Metropolitan Airports Commission

Flying Cloud Airport (FCM)

Long Term Comprehensive Plan

Metropolitan Council Determination April 2010
Final Adoption by MAC October 2010

Flying Cloud Airport
Long Term Comprehensive Plan Update

FINAL – October 2010

Metropolitan Council Determination April 2010

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Prepared by the Metropolitan Airports Commission

with assistance from HNTB Corporation

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Executive Summary

The Flying Cloud Airport is one of seven airports owned and operated by the Metropolitan Airports Commission (MAC). The airport identifier, or reference code, is FCM. Flying Cloud has played an important role in the Twin Cities since the airport opened in 1943. Located approximately 14 miles from downtown Minneapolis, the airport is considered by the MAC to be a primary reliever airport for the Minneapolis – St. Paul International Airport (MSP). Due to its location in the southwest suburbs, businesses consider it an important part of their local operations. In a 2005 economic report prepared by MAC, its contribution to the local economy was estimated to be more than $80 million annually.

This comprehensive planning document serves as a frame work for future development activity at the airport. This report follows guidelines set forth by the Federal Aviation Administration (FAA) and the Metropolitan Council. The previous long term plan for Flying Cloud was completed in 1992. Since that time, MAC has completed environmental reviews and implemented recommendations from that plan.

ES.1 Report Organization

This report is organized into the following chapters:

1. Existing Conditions / Inventory
2. Aviation Forecasts
3. Airside and Landside Facility Requirements
4. Alternatives and Plan Recommendations
5. Environmental Considerations
6. Land Use Compatibility
7. Capital Improvement Program Costs
8. Facility Implementation Schedule
9. Public Informational Process

The inventory of existing conditions is used to establish a baseline of facilities and services available at the airport. The forecasts are used to determine the type of activity likely to occur at the airport and at what projected levels. Facility requirements use the forecasts to determine what facilities will be required to support the level of activity indicated by the forecast. The projected facility needs are compared to the existing infrastructure to determine if additional facilities at the airport will be needed in the future.

The alternatives section identifies and analyzes the concepts considered for the airport, and indicates whether each alternative meets the needs of the airport as identified in the facility requirements chapter. In addition, the preferred alternative recommended for the airport is identified. The environmental considerations and land use sections discuss the existing and preferred alternative in relation to environmental issues, such as noise, and surrounding land use compatibility.

The last sections identify the preferred alternative project items, costs and the proposed timeline for implementation. The final section outlines the public information program that was followed, and summarizes any comments received during the document development process.

ES.2 Forecasts

This report includes aviation forecasts for based aircraft and the projected number of operations at the Flying Cloud Airport. Forecasts are presented for an approximate 20-year time horizon, and include 2010, 2015, 2020, and 2025. The forecasts are unconstrained and assume that the necessary facilities will be in place to accommodate demand except where noted.

The existing and projected socioeconomic conditions in the area and current general aviation activity are used to prepare the assumptions that form the foundation of the forecasts. Based aircraft forecasts for the MAC-owned airports are calculated and then allocated among the individual airports. Operations and peak activity forecasts for Flying Cloud are derived from the based aircraft forecasts. The analysis includes a set of high and low activity scenarios for the airport.

The assumptions inherent in the following calculations are based on data provided by the MAC, federal and local sources, and professional experience. Fuel cost assumptions reflect the recent major increase in oil prices. Forecasting, however, is not an exact science. Departures from forecast levels in the local and national economy and in the aviation industry will have an effect on the forecasts presented herein.

A copy of the full Activity Forecasts - Technical Report is contained in Appendix A of this document.

Table ES-1
Forecast Summary

Year	Baseline	High Forecast	Low Forecast
OPERATIONS			
2007	124,569	124,569	124,569
2010	99,540	127,443	69,757
2015	97,154	113,062	69,710
2020	106,030	145,273	74,776
2025	113,876	157,204	78,944
BASED AIRCRAFT			
2007	421	421	421
2010	420	426	416
2015	411	435	395
2020	406	442	372
2025	401	452	354

Source: Aviation Forecasts – Technical Report, April 2009

ES.3 Facility Requirements and Concepts Analyzed for Development

The current aircraft approach category assigned to the Airport is “B”. Typical aircraft in this aircraft approach category are the Beechcraft Baron, Raytheon Beechcraft King Air and Cessna Citation Jets (see Figure 3-1). Given that the role of the airport and types of aircraft operating there is not anticipated to change over the forecast period, the plan recommends the criteria associated with category “B” aircraft continue to be applied.

The current airplane design group applied to the Airport is group II. This means that the airport is designed to accommodate aircraft with wingspans less than 79 feet. Aircraft that fall into this category include most single engine and twin piston aircraft, the Raytheon Beechcraft King Air and smaller regional and corporate jets such as the Cessna Citation II, III, IV and V.

As shown in the forecasts for 2007, the number of based aircraft registered for FCM in 2007 was 421 aircraft, as identified in the base year of the forecasts in Chapter 2. Chapter 3 indicated that there is an estimated 508 actual indoor hangar spaces at the airport with development of the new south hangar area.   This means the current landside use equates to about 83% of capacity.

According to the Chapter 2 forecasts, the number of based aircraft is anticipated to decline from 421 in 2007 to 420 in 2010, and down to 401 by 2025. The forecasts also show a drop in operations by the single and multi-engine piston aircraft. This is due to a number of different factors such as fuel prices and the economy. Under the high forecast, the based aircraft would reach 452, or approximately 89% capacity. Therefore, the airport currently has enough hangar capacity available through the planning period.

The number of operations at Flying Cloud in 2007 was 124,569. In Chapter 3, the maximum number of operations the airport can handle, the annual service volume, was identified as 355,000 operations based on the existing three runway configuration. Therefore, from an airside standpoint, the airport is currently at 35% capacity.

The baseline 2025 forecast number of operations is lower than 2007. Under the high scenario, the 157,204 forecasted number of operations in 2025 would result in 44% capacity. None of these figures trigger the need to study additional runways at FCM.

Chapter 3, Section 3.2.2 discusses the FAA recommendations for runway length. A runway length of 5,000 feet accommodates all small aircraft weighing less than 12,500 pounds, and some large aircraft weighing less than 60,000 pounds. As described in Chapter 1, Runway 10R-28L is 5,000 feet long. The parallel Runway 10L-28R is 3,900 feet long and accommodates 100% of the small airplanes weighing less than 12,500 pounds. These figures are determined based on wet and slippery runway conditions, when more runway length is typically needed for operations. A runway length of 5,000 feet is the maximum allowed under Minnesota State law for a Minor Use Airport such as FCM.

The crosswind runway, 18-36, is currently 2,691 feet long but does not meet the recommended standard according to the FAA runway length tables. Also, as discussed in Chapter 3, Section 3.2.5, the runway safety area and runway object free area are deficient for the Runway 36 end. The alternatives reviewed for this LTCP update focus on this runway, and are discussed briefly below, and in Section 4.2.

An analysis of runway lengths and wind coverage needs was completed for a variety of aircraft known to use Runway 18-36. The need for a crosswind runway is easily justified by the existing wind coverage, especially for smaller aircraft operating at the airport. Aircraft weighing less than 12,500 pounds are typically more susceptible to crosswind conditions.

As discussed in Chapter 3, the runway safety area (RSA) and runway object free area (OFA) for the Runway 36 end do not meet current FAA standards. The deficiency is approximately 63-feet; however, with some minor fence modifications, the deficiency can be reduced to 58-feet. In order for the FAA to provide federal funding for projects related to Runway 18-36, MAC must address the RSA and OFA issues.

ES.3.1 No Build Alternative

A “no build” alternative would include no runway improvements and no changes to the airfield within the 20 year planning period except for reconstruction of the south end of Runway 18-36 and construction of a north perimeter road.

The no-build alternative also does not address the RSA and OFA issues. Therefore, the no-build alternative does not meet the needs of the airport.

ES.3.2 Shorten Runway 18-36

This alternative shortens the crosswind runway to create a compliant runway safety area (RSA) and object free area (OFA). The runway would be shortened by 58-feet. The current length is 2,691-feet; the ultimate length would be 2,633-feet.

This alternative addresses the RSA and OFA issue but does not address the fact that the runway length does not meet the FAA-recommended length for the type of aircraft using the airport.

ES.3.3 Shift Runway 18-36

This alternative shifts the crosswind runway to the north by 58-feet to create a compliant RSA and OFA. In addition to reducing pavement length at the Runway 36 end, new pavement would be constructed to extend the existing end of Runway 18. The runway length would be maintained at 2,691-feet.

This option meets the RSA and OFA correction needs, but maintaining the existing runway length does not meet the recommended FAA runway length for the type of aircraft at the airport.

ES.3.4 Shift and Extend Runway 18-36

(The Preferred Alternative)

As discussed in Chapter 3, the FAA recommends a runway length of 2,800 feet to accommodate 75% of the fleet of aircraft weighing less than 12,500 pounds. Those aircraft most susceptible to crosswinds are virtually all in the 75% category.

This alternative shifts the crosswind runway to the north by 58-feet to create a compliant runway safety area and object free area and then adds an additional 109 feet of pavement for a total runway length of 2,800 feet.

This alternative would correct both the RSA/OFA deficiency and enhances the runway use by providing additional length. This option, however, would be the most expensive because of the pavement construction costs and potential for increased obstruction removal requirements. See Section ES.6 for more information.

ES.3.5 Runway 18-36 North Perimeter Road

All of the Runway 18-36 alternatives show a new road north of the runway end, connecting the east and west sections of the north hangar area. This perimeter road is being considered at the request of the FAA to provide an east-west landside route for vehicles, fuel trucks, and MAC maintenance vehicles so they do not have to drive on or cross airfield pavements. The intention is to reduce the risk for runway incursions related to Runway 18-36. Note that unlike the two perimeter roads constructed at each end of the Runway 10-28 runways, this particular road is proposed to be constructed such that it can be used by both airport tenants and visitors.

ES.4 Noise Contours and Land Use

The noise contours presented in this document were developed using INM Version 7.0a. The contours represent predicted levels, or noise contours, of equal aircraft noise exposure on the ground as expressed in DNL. The FAA currently suggests that three different DNL levels (65, 70, and 75 DNL) be modeled. The Metropolitan Council suggests that the 60 DNL contour be included for airports in an urban environment. The methodology utilized the following data: aircraft activity levels, fleet mix, day/night split of operations, flight tracks and runway use.

In the Baseline 2007 noise contours there are no single-family homes located in the 60 DNL contour around Flying Cloud Airport. The 60 DNL contour contains approximately 0.87 square miles. The 65 DNL contour contains approximately 0.36 square miles and no single-family homes. The entire 70 and 75 DNL contours are contained on the airport property, essentially overlying the areas immediately adjacent to the runways. The 2007 70 and 75 DNL contours contain 0.18 and 0.07 square miles respectively.

The Forecast 2025 60 DNL noise contour around Flying Cloud Airport decreases to approximately 0.85 square miles while the 65 DNL contour increases to approximately 0.37 square miles. The residential structures within the 60 DNL contour increases to one single family home. The 65, 70 and 75 DNL contours cover 0.37, 0.17 and 0.05 square miles, respectively, with no residential structures in the contours.

In summary, there will be a 2.3 percent decrease in the 60 DNL contour, however 2 single family homes are located in the contour. The area within the 65, 70 and 75 DNL contours remains relatively unchanged with no single family homes located in these contours. The decrease in the overall size of the 60 DNL contour can be attributed primarily to an 8.6 percent decrease in total aircraft operations from 2007 to 2025. The increase in single family homes located in the 60 DNL contour can be attributed to the extension of Runway 10R/28L, which locates the departure end of Runway 10R closer to residential areas immediately southwest of the airport.

The 2025 noise contours are shown in Chapter 5.

Planning for the maintenance and development of airport facilities is a complex process. Successfully developing airports requires insightful decision-making predicated on various facts that drive the need for the development of additional airport infrastructure. Furthermore, these efforts should consider surrounding community land uses. Airports cannot be developed in a vacuum; the development effort must consider the needs of the surrounding populations and the land uses in the area surrounding the airport. The success of airport planning is predicated on close consideration and coordination of surrounding land use to ensure compatibility with the community surrounding the airport.

The Metropolitan Council has developed a set of land-use planning guidelines for responsible community development in the Minneapolis-St. Paul Metropolitan Area. The intent is to provide city governments with a comprehensive resource with regard to planning community development in a manner that considers adequacy, quality and environmental elements of planned land-uses.

The State of Minnesota Department of Transportation (Mn/DOT) has established regulations that control the type of development allowed off runway ends in order to prevent incompatible development. These guidelines should be used to establish zoning ordinances to protect areas around an airport. The states zoning areas overlay and extend beyond the RPZs. The most restrictive areas created by Mn/DOT regulations are called State Safety Zones A and B. The safety zones should exist off each runway end and follow the approach zones out to the total length of the runway. The recommended length of Safety Zone A is 2/3 of the total runway length; Safety Zone B is 1/3 of the total runway length and extends from Safety Zone A. There is also an area called Safety Zone C which is circular and typically follows the FAA FAR Part 77 horizontal surface.

Chapter 6 details the land use compatibility for both the existing and preferred alternative runway protection zones and state safety zones. For each runway end, the number of acres and types of land use are summarized. In addition, there is a discussion on the status of the Joint Airport Zoning Board (JAZB).

ES.5 Public Involvement Process

At the onset of this long term comprehensive plan update process, a public involvement program was developed. It included a specific plan for group meetings, with whom and when. The meetings held as part of this public process are listed in Table 9-1.

The purpose of the meetings was to inform the airport users and the public about the LTCP process and schedule, and offer an opportunity for personal question-and-answer sessions. The goal was to receive informal input as the process advanced, and prior to the formal public comment period. In addition, MAC held two meetings and corresponded regularly with a technical advisory group, made up of members of MAC staff, the FAA, Mn/DOT Aeronautics, and Metropolitan Council.

Informal comments were accepted at all meetings. The MAC committee meetings were open to the public, and verbal comments were invited at each of them. Meetings with the Flying Cloud Airport Advisory Commission typically involved a short presentation by MAC followed by a question and answer period. During the long term comprehensive planning drafting process, MAC requested informal written or verbal comments regarding the LTCP Update. Advertisements for the MAC public open house meeting were published in the *Eden Prairie News* and the *Sun Current* on June 11, 2009. The meeting was attended by six people. As of July 2009, two verbal and one written comment have been received supporting the shortening of Runway 36. Two verbal comments have been received asking that no runway length be lost. All correspondence received prior to the 30-day written public comment period are included in Appendix B.

Prior to August 2009, there were only two alternatives under considerations for Runway 18-36 (shortening the runway, or shifting the runway but maintaining the existing runway length). It was those two options that were presented at the LTCP public informational meeting and to the MAC Commissioners in July 2009. During the review and analysis of runway usage that occurred about the same time, it was determined that the crosswind Runway 18-36 is used very regularly – much more than the approximate 5% of the time there is a strong crosswind component. Based on this information, combined with FAA runway length design recommendations, staff began reviewing the possibility of not only maintaining the existing length, but also extending it to make the runway more effective in safely accommodating the traffic using it. In September 2009, MAC brought this new shift-and-extend alternative to the Finance Development and Environment (FD&E) Committee requesting it be adopted as the preferred alternative for the LTCP document. The full Commission ratified the decision on September 21, 2009.

The addition of the shift-and-extend alternative for Runway 18-36 was added to the document prior to the start of the formal written comment period. The draft LTCP document was completed in November, 2009, and made available for a 30-day written comment period starting November 23, 2009.

Upon completion of the written comment period on December 22, 2009, MAC received only one letter. The letter from the City of Eden Prairie and MAC's responses to that letter are included in Appendix B. One of the comments triggered a modification to Exhibit 6-3. The revised graphic is now included in this document. The Executive Summary and Figure 4-4 graphics were also modified as a result of a MAC staff request.

In February 2010, MAC submitted the draft LTCP document, along with the written comments received and MAC responses to those comments, to the Metropolitan Council for their review. The Metropolitan Council issued their determination in April 2010, finding the LTCP Update consistent with the Metropolitan Council's development guide. Correspondence from the Metropolitan Council has been included in Appendix B.

In June 2010, staff requested the Commission take action to adopt this LTCP as the final plan. The action was tabled at that meeting due to questions related to an FBO's proposed development concepts. It was taken back to the Commission in September 2010 where it was further tabled due to questions until the October 2010 meeting cycle. Staff returned to the Commission in October 2010, where the Commission took action to adopt this LTCP as the final plan. MAC is committed to preparing updates to this LTCP on a regular basis.

ES.6 Preferred Alternative and Other Plan Recommendations

Based on the analysis discussed above, it is recommended that Runway 18-36 be shifted north and lengthened to 2,800 feet to create a compliant RSA and OFA. The FAA will likely not provide federal funding for projects associated with Runway 18-36 unless a compliant runway safety and object free areas are achieved. The runway extension will better serve aircraft using the runway, especially during critical cross-wind operations. It is justified by both the FAA runway length curves and by the crosswind component at Flying Cloud. The recommended runway length is tied to the type of aircraft using the runway; not the number of operations by those aircraft (as long as the number of operations exceeds 500 per year). This is definitely the case at FCM.

It is recommended that with the 18-36 runway shift and extension, the south end pavement be reconstructed as currently planned in the MAC capital improvement program. It is also recommended that the existing FAA-owned VASIs be replaced with PAPIs. Obstructions related to Runway 18-36 should be identified and removed. It is also recommend that the north perimeter road be constructed as a part of the Runway 18-36 improvements.

The runway extension and perimeter road construction may have impacts on two existing FBO facilities at the approach end of Runway 18. MAC will review any necessary lease changes and/or parking modifications with the businesses prior to any construction implementation.

This preferred alternative may require environmental review. MAC will review the State Environmental Assessment Worksheet (EAW) requirements and the Federal FAA categorical exclusion checklist to identify the appropriate type of environmental review documentation.

As discussed above, there is no demonstrated need for additional runways or new hangar areas at the Flying Cloud Airport at this time. There are, however, various airside and landside improvements that are recommended for implementation in addition to the Runway 18-36 preferred alternative. They are itemized below:

1. MAC should continue pavement reconstruction and rehabilitation as a part of the on-going pavement maintenance program, including reconstruction of the south end of Runway 18-36 as a part of implementing the preferred alternative.

2. Completion of the south hangar area utilities shall be completed as new leases are executed and lot assessment fees are collected. Utilities include the installation of sanitary sewer, water, electric and/or natural gas services, and telephone.

   Figure ES-1 shows a boxed out area adjacent to the south hangar area. This box identifies a potential expansion to the building area, should forecasts in future LTCPs identify a need for additional hangar space. As noted in this document, there is no demonstrated need at this time. However, if at some point additional space is needed, this location near midfield would work well.

3. MAC should take steps to provide a clear Taxiway Alpha object free area. Some of the 1950's vintage hangars along the north side of Taxiway A actually lie within the taxiway object free area. MAC will work with these tenants over time as they plan on hangar redevelopment to eliminate obstructions to the taxiway.

4. MAC should continue discussions with the FAA relative to the ultimate relocation of the Air Traffic Control Tower to a location in the new south hangar area. The ATCT is not owned by the MAC. Its relocation will require the cooperation and assistance of the FAA.

5. MAC should continue the research the potential development of concurrent land uses for revenue generating purposes on airport property.

6. MAC should pursue continued cooperation with the City of Eden Prairie through the existing MAC/City agreements, the Flying Cloud Airport Advisory Commission, and on-going MAC/City staff interaction.

The plan recommendations are highlighted in Figure ES-1. Estimated costs and timelines for implementation are shown in Table ES-2.

Table ES-2
LTCP Recommendation Estimated Costs and Implementation Timeline

Recommendation	Estimated Cost	Timeline
Reconstruct Runway 18-36 south end, shift and extend runway to 2,800 feet, upgrade runway lights and circuit	$1,700,000	0 – 5 Years
Construct North Perimeter Road	$300,000	0 – 5 Years
Replace Runway 18-36 VASIs with PAPIs	$100,000 - 200,000	0 – 5 Years
Obstruction Removal	$100,000	0 – 5 Years
On-going pavement maintenance and replacement program*	$2,000,000	Continuous throughout planning period
South Hangar Area Utilities	$2,100,000	0 – 5 Years
Concurrent Use / Parcel Development	$0 (developer cost)	0 – 10 Years
Clear Taxiway A OFA	$0 (airport tenant cost)	15 – 20 Years
Relocate ATCT**	$6,000,000 -7,000,000	10 – 15 Years

Source: MAC calculation and engineering consultant estimates.

* Includes total cost for projects included in the draft 2010 – 2016 Capital Improvement Program for FCM alleyway rehabilitation and pavement maintenance.
** The Flying Cloud Air Traffic Control Tower is not owned by the MAC. Its relocation will require the cooperation and assistance of the FAA.

Chapter 1 Existing Conditions/Inventory

1.1 Airport History and Location

The Flying Cloud Airport is one of seven airports owned and operated by the Metropolitan Airports Commission (MAC). See Figure 1-1. The airport identifier, or reference code, is FCM. Flying Cloud has played an important role in the Twin Cities since the airport opened in 1943. Located approximately 14 miles from downtown Minneapolis, the airport is considered by the MAC to be a primary reliever airport for the main Minneapolis – St. Paul International Airport (MSP). Its location in the southwest suburbs allow businesses to consider it an important part of their local operations. In a 2005 economic report prepared by MAC, its contribution to the local economy was estimated to be more than $80 million annually.

The airport is located in Hennepin County, in the south central area of the City of Eden Prairie. See Figures 1-2 and 1-3. The airport can be accessed from Flying Cloud Drive (former Trunk Highway 212), and County-State-Aid-Highway 1, also known as Pioneer Trail. The airport lies southwest of Interstate 494, south of Trunk Highway 5, and just west of Trunk Highway 169. County Road 4 (Spring Road) and Eden Prairie Road bound portions of the airport on the west. The airport sits adjacent to the Minnesota River, which borders the airfield on the south.

The Flying Cloud Airport consists of 860 acres. When MAC acquired the airport in 1947, the airport had approximately 135 acres. Development in the 1950's included acquisition of an additional 409 acres. Other acquisitions have occurred as recently as 2001 which brought the total to 860 acres. See Figure 1-4 for the most recent Airport Property Inventory Map.

The first grass strip at FCM appeared in 1943. Since then, the airport has seen major modifications, including longer paved runways, expanded and improved hangar facilities, and the dedication of an air traffic control tower in 1963. In 1989, MAC embarked on a planning and environmental study focusing on expanding the airport. The proposal included land acquisition, extension of the longest runway from 3,900 feet to 5,000 feet, and extension of the north parallel runway from 3,600 feet to 3,900 feet. The proposal included land acquisition as well. In 2004, the state environmental process was completed, and in 2008, the Federal Aviation Administration issued their Record of Decision approval for the project. Construction began in 2008, and was substantially complete in November 2009. Table 1-1 outlines some historical notes and major construction projects that have occurred over the years. In addition to these projects, MAC has on-going rehabilitation program for all of the airfield and perimeter road pavements.

An article written by Mr. Bob Palmby[1], Manager of the Flying Cloud air traffic control tower in 1986 is the source of some of the historical notes below. In his article, he indicated that between 1966 and 1970, Flying Cloud was the second busiest tower in the FAA's Central Region, second only to Chicago's O'Hare Airport. At that time, it was ranked the 15th busiest in the nation, and held a record 446,198 operations in 1968. It peaked as the ninth busiest tower in the nation. Figure 1-5 shows the Airport Diagram from 1947, and Figure 1-6 shows the 2009 Airport Diagram. Figure 1-7 is an aerial photo of the airport from fall 2009 when construction was ending.

There have been a number of previous airport studies completed for the Airport. The Metropolitan Council prepared the 1986 *Metropolitan Airports System Plan* and the *Metropolitan Development Guide Aviation Policy Plan*, which was first adopted in 1972. The most recent update to the Policy Plan occurred in January 2009, and was called the 2030 Transportation Policy Plan.

[1] Bob Palmby, "Flying Cloud Airport – From 1943 Grass Strips to One of the Busiest Today", Great Lakes Intercom, February 1, 1986, page 9.

Table 1-1
Airfield Development Timeline

Year	Project Description
Prior to 1943	Navy uses existing grass strip for practice approaches
1943	Private use of grass strip and adjacent acres begins after WWII
1943 – 1947	Terminal building and first two hangars built
1947	MAC acquires airport
1949	North-south runway paved (now Runway 18-36) with a portion of Taxiway D
1952	Lights installed on north-south runway
1956	MAC acquires 196 acres
1956	Lighted east-west runway constructed (now 10L-28R) at 3,600 feet
1958	East-west parallel runway constructed (now south parallel Runway 10R-28L)
1958	North parallel Taxiway A constructed
1958	FAA's VOR constructed (approximate; exact year unknown)
1961	MAC acquires 208 acres
1963	Air Traffic Control Tower commissioned
1966	North-south Taxiway D extended
1966	MAC maintenance/equipment building constructed
1967	South east/west taxiway constructed (Taxiway B)
1969 - 1970	South parallel runway widened to 75-feet and extended to 3,200 feet
1970	North-south Taxiway E constructed
1976	ODALs approach lighting system installed on north parallel runway
1977	MAC maintenance building expansion
1979	South parallel runway extended to 3,900 feet, with runway lights
1979	ODALs removed from north parallel runway
1980	MALSR approach lighting system installed for Runway 9R (now 10R)
1988	Glideslope precision approach system installation for Runway 9R (now 10R)
1999	Parallel runway numbers changed from 9-27 to 10-28 due to magnetic declination
1980's - today	Ongoing pavement rehabilitation and security fence and gate projects
2008	North parallel runway (10L-28R) extended to 3,900 feet
2009	South parallel runway (10R-28L) extended to 5,000 feet and widened to 100 feet
2009	VOR facility relocated across Flying Cloud Drive
2009	Runway 10R glideslope and MALSR systems relocated with runway extension

MAC prepared the first Master Plan for FCM in 1976, which included recommendations for a runway extension for the south parallel runway to 3,900 feet, as well as abandonment of the existing runway end approach lighting systems for the north parallel runway.

In January 1978, MAC adopted Ordinance No. 51, which limited use at FCM to jet aircraft weighing 20,000 pounds or less that meet the noise emission levels of Federal Aviation Regulation (FAR) Part 36. The Flying Cloud Airport Advisory Commission (FCAAC) was formed in July 1978 to promote communication between the City of Eden Prairie and MAC. In 1979, an Environmental Impact Statement Report was prepared for the proposed extension, and the construction was completed in 1979.

In 1987, a feasibility study was completed to determine the type of instrument landing system (ILS) to serve the airport. In 1988, an FAA-owned end-fire glideslope was installed. This system, combined with a localizer antenna, provides both vertical and horizontal guidance for pilots approaching the runway end. The existing approach lighting system (MALSR) enhances the precision approach even further, by improving a pilot's visibility of the runway end.

MAC began an update to the FCM long term comprehensive plan in 1988. In March 1989, MAC held a public hearing on the comprehensive plan, which included recommendations for an extension of the south parallel runway to 5,000 feet, a new south hangar area, and an increase to the allowable aircraft weight to 30,000 pounds.

In 1992, MAC completed an amended long term comprehensive plan and updated airport master plan for the airport. That plan recommended the south parallel runway be extended to 5,000 feet, including a shift of the runway to the west by 1,100 feet; the north parallel runway be extended to 3,900 feet; and a new building area on the south side of the airport. The document analyzed noise contours, land acquisition, and costs.

Between 1989 and 1996, discussions between MAC, the City, the FAA and the Metropolitan Council continued, including mediation sessions for issues raised during the LTCP process. Some of the issues included noise concerns, land acquisition needed for the airport expansion, and FAA's determination that Ordinance No. 51 was inconsistent with federal policy. In April 1996, the Metropolitan Council found the LTCP for Flying Cloud consistent with its Development Guide.

In 1996, MAC and the FAA began preparing the joint Federal/State Environmental Impact Statement (EIS) for the proposed airport improvements. The process extended into 2008 before completion. Along the way, a Part 161 Notice and Analysis of Proposed Restrictions on Nighttime Maintenance Run-ups and Nighttime Stage 2 Aircraft operations was completed and distributed for public comment. Ultimately, MAC and the City of Eden Prairie executed two documents in December 2002 – one was a Memorandum of Understanding which addressed many outstanding concerns and issues between MAC and the City related to roadway and infrastructure improvements for the City, and sanitary sewer and water improvements for the airport; and the second was the Final Agreement enabling expansion of the airport by the City with commitments from MAC and an amendment to Ordinance No. 51.

In December 2002, MAC adopted Ordinance No. 97, which replaced Ordinance No. 51 by eliminating the 20,000-pound maximum takeoff weight restriction at the airport. Ordinance No. 97 includes limitation on nighttime maintenance of aircraft and engine run-ups, and increased the aircraft weight restriction at the airport to 60,000 pounds maximum takeoff weight.

Given concurrence between MAC and the City, the EIS process continued. The Minnesota Environmental Quality Board (EQB) made a determination of adequacy for the Final EIS document (FEIS) in accordance with State law and EQB rules in February 2006. In February 2008, the FAA prepared a written re-evaluation of the FEIS and determined that the FEIS remained applicable, adequate, accurate, and valid with no supplementation of the FEIS or further environmental documentation required. On May 23, 2008, the FAA issued a Record of Decision for the FEIS, indicating that the project is consistent with existing environmental policies and objectives as set forth in the National Environmental Policy Act of 1969.

As noted in the Table 1-1, construction of the airport improvements began in the summer of 2008, and the projects were substantially complete by the end of 2009.

1.2 Airport Role

The classification of an airport differs slightly between the MAC, Federal Aviation Administration (FAA), Minnesota Department of Transportation – Aeronautics (Mn/DOT), and the Metropolitan Council.

1.2.1 MAC Classification

MAC considers FCM to be a primary reliever airport for the Minneapolis – St. Paul International Airport. In January 2006, MAC accepted the *Recommendations Regarding the Future Operation and Development of the Reliever Airport System* prepared by the MAC Reliever Airports Task Force. That document recommends the Flying Cloud Airport be developed as a primary Reliever Airport, along with St. Paul Downtown Airport and the Anoka County – Blaine Airport, to enhance and support their ability to relieve corporate traffic at MSP.

The other three reliever airports, Airlake, Lake Elmo and Crystal, are labeled as "complimentary relievers" in the MAC owned seven airport system and should continue to serve as general aviation airports with some business jet traffic.

1.2.2 FAA Classification

According to the FAA, airport classification is based on the size and type of aircraft it serves and specific characteristics for those planes. The Flying Cloud Airport has an Airport Reference Code of B-II. This means it is designed, constructed and maintained to serve airplanes in that same Airplane Design Group. The "B" references airplanes with an approach speed of less than 121 knots, the "II" relates to wingspans up to but not including 79 feet.

1.2.3 Metropolitan Council Classification

The Metropolitan Council classifies FCM as a Minor Airport. Under this definition, the airport has a primary runway length between 2,500 and 5,000 feet, with either a precision or non-precision approach. The airport can accommodate personal use and recreational aircraft, business general aviation and air taxi traffic, flight training and military operations (see Table 1-2).

Table 1-2
Functional and Operational Characteristics of Metropolitan Airport Facilities

Airport Type	System Role	Airport Users	Primary Runway Length	Primary Rwy Instrumen-tation	MAC-Owned
Major	Scheduled Air Service • Minneapolis-St. Paul International	Air Carriers Regional/Commuter Passenger & Cargo Charters Air Cargo Air Taxi Corporate G.A. Military	8,000 feet or more	Precision	Yes
Intermediate	Primary Reliever • St. Paul Downtown	Regional/Commuter Air Taxi Corporate/Business General Aviation Flight Training Personal Use / Recreational Military	5,000 feet to 8,000 feet	Precision	Yes
Minor	Secondary Reliever • Airlake • Anoka County – Blaine • Crystal • Flying Cloud • Lake Elmo • South St. Paul	Air Taxi Business G.A. Flight Training Personal Use / Recreational Military	2,500 feet to 5,000 feet	Precision or Non-Precision	Yes Yes Yes Yes Yes No
Special Purpose	Special Uses • Forest Lake • Rice Lake • Wipline, IGH	All general aviation (grass strip) (seaplane) (seaplane)	Varies	Visual	No No No

Source: Metropolitan Council Aviation Policy Plan, December 1996.

1.2.4 Mn/DOT Classification

Mn/DOT classifies FCM as a Key System Airport, meaning it has a paved runway of 5,000 feet or more and is capable of accommodating all sizes of aircraft.

1.3 Existing Airside Facilities

Airside facilities include the operational aircraft areas of runways, taxiways, and aprons. These are areas where vehicular traffic is generally not allowed due to safety concerns of mixing with aircraft. Airside facilities also include airfield lighting and navigational aids.

1.3.1 Pavement Areas

FCM consists of three runways and numerous taxiways. The runways with their current lengths as of 2009 are listed in Table 1-3. The taxiway designations are shown in the Airport Diagram, in Figure 1-6.

All of the MAC-maintained airfield pavements are asphalt. They vary in pavement age, thickness and typical section. Over time, pavement overlays, rehabilitation, reconstruction and/or crack repair methods have changed the characteristics of the pavement from section to section. The agreement between MAC and the City of Eden Prairie, however, requires no more than a 60,000-pound pavement design strength for the extended 5,000-foot south parallel runway. In 2009, the runway was constructed with a pavement section consisting of 4-inches of asphalt and 6-inches aggregate base on top of a 3-foot granular subbase. This design meets the FAA minimum design criteria, and matches a 60,000-pound design strength for the airport and its design aircraft.

1.3.2 Lighting and Navigation

Navigational aids (NAVAIDS) and lighting are intended to guide pilots from point to point, increase the visibility of runway features, and control runway activity both on the ground and in the air. Runway and taxiway lighting consist of light fixtures placed near the pavement edge to help identify the limits. This lighting is essential for safe nighttime operations and during periods of low visibility.

Runway 10R-28L is lighted with High Intensity Runway Edge Lights (HIRLs) and Runways 10L-28R and 18-36 have Medium Intensity Runway Edge Lights (MIRLs). Taxiways are equipped with Medium Intensity Taxiway Lights (MITLs). The intensity of the runway and taxiway lighting can be controlled by air traffic control personnel. During the time when the Air Traffic Control Tower (ATCT) is closed, pilots can turn on and change the intensity of the lights for Runway 10R-28L and 18-36 by using the radio transmitter in the aircraft. Runway 10L-28R can be pilot activated only when Runway 10R-28L is closed. The airport also has lighted taxiway guidance signs to assist pilots in way-finding and runway guard lights.

A Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) extends 2,400 feet prior to the Runway 10R threshold. This system consists of a combination of flashing and steady burning lights and gives visual indicators during landing at the facility to transition from instrument flight to visual flight. Runways 28L, 18 and 36 have runway end identifier lights (REILs). REILs are synchronized flashing lights to help pilots visually acquire the runway end as they approach for landing. Runways 18 and 36 have visual approach slope indicators (VASIs). The VASI systems use a combination of red and white lights only visible at certain angles that help pilots determine appropriate angles of descent during landings. The former 10R-28L VASIs were replaced with Precision Approach Path Indicator (PAPI) systems in conjunction with the runway extension to 5,000 feet. Runway 10L-28R also has PAPI systems on each runway end.

Table 1-3
Runway/Airfield Data

	10R-28L	10L-28R	18-36
Design Critical Aircraft	Cessna Citation III	Cessna Citation III	Beech Baron 58
Runway Length (ft)	5,000	3,900	2,691
Runway Width (ft)	100	75	75
Runway Surface	Asphalt	Asphalt	Asphalt
Runway Load Bearing Strength (lbs)			
Single Wheel Loading (SWL)	37,500	30,000	12,500
Dual Wheel Loading (DWL)	60,000	--	—
Runway Lights	HIRL	MIRL	MIRL
Runway Markings	Precision Instrument	Non-Precision Instrument	Non-Precision Instrument
Visual Approach Aids	MALSR (10R) PAPI (10R & 28L) REIL (28L)	PAPI (10L & 29R)	VASI (18 & 36) REIL (18 & 36)
Instrument Approach Procedures	ILS or LOC(10R) RNAV GPS (28L) Copter ILS or LOC (10R) VOR (10R)	RNAV GPS (10L) RNAV GPS (28R)	RNAV GPS (36) VOR (36)*
Other	Air Traffic Control Tower, VOR facility, ASOS, Lighted Windcone, Lighted Beacon		

* The VOR approach to Runway 36 will be decommissioned in February 2010.

En route NAVAIDS utilize ground-based transmission facilities to provide navigational fix information to properly-equipped aircraft. There is one Very High Frequency Omni-Directional Range (VOR) station located on the Airport called Flying Cloud VOR. A VOR transmits radio signals 360 degrees in azimuth on a designated frequency. This information provides a tool for pilots to navigate point-to-point within the National Airspace System (NAS). This is particularly useful for low altitude and high altitude airway vectoring through the airspace surrounding the airport, as well as transition navigation into or out of the en route airspace structure at Flying Cloud Airport. In addition to providing en-route navigational assistance to aircraft, VORs also allow for non-precision approaches thereby enhancing the capability of the airport. Flying Cloud Airport has five published non-precision instrument approaches to the airport [RNAV (GPS) and VOR].

There is a precision instrument approach at the airport. Navigation aids for these systems include a glide slope and localizer with distance measuring equipment (DME). Runway 10R has an ILS or LOC approach with ½ mile visibility minimums. There is also a published precision instrument approach procedure for helicopters with visibility minimums of ¼ mile. See section 1.3.6 for more information on the approaches procedures.

In 1999, MAC updated the designations for both runways due to the shift in magnetic declination. Runways 09L-27R and 09R-27L became Runways 10L-28R and 10R-28L. Lastly, the airport has a lighted airfield beacon and a lighted windcone.

1.3.3 Airspace Management System

The airspace around an airport is defined by FAA classification, air traffic control designation, navigational aids (NAVAIDS), other surrounding airports, and flight rules specific to the Flying Cloud Airport. The Federal Aviation Act of 1958 gave jurisdiction of all US airspace to the FAA. The National Airspace System (NAS) was hence established to manage this system safely and efficiently among commercial, general aviation, military and other competing users. It is a common network of NAVAIDS, airport and landing sites, charting of information, procedures, regulations, technical support, and resources. Figure 1-8 shows the airports, airspace and radio aids for navigation in the vicinity of the Flying Cloud Airport.

1.3.4 Airspace Structure

The airspace structure is complex and requires the use of highly technical air traffic control (ATC) procedures. Airspace is either controlled or uncontrolled. Controlled airspace is managed by ground-to-air communications, NAVAIDS and air traffic services. The Flying Cloud Airport is located in what is considered Class D controlled airspace when the Air Traffic Control Tower is open (7:00 am to 10:00 pm April through October and 7:00 am to 9:00 pm November through March) and Class E airspace during the other times. Class D airspace is under the jurisdiction of a local Air Traffic Control Tower (ATCT). (See Figure 1-9). The purpose of the ATCT is to sequence arriving and departing aircraft and direct aircraft on the ground. Aircraft operating within this area are required to maintain radio communication with the ATCT. It is normally a circular area with a radius of five miles around the airport and extends upward from the surface to about 2,500 feet AGL. The ceiling elevation of Flying Cloud's Class D airspace is 3,400 feet MSL (2,494 feet above the airport elevation of 906 feet).

When the ATCT is not open at Flying Cloud, the airspace classification is Class E. Class E airspace is a general category of controlled airspace that is intended to provide air traffic service and separation for Instrument Flight Rules (IFR) aircraft from other aircraft. IFR means that the pilot is certified to fly under Instrument Meteorological Conditions (IMC) (less than three miles visibility and/or 1,000 foot ceilings). Pilots rated only for Visual Flight Rules (VFR) can operate in Class E airspace only when visibility is three statute miles and above and cloud heights are 1,000 feet above ground level (AGL) and higher. These pilots are not required to maintain contact with ATC. Class E is a common classification for airports without air traffic control towers (ATCTs). Class E airspace typically extends to 18,000 feet mean sea level (MSL) and generally fills in the gaps between other classes of airspace in the United States. At FCM, Class E airspace extends from the surface up to the base of the MSP Class B airspace when the ATCT is closed.

The Flying Cloud Airport also lies under Minneapolis/ St. Paul International Airport's (MSP) Class B Airspace which consists of controlled airspace extending upward from different floor elevations to a ceiling height of 8,000 feet MSL. There are very specific operating instructions and rules pilots must follow when flying within this airspace. Flying Cloud Airport lies under the area where the floor elevation is 3,000 feet MSL. As long as pilots stay below 3,000 feet they remain outside this MSP airspace.

1.3.5 Delegation of Air Traffic Control Responsibilities

Flying Cloud Airport has its own Air Traffic Control Tower (ATCT). During the times when it is open, it provides air traffic control services. When the ATCT is closed, services are provided by Minneapolis Terminal Radar Approach Control (TRACON) located at Minneapolis-St. Paul International Airport, and assisted by the Flight Service Station (FSS) at Princeton, Minnesota. Aircraft operating at Flying Cloud when the ATCT is closed are advised to broadcast their intentions and monitor Common Traffic Advisory Frequency (CTAF) frequency, which is also the UNICOM frequency. Pilots making instrument approaches or departures are in contact with the ATCT or Minneapolis TRACON.

1.3.6 Approach Procedures and Traffic Patterns

There are two different types of flight rules set out in Federal Aviation Regulations (FAR) Part 91. Visual Flight Rules (VFR) applies in generally good weather conditions based on visibility. Instrument Flight Rules (IFR) come into play when visibility levels fall to less than three statute miles and/or cloud levels go below 1,000 feet.

The local traffic pattern altitude is 1,906 feet MSL (1,000 feet above the airport elevation). All the runways, except 10R and 28R follow standard left traffic pattern all of the time. Runways 10R and 28R use right traffic pattern when the ATCT is open. The ATCT directs runway use when winds are calm (less than 5 knots). Runway 10L-28R is closed when the ATCT is closed.

Aircraft with IFR instrumentation can utilize established approach procedures at the Flying Cloud Airport. IFR flight rules have specific departure and arrival instructions, flight routing, altitude assignment, and communication procedures that are required. As stated, it allows a pilot to operate in controlled airspace and in poor weather at appropriately-equipped airport facilities such as Flying Cloud. There is one precision instrument approach procedure and five non-precision instrument approach procedures established for Flying Cloud Airport. The ILS or LOC RWY 10R, RNAV (GPS) 10L, RNAV (GPS) RWY 28L, RNAV (GPS) RWY 28R, RNAV (GPS) RWY 36, VOR RWY 10R and VOR RWY 36 approaches are shown on Figures 1-10 to 1-16, respectively. There is also an instrument approach for helicopters COPTER ILS or LOC RWY 10R shown on Figure 1-17.

Upon commissioning and charting of the new VOR facility, currently scheduled for February 2010, the VOR approach to Runway 36 will be decommissioned and no longer available. This is due to the location of the new VOR facility.

1.3.7 Imaginary Surfaces and Obstructions

FAR Part 77 is the guidance used to determine obstructions to navigational airspace. The surfaces are comprised of primary, approach, transitional, horizontal and conical three-dimensional imaginary surfaces. (See Figure 1-18.) Their exact configuration varies based upon the approach type of runway. Obstructions are defined as objects that penetrate these imaginary surfaces. Mitigative measures such as obstruction lights, removal or relocation may be required for the obstruction not to be considered a hazard. All obstructions should be catalogued and their disposition noted. The Airport Layout Plan (ALP), published separately from this report, shows the location and disposition of obstructions. Critical obstructions are also shown on the approach procedures for the airport.

1.3.8 Runway Protection Zones/State Safety Zones

Runway Protection Zones (RPZs) restrict land use off runway ends to help ensure the safety of people and property on the ground. The Federal Aviation Administration (FAA) recommends that the airport own or have control over all land within the RPZs. Among the land uses prohibited in RPZs are residences and those land uses which may result in public assembly (i.e. schools, hospitals, office buildings, and shopping centers). Although the FAA prefers that RPZs be kept free of all objects, some types of development are allowed within certain portions of the RPZ (provided the development does not attract wildlife or interfere with navigational aids).

The dimensions of RPZs are determined based upon the aircraft approach category and the associated runway approach visibility minimums. According to Table 2-4 of AC 150/5300-13, Airport Design, Runway 10R falls under the approach visibility minimums category lower than ¾ mile for all aircraft type. Runways 28L, 10L and 28R fall under visual and not lower than one mile for aircraft approach category A & B and Runways 18 and 36 fall under visual for small aircraft exclusively (utility runway). The existing recommended standard RPZ dimensions at Flying Cloud Airport are shown on Table 1-4.

Table 1-4
Runway Protection Zone Dimensions

Runway	RPZ Dimensions (ft)
10R	1,000 x 2,500 x 1,750
28L	500 x 1,000 x 700
10L	500 x 1,000 x 700
28R	500 x 1,000 x 700
18	250 x 1,000 x 450
36	250 x 1,000 x 450

Dimensions are inner width x length x outer width.

The State of Minnesota Department of Transportation (Mn/DOT) has established regulations that control the type of development allowed off runway ends in order to prevent incompatible development. These guidelines should be used to establish zoning ordinances to protect areas around an airport.

More information on Land Use, Development Plans and Zoning can be found in Chapter 1, Section 1.7 and in Chapter 6 – Land Use Compatibility. The RPZs and State Safety Zones for the existing airfield configuration at Flying Cloud Airport are shown in Figure 6-1. A discussion on the State Safety Zones and the zoning effort for the airport is included in Section 6.2.2.2.

1.4 Existing Landside Facilities

Landside facilities include aircraft storage hangar areas, aprons, fixed base operator (FBO) areas, terminal buildings, airport maintenance equipment storage areas, roadway access to the airport, and vehicle parking areas.

1.4.1 Fixed Base Operators (FBOs)

FCM currently has six full service fixed base operators (FBOs), and another three commercial operators with specialized leases. Table 1-5 indicates their airfield locations and the services they provide to their customers and clients.

The FBOs provide indoor and outdoor storage for aircraft. While they may park aircraft outside on occasion if necessary, generally airplanes are housed indoors and away from Minnesota elements such as ice, snow, wind, hail, and rain. Table 1-6 outlines the estimated available indoor space for each FBO.

1.4.2 Hangar Storage Areas

The Flying Cloud Airport has numerous hangar storage areas around the airport that are not a part of existing FBO facilities. (See Figures 1-19 through 1-23.) The southeast hangar area was the first constructed, followed by the remaining south-southeast area where the air traffic control tower is located. After that, the north side filled in as the east-west runways were constructed. The FBOs and storage hangars are spread fairly evenly throughout the hangar areas.

The south hangar area was constructed in 2009, as recommended in the previous long term comprehensive plan. This building area layout has changed from previous years based on the then-current assumptions for hangar needs. It is currently designed for mostly corporate jet storage. This is due to the on-going decline of general aviation, but growing trend of jet and very-light-jet usage as discussed in Chapter 2 of this report. With the relocation of the VOR facility, there is also an expansion area available for FBO development if desired. However, no aircraft spaces (indoor or outdoor) have been allotted for such FBO development.

Table 1-5
Fixed Base Operators

FBO Name	Airport Building Area Location	Services	Fuel Type
ASI Jet Center	Northwest	Fueling, maintenance, aircraft storage and line service, flight training, aircraft management, charter and sales, aviation parts, avionics, pilot accessory sales	100 LL Jet A
Elliott Aviation	Northeast	Fueling, maintenance, aircraft storage and line service, aircraft management, charter and sales, aviation parts, avionics, pilot accessory sales	100 LL Jet A
Executive Aviation	Southeast	Fueling, maintenance, aircraft storage and line service, aircraft management, charter leasing and sales, pilot accessory sales	100 LL Jet A
Hummingbird Helicopters	Northeast	Fueling, maintenance, aircraft storage and line service, flight training, aircraft charter, aerial surveys, pilot accessory sales	100 LL
Modern Aero	Northwest	Fueling, maintenance, aircraft storage and line service, flight training, avionics repair and sales, pilot accessory sales	100 LL
Thunderbird	North Central	Fueling, maintenance, aircraft storage and line service, flight training, aircraft charter and sales, air tours, pilot accessory sales	100 LL Jet A
Airovation	Northwest	Aircraft interior restyling	N/A
Larry Degner	Northwest	Office rental	N/A
PlaneSmith Aircraft Sales	North	Aircraft sales and brokerage services	N/A

Source: MAC lease documents

Table 1-6
FBO Storage Areas

FBO	Estimated Number of Indoor Spaces	Estimated Number of Outdoor Spaces
ASI Jet Center	40	27
Elliott Aviation	37	27
Executive Aviation	27	23
Hummingbird Helicopters	14	16
Modern Aero	7	10
Thunderbird	20	20
TOTAL	145	123

Source: Estimated by MAC Airport Managers

1.4.3 Aircraft Space Utilization

Aircraft space utilization is a calculation completed to estimate the existing number of spaces on the airport that would be available for aircraft parking. This is then compared to the forecasted demand in Chapter 3 – Facility Requirements to determine if a need exists for additional hangar space at an airport.

MAC allows tenants to sublease space within their hangar if they choose, but not all tenants do this. For hangars that are large enough to hold two or more aircraft, MAC discounted the number of available spaces by 10% to account for tenants who do not sublease extra space. MAC also assumed a 10% discount on large FBO hangars to account for any variance in operator choice for how many aircraft to house at one time.

This discounting does not have a significant impact on the available number of hangar spaces, and is very reasonable given the current status of most leases at the airport today.

Table 1-7 summarizes the maximum indoor storage available, with the discounted numbers shown. The total number of indoor spaces equates to 508 after discounting for single use in larger hangars. When added to the estimated 123 outdoor spaces available at the FBOs, the total number of spaces at FCM equals 631. This number is not much higher than the 626 spaces estimated in 2006 as part of a study completed for the Crystal Airport in which landside capacity calculations were completed for all the Reliever Airports. The current calculation is a better representation of existing hangars and incorporates recent changes on the airfield that have changed the maximum number of aircraft. MAC is seeing tenants more interested in demolishing older T-hangars and replacing them with single or double aircraft conventional hangars. The number of aircraft that could possibly be housed in the new south hangar area has been estimated and is included in the summary below. At the time of writing this report, construction of the area was just completing, so no hangars have been constructed in this area yet.

Table 1-7
Indoor Aircraft Storage Summary

	Number of Buildings	Number of Spaces	Discount Percent	Subtracted Spaces	Total Spaces
ALL HANGAR AREAS					
T-Hangars	43	197	2%	4	193
Single Conventional	27	27	2%	1	26
Double Conventional	28	56	10%	5	51
Triple or More Conv.	35	120	10%	12	108
FBOs	22	145	10%	15	130
TOTAL	155	545		37	508

Source: MAC visual survey and review of aerial maps; includes estimated spaces for new south hangar area that are not yet constructed.

1.4.4 Maintenance and Equipment Areas

MAC owns two maintenance and equipment storage buildings at FCM. One building is connected to the Air Traffic Control Tower building. This combined building is split between the FAA and MAC. MAC previously utilized a small office within this building, however, the FAA has recently taken back the space for their own use. MAC currently has no functional office space for the maintenance crew or airport manager.

The second maintenance building is located just across a parking area from the ATCT. This building contains a restroom and a shower facility for the crew. These buildings hold equipment, parts, and snow management materials. There is a diesel tank in the vicinity of the maintenance building for MAC use only. There is also a contained recycling area for airport tenants to dispose of used aircraft oil.

1.4.5 Roadway Access

The airport is located in Hennepin County, in the south central area of the City of Eden Prairie. It can be accessed from Flying Cloud Drive (former Trunk Highway 212), and County-State-Aid-Highway 1, also known as Pioneer Trail. The airport lies southwest of Interstate 494, south of Trunk Highway 5, and just west of Trunk Highway 169. County Road 4 (Spring Road) and Eden Prairie Road bound portions of the airport on the west. The airport sits adjacent to the Minnesota River, which borders the airfield on the south.   Hangar areas have access to these adjoining roadways.

1.4.6 Vehicle Parking Areas

Each FBO has parking for their customers. The number varies for each facility. There are no public parking spaces available at the airport aside from people visiting the FBO facilities. A small parking area is located at the base of the ATCT for FAA and MAC use. The aviation school has a large parking area for students and staff.

All privately owned hangars are accessed via the taxilanes, with tenants parking inside or adjacent to their individual hangars.

1.5 Airport Environment

This section highlights briefly the airport environment, including available utilities, drainage, and local services provided.

1.5.1 Utilities and Local Services

Most tenants at the Airport have either electric or natural gas service, or both, as well as telephone service. The electrical lines are above ground in some locations at the airport, and below ground in others. The tenants are billed directly by the utility companies. Qwest provides telephone service, and Minnegasco provides natural gas. Xcel provides electric service to the airport, and Comcast serves tenants with cable.

The City of Eden Prairie provides emergency services for the Airport, including police, fire and rescue. This is achieved through an agreement between MAC and the city.

1.5.2 Drainage and Water Quality

The Flying Cloud Airport is located on former farmland. According to Hennepin County soil surveys, soils on site are considered mainly Eden Prairie sandy loam categorized as Hydrologic Soil Group A. These soils have high infiltration rates even when thoroughly wetted, and consist chiefly of deep, well to excessively drained sands and/or gravel. These soils have a high rate of water transmission and result in low runoff potential.

The airport site drains primarily to the south, but a small portion drains to the north. Most of the airfield drainage infiltrates into the ground or is routed into ditches. These ditches outlet into infiltration basins. Approximately 96% of the airfield drainage is routed to infiltration basins. Only a small portion is routed to the north into the drainage conveyance for Pioneer Trail. Figure 1-24 shows the general airport drainage patterns.

The airport property and land acquired for the runway extensions and new south hangar area were field reviewed in their entirety as part of the 2008 Federal/State Environmental Impact Statement (EIS) and found to encompass no jurisdictional wetland that would be regulated under state or federal law, no non-jurisdictional wetland or water of the United States or any other wetland. Storm water ponding facilities on the airport were reviewed and found to lie in areas that lacked hydric soils under natural conditions. The National Wetland Inventory (NWI) shows a paulustrine emergent/seasonally flooded (PEMC) wetland off the west end of Runway 10R-28L; however, no wetland was found in this location when field reviewed. Accordingly, the Lower Minnesota River Watershed District (LMRWD) issued a Wetland Conservation Act (WCA) certificate exemption for impacts to storm water ponds to be affected by the airport project. Similarly, the U.S. Army Corps of Engineers provided written concurrence that the airport property encompasses no waters of the Untied States that would be regulated under the Clean Water Act.

The EIS process referenced in the previous paragraph identified only one small designated flood plain area on airport property. This floodplain area is located within the Runway 18-36 RPZ north of Pioneer Trail. A series of infiltration basins exist there to capture drainage prior it to flowing overland down the bluff to Staring Lake.

MAC maintains a Storm Water Spill Pollution Prevention Plan (SWPP) and a Spill Prevention Control and Countermeasure Plan (SPCC) for MAC-owned facilities at the Airport. The MAC has a general storm water discharge permit from the Minnesota Pollution Control Agency (MPCA). In addition, MAC maintains a Water Management Plan for the Airport. It includes best management practices for protecting the storm water conveyances, wetlands, and groundwater. Due to activities performed by the Fixed Base Operators (FBOs), they are required to maintain their own general storm water discharge permit from the MPCA, along with their own SWPP and SPCC plans.

Chemicals used in deicing activities at airports is of concern because of the potential effects on receiving water bodies. Airport tenants and/or FBOs conduct very little to no aircraft deicing at Flying Cloud. Most aircraft can be stored inside or in heated hangars prior to takeoff or cannot fly when icing conditions exist, which eliminates the need for glycol use. MAC may use some amount of urea on the runways during icing conditions. The amount used varies annually. Salt is not used due to its corrosive nature. Sand is used on a limited basis, depending on weather conditions. Given these minor uses, and as supported in the EIS document referenced above, the potential impact on water quality from the airport is minimal.

1.5.3 Sanitary Sewer and Water

The majority of the Flying Cloud Airport is now served with sanitary sewer and water. Two major projects completed in 2002 and in 2008 completed the service to and around the airport. Figure 1-25 identifies the main sewer and water locations, but not each and every service line or connection. There are a few localized areas within the airport where only cold storage hangars exist that do not have the ability to connect at the present time. The new south hangar area will be served with sanitary sewer and water in its entirety as the area develops with hangar construction. The water service to the hangars also includes numerous hydrants for fire protection. The City of Eden Prairie maintains the system, and tenants are responsible for connecting, repairing their own connections and for payment to the City. MAC owned maintenance facilities and the FAA air traffic control tower are all connected to the services, and payments are made by each respective agency.

Existing tenants that have legal wells and septic holding tanks have been allowed to keep them in past years. Tenants with illegal sandpoint wells or drain fields were required to remove or abandon them after MAC adopted its Sanitary Sewer and Water Policy in 1998, and subsequent revision in October 2000. Consistent with that policy, no new wells or holding tanks have been allowed at the airport. Now that services are available, MAC policy allows tenants 24 months to abandon compliant private systems and connect to the new sanitary sewer and water system. MAC is working with tenants and commercial operators to get their connections completed.

1.6 Meteorological Data

The Flying Cloud Airport is equipped with an Automated Surface Observing System (ASOS). The ASOS provides computerized weather readings 24-hours a day, with updates every minute, continuously reporting significant weather changes as they occur. The ASOS system reports cloud ceiling, visibility, temperature, dew point, wind direction and speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for non-standard temperature). The recording and monitoring equipment for the ASOS is located in the northwest corner of the airport near the athletic fields (see Figure 1-19). It requires a 1,000-foot radius in which no obstructions or significant amount of pavement exists since they may interfere with the weather readings.

1.7 Area Land Use, Airspace and Zoning

One of the biggest challenges facing airports in general today is the presence of incompatible land use either adjacent to the airport or in runway flight paths. Working closely with City officials, airport users, developers, and any nearby residents, airports can reduce these types of conflicts through the use of zoning regulations that disallow certain types of nearby development.

The City has a well-established review process that requires all applications for development be reviewed by MAC and the FAA to determine if the proposed structure would be a "general obstruction to air navigation" or an "obstruction to a public airport", and to ensure that proper notification to the Commissioner of Transportation is made if so required.

Land uses around the airport vary. There are many residential areas not far from the airport boundary. MAC acquired numerous homesteads within the runway approach areas on the west side of the airport as a part of the recent airport expansion to prevent non-compatible residential development within the RPZs or proposed state safety zone areas. Across Pioneer Trail to the north there exists a large City park area, and the City leases a portion of airport property for the use of athletic fields. A closed landfill area is located south-southeast. There are also some agricultural areas spread around the airport, however, many of these have been eliminated as part of the runway extension and new south hangar area.

A more in-depth discussion and figures showing the land uses are included in Chapter 6 of this report.

1.8 Area Socioeconomic Data

The reliever airport system owned and operated by MAC includes the Flying Cloud Airport and five other airports in the metropolitan area. According to the *Economic Analysis of Reliever Airport System*, prepared by Wilder Research in October 2005 for MAC, it is estimated that Flying Cloud contributes more than $80 million per year to the local economy and supports 777 jobs. This includes on-airport services, fuel sales, and visitor spending in the community.

1.9 Historic Airport Activity

Aircraft based at and using the Flying Cloud Airport include single engine, twin-engine piston and turbo props, small business jets, and helicopters. There are no military aircraft based at the airport, but they may fly in on occasion to complete training operations. It is assumed that flights in and out of Flying Cloud are of both a business and a recreational nature.

The based aircraft fleet mix currently registered with the State of Minnesota, as of 2007, consists of 336 single engine planes (80%), 37 multi-engine piston aircraft/light twins (9%), 20 turboprops (5%), five helicopters (1%), and 23 jets (5%).

In recent years, the activity at the airport has been declining. This is due to the overall downward trend in aviation since 9-11, primarily in general aviation. It is assumed that the majority of single engine operations are recreational. While single engine aircraft operations are forecasted to continue declining, jet operations are anticipated to increase at the airport over time. See Chapter 2.

Chapter 2

Aviation Forecast

This chapter provides a summary of the aviation activity forecasts prepared for the Long Term Comprehensive Plan (LTCP) for the Flying Cloud Airport (FCM). The forecasts are intended for use in subsequent facility requirements analyses for the airside and landside area development. A credible and usable forecast is critical to ensure that the type and size of the planned facilities are appropriate for future conditions. Forecasts are presented for an approximate 20-year time horizon, and include 2010, 2015, 2020, and 2025. The forecasts are unconstrained and assume that the necessary facilities will be in place to accommodate demand except where noted.

The existing and projected socioeconomic conditions in the area and current general aviation activity are used to prepare the assumptions that form the foundation of the forecasts. Based aircraft forecasts for the Metropolitan Airports Commission (MAC) airports are calculated and then allocated among the individual airports. Operations and peak activity forecasts for Flying Cloud are derived from the based aircraft forecasts. The analysis includes a set of high and low activity scenarios for the airport.

The assumptions inherent in the following calculations are based on data provided by the MAC, federal and local sources, and professional experience. Fuel cost assumptions reflect the recent major increase in oil prices. Forecasting, however, is not an exact science. Departures from forecast levels in the local and national economy and in the aviation industry could have an effect on the forecasts presented herein.

A copy of the full Activity Forecasts - Technical Report is contained in Appendix A of this document. The report includes background information, socioeconomic data, historical trends, and detailed descriptions of the assumptions for the forecasts. This chapter is a brief synopsis of that report as it pertains to the airport.

2.1 Aircraft Fleet Mix and Based Aircraft Forecasts

The number of based aircraft at the Flying Cloud Airport is expected to gradually decline from 421 in 2007 to 401 in 2025. Microjets and other jets based at the airport are expected to increase over the forecast period. Microjets are forecast to increase from 0 in 2007 to 20 in 2025 and other jets from 23 in 2007 to 40 in 2025. The number of turboprop aircraft is expected to remain steady and the number of helicopters is projected to increase.

Most of the decline of based aircraft occurs in the piston engine category. Single-engine piston based aircraft decline from 336 in 2007 to 286 in 2025, and multi-engine piston based aircraft decline from 37 in 2007 to 27 in 2025. FCM is located in Hennepin County, which is projected to be one of the slower growing counties. This is a driving factor in the expected decrease in based aircraft.

Table 2-1 shows the results of the based aircraft forecasts for Flying Cloud.

2.2 Aircraft Operations Forecasts

The forecasts of aircraft operations were derived from the based aircraft forecasts. Estimates of base year operation levels were obtained from the FAA’s Air Traffic Activity Data System (ATADS) data base, supplemented by Airport Noise and Operations Monitoring System (ANOMS) data for operations that occur when the Air Traffic Control Tower is not open. Base year operations by aircraft type were based on ANOMS data collected by the MAC. The ANOMS data base misses many of the aircraft flying under Visual Flight Rules (VFR). Those were allocated among piston aircraft according to the distribution of based aircraft.

Table 2-1
Based Aircraft Forecast Summary

	2007	2010	2015	2020	2025	Ave Annual Growth Rate
Single Engine Piston	336	326	310	296	286	-0.8%
Multi Engine Piston	37	36	32	29	27	-1.6%
Turboprop	20	21	20	20	20	0%
Microjets (VLJs)	0	3	8	15	20	(b)
Other Jets	23	27	34	38	40	2.8%
Helicopter	5	7	7	8	8	2.4%
Other (a)	0	0	0	0	0	0%
TOTAL	421	420	411	406	401	-0.2%

(a) Balloons, gliders, and ultralight aircraft.
(b) VLJ growth rates are not shown because with such small base year numbers, the annual percentage growth rate is very high and likely not representative of long term growth percentages.
Source: Appendix A – HNTB Activity Forecasts Technical Report, Table 7, April 2009.

The aircraft operations forecasts assume that average aircraft utilization will change consistent with the adjusted FAA forecasts. In each aircraft category, operations per active aircraft were projected to change at the same rate as hours flown per based aircraft, implicitly assuming that the number of operations per hours flown remain constant. The percentage of touch and go operations in each aircraft category was assumed to remain constant. Total military operations were also assumed to remain constant.

Table 2-2 summarizes the aircraft operations forecasts for Flying Cloud. The FAA projects average aircraft utilization to increase as a result of increased flying by business and corporate users.

Table 2-2
Aircraft Operations Forecast Summary

	2007	2010	2015	2020	2025
Single Engine Piston	96,356	70,740	65,531	67,319	70,455
Multi Engine Piston	13,648	10,788	8,345	7,714	7,656
Turboprop	5,926	5,283	4,941	4,858	4,842
Microjets (VLJs)	4	2,631	6,763	12,610	16,682
Other Jets	3,530	3,567	5,058	6,019	6,629
Helicopter	5,104	6,531	6,516	7,510	7,613
Other (a)	0	0	0	0	0
TOTAL	124,569	99,540	97,154	106,030	113,876

(a) Balloons, gliders, and ultralight aircraft.
Source: Appendix A – HNTB Activity Forecasts Technical Report, Table 10, April 2009.

Operations at Flying Cloud are forecast to decrease from 124,569 in 2007 to 97,154 in 2015 and then increase to 113,876 by 2025. Decreases are projected among single- and multi-engine piston and turboprop categories. Substantial increases are projected in microjets and other jets. By 2025, these two categories are projected to account for just over 20 percent of total operations at Flying Cloud, compared to about 3 percent currently.

The revised 2009 FAA forecasts, published about the end of April 2009, have taken note of recent changes in the VLJ industry. While the 2008 forecasts used for this analysis projected about 450 new VLJ aircraft per year (nationally), the 2009 forecasts are projecting 270-300 new VLJ aircraft per year. There was also a more drastic reduction in projected hours flown per aircraft from 1000 per year to 432 per year.

It's quite possible that the current FAA forecasts are too pessimistic, just like the earlier forecasts were too optimistic. There is great uncertainty in the industry right now, and there are growing pains associated with any new technology therefore the forecasts will not be adjusted at this time.

2.3 Peak Activity Forecasts

Table 2-3 shows the peak month, average day peak month (ADPM), and peak hour operations forecasts for Flying Cloud. The relationship between peak activity and annual activity was assumed to remain constant.

Peak activity forecasts for Flying Cloud Airport were estimated from FAA air traffic control tower records. Peak hour operations were assumed to be 12.7 percent of ADPM operations, consistent with the assumptions in the previous Flying Cloud Airport LTCP update from 1998. The peak month for the airport is July, and ADPM operations were estimated by dividing by 31 days. Peak hour operations at Flying Cloud are projected to decrease from 55 in 2007 to 43 in 2015 and then increase to 50 in 2025.

Table 2-3
Peak Activity Forecast Summary

	2007	2010	2015	2020	2025
Annual Operations (a)	124,569	99,540	97,154	106,030	113,876
Peak Month Operations (b)	13,424	10,727	10,470	11,426	12,272
ADPM Operations (c)	433	346	338	369	396
Peak Hour Operations (d)	55	44	43	47	50

(a) From Table 2-1.
(b) The 2007 percentage of peak month operations based on ATCT counts is assumed to continue through the forecast period.
(c) Average Daily Peak Month - Peak month (July) operations divided by 31 days.
(d) Assumed to be 12.7 percent of ADPM operations based on the 1991 Flying Cloud Airport LTCP.
Source: Appendix A – Activity Forecasts Technical Report, Table 13, April 2009.

2.4 Forecast Scenarios

General aviation activity has historically been difficult to forecast, since the relationships with economic growth and pricing factors are more tenuous than in other aviation sectors, such as commercial aviation. This uncertainty is likely to carry over into the near future, given the volatility of fuel prices and the anticipated emergence of microjets. To address these uncertainties, and to identify the potential upper and lower bounds of future activity at Flying Cloud, detailed high and low fuel price scenarios are presented. These scenarios use the same forecast approach that was used in the base case, but alter the assumptions to reflect either a more aggressive or more conservative outlook towards fuel costs.

2.4.1 High Forecast Scenario

The high forecast activity scenarios for the airport assumes that after the oil price spike in 2008, fuel prices return to the levels that had been originally projected by the Office of Management and Budget (OMB) (see Table I.1 in Appendix A). Other assumptions, including capacity constraints at MSP, are the same as in the base case.

Table 2-4 shows the high forecast scenario for Flying Cloud Airport. By 2025, the number of based aircraft is 13 percent higher than under the base case and the number of jets is 18 percent higher. By 2025, total annual operations would be 38 percent higher than under the base case. Of these operations, almost 20 percent would be jets, mostly microjets.

