# 2007 ANNUAL REPORT TO THE LEGISLATURE

## METROPOLITAN AIRPORTS COMMISSION

**March 2008**

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## FIGURES



## TABLES

# 1. INTRODUCTION

In 1989, the Minnesota Legislature adopted the Metropolitan Airport Planning Act. This legislation required the Metropolitan Airports Commission (MAC) and the Metropolitan Council (MC) to complete a comprehensive and coordinated program to plan for major airport development in the Twin Cities. The planning activities were designed to compare the option of future expansion of Minneapolis-Saint Paul International Airport (MSP) with the option of building a new airport.

The analysis was completed in 1996, and the MAC and MC formally submitted their recommendations to the Legislature on March 18, 1996. On April 2, 1996, legislation was passed by both the House and Senate, and subsequently signed by Governor Arne Carlson, stopping further study of a new airport and directing the MAC to implement the MSP 2010 Long Term Comprehensive Plan.

The 1996 legislation, amended in 2006, requires the MAC to prepare an annual report to the Legislature by March 30 of each year that describes recent airport activity, current and anticipated capacity and delay for the airfield and terminal, and technological developments that could improve airport efficiency. Activity trends at MSP are compared to the 1993 MAC forecasts. The 2006 legislation required MAC to include the reliever airports in the report to the legislature. **Figure 1-1** shows the MAC airport locations in the seven-county metropolitan area.

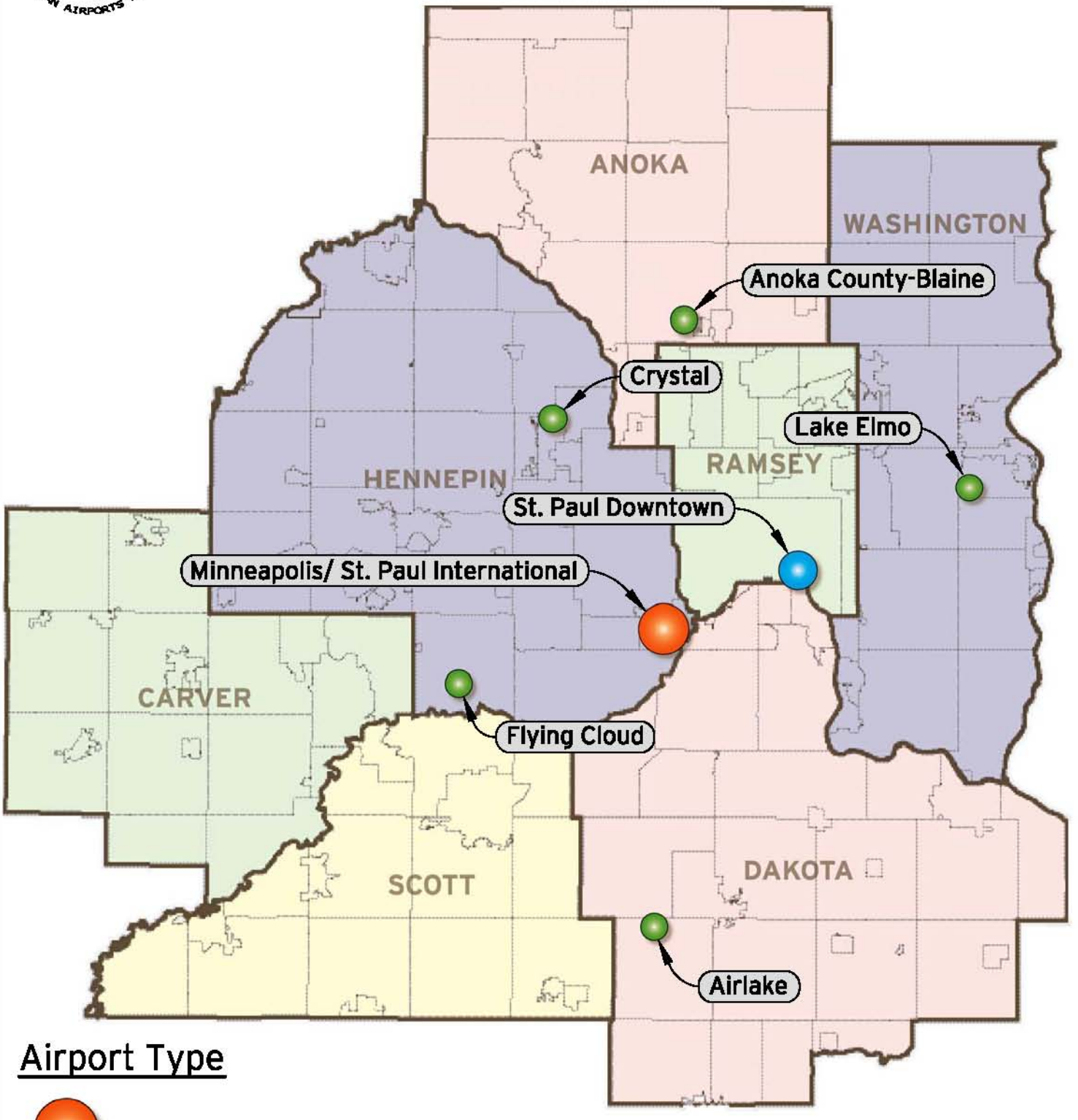
The 2007 Annual Report to the Legislature is divided into three main sections:

1. Introduction
2. Minneapolis-Saint Paul International Airport
3. Reliever Airports

The main sections are further subdivided into sub-sections pertinent to the various facilities.

MAC Airports in the Seven County Metropolitan Area

Figure 1-1



# 2. MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT

## 2.0 OVERVIEW

This portion of the report highlights the facilities and activities at Minneapolis-Saint Paul International Airport (MSP). It includes the following topics:

1. Description of MSP facilities
2. Description of MSP activity and service trends
3. Comparison of 1993 MAC forecasts with actual activity
4. Current airfield capacity and average length of delay statistics
5. Technological developments affecting aviation and their effect on airport operations and capacity

## 2.1 DESCRIPTION OF AIRPORT FACILITIES

### 2.1.1 Airfield

**Figure 2-1** shows the general airport layout for MSP. The airfield consists of two parallel runways, one north-south runway and one crosswind runway. Runway 4-22 is 11,006 feet long (with environmental approvals for an extension to 12,000 feet); Runway 12R-30L is 10,000 feet long; Runway 12L-30R is 8,200 feet long; Runway 17-35 is 8,000 feet long. **Table 2.1** summarizes the major airport components.

The parallel runways have deicing pads at each end sized to maintain runway departure rates during deicing conditions. Runway 17-35 has a 7-postion deicing pad at the north end only because current operating restrictions normally preclude departures to the north over Minneapolis. All the deicing pads have adjacent facilities to recharge the deicing trucks and rest the crews. A combined deicing operations and maintenance facility adjacent to the 12L deicing pad provides the capability to coordinate deicing operations on all pads.

Two cargo aprons (50 acres total) in the center of the airfield support a FedEx cargo sort facility and a UPS facility. A multi-tenant cargo facility and three airline maintenance hangars are sited on the western edge of the airfield. Northwest Airlines occupies two maintenance complexes and a cargo facility on the south side of the airport. Most of the Building B maintenance facility (adjacent to the Lindbergh Terminal inbound/outbound roadway) is scheduled for demolition in 2008.

N

## Minneapolis-St. Paul International Airport Layout — Figure 2-1

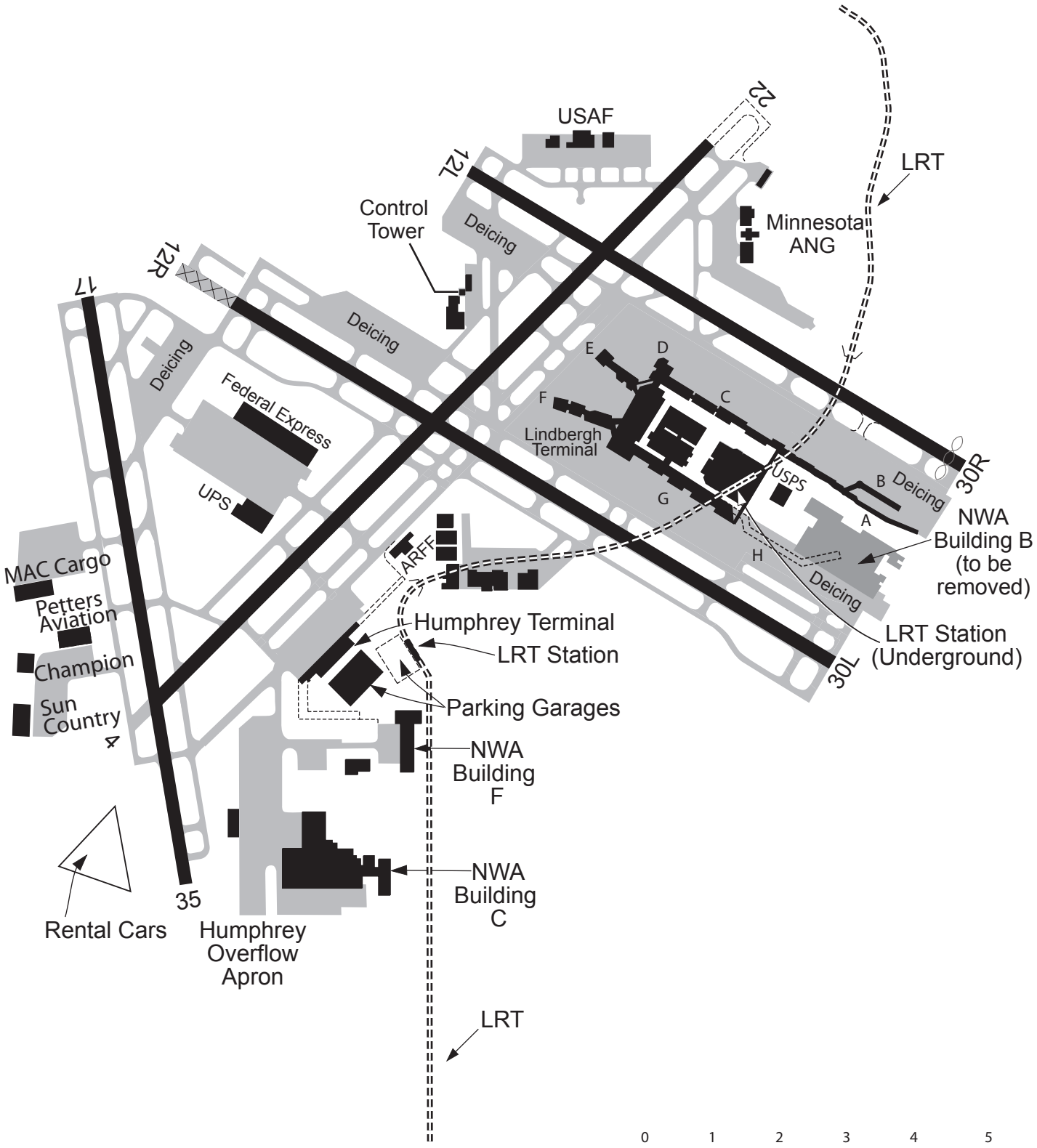


**Table 2.1**
**Existing Airport Facilities**

| Airport Component | | | Quantity | |
|---|---|---|---|---|
| Runways | | | | |
| | East/West Parallel | | 2 | |
| | North/South | | 1 | |
| | Crosswind | | 1 | |
| | Total | | 4 | |
| | Longest (ft.) | | 11,006 | (1) |
| Terminal Facilities | | | | |
| | Square Feet (millions) | | 2.4 | |
| | Total Gates | | 127 | |
| | | Lindbergh Terminal | 117 | |
| | | Humphrey Terminal | 10 | |
| | Northwest Gates | | 68 | |
| | Regional Positions (50 seats or less) | | 30 | |
| | Auto Parking Spaces | | 21,465 | (2) |

Notes:

(1) Runway 4-22 has environmental approval to be extended to 12,000 feet.

(2) The Humphrey garage provides 5,008 public parking spaces, an additional 4,575 spaces will be available in 2009.

Source: MAC and HNTB analysis.

The light rail transit (LRT) stations are located directly east of the Humphrey Terminal and below ground at the south end of the Lindbergh Terminal parking garage, providing direct access to downtown Minneapolis and the Mall of America. A bus station at ground level above the Lindbergh Terminal LRT station provides additional mass transit service and connectivity between the LRT and bus systems.

The main Aircraft Rescue and Fire Fighting (ARFF) facility is located near the center of the airfield on the south side of the runways; a satellite ARFF facility is located on the north side of the airfield between the parallel runways. Tunnels under the runways allow safe vehicle travel on the airfield without disrupting aeronautical operations.

### 2.1.2 Lindbergh Terminal

The Lindbergh Terminal is located between the two parallel runways, east of the crosswind runway. As shown in **Figure 2-2**, the terminal is laid out with single-loaded and double-loaded concourses that provide 117 gate positions. The terminal has ten gates that can support international arrivals into the International Arrival Facility. A concourse tram and moving sidewalks assist passenger travel along Concourse C. Moving sidewalks also facilitate passenger movement on Concourses A, B, G and through the connector between Concourses C and G. Four parking ramps provide short and long term parking for passengers and space for rental cars. A tram assists passenger movements to the two most remote parking ramps.

### 2.1.3 Humphrey Terminal

The Humphrey Terminal, as shown in **Figure 2-3**, provides 10 gates used by Sun Country, Midwest, Air Tran, Iceland Air, and several charter airlines. The terminal includes an International Arrival Facility. The Humphrey parking garage has a total of 5,008 spaces provided to employees and the public in the purple ramp. The orange ramp will be completed in 2009, adding 4,575 spaces. Further potential expansion could add another 2,428 spaces.

### 2.1.4 MSP 2020 Vision

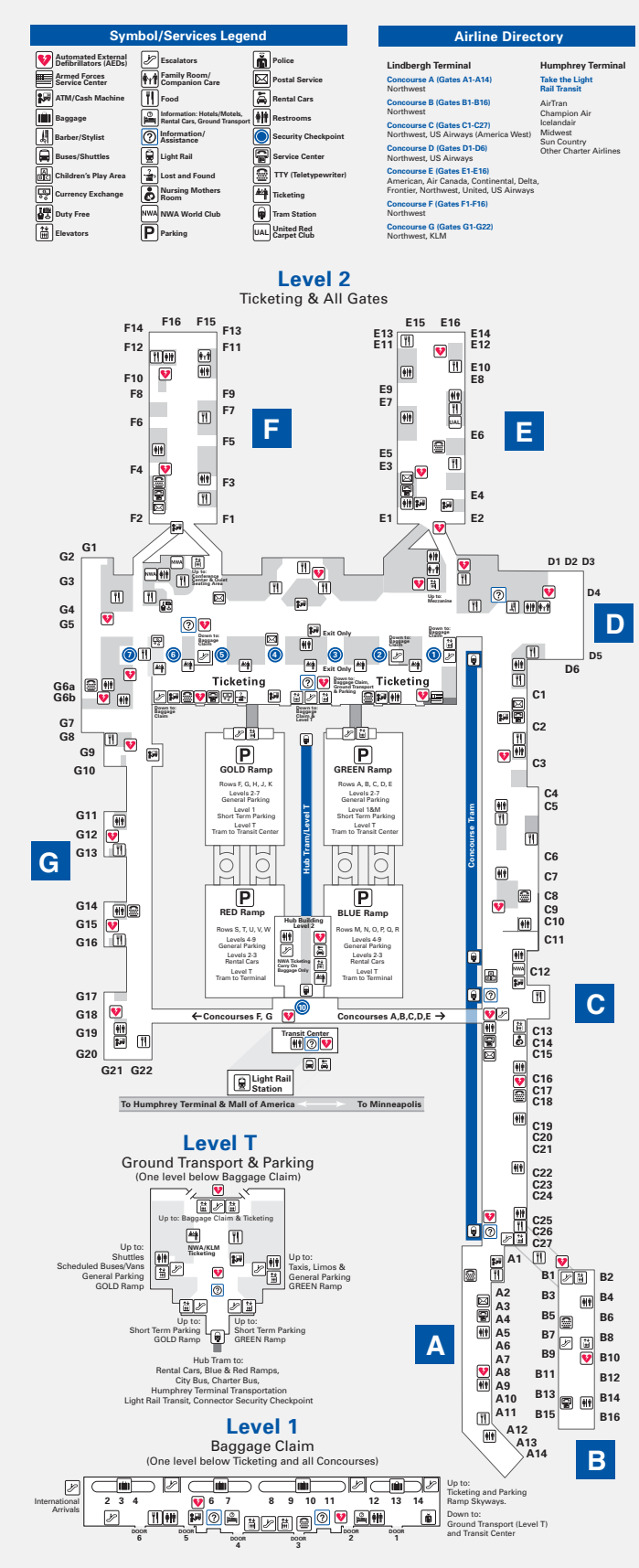
On September 21, 2004, an $862 million expansion called 2020 Vision was proposed for MSP. The program includes expansion of the Humphrey and Lindbergh Terminals to add gate capacity and consolidate all Sky Team member airlines in the Lindbergh Terminal. That plan was put on hold due to Northwest Airlines' bankruptcy. The MAC is initiating a Long Term Comprehensive Plan Update in 2008 to reassess this plan.

## 2.2 AIRPORT ACTIVITY AND SERVICE TRENDS

This section presents an overview of passenger and aircraft activity at MSP. It should be noted that the Northwest Airlines (NWA) Pilots Strike, during August and September 1998, affected activity levels during 1998. If the strike had not occurred, the activity levels for 1998 would likely have exceeded 500,000 aircraft operations at MSP. NWA's schedule returned to pre-strike levels around October 1998.

Sun Country Airlines, which is based at MSP, initiated scheduled passenger service on June 1, 1999. By the end of 2000, Sun Country had flown 1,437,496 total passengers, or 4.3 percent of MSP's passenger traffic, to or from the Airport. Due to severe financial pressures, the airline ceased operations on December 7, 2001. Sun Country resumed charter operations to several destinations in mid-2002 with new investors and reinstated scheduled service on February 27, 2002 to Orlando and Pensacola. Sun Country added more destinations in March 2002, and as of December 2007 serves 13 year-round and 17 seasonal destinations.

