside. Concessions and service areas will be located adjacent to each pair of departure lounges to provide for convenient access for passengers waiting for their flights.

8.5.4.6 Airline Support Space

Outbound Baggage Makeup areas include manual or automated baggage makeup units, baggage cart and container storage areas, baggage tug and cart circulation areas, and control and administrative support areas. By DBO+20, it is anticipated that automated, centralized baggage handling systems will be required. The baggage handling systems will be subject to further detailed analysis and evaluation.

Baggage Claim Area requirements are primarily based on the volume of peak hour arriving passengers, the concentration of the arriving passengers, and on the ratio of checked baggage per passenger. It is estimated that approximately 60 to 70 percent of passengers will arrive within a 20-minute period.

The majority of passengers usually arrive at the baggage claim area before their bags have been unloaded onto the baggage claim units. Therefore, the baggage claim units should be sized for the number of passengers waiting for baggage since most of the baggage is claimed on the first cycle of the baggage claim unit.

Typically baggage claim units at larger airports allow for 150-180 linear feet for most airlines. Baggage claim units of this size will adequately handle large narrow body (B-757) and widebody aircraft as well as allow multiple flights to be displayed on a single claim unit. The baggage claim area is recommended to be 35 square feet per linear foot of claim device to provide adequate queuing and circulation.

Baggage Claim Off-Load Areas include the portion of a flat plate, direct feed baggage claim unit adjacent to the inbound baggage roadway, on which the arriving baggage is placed on the feed conveyor for a remote fed baggage claim unit. A recommended area of 2,000 square feet per claim device should be provided for the Baggage Claim Off-Load Area. This area would accommodate the offload lanes for a baggage train of four baggage carts or dollies.

Baggage Train Circulation area includes the lanes and common use maneuvering areas. Typically, a 10-15 percent area allowance of all baggage handling areas should be allocated for baggage train circulation areas.

8.5.5 Terminal Curb Front Requirements

The long-range projections for SSA estimate that by DBO+20 passenger activity could increase significantly when compared to DBO+5 levels. As a result, the passenger terminal curb front roadway needs to be planned to carry a higher level of vehicle traffic. It is anticipated that by DBO+20 the terminal curb front would be a free flow two-level curb frontage roadway. A manual curb front capacity analysis was performed to estimate the future curb front requirements for both the low and the high case peak hour passenger forecasts. The following assumptions were made:

- Fifty percent of private cars were assumed to use the terminal curb front roadway, and fifty percent were assumed to use a parking facility. This assumption was made to avoid overestimating the projected demand for curbside.
- Mode splits, average curb front dwell times and vehicle occupancy parameters were modeled based on previous studies[17] of curb front vehicle distribution, and/or applying FAA guidelines on typical vehicle occupancy rates. Longer dwell times were assumed at the arrival curbside since typically the demand is greater at the arrival curbside. This information is presented in **Table 4-7**.
- It is anticipated that shuttle buses may circulate the departure curb front.

The curb front capacity analysis was performed for the peak 20-minute demand. The results of this analysis are illustrated in **Table 8-27**.

[17] *Technical Air Quality Report,* TAMS Consultants, 1997; *New Terminal Program at Midway Airport,* Barton-Aschman Assoc., 1995.

Table 8-27
Peak 20-Minute Curb Front Demand – DBO+20

Vehicle Type	Low Case		High Case	
	Departure Curb (ft)	Arrivals Curb (ft)	Departure Curb (ft)	Arrivals Curb (ft)
Private Cars	253	296	476	528
Taxi/ Limos	19	47	109	274
Shuttles	12	46	14	25
Total	284	389	599	827
Effective Linear Demand	673		1,426	

Source: TAMS, an Earth Tech Company, 2004.

It is anticipated that the projected DBO+20 traffic will require a 3-lane curb front road. The 3-lane cross-section configuration will provide the capacity needed for customer drop-off/pick-up and through traffic maneuvering. All commercial vehicles are assumed to use the inner lane. Private cars will also circulate the curb front road, but a significant percentage (50%) was assumed to enter the parking facility. Delivery vehicles, garbage collection trucks, armored vehicles, etc., will be directed to loading docks. Future planners will need to optimize the curbside configuration to better respond to the actual traffic patterns that will occur in DBO+20.

8.5.6 Summary of Passenger Terminal Facility Requirements

Table 8-28 summarizes the facility requirements for the passenger terminal complex, as discussed in the previous paragraphs.

Table 8-28
Summary of Passenger Terminal Complex Facility Requirements – DBO+20

Facility	Low Case	High Case
Passenger Terminal Curb Front (linear feet)		
Departures	284	599
Arrivals	389	827
Total	**673**	**1,426**
Passenger Aircraft Gates:		
Regional Jet Gates	3 - 4	8 - 10
Narrow Body Gates	9 - 11	22 - 27
Total Gates	**12 - 15**	**30 - 37**
Passenger Terminal Area (square feet)	256,300 sf	636,210 sf
Passenger Terminal Aircraft Apron		
Aircraft Apron Frontage (lf)	1,480 ft	4,960 ft
Aircraft Apron Area (sf)	521,975 sf	1,712,785 sf

Source: TAMS, an Earth Tech Company, 2004.

8.6 Intermediate Support/Ancillary Facility Requirements

8.6.1 Air Cargo Facility Requirements

The air cargo facilities projected at SSA in DBO+20 were estimated and sized based on the draft forecasts of air cargo aviation activity[18], an assumed cargo aircraft fleet (see Section 8.1.4), air cargo operations (see **Table 8-29**), load factors and percentages of freight/express, belly freight and mail for each aircraft (see **Table 8-30**).

Additional air cargo facilities may be required at SSA to accommodate the projected cargo activity through the twenty-year planning horizon. These facilities are market driven and could include:

- Third party development of on-airport and off-airport freight forwarders;
- Federal Customs and/or Inspection facilities;
- Specialized facilities such as air express stations or hubs, perishable facilities, etc.;
- Commercial air carrier belly cargo; and
- International air cargo.

Table 8-29
SSA Air Cargo Operations – DBO+20

Long-Range Projections	Domestic	International	Total
Low Case	3,140	1,601	4,741
High Case	6,726	4,043	10,769

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

Table 8-30
SSA Air Cargo Short Tons – DBO+20

Long-Range Projections	Freight/Express	Belly Freight	Mail	Total
Low Case	118,800	64,300	18,300	201,400
High Case	276,000	231,200	50,700	557,900

Source: Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

8.6.1.1 Air Cargo Facilities Sizing Methods

The sizing of SSA air cargo facilities for DBO+20 has been calculated using the same four methods described for the IAP (see Section 5.1.1). For DBO+20, the airport should have a mixture of air cargo facilities that reflect the market area. This may include commercial belly cargo, some air express stations, all-cargo freight and international air cargo operations. By this time, a healthy community of freight forwarders with on-airport and off-airport facilities is assumed to exist at SSA. **Table 8-31** provides a summary of the four different air cargo sizing methodologies for DBO+20, based on the long-range projections contained in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*.

[18] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program,* prepared for the Illinois Department of Transportation, May 2004.

Table 8-31
Air Cargo Warehouse Sizing Summary – DBO+20

Sizing Method	SSA Long-Range Projections DBO+20	
	Low Case *201,400 Tons*	**High Case** *557,900 Tons*
Total Area Ratios *(sf)* IATA Ratios	214,500	594,000
Functional Capacity *(sf)* *Spoke Terminals (Tons per sf)* High Range 1.3943 Low Range 0.5577	 281,000 112,500	 778,000 311,000
Annual Demand Profile *(sf)* *Ashford & Wright*	215,000	595,600
Planning Factors *(sf)* *OMP - O'Hare applied to IAP*	298,700	827,300

Source: TAMS, an Earth Tech Company, 2004.

8.6.1.2 Air Cargo Apron

Based on the air cargo fleet identified in Section 8.1.4, the new airside apron depth should be planned for a range of 245 feet to 266 feet from the face of the air cargo building to the parking limit line at the taxi-lane, to allow for the parking of MD-11 and B-767-300ER aircraft. This depth provides 40 feet of space between the nose of the aircraft and the face of the building for cargo staging and a 25-foot road for circulation of ramp equipment. Aircraft taxi-lanes should be between 112.5 feet and 138 feet wide from taxi-lane centerline to fixed or movable object. This allows the corresponding ADG IV or V aircraft access to the apron. **Table 8-32** summarizes the air cargo apron position and sizing requirements.

Table 8-32
Air Cargo Apron Positions and Sizing – DBO+20

	Low Case *201,400 Tons*	**High Case** *557,900 Tons*
Design Cargo Aircraft	B767-300ER; A300-600	MD-11
Scheduled Lifts per Day	18	42
Position Turnover	3.0	3.0
Positions Required	6	14
Frontage Width per Aircraft *(Linear Feet or L.F.)*	206	220
Total Apron L.F. Required	1,236	3,080
Apron Depth *(feet)*	180+ 40 + 25 = 245	201 + 40 + 25 = 266
Total Apron Area *(sf)*	303,000	819,000

Source: TAMS, an Earth Tech Company, 2004.