Table 2-4
High Forecast Scenario

	2007	2010	2015	2020	2025
BASED AIRCRAFT SUMMARY					
Single Engine Piston	336	331	325	319	321
Multi Engine Piston	37	37	33	31	28
Turboprop	20	20	22	23	24
Microjets (VLJs)	0	3	10	18	23
Other Jets	23	28	38	43	48
Helicopter	5	7	7	8	8
Other (a)	0	0	0	0	0
TOTAL	421	426	435	442	452
AIRCRAFT OPERATIONS SUMMARY					
Single Engine Piston	96,356	93,883	92,638	95,448	101,667
Multi Engine Piston	13,648	13,422	10,768	10,265	9,871
Turboprop	5,926	5,915	6,444	6,479	6,639
Microjets (VLJs)	4	3,085	9,948	17,697	22,435
Other Jets	3,530	4,186	6,347	7,484	8,636
Helicopter	5,104	6,952	6,917	7,900	7,956
Other (a)	0	0	0	0	0
TOTAL	124,569	127,443	133,062	145,273	157,204

(a) Balloons, gliders, and ultralight aircraft.
Source: Appendix A – Activity Forecasts Technical Report, Table 16, April 2009.

2.4.2 Low Forecast Scenario

The low forecast scenarios for the airport were prepared assuming that oil prices would continue to increase after 2008, rising to $200 per barrel by 2010, and then remaining at that level (see Table I.2 in Appendix A). Other assumptions, including capacity constraints at MSP, are the same as in the base case.

The low scenario forecast for Flying Cloud Airport is presented in Table 2-5. Microjet and other jet based aircraft categories would be expected to increase, and there would be a decline in fixed-wing piston powered aircraft. Total based aircraft in 2025 would be almost 12 percent lower than under the base case. Total operations would be 31 percent lower than under the base case, and jets would account for 22 percent of the total.

Table 2-5
Low Forecast Scenario

	2007	2010	2015	2020	2025
BASED AIRCRAFT SUMMARY					
Single Engine Piston	336	324	299	273	256
Multi Engine Piston	37	36	32	28	25
Turboprop	20	20	19	18	18
Microjets (VLJs)	0	2	7	12	14
Other Jets	23	27	31	34	34
Helicopter	5	7	7	7	7
Other (a)	0	0	0	0	0
TOTAL	421	416	395	372	354
AIRCRAFT OPERATIONS SUMMARY					
Single Engine Piston	96,356	46,894	43,334	43,895	46,077
Multi Engine Piston	13,648	8,242	6,448	5,816	5,590
Turboprop	5,926	3,977	3,827	3,664	3,737
Microjets (VLJs)	4	1,764	6,056	10,376	12,038
Other Jets	3,530	2,979	4,022	4,827	5,149
Helicopter	5,104	5,901	6,023	6,198	6,352
Other (a)	0	0	0	0	0
TOTAL	124,569	69,757	69,710	74,776	78,944

(a) Balloons, gliders, and ultralight aircraft.
Source: Appendix A – Activity Forecasts Technical Report, Table 19, April 2009.

2.5 Summary

The base case forecasts project a moderate decrease in based aircraft at Flying Cloud Airport. Operations are projected to decline through the 2010-2015 period and then begin to rise again later in the forecast, reflecting anticipated stabilization of oil prices at a new higher level. Although activity by piston powered aircraft is projected to decline, activity by higher performance turboprops and jets favored by business aviation is projected to increase significantly.

The forecast scenarios indicate that future fuel prices will have a major impact on the development of general aviation. Therefore, it is prudent to closely monitor actual aviation activity and modify the phasing of facility improvements if that activity materially departs from forecast levels.

Chapter 3 Airside and Landside Facility Requirements

This chapter describes the facility requirements needed to accommodate the base case and demand forecasts for year 2025. The sections of this chapter are intended to:

- Describe relevant design criteria
- Present airfield requirements in context of the critical aircraft
- Review NAVAID requirements
- Identify general aviation facility requirements
- Review parking and airport access needs
- Review obstructions issues
- Present miscellaneous requirements for the airport

3.1 Airside Requirements

3.1.1 Airport Reference Code

FAA Advisory Circular 150/5300-13 Airport Design outlines airport design guidelines. Primarily aimed at maintaining airport safety and efficiency, these guidelines help ensure that facilities at a given airport will match the requirements of the type of aircraft actually using (or forecast to use) the airport on a regular basis. For example, an airport serving larger aircraft will need wider runways and bigger safety areas than will an airport serving small single engine aircraft. In addition to aircraft type, airport design is also affected by the existing or planned approach visibility minimums for each runway.

To match aircraft type to the appropriate facility requirements, an Airport Reference Code (ARC) is applied to each runway. An ARC is most often determined based upon the Approach Category (grouping by approach speed) and the Airplane Design Group (ADG - grouping by wingspan and tail height) of aircraft using or expected to use the airport on a regular basis (at least 500 operations a year); though the FAA also considers local characteristics when approving applied criteria.

3.1.2 Approach Category

The current aircraft approach category assigned to the Airport is “B”. Typical aircraft in this aircraft approach category are the Beechcraft Baron, Raytheon Beechcraft King Air and Cessna Citation Jets (see Figure 3-1). Given that the role of the airport and types of aircraft operating are not anticipated to change over the forecast period, the plan recommends the criteria associated with category “B” aircraft continue to be applied. See Table 3-1.

3.1.3 Airplane Design Group

The current airplane design group applied to the Airport is group II. This means that the airport is designed to accommodate aircraft with wingspans less than 79 feet. Aircraft that fall into this category include most single engine and twin piston aircraft, the Raytheon Beechcraft King Air and smaller business and corporate jets such as the Cessna Citation II, III, IV and V. Table 3-2 shows the thresholds for the airplane design groups.

Table 3-1
Aircraft Approach Category

	Knots
A	Speed less than 91 knots.
B	Speed 91 knots or more but less than 121 knots.
C	Speed 121 knots or more but less than 141 knots.
D	Speed 141 knots or more but less than 166 knots.
E	Speed 166 knots or more.

Table 3-2
Aircraft Design Group

Category	Wingspan Criteria	Tail Height Criteria
I	Up to but not including 49 feet	Up to but not including 20 feet
II	49 feet up to but not including 79 feet	20 feet up to but not including 30 feet
III	79 feet up to but not including 118 feet	30 feet up to but not including 45 feet
IV	118 feet up to but not including 171 feet	45 feet up to but not including 60 feet
V	171 feet up to but not including 214 feet	60 feet up to but not including 66 feet
VI	241 feet up to but not including 262 feet	66 feet up to but not including 80 feet

3.1.4 Wind Coverage

Weather conditions have a significant influence on the operational capabilities at an airport. Wind speed and direction help determine runway orientation. Temperature also plays a role in determining runway length. High temperatures in the summer months result in longer runway length requirements. Cloud cover and low visibility are factors used to determine the need for navigation aids and instrument approaches.

Aircraft generally take off and land directly into the wind, or at least as directly into the wind as a given runway alignment allows. Crosswind runways are used when the wind is blowing perpendicular to the primary runway. Because small single engine aircraft have less power and are lighter than larger aircraft, they often have the most pressing need for crosswind runways.

The FAA prefers that the primary runway supply at least 95% percent wind coverage for the aircraft anticipated to use the airport. If the primary runway does not provide this level of coverage, a crosswind runway may be justified.

Wind and weather data from the National Oceanic and Atmospheric Administration for the Flying Cloud Airport Automated Surface Observing Systems (ASOS) for 1996– 2005 was obtained. This data was used to analyze the amount of wind coverage provided by the current runways.

Because larger, heavier and more powerful aircraft need a crosswind runway less often than smaller, lighter and less powerful ones, different winds speeds are used in the crosswind runway analysis for different aircraft. These different wind speeds are called crosswind components. Crosswind components are defined by wind direction and speed taken at a right angle to a runway. The FAA recommends that the criteria depicted in Table 3-3 be applied.

Table 3-3
Crosswind Components

Crosswind Component	Airport Reference Code
10.5 knots	A-I, B-I
13 knots	A-II, B-II
16 knots	A-III, B-III, C-I through D-III
20 knots	A-IV through D-VI

Tables 3-4 and 3-5 summarize the wind coverage of runways for different crosswind components. Table 3-4 includes the data for all of the weather conditions and Table 3-5 includes only the data when the weather is under IFR conditions of less than 1,000 foot ceilings and/or three miles visibility, but greater than 200 feet ceilings and half mile visibility (closed conditions).

Table 3-4
All Weather Wind Coverage

Wind Speed	Airport Reference Code	Rwy 10R-28L & 10L-28R	Rwy 18-36	All Runways
10.5	A-I and B-I	90.21%	89.95%	99.01%
13	A-II and B-II	94.89%	94.51%	99.80%
16	A-III, B-III, and C-I through D-III	98.86%	98.38%	99.97%

Source: NOAA National Data Center, US Department of Commerce, Minneapolis Flying Cloud Station (WMO: 72657), 01/01/96 to 12/31/05.

Runway 10R has a precision and non-precision instrument approach. Runways 10L, 28R, 28L, and 36 all have non-precision instrument approaches. These allow aircraft to land in a wider range of weather conditions. The data from the Flying Cloud ASOS indicates that weather conditions are below 1,000 feet ceilings and/or 3 mile visibility about 8% of the time. Weather data indicates that during instrument-flight-rule (IFR) conditions, Runway 10R/10L is favored.

Table 3-5
IFR Weather Wind Coverage

Wind Speed	Airport Reference Code	Rwy 10R-28L & 10L-28R	Rwy 18-36	All Runways
10.5	A-I and B-I	92.59%	89.61%	98.93%
13	A-II and B-II	96.20%	94.27%	99.75%
16	A-III, B-III, and C-I through D-III	99.17%	98.49%	99.94%

Source: NOAA National Data Center, US Department of Commerce, Minneapolis Flying Cloud Station (WMO: 72657), 01/01/96 to 12/31/05.

Another important factor to consider when planning facilities at airports is temperature. Temperature effects aircraft performance. The standard used is the mean daily maximum temperature of the hottest month at the airport. For the Flying Cloud Airport, the mean maximum temperature of the hottest month (July) is 84.0 degrees Fahrenheit.

3.2 Airside Capacity Requirements

3.2.1 Annual Service Volume

Airfield capacity is defined as the maximum number of operations that can be accommodated by a particular airfield configuration during a specified interval of time when there is constant demand. Annual service volume (ASV) is one capacity measure and the average hourly capacity is another.

The Annual Service Volume (ASV) for a given airport is the annual level of aircraft operations that can be accommodated with minimal delay. For an airport with annual operations below its ASV, delay is minimal within one to four minutes per operation. Anything above four minutes of delay per operation can result in increased congestion that can adversely tax airfield capacity.

An airfield system's capacity is determined by a multitude of various factors, including prevailing winds and associated orientation of runways, number of runways, taxiway system, fleet mix, operational characteristics of based aircraft and weather conditions.

Flying Cloud Airport's ASV is currently calculated to be 355,000, which is well above its current and projected (2025) annual operations of 124,569 and 113,876 respectively. It is also well above the high scenario 2025 year forecast of 157,204 annual operations. From the FAA Advisory Circular 150/5060-5 (Airport Capacity and Delay), Flying Cloud Airport's average hourly capacity was estimated to be 197 operations during VFR conditions and 59 operations during IFR conditions. Peak activity forecasts show 50 peak hour operations for the year 2025. Table 3-6 summarizes these numbers in terms of airside capacity.

Table 3-6
Airside Capacity

	Base/Forecasted Operations	Ops/Year Maximum	% Airside Capacity	Base/Forecasted Peak Hour Ops (VFR)	Ops/Hour Maximum (VFR)	% Airside Capacity
2007	124,569	355,000	35.1	55	197	27.9
2010	99,540	355,000	28.0	44	197	22.3
2015	97,154	355,000	27.4	43	197	21.8
2020	106,030	355,000	29.9	47	197	23.9
2025	113,876	355,000	32.1	50	197	25.4

Note: This table assumes that the parallel runways can be used simultaneously by single/multi-engine aircraft during VFR conditions.

Flying Cloud Airport has adequate runway capacity to support all of the forecast scenarios. This means that runway capacity will not be a contributing factor to any airport improvements.

3.2.2 Runway Length

Runway length requirements are based on the type of aircraft using or expected to use the runway, and are affected by temperature, airport elevation, and runway gradient. In addition, runway surface conditions also impact runway requirements. This last factor is an important consideration for determining runway lengths at airports in northern climates where wet and icy conditions exist.

Runway length analysis was conducted using two similar methods. The first method was the FAA Advisory Circular 150/5325-4B Runway Length Requirements for Airport Design while the second was the FAA Airport Design for microcomputers program.

FAA Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design uses a five-step procedure to determine recommended lengths for a list of critical design aircraft or “family grouping of aircraft having similar performance characteristics and operating weights.” Although this methodology is general in nature, it recognizes that there is uncertainty about the composition of the Airport’s fleet mix during the forecast period. Determining runway length based on a family of aircraft ensures the greatest measure of flexibility.

The AC provides runway length requirement tables for three groups of aircraft based upon the MTOW:

- Airplane Weight Category 12,500 pounds or less;
- Airplane Weight Category over 12,500 pounds but less than 60,000 pounds; and
- Airplane Weight Category 60,000 pounds or more or Regional Jets.

Based on both the existing and future fleet mix the Airplane Weight Category over 12,500 pounds but less than 60,000 pounds is the critical group for the airport. Under this weight range, one of two “percentage of fleet” categories can be used (75 percent or 100 percent). The 75% of fleet was used for this analysis. Typical aircraft are the Cessna Citation I, II, and III, the Learjet 35 and 45 and the Falcon 10 and 20. A complete list of the aircraft that make up this category can be found in the Advisory Circular, page 14, Table 3-1.

Figure 3-1 of the advisory circular was used to calculate runway length requirements. The calculations consider airport elevation above mean sea level, mean daily maximum temperature of the hottest month and critical design aircraft.

Based on the above analysis, to accommodate 75 percent of the fleet at 60% useful load, the runway length should be approximately 5,500 feet (adjusted for wet and slippery conditions). To accommodate 75 percent of the fleet at 90% useful load, the runway length should be approximately 7,000 feet long (adjusted for wet and slippery conditions).

Another way to calculate runway length requirements is to use the Airport Design for microcomputers program that is part of FAA AC 150/5200-13-Airport Design. This program incorporates Airport elevation, mean daily maximum temperature, length of haul, and runway conditions. The following analysis was done as a cross check. The Airport Design for microcomputers program provides runway length requirement tables for six groups of aircraft:

- Small airplanes with approach speeds of less than 30 knots
- Small airplanes with approach speeds of less than 50 knots
- Small airplanes with less than 10 passenger seats
- Small airplanes with 10 or more passenger seats
- Large airplanes of 60,000 pounds or less
- Airplanes of more than 60,000 pounds

Based on the above criteria, the category of large airplanes of 60,000 pounds or less is the critical grouping of aircraft for the Flying Cloud Airport since aircraft of this category will fly in and out of the airport more than 500 times per year; the runway length should be approximately 5,460 feet to accommodate 75 percent of these aircraft at 60% useful load and 7,000 feet to accommodate 75 percent of these aircraft at 90% useful load (each noted by a * in Table 3-7).

Table 3-7
Recommended Runway Lengths

AIRPORT AND RUNWAY DATA	
Airport elevation	906 feet
Mean daily maximum temperature of the hottest month	84.0 F.
Maximum difference in runway centerline elevation	7 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles

Table 3-7 continued

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN (for wet and slippery runways)	
Small airplanes with approach speeds of less than 30 knots	330 feet
Small airplanes with approach speeds of less than 50 knots	870 feet
Small airplanes with less than 10 passenger seats 75 percent of these small airplanes 95 percent of these small airplanes 100 percent of these small airplanes	 2,760 feet 3,280 feet 3,890 feet
Small airplanes with 10 or more passenger seats	4,340 feet
Large airplanes of 60,000 pounds or less 75 percent of these large airplanes at 60 percent useful load 75 percent of these large airplanes at 90 percent useful load 100 percent of these large airplanes at 60 percent useful load 100 percent of these large airplanes at 90 percent useful load	 *5,460 feet *7,000 feet 5,510 feet 8,240 feet
Airplanes of more than 60,000 pounds	Approximately 5,330 feet

Source: FAA's Airport Design software (Version 4.2D)

According to criteria found in FAA Advisory Circular 150/5325-4B, Runway Length Requirements for Airport Design, dated July 1, 2005, crosswind runway length should be 100% of the recommended runway length for the aircraft with lower crosswind capabilities. If the crosswind runway is designed to accommodate the same aircraft as the primary runway, it should be the same length as the primary. If it is designed for different (typically smaller) aircraft, it should be designed to accommodate the needs of those aircraft. At Flying Cloud Airport, the crosswind runway should be designed to accommodate smaller aircraft than the primary runway and therefore the recommended length of the crosswind runway is 2,760' to accommodate 75% of these small aircraft up to 3,890' to accommodate 100% of them.

3.2.3 Runway Orientation and Separation

For optimum runway design, the primary runway should be orientated to capture 95 percent of the crosswind component perpendicular to the runway centerline for any aircraft that is to use the airport. This is not always achievable. In cases where this cannot be done, a crosswind runway is recommended. A crosswind runway is also recommended when certain aircraft with lower crosswind capabilities are unable to utilize the primary runway, provided they have over 500 annual operations at that airport. The runways are oriented to achieve the necessary wind coverage for the design aircraft, and a crosswind runway exists to provide coverage for smaller aircraft.

The parallel runways are 500 feet apart. This is less than the minimum separation of 700 feet for simultaneous landings and take-offs under Visual Flight Rules. Single engine or multi-engine aircraft landing or departing on the parallel runways can operate simultaneously during VFR conditions, but jet operations must to be staggered. Order JO 7110.65S, Air Traffic Control which describes ATC procedures, says the during simultaneous same direction operation under VFR conditions, the minimum distance between parallel runways is 300 feet for lightweight, single-engine propeller driven aircraft, 500 feet for twin-engine propeller driven aircraft and 700 feet for all others (TBL 3-8-1 of the JO).

3.2.4 Runway Width and Shoulders

The FAA establishes 75 feet as the required width for a runway supporting B-II ARC with visibility minimums not lower than ¾ miles and 100 feet for lower than ¾ mile. Runway 10R-28L is 100' wide and Runways 10L-28R and 18-36 are 75' wide.

Runway shoulders are intended to provide a transition surface between the runway pavement and the adjacent surface, to support aircraft running off the pavement, provide blast protection, and enhance erosion control and drainage. For B-II ARC, the required shoulder width is 10 feet. The airport meets this requirement.

3.2.5 Runway Safety and Object Free Areas

The Runway Safety Area (RSA) for Runway 10R-28L at Flying Cloud meets FAA requirements for ARC II with ½ mile visibility minimums (600 feet beyond the runway end, and 300 feet wide). The RSA for Runway 10L-28R meets FAA requirements for ARC-II with 1 mile visibility minimums (300 feet beyond the runway end, and 150 feet wide). For Runway 18-36, the RSA is 120 feet wide and extends 240 feet beyond the Runway 18 end but only 204 feet beyond the Runway 36 end. This is deficient by 36 feet. This will be addressed in the next chapter.

The Runway Object Free Area (ROFA) is centered on the runway centerline and should be clear of any above ground objects protruding into the runway safety area edge elevation. The only exception to this rule is related to objects necessary for air navigation or aircraft ground movement. The standard ROFA extends 600 feet beyond the runway end and is 800 feet wide for Runway 10R-28L, is 500 feet wide and extends 300 feet beyond the end of Runway 10L-28R, and it is 250 feet wide and extends 240 feet beyond the end of Runway 18-36. There is an airport service road which goes through the Runway 28L OFA. MAC has requested a modification to standards and FAA approval is pending. The ROFA is deficient by 63 feet off the end of Runway 36 due to a fence and a public road. This will be addressed in the next chapter.

The Runway Obstacle Free Zone (OFZ) is a defined airspace centered above the runway and extends 200 feet beyond each runway end. The width varies depending on the characteristics of the runway's critical aircraft. For Flying Cloud, it is 400 feet wide for Runways 10R-28L and 10L-28R and 250 feet wide for Runway 18-36. All runways meet FAA requirements for OFZ dimensions.

3.2.6 Taxiway Requirements

The Airport Design Group (ADG) II criteria for taxiway width is 35 feet. The parallel taxiways and all connector taxiways are currently 40 feet wide. For ADG II aircraft, the recommended runway centerline-to-taxiway centerline separation is 300 feet for approach minimums less than ¾ mile and 240 feet for approach minimums not lower than ¾ mile. For Runway 10R-28L, the parallel taxiway separation distance is 400 feet. Runway-taxiway separation for Runway 10L-28R and Runway 18-36 is 250 feet.

Taxiway turnoffs should be present to facilitate aircraft exit off of the supported runway, to reduce incursions and minimize time on runway. The existing connectors currently provide this functionality and AC 150/5300-13 guidance will be utilized for proposed future parallel taxiway extensions.

Paved or stabilized shoulders are recommended along taxiways. ADG II aircraft would require 10 foot shoulders. Flying Cloud has 10-foot wide turf shoulders on its taxiways.

The Taxiway Object Free Area (OFA) width for ADG II aircraft is 131 feet, which is met for all taxiways except Taxiway A and a small area near the end of Runway 36. There are numerous hangars within the area along the taxiway. The ALP shows these hangars ultimately being removed.

The FAA-recommended taxilane OFA width is 115 feet for B-II airports. Any new hangar areas should be designed to meet this standard. Many of the existing taxilanes do not meet this standard for B-II aircraft. The FAA offers a calculation as an alternative that utilizes the wingspan of a particular aircraft to determine an adequate OFA. The formula takes the wingspan times 1.2, plus 20 feet. Based upon this calculation, the taxilanes in the north building area are designed for wingspan group I aircraft (wingspan less than 49'). Most of the aircraft that use those hangars are wingspan group I. The group II aircraft using the airport likely are hangared at FBO facilities or other areas where the adequate taxilane OFA is provided.

3.3 Landside Requirements

3.3.1 Hangar Facilities

The Flying Cloud Airport, like all of the MAC airports, has a wide variety of hangar sizes and hangar ages. In recent years, MAC has tried to standardize the size of hangars within new hangar areas at any of the Reliever Airports. However, aircraft also come in many different sizes, and trying to accommodate everyone leads to variability. As shown in Chapter 1, the airport is estimated to have 508 indoor aircraft storage spaces, including the estimated number of available spaces when hangars are constructed in the new south building area. This number includes an assumption that most airport tenants sublease extra space for additional aircraft within their hangars, but also includes a small discount for those who opt not to lease extra space.

Tenants own their hangars and lease the ground space from MAC. It is currently the policy of the MAC that no tenant can lease more space than they can justify with actual aircraft ownership. This practice has reduced the number of large hangar demands, and subsequently, reduces some of the subleasing opportunities at the airport. However, it is feasible that a tenant that owns a 3,600 square foot hangar and two aircraft can sell the hangar to a person who owns only one aircraft. That new tenant then would be allowed to sublet his extra space to house a second aircraft if they so choose.

3.3.2 Fixed Base Operators (FBOs)

At this time no additional space is needed for an FBO. MAC is prepared to reserve space in the proposed south building area since it could easily accommodate an FBO. Currently, however, there is not enough air traffic or business to support more than the existing FBO facilities at the airport.

3.3.3 Airport Access, Roadway Circulation and Parking

Airport access is currently being enhanced by the expansion and widening of County State Aid Highway CSAH 1 (Pioneer Trail) along the northern border of the airport. The project includes wider airport entrances and turn lanes for safer vehicle movements. In the early 2000's, the City of Eden Prairie completed numerous roadway improvements on the west and south sides of the airport, including reconstruction of CSAH 4/Spring Road and construction of the new Charlson Road (now named Robinson Way). These are primary access corridors for tenants utilizing the airport. The former Trunk Highway 212, now known only as Flying Cloud Drive, also provides access to the airport from the south, and from the east as well.

Combined with the construction of the extended east-west runways is the construction of two airport perimeter roads. One road connects the very east end of the north building area with the southeast hangar area. This road will allow airport maintenance and airport fuel trucks to access the building areas without crossing runway pavements. The same is true for the new west perimeter road, which will connect the west end of the north hangar area to the new south building area.

The existing FBO facilities maintain parking areas for their customers and employees. There is also parking located at the air traffic control tower for FAA employees. The aviation school has a large parking area for students and staff. The MAC maintenance facility includes a few parking areas for visitors and MAC staff.

No additional parking needs have been identified.

3.3.4 Maintenance and Fuel Storage Areas

There is currently no need for additional maintenance vehicle fueling areas. The expanded runway pavement length, taxiways, the new hangar area and perimeter roads have resulted in additional areas that require maintenance and snow plowing efforts. Existing maintenance facilities are undersized for the equipment needed for such activity. Also, airport staff have no office space available for their use. Further, the restroom facilities used jointly by MAC and FAA staff are old and undersized. MAC has identified a need for a new maintenance building for equipment storage, however, funding for a project has not been identified nor has it been listed in MAC's capital improvement program.

3.4 Lighting and Navigation Requirements

3.4.1 Runway and Taxiway Edge Lighting

Runway edge lights are used to outline the edges of runways during periods of reduced visibility or darkness. These light systems are classified according to the intensity they are capable of producing. The airfield modifications occurring with the east-west runway extensions include new runway and taxiway lighting where necessary. The new Taxiway B is lighted with LED blue taxiway lights as part of a sustainable environment initiative. Upgrades to Runway 18-36 lighting will take place when improvements are constructed (see Chapter 4).

3.4.2 Taxiway Guidance Signs

For many years the Flying Cloud Airport has maintained taxiway guidance signs. These signs have been upgraded and modified with the runway extension projects, and assist pilots in way-finding around the airport.

3.4.3 Runway Guard Lights

As part of the on-going airport improvements and runway extensions, runway guard lights will be installed at almost all runway-taxiway intersections. These lights consist of two alternating flashing yellow lights, also called wig-wag lights. The guard lights will be co-located with the runway hold bars, and provide a round-the-clock lighted visual indication to pilots that they are approaching the runway environment.

Similar to the taxiway guidance signs, guard lights are not required by the FAA for the type of airport operations for which Flying Cloud is certified. However, both the guidance sign and guard light installations enhance operational movements around the airport and offer ways to reduce the potential for hazardous conflicts between aircraft or vehicles on the ground with aircraft operating on runway surfaces.

3.4.4 PAPI/VASI

Precision Approach Path Indicator (PAPI) and Visual Approach Slope Indicator (VASI) systems consist of lights normally located on the left side of a runway that provide visual descent guidance information during an approach to a runway. The lights are visible from about 5 miles during the day and up to 20 miles at night. Currently there is a PAPI system on Runway 10L and Runway 28R and on Runway 10R and 28L. VASI systems exist on both ends of Runway 18-36. The FAA owns and maintains the PAPI and VASI systems. It is likely that the VASIs on Runway 18-36 will be upgraded to PAPI system as a part of any proposed improvements to that runway (see Chapter 4).

3.4.4 Instrument Approach

As noted in the inventory, Runway 10R has an Instrument Landing System (ILS) with a MASLR approach lighting system. Runways 10L, 28L, 28R and 36 have GPS approaches. Additionally, Runway 10R and Runway 36 have a VOR approach. The existing end-fire glideslope antenna was relocated with the extension of Runway 10R-28L to 5,000 feet. The MALSR system was relocated/replaced along with the extension at that same time. The approach visibility is ½ mile with the relocated ILS system.

The existing airport VOR is being relocated as a part of the 2008-2009 airport improvements. The new location is less than one-half mile away to the east. This existing VOR supports two approaches to Flying

Cloud, but also supports more than 60 approaches to the Minneapolis – St. Paul International Airport (MSP). The relocation of the VOR results in numerous modifications to existing approach procedures. However, the new location will not allow for a VOR approach to Runway 36. That approach procedure will be decommissioned in February 2010. All other approaches to Flying Cloud will be maintained/upgraded with the VOR and ILS relocations.

3.4.5 FAA Owned ATCT and ASR

As noted in Chapter 1, the Flying Cloud Airport has an Air Traffic Control Tower (ATCT). It is located in the southeast building area (see Figure 1-22). This facility is owned and operated by the FAA. It was commissioned in 1963. Since that time, the FAA has replaced and upgraded equipment, but the structure is essentially the same.

The south hangar area lies between the existing ATCT and the extended Runway 10R end. Due to the existing location and height of the ATCT, there are significant height restrictions in the hangar area. The restrictions actually prevent the construction of hangars in some locations. Relocation of the ATCT would benefit both the FAA and MAC. A new ATCT would result in a new facility for the FAA, and could be positioned such that there are no longer height restrictions in the hangar area.

As noted in Chapter 7 and 8 regarding costs and implementation of such a project, relocation of the ATCT would require the cooperation and assistance of the FAA.

The Minneapolis – St. Paul International Airport (MSP) currently has an Airport Surveillance Radar (ASR). This radar provides the MSP ATCT with flight data for aircraft operating within the Twin Cities area. Due to recent development within the City of Bloomington and other construction within the vicinity of the radar, it is partially shadowed by structures. This results in portions of some approach paths not being “seen” by the radar. While the shadowing is nothing more than an inconvenience at this time, additional development is proposed which would more significantly block the signal.

The FAA is currently reviewing the justification and possibility of constructing a second ASR to provide additional and overlapping radar coverage. Potential sites have been identified at MSP and at FCM. MAC continues to discuss the process and status with the FAA.

3.5 Security Requirements

The airport has a full perimeter fence and gate system. The fence and gates have been maintained and upgraded over the years. Gates have historically been left open at the airport, but MAC is planning to close and lock gates on a permanent basis for safety and security purposes. To accomplish that, recent improvements to the gates include full power operation and telephone call boxes for controlled access into the airfield. Airport tenants can punch in a code to open the gates. Airport visitors can call a specific FBO business to get access to their facility.

3.6 Utility Requirements

In 2002, the first phase of sanitary sewer and water was installed at the airport. In 2008, the remaining hangar areas on the airport were served except for the new south hangar area. At this time, there is no demand or requirement for additional utilities to serve the airport. As MAC moves forward with leasing of space in the new south hangar area, MAC will also secure funding and proceed with the installation of services. Installation of utilities will also include electricity, telephone, natural gas, etc.

3.7 Obstruction Related Issues

Obstructions, if any, are typically analyzed when an Airport Layout Plan (ALP) is prepared. Upon completion of this comprehensive plan, the ALP for Flying Cloud will be updated. Obstructions will be identified with a proposed disposition for each. In recent years, trees on airport property that were identified as potential obstructions were removed. Please note that the 2008-2009 airport improvements projects and the Hennepin County CSAH 1 project included the removal of many known obstructions around the airfield.

The most recently approved ALP for Flying Cloud identified obstructions (trees) north of Runway 18. MAC is in the process of locating and surveying these trees so the scope of removal can be determined.

Chapter 4 Alternatives and Plan Recommendations

In this chapter the different potential development options are analyzed for the airport. While the number of concepts could be infinite, the ones in this chapter have been developed taking into consideration the airport inventories, forecasted growth and facility requirements. In addition, other concepts or ideas arising from public input during the LTCP process also received consideration.

4.1 Airport Expansion – Runways and Hangar Areas

The Flying Cloud Airport currently has three runways, as discussed in Chapter 1. Alternatives for airport runways can include additional runways at an airport or runway extensions, depending on existing needs, forecasts, and airfield capacity.

4.1.1 Additional Runways

As shown in the forecasts for 2007, the number of operations was 124,569. In Chapter 3, the maximum number of operations the airport can handle, the annual service volume, was identified as 355,000 operations based on the existing three runway configuration. Therefore, from an airside standpoint, the airport is currently at 35% capacity.

The baseline 2025 forecast number of operations is lower than 2007. Under the high scenario, the 157,204 forecasted number of operations in 2025 would result in 44% capacity. None of these figures trigger the need to study additional runways at FCM.

4.1.2 Runway Extensions

As identified in the Chapter 1 inventory, Runway 10R-28L was extended to 5,000 feet long in 2009; Runway 10L-28R is 3,900 feet long; and Runway 18-36 is currently 2,691 feet long. A runway length of 5,000 feet is the maximum allowed under Minnesota State law for a Minor Use Airport such as FCM.

Chapter 3, Section 3.2.2 discusses the FAA recommendations for runway length. A runway length of 5,000 feet accommodates all small aircraft weighing less than 12,500 pounds, and some of the large aircraft weighing less than 60,000 pounds. The parallel runway length of 3,900 feet also accommodates 100% of the small airplanes weighing less than 12,500 pounds. These figures are determined based on wet and slippery runway conditions, when more runway length is typically needed for operations.

The crosswind runway, 18-36, does not meet the recommended standard according to these tables. Also, as discussed in Chapter 3, Section 3.2.5, the runway safety area and runway object free area are deficient for the Runway 36 end. The alternatives reviewed for this LTCP update focus on this runway, and are discussed in Section 4.2.

4.1.3 Hangar Areas

The number of based aircraft registered for FCM in 2007 was 421 aircraft, as identified in the base year of the forecasts in Chapter 2. Chapter 3 indicated that there is an estimated 508 actual indoor hangar spaces at the airport, including the new south hangar area. This means the current landside use equates to about 83% of capacity.

According to the Chapter 2 forecasts, the number of based aircraft is anticipated to decline from 421 in 2007 to 420 in 2010, and down to 401 by 2025. This is due to the forecasted drop in operations by the single and multi-engine piston aircraft. Under the high forecast, the based aircraft would reach 452, or approximately 89% capacity.

The airport currently has enough hangar capacity available through the planning period.

Chapter 1 noted that some existing tenants are opting to demolish existing old T-hangars and build new individual hangars for themselves and to sell. MAC expects this trend may continue, and offers a way for new tenants to come to the airfield and house aircraft in privately owned hangars. The new south hangar area is designed to accommodate mostly corporate hangar sizes which cannot fit in the existing building areas even with redevelopment of existing hangar sites. Therefore, the airport is currently positioned very well to accommodate a variety of hangar needs.

4.2 Runway 18-36 Alternatives

An analysis of runway lengths and wind coverage needs was completed for a variety of aircraft known to use Runway 18-36. The need for a crosswind runway is easily justified by the existing wind coverage, especially for the smallest aircraft operating at the airport. Aircraft weighing less than 12,500 pounds are typically more susceptible to crosswind conditions.