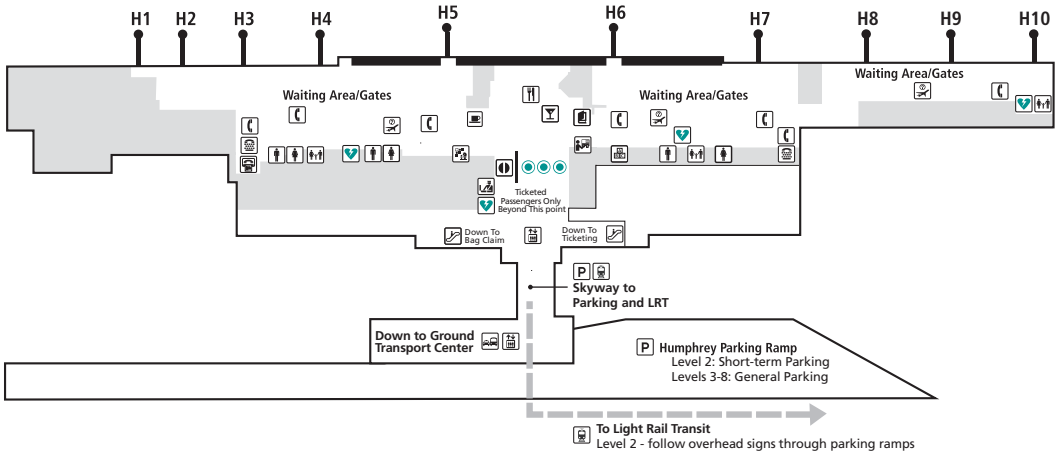
In 2005, Northwest Airlines dealt with the strike of the Aircraft Mechanics Fraternal Association (AMFA) as well as the impact of a bankruptcy filing. The AMFA strike caused Northwest Airlines to prematurely modify its summer schedule to a fall


Symbol/Services Legend
Automated External Defibrillators (AEDs)
Armed Forces Service Center
ATM/Cash Machine
Baggage
Barber/Stylist
Buses/Shuttles
Children's Play Area
Currency Exchange
Duty Free
Elevators
Escalators
Family Room/ Companion Care
Food
Information: Hotels/Motels, Rental Cars, Ground Transport
Information/ Assistance
Light Rail
Lost and Found
Nursing Mothers Room
NWA World Club
Parking
Police
Postal Service
Rental Cars
Restrooms
Security Checkpoint
Service Center
TTY (Teletypewriter)
Ticketing
Tram Station
United Red Carpet Club
Airline Directory
Lindbergh Terminal
Concourse A (Gates A1-A14)
Northwest
Concourse B (Gates B1-B16)
Northwest
Concourse C (Gates C1-C27)
Northwest, US Airways (America West)
Concourse D (Gates D1-D6)
Northwest, US Airways
Concourse E (Gates E1-E16)
American, Air Canada, Continental, Delta, Frontier, Northwest, United, US Airways
Concourse F (Gates F1-F16)
Northwest
Concourse G (Gates G1-G22)
Northwest, KLM
Humphrey Terminal
Take the Light Rail Transit
AirTran
Champion Air
Icelandair
Midwest
Sun Country
Other Charter Airlines
Level 2
Ticketing & All Gates
F
E
D
G
C
A
B
Ticketing
Exit Only
GOLD Ramp
GREEN Ramp
RED Ramp
BLUE Ramp
Hub Tram/Level T
Concourse Tram
←Concourses F, G
Concourses A,B,C,D,E →
Transit Center
Light Rail Station
To Humphrey Terminal & Mall of America
To Minneapolis
Level T
Ground Transport & Parking
(One level below Baggage Claim)
Up to: Baggage Claim & Ticketing
Up to: Shuttles Scheduled Buses/Vans General Parking GOLD Ramp
Up to: Taxis, Limos & General Parking GREEN Ramp
Up to: Short Term Parking GOLD Ramp
Up to: Short Term Parking GREEN Ramp
Hub Tram to: Rental Cars, Blue & Red Ramps, City Bus, Charter Bus, Humphrey Terminal Transportation Light Rail Transit, Connector Security Checkpoint
Level 1
Baggage Claim
(One level below Ticketing and all Concourses)
International Arrivals
Up to: Ticketing and Parking Ramp Skyways.
Down to: Ground Transport (Level T) and Transit Center

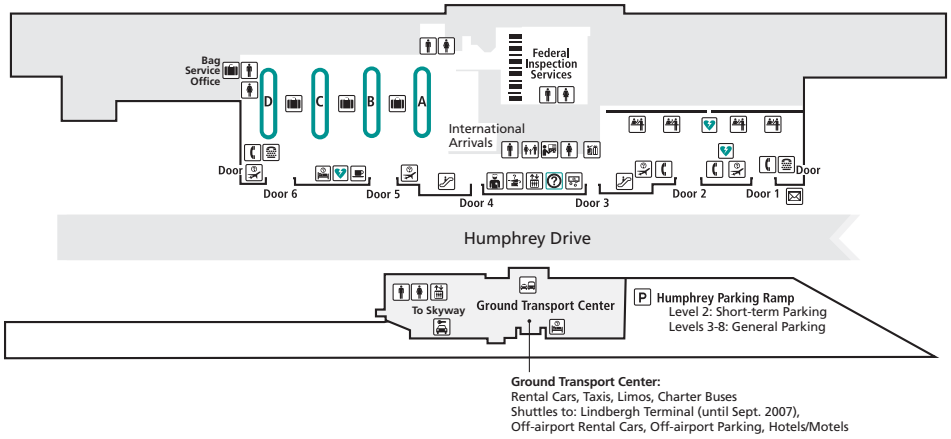
# Humphrey Terminal QuickMap

Minneapolis-St. Paul International Airport

## Level 2




## Level 1




**Ground Transport Center:**
Rental Cars, Taxis, Limos, Charter Buses
Shuttles to: Lindbergh Terminal (until Sept. 2007),
Off-airport Rental Cars, Off-airport Parking, Hotels/Motels

### Symbol/Services Legend

- Arcade
- ATM/Cash Machine
- Automated External Defibrillators (AEDs)
- Bag Claim
- Bar/Cocktails
- Bookstore
- Business Service Center
- Children's Play Area
- Coffee Shop Snack Bar
- Companion Care Restroom
- Currency Exchange
- Customs & Border Protection
- Elevators
- Escalators
- Exit from Security
- Flight Information
- Food, Restaurant
- Ground Transport
- Information: Hotels/Motels, Rental Cars, Ground Transport
- Information/Assistance
- Light Rail Transit (LRT)
- Lost and Found
- Parking
- Pay Phones
- Police
- Postal Service
- Rental Cars
- Restrooms
- Security Checkpoint
- Shopping Area
- Ticketing
- TTY (Teletypewriter)

### Humphrey Airline Directory

AirTran
Champion Air
Icelandair
Midwest
Ryan International
Sun Country
Other Charter Airlines

### Lindbergh Airline Directory

American
Air Canada
Continental
Delta
Frontier
KLM
Northwest
United
US Airways
(America West)

rev5/07

schedule. This reduced scheduled operations. The bankruptcy filing occurred on September 14, 2005. In an effort to regain profitability, Northwest Airlines cut aircraft leases as part of their restructuring, resulting in fewer aircraft and fewer operations. Fuel prices also continued to rise in 2005, causing ticket prices to increase which resulted in a reduction in demand for travel services. In 2006, Northwest Airlines reduced available seat miles by 7.5 percent. Available seat miles increased slightly, by 0.4 percent, in 2007. Northwest Airlines emerged from bankruptcy on May 31, 2007 and recorded a $764 million pre-tax profit for the year. Passengers carried by Sun Country, American, Delta, US Airways, and AirTran increased in 2007. Passenger traffic carried by United changed very little, and traffic carried by Continental and Midwest declined in 2007.

### 2.2.1 Domestic Originations/Destinations

**Figure 2-4** reviews historical passenger originations/destinations (O&D) at MSP. O&D passengers are those who begin or end their trip at the airport (versus passengers who are connecting at the airport en route to another destination). O&D passenger demand is primarily driven by local socioeconomic factors.

Following is a summary of recent O&D activity at MSP. MSP Domestic O&D data for 2007 are estimated based on passenger activity during the first three quarters of 2007.

- Between 1990 and 2007, domestic O&D passengers at MSP rose from 9.5 million to 17.5 million, an increase of 84.2 percent. This increase represents an annual compounded growth rate of 3.7 percent.

- The number of domestic O&D passengers at MSP increased slightly between 2006 and 2007, and was approximately 17 million in 2006 and 17.5 million in 2007.

### 2.2.2 Domestic Connections

The total estimated number of connecting passengers at MSP, as a percentage of total passengers, increased from 48.0 percent in 1990 to 49.4 percent in 2006, and then dropped to 48.6 percent in 2007. Data includes both air carrier and regional carrier passengers. Connecting passengers at MSP in 2007 are estimated from the first three quarters of 2007.

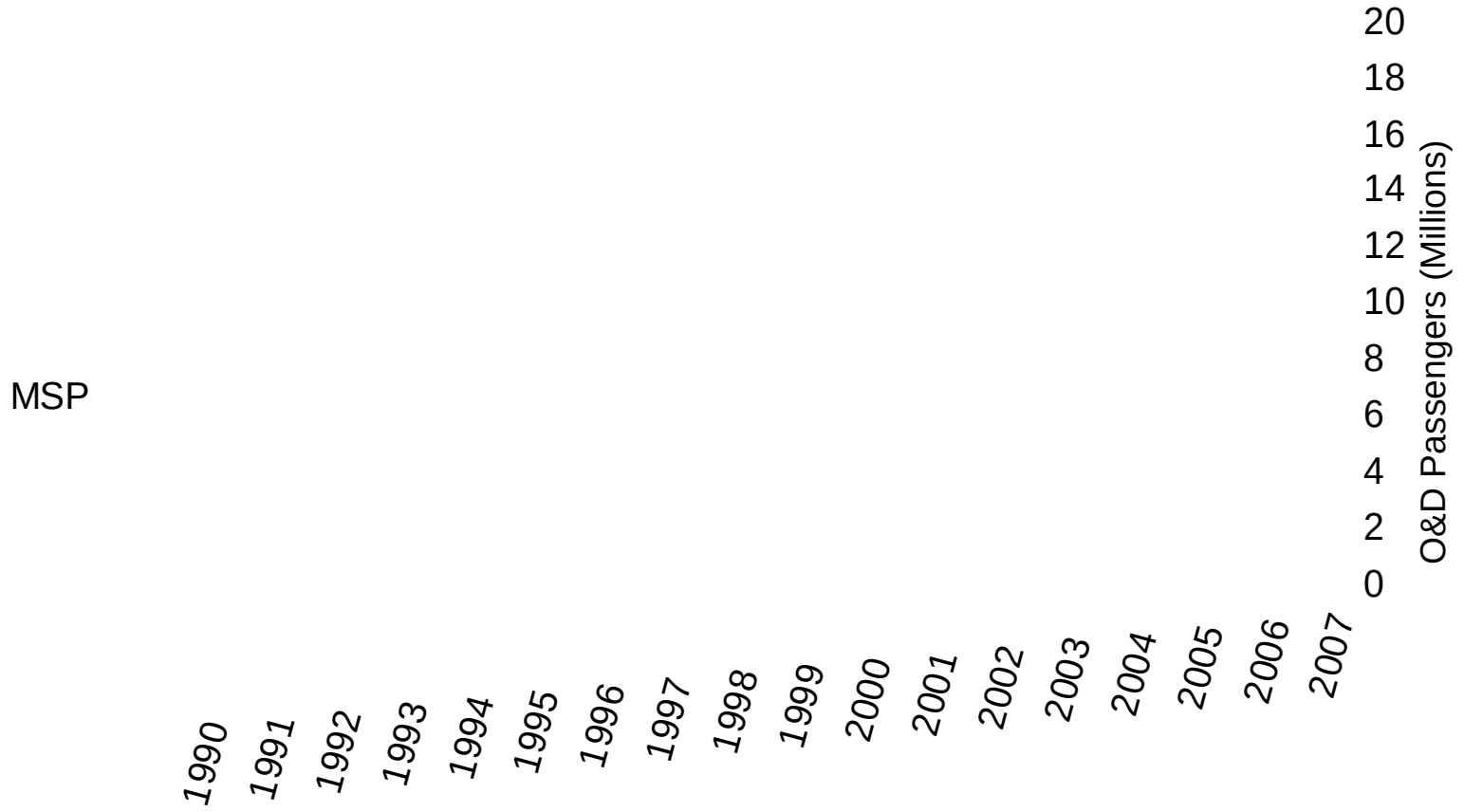
### 2.2.3 Total Annual Passengers

Total annual passengers are shown in **Figure 2-5**. Total passengers include O&D and connecting passengers.

- Between 1990 and 2007, total annual passengers grew by more than 14.9 million passengers at MSP, reaching 34.1 million total revenue passengers in 2007. This represents an annual compounded growth rate of 3.4 percent for MSP.

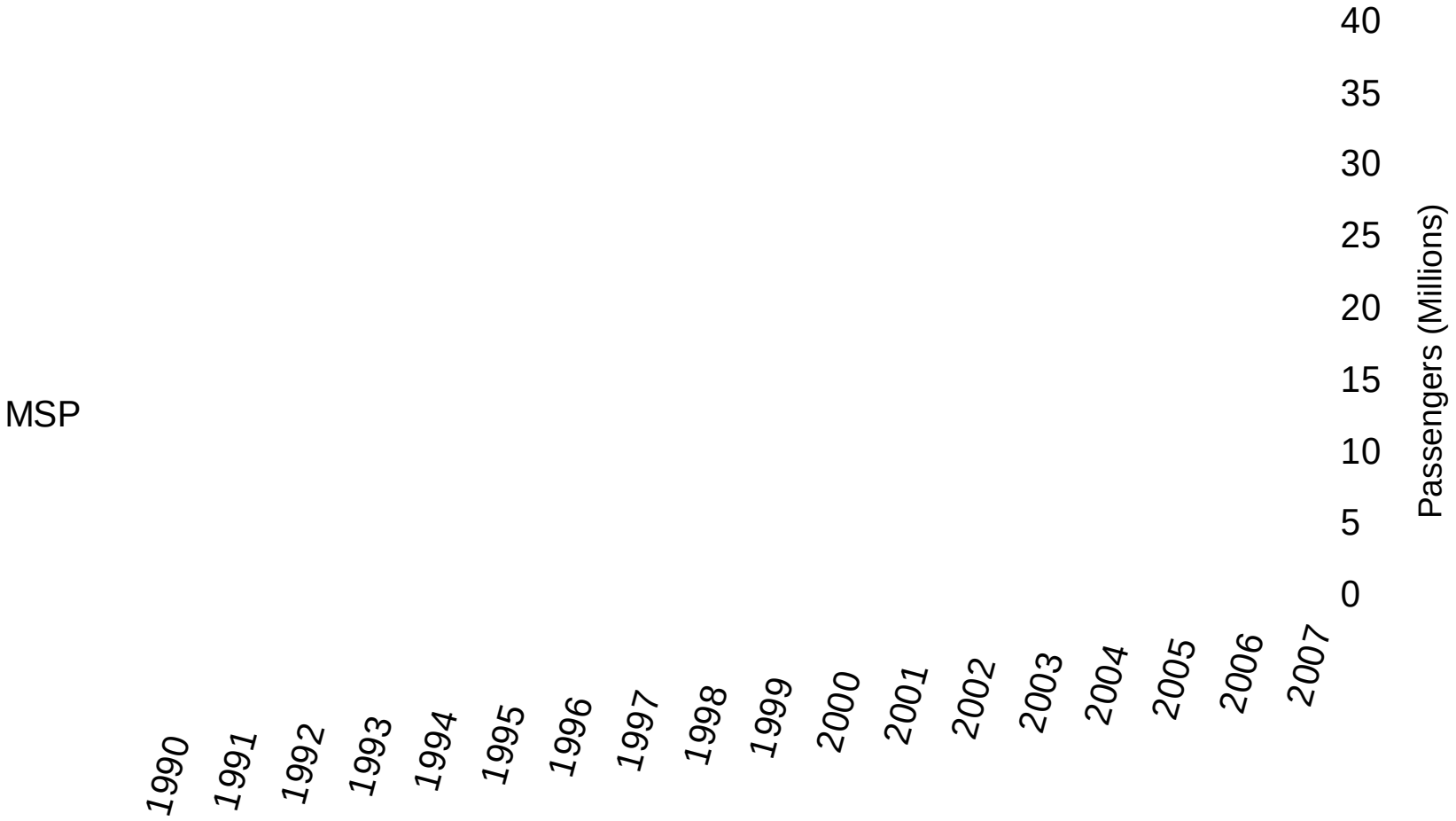
- A decline in total annual passenger numbers occurred in 2001 at MSP, due to the events of September 11. MSP numbers in 2001 dropped 8.3 percent from levels reported for the year 2000.

## Figure 2-4
### Annual Passenger Originations/Destinations* Totals
### 1990-2007




*2007 O&D passengers estimated from first three quarters of 2007.
Sources: U.S. DOT; HNTB analysis.

## Figure 2-5
### Total Annual Revenue Passengers
### 1990-2007




Sources: Metropolitan Airports Commission, Airports Council International; HNTB analysis.

- Although annual passenger numbers in 2004 and 2005 exceeded 2000 levels, the Northwest Airlines bankruptcy and associated capacity reductions, coupled with the impact of high fuel costs, has resulted in a decline in MSP enplanements in 2006 and 2007.

- In 2007, MSP experienced a decrease in total annual revenue passengers. MSP numbers decreased from 34.6 million in 2006 to 34.1 million passengers in 2007, a decrease of 1.4 percent.

### 2.2.4 Aircraft Operations

Annual aircraft operations are presented in **Figure 2-6**. Some of the key changes in the operational levels are highlighted below:

- In 1990, MSP had 382,960 annual operations according to FAA Tower counts. Total annual operations at MSP generally increased through 2000, then declined after the events of September 11, 2001. During 2001, 501,252 total operations occurred at MSP—a 4.0 percent decline from the previous year.

- Annual MSP operations peaked at 540,727 in 2004, but have since declined as a result of the Northwest Airlines bankruptcy and resulting capacity reductions.

- At MSP during 2007, operations decreased from those of 2006 by 4.6 percent to 453,566. The decrease can be attributed to the continued capacity reductions by Northwest Airlines in response to high fuel expenses.

- In 2007, Northwest's air carrier operations decreased by 9.0 percent to 198,689 at MSP compared to the 2006 level of 218,225.

- Operations by Northwest's regional carrier affiliates increased 7.1 percent from 108,655 in 2006 to 116,354 in 2007.

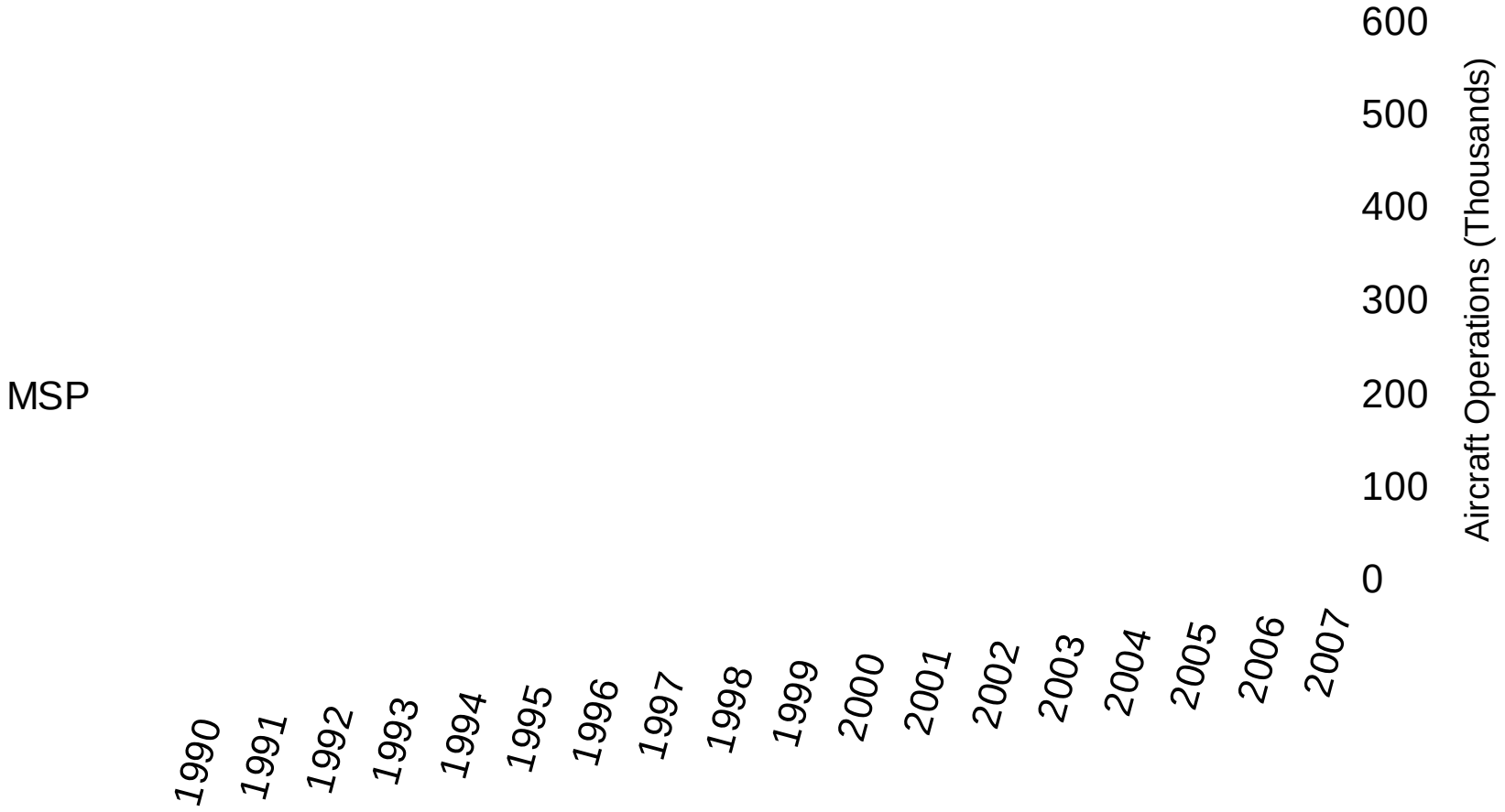
- Operations by non-Northwest scheduled carriers declined by 1.5 percent in 2007, from 89,701 to 88,354. Operations by American, Delta and US Airways increased, while operations by United, AirTran, and Continental decreased.

### 2.2.5 Nonstop Markets

**Figure 2-7** shows the number of nonstop domestic and international (including Canada) markets served from MSP in 2004, 2005, 2006, and 2007. The domestic markets include those receiving an annual average of at least five weekly nonstop flights. The international markets include those receiving an annual average of at least one weekly nonstop flight. Some of these markets are served only seasonally.