8.6.1.3 Air Cargo Facility Requirements Summary

Table 8-33 summarizes the projected air cargo facility requirements for DBO+20. A range of facility recommendations (high and low) is provided. This corresponds with the DBO+20 long-range projections of air cargo aviation activity levels contained in the draft forecast report for the IAP.

Table 8-33
Air Cargo Facility Requirements Summary by Facility Component – DBO+20

Facility Component	Planning-Metric	Recom'd Planning Factor	Forecasted Demand DBO+20 Level (tons) /Facility Size (sf)		Facilities Requirements	
			Low Case	High Case	Low Case	High Case
Design Air Cargo Aircraft					B-767-300R A-300-600	MD-11
Warehouse	*sf per peak month on-Airport enplaned tons*	33:1	8,600 tons	23,900 tons	285,000 s.f.	789,000 s.f.
Aircraft Positions	*peak hour tons per average tons per movement*	1:52 (High)[1] 1:42.5 (Low)	251 tons	696 tons	6 positions	14 positions
Airside Apron	*sf per peak hour aircraft position*	58,400:1 50,600:1	6 positions	14 positions	303,000 s.f.	819,000 s.f.
Truck Dock Area	*Percent of warehouse area sf*	80%	285,000 s.f.	789,000 s.f.	228,000 s.f.	631,000 s.f.
Truck Staging	*Stalls per 7,000 sf of building area*	1:7,000	285,000 s.f.	789,000 s.f.	41 stalls	113 stalls
Employee Parking	*Stalls per 1,000 sf of building area*	1:1,000	285,000 s.f.	789,000 s.f.	285 stalls	789 stalls
Visitor Parking	*Stalls per 3,500 sf of building area*	1:3,500	285,000 s.f.	789,000 s.f.	81 stalls	225 stalls
Auto Parking /Access/Circulation	*Percent of warehouse area sf*	63%	285,000 s.f.	789,000 s.f.	180,000 s.f.	497,000 s.f.
Other	*Percent of overall facility area sf*	15%	1,168,000 s.f.	3,208,000 s.f.	170,000 s.f.	465,000 s.f.
Air Cargo Site	*Sum of the parts cargo facility area sf/acres*				1,168,000 s.f.	3,199,000 s.f.
		43,560:1			27 acres	74 acres

Source: TAMS, an Earth Tech Company, 2004.
[1]Tons per peak hour parking position.

8.6.2 General Aviation Facility Requirements

General aviation activity at SSA is expected to expand to approximately 62,700 operations per year (high case) by DBO+20. At that time it is expected that a fixed base operator will be operating at SSA. The future GA aircraft parking apron and hangar requirements were estimated based on GA activity and based aircraft forecasts and using the following assumptions[19]:

- Corporate Jets require on average 272 square yards per aircraft;
- Multi-engine aircraft require on average 172 square yards per aircraft;
- Single engine piston aircraft require about 108 square yards per aircraft;
- Apron requirements for itinerant demand is calculated based on a ratio of 300 yards per aircraft; and
- Between seventy-five to eighty percent of the based aircraft would use the apron at one time.

The future GA apron area requirements are shown in **Table 8-34**. A planning ratio of 2.2 parking stalls per peak hour operation was used for estimating the public parking requirements. These numbers are shown in **Table 8-35**.

Table 8-34
GA Apron Area Requirements – DBO+20

Aircraft Type	Apron Demand[1] (aircraft)	Average Parking Area per Aircraft (sq. yds)	Parking Area Requirements (sq. yds)	Apron Area Requirements[2] (sq. yds)	Hangared Aircraft[3] (aircraft)	Hangar Reqmnts[4] (sf)
Low Case Long-Range Projections						
Single-engine	39	108	4210	12,630	11	9,350
Multi-engine	3	172	520	1,560	3	4,650
Turbojets	3	272	820	2,460	3	7,650
Total	**44**	**NA**	**5,550**	**16,650**	14	**26,000**
High Case Long-Range Projections						
Single-engine	95	108	10,260	30,780	28	23,800
Multi-engine	12	172	2,060	6,180	6	9,300
Turbojets	10	272	2,720	8,160	8	22,000
Total	**117**	**NA**	**15,050**	**45,120**	**42**	**63,700**

Source: TAMS, an Earth Tech Company, 2004.

1. Assumes that 80% of Based Single-engine and Multi-engine aircraft and 100% of Turbojets will utilize apron area during PMAD.
2. Assumes an apron area three times larger than actual parking area for aircraft circulation and wingtip clearances
3. Assumes that 50% of Multi-Engine and 70% of Jets will require hangar space for high forecast case.
4. Total Building requirements adjusted by 20% to reflect space for office and maintenance areas.

Table 8-35
GA Public Parking Requirements – DBO+20

Long-Range Projections	Annual Operations	Peak Hour Operations	Required Parking (Spaces)	Required Parking Area (sf)
Low Case	18,900	8	18	7,200
High Case	62,700	26	58	23,200

Source: TAMS, an Earth Tech Company, 2004.

[19] Based on data from commercial airports with similar levels of GA activity (T.F. Green International, Syracuse International).

8.6.3 Aircraft Rescue and Fire Fighting Facilities

As described in Section 5.3, the guidelines and criteria regarding the facility requirements for Aircraft Rescue and Fire Fighting (ARFF) services at an airport are outlined in Federal Aviation Regulation (FAR) Part 139. Paragraph 139.315 sets forth the ARFF facility index determination based on the length of aircraft (as a group) operating at the airport and the number of daily departures.

Table 8-36 summarizes the minimum number of vehicles and extinguishing agents for airports Index B and greater. Based on the forecasted aircraft mix for DBO+20, SSA would have an ARFF Index E under the high long-range projections. Under the low long-range projections SSA would normally have an Index E, but the index rating is reduced to Index D since the aircraft that qualify for Index E have less than five average daily departures under this scenario (see **Table 8-37**). The estimated number of ARFF vehicles required for both the low and high cases are shown in **Table 8-38.** The IAP ARFF facility should be expanded to make room for an additional vehicle or replace a vehicle purchased during the IAP with one that has a larger water capacity to meet or exceed the Index requirements.

Table 8-36
Summary of ARFF Equipment Requirements (FAR Part 139)

Airport Index	Aircraft Length	Vehicles		Agents	
		Light Weight	Self-Propelled	Dry Chemicals	Water
B	90' to 126'	1	1	500	1,500
C	126' to 160'	1	2	500	3,000
D	160' to 200'	1	2	500	4,000
E	Over 200'	1	2	500	6,000

Source: Federal Aviation Regulation (FAR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D*.

Table 8-37
Summary of ARFF Index per Average Daily Departures – DBO+20

Forecast Level	Index A < 90'	Index B 90' < 126'	Index C 126' < 159'	Index D 159' < 200'	Index E >200'
Low Case	0	113	45	13	3
High Case	0	287	120	37	9

Source: TAMS, an Earth Tech Company, 2004.

Table 8-38
ARFF Summary Requirements – DBO+20

Long-Range Projections	Index per Length & Average Daily Departures Criteria	NFPA Airport Category	Minimum Number of ARFF Vehicles
Low Case	D	8	3
High Case	E	9	3

Source: Federal Aviation Regulation (FAR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers–Subpart D* and NFPA 403 *Standard for Aircraft Rescue and Fire-Fighting Services at Airports*.

Paragraph 139.319 of FAR Part 139, specifies the required airport rescue and fire fighting vehicles response time to every emergency; these requirements are summarized in Section 5.3. The ARFF station to be constructed as part of the IAP is recommended to be located at the mid-point of the primary runway 09L-27R, 1,500 feet from the centerline. **Table 8-39** shows estimates for response times from this location to the proposed second runway, 09R-27L, with different runway separations. Based on a large separation distance of 7,400 feet, the response time from the IAP ARFF Station to the mid-point of runway 09R-27L would be approximately 2.1 minutes. This response time is within the 3-minute time criterion. The following response time criteria were used in the analysis:

- A twenty-second time period from when alarm sounds to the starting of the ARFF vehicle;
- FAA requirement for a Class 2 ARFF vehicle to accelerate to 50 mph within 30 seconds (AC 150/5220-10C[20]);
- Straight road sections have an average running speed of 50 mph;
- Curved road sections have an average running speed of 30 mph; and
- FAA requirement for a Class 2 ARFF vehicle to decelerate from 50 mph to a complete stop within 15 seconds (AC 150/5220-10C).

Table 8-39
ARFF Response Times to Runway 09R-27L – DBO+20

Runway Separation	4,300 foot	5,000 foot	7,400 foot
Response Time to the second runway 09R-27L	1.7 Minutes	1.9 Minutes	2.1 Minutes

Source: TAMS, an Earth Tech Company, 2004, T.F. Green Airport, Draft Airport Master Plan Study, Landrum & Brown, April 2002.