As discussed in Chapter 3, the runway safety area (RSA) and runway object free area (OFA) for the Runway 36 end do not meet current FAA standards. The deficiency is approximately 63-feet; however, with some minor fence modifications, the deficiency can be reduced to 58-feet. In order for the FAA to provide federal funding for projects related to Runway 18-36, MAC must address the RSA and OFA issues.

The following alternatives address the RSA and OFA shortage. Costs for each alternative are shown in Chapter 7.

4.2.1 No Build Concept

A “no build” alternative would include no runway improvements and no changes to the airfield within the 20 year planning period. If a no-build alternative was selected for Runway 18-36, the only work that would occur within the planning period is the on-going required pavement maintenance. Runway 18-36 where it intersects with the parallel runways has been reconstructed in recent years as apart of the parallel runway extensions. The pavement at the south end of the runway, however, remains in poor condition. MAC continues to carry a reconstruction project for the south end of Runway 18-36 in the Capital Improvement Program to address the pavement conditions. As noted above, it is unlikely the FAA would fund such a reconstruction project unless the RSA and OFA deficiencies are addressed.

It recommended that the no-build alternative include no changes to Runway 18-36, but that reconstruction of the south end and construction of the north perimeter road be completed within the planning period.

A no-build alternative also does not address the RSA and OFA issues. Therefore, the no-build alternative does not meet the needs of the airport.

4.2.2 Shorten Runway 18-36

This alternative shortens the crosswind runway to create a compliant runway safety area (RSA) and object free area (OFA). The runway would be shortened by 58-feet. The current length is 2,691-feet; the ultimate length would be 2,633-feet. See Figure 4-1.

The change in runway length will require a change in the runway lighting locations. The runway end lights and runway end identifier lights (REILs) would need to be relocated. The existing taxiway connectors would be removed and reconstructed to match with the new runway end. The VASI system for Runway 36 would have to be upgraded to a PAPI and relocated as required by the new runway end location (the existing VASI system cannot be relocated).

In lieu of removing the runway pavement, MAC would pursue approval to leave the pavement in place but mark it as unusable by aircraft. Under this scenario, 58-feet of the runway pavement could not be used on a regular basis, but it would provide a paved section of runway safety area. The runway end lights would not be in-pavement lights so as to prevent any usage of the pavement except in an emergency.

As noted above, some minor modifications to the existing airport property fence can minimize the necessary runway reduction from 63-feet to only 58-feet.

The following summarizes the items to be considered with this alternative:

Alternative Includes:	• Removing 58 feet of pavement, or repainting 58 feet as unusable by aircraft; • Relocating the taxiway connectors to match the new Runway 36 end; • Runway light location adjustments for the new length; • Working with Hennepin County to gain a minor amount of right-of-way to relocate the airport fence; • Relocating the airport fence along Flying Cloud Drive.
Beneficial Considerations:	• Achieves a compliant RSA and OFA for Runway 36; • This is the lowest cost option aside from no-build; • The taxiway configurations remain standard at both ends of the runway; • No environmental process is required.
Negative Considerations:	• The runway length would be reduced by 58-feet; • The runway is already shorter than the recommended runway length for a crosswind runway.

This alternative clearly addresses the RSA and OFA issue. It does not, however, address the fact that the runway length does not meet the FAA-recommended length for the type of aircraft using the airport.

4.2.3 Shift Runway 18-36

This alternative shifts the crosswind runway to the north by 58-feet to create a compliant RSA and OFA. In addition to reducing pavement length at the Runway 36 end, new pavement would be constructed to extend the existing end of Runway 18. The runway length would be maintained at 2,691-feet. See Figure 4-2.

This option, similar to the shorten option, requires the runway lights and taxiway connectors to be relocated. The Runway 36 pavement would also be kept in place and marked for non-use as discussed in the previous option. In this alternative, however, Taxiway A at the north end of the runway also needs to be reconstructed to match with the shifted runway end. Given the relatively short distance, the resulting taxiway configuration of Taxiway A is non-standard. This is clearly a higher cost option because of the added pavement construction.

The runway shift will require upgrade of the existing FAA-owned VASI systems to new PAPI systems since the existing VASIs cannot be relocated due to their age and condition.

As noted in Chapter 3, Section 3.7, there are existing obstructions to Runway 18 (trees). By shifting the runway end to the north, the possibility exists that additional obstructions will be identified for the runway approach slopes.

Alternative Includes:	• Removing 58 feet of pavement, or repainting 58 feet as unusable by aircraft at the Runway 36 end; • Constructing 58 feet of runway length at the Runway 18 end; • Relocating the taxiway connectors to match the new runway end at both ends of the runway; • Runway light adjustments for the new runway location; • Working with Hennepin County to gain a minor amount of right-of-way to relocate the airport fence; • Relocating the airport fence along Flying Cloud Drive.
Beneficial Considerations:	• Achieves a compliant RSA and OFA for Runway 36; • The existing runway length would be maintained.
Negative Considerations:	• The taxiway relocation at the north end results in a curved alignment which may cause confusion to pilots; • This is a higher cost option due to the construction of pavement in addition to other costs; • Moving the runway end to the north has the potential to cause more obstructions to Runway 18 (i.e. Pioneer Trail, existing trees); • An environmental review process may be required; • The incremental benefit of constructing additional pavement is not justified by operator need, and likely not justified by the cost.

This option meets the RSA and OFA correction needs, but maintaining the existing runway length does not meet the recommended FAA runway length for the type of aircraft at the airport.

4.2.4 Shift and Extend Runway 18-36

The recommended runway length is 3,900 feet to accommodate 100% of aircraft weighing less than 12,500 pounds. One physical constraint for such an option, however, is the existence of the Pioneer Trail roadway corridor, which is currently being upgraded by Hennepin County and the City of Eden Prairie to a 4-lane divided highway. There would be no way to route this roadway around a runway extension, and the cost for a tunnel scenario would be prohibitive. The runway end would also lie very close to the edge of Staring Lake, which lies approximately 80-feet lower in elevation than where the runway end would be.

As discussed in Chapter 3, the FAA recommends a runway length of 2,800 feet to accommodate 75% of the fleet of aircraft weighing less than 12,500 pounds. Those aircraft most susceptible to crosswinds are virtually all in the 75% category.

This alternative shifts the crosswind runway to the north by 58-feet to create a compliant runway safety area and object free area and then adds an additional 109 feet of pavement for a total runway length of 2,800 feet. See Figure 4-3.

As with the other two options, the pavement at the Runway 36 end would be maintained but marked for non-use. The runway must physically be extended to the north and a new taxiway connector must be constructed to match the new runway end pavement. The runway lighting would require relocation, and the existing VASIs should be upgraded to PAPI systems.

Alternative Includes:	• Removing 58 feet of pavement, or repainting 58 feet as unusable by aircraft at the Runway 36 end; • Constructing 167 feet of runway length at the Runway 18 end; • Relocating the taxiway connectors to match the new runway end at both ends of the runway; • Runway light adjustments for the new runway location; • Working with Hennepin County to gain a minor amount of right-of-way to relocate the airport fence; • Relocating the airport fence along Flying Cloud Drive.
Beneficial Considerations:	• Achieves a compliant RSA and OFA for Runway 36; • The runway would be lengthened to better serve aircraft that use it and are most affected by crosswinds.
Negative Considerations:	• The taxiway relocation at the north end slightly impacts the FBO; • This is a higher cost option due to the construction of pavement in addition to other costs; • Moving the runway end to the north has the potential to cause more obstructions to Runway 18 (i.e. Pioneer Trail, existing trees); • An environmental review process may be required.

This alternative would correct both the RSA/OFA deficiency and enhances the runway use by providing additional length. This option, however, would be the most expensive because of the pavement construction costs and potential for increased obstruction removal requirements.

4.2.5 Runway 18-36 North Perimeter Road

All three of the Runway 18-36 alternatives show a new road north of the runway end, connecting the east and west sections of the north hangar area. This perimeter road is being considered at the request of the FAA to provide an east-west landside route for vehicles, fuel trucks, and MAC maintenance vehicles so they do not have to drive on or cross airfield pavements. The intention is to reduce the risk for runway incursions related to Runway 18-36. Note that unlike the two perimeter roads constructed at each end of the Runway 10-28 runways, this particular road is proposed to be constructed such that it can also be used by airport tenants and visitors.

The cost for constructing the perimeter road is included in the cost estimates listed in Chapter 7 along with each of the alternatives.

4.2.6 Estimated Costs for Runway 18-36 Alternatives

Table 4-1 itemizes the estimated costs for the alternatives outlined for Runway 18-36. The alternatives include the recommended reconstruction of the south end of Runway 18-36, plus the paving, drainage and utility work needed to shorten, shift, and/or extend the runway. Also included is the electrical work for full replacement of the Runway 18-36 circuit, runway edge lights and runway threshold lights.

The PAPI line item includes costs for purchase of the systems plus anticipated costs for a FAA reimbursable agreement required for relocation/upgrade of their facilities. If the FAA is able to provide the PAPI systems, the amount would decrease. Even though the runway shorten option only physically impacts one VASI system, it is expected that both VASI systems would be replaced under that alternative. A range is provided given the cost difference if the equipment is or is not provided by the FAA.

The north perimeter road line item includes construction costs, security gate installation and fence modifications. All estimates are shown as 2009 dollars.

Table 4-1
Estimated Costs for Runway 18-36 Alternatives

ALTERNATIVE	ESTIMATED COST
No Build / Reconstruct South End Only	$1,000,000
Shorten Runway 18-36	$1,200,000
Shift Runway 18-36	$1,500,000
Shift and Extend 18-36	$1,700,000
Upgrade VASIs to PAPIs	$100,000 - $200,000
North Perimeter Road	$300,000

4.3 Preferred Alternative for Runway 18-36

Runway 36 currently has a non-compliant runway safety area (RSA) and non-compliant object free area (OFA). Three options were reviewed to correct the deficiency.

Based on the analysis of the three alternatives discussed above, it is recommended that Runway 18-36 be shifted north and lengthened to 2,800 feet to create a compliant RSA and OFA. The FAA will likely not provide federal funding for projects associated with Runway 18-36 unless a compliant runway safety and object free areas are achieved. The runway extension will better serve aircraft using the runway, especially during critical cross-wind operations. It is justified by both the FAA runway length curves and by the crosswind component at Flying Cloud. The recommended runway length is tied to the type of aircraft using the runway; not the number of operations by those aircraft (as long as the number of operations exceeds 500 per year). This is definitely the case at FCM.

It is recommended that with the runway shift and extension, the south end pavement be reconstructed as currently planned in the MAC capital improvement program. It is also recommended that the existing FAA-owned VASIs be replaced with PAPIs. Obstructions related to Runway 18-36 should be identified and removed, and the north perimeter road should be constructed as a part of the Runway 18-36 improvements.

The runway extension and perimeter road construction may have impacts on two existing FBO facilities at the end of Runway 18. MAC will review any necessary lease changes and/or parking modifications with the businesses prior to any construction implementation.

This preferred alternative may require environmental review. MAC will review the State Environmental Assessment Worksheet (EAW) requirements and the Federal FAA categorical exclusion checklist to identify the appropriate type of environmental review documentation.

4.4 Other Plan Recommendations

As discussed above, there is no demonstrated need for additional runways or new hangar areas at the Flying Cloud Airport at this time. There are, however, various airside and landside improvements that are recommended for implementation in addition to the Runway 18-36 preferred alternative. Specific items listed below are shown on Figure 4-4.

4.4.1 Pavement Maintenance Program

MAC should continue pavement reconstruction and rehabilitation as a part of the on-going pavement maintenance program, including reconstruction of the south end of Runway 18-36 as a part of implementing the preferred alternative.

4.4.2 South Hangar Area Utilities

Completion of the south hangar area utilities shall be completed as new leases are executed and lot assessment fees are collected. Utilities include the installation of sanitary sewer, water, electric and/or natural gas services, and telephone.

Figure 4-4 shows a boxed out area adjacent to the south hangar area. This box identifies a potential expansion to the building area, should forecasts in future LTCPs identify a need for additional hangar space. As noted in this document, there is no demonstrated need at this time. However, if at some point additional space is needed, this location near midfield would work well.

4.4.3 Taxiway A Object Free Area

MAC should take steps to provide a clear Taxiway Alpha object free area. Some of the 1950's vintage hangars along the north side of Taxiway A actually lie within the taxiway object free area (OFA). MAC will work with these tenants over time as they plan on hangar redevelopment to clear the TOFA.

4.4.4 ATCT Relocation

MAC should continue discussions with the FAA relative to the ultimate relocation of the Air Traffic Control Tower to a location in the new south hangar area. The ATCT is not owned by the MAC. Its relocation will require the cooperation and assistance of the FAA.

4.4.5 Concurrent Use / Development Parcels

MAC should continue the research the development of concurrent land uses for revenue generating purposes on airport property.

4.4.6 Agency Coordination

MAC should pursue continued cooperation with the City of Eden Prairie through the existing MAC/City agreements, the Flying Cloud Airport Advisory Commission, and on-going MAC/City staff interaction.

Chapter 5 Environmental Considerations

An integral part of the airport planning process focuses on the manner in which the airport and any planned enhancements to the facility pose environmental impacts. This chapter evaluates the environmental implications of the planned operation and development of the Flying Cloud Airport.

5.1 Aircraft Noise

5.1.1 Quantifying Aircraft Noise

5.1.1.1 Basics of Sound

Sound is a physical disturbance in a medium, a pressure wave typically moving through air. A sound source vibrates or otherwise disturbs the air immediately surrounding the source, causing variations in pressure above and below the static (at-rest) value of atmospheric pressure. These disturbances force air to compress and expand, setting up a wavelike movement of air particles that move away from the source. Sound waves, or fluctuations in pressure, vibrate the eardrum creating audible sound.

The decibel, or dB, is a measure of sound pressure level that is compressed into a convenient range, that being the span of human sensitivity to pressure. Using a logarithmic relationship and the ratio of sensed pressure compared against a fixed reference pressure value, the dB scale accounts for the range of hearing with values from 0 to around 200. Most human sound experience falls into the 30 dB to 120 dB range.

Decibels are logarithmic and thus cannot be added directly. Two identical noise sources each producing 70 dB do not add to a total of 140 dB. The correct answer is 73 dB. Each time the number of sources is doubled, the sound pressure level is increased 3 dB.

Baseline:	70 dB
2 sources:	70 dB + 70 dB = 73 dB
4 sources:	70 dB + 70 dB + 70 dB + 70 dB = 76 dB
8 sources:	70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB = 79 dB

The just-noticeable change in loudness for normal hearing adults is about 3 dB. That is, changes in sound level of 3 dB or less are difficult to notice. A doubling of loudness for the average listener of A-weighted sound is about 10 dB.[2] Measured, A-weighted sound levels changing by 10 dBA effect a subjective perception of being “twice as loud”.[3]

Figure 5-1 provides the noise levels for various common sources.

[2] A-weighted decibels represent noise levels that are adjusted relative to the frequencies that are most audible to the human ear.
[3] Peppin and Rodman, Community Noise, p. 47-48; additionally, Harris, Handbook, Beranek and Vér, Noise and Vibration Control Engineering, among others.

5.1.1.2 Day-Night Average Sound Level (DNL)

In 1979 the United States Congress passed the Aviation Safety and Noise Abatement Act. The Act required the Federal Aviation Administration (FAA) to develop a single methodology for measuring and determining airport noise impacts. In January 1985 the FAA formally implemented the Day-Night Average Sound Level (DNL) as the noise metric descriptor of choice for determining long-term community noise exposure in the airport noise compatibility planning provisions of 14 C.F.R. Part 150. Additionally, FAA Order 1050.1, *"Environmental Impacts: Policies and Procedures"* and FAA Order 5050.4, *"National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions,"* outline DNL as the noise metric for measuring and analyzing aircraft noise impacts.

As detailed above, the FAA requires the DNL noise metric to determine and analyze noise exposure and aid in the determination of aircraft noise and land use compatibility issues around United States airports. Because the DNL metric correlates well with the degree of community annoyance from aircraft noise, DNL has been formally adopted by most federal agencies dealing with noise exposure. In addition to the FAA, these agencies include the Environmental Protection Agency (EPA), Department of Defense, Department of Housing and Urban Development, and the Veterans Administration.

The DNL metric is calculated by cumulatively averaging sound levels over a twenty four-hour period. This average cumulative sound exposure includes the application of a 10-decibel penalty to sound exposures occurring during the nighttime hours (10:00 PM to 7:00 AM). Since the ambient, or background, noise levels usually decrease at night the night sound exposures are increased by 10 decibels because nighttime noise is more intrusive.

Figure 5-2 provides examples of typical DNL levels in various environments.

The FAA considers the 65 DNL contour line as the threshold of significance for noise impact. As such, sensitive land use areas (e.g., residential) around airports that are located in the 65 or greater DNL contours are considered by the FAA as incompatible structures.

5.1.1.3 Integrated Noise Model (INM)

The Federal Aviation Administration's (FAA) Office of Environment and Energy (AEE-100) has developed the Integrated Noise Model (INM) for evaluating aircraft noise impacts in the vicinity of airports. INM has many analytical uses, such as assessing changes in noise impact resulting from new or extended runways or runway configurations and evaluating other operational procedures. The INM has been the FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports. Statutory requirements for INM use are defined in FAA Order 1050.1, *"Environmental Impacts: Polices and Procedures"* and FAA Order 5050.4B, *"National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions,"* and Federal Aviation Regulations (FAR) Part 150, *"Airport Noise Compatibility Planning."*

The model utilizes flight track information, runway use information, operation time of day data, aircraft fleet mix, standard and user defined aircraft profiles, and terrain as inputs. The INM model produces DNL noise exposure contours that are used for land use compatibility maps. The INM program includes built in tools for comparing contours and utilities that facilitate easy export to commercial Geographic Information Systems. The model also calculates predicted noise at specific sites such as hospitals, schools or other sensitive locations. For these grid points, the model reports detailed information for the analyst to determine which events contribute most significantly to the noise at that location. The model supports 16 predefined noise metrics that include cumulative sound exposure, maximum sound level and time-above metrics from both the A-Weighted, C-Weighted and the Effective Perceived Noise Level families.

The INM aircraft profile and noise calculation algorithms are based on several guidance documents published by the Society of Automotive Engineers (SAE). These include the SAE-AIR-1845 report titled *"Procedure for the Calculation of Airplane Noise in the Vicinity of Airports,"* as well as others which address atmospheric absorption and noise attenuation. The INM is an average-value-model and is designed to estimate long-term average effects using average annual input conditions. Because of this, differences between predicted and measured values can occur because certain local acoustical variables are not averaged, or because they may not be explicitly modeled in INM. Examples of detailed local acoustical variables include temperature profiles, wind gradients, humidity effects, ground absorption, individual aircraft directivity patterns and sound diffraction terrain, buildings, barriers, etc.

As detailed previously, INM considers multiple airport and aircraft operational and noise propagation variables. The primary inputs into the model include aircraft activity levels, fleet mix, day/night split of operations, flight tracks and runway use.

5.1.2 Noise Contour Development

The noise contours presented in this document were developed using INM Version 7.0a. The contours represent predicted levels, or noise contours, of equal aircraft noise exposure on the ground as expressed in DNL. The FAA currently suggests that three different DNL levels (65, 70, and 75 DNL) be modeled. The Metropolitan Council suggests that the 60 DNL contour be included for airports in an urban environment and the 55 DNL in cases where airports are located outside the Metropolitan Urban Service Area (MUSA).

The Metropolitan Airports Commission (MAC) owns and operates an Airport Noise and Operations Monitoring System (ANOMS) at Minneapolis/St. Paul International Airport (MSP). In addition to monitoring noise levels at 39 noise monitoring poles located around MSP, the system receives flight track data from the FAA radar located at MSP. The flight track data extends to approximately 40 miles around MSP. Flying Cloud Airport is located approximately 10.5 miles from MSP. As such, radar flight track data in the vicinity of Flying Cloud Airport was provided by ANOMS to aid in the INM input file development process. ANOMS flight track data from 2007 was utilized in the development of the 2007 Baseline INM Inputs. Due to the distance and geography between the FAA radar at MSP and operations in the vicinity of Flying Cloud Airport, data acquisition/availability is reduced. However, for 2007 ANOMS reported 19,575 operations in the vicinity of Flying Cloud Airport. This provided an adequate data sample for purposes of contributing to the construction of the INM input variables.

The following details the methodology utilized in developing the data inputs for the INM contour modeling.

5.1.2.1 Aircraft Activity Levels

The total number of Flying Cloud Airport operations in 2007 was 124,569. As detailed in Chapter 2 the total number of 2007 operations was developed based on the Federal Aviation Administration's (FAA) control tower counts at the Flying Cloud Airport. Supplemental ANOMS operations data was used to account for operations during the non-tower hours.

The 2025 preferred alternative forecast number of total operations at Flying Cloud Airport is 113,876. The assumptions that were factored in the determination of the 2025 forecasted operations are detailed in Chapter 2 and Appendix A.

5.1.2.2 Fleet Mix

Using the ANOMS flight track data available in the vicinity of Flying Cloud Airport for 2007, various data processing steps were taken to develop an actual 2007 fleet mix. The flight track analysis process began by first excluding all MSP carrier jet flight tracks. Then all flight tracks with a start point or end point that did not fall within a 10km radius and 1km (above ground level) ceiling around Flying Cloud Airport were filtered out of the data. If the starting point of a track was within the radius/ceiling criteria around Flying Cloud Airport it was considered a departure operation. If the endpoint of a track was within the radius/ceiling criteria around Flying Cloud Airport it was considered an arrival operation.

The aircraft type distribution derived from the ANOMS flight track analysis was then applied to the 2007 total number of operations to develop the baseline 2007 fleet mix as detailed in Table 5-1.

The 2025 forecast fleet mix at Flying Cloud Airport is provided in Table 5-2. The assumptions that were factored in the determination of the 2025 fleet mix are detailed in Chapter 2 and Appendix A.

5.1.2.3 Day/Night Split of Operations

Based on the ANOMS flight track fleet mix data sample for Flying Cloud Airport the split of day and nighttime operations was determined. The daytime hours are defined as 7:00 a.m. to 10:00 p.m. and nighttime hours are 10:00 p.m. to 7:00 a.m.

The day/night operations distribution derived from the ANOMS flight track analysis was then applied to the 2007 total number of operations to develop the baseline 2007 day/night split as detailed in Table 5-1.

The 2025 forecast day/night operations at Flying Cloud Airport are provided in Table 5-2.

5.1.2.4 Flight Tracks

The Baseline 2007 INM flight track locations were developed based on the flight track trends established by the ANOMS flight tracks that met the fleet mix data sample criteria for Flying Cloud Airport. The 2007 INM flight tracks are provided in Figures 5-3(a-i) and the 2007 flight track use is detailed in Tables 5-3(a-d).

The 2025 INM flight tracks are provided in Figures 5-4(a-i) and the 2025 flight track use is detailed in Table 5-4(a-d).

5.1.2.5 Runway Use

Using the Flying Cloud Airport fleet mix ANOMS flight track data set, a runway use analysis was conducted. The analysis first included the development of trapezoids off the end of each runway to determine which runway a flight track was operating on. Each trapezoid ran along the axis of the centerline beginning at the runway endpoint and extending 3km from runway end. The trapezoid was 0.1km wide at the runway end point and 1km wide at the extent furthest from the runway end. For the purpose of the runway use analysis the last five, or first five, radar points of each track in the vicinity of Flying Cloud Airport were analyzed relative to the runway trapezoids.

In cases where the last five radar points of a track were in the vicinity of Flying Cloud Airport, if any one of the radar points were located within a respective runway trapezoid, the track was assigned as an arrival operation on that runway. Conversely, in cases where the first five radar points were in the vicinity of Flying Cloud Airport, if any one of the radar points were located within a respective runway trapezoid, the track was assigned as a departure operation on that runway. An operation was considered a “touch & go” if the track was assigned both an arrival and departure at the airport. The resultant runway use trends were then analyzed and adjusted relative to wind pattern data around Flying Cloud Airport.

The 2007 runway use derived from the ANOMS flight track analysis is detailed in Table 5-5.

The 2025 forecast runway use at Flying Cloud Airport is provided in Table 5-6.

Table 5-1
Flying Cloud Airport Year 2007 Average Daily Flight Operations

Aircraft Group	Aircraft Type	Identifier	INM/ANOMS Group	Arrivals Day	Arrivals Night	Arrivals Total	Departures Day	Departures Night	Departures Total	Touch and Gos Day	Touch and Gos Night	Touch and Gos Total	Total Operations Day	Total Operations Night	Total Operations Total
Jets	Canadair Challenger CL-601	CL601	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cessna 501 Citation I	CNA501	3	0.12	0.00	0.12	0.11	0.00	0.11	0.00	0.00	0.00	0.23	0.00	0.23
	Cessna Mustang 510 (VLJ)	CNA510	3	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Cessna 551 Citation II	CNA551	3	0.02	0.00	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.06
	Cessna 560 Citation V	CNA560	3	2.01	0.10	2.11	2.03	0.11	2.13	0.00	0.00	0.00	4.04	0.21	4.25
	Cessna 650 Citation VII	CNA650	3	0.04	0.00	0.05	0.03	0.00	0.03	0.00	0.00	0.00	0.08	0.00	0.08
	Cessna 750 Citation X	CNA750	3	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Cessna Citation 500	CNA500	3	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.06
	Cessna Citation 525	CNA525	3	0.66	0.02	0.68	0.66	0.02	0.68	0.00	0.00	0.00	1.32	0.04	1.35
	Cessna Citation 550	CNA550	3	0.78	0.05	0.83	0.83	0.02	0.85	0.00	0.00	0.00	1.61	0.08	1.69
	Dassault Falcon 10	FAL10	3	0.12	0.00	0.12	0.12	0.01	0.13	0.00	0.00	0.00	0.23	0.01	0.25
	Dassault Falcon 200	FAL200	3	0.01	0.00	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.03
	Dassault Falcon 2000	FAL20A	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Hawker 125 Jet	HS125	3	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	IAI 1124 Westwind	IA1124	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Learjet 31	LEAR31	3	0.04	0.00	0.04	0.03	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.07
	Learjet 35	LEAR35	3	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.03
	Learjet 45	LEAR45	3	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.04
	Learjet 55	LEAR55	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Raytheon Beechjet 400	BEC400	3	0.73	0.02	0.75	0.70	0.04	0.74	0.00	0.00	0.00	1.43	0.06	1.49
	Saberliner 65	SABR65	3	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Subtotal			*4.64*	*0.20*	*4.84*	*4.64*	*0.20*	*4.84*	*0.00*	*0.00*	*0.00*	*9.28*	*0.40*	*9.68*
Helicopters	Agusta 109	A109	H	0.41	0.02	0.43	0.42	0.02	0.44	0.08	0.00	0.08	0.90	0.04	0.95
	Bell 206	B206L	H	3.06	0.04	3.10	2.96	0.07	3.03	2.67	0.03	2.70	8.69	0.14	8.83
	Bell 222	B222	H	1.30	0.15	1.46	1.39	0.12	1.51	0.71	0.03	0.74	3.40	0.30	3.71
	Eurocopter BK-117	EC130	H	0.12	0.01	0.12	0.12	0.01	0.13	0.00	0.00	0.00	0.23	0.01	0.25
	Hughes 500D	H500D	H	0.04	0.00	0.04	0.05	0.00	0.05	0.03	0.00	0.03	0.12	0.00	0.12
	Robinson R22B	R22	H	0.02	0.00	0.02	0.01	0.00	0.01	0.06	0.00	0.06	0.10	0.00	0.10
	Sikorsky S-70 Blackhawk	S70	H	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.04
	Subtotal			*4.97*	*0.22*	*5.19*	*4.97*	*0.22*	*5.19*	*3.54*	*0.06*	*3.61*	*13.49*	*0.50*	*13.98*
Multi-Engine Piston	Beechcraft 18 Twin	BEC18	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Beechcraft Baron BE-55	BEC55	P	0.82	0.00	0.82	0.80	0.02	0.82	0.62	0.00	0.62	2.23	0.02	2.26
	Beechcraft Baron BE-58	BEC58	P	1.92	0.08	2.01	2.03	0.04	2.07	0.92	0.00	0.92	4.88	0.12	5.00
	Beechcraft Baron BE-58P	BEC58P	P	0.30	0.00	0.30	0.28	0.00	0.28	0.31	0.00	0.31	0.88	0.00	0.88
	Beechcraft Bonanza Twin	BEC50	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Beechcraft Duchess Twin	BEC76	P	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
	Beechcraft Duke Twin	BEC60	P	0.90	0.04	0.94	0.80	0.07	0.86	2.46	0.00	2.46	4.16	0.11	4.27
	Beechcraft Queen Air 65	BEC65	P	0.03	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.04
	Beechcraft Queen Air 80	BEC80	P	0.21	0.02	0.23	0.10	0.06	0.16	0.00	0.12	0.12	0.32	0.20	0.51
	Beechcraft Travel Air	BEC95	P	0.07	0.00	0.07	0.03	0.00	0.03	0.15	0.00	0.15	0.26	0.00	0.26
	Cessna 310	CNA310	P	0.75	0.04	0.80	0.80	0.01	0.80	0.77	0.00	0.77	2.32	0.05	2.37
	Cessna 335	CNA335	P	0.01	0.00	0.01	0.01	0.00	0.01	0.15	0.00	0.15	0.18	0.00	0.18
	Cessna 337 Super Skymaster	CNA337	P	0.09	0.00	0.09	0.03	0.00	0.03	0.00	0.00	0.00	0.12	0.00	0.12
	Cessna 340	CNA340	P	1.01	0.02	1.03	1.19	0.03	1.22	0.77	0.00	0.77	2.97	0.05	3.02
	Cessna 401	CNA401	P	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
	Cessna 402	CNA402	P	0.06	0.00	0.06	0.09	0.00	0.09	0.00	0.00	0.00	0.15	0.00	0.15
	Cessna 414 Chancellor	CNA414	P	1.13	0.06	1.19	1.02	0.07	1.09	0.92	0.00	0.92	3.07	0.14	3.21
	Cessna 421 Golden Eagle	CNA421	P	0.74	0.11	0.85	0.68	0.07	0.75	0.46	0.00	0.46	1.89	0.17	2.06
	Cessna Crusader 303	CNA303	P	0.03	0.00	0.03	0.03	0.01	0.04	0.00	0.00	0.00	0.06	0.01	0.07
	Cessna Executive Skynight	CNA320	P	0.04	0.00	0.04	0.03	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.07
	McDonnell Douglas DC3	DC3	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01

Table 5-1
Flying Cloud Airport Year 2007 Average Daily Flight Operations

Aircraft Group	Aircraft Type	Identifier	INM/ANOMS Group	Arrivals			Departures			Touch and Gos			Total Operations		
				Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
	Piper Aerostar 600/700	PA60	P	0.14	0.04	0.19	0.20	0.00	0.20	0.00	0.00	0.00	0.34	0.04	0.38
	Piper Apache	PA23AP	P	0.02	0.02	0.04	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.02	0.10
	Piper Aztec	PA23AZ	P	0.23	0.00	0.23	0.16	0.03	0.19	0.15	0.00	0.15	0.55	0.03	0.58
	Piper Navajo Chieftain	PA31	P	1.25	0.02	1.27	1.40	0.09	1.49	1.23	0.00	1.23	3.88	0.11	3.99
	Piper Seminole	PA44	P	0.42	0.02	0.44	0.43	0.00	0.43	3.08	0.00	3.08	3.92	0.02	3.94
	Piper Seneca	PA34	P	1.32	0.02	1.35	1.39	0.01	1.40	0.46	0.12	0.58	3.17	0.15	3.33
	Piper Twin Comanche	PA30	P	0.12	0.00	0.12	0.08	0.00	0.08	0.31	0.00	0.31	0.50	0.00	0.50
	Subtotal			*11.68*	*0.51*	*12.19*	*11.68*	*0.51*	*12.19*	*12.78*	*0.23*	*13.01*	*36.14*	*1.25*	*37.39*
Single-Engine Piston	Beechcraft F33A Bonanza	BEC33	P	9.26	0.55	9.82	9.53	0.29	9.82	8.18	0.00	8.18	26.97	0.84	27.81
	Beechcraft Musketeer	BEC23	P	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02
	Beechcraft Sport	BEC24	P	1.29	0.00	1.29	1.03	1.27	2.31	37.21	2.40	39.61	39.53	3.68	43.21
	Bellanca Cruisair	BL14	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Bellanca Super Viking	BL26	P	0.18	0.00	0.18	0.10	0.00	0.10	0.00	0.00	0.00	0.28	0.00	0.28
	Cessna 150	CNA150	P	0.33	0.00	0.33	0.59	0.00	0.59	0.79	0.00	0.79	1.71	0.00	1.71
	Cessna 152	CNA152	P	0.16	0.14	0.30	0.18	0.02	0.20	0.53	0.00	0.53	0.87	0.16	1.03
	Cessna 170	CNA170	P	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
	Cessna 205 Super Skywagon	CNA205	P	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
	Cessna 206H	CNA206	P	4.63	0.07	4.70	4.48	0.03	4.51	8.97	0.00	8.97	18.08	0.10	18.19
	Cessna 207	CNA207	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Cessna Cardinal 177	CNA177	P	0.20	0.00	0.20	0.22	0.00	0.22	0.00	0.00	0.00	0.42	0.00	0.42
	Cessna Centurion 210	CNA210	P	4.34	0.07	4.41	4.18	0.10	4.28	4.22	0.06	4.28	12.74	0.23	12.97
	Cessna Skyhawk 172	CNA172	P	5.45	0.28	5.72	5.37	0.02	5.39	40.64	0.03	40.67	51.46	0.33	51.78
	Cessna Skylane 182	CNA182	P	5.27	0.21	5.48	4.80	0.02	4.82	5.81	0.00	5.81	15.88	0.22	16.10
	Cessna Skywagon 180	CNA180	P	0.03	0.00	0.03	0.04	0.00	0.04	0.00	0.00	0.00	0.07	0.00	0.07
	Cessna Skywagon 185	CNA185	P	0.10	0.00	0.10	0.10	0.00	0.10	0.26	0.00	0.26	0.46	0.00	0.46
	GA Single-Engine Prop Fixed	GASEPF	P	6.23	0.14	6.37	6.87	0.20	7.08	7.92	0.00	7.92	21.02	0.34	21.36
	GA Single-Engine Prop Variable	GASEPV	P	5.37	0.35	5.71	5.59	0.25	5.85	3.69	0.00	3.69	14.66	0.60	15.26
	Grumman American	AA5A	P	0.20	0.00	0.20	0.20	0.00	0.20	1.06	0.00	1.06	1.45	0.00	1.45
	Mooney M20J	M20J	P	3.59	0.07	3.66	3.24	0.03	3.28	3.69	0.03	3.73	10.53	0.13	10.66
	Piper Cherokee 140	PA28CH	P	2.35	0.07	2.42	0.83	0.00	0.83	3.17	0.00	3.17	6.35	0.07	6.42
	Piper Cherokee Arrow II	PA28CA	P	0.88	0.14	1.02	0.95	0.05	1.00	2.11	0.00	2.11	3.94	0.19	4.13
	Piper Cherokee Six	PA32C6	P	1.76	0.28	2.04	1.95	0.14	2.08	1.32	0.00	1.32	5.03	0.41	5.44
	Piper Comanche	PA24	P	0.67	0.00	0.67	0.53	0.02	0.54	0.26	0.00	0.26	1.46	0.02	1.48
	Piper Dakota	PA28DK	P	0.03	0.00	0.03	0.04	0.00	0.04	0.00	0.00	0.00	0.07	0.00	0.07
	Piper Lance	PA32LA	P	0.47	0.07	0.54	0.61	0.02	0.63	0.26	0.00	0.26	1.35	0.09	1.43
	Piper Malibu	PA46	P	3.80	0.07	3.87	4.24	0.08	4.32	2.38	0.00	2.38	10.41	0.15	10.57
	Piper Super Cub	PA18	P	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02
	Piper Tomahawk	PA38	P	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.05
	Piper Tri-Pacer	PA22TR	P	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
	Piper Warrior	PA28	P	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
	Piper Warrior II	PA28WA	P	1.57	0.07	1.64	2.68	0.02	2.69	5.28	0.00	5.28	9.52	0.09	9.61
	Rockwell Aero Commander 112	RWCM12	P	0.51	0.00	0.51	0.53	0.00	0.53	0.53	0.00	0.53	1.56	0.00	1.56
	Rockwell Commander 114	RWCM14	P	0.07	0.00	0.07	0.06	0.00	0.06	0.00	0.00	0.00	0.13	0.00	0.13
	Siai-Marchetti SF260M	SF260M	P	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.05
	T-6 Texan	T6	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Subtotal			*59.03*	*2.56*	*61.59*	*59.03*	*2.56*	*61.59*	*138.28*	*2.53*	*140.81*	*256.34*	*7.65*	*263.99*
Turboprops	Avions ATR-42	ATR42	T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Beechcraft 1900	BEC190	T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Beechcraft 99	BEC99	T	0.06	0.00	0.06	0.05	0.00	0.05	0.00	0.00	0.00	0.11	0.00	0.11
	Beechcraft King Air 100	BEC100	T	0.07	0.00	0.07	0.06	0.00	0.06	0.00	0.00	0.00	0.13	0.00	0.13
	Beechcraft King Air 200	BEC200	T	2.93	0.22	3.15	2.93	0.17	3.10	0.00	0.00	0.00	5.86	0.39	6.25