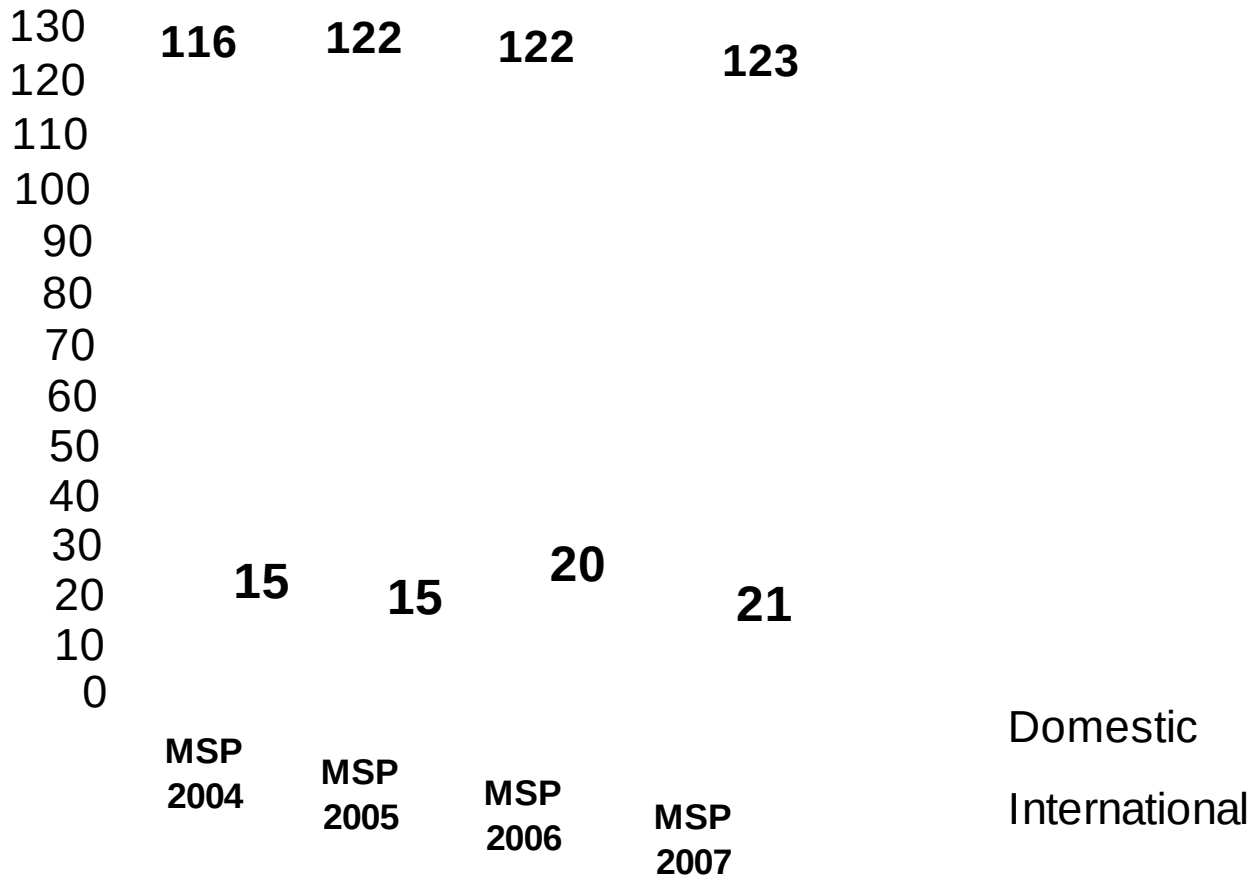
MSP offered 144 nonstop markets in 2007–123 domestic and 21 international (nine of these international markets were to Canada). This is an increase of 1.4 percent from the number of markets MSP offered in 2006.

## Figure 2-6
### Annual Aircraft Operations
### 1990-2007




Sources: Metropolitan Airports Commission, Airports Council International; HNTB analysis.

## Figure 2-7
### Number of Nonstop Markets
### 2004, 2005, 2006, 2007




Sources: Official Airline Guide via BACK Aviation Solutions, 2007; HNTB analysis.

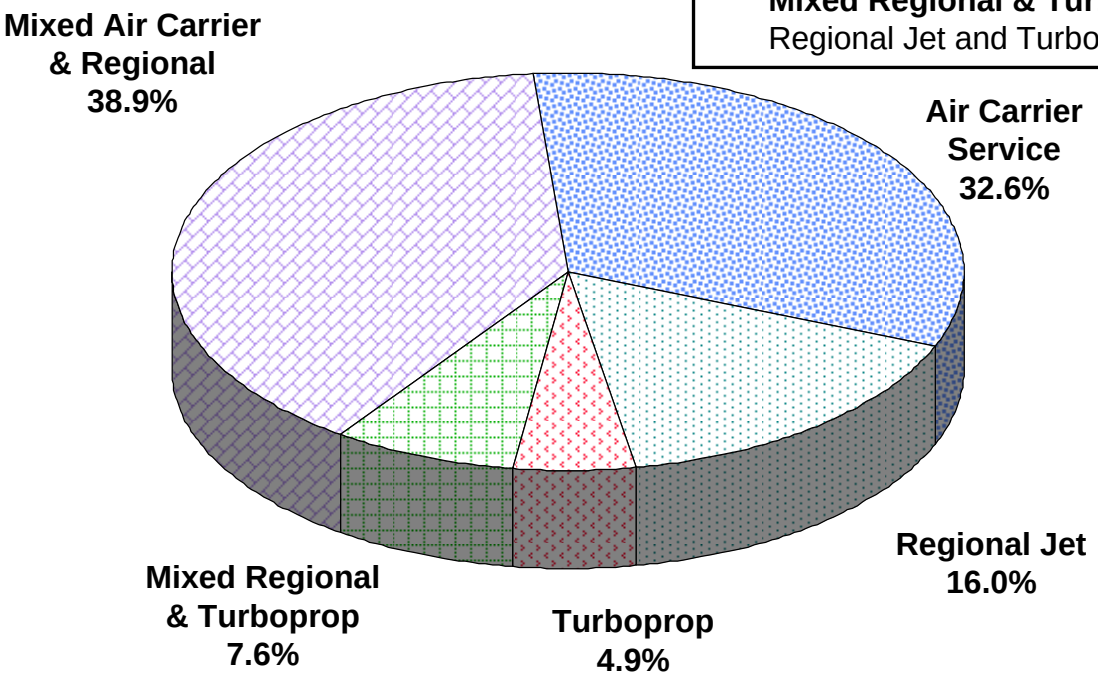
**Figure 2-8** displays how the nonstop markets to MSP are served. The categories are listed as air carrier service (jet aircraft), regional carrier service (regional jet, turboprop aircraft, and a combination of both), and a combination of air carrier and regional carrier service. For the purposes of this report, a "regional jet aircraft" is defined as a jet aircraft with 85 or fewer seats (i.e., Avro Regional Jet, Canadair Regional Jet, and Embraer Regional Jet).

Of the MSP nonstop markets, 32.6 percent are served exclusively by air carrier jets. Regional carrier service accounts for 28.5 percent of MSP markets, with 16.0 percent being served by regional jets, 4.9 percent being served by turboprop aircraft, and 7.6 percent being served by a combination of regional jets and turboprops. 38.9 percent of MSP markets are served by a combination of air carrier and regional carrier service.

**Table 2.2** and **Figure 2-9** compare MSP to other major metropolitan areas in terms of the number of nonstop markets served by each airport per population of the Metropolitan Statistical Area. As shown, few metropolitan areas of similar size have more cities served by nonstop flights than MSP.

## Figure 2-8
### 2007 Nonstop Markets by Type of Service

**Air Carrier Service** = Jet Aircraft
**Mixed Air Carrier & Regional** = Combination of Air Carrier & Regional Carrier Service
**Regional Carrier Service** –
**Regional Jet** = Regional Jet Aircraft
**Turboprop** = Turboprop Aircraft
**Mixed Regional & Turboprop** = Combination of Regional Jet and Turboprop Aircraft




**M S P**
*144 Nonstop Markets*

Sources: Official Airline Guide via BACK Aviation Solutions, 2007; HNTB analysis.
Note: Regional jets are defined as a jet aircraft having 85 or fewer seats.

**Table 2.2**

**Nonstop Markets by Metropolitan Area**

| Metropolitan Area | Population [1] (Millions) | Nonstop Markets [2] [3] | Markets/Pop. (Million) Ratio |
|---|---|---|---|
| New York | 22.0 | 226 | 10.3 |
| Los Angeles | 17.8 | 155 | 8.7 |
| Chicago | 9.7 | 193 | 19.9 |
| Washington-Baltimore | 8.2 | 130 | 15.9 |
| Boston | 7.5 | 106 | 14.1 |
| San Francisco-Oakland | 7.2 | 96 | 13.3 |
| Philadelphia | 6.4 | 117 | 18.3 |
| Dallas-Fort Worth | 6.4 | 162 | 25.3 |
| Houston | 5.6 | 179 | 32.0 |
| Atlanta | 5.5 | 242 | 44.0 |
| Miami-Fort Lauderdale | 5.5 | 118 | 21.5 |
| Detroit | 5.4 | 148 | 27.4 |
| Phoenix | 4.0 | 104 | 26.0 |
| Seattle-Tacoma | 3.9 | 89 | 22.8 |
| **Minneapolis-St. Paul** | **3.5** | **144** | **41.1** |
| Cleveland | 2.9 | 74 | 25.5 |
| San Diego | 2.9 | 50 | 17.2 |
| St. Louis | 2.9 | 74 | 25.5 |
| Denver | 2.9 | 149 | 51.4 |
| Tampa-St. Petersburg | 2.7 | 67 | 24.8 |

Notes:

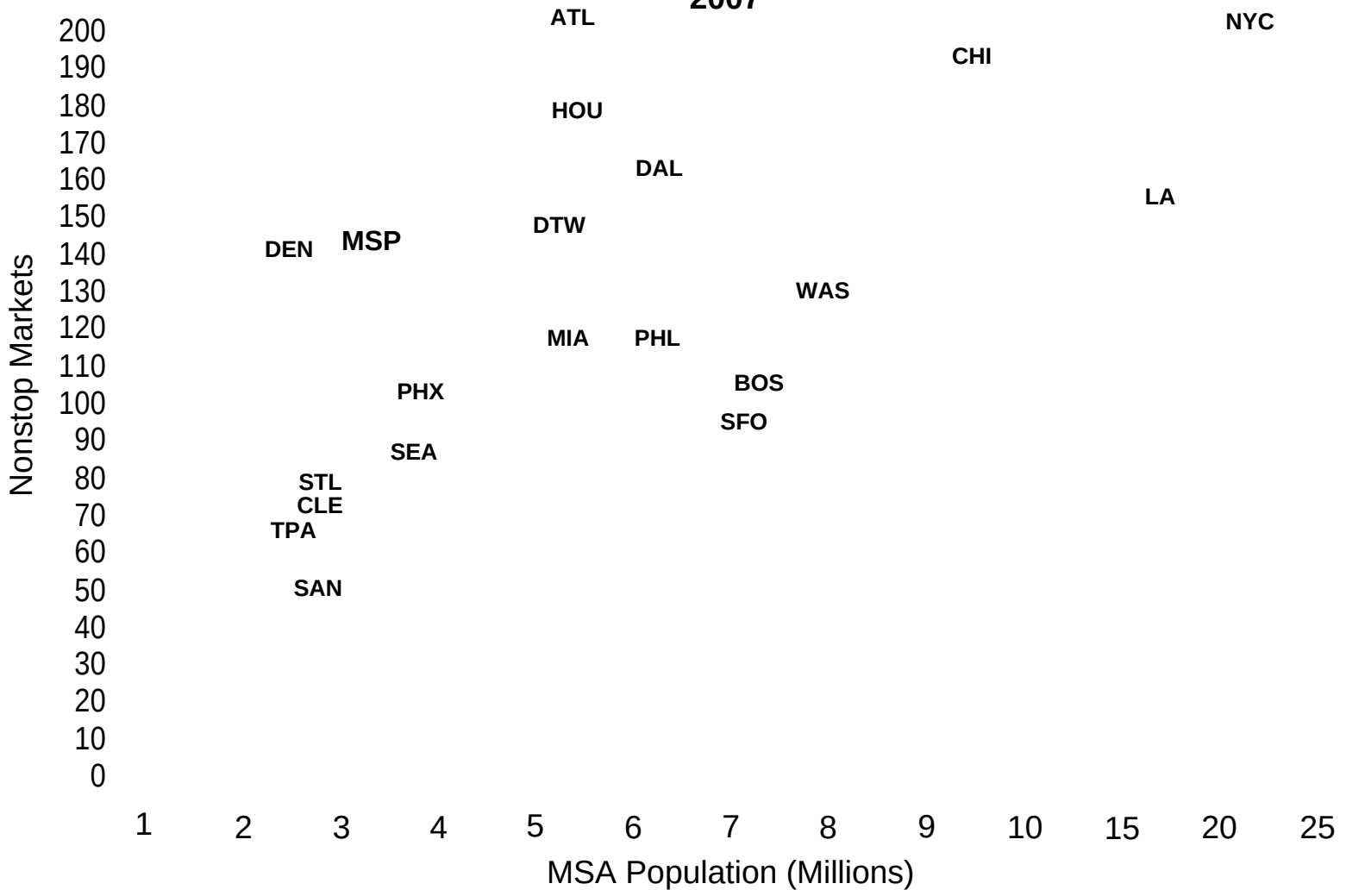
[1] U.S. Census Bureau; Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2006 (CBSA-EST2006-01); Annual Estimates of the Population of Combined Statistical Areas: April 1, 2000 to July 1, 2006 (CBSA-EST2006-02).

[2] Metro. areas served by more than one airport are counted once.

[3] Markets include those receiving an average of at least five weekly nonstop domestic flights or one weekly nonstop international flight during the period from January through December 2006.

Sources: U.S. Census Bureau, 2007 Official Airline Guide via Back Aviation Solutions

## Figure 2-9
### Population vs. Nonstop Service
### 2007




Sources: U.S. Census Bureau; Official Airline Guide via BACK Aviation Solutions, 2007; HNTB analysis.

## 2.3 COMPARISON OF 1993 MAC FORECAST WITH ACTUAL ACTIVITY

As required by the Metropolitan Planning Act of 1989, the Dual Track forecasts were revised in 1993, using 1992 as a base year. To ensure that the revised forecasts were optimal from both predictive and planning standpoints, forecast workshops were convened in 1992 and 1993 by the MAC and the Metropolitan Council (MC). The Expert Panel Session on Forecast Methodologies, held on October 29, 1992, focused on the most appropriate forecasting techniques given recent aviation trends and the character of aviation demand at MSP. The Expert Panel Session on Aviation Assumptions, held on November 18, 1992, addressed ongoing trends in the aviation industry with regard to fares, aircraft equipment, and airline service practices. The Socioeconomics Expert Panel Session was convened on November 19, 1992, to assess the most likely trends in area population, employment, and income that ultimately drive demand for aviation services. The final Expert Panel Session was held on May 27, 1993, to review the work accomplished to date and to develop a consensus on the final assumptions, methodologies, and scenarios to be used in the updated forecasts.

The forecasts were developed with the understanding that the assumptions were likely to vary over the forecast period, and that the variation could be material. The likely range of possibilities resulting from these variations was tested by constructing alternative scenarios in conjunction with the expert panels. These scenarios were developed separately and in combination. In this manner, a range of possible variations from the base case forecasts was developed.

The scenarios took into account factors affecting economic growth, including fuel prices, low-cost carriers, airfares, airline hubbing ratio, regional carrier penetration into air carrier markets, and changes in the structure of air travel demand. The highest scenario was defined by the following assumptions:

- Higher than projected economic growth
- A continuation of the high level of connecting activity at MSP by Northwest Airlines
- High international travel demand resulting from an increasingly globalized economy

The most conservative scenario was defined by the following assumptions:

- Lower than projected economic growth
- A reduction in connecting activity by Northwest Airlines to the minimum level allowed by the hub covenant contained in the Northwest loan agreement
- A greater transfer of routes from air carriers to regional carriers

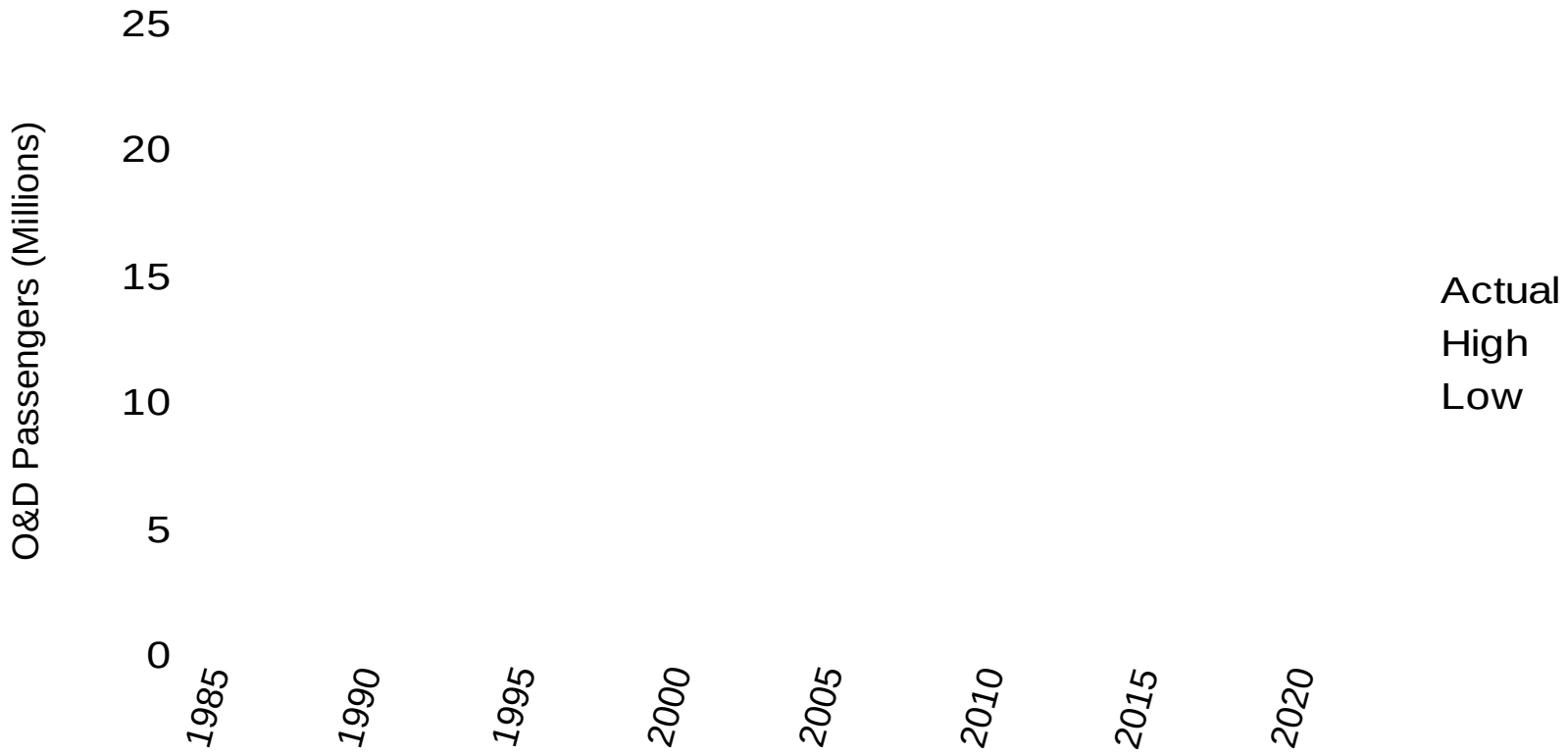
A comparison of the enplanement, passenger origination, and aircraft operations forecasts with actual 1993-2007 activity follows. It should be noted that activity levels fluctuate from year to year around a long-term average. It is important to distinguish between these short-term fluctuations and long-term trends when evaluating a forecast.

**Figures 2-10–2-12** show O&D, total passengers, and annual aircraft operations, respectively.

- Actual passenger originations were slightly below the high forecast level in 1993 through 1999, but increased to a level above the high forecast during 2000 (**Figure 2-10**). Passenger originations and destinations in 1998 were reduced because of the loss of service resulting from the Northwest Airlines strike in August and September. O&D totals were also down in 1999 due to the strike, but rebounded midway through the year to pre-strike levels. At the end of 2001, O&D numbers decreased 8.4 percent from a high of 16.6 million after passengers reduced air travel in response to the events of September 11. In 2002, due to the lingering effects of September 11, and the economic downturn, O&D passenger numbers continued their decline. By the end of the year, they were down 5.3 percent from 2001, to 14.4 million. In 2005, O&D passengers rebounded to pre-September 11, 2001 levels. O&D passenger levels decreased a little in 2006 to 17.0 million. In 2007 the levels increased to 17.5 million which is 5.4 percent below the high forecast of 18.5 million O&D passengers.