8.6.4 Fuel Storage Facility

The airport fuel farm is expected to have aboveground tanks and should be readily accessible to the terminal area. Fuel storage requirements were calculated based on projected daily operations and the passenger and cargo aircraft fleet mix. Gross assumptions were used regarding future markets and flight ranges as shown in **Table 8-40**. An average fuel consumption of 10,000 gallons per operation has been assumed for the purpose of this analysis for cargo aircraft. The estimated fuel storage capacity requirements for DBO+20, based on the above criteria, are shown in **Table 8-40**. IDOT assumes that the fuel farm should hold the equivalent of seven days of demand.

[20] FAA Advisory Circular 150/5220-10C, *Guide Specification for Water/Foam Aircraft Rescue and Firefighting Vehicles*, February 2002.

Table 8-40
Estimated Fuel Consumption, Commercial Aircraft – DBO+20

Fuel Required (gallons)	Flight Range (NM)	Low Case		High Case	
		Daily Departures	Total Gallons	Daily Departures	Total Gallons
61-80 Seat Range Passenger Aircraft					
630	300	1	630	3	1,890
81-100 Seat Range Passenger Aircraft					
2,000	1,500	3	6,000	6	12,000
101-120 Seat Range Passenger Aircraft					
3,000	1,100	4	12,000	8	24,000
121-140 Seat Range Passenger Aircraft					
3,000	1,700	7	32,000	17	28,000
141-160 Seat Range Passenger Aircraft					
4,000	1,500	3	12,000	11	44,000
161-180 Seat Range Passenger Aircraft					
6,800	1,800	1	6,800	6	40,800
181-200 Seat Range Passenger Aircraft					
6,000	3,600	1	6,000	2	12,000
201-220 Seat Range Passenger Aircraft					
6,000	3,600	1	6,000	2	12,000
221-240 Seat Range Passenger Aircraft					
10,000	4,000	N/A	N/A	2	20,000
Cargo aircraft					
10,000	4,000	6	60,000,	14	140,000
Total Daily Demand		**27**	**135,430**	**69**	**335,000**
7-Day Demand		N/A	**948,000**	N/A	**2,350,000**

Source: TAMS, an Earth Tech Company, 2004. The amount of required fuel was estimated from the appropriate Airplane Characteristics for Airport Planning Manuals.
N/A = Not Applicable

For general aviation operations, an average of 10 gallons of 100LL aviation fuel was estimated per operation. **Table 8-41** shows the estimated amounts of 100LL aviation fuel required to be stored in the fuel farm.

Table 8-41
Estimated 100LL Fuel Storage Requirements – DBO+20

Long-Range Projections	PMAD Operations	Gallons/PMAD Operation	100LL[21] Fuel Demand (Gal)	7-day Supply (Gal)
Low	51	10	510	3,570
High	171	10	1,710	11,970

Source: TAMS, an Earth Tech Company, 2004.
PMAD = Peak Month Average Day

Design provisions for future underground fuel lines to the main passenger and cargo apron areas should be included. These fuel lines should have proper protection and monitoring devices to avoid any detrimental environmental impact

[21] 100LL Avgas, is a 100-octane fuel, rated by the severe Motor Octane Number method. ('LL' stands for 'low-lead').

due to leakage. A cost/benefit analysis will need to be performed to determine the type of fuel supply facilities.

8.6.5 Aircraft and Airfield Pavement Deicing Facilities

As mentioned in Section 5.5, it is anticipated that in the inaugural phase of SSA, aircraft deicing will occur at the gate. By DBO+20 remote deicing pads located near the runway(s) thresholds should be provided. These facilities will be laid out in accordance with taxiway/taxilane separation criteria for ADG IV and the ATCT line-of-site criteria and sized to meet the needs of the most demanding aircraft (Boeing 777-200, B767-300ER, MD-11) and mobile deicing vehicles.

8.6.6 Airfield Maintenance Center Facilities

The Airfield Maintenance Center (AMC) would include all equipment related to the upkeep of all airfield facilities in order to ensure the safe and efficient operation of the airport, such as: ground maintenance, snow removal, deicing trucks and mowing equipment. Parking provisions for deicing trucks should be included in the conceptual planning and design of these facilities. A snow-dump site will be designated on the Airport Layout Plan. These facilities will be planned and designed in accordance with FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials.*

8.6.6.1 Airfield Maintenance Operation

Table 8-42 summarizes the airport operation areas that need to be cleared and maintained for efficiency and safety purposes.

Table 8-42
Primary Surface Areas to be Cleared of Snow – DBO+20

Surface Area	Low Case	High Case	
	R/W 09L-27R	R/W 09L-27R	R/W 09R-27L
	CAT I	CAT I	CAT II
Assumed Runway Length (feet)	9,800	10,800	10,800
Runway (sf)	1,960,000	2,160,000	2,160,000
Taxiways – Including fillets, crossover (sf)	3,000,000	2,477,000	2,477,000
Connecting/Dual Taxiways - Including fillets (sf)	0	2,113,000	1,123,000
ARFF Pavement (sf)	24,000	24,000	24,000
Aprons (Pax, Cargo, GA) (sf)	986,000		2,804,000
Blast Pads (sf)	176,000	176,000	176,000
Firefighter's Emergency Service Roads (sf)	417,000	417,000	417,000
Deicing Pad (sf)	332,200	332,200	332,200
Priority 1 Area for Snow Control	7,872,000	N/A	9,514,000
Priority 2 Area for Snow Control	N/A	7,282,000	N/A
Total Clearance Area S.F.	**7,872,000**	**16,796,000**	

Source: TAMS, an Earth Tech Company, 2004.
N/A = Not Applicable

Table 8-43 summarizes the requirements for snow clearance and **Table 8-44** identifies the recommended snow removal equipment.

Table 8-43
Rate of Snow to be Cleared – DBO+20

	Low Case	**High Case**
Runway Length (feet)	9,800	10,800
Primary Surface Area to be Cleared (sf)	7,872,000	9,514,000
1" snow depth = Area SF x 0.083" = sf[1]	653,400	789,600
Cubic ft of snow x 25.0 lb/ft[1] = lbs	16,334,500	19,740,600
Pounds of Snow / 0.7 plow efficiency = lbs	23,335,000	28,201,000
DBO+20 clearance / .5 hour = lbs/hr	46,670,000	56,402,000
DBO+20 Rate of Snow to be Cleared		
Pounds per hour/2,000 lbs per ton = tons/hr	**23,350**	**28,200**

Source: TAMS, an Earth Tech Company, 2004.
[1]FAA Advisory Circular 150/5220-18, *Buildings for the Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*.

Table 8-44
Snow Removal Equipment List – DBO+20

Vehicle	**Planning Ratios**	**Storage Unit Area (sf)**	**Unit Requirement**		**Total Required Equipment Storage (sf)**	
			Low Case	**High Case**	**Low Case**	**High Case**
Hi-Speed Rotary Snow Plow Class V – 4,000 tons/hr Class VI – 5,000 tons/hr	*21,400 tons/hr Low Case* *28,000 tons/hr High Case*	1,000 1,000	1 4	2 4	1,000 4,000	2,000 4,000
Displacement Plow	*2 per Rotary Plow*	1,000	10	12	10,000	12,000
Air Blast Power Sweeper	*1 / 750,000 sf*	800	10	13	8,000	10,400
Hopper Spreader 5 – 17 cu yd	*1 / 750,000 sf*	600	10	13	6,000	7,800
Liquid Spreader 500 – 4000 gal	*4,200 gal/Tank*	1,000	2	3	2,000	3,000
Front End Loader		750	2	4	1,500	3,000
Snow Removal Equipment Bays & Storage Area			**39**	**51**	**19,150**	**42,200**

Source: TAMS, an Earth Tech Company, 2004.

8.6.6.2 Airfield Maintenance Center - Building and Site Requirements

The Airfield Maintenance Center (AMC) building requirements for DBO+20 are listed in **Table 8-45**; the AMC area requirements are summarized in **Table 8-46**. The Airfield Maintenance Center building will range from approximately 51,750 square feet to 75,600 square feet. The AMC will require about 7 to 10 acres of site development. This includes 52 to 76 parking spaces for employees. A secondary equipment storage building (open or side enclosed) may be required to store other vehicles as required for protection from the elements.

Table 8-45
Airfield Maintenance Center Building Size Summary – DBO+20

AMC Area	Low Case	High Case
Equipment Parking Area	32,500 sf	42,200 sf
Ancillary Support Area	7,300 sf	14,300 sf
Aisle/Circulation Area	12,000 sf	19,100 sf
Total DBO+20	**51,750 sf**	**75,600 sf**

Source: TAMS, an Earth Tech Company, 2004.