Table 5-1
Flying Cloud Airport Year 2007 Average Daily Flight Operations

Aircraft Group	Aircraft Type	Identifier	INM/ANOMS Group	Arrivals			Departures			Touch and Gos			Total Operations		
				Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
	Beechcraft King Air 300	BEC300	T	0.71	0.00	0.71	0.73	0.03	0.76	0.00	0.00	0.00	1.44	0.03	1.47
	Beechcraft King Air 350	BEC30B	T	0.59	0.02	0.61	0.58	0.02	0.60	0.00	0.00	0.00	1.17	0.04	1.21
	Beechcraft King Air C90	BEC90	T	2.11	0.07	2.18	2.04	0.10	2.14	0.00	0.00	0.00	4.15	0.18	4.32
	Cessna 208	CNA208	T	0.29	0.00	0.30	0.26	0.00	0.26	0.00	0.00	0.00	0.55	0.01	0.56
	Cessna 425 Corsair	CNA425	T	0.14	0.00	0.14	0.16	0.00	0.16	0.00	0.00	0.00	0.31	0.00	0.31
	Cessna Conquest II	CNA441	T	0.42	0.00	0.42	0.44	0.01	0.44	0.00	0.00	0.00	0.85	0.01	0.87
	Mitsubishi MU-2	MU2	T	0.11	0.00	0.11	0.13	0.00	0.13	0.00	0.00	0.00	0.24	0.00	0.25
	Piper Cheyenne	PA31T	T	0.13	0.00	0.13	0.16	0.00	0.16	0.00	0.00	0.00	0.29	0.00	0.29
	Piper Cheyenne III	PA42	T	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	Rockwell Turbo Commander 690	RWCM69	T	0.20	0.01	0.21	0.23	0.00	0.23	0.00	0.00	0.00	0.43	0.01	0.44
	Subtotal			*7.78*	*0.34*	*8.12*	*7.78*	*0.34*	*8.12*	*0.00*	*0.00*	*0.00*	*15.56*	*0.68*	*16.24*
Total				**88.10**	**3.82**	**91.93**	**88.10**	**3.82**	**91.93**	**154.60**	**2.83**	**157.42**	**330.81**	**10.48**	**341.29**

Source: MAC ANOMS Analysis, 2009.

Table 5-2
Flying Cloud Airport Year 2025 Average Daily Flight Operations

			INM/ANOMS	Arrivals			Departures			Touch and Gos			Total Operations		
Aircraft Group	Aircraft Type	Identifier	Group	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Jets	Canadair Challenger CL-601	CL601	3	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02
	Cessna 501 Citation I	CNA501	3	0.16	0.00	0.16	0.15	0.00	0.15	0.00	0.00	0.00	0.31	0.00	0.31
	Cessna Mustang 510 (VLJ)	CNA510	3	21.90	0.95	22.85	21.90	0.95	22.85	0.00	0.00	0.00	43.80	1.90	45.70
	Cessna 551 Citation II	CNA551	3	0.03	0.00	0.03	0.04	0.00	0.04	0.00	0.00	0.00	0.08	0.00	0.08
	Cessna 560 Citation V	CNA560	3	1.93	0.09	2.02	1.95	0.09	2.03	0.00	0.00	0.00	3.88	0.17	4.05
	Cessna 650 Citation VII	CNA650	3	0.04	0.00	0.04	0.03	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.08
	Cessna 750 Citation X	CNA750	3	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Cessna Citation 500	CNA500	3	0.05	0.00	0.05	0.03	0.00	0.03	0.00	0.00	0.00	0.08	0.00	0.08
	Cessna Citation 525	CNA525	3	0.89	0.02	0.91	0.86	0.04	0.90	0.00	0.00	0.00	1.75	0.06	1.81
	Cessna Citation 550	CNA550	3	1.05	0.07	1.12	1.09	0.05	1.14	0.00	0.00	0.00	2.14	0.12	2.26
	Dassault Falcon 10	FAL10	3	0.11	0.00	0.12	0.11	0.01	0.12	0.00	0.00	0.00	0.22	0.01	0.23
	Dassault Falcon 200	FAL200	3	0.01	0.00	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.03
	Dassault Falcon 2000	FAL20A	3	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.04
	Hawker 125 Jet	HS125	3	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	IAI 1124 Westwind	IA1124	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Learjet 31	LEAR31	3	0.04	0.00	0.04	0.03	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.06
	Learjet 35	LEAR35	3	0.09	0.02	0.11	0.04	0.01	0.05	0.00	0.00	0.00	0.13	0.03	0.15
	Learjet 45	LEAR45	3	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.04
	Learjet 55	LEAR55	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Raytheon Beechjet 400	BEC400	3	4.24	0.17	4.41	4.27	0.18	4.45	0.00	0.00	0.00	8.52	0.35	8.87
	Saberliner 65	SABR65	3	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Subtotal			*30.60*	*1.33*	*31.93*	*30.60*	*1.33*	*31.93*	*0.00*	*0.00*	*0.00*	*61.21*	*2.66*	*63.87*
Helicopters	Agusta 109	A109	H	0.62	0.03	0.65	0.63	0.03	0.66	0.11	0.00	0.11	1.36	0.06	1.42
	Bell 206	B206L	H	4.61	0.06	4.67	4.46	0.10	4.56	3.87	0.05	3.92	12.94	0.20	13.14
	Bell 222	B222	H	1.96	0.23	2.19	2.09	0.19	2.28	1.03	0.04	1.07	5.09	0.46	5.54
	Eurocopter BK-117	EC130	H	0.17	0.01	0.18	0.18	0.01	0.19	0.00	0.00	0.00	0.35	0.02	0.37
	Hughes 500D	H500D	H	0.05	0.00	0.05	0.08	0.00	0.08	0.04	0.00	0.04	0.18	0.00	0.18
	Robinson R22B	R22	H	0.03	0.00	0.03	0.02	0.00	0.02	0.09	0.00	0.09	0.14	0.00	0.14
	Sikorsky S-70 Blackhawk	S70	H	0.03	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.06
	Subtotal			*7.49*	*0.32*	*7.81*	*7.49*	*0.32*	*7.81*	*5.14*	*0.09*	*5.23*	*20.11*	*0.74*	*20.85*
Multi-Engine Piston	Beechcraft 18 Twin	BEC18	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Beechcraft Baron BE-55	BEC55	P	0.46	0.00	0.46	0.45	0.01	0.46	0.35	0.00	0.35	1.25	0.01	1.27
	Beechcraft Baron BE-58	BEC58	P	1.08	0.05	1.13	1.14	0.02	1.16	0.52	0.00	0.52	2.74	0.07	2.81
	Beechcraft Baron BE-58P	BEC58P	P	0.17	0.00	0.17	0.16	0.00	0.16	0.17	0.00	0.17	0.50	0.00	0.50
	Beechcraft Bonanza Twin	BEC50	P	0.01	0.00	0.01	0.01	0.00	0.01	1.38	0.00	1.38	1.40	0.00	1.40
	Beechcraft Duchess Twin	BEC76	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Beechcraft Duke Twin	BEC60	P	0.50	0.02	0.53	0.45	0.04	0.48	0.00	0.00	0.00	0.95	0.06	1.01
	Beechcraft Queen Air 65	BEC65	P	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	Beechcraft Queen Air 80	BEC80	P	0.12	0.01	0.13	0.06	0.03	0.09	0.00	0.07	0.07	0.18	0.11	0.29
	Beechcraft Travel Air	BEC95	P	0.04	0.00	0.04	0.02	0.00	0.02	0.09	0.00	0.09	0.14	0.00	0.14
	Cessna 310	CNA310	P	0.42	0.02	0.45	0.45	0.00	0.45	0.43	0.00	0.43	1.30	0.03	1.33
	Cessna 335	CNA335	P	0.01	0.00	0.01	0.01	0.00	0.01	0.09	0.00	0.09	0.10	0.00	0.10
	Cessna 337 Super Skymaster	CNA337	P	0.05	0.00	0.05	0.02	0.00	0.02	0.00	0.00	0.00	0.07	0.00	0.07
	Cessna 340	CNA340	P	0.56	0.01	0.58	0.67	0.02	0.68	0.43	0.00	0.43	1.66	0.03	1.69
	Cessna 401	CNA401	P	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	Cessna 402	CNA402	P	0.03	0.00	0.03	0.05	0.00	0.05	0.00	0.00	0.00	0.08	0.00	0.08
	Cessna 414 Chancellor	CNA414	P	0.63	0.04	0.67	0.57	0.04	0.61	0.52	0.00	0.52	1.72	0.08	1.80
	Cessna 421 Golden Eagle	CNA421	P	0.42	0.06	0.48	0.38	0.04	0.42	0.26	0.00	0.26	1.06	0.10	1.16
	Cessna Crusader 303	CNA303	P	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.04
	Cessna Executive Skynight	CNA320	P	0.02	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.04
	McDonnell Douglas DC3	DC3	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Piper Aerostar 600/700	PA60	P	0.08	0.02	0.10	0.11	0.00	0.11	0.00	0.00	0.00	0.19	0.02	0.22

Table 5-2
Flying Cloud Airport Year 2025 Average Daily Flight Operations

Aircraft Group	Aircraft Type	Identifier	INM/ANOMS	Arrivals			Departures			Touch and Gos			Total Operations		
			Group	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
	Piper Apache	PA23AP	P	0.01	0.01	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.04	0.01	0.06
	Piper Aztec	PA23AZ	P	0.13	0.00	0.13	0.09	0.02	0.11	0.09	0.00	0.09	0.31	0.02	0.32
	Piper Navajo Chieftain	PA31	P	0.70	0.01	0.71	0.78	0.05	0.83	0.69	0.00	0.69	2.17	0.06	2.24
	Piper Seminole	PA44	P	0.23	0.01	0.24	0.24	0.00	0.24	1.73	0.00	1.73	2.20	0.01	2.21
	Piper Seneca	PA34	P	0.74	0.01	0.75	0.78	0.01	0.79	0.26	0.07	0.33	1.78	0.09	1.86
	Piper Twin Comanche	PA30	P	0.06	0.00	0.06	0.05	0.00	0.05	0.17	0.00	0.17	0.28	0.00	0.28
	Subtotal			*6.55*	*0.28*	*6.83*	*6.55*	*0.28*	*6.83*	*7.18*	*0.13*	*7.31*	*20.28*	*0.70*	*20.98*
Single-Engine Piston	Beechcraft F33A Bonanza	BEC33	P	6.77	0.41	7.18	6.97	0.21	7.18	5.98	0.00	5.98	19.72	0.62	20.34
	Beechcraft Musketeer	BEC23	P	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Beechcraft Sport	BEC24	P	0.94	0.00	0.94	0.76	0.93	1.69	27.21	1.76	28.96	28.91	2.69	31.59
	Bellanca Cruisair	BL14	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Bellanca Super Viking	BL26	P	0.13	0.00	0.13	0.07	0.00	0.07	0.00	0.00	0.00	0.21	0.00	0.21
	Cessna 150	CNA150	P	0.24	0.00	0.24	0.43	0.00	0.43	0.58	0.00	0.58	1.25	0.00	1.25
	Cessna 152	CNA152	P	0.12	0.10	0.22	0.13	0.01	0.15	0.39	0.00	0.39	0.64	0.11	0.75
	Cessna 170	CNA170	P	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07
	Cessna 205 Super Skywagon	CNA205	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Cessna 206H	CNA206	P	3.39	0.05	3.44	3.28	0.02	3.30	6.56	0.00	6.56	13.22	0.08	13.30
	Cessna 207	CNA207	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Cessna Cardinal 177	CNA177	P	0.14	0.00	0.14	0.16	0.00	0.16	0.00	0.00	0.00	0.31	0.00	0.31
	Cessna Centurion 210	CNA210	P	3.17	0.05	3.22	3.05	0.07	3.13	3.09	0.05	3.13	9.31	0.17	9.48
	Cessna Skyhawk 172	CNA172	P	3.98	0.20	4.19	3.93	0.01	3.94	29.72	0.02	29.74	37.63	0.24	37.86
	Cessna Skylane 182	CNA182	P	3.85	0.15	4.00	3.51	0.01	3.53	4.25	0.00	4.25	11.61	0.16	11.77
	Cessna Skywagon 180	CNA180	P	0.02	0.00	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.05	0.00	0.05
	Cessna Skywagon 185	CNA185	P	0.07	0.00	0.07	0.07	0.00	0.07	0.19	0.00	0.19	0.34	0.00	0.34
	GA Single-Engine Prop Fixed	GASEPF	P	4.56	0.10	4.66	5.02	0.15	5.17	5.79	0.00	5.79	15.37	0.25	15.62
	GA Single-Engine Prop Variable	GASEPV	P	3.92	0.25	4.18	4.09	0.19	4.28	2.70	0.00	2.70	10.72	0.44	11.16
	Grumman American	AA5A	P	0.14	0.00	0.14	0.15	0.00	0.15	0.77	0.00	0.77	1.06	0.00	1.06
	Mooney M20J	M20J	P	2.62	0.05	2.67	2.37	0.02	2.40	2.70	0.02	2.72	7.70	0.10	7.79
	Piper Cherokee 140	PA28CH	P	1.72	0.05	1.77	0.61	0.00	0.61	2.32	0.00	2.32	4.64	0.05	4.69
	Piper Cherokee Arrow II	PA28CA	P	0.64	0.10	0.75	0.70	0.04	0.73	1.54	0.00	1.54	2.88	0.14	3.02
	Piper Cherokee Six	PA32C6	P	1.29	0.20	1.49	1.42	0.10	1.52	0.96	0.00	0.96	3.68	0.30	3.98
	Piper Comanche	PA24	P	0.49	0.00	0.49	0.39	0.01	0.40	0.19	0.00	0.19	1.07	0.01	1.08
	Piper Dakota	PA28DK	P	0.02	0.00	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.05	0.00	0.05
	Piper Lance	PA32LA	P	0.35	0.05	0.40	0.44	0.01	0.46	0.19	0.00	0.19	0.98	0.06	1.05
	Piper Malibu	PA46	P	2.78	0.05	2.83	3.10	0.06	3.16	1.74	0.00	1.74	7.61	0.11	7.73
	Piper Super Cub	PA18	P	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
	Piper Tomahawk	PA38	P	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.04
	Piper Tri-Pacer	PA22TR	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Piper Warrior	PA28	P	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Piper Warrior II	PA28WA	P	1.14	0.05	1.20	1.96	0.01	1.97	3.86	0.00	3.86	6.96	0.06	7.02
	Rockwell Aero Commander 112	RWCM12	P	0.37	0.00	0.37	0.39	0.00	0.39	0.39	0.00	0.39	1.14	0.00	1.14
	Rockwell Commander 114	RWCM14	P	0.05	0.00	0.05	0.04	0.00	0.04	0.00	0.00	0.00	0.09	0.00	0.09
	Siai-Marchetti SF260M	SF260M	P	0.02	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.04
	T-6 Texan	T6	P	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Subtotal			*43.16*	*1.87*	*45.03*	*43.16*	*1.87*	*45.03*	*101.11*	*1.85*	*102.96*	*187.43*	*5.60*	*193.03*
Turboprops	Avions ATR-42	ATR42	T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Beechcraft 1900	BEC190	T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Beechcraft 99	BEC99	T	0.05	0.00	0.05	0.04	0.00	0.04	0.00	0.00	0.00	0.09	0.00	0.09
	Beechcraft King Air 100	BEC100	T	0.06	0.00	0.06	0.05	0.00	0.05	0.00	0.00	0.00	0.11	0.00	0.11
	Beechcraft King Air 200	BEC200	T	2.39	0.18	2.57	2.40	0.14	2.53	0.00	0.00	0.00	4.79	0.32	5.11
	Beechcraft King Air 300	BEC300	T	0.58	0.00	0.58	0.60	0.02	0.62	0.00	0.00	0.00	1.18	0.02	1.20
	Beechcraft King Air 350	BEC30B	T	0.48	0.02	0.50	0.47	0.01	0.49	0.00	0.00	0.00	0.96	0.03	0.99

Table 5-2
Flying Cloud Airport Year 2025 Average Daily Flight Operations

Aircraft Group	Aircraft Type	Identifier	INM/ANOMS Group	Arrivals			Departures			Touch and Gos			Total Operations		
				Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
	Beechcraft King Air C90	BEC90	T	1.72	0.06	1.78	1.66	0.09	1.75	0.00	0.00	0.00	3.39	0.14	3.53
	Cessna 208	CNA208	T	0.24	0.00	0.24	0.21	0.00	0.21	0.00	0.00	0.00	0.45	0.01	0.46
	Cessna 425 Corsair	CNA425	T	0.12	0.00	0.12	0.13	0.00	0.13	0.00	0.00	0.00	0.25	0.00	0.25
	Cessna Conquest II	CNA441	T	0.34	0.00	0.34	0.36	0.01	0.36	0.00	0.00	0.00	0.70	0.01	0.71
	Mitsubishi MU-2	MU2	T	0.09	0.00	0.09	0.11	0.00	0.11	0.00	0.00	0.00	0.20	0.00	0.20
	Piper Cheyenne	PA31T	T	0.11	0.00	0.11	0.13	0.00	0.13	0.00	0.00	0.00	0.24	0.00	0.24
	Piper Cheyenne III	PA42	T	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
	Rockwell Turbo Commander 690	RWCM69	T	0.16	0.01	0.17	0.19	0.00	0.19	0.00	0.00	0.00	0.35	0.01	0.36
	Subtotal			*6.36*	*0.28*	*6.63*	*6.36*	*0.28*	*6.63*	*0.00*	*0.00*	*0.00*	*12.71*	*0.55*	*13.27*
Total				**94.16**	**4.09**	**98.24**	**94.16**	**4.09**	**98.24**	**113.43**	**2.07**	**115.50**	**301.74**	**10.25**	**311.99**

Source: MAC ANOMS Analysis, 2009.

Table 5-3a
Flying Cloud Airport Year 2007 Departure Flight Track Use

		Stage 3 Jets		Piston		Turboprop	
Runway	Track	Day	Night	Day	Night	Day	Night
18	A	33.3%	0.0%	2.5%	39.6%	0.0%	0.0%
	B	33.3%	0.0%	0.9%	10.6%	0.0%	0.0%
	C	0.0%	0.0%	2.9%	5.3%	0.0%	0.0%
	D	0.0%	0.0%	5.0%	5.3%	0.0%	25.0%
	E	0.0%	0.0%	9.8%	7.9%	5.6%	0.0%
	F	0.0%	0.0%	28.8%	9.1%	36.7%	50.0%
	G	33.3%	0.0%	8.1%	9.1%	7.8%	0.0%
	H	0.0%	0.0%	6.7%	5.3%	16.7%	0.0%
	I	0.0%	0.0%	11.7%	7.9%	22.2%	0.0%
	J	0.0%	0.0%	5.1%	0.0%	3.3%	25.0%
	K	0.0%	0.0%	18.3%	0.0%	7.8%	0.0%
36	A	0.0%	0.0%	18.6%	10.6%	0.0%	0.0%
	B	100.0%	0.0%	16.2%	0.0%	36.4%	0.0%
	C	0.0%	0.0%	19.8%	10.6%	13.6%	0.0%
	D	0.0%	0.0%	15.6%	0.0%	4.5%	0.0%
	E	0.0%	0.0%	4.6%	0.0%	4.5%	0.0%
	F	0.0%	0.0%	2.2%	4.7%	4.5%	0.0%
	G	0.0%	0.0%	1.9%	0.0%	4.5%	0.0%
	H	0.0%	0.0%	2.9%	53.0%	4.5%	0.0%
	I	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%
	J	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%
	K	0.0%	0.0%	0.3%	0.0%	9.1%	0.0%
	L	0.0%	0.0%	2.9%	0.0%	0.0%	0.0%
	M	0.0%	0.0%	12.0%	21.2%	18.2%	0.0%
10L	A	0.0%	0.0%	7.6%	10.1%	3.5%	5.6%
	B	3.1%	0.0%	5.8%	0.0%	2.3%	5.6%
	C	3.1%	0.0%	3.7%	10.1%	0.0%	2.8%
	D	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
	E	0.0%	0.0%	0.9%	0.0%	0.6%	2.8%
	F	0.0%	0.0%	1.0%	10.1%	1.2%	13.9%
	G	0.0%	0.0%	3.0%	0.0%	3.5%	11.1%
	H	12.5%	66.7%	3.6%	4.4%	5.3%	16.7%
	I	25.0%	33.3%	5.7%	0.0%	19.3%	22.2%
	J	18.8%	0.0%	14.4%	34.8%	24.0%	8.3%
	K	34.4%	0.0%	13.0%	10.1%	22.8%	2.8%
	L	3.1%	0.0%	26.3%	20.2%	12.9%	2.8%
	M	0.0%	0.0%	14.4%	0.0%	4.7%	5.6%
10R	A	0.0%	0.0%	1.6%	0.0%	1.0%	0.8%
	B	0.7%	0.0%	1.4%	2.3%	2.9%	3.9%
	C	0.2%	0.0%	1.4%	23.2%	0.0%	0.8%
	D	0.4%	0.0%	0.8%	4.6%	0.0%	0.0%
	E	0.0%	0.0%	0.1%	2.3%	0.4%	2.3%
	F	0.5%	4.2%	0.5%	0.0%	2.3%	3.1%
	G	1.1%	4.2%	0.4%	2.3%	1.4%	9.4%
	H	1.2%	0.0%	1.1%	1.0%	2.3%	7.8%
	I	2.8%	6.2%	1.8%	3.3%	2.2%	9.4%
	J	28.6%	27.0%	5.2%	6.7%	15.3%	27.3%
	K	31.1%	47.8%	13.8%	18.3%	22.9%	11.7%
	L	28.0%	4.3%	21.4%	14.4%	25.8%	12.5%
	M	4.6%	4.2%	31.6%	13.1%	18.6%	3.1%
	N	0.7%	2.1%	18.8%	8.4%	4.9%	7.8%
28L	A	0.0%	0.0%	3.2%	8.7%	0.0%	0.7%
	B	0.2%	0.0%	3.6%	3.6%	0.2%	0.4%
	C	2.4%	5.6%	11.3%	8.5%	4.5%	3.2%
	D	10.5%	15.5%	12.8%	10.9%	13.4%	8.9%
	E	26.2%	29.0%	16.5%	15.0%	20.0%	18.9%
	F	31.1%	20.0%	17.9%	13.1%	26.6%	13.6%
	G	5.7%	14.4%	4.6%	6.3%	6.3%	9.6%
	H	6.6%	3.3%	2.1%	1.8%	4.7%	5.4%
	I	12.1%	5.6%	8.2%	7.5%	13.6%	13.6%
	J	4.3%	2.2%	10.9%	0.0%	8.5%	10.7%
	K	0.7%	3.3%	5.1%	0.5%	1.7%	9.6%
	L	0.1%	0.0%	3.2%	0.5%	0.4%	4.3%
	M	0.1%	1.1%	0.4%	3.7%	0.0%	1.1%
	N	0.0%	0.0%	0.2%	19.9%	0.0%	0.0%
28R	A	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%
	B	0.0%	0.0%	9.2%	0.0%	2.3%	0.0%
	C	0.0%	0.0%	12.9%	0.0%	11.3%	0.0%
	D	0.0%	0.0%	9.3%	0.0%	15.0%	0.0%
	E	33.3%	0.0%	13.9%	0.0%	15.8%	0.0%
	F	0.0%	0.0%	4.0%	0.0%	7.5%	0.0%
	G	0.0%	0.0%	3.9%	0.0%	4.5%	0.0%
	H	16.7%	0.0%	3.7%	0.0%	2.3%	0.0%
	I	33.3%	0.0%	6.1%	0.0%	9.8%	0.0%
	J	16.7%	0.0%	15.3%	0.0%	23.3%	0.0%
	K	0.0%	0.0%	9.5%	0.0%	5.3%	0.0%
	L	0.0%	0.0%	4.2%	0.0%	1.5%	0.0%
	M	0.0%	0.0%	2.3%	0.0%	0.0%	0.0%
	N	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%
	O	0.0%	0.0%	1.2%	0.0%	0.0%	0.0%
	P	0.0%	0.0%	0.7%	0.0%	1.5%	0.0%

Totals may not add up to 100% due to rounding.

Source: Radar track data, MAC Analysis, 2009.

Table 5-3b
Flying Cloud Airport Year 2007 Departure Flight Track Use

Runway	Track	Helicopters Day	Night
10LH	A	9.4%	13.8%
	B	7.6%	27.6%
	C	11.8%	6.9%
	D	5.3%	10.3%
	E	15.3%	6.9%
	F	28.8%	10.3%
	G	21.8%	24.1%
10RH	H	27.5%	33.3%
	I	17.4%	50.0%
	J	15.9%	0.0%
	K	39.1%	16.7%
18H	L	27.4%	34.5%
	M	10.6%	3.4%
	N	20.4%	17.2%
	O	24.8%	24.1%
	P	16.8%	20.7%
28LH	Q	9.6%	15.8%
	R	18.4%	26.3%
	S	20.0%	15.8%
	T	23.2%	10.5%
	U	28.8%	31.6%
28RH	V	43.6%	30.8%
	W	23.6%	53.8%
	X	32.7%	15.4%
36H	AA	27.8%	20.0%
	Y	29.3%	20.0%
	Z	42.9%	60.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-3d
Flying Cloud Airport Year 2007
Arrival Flight Track Use

Runway	Track	Helicopters Day	Night
10LH	A	100.0%	100.0%
18H	B	40.4%	20.0%
	C	26.3%	20.0%
	D	33.3%	60.0%
28LH	E	29.7%	56.8%
	F	15.5%	5.4%
	G	37.8%	27.0%
	H	16.9%	10.8%
28RH	I	22.1%	0.0%
	J	23.2%	40.0%
	K	14.9%	28.0%
	L	24.6%	28.0%
	M	15.2%	4.0%
36H	N	100.0%	100.0%
10RH	O	100.0%	100.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-3c
Flying Cloud Airport Year 2007 Arrival Flight Track Use

		Stage 3 Jets		Piston		Turboprop	
Runway	Track	Day	Night	Day	Night	Day	Night
18	A	25.0%	0.0%	29.3%	62.1%	9.0%	0.0%
	B	62.5%	0.0%	38.4%	37.9%	57.7%	0.0%
	C	12.5%	0.0%	32.3%	0.0%	33.3%	100.0%
36	A	0.0%	0.0%	11.1%	0.0%	12.0%	0.0%
	B	100.0%	0.0%	63.9%	43.4%	69.3%	0.0%
	C	0.0%	0.0%	25.1%	56.6%	18.7%	100.0%
10L	A	36.4%	0.0%	29.6%	0.0%	38.6%	0.0%
	B	57.6%	0.0%	55.9%	0.0%	52.6%	0.0%
	C	6.1%	0.0%	14.5%	0.0%	8.8%	0.0%
10R	A	6.9%	5.1%	18.6%	9.1%	10.0%	8.9%
	B	91.5%	93.3%	77.0%	86.3%	85.0%	83.5%
	C	1.7%	1.7%	4.4%	4.6%	5.0%	7.6%
28L	A	2.6%	0.0%	16.2%	6.9%	11.7%	1.7%
	B	86.2%	90.9%	45.6%	63.5%	61.6%	85.0%
	C	11.2%	9.1%	38.2%	29.6%	26.6%	13.3%
28R	A	2.9%	0.0%	35.5%	51.1%	18.8%	14.3%
	B	72.8%	100.0%	31.8%	7.8%	42.5%	85.7%
	C	24.3%	0.0%	32.7%	41.1%	38.6%	0.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-4a
Flying Cloud Airport Year 2025 Departure Flight Track Use

Runway	Track	Stage 3 Jets Day	Stage 3 Jets Night	Piston Day	Piston Night	Turboprop Day	Turboprop Night
18	A	33.3%	0.0%	2.5%	39.8%	0.0%	0.0%
	B	33.3%	0.0%	0.9%	10.6%	0.0%	0.0%
	C	0.0%	0.0%	2.9%	5.3%	0.0%	0.0%
	D	0.0%	0.0%	5.1%	5.3%	0.0%	25.0%
	E	0.0%	0.0%	10.0%	8.0%	5.6%	0.0%
	F	0.0%	0.0%	28.5%	8.9%	36.7%	50.0%
	G	33.3%	0.0%	8.0%	8.9%	7.8%	0.0%
	H	0.0%	0.0%	6.7%	5.3%	16.7%	0.0%
	I	0.0%	0.0%	11.8%	8.0%	22.2%	0.0%
	J	0.0%	0.0%	5.1%	0.0%	3.3%	25.0%
	K	0.0%	0.0%	12.8%	0.0%	7.8%	0.0%
	L	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%
36	A	0.0%	0.0%	18.7%	10.7%	0.0%	0.0%
	B	100.0%	0.0%	16.2%	0.0%	36.4%	0.0%
	C	0.0%	0.0%	19.9%	10.7%	13.6%	0.0%
	D	0.0%	0.0%	15.3%	0.0%	4.5%	0.0%
	E	0.0%	0.0%	4.7%	0.0%	4.5%	0.0%
	F	0.0%	0.0%	2.2%	3.6%	4.5%	0.0%
	G	0.0%	0.0%	2.0%	0.0%	4.5%	0.0%
	H	0.0%	0.0%	3.0%	53.6%	4.5%	0.0%
	I	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%
	J	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%
	K	0.0%	0.0%	0.2%	0.0%	9.1%	0.0%
	L	0.0%	0.0%	3.0%	0.0%	0.0%	0.0%
	M	0.0%	0.0%	12.0%	21.4%	18.2%	0.0%
10L	A	0.0%	0.0%	7.6%	10.3%	3.5%	5.6%
	B	3.6%	0.0%	5.8%	0.0%	2.3%	5.6%
	C	3.6%	0.0%	3.8%	10.3%	0.0%	2.8%
	D	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
	E	0.0%	0.0%	0.9%	0.0%	0.6%	2.8%
	F	0.0%	0.0%	1.0%	10.3%	1.2%	13.9%
	G	0.0%	0.0%	3.0%	0.0%	3.5%	11.1%
	H	12.6%	66.7%	3.6%	3.5%	5.3%	16.7%
	I	25.2%	33.3%	5.8%	0.0%	19.3%	22.2%
	J	19.9%	0.0%	14.2%	34.5%	24.0%	8.3%
	K	32.3%	0.0%	12.8%	10.3%	22.8%	2.8%
	L	2.7%	0.0%	26.2%	20.7%	12.9%	2.8%
	M	0.0%	0.0%	14.6%	0.0%	4.7%	5.6%
10R	A	0.0%	0.0%	1.6%	0.0%	1.0%	0.8%
	B	0.1%	0.0%	1.4%	2.5%	2.9%	3.9%
	C	0.1%	0.0%	1.5%	24.5%	0.0%	0.8%
	D	0.1%	0.0%	0.8%	4.9%	0.0%	0.0%
	E	0.0%	0.0%	0.1%	2.5%	0.4%	2.3%
	F	0.1%	1.4%	0.5%	0.0%	2.3%	3.1%
	G	0.3%	0.4%	0.4%	2.5%	1.4%	9.4%
	H	0.2%	0.0%	1.0%	0.8%	2.3%	7.8%
	I	0.6%	0.9%	1.8%	3.3%	2.2%	9.4%
	J	6.2%	4.4%	5.0%	6.6%	15.3%	27.3%
	K	7.0%	10.8%	13.5%	18.8%	22.9%	11.7%
	L	84.0%	80.5%	21.3%	14.0%	25.8%	12.5%
	M	1.3%	1.4%	31.7%	12.3%	18.6%	3.1%
	N	0.1%	0.2%	19.4%	7.4%	4.9%	7.8%
28L	A	0.0%	0.0%	3.4%	9.2%	0.0%	0.7%
	B	0.1%	0.0%	3.7%	3.5%	0.2%	0.4%
	C	0.9%	2.6%	11.4%	8.7%	4.5%	3.2%
	D	4.3%	3.7%	12.6%	10.9%	13.4%	8.9%
	E	75.8%	75.3%	16.6%	14.9%	20.0%	18.9%
	F	9.9%	6.5%	17.7%	12.7%	26.6%	13.6%
	G	1.8%	2.1%	1.9%	1.7%	4.7%	5.4%
	H	1.9%	6.0%	4.4%	5.7%	6.3%	9.6%
	I	3.9%	2.4%	8.1%	7.0%	13.6%	13.6%
	J	1.1%	0.3%	10.7%	0.0%	8.5%	10.7%
	K	0.2%	0.7%	5.3%	0.4%	1.7%	9.6%
	L	0.0%	0.0%	3.4%	0.4%	0.4%	4.3%
	M	0.0%	0.4%	0.5%	3.9%	0.0%	1.1%
	N	0.0%	0.0%	0.2%	20.9%	0.0%	0.0%
28R	A	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%
	B	0.0%	0.0%	9.3%	0.0%	2.3%	0.0%
	C	0.0%	0.0%	12.9%	0.0%	11.3%	0.0%
	D	0.0%	0.0%	9.3%	0.0%	15.0%	0.0%
	E	43.4%	0.0%	13.9%	0.0%	15.8%	0.0%
	F	0.0%	0.0%	4.0%	0.0%	7.5%	0.0%
	G	0.0%	0.0%	3.9%	0.0%	4.5%	0.0%
	H	35.7%	0.0%	3.7%	0.0%	2.3%	0.0%
	I	15.4%	0.0%	6.0%	0.0%	9.8%	0.0%
	J	5.6%	0.0%	15.1%	0.0%	23.3%	0.0%
	K	0.0%	0.0%	9.5%	0.0%	5.3%	0.0%
	L	0.0%	0.0%	4.2%	0.0%	1.5%	0.0%
	M	0.0%	0.0%	2.3%	0.0%	0.0%	0.0%
	N	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%
	O	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%
	P	0.0%	0.0%	0.7%	0.0%	1.5%	0.0%

Totals may not add up to 100% due to rounding.