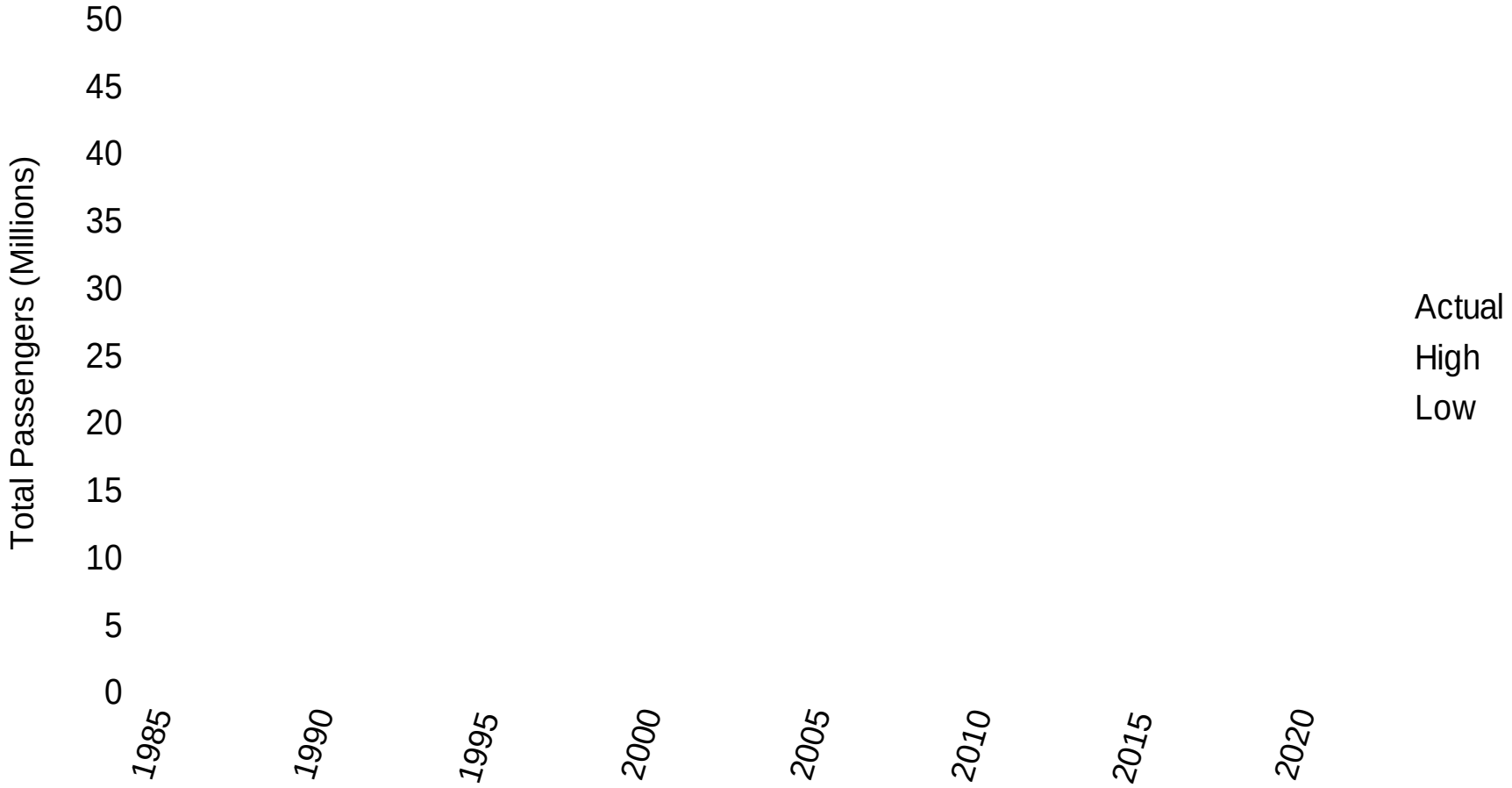
- As shown in **Figure 2-11**, MSP total passenger activity grew at close to historical rates in 1993, but growth accelerated between 1994 and 1995 and approached the high forecast in 1996. In 1999 and 2000, total passengers exceeded the high forecast. Much of the passenger growth at MSP between 1994 and 2000 was the result of one-time factors. These include Northwest Airlines' hub consolidation that involved reducing operations at other airports to concentrate connections at the two major hubs (MSP and DTW in 1992 and 1993); the liberalization of Canadian markets, which opened up MSP as a hub for cross-border traffic beginning in 1995; and the lapse of the passenger ticket tax during most of 1996, which reduced effective fares to travelers and thereby increased demand. Also, airlines have developed much more sophisticated reservation systems in recent years, allowing them to generate more revenue by filling otherwise empty seats with passengers flying on discount fares. The passenger growth rate in 1998 decreased from that of previous years because of the loss of service resulting from the Northwest strike in August and September. Discount fares helped Northwest regain lost passengers volumes in 1999. A decline in the number of total revenue passengers occurred after September 11, 2001, with MSP experiencing an 8.3 percent decrease from 2000 levels. In 2002, MSP experienced another decline in total revenue passengers, due to the aftereffects of September 11$^{th}$ coupled with the sluggish economy. Passenger levels decreased 2.2 percent from 2001. In 2006 passenger levels decreased 5.7 percent from 2005. 2006 passenger levels decreased to 34.6 million total passengers. In 2007 passenger levels continued to decrease to 34.1 million. This is 13.0 percent below the high forecast of 39.2 million.

## Figure 2-10
### Minneapolis-St. Paul International Airport
### Forecast vs. Actual 2007 Passenger Originations/Destinations




Sources: MSP Base and Combination 2 Forecasts; U.S. DOT; HNTB analysis.
Note: O&D Passenger estimates are based on the first three quarters of 2007.

## Figure 2-11
### Minneapolis-St. Paul International Airport
### Forecast vs. Actual 2007 Total Revenue Passengers




Sources: MSP Base and Combination 2 Forecasts; Metropolitan Airports Commission; Airports Council International; HNTB analysis.

- **Figure 2-12** compares total aircraft operations (as counted by the MSP Air Traffic Control Tower) with the high and low forecasts. There was an initial burst of aircraft operations in 1993 and 1994 as a result of significant build-up of regional carrier flights by Northwest Airlink. Since that time, factors that stimulated passenger traffic, such as the strong economy, Northwest Airlines' hub consolidation, the liberalization of Canadian markets, and the lapse of the passenger ticket tax, have served to maintain a high number of aircraft operations. Numbers of total aircraft operations decreased in 1998 due to the Northwest strike in August and September. As stated previously, the Northwest schedule rebounded to pre-strike levels in October 1998. Immediately after September 11, 2001, air carriers reduced aircraft operations at MSP nearly 20 percent in response to low passenger demand. As a result, MSP aircraft operations in 2001 decreased by 4.0 percent from 2000 levels. The economic downturn and lingering effects of September 11 have also affected the growth rate of total aircraft operations at MSP in 2002. Operations in 2002 actually increased by 1.2 percent over the total number of aircraft operations in 2001. In 2004 operations increased by 6.4 percent over 2003. The operations in 2006 decreased from 2005 by 10.6 percent (total operations 475,633). Operations in 2007 continued to decrease to 453,566 which is 22.7 percent below the high forecast. The reductions in the past two years have resulted primarily from the Northwest Airlines bankruptcy and associated capacity reductions.

## Figure 2-12
### Minneapolis-St. Paul International Airport
### Forecast vs. Actual 2007 Total Aircraft Operations


Sources: MSP Base and Combination 2 Forecasts; Metropolitan Airports Commission, FAA; HNTB analysis.

## 2.4 AIRPORT CAPACITY AND DELAY

This section describes the airfield capacity at MSP. Aircraft delay analysis is also summarized.

### 2.4.1 Airfield Capacity

Airfield capacity is typically described in terms of hourly capacity and annual capacity under good weather and poor weather conditions. **Table 2.3** shows existing and future hourly capacity for MSP.

**Table 2.3**

**2007 REPORT TO THE LEGISLATURE**

**Existing and Future Hourly Airfield Capacity**

| Hourly Airfield Capacity | Existing | 2010 |
|---|---|---|
| Optimum Rate[(1)] | 160 | 167 |
| Marginal Rate[(2)] | 155 | 167 |
| IFR Rate[(3)] | 125 | 137 |

Notes: [(1)] Ceiling and visibility above minima for visual approaches.
[(2)] Below visual approach minima but better than instrument conditions.
[(3)] Instrument conditions (ceiling < 1000 feet or visibility < 3 miles).

Source: FAA Benchmark Report, 2004.

- As shown in **Table 2.3**, existing hourly capacity at MSP is about 160 operations in good weather and 125 operations in poor weather. Specific conditions that define poor weather include the airport's most commonly used instrument configuration, where operations are conducted below visual approach minima (i.e. instrument approaches).

- Within the next 10 years it is possible that improvements in technology could occur that will support higher capacity levels according to the FAA 2004 Benchmark study. These improvements include advanced Traffic Management Advisor (TMA) to allow controllers to sequence aircraft more efficiently and Cockpit Display of Traffic Information (CDTI)-Enhanced Flight Rules which will enable specially-equipped aircraft to maintain visual approaches even in marginal weather conditions. Minneapolis-St. Paul's hourly capacity could increase by a total of 4.4 percent to 167 operations in good weather and by a total of 9.6 percent to 137 operations in adverse weather.

- According to the FAA's 1993 Capacity Enhancement Plan for MSP, with the north-south runway in place, annual capacity would be 580,000 operations assuming a 4-minute average delay level. Based on analysis reported in the 2015 Terminal

Expansion Project Draft Environmental Assessment, the airfield could accommodate up to 723,000 annual operations with a average delay of 12.7 minutes per operation. (It should be noted that this level of delay is considered to be the maximum tolerable based on a review of the nation's most congested airports.)

### 2.4.2 Airfield Delay

Delay can be measured in several ways. This section reviews various delay measures as they apply to MSP.

**Number of Delayed Flights as Reported by FAA OPSNET**

The FAA Air Traffic Operations Network (OPSNET) database counts flights that were reported to be delayed by Air Traffic Control (ATC) for more than 15 minutes. Delays of less than 15 minutes are not counted, nor are delays not initiated by ATC. In addition, since delays are reported by facility, a flight could be delayed by 13 minutes by one facility and 12 minutes by another facility (for a total delay of 25 minutes) and still not be included in the OPSNET database. These data limitations should be kept in mind when reviewing OPSNET delay data.

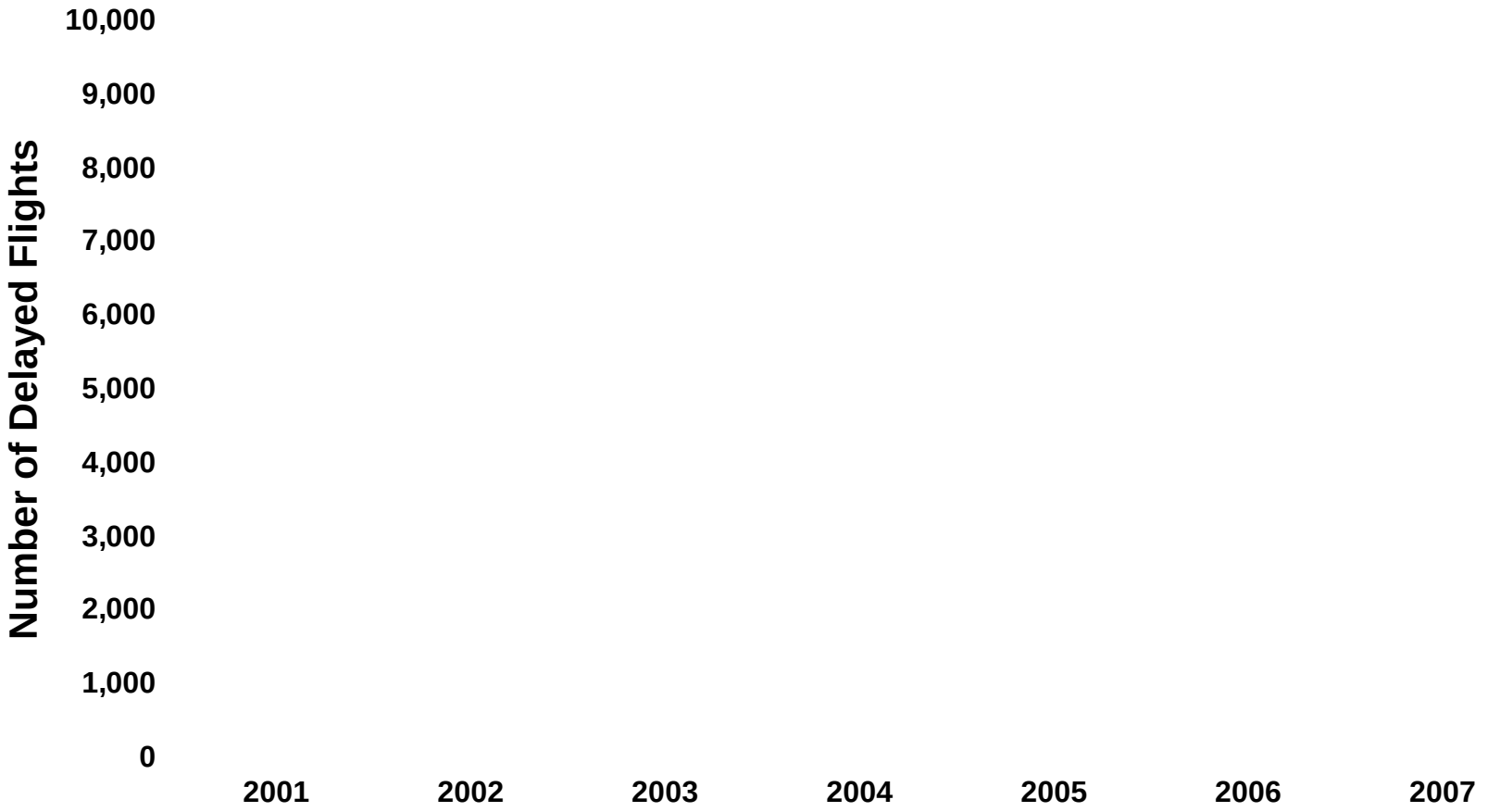
As shown in **Figure 2-13**, the number of flights delayed by ATC peaked in 2002, when a total of 8,733 flights were reported delayed. Over the next four years, the number of delayed flights steadily decreased, reaching a low of 1,474 in 2006 (which is the first full year of operation with the new runway). In 2007, the number of reported delays jumped to 8,510. It is likely that the two-month closure of Runway 12R/30L for reconstruction and high instances of bad weather conditions caused a good portion of this increase.

**Percentage of Flights Arriving On Time**

A more well-known measure of delay is the percentage of flights arriving on time (i.e., within 15 minutes of their scheduled arrival time). The data series used to calculate on-time performance is the FAA's Aviation System Performance Metrics (ASPM) database. Within this data set, aircraft must be airborne in order for them to be considered "delayed;" therefore, cancelled and/or diverted flights are not considered "late" in this system. Scheduled times typically include some "cushion" for delay, especially those operating during peak periods. A delayed flight can be attributed to any of these causes: mechanical problems, lack of crew, or poor weather, and are not limited to capacity constraints.

**Figure 2-14** shows average on-time gate arrival performance for domestic air carrier flights at MSP based on the delay data extracted from the Federal Aviation Administration's ASPM database. The top graph compares MSP's 12-month moving average on-time performance with the national average. Between 2001 and 2007, the highest on-time performance for MSP occurred in 2002 and 2003 when overall annual on-time performance averaged about 84 percent. In 2004 and 2005, on-time performance slowly declined to about 80 percent. On-time performance

## Figure 2-13
### MSP Flights Delayed by ATC*
### 2001-2007

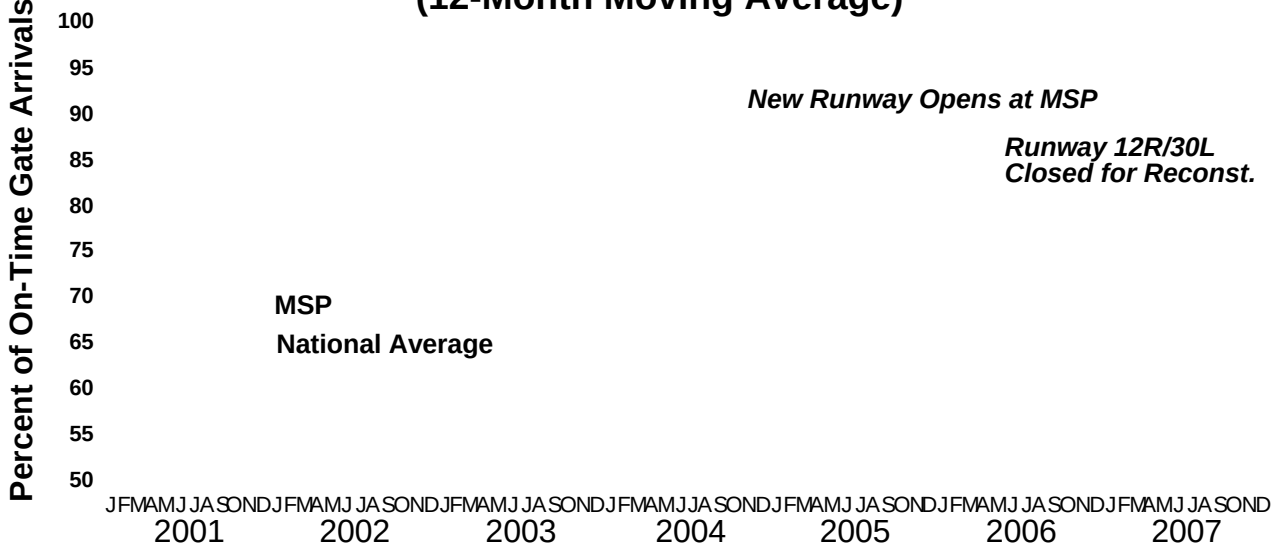



*Total arriving and departing flights reported delayed by FAA air traffic control by at least 15 minutes.

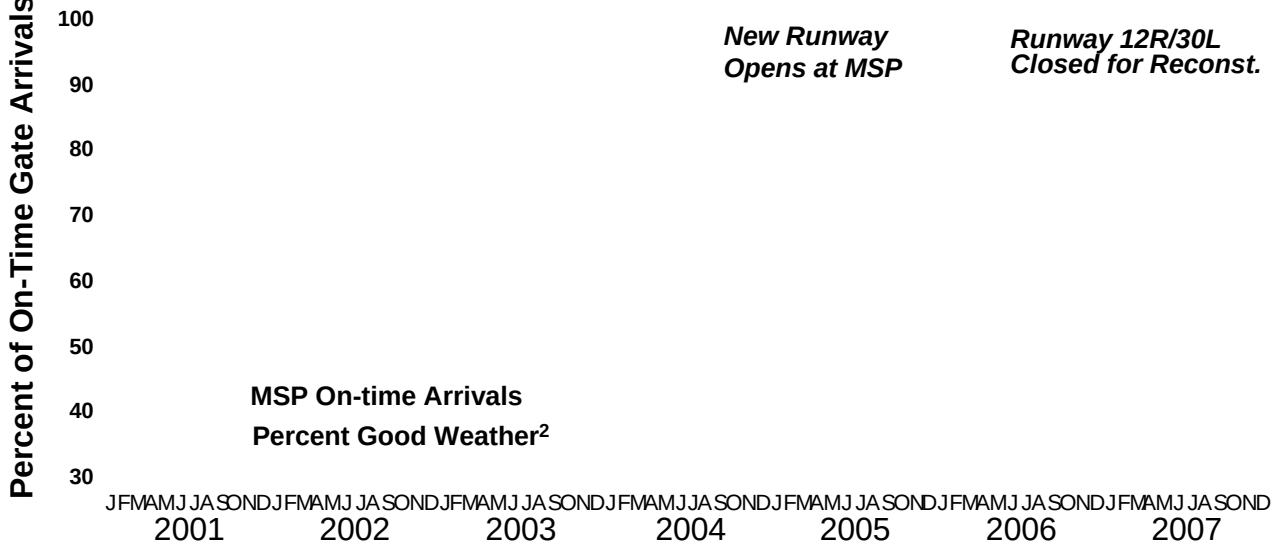
Sources: FAA-APO OPSNET database, HNTB analysis.