Table 8-46
Airfield Maintenance Center Summary Requirements – DBO+20

Area	Planning Factor	Low Case	High Case
Maintenance Site Area	*1:5.9 (Building/Site Area Ratio)*	7.0 acres	10.2 acres
Employee Parking Spaces	*1,000 sf/space*	52	76
Employee Parking Area	*400 sf/space*	20,700	30,200
Building Area		51,750 sf	75,600 sf
Snow Removal Plow Equipment	*(Rotary Plows plus Displacement Plows)*	15	18
Other Vehicles (Utility, Pick-ups, Mowing, Deicing)	*2.4 Other Vehicles to 1 Snow Removal Vehicle Ratio*	36	43

Source: TAMS, an Earth Tech Company, 2004.

8.6.7 Airport Utilities

<u>Power Supply</u>

Table 8-47 provides the preliminary electrical loads required under the low and high long-range projections. It is anticipated that Commonwealth Edison will provide a 34.5kV electrical substation (ESS) on the airport. The airport substation will be fed from two independent power distribution substations. The distribution system for electric power on the site will be provided via an underground duct bank, which will feed three or four utility network distribution centers located throughout the airport site. Power will be transformed from 34.5kV to 480V at each network center.

Table 8-47 Preliminary Electrical Loads Summary – DBO+20		
Demand Load Areas	Long-Range Projections	
	Low Case	High Case
Building Loads (KVA)	3,000	8,100
Landside Loads (KVA)	3,000	8,100
Airside Loads (KVA)	2,400	6,600
Equipment Loads (KVA)	8,600	25,900
Total Electrical Loads (KVA)	17,000	48,700

Source: TAMS, an Earth Tech Company, 2004.

Water Supply

The water supply requirements were estimated using the assumptions described in Section 5.7.2. A planning ratio of 20-gallons per PMAD enplaned passenger was used to derive the DBO+20 daily water consumption demand for both the low and high long-range projections. These estimates are shown in **Table 8-48**.

Table 8-48 Water Supply Requirements – DBO+20		
	Low Case	High Case
Annual Enplanements	2,226,000	6,679,000
Peak Month Average Day Enplaned Passengers	7,620	20,720
Daily Water Requirements (gallons)	152,000	414,000

Source: TAMS, an Earth Tech Company, 2004.

Sanitary Wastewater Treatment Requirements

Airport sewage treatment requirements were estimated based on the projected water supply requirements. It was assumed that sewage treatment demand would be 100 percent of the water supply demand, based on planning estimates used at other U.S. airports. **Table 8-49** presents the sanitary wastewater treatment requirements for the low and high long-range projections.

Table 8-49 Sanitary Wastewater Treatment Requirements – DBO+20		
	Low Case	High Case
Daily Water Requirements (gallons)	152,000	414,000
Daily Sanitary Wastewater Treatment (gallons)	152,000	414,000

Source: TAMS, an Earth Tech Company, 2004.

Storm Sewer System

It is anticipated that the inaugural airport drainage and stormwater system will be extended and augmented to satisfy the requirements of the DBO+20 airport. Planning and design recommendations will be made after an engineering assessment and a cost/benefit analysis are completed to determine the best alternative for SSA.

Communications

The DBO+20 telephone service will be designed in accordance with the latest changes in communication technology, including wide-band data service, wide area WATS lines and medium and high transmission capabilities.

8.6.8 Service Roads and Security Access

A secure airside service roadway system, linking all Air Operations Areas (AOA), will be provided. The proposed alignment will strive to minimize the crossing of active airside facilities. The inclusion of a 25-foot wide apron service road to facilitate the access to parked aircraft is recommended. Access to the AOA will be restricted, and entrance will only be allowed at certain locked or continuously manned gates. State-of-the-art technologies could be implemented to regulate the access to AOA and secure areas of the airport. The access will follow the guidelines defined in the Code of Federal Regulations – U.S. Transportation Security Administration (TSA) Regulation Part 1542, *Airport Security*, which has replaced Federal Aviation Regulation Part 107, *Airport Security*.

8.7 Intermediate Ground Transportation Facilities

8.7.1 Projected Traffic Volumes

As discussed in the IAP section, the I-57 interchange and the airport entrance road will be designed to handle year 2030 design hour traffic volumes at a minimum acceptable Level of Service of "C", in accordance with FHWA and IDOT policy. Since the intermediate period horizon for SSA is DBO+20, which roughly corresponds to the year 2030, the projected roadway traffic volumes that were used for planning the Inaugural Airport entrance road are also valid estimates for DBO+20. Projected traffic and roadway improvements for the year 2030 based on the CATS Recommended Year 2030 Plan are discussed in Section 6.4.

8.7.2 Public Parking

The demand for public parking at SSA is estimated to increase by up to approximately 1,500 to 5,500 spaces in DBO+20. These projections were derived based on peak month average day enplanements and utilizing an average planning number of 900 spaces per million enplaned passengers.[22]

It is anticipated that a multi-level garage structure located near the terminal building would primarily accommodate short-term parking demand. In addition to the short-term parking spaces, long-term and economy parking would be accommodated in surface parking lots. A summary of parking requirements for DBO+20 for both the low and high long-range projections are shown in **Table 8-50**.

[22] *Intermodal Ground Access – A Planning Guide*, FAA/FHWA, 1996.

Table 8-50
Summary of Parking Requirements – DBO+20

Parking Facility	Low Case	High Case
Public Parking[1]	2,500	7,400
Employee Parking[2]	900	1,670
Total	3,400	9,100

Source: TAMS, an Earth Tech Company, 2004.
[1] Calculated at 1 space per 900 annual enplaned passengers.
[2] Calculated at 250 parking spaces per 1 million annual enplaned passengers.

8.7.3 Employee Parking

A ratio of 250-400 employee parking spaces per million annual enplaned passengers (MAP)[23] is recommended to estimate employee-parking requirements. The DBO+20 employee-parking requirements were modeled based on a ratio of 250 parking spaces per MAP. These projections are shown in **Table 8-50**.

8.7.4 Rental Car Facility

As discussed in Section 6.7, the ratio of ready return spaces ranges from 40 to 100 ready return spaces per MAP at existing airports. The size of rental car facilities at several surveyed airports ranged between 2.1-3.9 acres per MAP. These planning ratios were used to estimate the DBO+20 rental car requirements at SSA, as shown in **Table 8-51**.

Table 8-51
Summary of Rental Car Facility Requirements – DBO+20

Rental Car Facility	Low Case	High Case
Ready Return Spaces	90-220	275-670
Total Rental Car Area (acres)	4.7-8.8	14-26

Source: TAMS, an Earth Tech Company, 2004.

8.8 Summary of Intermediate Facility Requirements

The facility requirements for the DBO+20 planning horizon at SSA were derived from the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*. **Table 8-52** presents a summary of the facility requirements by facility component for the DBO+20 planning horizon.

[23] *Intermodal Ground Access – A Planning Guide*, FAA/FHWA, 1996.

Table 8-52
Summary of Facility Requirements – DBO+20

Facility	Low Case	High Case
Existing Primary Runway[1] (09L-27R) (ft)	9,800 (300-foot extension)	10,800 (1,300-foot extension)
Existing Primary Runway Width (ft) (no change)	150	150
Existing Taxiway Width (ft) (no change)	75	75
Existing Parallel Runway to Taxiway Centerline Separation (ft) (no change)	400	500
Second Runway[1] Length (09R-27L) (ft)	N/A	10,800
Second Runway Width (ft)	N/A	150
Runway/Runway Centerline Separation (ft)	N/A	4,300
Second Runway-Parallel Taxiway Centerline Separation (ft)	N/A	500
Existing Crosswind Runway (05-23) (ft)	4,000	4,000
Existing Crosswind Runway Width (ft)	75	75
Existing Crosswind Taxiway Width (ft)	35	35
Airport Traffic Control Tower (ATCT)	Level II	Level III
Instrument Landing System (ILS) – Existing Primary Runway (09L-27R)	CAT I	CAT I
Instrument Landing System (ILS) – Second Runway (09R-27L)	N/A	CAT II (or CAT III)
Passenger Aircraft Gates: *Regional Jet Gates* *Narrow Body Gates*	 3-4 9-11	 8-10 22-27
Passenger Terminal (sf)	256,300	636,200
Passenger Terminal Curb Front (feet)	670	1,400
Passenger Terminal Aircraft Apron (sf)	522,000	1,700,000
Cargo Aircraft Positions	6	14
Air Cargo Area[2] (acres)	27	74
General Aviation/Corporate Aviation Aircraft Positions	44	117
General Aviation/Corporate Aviation Area[3] (sf)	92,600	244,000
ARFF Index	D	E
Jet Fuel Storage (gallons)	948,000	2,350,000
100LL[4] Fuel Storage (gallons)	3,600	12,000
Airfield Maintenance Center Area[5] (acres)	7	10
Water Supply (gallons)	152,000	414,000
Sanitary Wastewater Treatment (gallons)	152,000	414,000
Public Parking Spaces	2,500	7,400
Employee Parking Spaces	900	1,670
Rental Car Area (acres)	4.7-8.8	14-26

Source: TAMS, an Earth Tech Company, 2004. N/A = Not Applicable
[1]Includes full parallel taxiway.
[2]Includes warehouse, airside apron, truck docks, and parking.
[3]Includes aircraft parking areas, apron area, hangars, tie down areas and public parking.
[4]100LL Avgas is a 100-octane fuel for GA aircraft.
[5]Includes parking, building and storage areas.