Source: Radar track data, MAC Analysis, 2009.

Table 5-4b
Flying Cloud Airport Year 2025 Departure Flight Track Use

Runway	Track	Helicopters Day	Helicopters Night
10LH	A	9.4%	13.8%
	B	7.6%	27.6%
	C	11.8%	6.9%
	D	5.3%	10.3%
	E	15.3%	6.9%
	F	28.8%	10.3%
	G	21.8%	24.1%
10RH	H	27.5%	33.3%
	I	17.4%	50.0%
	J	15.9%	0.0%
	K	39.1%	16.7%
18H	L	27.4%	34.5%
	M	10.6%	3.4%
	N	20.4%	17.2%
	O	24.8%	24.1%
	P	16.8%	20.7%
28LH	Q	9.6%	15.8%
	R	18.4%	26.3%
	S	20.0%	15.8%
	T	23.2%	10.5%
	U	28.8%	31.6%
28RH	V	43.6%	30.8%
	W	23.6%	53.8%
	X	32.7%	15.4%
36H	AA	27.8%	20.0%
	Y	29.3%	20.0%
	Z	42.9%	60.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-4d
Flying Cloud Airport Year 2025 Arrival Flight Track Use

Runway	Track	Helicopters Day	Helicopters Night
10LH	A	100.0%	100.0%
10RH	B	100.0%	100.0%
18H	C	40.4%	20.0%
	D	26.3%	20.0%
	E	33.3%	60.0%
28LH	F	29.7%	56.8%
	G	15.5%	5.4%
	H	37.8%	27.0%
	I	16.9%	10.8%
28RH	J	22.1%	0.0%
	K	23.2%	40.0%
	L	14.9%	28.0%
	M	24.6%	28.0%
	N	15.2%	4.0%
36H	O	100.0%	100.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-4c
Flying Cloud Airport Year 2025 Arrival Flight Track Use

Runway	Track	Stage 3 Jets Day	Stage 3 Jets Night	Piston Day	Piston Night	Turboprop Day	Turboprop Night
18	A	14.5%	0.0%	29.4%	68.1%	9.0%	0.0%
	B	64.3%	0.0%	38.2%	31.9%	57.7%	0.0%
	C	21.3%	0.0%	32.4%	0.0%	33.3%	100.0%
36	A	0.0%	0.0%	11.2%	0.0%	12.0%	0.0%
	B	100.0%	0.0%	63.7%	44.8%	69.3%	0.0%
	C	0.0%	0.0%	25.1%	55.2%	18.7%	100.0%
10L	A	50.3%	0.0%	29.7%	0.0%	38.6%	0.0%
	B	46.8%	0.0%	55.7%	0.0%	52.6%	0.0%
	C	3.0%	0.0%	14.6%	0.0%	8.8%	0.0%
10R	A	67.9%	57.1%	18.7%	9.5%	10.0%	8.9%
	B	31.3%	42.3%	76.8%	85.7%	85.0%	83.5%
	C	0.9%	0.6%	4.5%	4.8%	5.0%	7.6%
28L	A	0.4%	0.0%	16.5%	7.1%	11.7%	1.7%
	B	97.4%	99.1%	44.9%	63.1%	61.6%	85.0%
	C	2.2%	0.9%	38.6%	29.9%	26.6%	13.3%
28R	A	4.2%	0.0%	35.7%	54.0%	18.8%	14.3%
	B	66.8%	100.0%	31.7%	6.3%	42.5%	85.7%
	C	29.0%	0.0%	32.6%	39.7%	38.6%	0.0%

Totals may not add up to 100% due to rounding.
Source: Radar track data, MAC Analysis, 2009.

Table 5-5
Flying Cloud Airport Year 2007 Average Annual Runway Use

Aircraft Group	Runway	Arrivals Day	Arrivals Night	Arrivals Total	Departures Day	Departures Night	Departures Total	Touch and Gos Day	Touch and Gos Night	Touch and Gos Total
Jets	18	1.3%	0.0%	1.3%	0.1%	0.0%	0.1%	-	-	-
	36	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%	-	-	-
	10L	2.0%	0.0%	1.9%	2.4%	1.1%	2.4%	-	-	-
	10R	48.2%	72.0%	49.3%	40.3%	34.4%	40.1%	-	-	-
	28L	41.8%	26.3%	41.1%	56.8%	64.5%	57.1%	-	-	-
	28R	6.5%	1.7%	6.3%	0.3%	0.0%	0.3%	-	-	-
Helicopters	18	20.6%	28.8%	20.9%	12.5%	23.3%	12.8%	15.2%	10.8%	15.2%
	36	6.6%	9.1%	6.6%	23.5%	10.1%	23.1%	1.4%	0.0%	1.4%
	10L	2.6%	2.1%	2.6%	28.2%	32.8%	28.3%	31.3%	36.9%	31.4%
	10R	5.1%	0.8%	4.9%	10.4%	10.5%	10.4%	19.4%	36.9%	19.7%
	28L	19.6%	32.2%	19.9%	17.7%	13.8%	17.6%	4.7%	9.2%	4.7%
	28R	45.6%	27.0%	45.1%	7.7%	9.5%	7.8%	28.0%	6.2%	27.7%
Pistons	18	19.4%	1.1%	18.7%	18.4%	15.6%	18.3%	18.5%	24.8%	18.5%
	36	7.8%	1.6%	7.6%	5.9%	3.2%	5.8%	7.8%	5.1%	7.8%
	10L	8.1%	0.0%	7.8%	18.9%	5.8%	18.5%	19.9%	9.4%	19.8%
	10R	23.6%	55.7%	24.8%	12.4%	23.8%	12.7%	9.5%	13.0%	9.5%
	28L	25.8%	33.5%	26.1%	17.4%	51.5%	18.4%	9.1%	47.7%	9.3%
	28R	15.3%	8.1%	15.0%	27.1%	0.0%	26.2%	35.2%	0.0%	35.0%
Turboprops	18	8.1%	0.7%	7.8%	3.9%	0.4%	3.8%	-	-	-
	36	3.2%	0.7%	3.1%	0.9%	0.0%	0.9%	-	-	-
	10L	4.5%	0.0%	4.3%	7.9%	6.1%	7.8%	-	-	-
	10R	39.9%	53.4%	40.5%	27.3%	29.0%	27.4%	-	-	-
	28L	36.0%	40.7%	36.3%	54.2%	64.5%	54.6%	-	-	-
	28R	8.2%	4.6%	8.0%	5.7%	0.0%	5.4%	-	-	-

Totals may not add up to 100% due to rounding.

Source: MAC ANOMS Analysis, 2009.

Table 5-6
Flying Cloud Airport Year 2025 Average Annual Runway Use

Aircraft Group	Runway	Arrivals Day	Arrivals Night	Arrivals Total	Departures Day	Departures Night	Departures Total	Touch and Gos Day	Touch and Gos Night	Touch and Gos Total
Jets	18	0.3%	0.0%	0.3%	0.0%	0.0%	0.0%	-	-	-
	36	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	-	-	-
	10L	0.6%	0.0%	0.6%	0.4%	0.3%	0.4%	-	-	-
	10R	36.6%	42.7%	36.8%	46.2%	44.6%	46.2%	-	-	-
	28L	60.4%	55.7%	60.2%	53.2%	55.1%	53.2%	-	-	-
	28R	2.0%	1.6%	2.0%	0.2%	0.0%	0.2%	-	-	-
Helicopters	18H	22.6%	28.8%	22.9%	17.0%	25.9%	17.4%	14.9%	12.5%	14.9%
	36H	8.8%	9.6%	8.9%	20.0%	8.9%	19.5%	2.6%	0.0%	2.5%
	10LH	2.3%	1.0%	2.3%	25.6%	25.9%	25.6%	28.1%	25.0%	28.0%
	10RH	4.8%	1.0%	4.6%	10.4%	10.7%	10.4%	23.0%	45.8%	23.4%
	28LH	21.4%	35.6%	22.0%	18.8%	17.0%	18.7%	5.5%	12.5%	5.7%
	28RH	40.0%	24.0%	39.3%	8.3%	11.6%	8.4%	26.0%	4.2%	25.6%
Pistons	18	21.1%	3.4%	20.3%	19.2%	21.7%	19.3%	20.8%	26.5%	20.9%
	36	8.6%	5.2%	8.5%	6.0%	5.4%	6.0%	8.2%	5.8%	8.1%
	10L	8.8%	0.0%	8.4%	19.8%	5.6%	19.2%	21.8%	2.3%	21.5%
	10R	22.0%	49.4%	23.1%	11.0%	23.4%	11.5%	6.5%	10.4%	6.6%
	28L	23.4%	33.3%	23.8%	16.1%	44.0%	17.2%	7.6%	55.0%	8.5%
	28R	16.2%	8.7%	15.9%	28.0%	0.0%	26.9%	35.1%	0.0%	34.5%
Turboprops	18	8.5%	0.7%	8.2%	4.7%	0.9%	4.6%	-	-	-
	36	3.4%	0.7%	3.3%	1.2%	0.0%	1.1%	-	-	-
	10L	5.1%	0.0%	4.9%	9.0%	8.0%	9.0%	-	-	-
	10R	38.7%	53.4%	39.3%	26.9%	28.6%	27.0%	-	-	-
	28L	35.0%	40.5%	35.2%	51.2%	62.5%	51.7%	-	-	-
	28R	9.3%	4.7%	9.1%	7.0%	0.0%	6.7%	-	-	-

Totals may not add up to 100% due to rounding.

Source: MAC ANOMS Analysis, 2009.

5.1.3 Baseline 2007 Noise Impacts

In the Baseline 2007 noise contours there are no single-family homes located in the 60 DNL contour around Flying Cloud Airport. The 60 DNL contour contains approximately 0.87 square miles. The 65 DNL contour contains approximately 0.36 square miles and no single-family homes. The entire 70 and 75 DNL contours are contained on the airport property, essentially overlying the areas immediately adjacent to the runways. The 2007 70 and 75 DNL contours contain 0.18 and 0.07 square miles respectively.

The 2007 noise contours are shown in Figure 5-5.

5.1.4 Forecast 2025 Noise Impacts

The Forecast 2025 60 DNL noise contour around Flying Cloud Airport decreases to approximately 0.85 square miles while the 65 DNL contour increases to approximately 0.37 square miles. The residential structures within the 60 DNL contour increase to 1 single family home. The 65, 70 and 75 DNL contours cover 0.37, 0.17 and 0.05 square miles, respectively, with no residential structures in the contours.

The 2025 noise contours are shown in Figure 5-6.

In summary, there will be a 2.3 percent decrease in the 60 DNL contour, however 2 single family homes are located in the contour. The area within the 65, 70 and 75 DNL contours remains relatively unchanged with no single family homes located in these contours. The decrease in the overall size of the 60 DNL contour can be attributed primarily to an 8.6 percent decrease in total aircraft operations from 2007 to 2025. The increase in single family homes located in the 60 DNL contour can be attributed to the extension of Runway 10R/28L, which locates the departure end of Runway 10R closer to residential areas immediately southwest of the airport.

5.2 Environmental Review

In addition to noise and land use, MAC also reviews projects for other potential environmental concerns. Depending on the type of project, different levels of environmental review may be needed. MAC completes an Assessment of Environmental Effects (AOEE) each year as a part of the Capital Improvement Program. This document identifies projects that have had or require environmental review. For many projects proposed to utilize federal funds, MAC will submit a Categorical Exclusion to the FAA for approval. The environmental topics identified and considered in a “Cat Ex” are listed below. If a project does not meet the requirements for a Cat Ex, a federal environmental assessment (EA) is completed and reviewed/approved by the FAA. Some projects warrant a State Environmental Assessment Worksheet (EAW) as a way to identify and consider any potential environmental impacts. Lastly, projects that involve runway extensions to 5,000 feet at the Reliever Airports require a State and Federal Environmental Impact Statement (EIS).

The type of funding for a project usually dictates what type of review is necessary. For example, projects not using federal funds do not need FAA approval. Also, some projects do not rise to the level of any necessary environmental review.

Specific categories contemplated and/or analyzed in environmental reviews are shown in Table 5-7.

Environmental review for the specific projects listed as recommendations in this LTCP lies outside the scope of a long term comprehensive planning document and any necessary environmental review will be evaluated as a separate process.

Table 5-7
Environmental Review Categories

Environmental Review Categories	
Air Quality	Historic Structures/Resources
Archaeological	Light Emissions
Biotic Communities	Migratory Birds
Coastal Resources	Natural Resources
Compatible Land Use	Noise Levels
Construction Impacts	Parks, Public Lands, Refuges, Recreational Resources
Endangered Species (flora and fauna)	Relocation Housing
Energy Supply	Social/Socioeconomic Impacts
Environmental Justice	Surface Transportation
Essential Fish Habitat	Water Quality
Farmland	Wetlands
Floodplains	Wild and Scenic Rivers
Hazardous Materials	Other Connected or Cumulative Actions

Chapter 6 Land Use Compatibility

Planning for the maintenance and development of airport facilities is a complex process. Successfully developing airports requires insightful decision-making predicated on various facts that drive the need for the development of additional airport infrastructure. Furthermore, these efforts should consider surrounding community land uses. Airports cannot be developed in a vacuum; the development effort must consider the needs of the surrounding populations and the land uses in the area surrounding the airport. The success of airport planning is predicated on close consideration and coordination of surrounding land use to ensure compatibility with the community surrounding the airport.

Cities and airport operators are both responsible for the ongoing development of public assets. The development of U.S. airports, as well as city infrastructure is within the concept of conducting development predicated on the greater public interest. The responsible development of such community and airport infrastructure requires cooperative efforts on behalf of the airport proprietor and the community.

As city governments are responsible for the development and enhancement of city infrastructure, airport proprietors are responsible for the federally endorsed enhancement of our nation's airport system. Airport operators would be remiss in their duties if such efforts did not consider the land use consequences of decisions made regarding airport development.

This chapter evaluates the land use implications of the planned operation and development of the Flying Cloud Airport.

6.1 Land Use Compatibility Criteria

The Federal Aviation Administration has established Land Use Compatibility criteria in 14 C.F.R. Part 150 detailing acceptable land uses around airports considering noise impacts in terms of DNL. In the case of airports located in the Minneapolis/St. Paul Metropolitan Area additional criteria also must be evaluated in relation to noise exposure as established by the Metropolitan Council's Transportation Policy Plan (TPP).

6.1.1 Federal Aviation Administration Land Use Compatibility Guidelines

Federal guidelines for compatible land use that take into account the impact of aviation noise have been developed for land near airports. They were derived through an iterative process that started before 1972. Independent efforts by the FAA, HUD, USAF, USN, EPA and other Federal agencies to develop compatible land use criteria were melded into a single effort by the Federal Interagency Committee on Urban Noise in 1979, and resulted in the FICUN Guidelines document (1980). The Guidelines document adopted DNL as its standard noise descriptor, and the Standard Land Use Coding Manual (SLUCM) as its standard descriptor for land uses. The noise-to-land use relationships were then expanded for FAA's Advisory Circular Airport-Land Use Compatibility Planning. The current individual agency compatible land use criteria have been, for the most part, derived from those in the FICUN Guidelines. Airport environments pertain only to certain categories of these guidelines.[4]

In 1985 the FAA adopted 14 C.F.R. Part 150 outlining land use compatibility guidelines around airports. Table 6-1 provides the land use compatibility guidelines as established by the FAA.

[4] Federal Interagency Committee On Noise (FICON), "Federal Agency Review of Selected Airport Noise Analysis Issues, " (1992), pp. 2-6 to 2-7.

Table 6-1

FAA Aircraft Noise and Land Use Compatibility Guidelines

Land Use	DNL Contour Interval (dB)					
	Less than 65	**65-69**	**70-74**	**75-79**	**80-84**	**Greater than 85**
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home park,	Y	N	N	N	N	N
Transient Lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	Y
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail–building materials, Hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade–general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource Production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

See following page for Table Key and Notes.

Key

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land use and related structures compatible without restrictions.
N(No)	Land use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute locally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150

According to FAA standards, areas with noise levels less than 65 DNL are considered compatible with residential development.

6.1.2 Metropolitan Council Land Use Compatibility Guidelines

The Metropolitan Council has developed a set of land-use planning guidelines for responsible community development in the Minneapolis-St. Paul Metropolitan Area. The intent is to provide city governments with a comprehensive resource with regard to planning community development in a manner that considers adequacy, quality and environmental elements of planned land-uses.

Specifically, the Minnesota State Land Planning Act, the underlying law that requires local units of government to prepare a comprehensive plan and submit it for Metropolitan Council review, was enacted in 1976. By 1980, all community plans had been approved. The 1973 Aviation Chapter of the Metropolitan Development Guide was updated in 1977. In 1983, the Metropolitan Council amended the Aviation Policy Plan to include “Land Use Compatibility Guidelines for Aircraft Noise.”

In 1994, the Land Planning Act of 1976 had been amended to require communities to update their comprehensive plans at least every ten years. Therefore, all Metropolitan Development Guide chapters were updated by December 1996.

Under the 1976 legislation, communities designated land uses and defined the zoning applicable to the particular land use parcel; the zoning took precedence. The land use measure was a request that local jurisdictions review existing zoning in Airport Noise Zones to determine their consistency with the regional compatibility guidelines, and rezone the property for compatible development if consistent with other development factors. This policy changed in 1994.

Under the amended Land Planning Act, communities determine the land use designation, and the zoning must be consistent with that designation. Thus, the communities had to re-evaluate designated use, permitted uses within the designation, zoning classifications, and adequacy.

In 2004 the Aviation Policy Plan was incorporated into the Transportation Policy Plan (TPP) of the Metropolitan Development Guide. Land use compatibility guidelines for all metropolitan system airports are included in the TPP. It has since been updated in January 2009.

In the case of airports located in the Minneapolis/St. Paul Metropolitan Area, the Metropolitan Council Development Guidelines in relation to airport noise exposure need to be considered. The TPP provides land use guidelines based on 4 noise zones around an airport. The following provides the Metropolitan Council’s description of each noise zone:

- **Zone 1** – Occurs on and immediately adjacent to the airport property. Existing and projected noise intensity in the zone is severe and permanent. It is an area affected by frequent landings and takeoffs and subjected to aircraft noise greater than 75 DNL. Proximity of the airfield operating area, particularly runway thresholds, reduces the probability of relief resulting from changes in the operating characteristics of either the aircraft or the airport. Only new, non-sensitive, land uses should be considered – in addition to preventing future noise problems the severely noise-impacted areas should be fully evaluated to determine alternative land use strategies including eventual changes in existing land uses.[5]
- **Zone 2** – Noise impacts are generally sustained, especially close to runway ends. Noise levels are in the 70 to 74 DNL range. Based upon proximity to the airfield the seriousness of the noise exposure routinely interferes with sleep and speech activity. The noise intensity in this area is generally serious and continuing. New development should be limited to uses that have been constructed to achieve certain exterior-to-interior noise attenuation and that discourage certain outdoor uses.[6]

[5] Metropolitan Council 2030 Transportation Policy Plan, Appendix L, January 2009.
[6] Ibid.

- **Zone 3** – Noise impacts can be categorized as sustaining. Noise levels are in the 65 to 69 DNL range. In addition to the intensity of the noise, location of buildings receiving the noise must also be fully considered. Aircraft and runway use operational changes can provide some relief for certain uses in this area. Residential development may be acceptable if it is located outside areas exposed to frequent landings and takeoffs, is constructed to achieve certain exterior-to-interior noise attenuation, and is restrictive as to outdoor use. Certain medical and educational facilities that involve permanent lodging and outdoor use should be discouraged.[7]

- **Zone 4** – Defined as a transitional area where noise exposure might be considered moderate. Noise levels are in the 60 to 64 DNL range. The area is considered transitional since potential changes in airport and aircraft operating procedures could lower or raise noise levels. Development in this area can benefit from insulation levels above typical new construction standards in Minnesota, but insulation cannot eliminate outdoor noise problems.[8]

- **Noise Buffer Zones:**

  Additional area that can be protected at option of the affected community; generally, the buffer zone becomes an extension of noise zone 4. At MSP, a one-mile buffer zone beyond the DNL60 has been established to address the range of variability in noise impact, by allowing implementation of additional local noise mitigation efforts. A buffer zone, out to DNL55 is optional at those reliever airports with noise policy areas outside the MUSA.[9]

The listed noise zones also use the DNL noise exposure metric. The Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise are provided in Table 6-2.

The Metropolitan Council suggests that the 60 DNL contour be used for planning purposes in areas inside the MUSA.

[7] Ibid.
[8] Ibid.
[9] Ibid.

Table 6.2

Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise										
	Noise Exposure Zones									
Type of Development	**New Development or Major Redevelopment**					**Infill - Reconstruction or Additions to Existing Structures**				
Land Use Category	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ
Residential										
Single/Multiplex, with individual entrance	INCO	INCO	INCO	INCO		COND	COND	COND	COND	
Multiplex/Apartment, with shared entrance	INCO	INCO	COND	PROV		COND	COND	PROV	PROV	
Mobile Home	INCO	INCO	INCO	COND		COND	COND	COND	COND	
Educational, Medical, Schools, Churches, Hospitals, & Nursing Homes	INCO	INCO	INCO	COND		COND	COND	COND	PROV	
Cultural, Entertainment, & Recreation										
Indoor	COND	COND	COND	PROV		COND	COND	COND	PROV	
Outdoor	COND	COND	COND	COND		COND	COND	COND	COMP	
Office, Commercial, Retail	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Services										
Transportation - Passenger Facilities	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Transient Lodging	INCO	COND	PROV	PROV		COND	COND	PROV	PROV	
Other Medical, Health, and Education	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Other Services	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Industrial, Communication, & Utilities	PROV	COMP	COMP	COMP		PROV	COMP	COMP	COMP	
Agriculture, Land/Water Area, & Resource Extraction	COMP	COMP	COMP	COMP		COMP	COMP	COMP	COMP	

Table Key:

- **COMP** – "Compatible" – uses that are acoustically acceptable for both indoors and outdoors.
- **PROV** – "Provisional" – uses that should be discouraged if at all feasible; if allowed, must meet certain structural performance standards to be acceptable according to MS473.192 (metropolitan area Noise Attenuation Act). Structures built after December 1983 shall be acoustically constructed so as to achieve interior noise levels as follows:
  - Residential, Educational and Medical = 45 dBA Interior Sound Level
  - Cultural, Entertainment, Recreational, Office, Commercial, Retail and Services = 50 dBA Interior Sound Level
  - Industrial, Communications, Utility, Agricultural Land, Water Area, Resource Extraction = 60 dBA Interior Sound Level

  Each local governmental unit having land within the airport noise zones is responsible for implementing and enforcing the structural performance standards in its jurisdiction.
- **COND** – "Conditional" – uses that should be strongly discouraged; if allowed, must meet the structural performance standards, and requires a comprehensive plan amendment for review of the project under the Conditional Land Use Review Factors outlined in the Metropolitan Council's 2030 Transportation Policy Plan, Appendix H, Table 5.
- **INCO** – "Incompatible" – land uses that are not acceptable even if acoustical treatment were incorporated in the structure and outside uses restricted.

Source: Metropolitan Council 2030 Transportation Policy Plan, Appendix H – December 15, 2004.

6.1.3 Runway Safety Zones

The State of Minnesota Department of Transportation (Mn/DOT) has established regulations that control the type of development allowed off runway ends in order to prevent incompatible development. These guidelines should be used to establish zoning ordinances to protect areas around an airport. The states zoning areas overlay and extend beyond the RPZs. The most restrictive areas created by Mn/DOT regulations are called State Safety Zones A and B. The safety zones should exist off each runway end and follow the approach zones out to the total length of the runway. The recommended length of Safety Zone A is 2/3 of the total runway length; Safety Zone B is 1/3 of the total runway length and extends from Safety Zone A. There is also an area called Safety Zone C which is circular and typically follows the FAAs FAR Part 77 horizontal surface.

Safety Zone A does not allow any buildings or temporary structures, places of public assembly or transmission lines. Permitted uses include agriculture, livestock, cemeteries and auto parking areas.

Safety Zone B does not allow places of public or semipublic assembly (i.e. churches, hospitals, schools) and is subject to site-to-building area ratios and site population limits. Permitted uses are generally the same as Zone A, plus some low-density developments.

Safety Zone C does not allow use that causes interference with radio or electronic facilities on the airport or interference with radio or electronic communications between the airport and aircraft, lighting that makes it difficult for pilots to distinguish between airport lights and other lights or that results in glare in pilot's eyes, and lighting that impairs visibility in the airport vicinity.

A complete description and copy of the Minnesota Rules Chapter 8800 Department of Transportation Aeronautics Section 2400 Airport Zoning Standards can be found at http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html.

Mn/DOT prefers that airports own all of State Zone A. For land within the area that is not airport-owned, land use protection is recommended by including the safety zones in local zoning codes and zoning maps. Inclusion of the safety zones on community Comprehensive Plans is also strongly encouraged. The RPZ's and recommended State Safety Zones for Flying Cloud Airport are shown on Figure 6-1.

6.2 Land Use Compatibility Analysis

The Flying Cloud Airport is located in Hennepin County, southwest of the City of Minneapolis. The airport is located in the City of Eden Prairie. The airport is bordered by primarily residential land uses to the southwest of the airport. Park/recreational and/or preserve is located immediately north and south of the airport while industrial/utility and residential land uses are located west of the airport. The airport is bordered by Pioneer Trail to the north and TH 212 to the south. The City of Eden Prairie adopted a Comprehensive Plan Update which addresses planning and development in airport noise and airspace safety zones. Eden Prairie has adopted by reference the Metropolitan Council's *Land Use Compatibility Guidelines for Aircraft Noise* for new development and also uses state safety zones for planning purposes. The City's zoning ordinance contains height limits ranging between 30 and 45 feet, depending on zoning district.

The following sections detail land use considerations in the context of existing and planned land uses around Flying Cloud Airport focusing on airport noise and runway safety zones.

6.2.1 Existing Condition Land Use Compatibility

In general, the area around the airport is primarily residential to the west and southwest with park/recreational and/or preserve located to the north and south and industrial/utility/residential land uses to the east. The airport is bordered by Pioneer Trail to the north and TH 212 to the south. Residential uses border portions of airport property to east and northwest. Industrial and utility uses border TH 212 along the east side of the airport. Much of the park/recreational and/or preserve uses in the vicinity of the airport, are located immediately north of the airport along Pioneer Trail and to the south along TH 212.

6.2.1.1 Land Use Compatibility and Airport Noise Considerations

As detailed in Chapter 5, Section 5.1, the 2007 baseline noise contours around Flying Cloud Airport contains no single-family homes in the 60 DNL.

Figure 6-2 provides the 2007 baseline 60 and greater DNL noise contours around Flying Cloud Airport with 2005 land use data provided by the Metropolitan Council. As is detailed on the map, there are no residential structures located within the 60 and greater DNL noise contours around Flying Cloud Airport.

The 2007 baseline 70 and greater DNL contours are contained on airport property.

6.2.1.2 Land Use Compatibility and Existing Runway Protection/Safety Zones

The existing RPZs and State Safety Zones A and B for Runways 10R/28L, 10L/28R, and 18/36 at Flying Cloud Airport are depicted in Figure 6-3 with the existing land uses around the airport.

The Runway 10R RPZ encompasses 78.8 total acres; 77.8 acres are on airport property and 1.0 acres are undeveloped. State Zone A contains 83.1 total acres; 81.2 acres are airport property and 1.9 acres are undeveloped. State Zone B contains 59.1 total acres; 53.9 are on airport property and 5.2 are undeveloped.

The Runway 10L RPZ encompasses 13.8 total acres on airport property. State Zone A contains 53.1 total acres; 52.7 acres are airport property and 0.4 acres are undeveloped. State Zone B contains 44.0 total acres; 29.4 acres are airport property, 11.9 acres are undeveloped and 2.7 acres are institutional.

The Runway 28R RPZ encompasses 13.8 total acres on airport property. State Zone A contains 53.0 total acres; 50.1 acres are airport property, 2.3 acres are undeveloped and 0.6 acres are industrial/utility. State Zone B contains 44.0 total acres; 20.6 acres are airport property, 18.2 acres are single family residential, 2.7 acres are undeveloped and 2.5 acres are park. There are 33 single family residential structures located in State Zone B.

The Runway 28L RPZ encompasses 13.8 total acres; 12.9 acres on airport property and 0.9 acres are undeveloped. State Zone A contains 83.1 total acres; 70.1 acres are airport property, 10.4 acres are industrial/utility and 2.6 acres are undeveloped. State Zone B contains 59.1 total acres; 26.7 acres on airport property, 12.4 acres are single family residential, 9.5 acres are undeveloped, 8.3 are industrial/utility and 2.2 acres are park. There are 51 single family residential structures located in State Zone B.

The Runway 36 RPZ encompasses 8.0 total acres; 6.1 acres are on airport property, 1.3 acres are park and 0.6 acres are undeveloped. State Zone A contains 31.7 total acres; 20.3 acres are park, 9.9 acres are on airport property, 1.0 acres are undeveloped and 0.5 acres are industrial/utility. State Zone B contains 24.1 total acres; 19.1 are water and 5.0 acres are park.

The Runway 18 RPZ encompasses 8.02 total acres; 7.70 acres are on airport property, 0.30 acres are park and 0.02 are single family residential. State Zone A contains 31.6 total acres; 21.4 acres are airport property, 5.2 acres are water, 3.9 acres are park and 1.1 acres are single family residential. There is 1 single family residential structure located in State Zone A. State Zone B contains 24.1 total acres, all of which are water.

6.2.2 Preferred Alternative Land Use Compatibility

The preferred development alternative at Flying Cloud Airport maintains the existing airport infrastructure and runway lengths on the parallel runways. The only notable change will be a slight shift of the crosswind runway to the north by 58-feet to create a compliant runway safety area and object free area to the south of the runway with the addition of 109 feet of pavement to the north for a total runway length of 2,800 feet.

The forecasted change in fleet mix, primarily an increase in jet operations, and an overall reduction in forecasted operations results in slight changes to the forecast noise contour.

6.2.2.1 Forecast Land Use Compatibility and Airport Noise Considerations

As detailed in Chapter 5, Section 5.1, the 2025 preferred alternative forecast 60 DNL noise contour around Flying Cloud Airport contains 1 single family home. The 2025 preferred alternative forecast 65, 70 and 75 DNL contours are contained on airport property.

Figure 6-4 provides the 2025 preferred alternative forecast 60 and greater DNL noise contours around Flying Cloud Airport with 2005 land use data provided by the Metropolitan Council. Additional analysis was conducted relative to the planned 2020 land uses around Flying Cloud Airport as provided by the Metropolitan Council. Much of the undeveloped land to the west and south west of the airport is planned to be converted into single family with some mixed use and park land use. To the east, there is some conversion from undeveloped land to single family and industrial land uses. There is undeveloped land to the southeast of the airport that is planned to be converted to park land.

The preferred development alternative does not include residential structures in recognized airport noise areas as outlined in the FAA land use guidelines in Table 6-1.

6.2.2.2 Land Use Compatibility and Preferred Alternative Runway Protection/Safety Zones

The preferred alternative RPZs and state safety zones A and B for Runways 10R/28L, 10L/28R, and 18/36 at Flying Cloud Airport are depicted in Figure 6-5 with existing land uses around the airport.

The Runway 10R RPZ encompasses 78.8 total acres; 63.6 acres are on airport property and 15.2 acres are undeveloped. State Zone A contains 83.1 total acres; 64.5 acres are airport property and 18.6 acres are undeveloped. State Zone B contains 59.09 total acres; 42.62 are undeveloped, 14.02 are agricultural, 2.44 are on airport property and 0.01 are institutional.