# Figure 2-14

## On-Time Gate Arrivals, MSP vs. National Average[1]
## 2001-2007
## (12-Month Moving Average)




## Comparison of MSP Monthly On-Time Gate Arrivals[1] and Percent of Good Weather




1. Percentage of flights arriving within 15 minutes of scheduled arrival time.
2. Defined as when conditions may allow visual approaches; actual separation standards used at time of observation is not available in ASPM database.

Sources: FAA-APO Aviation System Performance Metrics (ASPM) database, HNTB analysis.

remained at roughly 80 percent through 2006. In general, MSP's on-time performance has tracked fairly closely to the national average, although in 2007, the Airport saw its on-time performance decline more steeply than was experienced at the national level, to a low of 73 percent. It is possible that some of this decline in 2007 may be attributable to major runway reconstruction from August 13, 2007 to October 18, 2007 and poor weather at MSP, particularly in December 2007, as shown in the bottom graph. In December, the Airport operated in poor weather (which typically provides the lowest capacity and results in the highest delays) more than 60 percent of the time.

**Average Delay Per Aircraft Operation**

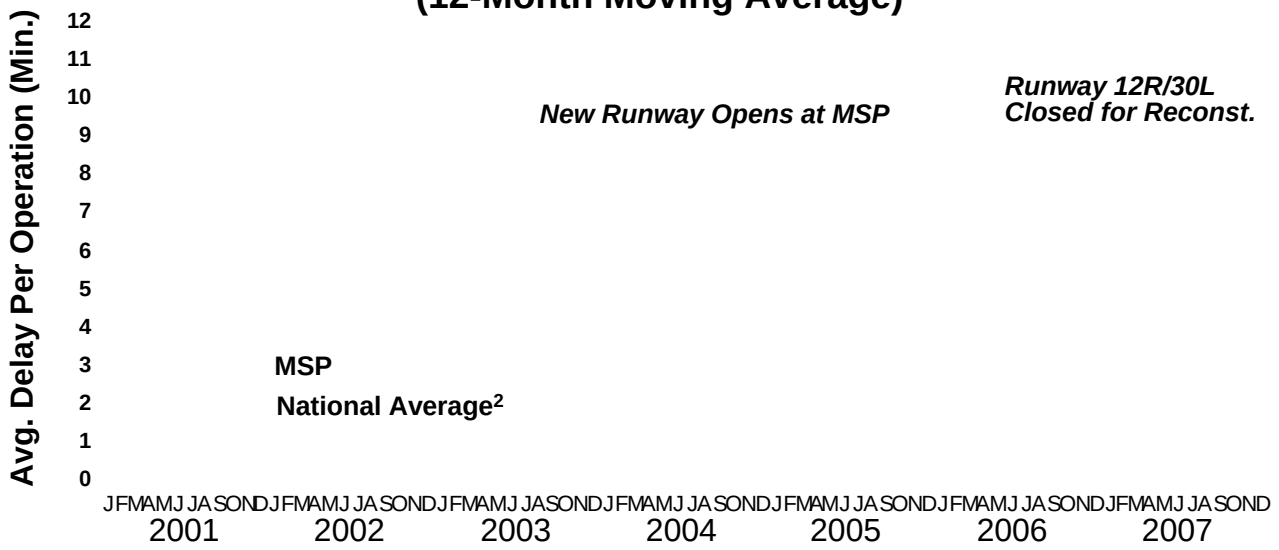
Finally, average delay per operation attributable to the Airport is examined. Airport-attributable delay can be estimated by comparing a flight's actual air and taxi times with estimated unconstrained times. The total cumulative amount of delay experienced by all scheduled flights in the database is then divided by the total number of flights in the database for the same time period. The output is usually expressed in minutes of delay per operation.

In editions of this report prior to 2005, delay was estimated by using the FAA's Consolidated Operations and Delay Analysis System (CODAS) and the DOT Airline Service Quality Performance (ASQP) database to compare optimal versus actual taxi and flight times for MSP. Subsequent to 2005, the FAA's Aviation System Performance Metrics (ASPM) database was used. The FAA replaced CODAS with this new program providing delay information to industry professionals and government agencies. ASPM data come from ARINC's Out-Off-On-In (OOOI), Enhanced Traffic Management System (ETMS), ASQP, weather data, airport arrival and departure rates (15-minute interval), airport runway configurations and cancellations. Creation of the ASPM database provides a more comprehensive analysis of airport delay and capacity. The FAA also uses the results to create performance benchmarks for airports based on facility enhancements that occur each year. FAA's main objective was to develop a clear and well-supported methodology to calculate aircraft delays that will be accepted by both government and industry as valid, accurate and reliable. Currently, there is general industry acceptance of the ASPM metric.

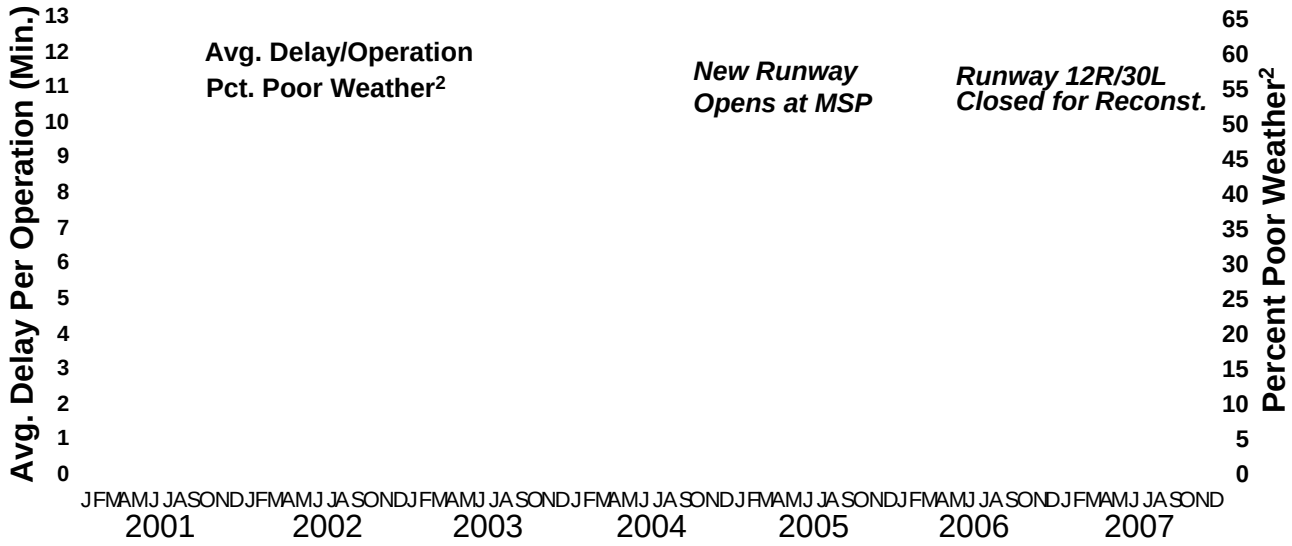
The ASPM information presented in **Figure 2-15** shows average delay per operation. The top graph compares the Airport's 12-month moving average with the average for 75 high-delay airports tracked by the FAA. Between 2001 and 2005, MSP's average delay per operation ranged between 6.5 minutes and 7.1 minutes, while the average delay for the 75 airports tracked by the FAA ranged from about 4.8 minutes to 5.6 minutes. After MSP's new runway opened in late October 2005, average delay per aircraft began to decrease dramatically, reaching a low of about 5.5 minutes toward the end of 2006. Since that time, however, the 12-month moving average delay per operation began to increase steadily, reaching about 7.5 minutes by the end of 2007, while average delay for the 75 airports tracked by the FAA remained fairly constant at about 6.0 minutes.

# Figure 2-15

## MSP Average Delay Per Aircraft Operation[1]
## 2001-2007
## (12-Month Moving Average)




## Comparison of MSP Average Delay Per Aircraft Operation and Percent Poor Weather[2]




1) An operation is either a landing or a takeoff.
2) Poor weather is defined as when aircraft must make instrument approaches; actual separation standards used at time of observation is not available in ASPM database.

Sources: FAA-APO Aviation System Performance Metrics (ASPM) database, HNTB analysis.

The bottom graph compares MSP's month-by-month average delay per operation with the percentage of time the Airport operated in poor weather conditions (which typically increases delays). As shown, the highest delays were experienced when Runway 12R/30L was closed for reconstruction and again in December 2007 when the Airport was operating in poor weather conditions more than 60 percent of the time.

As shown in **Table 2.4**, MSP ranked 7th in the nation in 2007 in terms of highest average delay, up from 15th in 2006. Although the new runway was opened in late October 2005, one of the two parallel runways (12R/30L) was closed for about two months for reconstruction, decreasing capacity. The closure of 12R/30L occurred during one of the poorest weather conditions on record for that period, which magnified the impact of the closure, in terms of delay.

**Table 2.4**

**2007 REPORT TO THE LEGISLATURE**

**Top Fifteen Large Hub Airports with Highest Average Total Delay per Operation (1)**

| 2007 Rank | Airport | 2007 Total Operations (2) | 2007 Avg. Minutes Per Operation | 2006 Avg. Minutes Per Operation | 2006 Rank | Change from 2006 to 2007 |
|---|---|---|---|---|---|---|
| 1 | JFK | 456,835 | 14.78 | 12.68 | 1 | 2.10 |
| 2 | LGA | 397,280 | 12.25 | 10.76 | 3 | 1.49 |
| 3 | EWR | 441,908 | 11.76 | 12.21 | 2 | -0.45 |
| 4 | PHL | 499,683 | 10.58 | 10.00 | 4 | 0.58 |
| 5 | ATL | 991,627 | 8.17 | 8.77 | 5 | -0.60 |
| 6 | DTW | 467,442 | 7.83 | 6.39 | 9 | 1.44 |
| **7** | **MSP** | **453,566** | **7.59** | **5.55** | **15** | **2.04** |
| 8 | ORD | 926,973 | 7.33 | 7.08 | 8 | 0.25 |
| 9 | CLT | 525,943 | 7.04 | 7.21 | 7 | -0.17 |
| 10 | BOS | 401,890 | 6.79 | 6.13 | 10 | 0.66 |
| 11 | SLC | 420,996 | 6.54 | 5.71 | 13 | 0.83 |
| 12 | DEN | 619,941 | 6.19 | 4.75 | 21 | 1.44 |
| 13 | DFW | 686,711 | 6.10 | 5.66 | 14 | 0.44 |
| 14 | IAH | 603,641 | 6.05 | 7.24 | 6 | -1.19 |
| 15 | IAD | 419,127 | 5.95 | 5.26 | 17 | 0.69 |

Notes: (1) Includes taxi-in, taxi-out, and airborne delay.
(2) Operations for MSP and other airports from FAA ATADS database.

Source: As noted above and HNTB analysis.

It is important to note that many factors can contribute to airfield delay, including poor weather conditions, runway closures (typically due to reconstruction), changes in airline schedules, changes in ATC procedures, airline fleet mix changes, airline practices, and other factors. In addition, how delays are defined or reported can change over time.

For these reasons, it is often difficult to determine the causes for delays or to be definitive about delay trends over time.

## 2.5 TECHNOLOGICAL / CAPACITY ENHANCEMENTS

The FAA continuously investigates potential capacity-enhancing development/ technology in an effort to increase airport efficiency and reduce delay. When advancement is identified, efforts are made to implement the technology at the busiest airports. This section describes these efforts as they apply to MSP.

- In 1993, the FAA published the *Minneapolis-Saint Paul International Airport Capacity Enhancement Plan*. The purpose of the plan was to identify potential cost-effective projects which would appreciably increase airport capacity. The plan was followed by the 1996 *Airport Capacity Enhancement Terminal Airspace Study*, which identified potential methods of improving airspace capacity.

- Airport Surface Detection Equipment (ASDE-3) was installed at MSP in 1996. It allows controllers to "see" aircraft movements on the ground during poor visibility, which increases safety and efficiency.

- Capacity improvements at Minneapolis-St. Paul will be aided by the use of Flight Management System/Area Navigation Routes (FMS/RNAV). The equipment will provide a more consistent flow of aircraft to the arrival runway.

- A Precision Runway Monitor (PRM) was installed in 1997 and has been commissioned. The PRM permits simultaneous landings on the parallel runways in poor weather down to CAT I minimums. Due to airline and air traffic control coordination issues, the PRM was removed from service in mid-2002. It was returned to service in 2003 and helped reduce delays until 2006 after Runway 17-35 opened. The geometry of the airport after Runway 17-35 was opened reduced the amount of time the PRM could be used and provides a benefit. However, the capacity gains provided by Runway 17-35 far surpassed the gains provided by the PRM. The PRM was decommissioned and use of the system ceased in June 2006.

- The MAC has had ongoing involvement with the development and deployment of differential Global Positioning System technology at MSP. Over seven years ago a Special CAT I Local Area Augmentation System (LAAS) was installed at MSP and in late 2008/early 2009 the system will be upgrade to an FAA certified CAT I installation. This system will allow operators to utilize on-aircraft technologies that could provide for flight management approaches that reduce fuel consumption and controller workload. Ultimately, curved approaches and precision missed approaches may be provided to reduce noise impacts and to lower landing minimums. This will result in a small increase in airport capacity.

- In an effort to increase the operational efficiency and capacity of MSP during inclement weather, MAC has implemented additional CAT II and CAT III capabilities at the airport. Cat II approaches (currently on Runway 30L) allow approaches down to 1200 feet visibility and 100 foot cloud ceiling. CAT III(B) approaches (currently on

Runways 12R, 12L and 35) allow approaches down to 600 feet visibility, and no ceiling.

- Future increases in MSP capacity levels will depend on the introduction of new aircraft avionics. An enhanced tool called Automatic Dependent Surveillance-Broadcast/Cockpit Display of Traffic Information (ADS-B/CDTI) identifies the location of other aircraft and displays their position in the cockpit. This technology allows pilots to maintain the desired separation more precisely; however, it requires aircraft to be properly equipped to use this device. The FAA has awarded a contract to start the installation of the ground equipment necessary to install this system. Minneapolis is in Segment 1, which is expected to have the ground equipment certified by September of 2010. The FAA has issued a notice of proposed rule making (NPRM) which calls for all aircraft which will operate in a terminal area, such as MSP, to have on board aircraft equipment by 2020.

- Alternative airspace improvements were studied in the *Airport Capacity Enhancement Terminal Airspace Study*. The report found that the existing airspace around MSP can be reconfigured to accommodate the proposed north-south runway. In addition, airspace efficiency can be improved either by adding a new jet arrival fix or a new parallel jet arrival stream. These improvements have now been implemented with the opening of Runway 17-35.

- Within the next decade air traffic controllers will begin using the Passive Final Approach Spacing Tool (pFAST). It assists controllers with sequencing aircraft and creates a better flow of traffic into the terminal area.

### 2.5.1 Precision Instrument Approaches

In addition to how an airport's runways are separated and configured, airfield capacity can be greatly affected by how the runways are equipped for inclement weather. The number and type of precision instrument approaches at MSP is summarized in **Table 2.5**.

**Table 2.5**

**Precision Instrument Approaches**

| MSP | CAT I | CAT II | CAT III |
|---|---|---|---|
| Runways: | 30R | 30L | 12L (CAT IIIB)<br>12R (CAT IIIA)<br>35 (CAT IIIB) |

Notes: The term decision height is defined as the height at which a decision must be made during a precision approach to either continue the landing maneuver or execute a missed approach.

Precision approaches are categorized based on decision height and the horizontal visibility that a pilot has along the runway. Visibility values are expressed in statute miles, or in terms of runway visual range (RVR), if RVR measuring equipment is installed at an airport.

The different classes of precision instrument approaches are:

i. Category I (CAT I) – provides approaches to a decision height down to 200 feet and a basic visibility of ¾ statute miles or as low as 1,800 feet RVR.
ii. Category II (CAT II) – provides approaches to a decision height down to 100 feet and an RVR down to 1,200 feet.
iii. Category IIIA (CAT IIIA) – provides approaches without a decision height (down to the ground) and an RVR down to 700 feet.
iv. Category IIIB (CAT IIIB) – provides approaches without a decision height and an RVR down to 150 feet.
v. Category IIIC (CAT IIIC) – provides approaches without a decision height and RVR. This will permit landings in "0/0 conditions," that is, weather conditions with no ceiling and visibility as during periods of heavy fog.

Source: December 2006 U.S. Terminal Procedures, NOAA.

# 3. RELIEVER AIRPORTS

## 3.0 OVERVIEW

The Metropolitan Airports Commission (MAC) airport system is comprised of seven airports: Minneapolis/St. Paul International and six reliever airports. The reliever airports include Airlake, Anoka County-Blaine, Crystal, Flying Cloud, Lake Elmo and St. Paul Downtown.

This portion of the report highlights the facilities and activities at the six reliever airports. It is divided into three sections:

1. Description of Reliever Airport Facilities

2. Historic and Existing Activity Levels

3. Development Programs

## 3.1. DESCRIPTION OF AIRPORT FACILITIES

According to the Metropolitan Council Aviation Policy Plan, December 1996, all but one of the MAC reliever airports are classified as minor airports, which have primary runway lengths between 2,500 and 5,000 feet. St. Paul Downtown is classified as an intermediate airport, as its primary runway is between 5,000 feet and 8,000 feet long.

Airport users at the MAC reliever airports include air taxi, business, general aviation, flight training, personal, recreational, and military. This section outlines the existing airport facilities at each reliever airport.

### 3.1.1 Airlake Airport

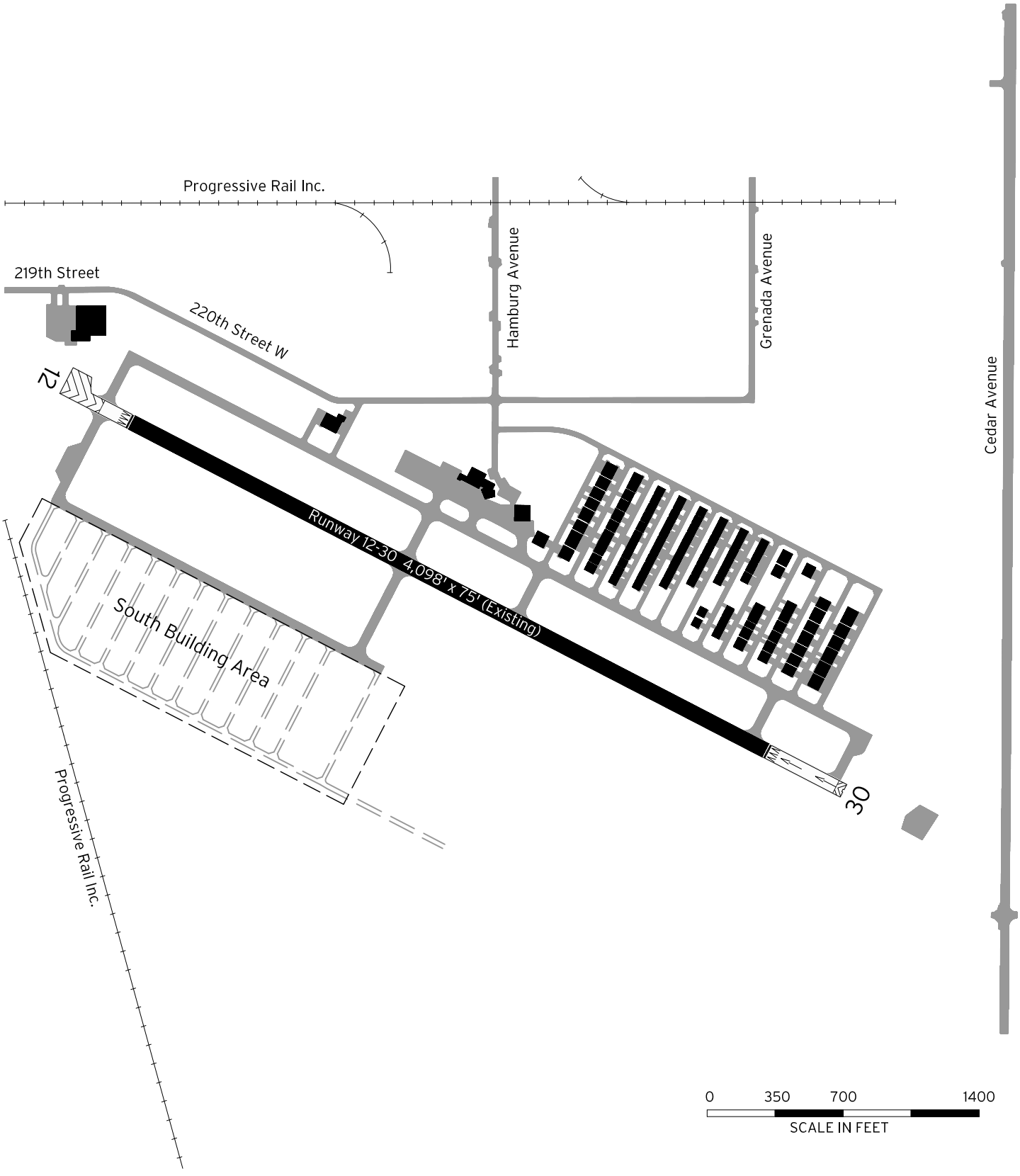
**Figure 3-1** shows the general airport layout for Airlake Airport (LVN). The airfield at LVN consists of one northwest-southeast runway and full-length parallel taxiway. Runway 12-30 is 4,098 feet long by 75 feet wide. The airport has a precision instrument approach to Runway 30 and a non-precision approach to Runway 12. A Fixed Base Operator (FBO) at the airport provides fueling and other aircraft maintenance services. The airport had 175 based aircraft and estimated 41,300 annual aircraft operations in 2007. There is no air traffic control tower (ATCT) located at the airport.