Section 9 – Ultimate Airport Facility Requirements (Beyond DBO+20)

9.1 Introduction

The following section develops the facility requirements for the period beyond DBO+20. To a large degree the planning requirements are dependent on the future vision of IDOT in preserving options for development of an additional high capacity airport to serve the Chicago region. Starting with the *Chicago Airport Capacity Study* in 1988, it has always been recognized that a new supplemental airport should have the potential to become a major airport.[24] The following documents the events leading to the current position of IDOT regarding the long-range future of SSA.

In 2002, the FAA issued a Record of Decision (ROD) for the Tier 1 Environmental Impact Statement (EIS) on site approval and land acquisition by the State of Illinois for the proposed South Suburban Airport in eastern Will County. The ROD stated, "These actions are necessary to preserve the option of developing a potential, future air carrier airport to serve the greater Chicago region as determined necessary and appropriate to meet future aviation capacity needs in the region."[25] IDOT, whose responsibilities include planning for the future transportation needs of the citizens of Illinois, is preserving the option of constructing an airport capable of handling up to four simultaneous precision instrument approaches under All-Weather conditions, as originally described and evaluated in the Tier 1 EIS. The need for an airport capable of handling four simultaneous precision instrument approaches in All-Weather conditions may or may not materialize at SSA in the future. However, considering the expense and time it takes to expand existing airports that are surrounded by urban and suburban development, (i.e., Hartsfield-Jackson Atlanta International Airport, Minneapolis-St. Paul International Airport, Boston Logan International Airport), IDOT considers it prudent to preserve the option of expanding SSA to an ultimate airport configuration, if demand and market conditions in the future warrant expansion.

This policy follows the recommendations of an FAA sponsored study on planning multi-airport systems.[26] The study focused on when and under what circumstances it is desirable to invest in an additional airport in a metropolitan area. It examined multi-airport systems worldwide, the state of the airline industry in 2000, the viability of new airports in a multi-airport system, the distribution of traffic between airports in a multi-airport system, and the effects of hubbing. The report states that aviation traffic is highly variable due to its sensitivity to a broad range of unpredictable innovations that alter the cost, and thus the attractiveness, of aviation traffic, and defines aviation traffic as a commodity whose demand is derived from, and thus especially sensitive to, changing economic conditions.[27] The FAA sponsored study concluded that:

> "The development of second airports to serve a metropolitan region must, to be effective, *be part of a long-term strategy of dealing with the uncertainties of future aviation traffic*, especially as regards hubbing operations. Because of these risks, the most reasonable strategy may be

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[24] *Chicago Airport Capacity Study*, prepared for the Illinois Department of Transportation, Indiana Department of Transportation and Wisconsin Department of Transportation, Peat Marwick Main & Co., 1988.
[25] *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, Great Lakes Region, July 2002.
[26] *Planning Multi-Airport Systems in Metropolitan Regions in the 1990s*, prepared for the FAA by Dr. Richard de Neufville, Massachusetts Institute of Technology, April 12, 2000.
[27] Ibid.

to expand at primary hub airports while simultaneously establishing the option of developing secondary airports to serve some of the traffic origination from the region."[28]

In June 2004, the FAA released a report entitled *Capacity Needs in the National Airspace System, An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*. This study examined 291 commercial service airports in 223 metropolitan areas across the U.S., to determine if the long-term capacity of the aviation system matched forecasts of demand. The methodology employed in the study included modeling current and future capacity, modeling future airport demand, and estimating future performance in terms of Annual Service Volume (ASV) and delay.[29] Each airport and metropolitan area was evaluated for capacity needs in 2003 (baseline), 2013 and 2020. The study identified five airports, including O'Hare International Airport (ORD), where additional capacity was already needed in 2003. Furthermore, the FAA anticipates that ORD and the Chicago region will need additional capacity in 2013, although the analysis for 2013 did not include the proposed improvements contained in the O'Hare Modernization Program (OMP). If OMP is implemented as envisioned in the ORD Master Plan[30], the FAA projects that no additional capacity will be required at ORD in 2020.[31] However, if planned improvements do not occur, the FAA predicts that ORD, Midway International Airport (MDW) and the Chicago region will need additional capacity both in 2013 and 2020.[32]

As noted in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*, forecasts of aviation activity include a level of uncertainty. Forecasts for SSA developed in the mid-1990s indicated that future demand for air travel in the Chicago region would require substantial additional airfield infrastructure, anywhere from four to six runways within the next 30 years. While these forecasts originally assumed that ORD would not be expanded, with the creation of OMP in 2001, a substantial portion of this additional projected demand could be accommodated at ORD. While IDOT supports the planned improvements at ORD, there is still uncertainty about the timing and extent of improvements that will be made at ORD and the other existing Chicago area airports. Because of this uncertainty, IDOT believes it is prudent to continue to preserve the option of developing additional airfield capacity at SSA.

The ultimate airport footprint, delineated by IDOT in the Phase 1 Engineering Study[33] and in the FAA's Tier 1 EIS, identified an airport boundary encompassing approximately 24,000 acres for a potential new air carrier airport in eastern Will County, Illinois. The land requirements for the site were based on the area required for proposed airport facilities, support/ancillary facilities, surface transportation facilities and environmental mitigation, but were primarily determined by the proposed ultimate runway configuration for the airport.

[28] *Planning Multi-Airport Systems in Metropolitan Regions in the 1990s*, prepared for the FAA by Dr. Richard de Neufville, Massachusetts Institute of Technology, April 12, 2000.
[29] *Capacity Needs in the National Airspace System: An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*, Federal Aviation Administration and the MITRE Corporation's Center for Advanced Aviation System Development, June 2004.
[30] *O'Hare International Airport Master Plan*, City of Chicago, 2004.
[31] *Capacity Needs in the National Airspace System: An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*, Federal Aviation Administration and the MITRE Corporation's Center for Advanced Aviation System Development, June 2004.
[32] Ibid.
[33] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

The previous sections of the Facility Requirements report have identified facilities required at SSA to meet the aeronautical forecasts detailed in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*.[34] Because no forecasts beyond DBO+20 can currently be developed with any level of confidence, estimates of the potential level of activity and associated facility requirements for the ultimate development of SSA in this document are entirely based on the assumptions used in the Phase 1 Engineering Study[35] and FAA's Tier 1 EIS[36].

9.2 Ultimate Airport Classification

The Airport Reference Code (ARC) for the ultimate airport will depend on the actual fleet mix utilizing SSA in the future. As stated in Section 2.1, the largest passenger aircraft in operation in 2004 is the Boeing 747-400, classified as an ADG V. Airbus is in the final design/production stages of it's A-380, which will be classified as an ADG VI aircraft.

The current commercial aircraft with the fastest approach speeds are included in Category D, which includes approach speeds from 141 knots to just less than 166 knots. The maximum approach speed of the A-380 is approximately 152 knots[37], which will also put it into Category D. IDOT is not aware of any future commercial aircraft that anticipates having approach speeds greater than 166 knots. Thus, in order to accommodate the most demanding aircraft anticipated to be in the fleet beyond DBO+20, the ultimate plan for SSA should allow for an ARC of D-VI.

9.3 Ultimate Airfield Demand/Capacity Analysis

As stated in Section 9.1, the ultimate airfield is being planned to accommodate up to four simultaneous precision instrument approaches under All-Weather conditions. This section discusses the aircraft operation activity levels required to occur at SSA before additional runways beyond the Intermediate phase (DBO+20) are planned, designed and constructed.

The FAA capacity calculations contained in AC 150/5060-5, Change 2[38] established 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[39]. To estimate the hourly capacity of various runway configurations and the annual service volume (ASV) for long-range planning at SSA, the typical diagrams presented in the FAA AC 150/5060-5, Change 2 were used. This advisory circular does not discuss the capacity of three or four independent parallel runways; thus, the hourly capacity of runway systems with more than two independent parallel runways is an extrapolation by IDOT of the data contained in the AC.

[34] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.
[35] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.
[36] *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, Great Lakes Region, July 2002.
[37] *A380 Airplane Characteristics for Airport Planning AC, Preliminary Issue*, Airbus S.A.S., January 2004.
[38] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[39] ILS CAT III provide for IFR approaches when ceiling is less than 100 feet and visibility less than ¼-mile.