The Runway 10L RPZ encompasses 13.8 total acres on airport property. State Zone A contains 53.0 total acres; 52.0 acres are airport property and 1.0 acres are undeveloped. State Zone B contains 44.0 total acres; 25.4 are undeveloped, 11.6 acres are agricultural, 4.0 acres are airport property and 2.9 acres are institutional. There are 28 single family residential structures located in State Zone B.

The Runway 28R RPZ encompasses 13.8 total acres on airport property. State Zone A contains 53.0 total acres; 50.1 acres are airport property, 2.3 acres are undeveloped and 0.6 acres are industrial/utility. State Zone B contains 44.0 total acres; 18.1 acres are single family residential, 16.4 acres are airport property, 6.8 acres are undeveloped and 2.7 acres are park. There are 110 single family residential structures located in State Zone B.

The Runway 28L RPZ encompasses 13.8 total acres; 12.7 acres on airport property and 1.1 acres are undeveloped. State Zone A contains 83.1 total acres; 61.2 acres are airport property, 17.8 acres are industrial/utility and 4.1 acres are undeveloped. State Zone B contains 59.1 total acres; 20.8 acres on airport property, 15.3 acres are undeveloped, 12.4 acres are single family residential, 8.3 are industrial/utility and 2.3 acres are park. There are 49 single family residential structures located in State Zone B.

The Runway 36 RPZ encompasses 8.0 total acres; 6.7 acres are on airport property, 0.8 acres are park and 0.6 acres are undeveloped. State Zone A contains 33.4 total acres; 21.2 acres are park, 10.7 acres are on airport property, 1.0 acres are undeveloped and 0.5 acres are industrial/utility. State Zone B contains 25.7 total acres; 20.9 are water and 4.8 acres are park.

The Runway 18 RPZ encompasses 8.0 total acres; 7.8 acres are on airport property and 0.2 acres are park. State Zone A contains 33.4 total acres; 18.7 acres are airport property, 10.6 acres are water,, 3.2 acres are park, and 0.9 acres are single family residential. State Zone B contains 25.7 total acres, all of which are water.

The total residential units in the RPZs and State A and B Zones with the preferred alternative are 0, 17 and 187 respectively. This represents an increase of 103 total residential units in the State B Zone from the existing airport layout.

Additional analysis was conducted relative to the planned 2020 land uses around Flying Cloud Airport as provided by the Metropolitan Council. Substantive proposed changes in land use are planning in the State Zones off of each end of runways 10L/28R and 10R/28L. Undeveloped land in State Zone B of runway 10R is planned to change to single family residential while undeveloped land in State Zone B of runway 10L changes to institutional land use. In State Zones A and B of runways 28L and 28R, undeveloped land is slated to change to industrial, single family residential, right of way, and park land use. Minor changes in Zone A of runway 36 include the conversion of undeveloped land into right of way, industrial and park land uses.

The MAC is in the process of convening a Joint Airport Zoning Board (JAZB) that will include the respective Responsible Governmental Units (RGUs) that control land use development around the Flying Cloud Airport. This effort will address land uses around Flying Cloud Airport in the context of the preferred alternative runway zones and may result in modification to the safety zone dimensions and development restrictions outlined in this chapter. The airport zoning process is spelled out in detail in Minn. Stat. Chap. 360, 360.061 – 360.074 and Minn. Rules Chap. 8800.1200 and 8800.2400. Specifically, Minn. Stat. § 360.062 establishes that “airport hazards” endanger lives, property and airport utility and should be prevented, with consideration given to avoiding the disruption of existing land uses based on social and financial costs. In an effort to prevent the creation or establishment of “airport hazards,” the statute states that “the Metropolitan Airports Commission shall request creation of one joint airport zoning board for each airport operated under its authority.” The statute states that “A joint board shall have as members two representatives appointed by the municipality owning or controlling the airport and two from the county or municipality, or in case more than one county or municipality is involved two from each county or municipality, in which the airport hazard is located, and in addition a chair elected by a majority of the members so appointed.”

The goal of the JAZB will be to develop a Flying Cloud Airport Zoning Ordinance for review and approval by the Commissioner of Transportation, for subsequent adoption by the Board and then by local municipalities. The Board will determine if the state model zoning ordinance provisions are appropriate for the Flying Cloud Airport or if modifications to the model are necessary considering the provisions of Minn. Stat. §360.066, subd. 1. The focus of this discussion is likely to be on the following:

- MnDOT Model Ordinance – Minnesota Rule 8800.2100 and Minnesota Rule 8800.2400 (additional information on the MnDOT Model Zoning Ordinance is available on the Internet at http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html)

- Flying Cloud Airport unique characteristics in the context of existing and planned land uses around the airport

- Maintaining a “reasonable standard of safety” while considering the social and financial costs to the community

- Minn. Stat. §360.066, subd. 1, which is especially instructive when addressing the question of balancing the safety with the social and economic impacts in the zoning process.

6.3 Concurrent Use / Development Areas on Airport Property

MAC is currently analyzing the potential for developing concurrent use, revenue-generating development at the Flying Cloud Airport and all of its Reliever Airports. Any parcels reviewed by MAC at FCM will be compatible with the airport and MAC will work with the City of Eden Prairie to address any concerns.

Chapter 7

Capital Improvement Program Costs

The items included in the 20-year planning period for the Runway 18-36 preferred alternative and other items recommended are listed in the table below. Chapter 4 describes each of the proposed projects itemized.

The estimated costs are in 2009 dollars, and they include estimated engineering costs.

Table 7-1
LTCP Recommendation Estimated Costs

Recommendation	Estimated Cost
Reconstruct Runway 18-36 south end, shift and extend runway to 2,800 feet, upgrade runway lights and circuit	$1,700,000
Construct North Perimeter Road	$300,000
Replace Runway 18-36 VASIs with PAPIs	$100,000 - 200,000
Obstruction Removal	$100,000
On-going pavement maintenance and replacement program*	$2,000,000
South Hangar Area Utilities	$2,100,000
Concurrent Use / Parcel Development	$0 (developer cost)
Clear Taxiway A OFA	$0 (airport tenant cost)
Relocate ATCT**	$6,000,000 -7,000,000

Source: MAC calculation and engineering consultant estimates.

* Includes total cost for projects included in the draft 2010 – 2016 Capital Improvement Program for FCM alleyway rehabilitation and pavement maintenance.

** The Flying Cloud Air Traffic Control Tower is not owned by the MAC. Its relocation will require the cooperation and assistance of the FAA.

Please note that these are recommendations for future airport improvements. Having them listed in this planning document does not guarantee that all or any of them will be completed. Additional engineering and environmental study as necessary will be completed prior to any implementation of projects. This summary provides a guide for MAC when planning the Capital Improvement Program. Costs for Reliever Airport projects must be carefully programmed to ensure all necessary funding is available. Those projects that will be eligible for federal or state funding will be placed in years when the opportunity to receive such funds is greatest. Projects that are not eligible for federal or state funds must have other funding sources identified prior to implementation.

Chapter 8

Facility Implementation Schedule

The Runway 18-36 preferred alternative and other recommended items are listed in the table below. These timelines will vary depending on the availability of funds and other parameters. The Flying Cloud Air Traffic Control Tower is not owned by MAC. Its relocation will require the cooperation and assistance of the FAA.

Chapter 4 discussed each of the proposed projects itemized below.

Table 8-1
LTCP Recommendation Implementation Schedule

Recommendation	Timeline
Reconstruct Runway 18-36 south end, shift and extend runway to 2,800 feet, upgrade runway lights and circuit	0 – 5 Years
Construct North Perimeter Road	0 – 5 Years
Replace Runway 18-36 VASIs with PAPIs	0 – 5 Years
Obstruction Removal	0 – 5 Years
On-going pavement maintenance and replacement program	Continuous throughout planning period
Completion of South Hangar Area Utilities	0 – 5 Years
Concurrent Use / Parcel Development	0 – 10 Years
Clear Taxiway A OFA	15 – 20 Years
Relocate ATCT*	10 – 15 Years

* The Flying Cloud Air Traffic Control Tower is not owned by the MAC. Its relocation will require the cooperation and assistance of the FAA.

Chapter 9 Public Information Process

At the onset of this long term comprehensive plan update process, a public involvement program was developed. It included a specific plan for group meetings, with whom and when. The meetings held as part of this public process are listed in Table 9-1.

The purpose of the meetings was to inform the airport users and the public about the process and schedule, and offer an opportunity for personal question-and-answer sessions. The goal was to receive informal input as the process advanced, and prior to the formal public comment period that took place upon completion of the full draft document. In addition, MAC held two meetings and corresponded regularly with a technical advisory group, made up of members of MAC staff, the FAA, Mn/DOT Aeronautics, and Metropolitan Council.

Informal comments were accepted at all meetings. The MAC committee meetings were open to the public, and verbal comments were invited at each of them. Meetings with the Flying Cloud Airport Advisory Commission typically involved a short presentation by MAC followed by a question and answer period.

Table 9-1
Public Information Program Meetings

Meeting with:	Date
Eden Prairie City Planners	February 17, 2009
Airport FBOs	March 3, 2009
Airport Tenants	March 3, 2009
Reliever Airport Advisory Committee (RAAC)	April 29, 2009
Flying Cloud Airport Advisory Commission (FCAAC)	March 12, 2009
MAC FD&E Committee Meeting	May 6, 2009
MAC M&O Committee Meeting	May 6, 2009
FCAAC	May 14, 2009
FCAAC – Public Informational Presentation / Meeting	May 28, 2009
LTCP Public Informational Meeting	June 18, 2009
MAC FD&E Committee	July 8, 2009
FCAAC	July 9, 2009
MAC FD&E Committee Meeting	September 9, 2009
FCAAC	September 10, 2009
FCAAC	November 12, 2009
LTCP Public Informational Meeting	December 14, 2009
MAC FD&E Meeting	February 3, 2010

During the long term comprehensive planning drafting process, MAC requested informal written or verbal comments regarding the LTCP Update. Advertisements for the MAC public open house meeting were published in the *Eden Prairie News* and the *Sun Current* on June 11, 2009. The meeting was attended by six people. As of July 2009, two verbal and one written comment has been received supporting the shortening of Runway 36. Two verbal comments have been received asking that no runway length be lost. All correspondence received prior to the 30-day written public comment period are included in Appendix B.

Prior to August 2009, there were only two alternatives under considerations for Runway 18-36 – shortening the runway, or shortening the runway but maintaining the existing runway length (see Chapter 4). It was those two options that were presented at the LTCP public informational meeting and to the MAC Commissioners in July 2009. During the review and analysis of runway usage that occurred about the same time, it was determined that the crosswind Runway 18-36 is used very regularly – much more than approximate 5% of the time there is a strong crosswind component. Based on this information, combined with FAA runway length design recommendations, staff began reviewing the possibility of not only maintaining the existing length, but also extending it to make the runway more effective in accommodating the traffic using it. In September 2009, MAC brought this new shift-and-extend alternative to the Finance Development and Environment (FD&E) Committee requesting it be adopted as the preferred alternative for the LTCP document. The full Commission ratified the decision in September.

The addition of the shift-and-extend alternative for Runway 18-36 was added to the document prior to the start of the formal written comment period. The draft LTCP document was completed in November, 2009, and made available for a 30-day written comment period starting November 23, 2009. The comment period ended on December 22, 2009.

Advertisements for the 30-day public written comment period on the draft LTCP were published in the *Pioneer Press* and *Star Tribune* newspapers on November 19, 2009 and in the *EP News* and *Sun Current* local papers also on November 19, 2009. Advertisements for a second public informational open house meeting were published in the *Pioneer Press, Star Tribune, EP News* and *Sun Current* papers on December 10, 2009.

On December 14, 2009, MAC held a second public informational meeting to address any questions or comments about the revised preferred alternative. The meeting was attended by six people. No written comments were received at the meeting.

Upon completion of the written comment period on December 22, 2009, MAC received only one letter. The letter from the City of Eden Prairie and MAC's responses to that letter are included in Appendix B. One of the comments triggered a modification to Exhibit 6-3. The revised graphic is now included in this document. The Executive Summary and Figure 4-4 graphics were also modified as a result of a MAC staff request.

In February 2010, MAC submitted the draft LTCP document, along with the written comments received and MAC responses to those comments, to the Metropolitan Council for their review. The Metropolitan Council issued their determination in April 2010, finding the LTCP Update consistent with the Metropolitan Council's development guide. Correspondence from the Metropolitan Council has been included in Appendix B.

In June 2010, staff requested the Commission take action to adopt this LTCP as the final plan. The action was tabled at that meeting due to questions related to an FBO's proposed development concepts. The item was first brought back to the Commission in September 2010, but was further deferred for another month due to additional questions. Staff returned to the Commission in October 2010, where the Commission took action to adopt this LTCP as the final plan. MAC is committed to preparing updates to this LTCP on a regular basis.

Appendix A

ACTIVITY FORECASTS – TECHNICAL REPORT

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS
Activity Forecasts – Technical Report
April 2009

1. Introduction

The purpose of this analysis is to provide aviation activity forecasts for use in the Long-Term Comprehensive Plans (LTCPs) for Anoka County Airport (ANE), Flying Cloud Airport (FCM) and St. Paul Downtown Airport, also known as Holman Field (STP). Forecasts are presented for an approximate 20-year time horizon, and include 2010, 2015, 2020, and 2025. The forecasts for the three airports are unconstrained, and assume that the necessary facilities will be in place to accommodate demand except where noted.

This study follows three previous LTCP forecasts prepared for Crystal Airport (MIC), Lake Elmo Airport (21D), and Airlake Airport (LVN) in 2006. The methodology in this study is consistent with the methodology used in the previous study, except for updated base year data and changes in the fuel cost assumptions reflecting the recent major increase in oil prices.

The report first discusses the existing and projected socioeconomic conditions in the area, and current general aviation activity. The discussion includes an assessment of the impact of current fuel prices on the general aviation industry. This background information is used to prepare the assumptions that form the foundation of the subsequent forecasts. Based aircraft forecasts for the Metropolitan Airports Commission (MAC) airports are then presented and allocated among the individual airports. Operations and peak activity forecasts for Anoka County, Flying Cloud, and St. Paul Downtown are derived from the based aircraft forecasts. The report concludes with a set of high and low activity scenarios for each airport.

The assumptions inherent in the following calculations are based on data provided by the MAC, federal and local sources, and professional experience. Forecasting, however, is not an exact science. Departures from forecast levels in the local and national economy, fuel prices, and in the aviation industry would have a significant effect on the forecasts presented herein.

2. Socioeconomic Background

This section examines historical and projected income, employment, and population data for the catchment areas for the three airports. Projections of future income, employment and population levels are derived from projections prepared by both the Metropolitan Council's Regional Development Framework forecasts (Met Council) and Woods and Poole Economics (W&P).

2.1. Catchment Areas

Anoka County Airport is located in Anoka County, while Flying Cloud is located in Hennepin County and St. Paul Downtown is located in Ramsey County. In each instance most of the based aircraft owners reside in the same county as the airport they use.

Nevertheless, there is some overlap between the airport catchment areas. Jet and turboprop aircraft owners that require longer runways and more extensive maintenance and fueling facilities tend to gravitate towards St. Paul Downtown and Flying Cloud Airport. Likewise, operators of small single engine piston aircraft often shy away from larger more commercial airports such as Minneapolis-St. Paul International (MSP) and STP because of congestion and costs, even though these airports may be closer to their place of residence. Based aircraft were projected from a system standpoint to take these factors into account, and then allocated to the individual airports operated by the MAC including Anoka, Flying Cloud, and St. Paul Downtown. Separate socioeconomic forecasts for each county in the metropolitan area are required for this methodology.

2.2. Socioeconomic Forecasts

As noted earlier, both the Met Council and W&P socioeconomic forecasts were examined for use in this study. Each source has its strengths and weaknesses.

The Met Council forecasts are prepared locally and reflect a detailed knowledge of the existing and projected growth trends within the Minneapolis-St. Paul metropolitan area. However, they do not include projections of income or projections of national activity. Income is important because an analysis of historical registered aircraft data by county indicated that registered aircraft were more closely correlated with income than with population or employment. Also, much of the analysis will be based on FAA projections of national general aviation activity. For this analysis to be valid, the local and national socioeconomic projections need to be based on a consistent set of assumptions.

The W&P forecasts are more recent than the Met Council forecasts. They also include personal income and prepare metropolitan and national forecasts using a common set of assumptions. However, the W&P forecasts do not incorporate a detailed knowledge of local growth trends and development constraints.

A hybrid income forecast that incorporates the strengths and minimizes the weaknesses of the two data sources was prepared for use in this study. Per capital income projections by W&P were applied to Met Council population forecasts to generate income forecasts for each county. These forecasts were then adjusted, on a prorated basis, to sum to the W&P income forecasts for the seven-county Met Council metropolitan area. A final adjustment was made to match all the forecasts to the most recent common base year – 2006 – for which personal income was available.

Table 1 shows the income forecast that resulted from the adjustments discussed above. As in most metropolitan areas, the outer counties, such as Carver, Scott, and Washington, are projected to grow more quickly than the inner counties such as Hennepin and Ramsey. Total real income in the seven-county metropolitan area is projected to grow at an average annual rate of 2.4 percent through 2030, slightly more rapidly than in the United States as a whole.

Appendix A provides more detailed historical and projected socioeconomic data, including population, employment, and per capita income as well as total personal income. The original Met Council and W& P forecasts are shown in the appendix, along the hybrid forecasts prepared for this study.

3. Historical Trends

The MAC is responsible for the operation of four airports in addition to those under study. These include Minneapolis-St. Paul International Airport (MSP), Crystal Airport, Lake Elmo Airport, and Airlake Airport. This section discusses trends in historical based aircraft and operations at the MAC airports.

3.1 Based Aircraft

Table 2 shows historical based aircraft recorded at each of the seven MAC airports from 1980 through 2007.

Based aircraft at Anoka County Airport have increased since the mid-1980s. Based aircraft at Flying Cloud declined abruptly in the mid-1980s, then abruptly increased in 1999, at which point they began to gradually decrease again. Based aircraft at Holman Field decrease and then increased rapidly during the 1980s, and then more gradually during the 1990s and then rapidly decreased in the 2000's. Total based aircraft at the MAC airports gradually increased until 1999, after which they began a gradual decrease. Perhaps most notable is the sharp decrease in based aircraft at MSP and Holman Field, as commercial operations or larger business aircraft displaced a greater number of smaller general aviation aircraft.

The numbers in Table 2 are the best available but nevertheless should be viewed with caution. In some cases, notably MSP from 1985 through 1998, based aircraft data are missing. In other cases, the numbers remained unchanged over periods of several years indicating infrequent updates.

Until recently, the number of aircraft based at MAC airports has accounted for between 0.8 and 0.9 percent of the U.S. active fleet (see Table B.2 in Appendix B). Since 1999, the share has been gradually declining and is now just over 0.7 percent of the U.S. fleet. 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 (see Table A.5 in Appendix A). The decline in share 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. 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. Additionally, some ultra light (Part 103) aircraft need not be based at an airport. In fact, ultra light aircraft are not permitted to operate at MAC airports and are therefore often stored elsewhere.
Table 3 shows the current distribution of aircraft based at MAC airports by type and county of registration. The more populous counties, such as Hennepin and Ramsey, have the highest number of registered aircraft. In addition, more sophisticated aircraft such as

jets and turboprops tend to be registered in the inner counties where most major businesses are located, rather than in the outer counties.

Table 4 shows the distribution of general aviation aircraft by the county in which they are registered and the airport at which they are based. More than 40 percent of the based aircraft at Anoka County Airport are registered in Anoka County, with another 22 percent registered in Ramsey County, and another 22 percent registered in Hennepin County. Almost 70 percent of the aircraft based at Flying Cloud Airport are registered in Hennepin County, along with 7 percent registered in Scott County, and another 12 percent registered outside the seven-county area. About 53 percent of aircraft based at Holman Field are registered in Ramsey County, and another 29 percent are registered in Hennepin County. As shown, geography is a major determinant but not the only determinant of where aircraft are based.

Table B.3 in Appendix B provides the information in Table 4 broken out by aircraft category.

3.2 Aircraft Operations

The three airports in this study – STP, FCM, and ANE – have an active air traffic control tower. Therefore, unlike the non-towered airports, it is possible to more accurately identify long-term trends in the number of aircraft operations. Although the airports are towered, the towers are not operated 24 hours a day. The STP tower is operated from 6 am to 10 pm from Monday to Friday and from 7 am to 10 pm on Saturday and Sunday. The FCM tower is operated from 7 am to 10 pm from April through October and from 7 am to 9 pm from November through March. The ANE tower is operated from 7 am to 10 pm from May through September and from 7 am to 9 pm from October through April. As a result the tower counts understate the true number of aircraft operations.

Tables B.4 through B.6 in Appendix B show the historical tower counts of aircraft operations at the three airports. Aircraft operations at Anoka County Airport (Table B.4) showed an increase through 2000, but have since declined especially since 2003 with the run-up in the cost of fuel. There has been a gradual decline in the number of operations at Flying Cloud since 1994, with a sharp drop-off in 2007 corresponding to the spike in fuel prices. Aircraft operations at St. Paul Downtown have declined at a more moderate rate over the same period, possibly because of the greater concentration of business flying which tends to be less discretionary and therefore less sensitive to operating costs such as fuel. Air taxi operations at STP have increased while general aviation operations have decreased.

Tables B.7 through B.9 in Appendix B show the monthly distributions of aircraft operations at the three airports in 2007 including adjustments for the operations missed in the tower counts. ANOMS radar data was used to estimate the number of aircraft operations that occurred when the towers were not operated, which were then added to the official counts. The peak month at ANE (Table B.7) was May in 2007, which accounted for 10.1 percent of annual operations. At FCM, the peak month was July, and it accounted for 10.8 percent of annual operations. At STP, there was little variation in the level of operations between May and October. October accounted for the highest amount of aircraft operations in 2007 – 9.8 percent. Typically, business aviation is more evenly spread out through the year than personal travel, which tends to be concentrated in the summer months.

4.

4. Assumptions

This section describes the general forecast assumptions that were applied in this forecast. More detailed assumptions specific to a particular activity category are described in the sections pertaining to those categories. The major assumptions are described below.

4.1 Unconstrained Forecasts

The activity forecasts contained herein are physically and operationally unconstrained except where noted. For the purposes of this study, "physically unconstrained" means that there will be sufficient airport airfield, hangar, apron, and landside facilities at Anoka, Flying Cloud, and Holman Field to accommodate all aviation activity dictated by demand.

There are limits to the area available for expansion at Holman Field. Given the number of aircraft that have been accommodated historically by STP (see Table 2) and after discussion with MAC staff, it was determined that STP could accommodate the modest increases in based aircraft identified in the base forecast. The forecasts assume that the runways at STP and ANE would remain at their current lengths and that one of the FCM runways would be extended to 5,000 feet as planned. The planned runway system will allow the three airports under study to accommodate most general aviation aircraft.

It is assumed that destination airports will be developed sufficiently to accommodate demand from the Twin Cities area.

4.2 Development at Other MAC Airports

No change is assumed for the number and length of the runways at the other MAC airports except for the elimination of runway 14R/22L and turf runway 6R/24L at Crystal, and the extension of runway 4/22 to 3,200 feet at Lake Elmo. General aviation facilities at MSP are expected to remain constrained and therefore only minor growth in based aircraft above current levels is assumed at MSP. After consultation with the MAC an upper limit of thirty based aircraft at MSP was assumed.

4.3 Regulatory Assumptions

No regulatory restrictions affecting the types of aircraft operated at Anoka, Flying Cloud, and Holman Field are assumed. There will be no nighttime restrictions on aircraft operations at these airports.

4.4 Catchment Area

It is assumed that ground transportation network will not change sufficiently over the forecast period to materially affect the ground travel time between the MAC airports and the locations of the airport users.

4.5 Economic Assumptions

The local and national economies area assumed to grow in accordance with the projections in Table 1. The forecasts assume no major economic downturn, such as occurred during the depression of the 1930s. The local and national economies will periodically increase and decrease the pace of growth in accordance with business cycles. However, it is assumed that, over the next twenty years, the high-growth and low-growth periods will offset each other so that the adjusted economic forecasts described in Section 2 will be realized.

4.6 Environmental Factors

No major changes in the physical environment are assumed. It is assumed that global climate changes will not be sufficient enough to force restrictions on the burning of hydrocarbons or major aviation fuel tax increases within the forecast period.

4.7 National Airspace System

It is assumed that the FAA will successfully implement any required changes and improvements for the national airspace system to accommodate the unconstrained forecast of aviation demand.

4.8 Fractional Ownership

Consistent with FAA projections, the share of business jet aviation accounted for by fractional ownership is expected to increase. Fractional ownership operations are expected to continue to be business related and to focus primarily on jet and turboprop aircraft. As such most of the growth in registered aircraft related to fractional ownership is expected to occur at the main business centers in Hennepin and Ramsey Counties.

4.9 Microjets

Microjets or very light jets (VLJs), such as the Eclipse and Mustang, are expected to increase by several hundred per year nationally, consistent with the FAA forecast. It is anticipated that most microjets would be used for business purposes, and therefore most of the demand would originate in the inner counties such as Hennepin and Ramsey.

4.10 Ultra Light Recreational Aircraft

The number and utilization of ultra light recreational aircraft is assumed to increase at the FAA projected rate. Because these aircraft are light and easily transported, it is anticipated that most of them will continue to be based off-airport. As noted earlier, they may not be operated at MAC airports.

4.11. General Aviation Taxes and Fees

It is assumed that future fuel taxes and other fees related to general aviation will remain unchanged except for adjustments for inflation. It is assumed that there will be no reduction in based aircraft at MAC-owned reliever airports due to the latest increases in rates and charges.

5. Impact of Fuel Costs

In the previous set of LTCP forecasts, the FAA national general aviation forecast was used without adjustment. In 2008, however, there was an unprecedented increase in oil prices that was not foreseen in the FAA forecasts. The most recent FAA forecasts, published in early 2008, used the Office of Management and Budget's (OMB) forecast of Refiners' Acquisition Cost, a measure of the cost of oil per barrel. This forecast assumed that the cost per barrel would increase from $60.78 in 2007 to $86.35 in 2008, and then decline to $73.36 in 2015 ($62.72 in 2008 prices). The OMB forecast assumed nominal oil prices would increase again after 2015, but at a lower rate than inflation.

As of May 2008, the Refiners' Acquisition Cost had increased to $118.14 per barrel, much higher than the OMB forecast.[1] There is increased concern that, continuing growth in the economies of China, India, and other developing nations, coupled with diminishing new oil field discoveries, would cause prices to remain at this level or increase even more. The spike in oil prices has significantly increased aircraft operating costs, and this has been reflected by reductions in the number of commercial and general aviation aircraft operations in 2007 and early 2008.

The most recent FAA forecasts have not fully incorporated the increase in fuel prices or their impact on general aviation activity. It is therefore prudent to make an adjustment to the FAA forecasts reflecting the current fuel cost environment prior to using them in the LTCP forecasts.

The calculations showing the adjustments to the FAA forecasts are presented in Appendix C. Table C.1 shows forecasts of general aviation aircraft operating costs with the existing FAA forecasts (Unadjusted Case) and the adjusted FAA forecasts. The Adjusted Case assumes that, unlike the OMB projections, real fuel costs will remain at May 2008 levels through the remainder of the forecast period. This translates to higher general aviation aircraft operating costs. Typically, increased operating costs reduce demand (number of aircraft operations). The impact on demand was estimated using FAA demand elasticities in the *FAA Airport Benefit-Cost Analysis Guidance*. The elasticities vary depending on the trip purpose and distance. For long business trips there is little choice in either the need for the trip or the transportation mode. These trips are therefore relatively insensitive to cost. On the other hand, short personal trips are highly discretionary and can be accommodated with a variety of transportation modes. These trips are highly sensitive to cost. As a result, single-engine piston operations are more price sensitive than jet operations.

Table C.2 shows the estimated impact of the adjustment factors on the FAA forecast of U.S. active aircraft. The forecast of the future fleet reflects three factors, the number of existing aircraft, the number of retirements, and the number of new aircraft. It was assumed that 2 percent of the active aircraft fleet would be retired each year. This suggests a general aviation aircraft retirement age of fifty years, on average. According

[1] May 2008 was the most recent month for which the Refiners' Acquisition Cost was available at the time of the analysis.

to the General Aviation Manufacturers Association (GAMA) the average age of all U.S. aircraft in 2007 was 35 years.[2] This average includes new aircraft in addition to those approaching retirement. It was also assumed that the demand for new aircraft would decline in direct proportion to the estimated reduction in their use. Therefore, estimated new aircraft were multiplied by the adjustment factors developed in Table C.1 to generate an adjusted forecast of new aircraft. The adjusted FAA forecast of U.S. active aircraft reflects the balance of the existing fleet, estimated aircraft retirements, and the adjusted estimate of new aircraft purchases.

Table C.3 shows the adjusted FAA forecast of hours flown for each aircraft category. In each case the original FAA forecast of hours flown was multiplied by the adjustment factor in Table C.1 to provide an adjusted FAA forecast of hours flown.

Table C.4 shows how the national fleet mix numbers have related historically to the number of based aircraft at MAC airports. Since 1999, the share of U.S. active aircraft based at MAC airports has been declining. Some owners have been moving their aircraft to non-MAC airports either inside or outside the seven-county area. Others have bought ultra light aircraft which often are not based at an airport. As shown in Table C.4, this decline is projected to continue at historical rates.

6. Based Aircraft Forecast

Since the catchment areas for the three airports under analysis overlap each other and the other MAC airports, the based aircraft forecast was prepared from a system standpoint. The process consisted of the following major steps:

1. Project the number of MAC-airport based aircraft registered in each county by aircraft category.
2. Distribute the county projections of based aircraft to each MAC airport according to the existing distribution patterns for each aircraft category.
3. Estimate the number of aircraft on waiting lists that would be added under unconstrained conditions.
4. Redistribute aircraft from MSP, which is constrained for GA, to the remaining unconstrained airports based on the existing distribution patterns to the airports.

It should also be noted that, within any given year, the based aircraft totals at an airport will fluctuate.

6.1 Forecast of Based Aircraft by County

Appendix D shows the methodology used to project MAC based aircraft in each of the seven counties of the Metropolitan Council. Aircraft were projected separately for each of the major categories: single engine piston, multi-engine piston, turboprop, jets, helicopters, and other. Jets were further subdivided into microjets and other jets.

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[2] General Aviation Manufacturers Association, *2007 General Aviation Statistic Databook & Industry Outlook.*

Based aircraft were projected to increase as a share of the adjusted FAA forecast of active aircraft in each category, essentially a top-down approach. There are two major reasons for using the top-down approach. First, the fortunes of the general aviation industry are subject to a number of factors, many of which cannot be easily incorporated into an economic forecasting model. These factors include technology, tax policy, regulatory policy, recreational trends, and growth in competing transportation modes and communications technology. When they prepare their national forecast, the FAA holds a workshop in conjunction with the Transportation Research Board to which a number of industry experts are invited. The FAA exploits the knowledge and expertise of these industry representatives to help prepare forecast assumptions on the future of general aviation. Using the top-down approach provides a means of incorporating this assembled expertise into the LTCP forecasts. Second, as noted earlier, historical data on registered and based aircraft in the Twin Cities area has gaps and inconsistencies. The problems in the historical data make it difficult to prepare credible forecasts based on trend or regression analyses.

The adjusted FAA forecasts were then adjusted additionally by an income index and a based aircraft index to generate a forecast of based aircraft for each county. The income index is used to adjust for differences in projected economic growth between the United States and the county under analysis. The based aircraft index represents the change in the share of active U.S. aircraft based at MAC airports over time net of income effects (see Table C.4 in Appendix C).

As an example, the share of single engine piston aircraft registered in Anoka County and based at MAC airports is projected to decline slightly (see Table D.1 in Appendix D). This decline results because the projected increase in the county share of U.S. income would be offset by the decline in the based aircraft index.

Since microjets are a new phenomenon, there is no historical activity upon which to base future growth. In this instance, each county's share of U.S. microjets was assumed to be the average of its share of turboprops and other jets.

Table 5 summarizes the forecasts of based aircraft at MAC airports by county of registration. As shown, counties such as Scott and Carver, which are projected to experience more rapid economic growth, maintain a relative constant number of based aircraft compared to the other counties which show a decline. The decline is a combination of the low growth in the national active fleet anticipated under the adjusted FAA forecast, coupled with the declining share of the U.S. fleet accommodated at MAC airports.

6.2. Unconstrained Distribution of Based Aircraft by Airport

The county forecasts of based aircraft estimated in Appendix D were distributed among the MAC airports according to existing distributions for each aircraft type. Appendix E shows the results of these distributions. All the MAC airports, including MSP, were assumed to be unconstrained in this iteration.

6.3 Aircraft on Waiting Lists

Anoka, Flying Cloud, and Holman Field Airports all have waiting lists of aircraft owners and operators who would like to base their aircraft at the airport in question if hangar facilities become available. Since the forecasts in this analysis are unconstrained, this latent demand needs to be considered, since they would presumably base their aircraft at these airports were the facilities available.

A number of the people on the waiting lists made their requests many years ago and very likely have lost interest or found an alternative facility for their aircraft by now. Consequently, anyone who signed on to the waiting lists more than five years ago was eliminated from the analysis. Also, it is unlikely that everyone who signed on to a waiting list within the past five years would base their aircraft at the airport in question should the desired facilities become available. Based on consultation with MAC staff, it was assumed that 90 percent of the aircraft owners and operators who signed up for a waiting list within the past five years would base their aircraft at one of the three study airports under unconstrained conditions. The waiting list information for Crystal, Airlake, and Lake Elmo Airports was taken for the previous LTCP report.

Table F.1 in Appendix F shows the estimate of additional based aircraft at the MAC airports that would result from accommodating aircraft on the waiting list. Anoka would be expected to accommodate 37 additional aircraft, Flying Cloud would be expected to accommodate 16 additional aircraft and Holman Field would be expected to accommodate 9 additional aircraft. No detailed information is available on the types of aircraft on the waiting list, so they were assumed to mirror the 2015 distribution of based aircraft at each airport, mostly single engine piston aircraft. The year 2015 was assumed to be the year by which all the aircraft on the waiting list could be absorbed.