More detailed analysis of based aircraft and operations were done as part of the LTCP efforts for Airlake, Crystal, and Lake Elmo Airports. Forecasts for those reports were based on updated numbers. These numbers are not exactly the same as the FAA's numbers. For consistency, the FAA records were used in this report because more complete data were available for all of the airports.

N

# Airlake Airport Layout

Figure 3-1



### 3.1.2 Anoka County-Blaine Airport

**Figure 3-2** shows the general airport layout for the Anoka County-Blaine Airport (ANE). The airfield at ANE consists of one east-west runway and one north-south runway. Both have full-length parallel taxiways. Runway 9-27 is 5,000 feet long by 100 feet wide and Runway 18-36 is 4,855 feet long by 100 feet wide. The airport has a precision instrument approach to Runway 27 and non-precision instrument approaches to Runways 9, 18 and 27. Two FBOs at the airport provide fueling, flight training and other maintenance services for aircraft and helicopters. The airport had 459 based aircraft and approximately 80,500 annual aircraft operations in 2007. A non-federal ATCT is located at the airport.

### 3.1.3 Crystal Airport

**Figure 3-3** shows the general airport layout for Crystal Airport (MIC). The airfield at MIC consists of two northwest-southeast runways and two southwest-northeast runways, one of which is turf and not open during the winter months. Runway 14R-32L has a full length parallel taxiway. Runway 14L-32R is 3,263 feet long by 75 feet wide, Runway 14R-32L is 3,266 feet long by 75 feet wide, Runway 6L-24R is 2,499 feet long by 75 feet wide, and the turf runway (6R-24L) is 2,122 feet long by 150 feet wide. The airport has two non-precision instrument approaches. Four FBOs at the airport provide fueling, flight training and other aircraft maintenance services. The airport had 251 based aircraft and approximately 53,000 annual aircraft operations in 2007. An FAA operated ATCT is located at the airport.

More detailed analysis of based aircraft and operations were done as part of the LTCP efforts for Airlake, Crystal, and Lake Elmo Airports. Forecasts for those reports were based on updated numbers. These numbers are not exactly the same as the FAA's numbers. For consistency, the FAA records were used in this report because more complete data were available for all of the airports.

### 3.1.4 Flying Cloud Airport

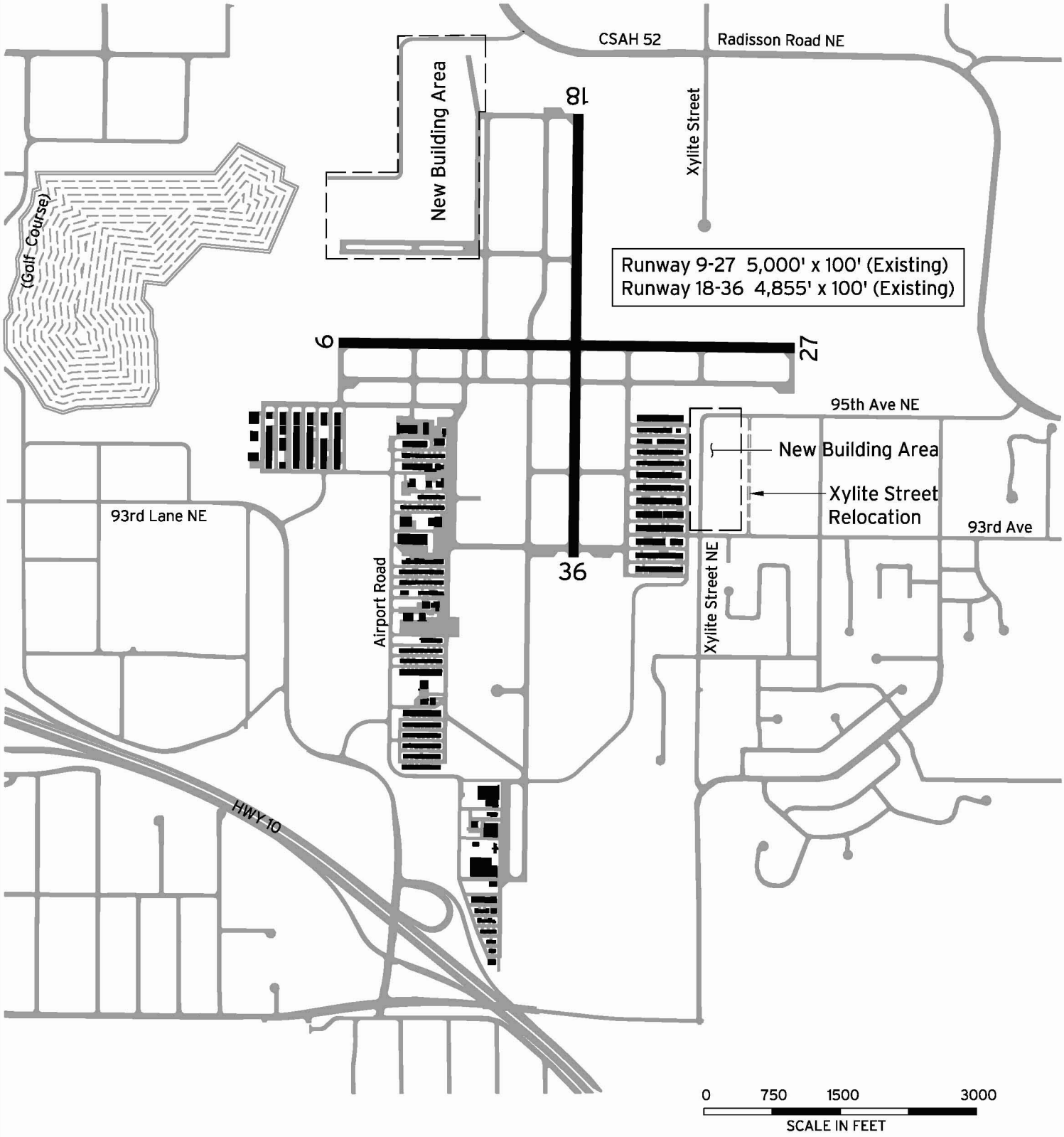
**Figure 3-4** shows the general airport layout for Flying Cloud Airport (FCM). The airfield at FCM consists of two east-west runways and one north-south runway. All runways have full-length parallel taxiways. Runway 10R-28L is 3,909 feet long by 75 feet wide, Runway 10L-28R is 3,599 feet long by 75 feet wide and Runway 18-36 is 2,691 feet long by 75 feet wide. The airport has a precision instrument approach to Runway 10R and non-precision instrument approaches to Runways 10R, 28L, 28R, and 36. It also has a published precision instrument approach procedure for helicopters. Six FBOs at the airport provide fueling, flight training and other maintenance services for aircraft and helicopters. The airport had 450 based aircraft and approximately 117,500 annual aircraft operations in 2007. An FAA operated ATCT is located at the airport.

### 3.1.5 Lake Elmo Airport

**Figure 3-5** shows the general airport layout for Lake Elmo Airport (21D). The airfield at Lake Elmo Airport consists of one northwest-southeast runway and one southwest-northeast runway. Both have full length parallel taxiways. Runway 14-32 is 2,850 feet long by 75 feet wide and Runway 4-22 is 2,497 feet long by 75 feet wide. The airport

# Anoka County-Blaine Airport Layout

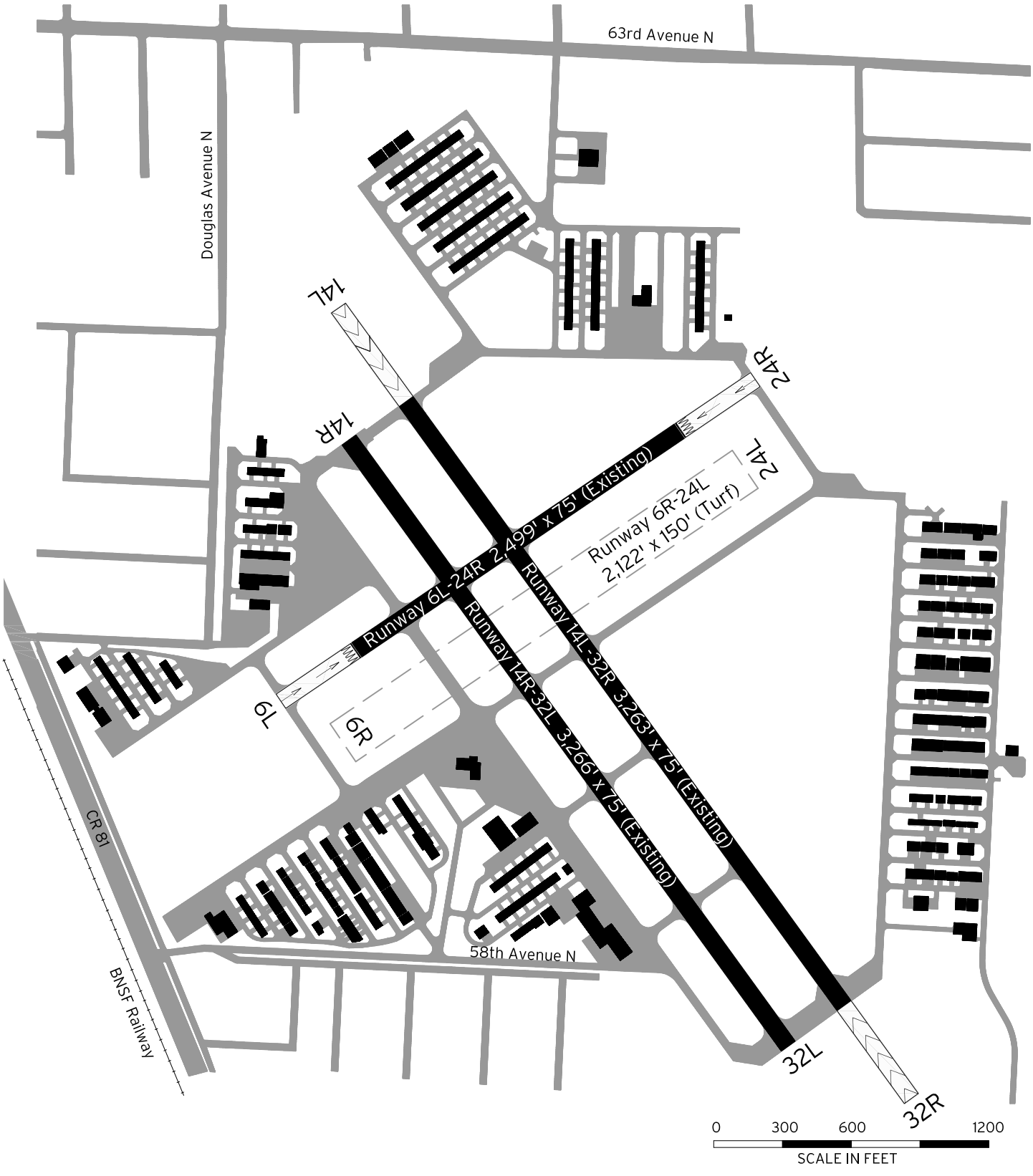
Figure 3-2



N

# Crystal Airport Layout

Figure 3-3

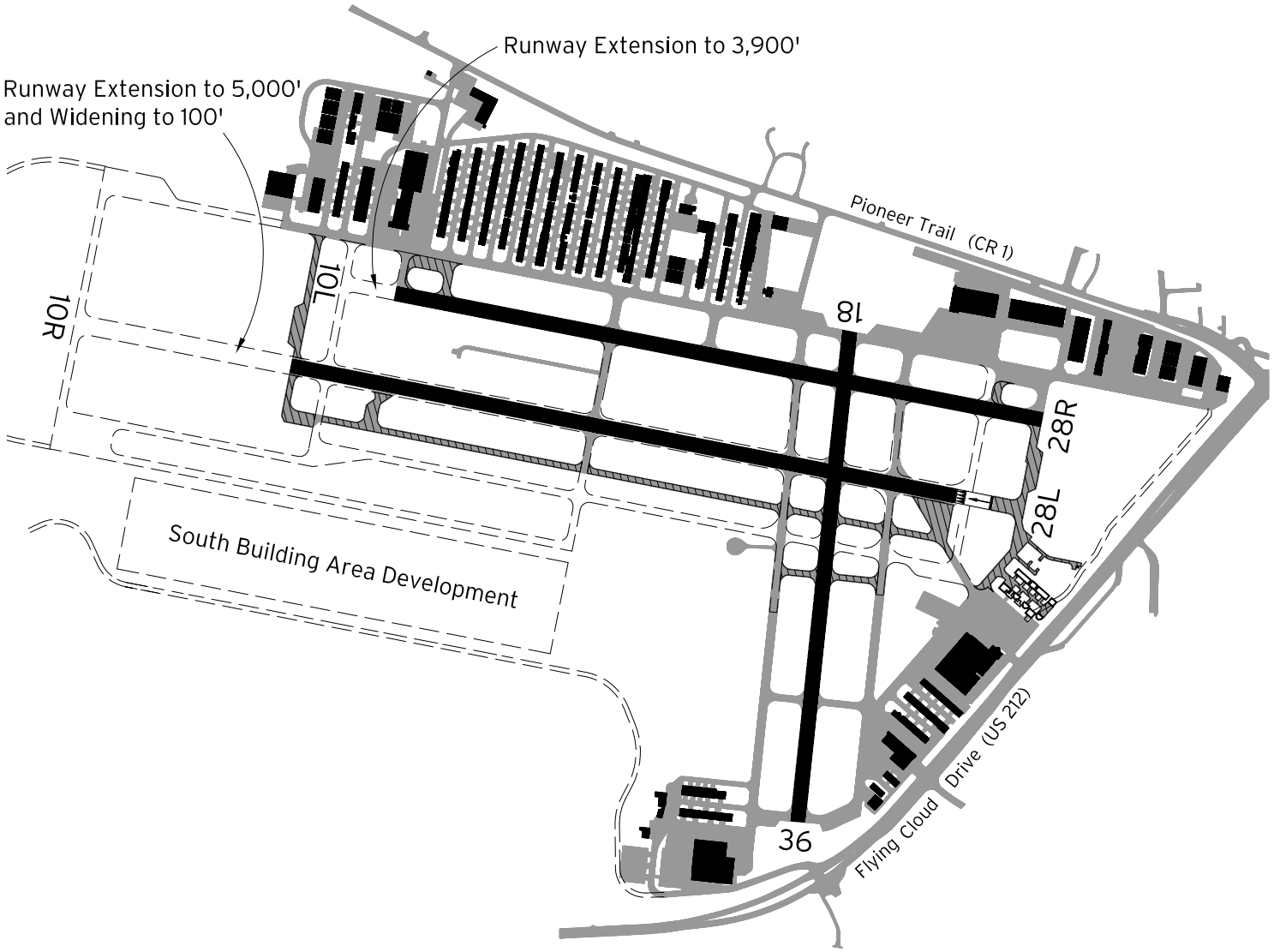


# Flying Cloud Airport Layout

Figure 3-4

N

Runway 10L-28R 3,599' x 75' (Existing) 3,900' (Ultimate)
Runway 10R-28L 3,909' x 75' (Existing) 5,000' x 100' (Ultimate)
Runway 18-36 2,691' x 75' (Existing)



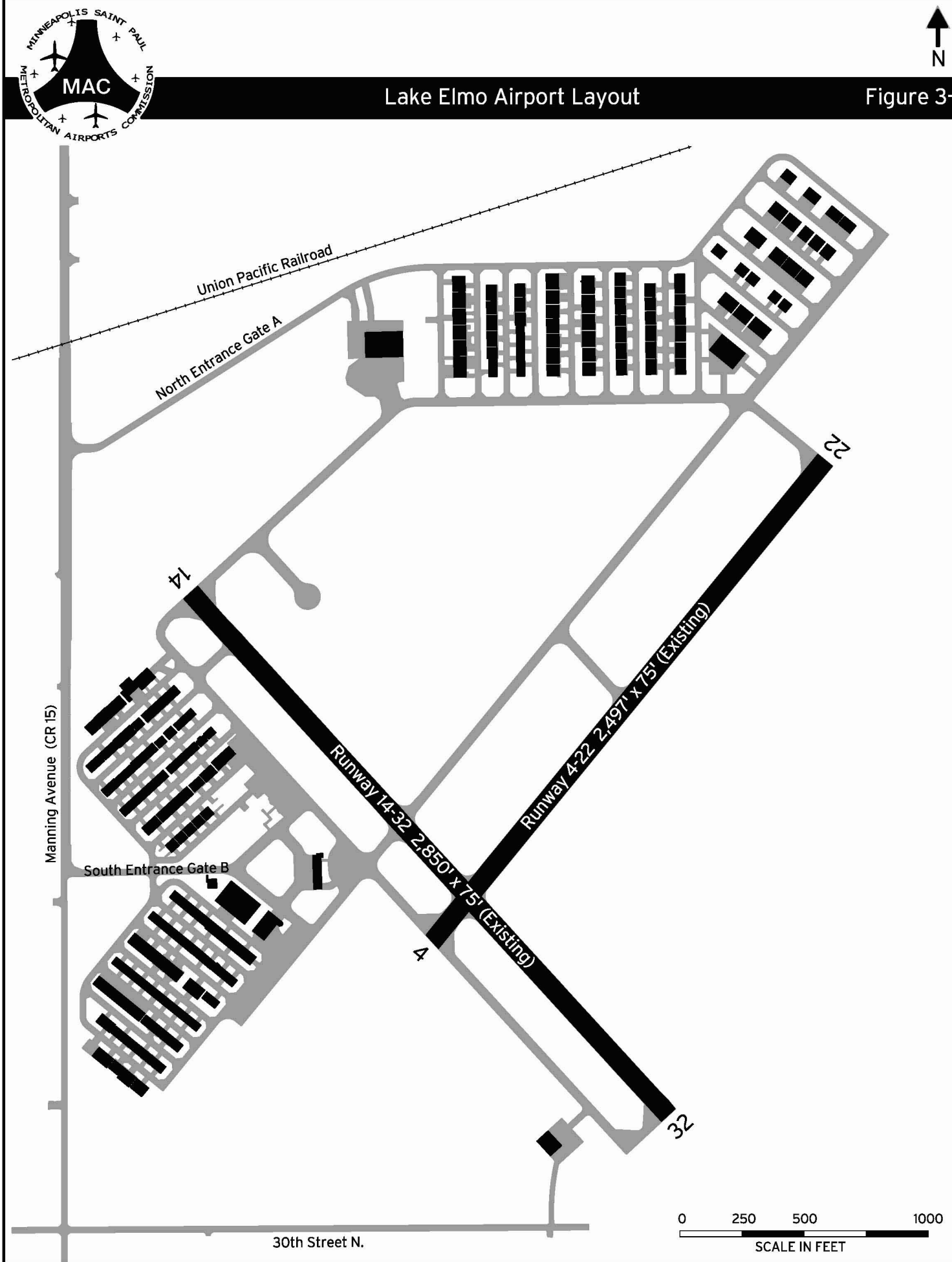

## KEY

= Planned Development
= Future Pavement Removal

0 400 800 1600
SCALE IN FEET

# Lake Elmo Airport Layout

Figure 3-5



has two non-precision instrument approaches to the airport. One FBO at the airport provides fueling, flight training and other aircraft maintenance services. The airport had 227 based aircraft and estimated 38,600 annual aircraft operations in 2007. There is no ATCT located at the airport.