As discussed in Section 8.3, the ratio of annual demand to ASV is considered a capacity planning guideline to be utilized in estimating the need for additional runway capacity. When the ratio of annual demand to ASV is greater than or equal to 0.8, it is an indication that an airport may need additional capacity.[40] In addition, FAA Order 5090.3C[41] states that capacity development should be recommended when activity levels approach 60 to 75 percent of annual capacity. This ratio has been applied to the theoretical capacity of the various airfield configurations discussed below, in order to identify approximate operational levels when planning for additional runways should occur.

9.3.1 Two Parallel Runway Airfield Capacity Analysis

As discussed in Section 8.3, a second runway should be planned when operations reach an annual level of 126,000 and constructed by the time SSA reaches 80 percent of the ASV capacity (i.e., 168,000 annual operations). FAA Advisory Circular 150/5060-5, Change 2, indicates that two independent parallel runways can accommodate between 315,000 to 370,000 annual operations, depending on the mix of aircraft present at an airport. **Table 9-1** summarizes the capacity of different configurations of a two parallel runway airfield. The mix index, VFR and IFR conditions and the calculation of ASV are explained in Section 3.2.

Table 9-1
Capacity of Two Parallel Runway Airfield

Runway Configuration	Mix Index (percent)	VFR (ops/hr)	IFR (ops/hr)	ASV (ops/year)
Independent (4,300' or greater separation)	81-120	111	105	315,000
	121-180	103	99	370,000
Dependent (700' to 2,499' separation)	81-120	105	59	285,000
	121-180	94	60	340,000
Dependent (2,499' to 4,299' separation)	81-120	111	70	300,000
	121-180	103	75	365,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.

9.3.2 Three Parallel Runway Airfield Capacity Analysis

As stated in Section 8.3, a ratio of annual demand to ASV of 0.8 or higher is an indication that an airport may need additional capacity and planning for additional capacity should begin when activity reaches 60 to 75 percent of annual capacity. Thus, planning for a third runway at SSA should start when operational levels reach a level of 189,000 to 222,000 annual operations. A third parallel independent runway would increase the SSA airfield capacity to approximately 740,000 annual operations per IDOT's estimate. The capacity range of different three parallel runway airfield configurations is presented in **Table 9-2**.

[40] FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995.
[41] FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 2000.

Table 9-2
Capacity of Three Parallel Runway Airfield

Runway Configuration	Mix Index (percent)	VFR (ops/hr)	IFR (ops/hr)	ASV (ops/year)
Three Independent[1] (5,000' or greater separation)	121-180	206	198	740,000
Two Independent (4,300' or greater separation) ***One Dependent*** (700' to 2,499' separation)	121-180	146	120	645,000
Three Dependent (700' to 2,499' or 2,500' to 4,299' separation)	121-180	146	75	385,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995; TAMS, an Earth Tech Company, 2004.
[1] Estimated.

9.3.3 Four Parallel Runway Airfield Capacity Analysis

Planning for a fourth runway at SSA should start when operational levels reach a level of 444,000 annual operations, or 60 percent of the annual capacity. IDOT estimates that a fourth independent parallel runway would increase the SSA airfield capacity to approximately 1.1 to 1.3 million annual operations. The range of capacity for different four parallel runway airfield configurations is presented in **Table 9-3**.

Table 9-3
Capacity of Four Parallel Runway Airfield

Runway Configuration	Mix Index (percent)	VFR (ops/hr)	IFR (ops/hr)	ASV (ops/year)
Four Independent (5,000' or greater separation)	121-180	222-270	210-225	1,100,000-1,300,000
Two Independent (4,300' or greater separation) ***Two Dependent*** (700' to 2,499' separation)	121-180	243-258	212-219	1,050,000 – 1,200,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995; TAMS, an Earth Tech Company, 2004.

9.3.4 Six Parallel Runway Airfield Capacity Analysis

The ultimate airfield development phase anticipates that South Suburban Airport could expand to a six-runway airfield consisting of four independent and two dependent parallel runways. The projected runway capacity of the ultimate airfield is shown in **Table 9-4**.

Table 9-4 Capacity of Six Parallel Runway Airfield				
Runway Configuration	Mix Index (percent)	VFR (ops/hr)	IFR (ops/hr)	ASV (ops/year)
Four Independent (5,000' or greater separation) ***Two Dependent*** (700' to 2,499' separation)	121-180	292	240	1,460,000

Source: FAA Advisory Circular 150/5060-5, Change 2, *Airport Capacity and Delay,* December 1995; TAMS, an Earth Tech Company, 2004.

9.4 Ultimate Airfield Facility Requirements

9.4.1 Runway Orientation and Configuration

To obtain quadruple simultaneous precision instrument approaches, the runway system needs to consist of parallel runways with a minimum separation of 5,000 feet between runways. FAA AC 150/5300-13, *Airport Design*, states that multiple parallel runways need at least 5,000 feet separation to operate independently in Category III visibility conditions. In addition to these four parallel runways, two dependent runways for departures during VFR conditions could be added between the northern and southern pair of independent runways. Any additional runways would parallel the primary runways described in Sections 3.1.6 and 8.4.1, maintaining the runway system in an east-west orientation (09-27).

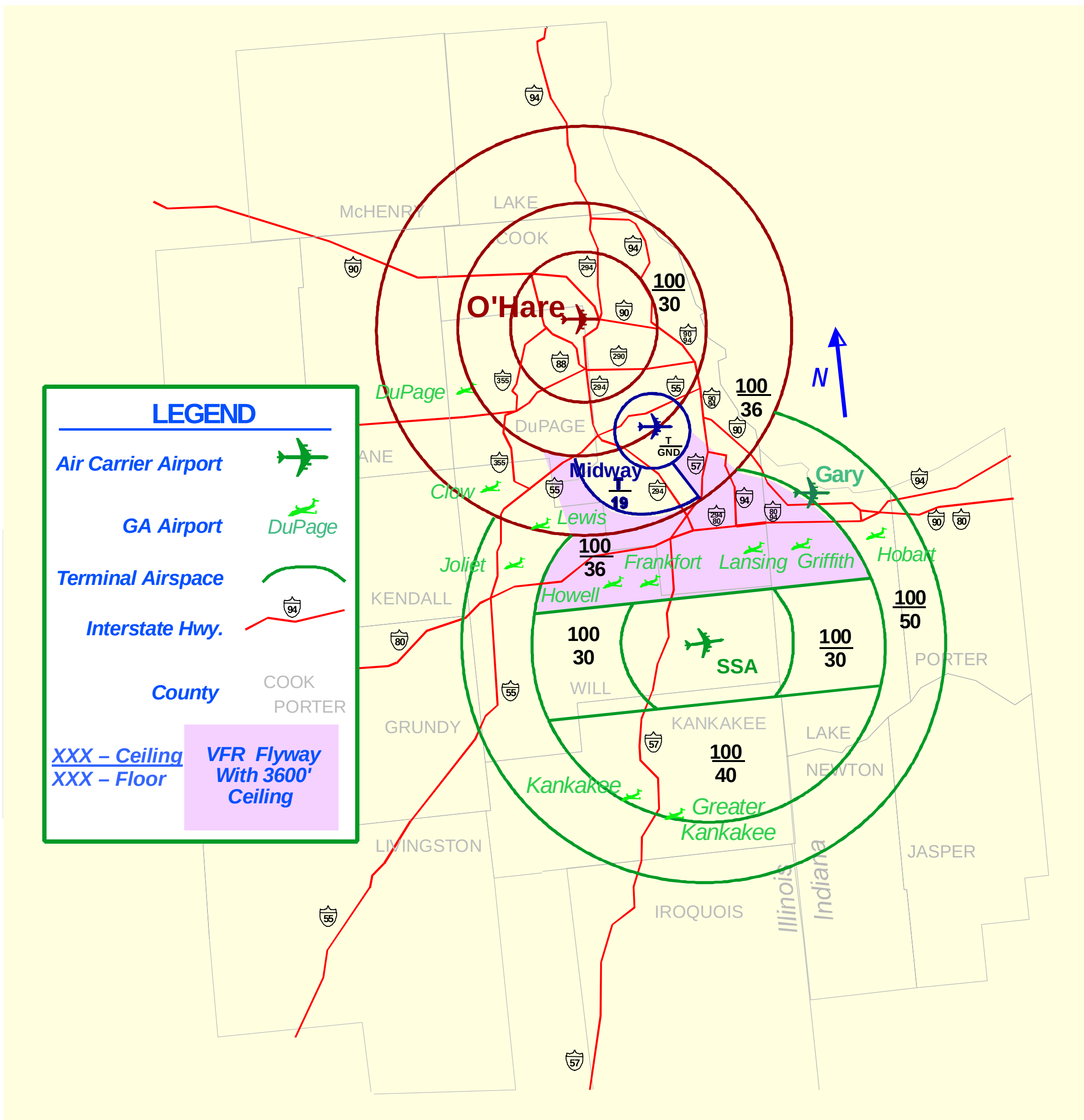
9.4.2 Proposed Ultimate Airspace Classification

Any additional runways and operations will need to undergo airspace analysis at the appropriate time, to ensure that they do not adversely impact other airport operations in the area. In addition, if the level of operations reaches 300,000, of which at least 50 percent are air carrier operations, the Airspace Classification for SSA would need to be evaluated to determine if it should be upgraded from Class C to Class B. FAA Order 7400.2E, *Procedures for Handling Airspace Matters,* Part 4, Chapter 15, establishes the following criteria for considering an airport as a candidate for a Class B airspace designation:

- The primary airport serves at least 3.5 million passengers enplaned annually; or
- The primary airport has a total airport operations count of 300,000 (of which 50 percent are air carriers).

Exhibit 9-1 illustrates one way a Class B Airspace structure could be imposed for SSA, in conjunction with the existing ORD and MDW airspace. In addition, an east-west VFR flyway could remain between MDW and SSA airspace for GA operations below 3,600 feet. However, the feasibility of any ultimate airspace structure for SSA would depend on air traffic control (ATC) procedures and operations within the Chicago airspace and would need to be determined by FAA at the appropriate time.

Exhibit 9-1
Potential Class B Airspace Structure at SSA



Source: *Summary Draft, Phase I Engineering Report,* Illinois Department of Transportation, September 1997.

9.4.3 *Airfield Requirements*

The airfield requirements for the ultimate airport will be based on design criteria for ARC D-VI, as stated in Section 9.2. The two most demanding aircraft expected to be operating beyond DBO+20 are the Boeing 747-400 and the Airbus 380. Under maximum takeoff weight, with a stage length of 6,500 nautical miles, ambient temperature of 90ºF, and an airport elevation of 780 feet, the Boeing 747-400 requires a runway length of 12,000 feet.[42] Under standard conditions, the Airbus 380 requires a runway length of approximately 10,000 feet.[43] Thus, the ultimate airport runway configuration should provide for the possibility of two 12,000-foot runways, one on either side of the terminal area, while the other runways would be a maximum of 10,000 feet in length.

The airfield should be designed to accommodate full dual parallel taxiway systems on the two runways adjacent to the terminal complex. A dual taxiway system provides complete flow separation between arriving and departing aircraft adjacent to the terminal complex, enhancing airfield capacity. The other parallel runways should have full single parallel taxiways. **Table 9-5** lists runway and taxiway facility dimensions that comply with ARC D-VI design criteria.

Table 9-5
Summary of Runway Planning Requirements – Ultimate Airport

Facility	Dimensions (feet)
	Airplane Design Group VI
Runway Width	200
Runway Length	10,000-12,000
Runway Protection Zone Length (CAT III)	2,500
Runway Protection Zone Inner Width (CAT III)	1,000
Runway Protection Zone Outer Width (CAT III)	1,750
Runway Safety Area Width	500
Runway Safety Area (RSA) Length beyond Runway End	1,000
Runway Object Free Area (OFA) Width	800
Runway Object Free Area Length beyond Runway End	1,000
Runway Precision Object Free Zone (POFZ) Width	800
Runway Precision Object Free Zone (POFZ) Length	200
Runway Shoulder Width	40
Parallel Runway to Taxiway Centerline Separation	600
Taxiway Width	100
Taxiway Shoulder Width	40
Taxiway Object Free Area Width	386
Taxiway Safety Area	262
Taxiway Centerline to Parallel Taxiway Centerline	324

Source: FAA Advisory Circular 150/5300-13, *Airport Design* up to Change 8, September 2004.

[42] *747-400, Airplane Characteristics for Airport Planning,* Boeing Commercial Airplanes, December 2002.
[43] *A380, Airplane Characteristics for Airport Planning AC, Preliminary Issue,* Airbus S.A.S., January 2004.

To enhance runway capacity, all air carrier runways could also have perimeter taxiways. Requiring aircraft to stop before taxiing across active runways results in major delays at high activity airports and also increases the chances for runway incursions. Routing and directing aircraft along taxiway routes that cross active runways is a major contributor to ground traffic controller workload. For these reasons, it is recommended that space be preserved for the potential long-term development of perimeter taxiways that would allow aircraft to taxi around active runways.

Perimeter taxiways would need to be designed and located so that all aircraft using them would remain outside of all runway safety areas, object free areas and TERPS surfaces. When perimeter taxiways cross the extended centerlines of runways, aircraft approaching or departing those runways must be able to clear other aircraft taxiing on the perimeter taxiways. The standard precision instrument approach slope is 50:1 for 50,000 feet from the runway end. The standard departure slope is 34:1. The maximum anticipated tail height of the A-380 is 80 feet.[44] To provide clearance for approaches over aircraft with this tail height, the perimeter taxiway centerline must be at least 4,200 feet from the end of the runway. If a runway is used solely for departures, this distance may be reduced to 2,920 feet.

9.4.4 Airport NAVAIDS and Visual Aids

To minimize flight delays and cancellations, larger commercial service airports use Category III (CAT III) precision instrument approach systems. The ultimate airfield should be designed so that all parallel air carrier runways used for landings could have CAT III precision instrument approach systems, or their equivalent. All CAT III runway approaches would include the navigation aids and lighting equipment identified in **Table 9-6**. Anticipated terminal navigational aids are listed in **Table 9-7**.

[44] *A380, Airplane Characteristics for Airport Planning AC, Preliminary Issue,* Airbus S.A.S., January 2004.

Table 9-6
Summary of Runway Navigational, Visual Aids and Other Facilities – Ultimate Airport

NAVAIDS	Equipment Function Description
Instrument Landing System CAT III	Provides instrument guidance during weather conditions when visibility is less than ¼-miles or ceiling is less than 100 feet
Glide Slope	Provides vertical guidance
Localizer	Provides horizontal guidance
Inner, Middle and Outer Marker Required for CAT III	Marks specific points along the approach path
Runway Visual Range (RVR) Instrumentation (Touchdown, Midpoint and Rollout Required for CAT III)	Measures visibility along specific stretches of the runway
Precision Runway Monitors (PRM)	Enhances precision of horizontal guidance, may eventually support straight-out departures
Precision Approach Indicator Path (PAPI)	Provides visual approach slope guidance
Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MASLR)	Provides visual guidance on final approach during night and low visibility conditions
High Intensity Runway Edge Lights (HIRL)	Defines runway edges and length necessary for precision instrument approaches
Runway Centerline Lights	Defines runway centerline; required for CAT III approaches
Touchdown Zone Lights	Defines aircraft touchdown zone, required for CAT III approaches
Wind Cones	Provides visual wind direction and velocity
High Intensity Approach Lights with Sequenced Flashers (ALSF-2)	Provide additional visual guidance on final approach in low visibility conditions and at night
Medium Intensity Taxiway Edge Lights (MITL)	Defines taxiway edges and length
Taxiway Centerline Lights	Defines taxiway alignment; they provide better guidance to pilots than edge lights

Source: TAMS, an Earth Tech Company, 2004.

Table 9-7
Summary of Airport Navigational, Visual Aids and Other Facilities – Ultimate Airport

NAVAID	Equipment Function Description
ATCT – Airport Traffic Control Tower	Controls flight operations within the airport's designated airspace.
Rotating Beacon	Indicates location of an airport.
TVOR-DME – Terminal Very High-frequency Omnirange Distance Measuring Equipment	Emits VFR azimuth data over 360 degrees for non-precision instrument approach procedures, DME signals provide distance to the airport
NDB – Non Directional Beacon	Provides directional guidance to be used as an aid to final non-precision approaches.
LLWAS – Low Level Wind Shear Alert	An automated system to detect hazardous wind shear events and provide warnings to air traffic controllers.
AWOS –Automatic Weather Observation System	Recording instruments that measure cloud height, visibility, wind speed, temperature, dew point, etc.
ASR – Airport Surveillance Radar	Provide air traffic controllers information regarding the location of an aircraft within 60 nautical miles of the airport.
SSR – Secondary Surveillance Radar	In combination with an ASR, or by itself, identifies air traffic within a specific airspace
ASDE – Airport Surface Detection Equipment	Enhance visual observation of surface traffic during low visibility

Source: TAMS, an Earth Tech Company, 2004.

9.5 Ultimate Passenger Terminal Facility Requirements

9.5.1 Aircraft Gate Requirements

The *Phase 1 Engineering Study* identified a potential passenger terminal complex consisting of 120 gates, 80 for domestic operations and 40 for international operations.[45] The number and types of gate modules will be determined at an appropriate future time, as necessary.

9.5.2 Aircraft Apron Requirements

The aircraft apron requirements are based on a theoretical mix of aircraft and aircraft gates required during peak periods. The assumptions used for the ultimate aircraft apron requirements are listed in **Table 9-8**.