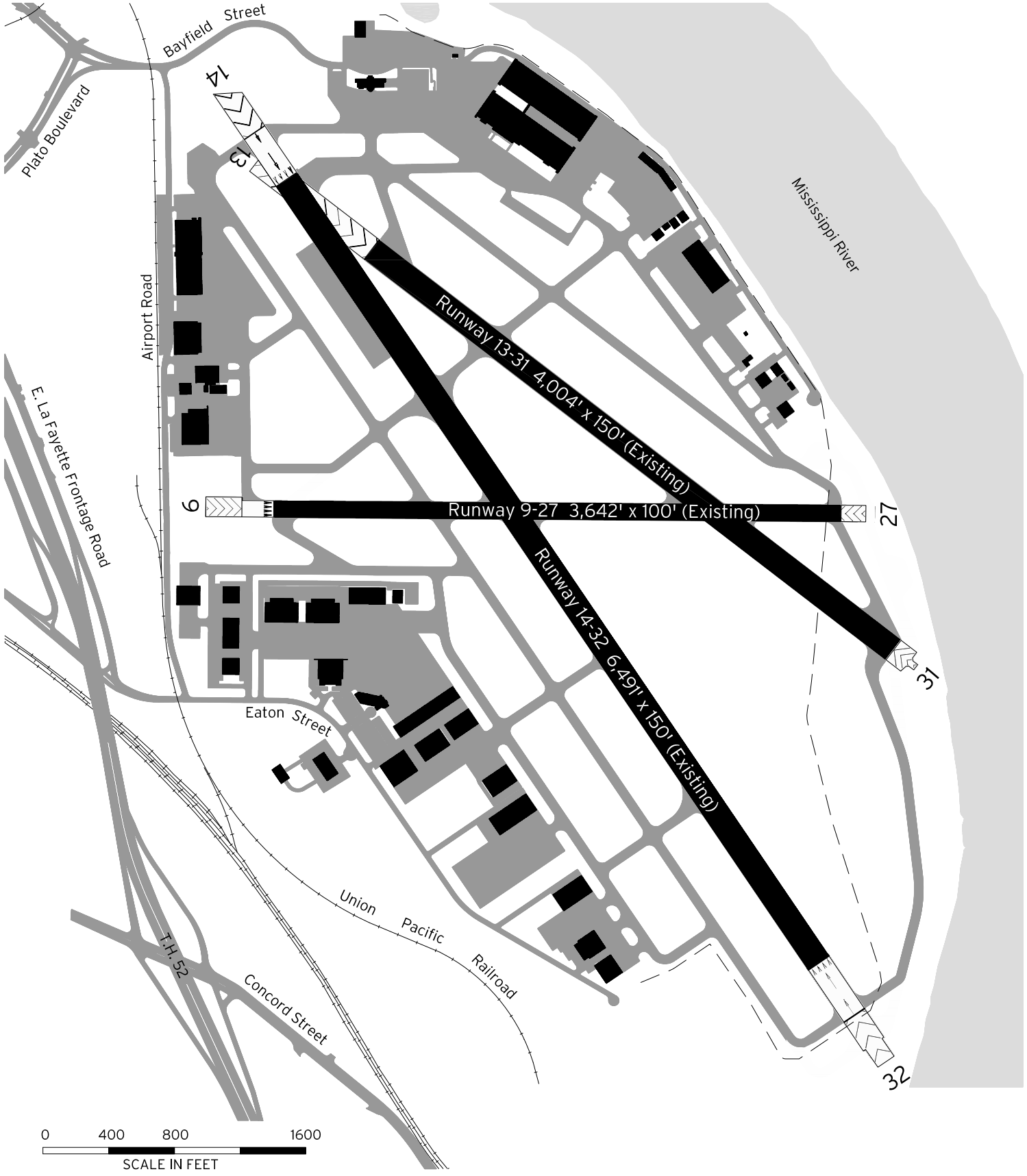
More detailed analysis of based aircraft and operations were done as part of the LTCP efforts for Airlake, Crystal, and Lake Elmo Airports. Forecasts for those reports were based on updated numbers. These numbers are not exactly the same as the FAA's numbers. For consistency, the FAA records were used in this report because more complete data were available for all of the airports.

### 3.1.6 St. Paul Downtown Airport

**Figure 3-6** shows the general airport layout for the St. Paul Downtown Airport (STP), also known as Holman Field. The airfield at STP consists of two northwest-southeast runways and one east-west runway. Runway 14-32 has a full-length parallel taxiway. Both other runways have partial parallel taxiways. Runway 14-32 is 6,491 feet long by 150 feet wide, Runway 13-31 is 4,004 feet long by 150 feet wide, and Runway 9-27 is 3,642 feet long by 100 feet wide. The airport has precision instrument approaches to Runways 14 and 32 and non-precision instrument approaches to Runways 14, 31, and 32. It also has a published precision instrument approach procedure for helicopters. Three FBOs at the airport provide fueling, flight training and other maintenance services for aircraft. The airport had 124 based aircraft and approximately 117,500 annual aircraft operations in 2007. An FAA operated ATCT is located at the airport.

# St. Paul Downtown Airport Layout

Figure 3-6



## 3.2 HISTORIC AND FORECAST ACTIVITY LEVELS

This section presents an overview of aircraft activity at the reliever airports.

**Table 3.1** shows historical based aircraft recorded at the six MAC reliever airports from 1980 through 2007. Total based aircraft grew slowly between 1984 and 1999, reaching a high of 1,864 aircraft. Since 1999, total based aircraft have declined nearly 15 percent to 1,602 aircraft in 2008. Over the last 10 years, the numbers of aircraft based at Anoka County, Lake Elmo and St. Paul Downtown have remained fairly constant, while the numbers of aircraft based at Airlake, Crystal and Flying Cloud have decreased. The data in **Table 3.1** are the best available, but should be viewed with caution, as in some cases the numbers remain unchanged over periods of several years suggesting infrequent updates.

Historically, the number of aircraft based at MAC airports has accounted for between 0.8 and 0.9 percent of the U.S. active fleet. Since 1999, the share has been gradually declining. A small part of this decline is attributable to the decline in the share of U.S. income accounted for by the Minneapolis-St. Paul seven-county metropolitan area. The decline in share, however, does not necessarily mean that the number of general aviation aircraft in the Twin Cities area is growing more slowly than in the United States, as some new aircraft could be based at non-MAC airports such as South St. Paul or Forest Lake, or at airports outside the seven county area. Recent increases in rates and charges at the MAC reliever airports may have encouraged migration of some aircraft to non-MAC airports.

Historical operations recorded at the reliever airports are presented in **Table 3.2**. Aircraft operations are difficult to estimate especially at airports with no ATCT. Although Anoka County-Blaine, Flying Cloud, Crystal, and St. Paul Downtown Airports have control towers, they are operational for 15 hours a day; therefore activity is likely under-reported. Operations at Airlake and Lake Elmo are estimated.

**Figure 3-7** and **Figure 3-8** show the historic activity at the reliever airports.

**Table 3.1**
**Historical Based Aircraft at MAC Reliever Airports (MAC Records)**

| Year | Airlake | Anoka County | Crystal | Flying Cloud | Lake Elmo | St. Paul | Total |
|---|---|---|---|---|---|---|---|
| 1980 | N/A | 353 | 315 | 582 | 170 | 190 | 1,610 |
| 1981 | N/A | 360 | 297 | 580 | 220 | 205 | 1,662 |
| 1982 | N/A | 384 | 337 | 608 | 238 | 181 | 1,748 |
| 1983 | N/A | 362 | 327 | 615 | 236 | 164 | 1,704 |
| 1984 | 61 | 361 | 352 | 568 | 244 | 165 | 1,751 |
| 1985 | 63 | 390 | 338 | 568 | 145 | 147 | 1,651 |
| 1986 | 93 | 412 | 333 | 560 | 145 | 160 | 1,703 |
| 1987 | 153 | 408 | 345 | 565 | 150 | 168 | 1,789 |
| 1988 | 153 | 384 | 325 | 492 | 149 | 181 | 1,684 |
| 1989 | 140 | 405 | 320 | 485 | 171 | 188 | 1,709 |
| 1990 | 140 | 411 | 324 | 485 | 177 | 191 | 1,728 |
| 1991 | 140 | 414 | 327 | 487 | 179 | 193 | 1,740 |
| 1992 | 165 | 408 | 327 | 482 | 189 | 198 | 1,769 |
| 1993 | 179 | 408 | 327 | 482 | 189 | 198 | 1,783 |
| 1994 | 179 | 415 | 327 | 482 | 198 | 198 | 1,799 |
| 1995 | 179 | 415 | 327 | 482 | 198 | 198 | 1,799 |
| 1996 | 179 | 431 | 327 | 482 | 205 | 198 | 1,822 |
| 1997 | 179 | 441 | 327 | 482 | 210 | 203 | 1,842 |
| 1998 | 179 | 451 | 327 | 482 | 210 | 180 | 1,829 |
| 1999 | 178 | 472 | 309 | 509 | 250 | 146 | 1,864 |
| 2000 | 175 | 454 | 296 | 485 | 245 | 137 | 1,792 |
| 2001 | 170 | 447 | 280 | 461 | 235 | 131 | 1,724 |
| 2002 | 170 | 464 | 278 | 473 | 237 | 130 | 1,752 |
| 2003 | 190 | 490 | 288 | 463 | 237 | 124 | 1,792 |
| 2004 | 177 | 488 | 263 | 456 | 236 | 124 | 1,744 |
| 2005 | 163 | 482 | 265 | 451 | 239 | 124 | 1,724 |
| 2006 | 159 | 475 | 261 | 447 | 233 | 124 | 1,699 |
| 2007 | 175 | 459 | 251 | 450 | 227 | 124 | 1,686 |
| 2008 | 158 | 439 | 238 | 413 | 230 | 124 | 1,602 |

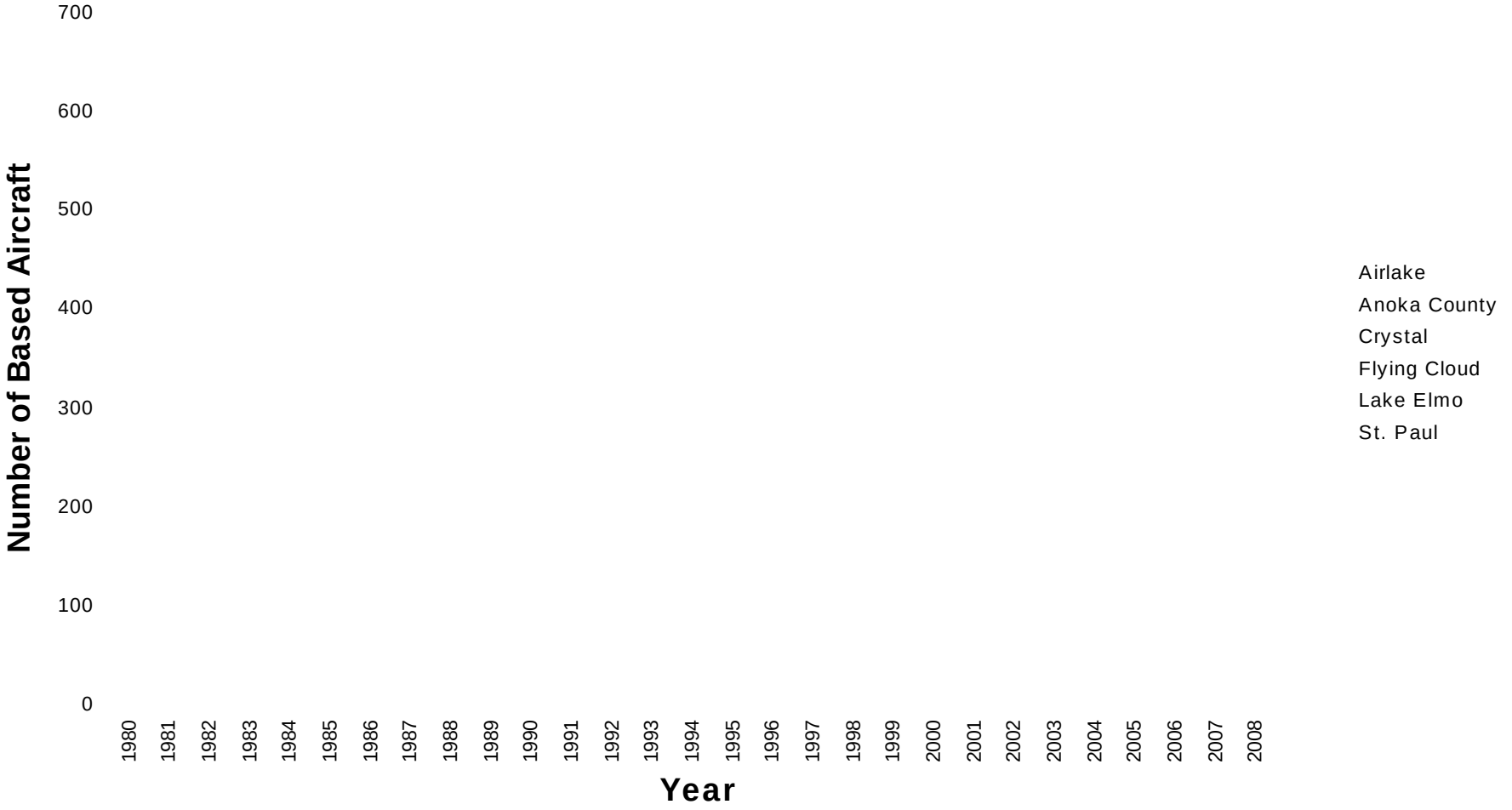
Source: Metropolitan Airports Commission.

**Table 3.2**
**Historical Operations at MAC Airports (MAC Records)**

| Year | Airlake | Anoka County | Crystal | Flying Cloud | Lake Elmo | St. Paul | Total |
|---|---|---|---|---|---|---|---|
| 1980 | N/A | 190,000 | 183,840 | 218,975 | 100,000 | 134,286 | 827,101 |
| 1981 | N/A | 150,000 | 154,436 | 194,229 | 90,000 | 107,305 | 695,970 |
| 1982 | N/A | 150,000 | 123,577 | 145,718 | 90,000 | 77,509 | 586,804 |
| 1983 | 20,000 | 140,000 | 136,314 | 166,266 | 90,000 | 97,118 | 649,698 |
| 1984 | 23,000 | 145,000 | 140,704 | 165,542 | 92,000 | 103,118 | 669,364 |
| 1985 | 35,000 | 160,000 | 143,665 | 176,246 | 82,000 | 112,019 | 708,930 |
| 1986 | 40,000 | 165,000 | 152,773 | 191,350 | 70,000 | 124,786 | 743,909 |
| 1987 | 52,000 | 180,000 | 165,367 | 209,423 | 63,000 | 135,397 | 805,187 |
| 1988 | 64,000 | 200,000 | 172,074 | 186,699 | 65,000 | 151,869 | 839,642 |
| 1989 | 66,000 | 212,000 | 177,679 | 207,661 | 65,000 | 166,436 | 894,776 |
| 1990 | 67,980 | 215,000 | 189,910 | 227,408 | 66,950 | 190,333 | 957,581 |
| 1991 | 74,745 | 195,650 | 173,150 | 186,496 | 69,650 | 168,450 | 868,141 |
| 1992 | 81,087 | 195,650 | 179,546 | 198,306 | 69,650 | 152,378 | 876,617 |
| 1993 | 81,087 | 195,650 | 183,554 | 218,745 | 69,950 | 132,531 | 881,517 |
| 1994 | 82,500 | 199,000 | 185,991 | 238,838 | 71,000 | 145,834 | 923,163 |
| 1995 | 75,397 | 181,866 | 171,478 | 216,313 | 64,887 | 133,686 | 843,627 |
| 1996 | 75,397 | 192,600 | 187,957 | 217,703 | 68,400 | 139,055 | 881,112 |
| 1997 | 72,382 | 143,083 | 175,728 | 198,199 | 65,664 | 136,968 | 792,024 |
| 1998 | 76,725 | 143,950 | 179,186 | 210,907 | 69,604 | 158,785 | 839,157 |
| 1999 | 76,725 | 150,014 | 178,342 | 192,737 | 70,996 | 158,835 | 827,649 |
| 2000 | 76,418 | 156,546 | 176,554 | 186,078 | 70,687 | 157,788 | 824,071 |
| 2001 | 70,229 | 136,892 | 156,801 | 185,593 | 64,962 | 142,794 | 757,271 |
| 2002 | 69,176 | 138,935 | 127,095 | 176,408 | 64,529 | 171,628 | 747,771 |
| 2003 | 58,108 | 132,144 | 98,612 | 155,837 | 54,205 | 131,794 | 630,700 |
| 2004 | 53,309 | 109,853 | 75,023 | 163,196 | 49,855 | 127,478 | 578,714 |
| 2005 | 51,678 | 101,267 | 72,205 | 157,710 | 48,329 | 129,814 | 561,003 |
| 2006 | 48,014 | 92,947 | 65,528 | 144,178 | 44,903 | 125,669 | 521,239 |
| 2007 | 41,292 | 80,508 | 53,038 | 117,492 | 38,617 | 117,535 | 448,482 |

Source: Metropolitan Airports Commission.

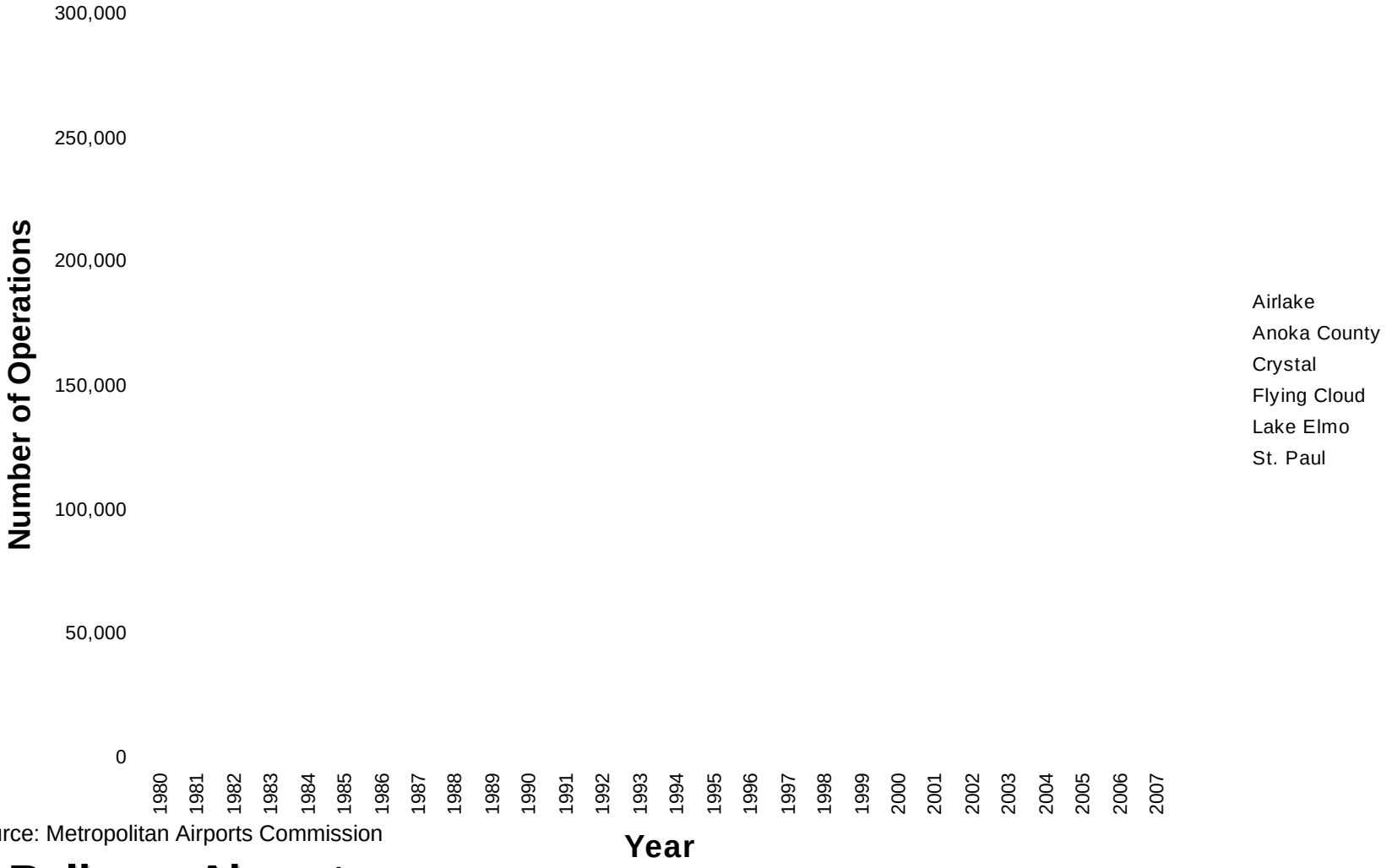
## Figure 3-7
## Historic Based Aircraft
## 1980-2008




Source: Metropolitan Airports Commission

# Reliever Airports

## Figure 3-8
## Historic Operations
## 1980-2007




Source: Metropolitan Airports Commission

## Reliever Airports

The FAA prepares activity forecasts called Terminal Area Forecasts (TAF) for these airports. **Table 3.3** and **Table 3.4** show FAA TAF for based aircraft and operations at the six MAC reliever airports through 2025.

The forecasts show a slow steady increase in based aircraft and operations at each of the airports over the next 20 years. The average annual growth rate of total based aircraft at the reliever airports is approximately 1.3%. The average annual growth rate of total operations is approximately 2.0%. These rates coincide with the national averages.

**Figure 3-9** and **Figure 3-10** show the forecast trend in based aircraft and operations at each of the airports through the year 2025.

**Table 3.3**
**Forecast Based Aircraft at MAC Airports (FAA TAF)**

| Year | Airlake | Anoka County | Crystal | Flying Cloud | Lake Elmo | St. Paul | Total |
|---|---|---|---|---|---|---|---|
| 2009 | 163 | 481 | 278 | 475 | 244 | 124 | 1,765 |
| 2010 | 164 | 487 | 283 | 483 | 246 | 125 | 1,788 |
| 2011 | 165 | 494 | 288 | 491 | 249 | 125 | 1,812 |
| 2012 | 167 | 503 | 293 | 500 | 251 | 126 | 1,840 |
| 2013 | 168 | 510 | 299 | 508 | 253 | 126 | 1,864 |
| 2014 | 170 | 518 | 304 | 516 | 256 | 127 | 1,891 |
| 2015 | 170 | 524 | 309 | 525 | 258 | 128 | 1,914 |
| 2016 | 172 | 532 | 315 | 534 | 260 | 130 | 1,943 |
| 2017 | 174 | 540 | 321 | 543 | 263 | 131 | 1,972 |
| 2018 | 175 | 548 | 327 | 552 | 265 | 131 | 1,998 |
| 2019 | 177 | 556 | 333 | 562 | 268 | 133 | 2,029 |
| 2020 | 179 | 564 | 339 | 571 | 270 | 134 | 2,057 |
| 2021 | 180 | 572 | 345 | 580 | 273 | 134 | 2,084 |
| 2022 | 181 | 581 | 351 | 589 | 275 | 136 | 2,113 |
| 2023 | 183 | 589 | 357 | 600 | 278 | 138 | 2,145 |
| 2024 | 185 | 597 | 364 | 610 | 280 | 139 | 2,175 |
| 2025 | 187 | 605 | 371 | 620 | 282 | 140 | 2,205 |

Source: FAA TAF, Issued December 2007

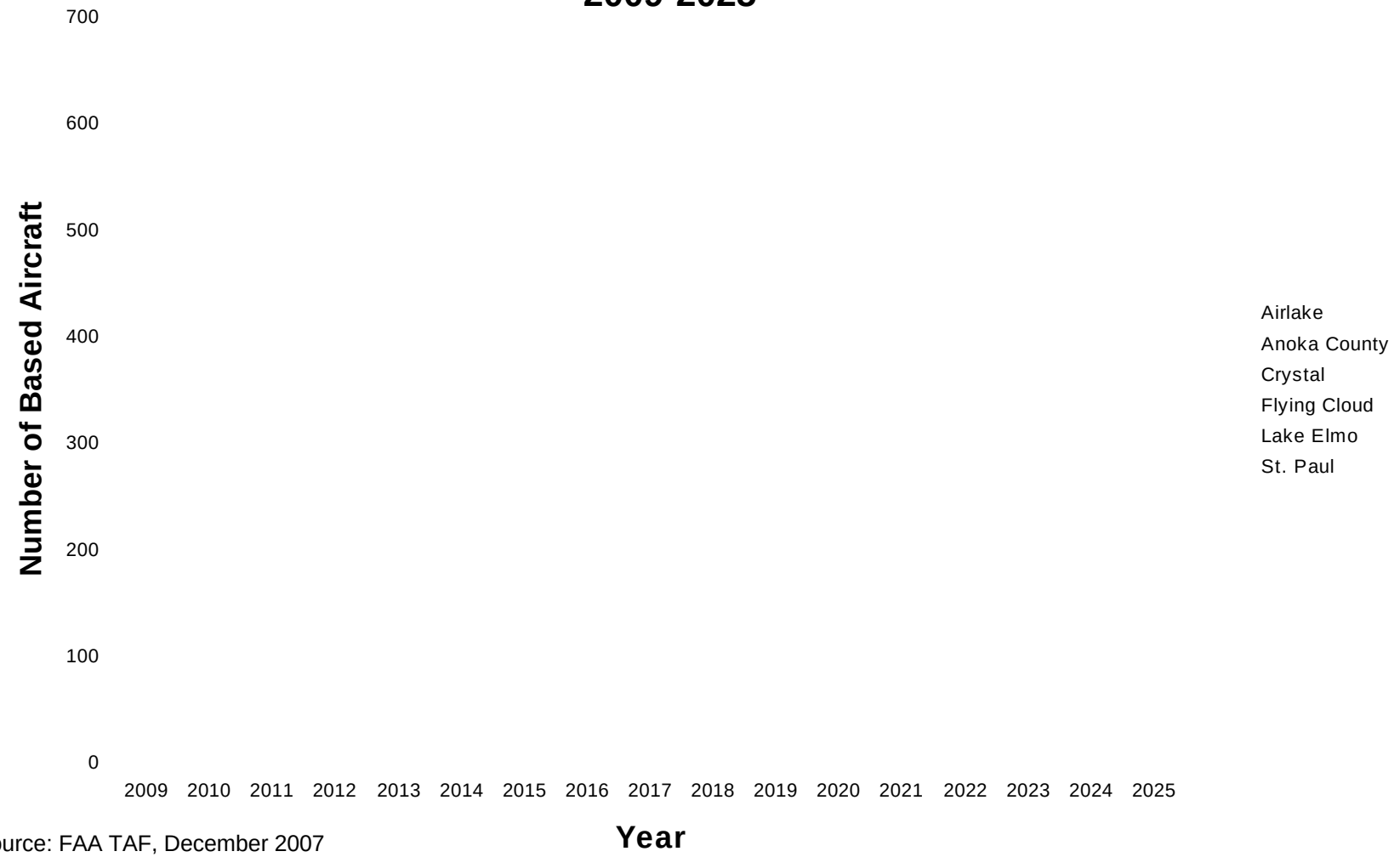
**Table 3.4**
**Forecast Operations at MAC Airports (FAA TAF)**

| Year | Airlake | Anoka County | Crystal | Flying Cloud | Lake Elmo | St. Paul | Total |
|---|---|---|---|---|---|---|---|
| 2008 | 61,070 | 88,530 | 54,036 | 125,231 | 61,381 | 127,722 | 517,970 |
| 2009 | 63,390 | 90,457 | 55,400 | 127,165 | 63,133 | 130,476 | 530,021 |
| 2010 | 65,799 | 92,438 | 56,675 | 129,158 | 64,936 | 133,308 | 542,314 |
| 2011 | 68,299 | 94,477 | 57,978 | 131,212 | 66,790 | 136,219 | 554,975 |
| 2012 | 70,895 | 96,574 | 59,318 | 133,328 | 68,698 | 139,215 | 568,028 |
| 2013 | 73,589 | 98,731 | 60,690 | 135,508 | 70,659 | 142,295 | 581,472 |
| 2014 | 76,385 | 100,950 | 62,089 | 137,755 | 72,677 | 145,464 | 595,320 |
| 2015 | 79,288 | 102,375 | 63,231 | 139,042 | 74,753 | 147,534 | 606,223 |
| 2016 | 82,300 | 103,822 | 64,594 | 140,343 | 76,888 | 149,641 | 617,588 |
| 2017 | 85,428 | 105,292 | 65,575 | 141,673 | 79,084 | 151,782 | 628,834 |
| 2018 | 88,674 | 106,785 | 66,782 | 143,026 | 81,343 | 153,958 | 640,568 |
| 2019 | 92,044 | 108,301 | 68,011 | 144,402 | 83,667 | 156,171 | 652,596 |
| 2020 | 95,542 | 109,841 | 69,259 | 145,793 | 86,057 | 158,420 | 664,912 |
| 2021 | 96,705 | 111,405 | 70,475 | 147,207 | 87,277 | 160,707 | 673,776 |
| 2022 | 97,882 | 112,995 | 71,712 | 148,645 | 88,516 | 163,032 | 682,782 |
| 2023 | 99,067 | 114,611 | 72,975 | 150,107 | 89,771 | 165,396 | 691,927 |
| 2024 | 100,274 | 116,251 | 74,256 | 151,602 | 91,044 | 167,800 | 701,227 |
| 2025 | 101,494 | 117,916 | 75,560 | 153,114 | 92,335 | 170,244 | 710,663 |

Source: FAA TAF, Issued December 2007

More detailed analysis of based aircraft and operations were done as part of the Long Term Comprehensive Development Plan (LTCP) efforts for Airlake, Crystal, and Lake Elmo Airports. Forecasts for those reports were based on updated numbers. These numbers are not exactly the same as the FAA's numbers. For consistency, the FAA records were used in this report because more complete data were available for all of the airports.

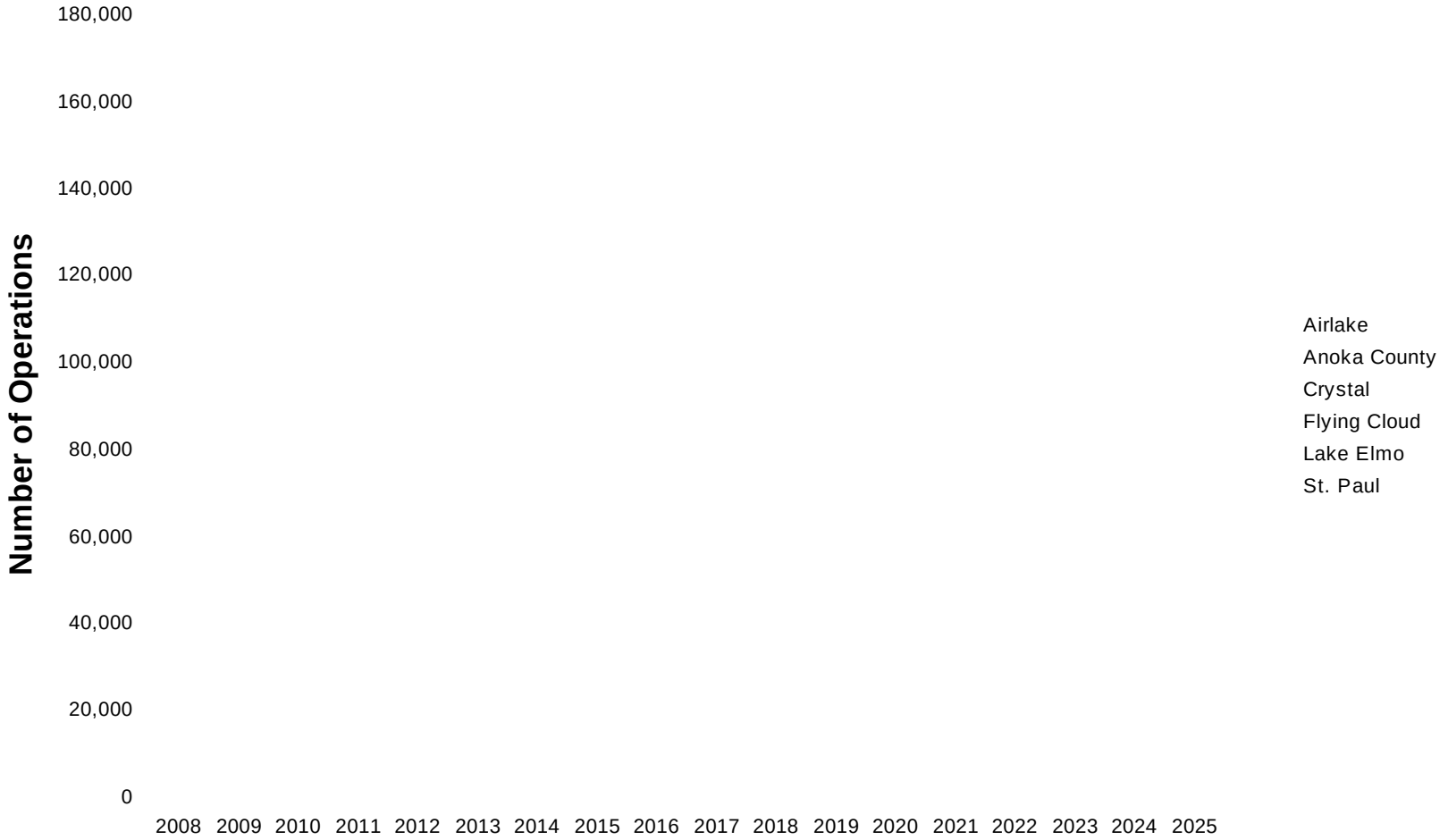
## Figure 3-9
## Forecast Based Aircraft
## 2009-2025




Source: FAA TAF, December 2007

## Reliever Airports

## Figure 3-10
## Forecast Operations
## 2008-2025




Source: FAA TAF, December 2007

## Reliever Airports

## 3.3 DEVELOPMENT PROGRAMS

This section outlines the status of major development programs at each of the reliever airports.

### Airlake Airport

Recent projects at Airlake include complete runway reconstruction in 2000, reconstruction and realignment of the north parallel taxiway, and construction of a partial south parallel taxiway in 2003. Another major development project ended in 1999 with the completion of grading for a new south building area. Since then, further development of this area has been delayed due to funding issues and issues with the provision of sanitary sewer and water to this area.

In 2006, rehabilitation of taxilanes in the North Building Area began. This work resulted in the reclamation of existing pavement and placement of new bituminous surfacing on five of 13 taxilanes. In addition, the pavement areas on the east side of MAC's maintenance facility were reconstructed. In 2007 the rehabilitation of pavements in the North Building Area continued with rehabilitation of the remaining eight taxilanes and the entrance road to the airport.

A Long Term Comprehensive Development Plan (LTCP) is being prepared for the airport. This plan analyzes existing facilities, forecasts future activity, and outlines development needed to meet the projected demand. It also reviews the previous LTCP recommendations for airport development, and summarizes new recommendations through 2025. It should be finished by the spring of 2008.

### 3.3.2 Anoka County – Blaine Airport

A major airport expansion program commenced in 2005 that included an extension to Runway 9-27 and the installation of an Instrument Landing System (ILS). The runway was extended from 4,000 feet to 5,000 feet, and widened from 75 feet to 100 feet. As a result, the entire runway pavement was reconstructed. The parallel taxiway was also extended and fully reconstructed. An approach lighting system (MALSR) was also added for Runway 27.

A new hangar area was also included in the development. The project involved the construction of taxiways and connectors, a new FBO apron, site preparation for a new building area, security fencing, basins for storm water, and a water main loop from the new building area to the Air Traffic Control Tower. An access road was constructed from Radisson Road to the new building area. This area is now ready for a new FBO and storage hangars. The expansion program was funded through a pubic-public-private agreement between MAC, Anoka County and a developer. The latter will build new hangars for sale or lease.

All of the expansion projects have impacted wetland areas on the airport. A substantial wetland mitigation project has been completed on MAC owned property in the City of Ham Lake, which included the creation and restoration of 120 acres of varying wetland types.

Recent construction projects include the on-going pavement rehabilitation projects for the taxiways and the installation of sanitary sewer and water facilities in 1999 and 2000. In addition, approximately 370 acres of land was leased to the Minnesota Amateur Sports Commission for the construction and operation of an 18-hole youth golf course.

MAC has just begun working with the local communities to enact airport safety zoning. This process is expected to take approximately eight months to complete.

Preparation of a Long Term Comprehensive Development Plan (LTCP) is beginning for the airport and should be completed by the end of 2008 or early 2009. This plan will analyze existing facilities, forecast future activity, and outline development needed to meet the projected demand.

### 3.3.3 Crystal Airport

There have been ongoing pavement rehabilitation projects at the airport over the last few years. The projects include bituminous overlays, seal coats and reconstruction to restore the pavement surfaces and improve overall airfield conditions. Runway 6L-24R was reconstructed in 2001. Other airfield taxiways have been reconstructed, and sanitary sewer and water facilities were installed in 1999.

A Long Term Comprehensive Development Plan (LTCP) is being prepared for the airport and will be completed in the spring of 2008. This plan analyzes existing facilities, forecasts future activity, and outlines development needed to meet the projected demand. It also reviews the previous LTCP recommendations for airport development, and summarizes new recommendations through 2025.

### 3.3.4 Flying Cloud Airport

Pavement rehabilitation projects have been ongoing at the airport over the past few years. Runway 10R-28L was reconstructed in 2005. Security gate improvements were completed in 2004. A sanitary sewer and water installation project was undertaken in 2002 to serve the east and south hangar areas. The extension of sanitary sewer and water to the north hangar areas will occur in 2008.

A State EIS was recently (2006) completed and approved for two runway extensions and a new building area development. The Federal Record of Decision approving the project is expected in early 2008. The expansion projects are currently listed in the MAC Capital Improvement Program for 2008 and 2009 and include the extension of Runway 10L-28R to 3,900 feet and Runway 10R-28L to 5,000 feet. The project also includes new building area development on the south side of the parallel runways.

Preparation of a Long Term Comprehensive Development Plan (LTCP) is beginning for the airport and should be completed by the end of 2008 or early 2009. This plan will analyze existing facilities, forecast future activity, and outline development needed to meet the projected demand.

### 3.3.5 Lake Elmo Airport

There have been ongoing pavement rehabilitation projects at the airport over the last few years involving runways and taxiways. Some projects have involved crack repairs and joint sealing. The compass calibration pad was reconstructed in 2006. In 2007 the pavement on the northeasterly end of taxiway 4-22 was reclaimed and a new bituminous surface placed. In addition, crack sealing of the northeasterly taxilanes was accomplished. In 2008, the taxiway connectors to Runway 14-32 and an apron area will be reconstructed.

The last major improvement project occurred in 2005 when the runway lights and circuit for Runway 14-32 were replaced.

A Long Term Comprehensive Development Plan (LTCP) is being prepared for the airport and will be completed in the spring of 2008. This plan analyzes existing facilities, forecasts future activity, and outlines development needed to meet the projected demand. It also reviews the previous LTCP recommendations for airport development, and summarizes new recommendations through 2025.

### 3.3.6 St. Paul Downtown Airport

The St. Paul Downtown Airport is currently undergoing numerous construction projects. A subdrain improvement project has been completed. This project provided for enhanced drainage of the airfield pavement areas, which have reduced weight bearing strengths when the subgrade is saturated due to high ground water or elevated river stages.

A three-year runway safety area enhancement project began in 2006. A contract for the construction of a floodwall was awarded in the summer of 2007. This project consists of permanent floodwall sections, combined with the acquisition of and foundation work for, temporary walls to be erected during flood conditions. When completed, the airfield will be able to operate to its full capability until a flooding occurs. During a flood event, temporary walls will be installed across runway safety areas along the river, which will shorten the runways, but the airfield will remain open at a reduced capability. In order to proceed with the floodwall construction, MAC completed a compensatory excavation project in 2006 which widened the Mississippi River channel so the new floodwall would not result in any upstream or downstream impacts.

Projects that brought the safety areas for each runway into compliance with FAA regulations have been completed with the exception of the planned EMAS (Engineered Materials Arrestor System) bed construction off the ends of Runway 14-32 in 2008 and 2009.

In 2005 and 2006, Runway 9-27 was reconstructed and its lighting system replaced. Crack sealing of bituminous pavements have also been completed on an annual basis, along with various taxiway rehabilitation projects.

Besides the EMAS construction for Runway 14-32, portions of Taxiways D, N, and W will be reconstructed in 2008.

MAC has just begun working with the local communities to enact airport safety zoning. This process is expected to take approximately eight months to complete.

Preparation of a Long Term Comprehensive Development Plan (LTCP) is beginning for the airport and should be completed by the end of 2008 or early 2009. This plan will analyze existing facilities, forecast future activity, and outline development needed to meet the projected demand.