[45] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

Table 9-8 Peak Aircraft and Gate Front Requirements – Ultimate Airport					
FAA Aircraft Design Group	**Maximum Wingspan (ft)**	**Wingtip Clearance (ft)**	**Gate Front (ft)**	**Number of Aircraft**	**Total Front (ft)**
Domestic:					
III(A)	89	25	114	9	1,026
III(B)	118	25	143	42	6,006
IV	171	33	204	20	4,080
V	214	33	247	2	494
VI	262	33	295	1	295
Total Domestic				74	11,900
International:					
IV	171	33	204	21	4,284
V	214	33	247	16	3,952
VI	262	33	295	3	885
Total International				40	9,120
Grand Total				114	21,020

Source: *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

9.5.3 Passenger Terminal Functional Area Requirements

Estimates of gross ultimate passenger terminal functional area requirements were made during the *Phase 1 Engineering Study*. It was estimated that the main passenger terminal might require approximately 1.8 million square feet, domestic satellites 1.2 million square feet and an international satellite 550,000 square feet for a grand total of 3.5 million square feet.[46] The ultimate passenger terminal should include appropriate space for the functional areas discussed in Sections 4.4 and 8.5.4.

9.5.4 Terminal Curb Front Requirements

Terminal curb front requirements were determined during the *Phase 1 Engineering Study* based on the estimates used to calculate peak gate requirements and peak hour passenger levels.[47] It was estimated that the ultimate terminal departures curb front would need approximately 1,500 linear feet and the ultimate terminal arrivals curb front would need approximately 2,300 linear feet.

9.6 Ultimate Support/Ancillary Facility Requirements

9.6.1 Air Cargo Facility Requirements

An “order of magnitude” estimate of cargo operations that could ultimately occur at SSA was calculated as part of the *Phase 1 Engineering Study*. It was estimated that approximately 17,600 annual all-cargo operations could occur if demand required. Based on this level of operations, the total tonnage shipped (both as belly cargo and in dedicated freight aircraft) was estimated at 931,200 tons and the total space requirements for handling that tonnage was estimated to be approximately 910,000 square feet.[48]

[46] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.
[47] Ibid.
[48] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

Air cargo could be accommodated in the central area core, thus giving cargo and passenger aircraft comparable access to the runway system. There would also be large tracts of land around the periphery of the airport available for a large cargo operation such as an air freight hub.

9.6.2 General Aviation Facility Requirements

A general aviation facility could be located in the central core or to one side of the airfield, to accommodate any type of general aviation activity. If supported by demand, the complex could include a full service fixed base operation. Hangar storage could also be accommodated.

9.6.3 Aircraft Rescue and Fire Fighting Facilities

Based on the ARFF operational requirements and response time established by FAR Par 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*, the airport would need at least two, and potentially five, ARFF stations in order to meet the emergency response time requirements, as discussed in Section 5.3. The ultimate number and location of ARFF facilities would be determined in the future, as warranted.

9.6.4 Fuel Storage Facility

The fuel storage facilities would have aboveground tanks with state-of-the-art cooling systems designed to provide a separate, sterile environment. On-airport underground fuel lines would have proper protection and monitoring to avoid any leakage and would provide fuel to the passenger and cargo terminal areas. The fuel farm would provide fuel storage for at least seven days of demand.

9.6.5 Aircraft and Airfield Pavement Deicing Facilities

As the airport expands, appropriate deicing facilities including provisions for a treatment and recycling system, will be provided.

9.6.6 Airfield Maintenance Center Facilities

The ultimate size and location of airfield maintenance center facilities will be determined at the appropriate time in the future, as the airfield expands. Sufficient space exists within the central core area or in the northern and southern airfield for these facilities.

9.6.7 Airport Utilities

Utilities would include electrical, heating, air conditioning, telephone, gasoline or natural gas (or both), water and wastewater. Power supply stations, emergency power plants, a wastewater treatment plant and a central plant capable of distributing heating and air conditioning to all airport facilities could be provided and sized according to demand.

9.6.8 Service Roads and Security Access

A secure airside service roadway system, linking all Air Operations Areas (AOA), should be provided. The proposed alignment should strive to minimize the crossing of active airside facilities. An apron service road should be included to facilitate the access to parked aircraft. Access to the AOA will be restricted, and entrance will be only allowed at certain locked or continuously manned gates. State-of-the-art technologies could be implemented to regulate the access to the AOA and secure areas of the airport. The access will follow the guidelines defined in the Code of Federal Regulations – Part 1542, *Airport Security*, of U.S. Transportation Security Administration (TSA), which has replaced Federal Aviation Regulation Part 107, *Airport Security*.

9.7 Ultimate Ground Transportation Facilities

9.7.1 Future Roadway and Rail Improvements

As the region around SSA grows in population, households and employment, the regional roadway and rail network will also expand. Since current transportation planning for the area only goes out to 2030 (discussed in Section 6.2), it is difficult to predict what other roadway and rail improvements will occur beyond this timeframe. The ultimate airport should have provisions for both western and eastern access to the airport, as well as a transit system, whether by road, rail or people mover, to move passengers from one side of the airport to the other.

9.7.2 Projected Traffic Volumes

CATS generated traffic volumes for an ultimate SSA during the *Phase 1 Engineering Study*. These traffic volume estimates assumed that an off-airport east-west connector road would exist to move traffic from one side of the airport to the other and allow traffic to enter the airport from two locations.

Airport Entrance Road: The projected Annual Average Daily Traffic (AADT) along the airport entrance road to I-57 is 63,200.

Interstate 57: The projected AADT on I-57 is 149,800 vehicles between the Manhattan-Monee Road interchange and the SSA entrance road interchange. The AADT to the south between the Airport entrance road interchange and the Peotone-Wilmington Road interchange is approximately 152,000 vehicles.

IL Route 50: The projected AADT for IL Route 50 along the western boundary of the airport is approximately 52,000 vehicles per day.

IL Route 394: The projected AADT for IL Route 394 near the northeastern boundary of the airport is approximately 160,000 vehicles per day.

IL Route 1: The projected AADT for IL Route 1 along the eastern boundary of the airport is approximately 86,000 vehicles per day.

9.7.3 Parking Requirements

Estimated parking requirements for the ultimate airport will depend on the type of activity that develops at SSA in the future. The *Phase 1 Engineering Study* estimated that the ultimate airport could have substantial parking needs, as illustrated in **Table 9-9**.

Table 9-9
Summary of Parking Requirements – Ultimate Airport

Facility	Number of Spaces
Short-Term Parking	7,800
Long-Term Parking	9,600
Employee Parking	11,000
Rental Car Parking	17,100
Total Parking	45,500

Source: *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.

9.8 Summary of Ultimate Airport Facility Requirements

It is anticipated that SSA could be developed to provide maximum long-term capacity by providing quadruple simultaneous precision instrument approaches. The ultimate airport could have six parallel runways in an east-west orientation. The distance between the four independent runways should be a minimum 5,000 feet. A dependent (departure only) runway could be centered between each quad runway pair (2,500 feet from the centerline of each of the quad runways) and a short crosswind runway could serve small commuter/regional aircraft.

The previous sections of the Facility Requirements report have identified facilities required at SSA to meet the aeronautical forecasts detailed in the draft *Projections of Aeronautical Activity for the Inaugural Airport Program*.[49] Because no forecasts beyond DBO+20 can be developed with any level of confidence, estimates of the potential level of activity and associated facility requirements for the ultimate development of SSA are entirely based on the assumptions used in the Phase 1 Engineering Study[50] and FAA's Tier 1 EIS[51]. **Table 9-10** presents the possible facility requirements for this planning horizon.

[49] Draft *Projections of Aeronautical Activity for the Inaugural Airport Program, South Suburban Airport,* prepared for the Illinois Department of Transportation, May 2004.
[50] *Summary Draft, South Suburban Airport Phase 1 Engineering Report*, Illinois Department of Transportation, September 1997.
[51] *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, Great Lakes Region, July 2002.

Table 9-10
Summary of Facility Requirements – Ultimate Airport

Facility	Unit
Number of Parallel Runways	6
First Runway (9-27) Length (ft)	9,500
Additional Runway Lengths (ft)	10,000 and 12,000
Runway Width (ft)	200
Taxiway Width (ft)	100
Runway-Parallel Taxiway Centerline Separation (ft)	600
Crosswind Runway Width (ft)	4,000
Crosswind Runway Width (ft)	75
Airport Traffic Control Tower (ATCT)	Yes
Instrument Landing System (ILS)	CAT III
Passenger Aircraft Gates: *Domestic Gates* *International Gates*	 80 40
Passenger Terminal (sf)	3,500,000
Passenger Terminal Curb Front (feet)	3,800
Air Cargo Area[1] (sf)	Demand Driven
General Aviation/Corporate Aviation Area[2] (sf)	Demand Driven
Public Parking Spaces	17,400
Employee Parking Spaces	11,000
Rental Car Parking Spaces	17,100

Source: TAMS, an Earth Tech Company, 2004.
[1]Includes warehouse, airside apron, truck docks, and parking.
[2]Includes aircraft parking areas, apron area, hangars, tie down areas and public parking.