6.4 Redistribution of Based Aircraft from MSP

As noted earlier, one of the MAC airports – MSP – is anticipated to be limited in its physical ability to accommodate more based aircraft. Any based aircraft that could not be accommodated at MSP would have to be accommodated elsewhere. Since the aircraft currently based at this airport tend to be more sophisticated corporate-owned aircraft, it is likely that their owners would seek out an airport with enhanced facilities which would most likely be found at another MAC airport.

Based on the historical experience at MSP and other airports, it was assumed that single-engine piston aircraft would be most likely to be diverted and that jet aircraft would be least likely to be diverted. The diverted based aircraft were assumed to be relocated to the remaining unconstrained airports in proportion to the existing distributions by aircraft type.

Tables F.2 through F.5 in Appendix F detail the addition of aircraft on the waiting list and the redistribution of aircraft from MSP. The ability of the airports to accommodate redistributed aircraft is highly dependent on the runway requirements of these aircraft. For example, the published requirements for microjets range from 1800 feet (takeoff) and 2300 feet (landing) for the Excel Sportjet, to 2155 feet (takeoff) and 2040 feet (landing) for the Eclipse, to 3400 feet (takeoff) and 2520 feet (landing) for the Adam A700. As a comparison, the Beech King Air (C90GT) turboprop requires about 2700 feet for takeoff and 2300 feet for landing.

6.5. Based Aircraft Forecast Results

Tables 6, 7 and 8 show the results of the based aircraft forecasts for Anoka County, Flying Cloud and St. Paul Downtown Airports.

The number of based aircraft at Anoka County Airport is expected to grow from 437 in 2007 to 455 in 2010, and then decline to 414 in 2025. Most of the initial growth would be from aircraft on the waiting list. Jet aircraft (including microjets) are projected to almost triple from 12 to 35 over the forecast period. Based turboprop aircraft and helicopters are also projected in increase while piston powered aircraft are projected to decrease.

The absence of anticipated growth in the piston aircraft category is attributable to several factors. The Airport is located in Anoka County, which is projected to be one of the slower growing counties. Also, the FAA projects piston powered aircraft to grow more slowly than the other categories. In addition, high fuel costs are anticipated to discourage the acquisition of new aircraft and the number of aircraft accommodated at MAC airports is declining

The number of based aircraft at Flying Cloud Airport is expected to gradually decline from 421 in 2007 to 401 in 2025 (Table 7). Microjets and other jets are expected to increase dramatically over the forecast period. Microjets are forecast to increase from 0 in 2007 to 20 in 2025 and other jets from 23 in 2007 to 40 in 2025. The number of turboprop aircraft is expected to remain steady and the number of helicopters is projected to increase.

Most of the decline of based aircraft occurs in the piston engine category. Single-engine piston based aircraft decline from 336 in 2007 to 286 in 2025, and multi-engine piston based aircraft decline from 37 in 2007 to 27 in 2025. FCM is located in Hennepin County, which is projected to be one of the slower growing counties, which is a driving factor in the expected decrease in based aircraft.

The number of civil based aircraft at Holman Field is expected to increase from 83 in 2007 to 122 in 2025 (see Table 8). Jets, including microjets, are expected to increase significantly while piston-powered aircraft are projected to decrease. The number of based aircraft at Holman Field is projected to increase, in contrast to Flying Cloud and Anoka, because of the high concentration of high-performance aircraft typically used in business. Holman Field currently has 10 military based aircraft which are expected to remain constant during the forecast period.

Appendix G shows the based aircraft forecasts for the other four MAC airports that result from the analysis in Appendix F.

7. Aircraft Operations Forecasts

The forecasts of aircraft operations were derived from the based aircraft forecasts. Estimates of base year operation levels were obtained from the adjusted FAA's ATADS data base as shown in Tables B.7 through B.9. Base year operations by aircraft type were based on ANOMS data collected by the MAC for the three airports. The ANOMS data base misses many of the aircraft flying under Visual Flight Rules (VFR). Those were allocated among piston aircraft according to the distribution of based aircraft.

The aircraft operations forecasts assume that average aircraft utilization will change consistent with the adjusted FAA forecasts. In each aircraft category, operations per active aircraft were projected to change at the same rate as hours flown per based aircraft, implicitly assuming that the number of operations per hours flown remain constant. The percentage of touch and go operations in each aircraft category was assumed to remain constant. Total military operations were also assumed to remain constant. Tables H.1 through H.3 in Appendix H show the calculations of future aircraft operations for Anoka County Airport. Tables H.4 through H.6 show the calculations for Flying Cloud and Tables H.7 through H.9 show the calculations for St. Paul Downtown Airport.

Tables 9, 10, and 11 summarize the aircraft operations forecasts for Anoka, Flying Cloud, and Holman Field. The FAA projects average aircraft utilization to increase as a result of increased flying by business and corporate users.

Total aircraft operations at Anoka County are forecast to decrease from 86,838 in 2007 to 79,560 in 2025, an average annual decrease of 0.5 percent. Increases are projected in all categories except the single- and multi-engine piston engine categories, which account for the decrease in overall operations. Microjet operations are projected to increase significantly in percentage terms, and are expected to account for about 14 percent of total operations in 2025.

Operations at Flying Cloud are forecast to decrease from 124,569 in 2007 to 97,154 in 2015 and then increase to 113,876 by 2025. Decreases are projected among single- and multi-engine piston and turboprop categories. Substantial increases are projected in microjets and other jets. By 2025, these two categories are projected to account for almost 20 percent of total operations at Flying Cloud, compared to about 3 percent currently.

Operations at Holman Field are projected to increase from 125,254 in 2007 to 137,310 in 2025, an average annual increase of 0.5 percent. Decreases are projected in single and multi-engine piston and turboprop categories, with significant increases projected for all the other categories. By 2025, combined jet operations are projected to account for about 31 percent of total operations at Holman Field, compared to about 13 percent currently.

8. Peak Activity Forecasts

Peak month, average day peak month (ADPM), and peak hour operations forecasts for Anoka, Flying Cloud, and Holman Field are shown in Tables 12, 13, and 14. In each case the relationship between peak activity and annual activity was assumed to remain constant.

The percentage of operations occurring in May, the peak month at Anoka County Airport, was estimated from FAA air traffic control tower records. ADPM operations were estimated by dividing by 31 days. Peak hour operations were assumed to be 12 percent of ADPM operations, consistent with the assumptions in the previous Anoka County-Blaine Airport LTCP from 1991. As shown in Table 12, peak hour operations are projected to decrease from 34 in 2007 to 28 in 2010 and then increase to 31 in 2025.

Table 13 presents peak activity forecasts for Flying Cloud Airport and was estimated from FAA air traffic control tower records. Peak hour operations were assumed to be 12.7 percent of ADPM operations, consistent with the assumptions in the previous Flying Cloud Airport LTCP update from 1998. The peak month for the airport is July, and ADPM operations were estimated by dividing by 31 days. Peak hour operations at Flying Cloud are projected to decrease from 55 in 2007 to 43 in 2015 and then increase to 50 in 2025.

Table 14 presents the peak activity forecasts for Holman Field and was estimated from FAA air traffic control tower records. Peak hour operations were assumed to be 15 percent of ADPM operations, consistent with the assumptions in the previous STP LTCP. The peak month for the airport is October, and ADPM operations were estimated by dividing by 31 days. Peak hour operations at Holman Field are projected to increase from 60 in 2007 to 65 in 2025.

9. Forecast Scenarios

General aviation activity has historically been difficult to forecast, since the relationships with economic growth and pricing factors are more tenuous than in other aviation sectors, such as commercial aviation. This uncertainty is likely to carry over into the near future, given the volatility of fuel prices and the anticipated emergence of microjets. To address these uncertainties, and to identify the potential upper and lower bounds of future activity at Anoka County, Flying Cloud, and Holman Field, detailed high and low fuel price scenarios are presented. These scenarios use the same forecast approach that was used in the base case, but alter the assumptions to reflect either a more aggressive or more conservative outlook towards fuel costs.

9.1 High Forecast Activity Scenarios

The high forecast activity scenarios for the three airports assumes that after the oil price spike in 2008, fuel prices return to the levels that had been originally projected by the

OMB (see Table I.1). Other assumptions, including capacity constraints at MSP, are the same as in the base case.

Table 15 shows the high forecast scenario for Anoka County Airport. By 2025 the number of based aircraft is 12 percent higher than under the base case. The number of turboprops and microjets remains relatively small. Total operations under the high scenario would be 39 percent higher than in the base case.

Table 16 shows the high forecast scenario for Flying Cloud Airport. By 2025, the number of based aircraft is 13 percent higher than under the base case and the number of jets is 18 percent higher. By 2025, total annual operations would be 38 percent higher than under the base case. Of these operations, almost 20 percent would be jets, mostly microjets.

Table 17 shows the high forecast scenario for St. Paul Downtown Airport. There would be no additional increase in the number of based aircraft because of hangar space constraints. Total operations would be 14 percent higher than under the base case, and jet operations would account for almost 34 percent of total operations.

9.2 Low Forecast Scenarios

The low forecast scenarios for each airport were prepared assuming that oil prices would continue to increase after 2008, rising to $200 per barrel by 2010, and then remaining at that level (see Table I.2 in Appendix I). Other assumptions, including capacity constraints at MSP, are the same as in the base case.

Table 18 shows the low scenario forecast for Anoka County Airport. Although a moderate increase in based helicopters and microjets is projected, based fixed-wing piston powered aircraft are projected to decline. As a result, by 2025 total based aircraft would be almost 10 percent lower than under the base case. Total operations would be 29 percent lower than under the base case.

The low scenario forecast for Flying Cloud Airport is presented in Table 19. Microjet and other jet based aircraft categories would be expected to increase, and there would be a decline in fixed-wing piston powered aircraft. Total based aircraft in 2025 would be almost 12 percent lower than under the base case. Total operations would be 31 percent lower than under the base case, and jets would account for 22 percent of the total.

Table 20 presents the low scenario forecast for St. Paul Downtown Airport. By 2025 total based aircraft are expected to be 9 percent lower than under the base case. Total operations would be 18 percent lower than in the base case by 2025.

10. Summary

The base case forecasts for the three airports anticipate moderate growth in based aircraft at Holman Field, and moderate decreases at Anoka County and Flying Cloud. Operations are projected to decline at each of the three airports through the 2010-2015 period and then begin to rise again later in the forecast, reflecting anticipated stabilization of oil prices at a new higher level. Although activity by piston powered aircraft is projected to decline, activity by higher performance turboprops and jets favored by business aviation is projected to increase significantly.

The forecast scenarios indicate that future fuel prices will have a major impact on the development of general aviation. Therefore, it is prudent to closely monitor actual aviation activity and modify the phasing of facility improvements at the three airports if that activity materially departs from forecast levels.

Table 1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Income (thousands of 2007 dollars)

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US (a)
2000	10,579,530	3,162,800	15,010,929	55,208,023	19,582,125	3,522,466	8,466,433	115,532,307	9,658,013,360	1.20%
2005	11,404,951	3.905,705	16,355,470	58,278,620	20,897,566	4,371,509	9,613,791	124,827,612	10,568,865,149	1.18%
2006	11,545,682	4,100,882	16,627,273	59,719,128	21,305,673	4,531,505	9,905,571	127,735,714	10,968,393,000	1.16%
2007	12,038,763	4,261,618	17,161,109	59,997,720	21,686,605	4,725,339	10,310,930	130,182,083	11,168,155,374	1.17%
2010	13,518,004	4,743,825	18,762,619	60,833,494	22,829,400	5,306,839	11,527,008	137,521,190	11,767,442,497	1.17%
2015	15,279,365	6,153,455	21,574,365	67,681.996	25,205,886	6,402,165	13,369,595	155,666,827	13,140,580,376	1.18%
2020	17,279,137	7,728,849	24;742,396	75,407,540	27,880,498	7,639,811	15,476,238	176,154,470	14,697,043,513	1.20%
2025	19,168,137	9,105,310	27,981,239	84,752,688	31,505,682	9,060,680	17,945,490	199,519,226	16,464,153,733	1.21%
2030	21,309,537	10,678,264	31,649,499	95,325,987	35,621,847	10,690,294	20,783,923	226,059,350	18,473,516,821	1.22%
					Average Annual Growth Rate					
2005-2030	2.5%	4.1%	2.7%	2.0%	2.2%	3.6%	3.1%	2.4%	2.3%	0.1%

(a) Seven-county Metropolitan Council share of U.S.

Sources: Table A.6 in Appendix A and HNTB analysis.

Table 2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Based Aircraft at MAC Airports

	General Aviation								
Year	**Flying Cloud**	**Crystal**	**Anoka County**	**Lake Elmo**	**Airlake**	**Holman**	**MSP**	**Total without MSP**	**Total with MSP**
1980	582	315	353	170		190	79	1,610	1,689
1981	580	297	360	220		205	69	1,662	1,731
1982	608	337	384	238		181	79	1,748	1,827
1983	615	327	362	236		164	87	1,704	1,791
1984	568	352	361	244	61	165	107	1,751	1,858
1985	568	338	390	145	63	147	n/a	1,651	n/a
1986	560	333	412	145	93	160	n/a	1,703	n/a
1987	565	345	408	150	153	168	n/a	1,789	n/a
1988	492	325	384	149	153	181	n/a	1,684	n/a
1989	485	320	405	171	140	188	n/a	1,709	n/a
1990	485	324	411	177	140	191	n/a	1,728	n/a
1991	487	327	414	179	140	193	n/a	1,740	n/a
1992	482	327	408	189	165	198	n/a	1,769	n/a
1993	482	327	408	189	179	198	n/a	1,783	n/a
1994	482	327	415	198	179	198	n/a	1,799	n/a
1995	482	327	415	198	179	198	n/a	1,799	n/a
1996	482	327	431	205	179	198	n/a	1,822	n/a
1997	482	327	441	210	179	203	n/a	1,842	n/a
1998	482	327	451	210	179	180	n/a	1,829	n/a
1999	509	309	472	250	178	146	29	1,864	1,893
2000	485	296	454	245	175	137	29	1,792	1,821
2001	461	280	447	235	170	131	13	1,724	1,737
2002	473	278	464	237	170	130	13	1,752	1,765
2003	463	288	490	237	190	124	16	1,792	1,808
2004	456	263	488	236	177	124	19	1,744	1,763
2005	451	265	482	239	163	124	19	1,724	1,743
2006	447	261	475	233	159	124	19	1,699	1,718
2007	421	244	437	229	162	83	24	1,576	1,600

Source: Metropolitan Airports Commission.

Table 3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Aircraft Based at MAC Airports by County of Registration and Aircraft Type: 2007

Aircraft Type	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Total
Single Engine Piston (a)	159	19	130	507	176	50	150	111	1,302
Multi Engine Piston	18	1	14	47	15	4	10	19	128
Turboprop	2	1	0	25	5	1	0	2	36
MicroJets	1	0	0	0	0	0	0	0	1
Jet	1	0	6	56	19	0	1	17	100
Rotor	4	0	0	9	6	0	2	8	29
Other	0	0	0	0	1	0	2	1	4
Total	185	21	150	644	222	55	165	158	1,600

(a) Light sport aircraft are included in the single engine piston category.

Sources: Minnesota Department of Transportation Based Aircraft Reports (October 2007) and HNTB analysis.

Table 4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County: 2007

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
Crystal	6	3	2	192	20	1	1	19	244
Airlake	0	1	104	16	3	21	0	17	162
Lake Elmo	1	0	11	8	51	0	142	16	229
Anoka County/Blaine - Janes Field	177	1	8	96	100	2	14	39	437
Flying Cloud	1	16	22	296	4	31	2	49	421
MSP	0	0	0	12	0	0	0	12	24
St. Paul Downtown-Holman Field	0	0	3	24	44	0	6	6	83
Total MAC Airports	185	21	150	644	222	55	165	158	1,600

Sources: Minnesota Department of Transportation Based Aircraft Reports (October 2007) and HNTB analysis.

Table 5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Projected Based Aircraft at MAC Airports by County of Registration

	County of Registration								
Year	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
2007	185	21	150	644	222	55	165	158	1,600
2010	192	22	153	620	222	57	170	158	1,594
2015	182	23	147	593	211	57	165	154	1,532
2020	176	24	144	572	202	57	162	150	1,487
2025	167	24	138	559	198	58	159	148	1,451

Source: Appendix D.

Table 6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
2007	359	51	6	1	11	8	1	437
2010	370	50	7	2	14	11	1	455
2015	359	49	7	7	18	11	1	452
2020	339	44	7	9	21	12	1	433
2025	322	37	7	12	23	12	1	414
Average Annual Growth Rate								
	-0.5%	-1.6%	0.8%	-	3.8%	2.0%	0.0%	-0.3%

Source: Table G.5.

Table 7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
2007	336	37	20	0	23	5	0	421
2010	326	36	21	3	27	7	0	420
2015	310	32	20	8	34	7	0	411
2020	296	29	20	15	38	8	0	406
2025	286	27	20	20	40	8	0	401
Average Annual Growth Rate								
	-0.8%	-1.6%	0.0%	-	2.8%	2.4%	-	-0.2%

Source: Table G.5.

Table 8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Civil				
2007	23	7	8	0	39	6	0	83
2010	23	8	9	3	46	6	0	95
2015	21	7	9	8	54	8	0	107
2020	20	7	9	13	60	9	0	118
2025	19	7	9	16	62	9	0	122
				Average Annual Growth Rate				
	-1.0%	0.0%	0.6%	-	2.3%	2.0%	-	1.9%
				Military (a)				
2007	0	1	0	0	0	9	0	10
2010	0	1	0	0	0	9	0	10
2015	0	1	0	0	0	9	0	10
2020	0	1	0	0	0	9	0	10
2025	0	1	0	0	0	9	0	10
				Average Annual Growth Rate				
	-	0.0%	-	-	-	0.0%	-	0.0%
				Total				
2007	23	8	8	0	39	15	0	93
2010	23	9	9	3	46	15	0	105
2015	21	8	9	8	54	17	0	117
2020	20	8	9	13	60	18	0	128
2025	19	8	9	16	62	18	0	132
				Average Annual Growth Rate				
	-1.0%	0.0%	0.6%	-	2.3%	0.9%	-	1.8%

(a) Assumed to remain constant.

Source: Table G.7.

Table 9

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (a)	Total
Forecast of Total Aircraft Operations								
2007	62,203	17,178	2,562	14	1,992	2,889	-	86,838
2010	48,510	13,682	2,537	1,960	2,182	3,554	-	72,424
2015	45,852	11,666	2,492	6,613	3,159	3,546	-	73,328
2020	46,582	10,685	2,450	8,454	3,924	3,877	-	75,973
2025	47,927	9,584	2,442	11,185	4,496	3,926	-	79,560
Forecast of Touch & Go Operations								
2007	31,346	3,812	-	-	-	1,143	-	36,301
2010	24,446	3,040	-	-	-	1,381	-	28,867
2015	23,106	2,595	-	-	-	1,378	-	27,079
2020	23,474	2,378	-	-	-	1,497	-	27,349
2025	24,152	2,135	-	-	-	1,514	-	27,801
Forecast of Non-Touch & Go Operations								
2007	30,857	13,366	2,562	14	1,992	1,746	-	50,537
2010	24,064	10,642	2,537	1,960	2,182	2,173	-	43,558
2015	22,746	9,071	2,492	6,613	3,159	2,168	-	46,249
2020	23,108	8,307	2,450	8,454	3,924	2,381	-	48,624
2025	23,775	7,449	2,442	11,185	4,496	2,412	-	51,759

(a) Balloons, gliders, and ultralight aircraft.

Source: Table H.3 in Appendix H.

Table 10

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (a)	Total
Forecast of Total Aircraft Operations								
2007	96,356	13,648	5,926	4	3,530	5,104	-	124,569
2010	70,740	10,788	5,283	2,631	3,567	6,531	-	99,540
2015	65,531	8,345	4,941	6,763	5,058	6,516	-	97,154
2020	67,319	7,714	4,858	12,610	6,019	7,510	-	106,030
2025	70,455	7,656	4,842	16,682	6,629	7,613	-	113,876
Forecast of Touch & Go Operations								
2007	51,395	4,749	-	-	-	1,316	-	57,460
2010	37,732	3,755	-	-	-	1,654	-	43,141
2015	34,953	2,907	-	-	-	1,651	-	39,511
2020	35,907	2,688	-	-	-	1,886	-	40,481
2025	37,580	2,668	-	-	-	1,910	-	42,158
Forecast of Non-Touch & Go Operations								
2007	44,961	8,899	5,926	4	3,530	3,788	-	67,109
2010	33,008	7,032	5,283	2,631	3,567	4,877	-	56,399
2015	30,578	5,438	4,941	6,763	5,058	4,865	-	57,644
2020	31,412	5,026	4,858	12,610	6,019	5,624	-	65,550
2025	32,875	4,988	4,842	16,682	6,629	5,702	-	71,719

(a) Balloons, gliders, and ultralight aircraft.

Source: Table H.6 in Appendix H.

Table 11

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (a)	Total
				Forecast of Total Aircraft Operations				
2007	55,485	21,938	7,864	22	16,448	23,497	-	125,254
2010	41,984	20,412	7,510	2,957	16,697	22,310	-	111,870
2015	37,344	15,723	7,376	7,601	22.080	27,276	-	117,399
2020	38,263	16.014	7,251	12,282	26,123	30,122	-	130,056
2025	39,374	17,019	7,227	15,000	28,243	30,448	-	137,310
				Forecast of Touch & Go Operations				
2007	24,107	6,066	-	-	-	9,319	-	39,492
2010	18.241	5,656	-	-	-	8,895	-	32,792
2015	16,225	4,397	-	-	-	10,670	-	31,291
2020	16,624	4,475	-	-	-	11,687	-	32,787
2025	17,107	4,745	-	-	-	11,804	-	33,655
				Forecast of Non-Touch & Go Operations				
2007	31,379	15,872	7,864	22	16,448	14,178	-	85,763
2010	23,743	14,756	7,510	2,957	16,697	13,415	-	79,078
2015	21,119	11,326	7,376	7,601	22,080	16,606	-	86,108
2020	21,639	11,539	7,251	12.282	26,123	18,435	-	97,269
2025	22,267	12,274	7,227	15,000	28,243	18,644	-	103,655

(a) Balloons, gliders, and ultralight aircraft.

Source: Table H.9 in Appendix H.

Table 12

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Peak Activity Forecast: Anoka County Airport

Year	Annual Operations (a)	Peak Month Operations (b)	ADPM Operations (c)	Peak Hour Operations (d)
2007	86,838	8,792	284	34
2010	72,424	7,332	237	28
2015	73.328	7,424	239	29
2020	75,973	7,692	248	30
2025	79,560	8,055	260	31

(a) Table 9.

(b) The 2007 percentage of peak month operations, based on ATCT counts, is assumed to continue through the forecast period. (see Table B.7)

(c) Peak month (May) operations divided by 31 days.

(d) Assumed to be 12 percent of ADPM operations based on Anoka County-blaine Airport Long-Term Comprehensive Plan Update, 1998.

Sources: As noted and HNTB analysis.

Table 13

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Peak Activity Forecast: Flying Cloud Airport

Year	Annual Operations (a)	Peak Month Operations (b)	ADPM Operations (c)	Peak Hour Operations (d)
2007	124,569	13,424	433	55
2010	99,540	10,727	346	44
2015	97,154	10,470	338	43
2020	106,030	11,426	369	47
2025	113,876	12,272	396	50

(a) Table 10.

(b) The 2007 percentage of peak month operations, based on ATCT counts, is assumed to continue through the forecast period. (see Table B.8)

(c) Peak month (July) operations divided by 31 days.

(d) Assumed to be 12.7 percent of ADPM operations based on Flying Cloud Airport LTCP, 1991.

Sources: As noted and HNTB analysis.

Table 14

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Peak Activity Forecast: St. Paul Downtown Airport

Year	Annual Operations (a)	Peak Month Operations (b)	ADPM Operations (c)	Peak Hour Operations (d)
2005	125,254	12,318	397	60
2010	111,870	11,002	355	53
2015	117,399	11,546	372	56
2020	130,056	12,791	413	62
2025	137,310	13,504	436	65

(a) Table 11.

(b) The 2007 percentage of peak month operations, based on ATCT counts, is assumed to continue through the forecast period. (see Table B.9)

(c) Peak month (October) operations divided by 31 days.

(d) Assumed to be 15 percent consistent with assumptions in most recent STP LTCP.

Sources: As noted and HNTB analysis.

Table 15

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of High Civil and Military Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	MicroJets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	359	51	6	1	11	8	1	437
2010	377	51	7	2	14	10	1	462
2015	374	50	7	7	21	12	1	472
2020	365	42	7	11	24	12	1	462
2025	363	40	7	14	27	13	1	465
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	62,203	17,178	2,562	14	1,992	2,889	-	86,838
2010	64,607	16,893	2,982	2,297	2,469	3,463	-	92,711
2015	64,411	14,893	2,954	7,777	4,137	4,044	-	98,216
2020	65,986	12,702	2,841	12,079	4,927	4,062	-	102,597
2025	69,464	12,876	2,790	15,252	5,730	4,391	-	110,503
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	31,346	3,812	-	-	-	1,143	-	36,301
2010	32,557	3,749	-	-	-	1,349	-	37,655
2015	32,459	3,307	-	-	-	1,556	-	37,322
2020	33,252	2,824	-	-	-	1,563	-	37,638
2025	35,005	2,862	-	-	-	1,680	-	39,547
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	30,857	13,366	2,562	14	1,992	1,746	-	50,537
2010	32,050	13,144	2,982	2,297	2,469	2,115	-	55,057
2015	31,952	11,586	2,954	7,777	4,137	2,488	-	60,894
2020	32,734	9,878	2,841	12,079	4,927	2,500	-	64,959
2025	34,459	10,014	2,790	15,252	5,730	2,711	-	70,956

Sources: As noted and HNTB analysis.

Table 16

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of High Civil and Military Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	336	37	20	0	23	5	0	421
2010	331	37	20	3	28	7	0	426
2015	325	33	22	10	38	7	0	435
2020	319	31	23	18	43	8	0	442
2025	321	28	24	23	48	8	0	452
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	96,356	13,648	5,926	4	3,530	5,104	-	124,569
2010	93,883	13,422	5,915	3,085	4,186	6,952	-	127,443
2015	92,638	10,768	6,444	9,948	6,347	6,917	-	133,062
2020	95,448	10,265	6,479	17,697	7,484	7,900	-	145,273
2025	101,667	9,871	6,639	22,435	8,636	7,956	-	157,204
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	51,395	4,749	-	-	-	1,316	-	57,460
2010	50,076	4,670	-	-	-	1,754	-	56,500
2015	49,412	3,748	-	-	-	1,746	-	54,906
2020	50,911	3,574	-	-	-	1,979	-	56,463
2025	54,228	3,437	-	-	-	1,992	-	59,657
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	44,961	8,899	5,926	4	3,530	3,788	-	67,109
2010	43,807	8,751	5,915	3,085	4,186	5,198	-	70,943
2015	43,226	7,019	6,444	9,948	6,347	5,171	-	78,156
2020	44,537	6,691	6,479	17,697	7,484	5,921	-	88,810
2025	47,439	6,434	6,639	22,435	8,636	5,964	-	97,548

Sources: As noted and HNTB analysis.

Table 17

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of High Civil and Military Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	23	8	8	0	39	15	0	93
2010	23	9	9	3	46	15	0	105
2015	22	8	9	9	59	18	0	125
2020	19	8	9	12	66	18	0	132
2025	13	7	8	17	69	18	0	132
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	55,485	21,938	7,864	22	16,448	23,497	-	125,254
2010	54,878	24,555	8,829	3,467	18,897	23,327	-	133,953
2015	52,752	19,485	8,745	10,062	27,085	31,235	-	149,365
2020	52,094	19,760	8,411	13,259	31,575	31,359	-	156,458
2025	46,690	18,100	7,344	18,636	34,123	31,537	-	156,431
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	24,107	6,066	-	-	-	9,319	-	39,492
2010	23,843	6,769	-	-	-	9,258	-	39,870
2015	22,919	5,407	-	-	-	12,085	-	40,412
2020	20,778	5,481	-	-	-	12,129	-	38,388
2025	15,048	5,035	-	-	-	12,193	-	32,277
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	31,379	15,872	7,864	22	16,448	14,178	-	85,763
2010	31,035	17,786	8,829	3,467	18,897	14,069	-	94,083
2015	29,833	14,078	8,745	10,062	27,085	19,150	-	108,953
2020	31,316	14,279	8,411	13,259	31,575	19,230	-	118,070
2025	31,642	13,065	7,344	18,636	34,123	19,344	-	124,154

Sources: As noted and HNTB analysis.

Table 18

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Low Civil and Military Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	359	51	6	1	11	8	1	437
2010	368	50	7	2	13	11	1	452
2015	344	47	7	4	16	10	1	429
2020	317	42	7	7	16	10	1	400
2025	292	36	7	9	19	11	1	375
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	62,203	17,178	2,562	14	1,992	2,889	-	86,838
2010	32,181	10,456	2,006	1,909	1,692	3,242	-	51,485
2015	30,123	8,649	2,032	3,745	2,449	3,043	-	50,041
2020	30,796	7,967	2,053	6,550	2,680	3,123	-	53,169
2025	31,755	7,354	2,094	8,375	3,394	3,465	-	56,437
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	31,346	3,812	-	-	-	1,143	-	36,301
2010	16,217	2,328	-	-	-	1,269	-	19,814
2015	15,180	1,929	-	-	-	1,199	-	18,307
2020	15,519	1,778	-	-	-	1,227	-	18,524
2025	16,002	1,643	-	-	-	1,349	-	18,994
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	30,857	13,366	2,562	14	1,992	1,746	-	50,537
2010	15,964	8,128	2,006	1,909	1,692	1,973	-	31,672
2015	14,943	6,720	2,032	3,745	2,449	1,845	-	31,734
2020	15,277	6,189	2,053	6,550	2,680	1,896	-	34,645
2025	15,753	5,711	2,094	8,375	3,394	2,116	-	37,443

Sources: As noted and HNTB analysis.

Table 19

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Low Civil and Military Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	336	37	20	0	23	5	0	421
2010	324	36	20	2	27	7	0	416
2015	299	32	19	7	31	7	0	395
2020	273	28	18	12	34	7	0	372
2025	256	25	18	14	34	7	0	354
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	96,356	13,648	5,926	4	3,530	5,104	-	124,569
2010	46,894	8,242	3,977	1,764	2,979	5,901	-	69,757
2015	43,334	6,448	3,827	6,056	4,022	6,023	-	69,710
2020	43,895	5,816	3,664	10,376	4,827	6,198	-	74,776
2025	46,077	5,590	3,737	12,038	5,149	6,352	-	78,944
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	51,395	4,749	-	-	-	1,316	-	57,460
2010	25,013	2,871	-	-	-	1,505	-	29,389
2015	23,114	2,248	-	-	-	1,534	-	26,895
2020	23,413	2,028	-	-	-	1,575	-	27,016
2025	24,577	1,950	-	-	-	1,612	-	28,139
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	44,961	8,899	5,926	4	3,530	3,788	-	67,109
2010	21,881	5,371	3,977	1,764	2,979	4,396	-	40,369
2015	20,220	4,200	3,827	6,056	4,022	4,489	-	42,815
2020	20,482	3,787	3,664	10,376	4,827	4,623	-	47,760
2025	21,500	3,640	3,737	12,038	5,149	4,740	-	50,805

Sources: As noted and HNTB analysis.

Table 20

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Low Civil and Military Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
			Total Based Aircraft Forecast (a)					
2007	23	8	8	0	39	15	0	93
2010	23	9	9	2	44	15	0	102
2015	22	8	9	5	50	18	0	112
2020	21	8	9	8	51	18	0	115
2025	20	8	8	12	54	18	0	120
			Forecast of Total Civil and Military Aircraft Operations (a)					
2007	55,485	21,938	7,864	22	16,448	23,497	-	125,254
2010	28,004	15,771	5,936	2,025	13,337	20,786	-	85,858
2015	26,822	12,317	6,012	4,966	17,826	27,990	-	95,934
2020	28,404	12,666	6,076	7,941	19,900	28,627	-	103,613
2025	30,283	13,571	5,509	11,845	22,474	29,187	-	112,869
			Forecast of Civil and Military Touch&Go Operations (a)					
2007	24,107	6,066	-	-	-	9,319	-	39,492
2010	12,167	4,410	-	-	-	8,350	-	24,926
2015	11,653	3,482	-	-	-	10,925	-	26,061
2020	12,341	3,576	-	-	-	11,153	-	27,069
2025	13,157	3,819	-	-	-	11,353	-	28,329
			Forecast of Civil and Military Non Touch&Go Operations (a)					
2007	31,379	15,872	7,864	22	16,448	14,178	-	85,763
2010	15,837	11,361	5,936	2,025	13,337	12,436	-	60,932
2015	15,169	8,835	6,012	4,966	17,826	17,065	-	69,873
2020	16,063	9,090	6,076	7,941	19,900	17,474	-	76,544
2025	17,126	9,752	5,509	11,845	22,474	17,834	-	84,540

Sources: As noted and HNTB analysis.

Table A.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Population

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US (a)
1980	196,934	37,246	195,537	944,339	460,972	44,037	114,207	1,993,272	227,224,719	0.88%
1981	200,223	37,960	200,120	953,632	464,661	44,949	116,489	2,018,034	229,465,744	0.88%
1982	203,185	38,516	204,814	961,435	467,807	45,803	118,856	2,040,416	231,664,432	0.88%
1983	205,362	38,799	207,632	966,876	469,240	46,005	120,247	2,054,161	233,792,014	0.88%
1984	208,888	39,342	213,995	972,868	469,887	47,187	122,543	2,074,710	235,824,907	0.88%
1985	213,359	40,208	221,244	985,599	473,859	48,987	124,760	2,108,016	237,923,734	0.89%
1986	218,309	41,263	228,968	997,454	478,857	50,405	127,522	2,142,778	240,132,831	0.89%
1987	224,834	42,741	241,271	1,005,648	480,597	52,568	131,170	2,178,829	242,288,936	0.90%
1988	232,370	44,715	255,030	1,018,825	483,483	54,895	137,085	2,226,403	244,499,004	0.91%
1989	237,833	46,304	265,585	1,026,682	485,633	56,454	141,537	2,260,028	246,819,222	0.92%
1990	245,255	48,409	277,866	1,035,132	486,531	58,285	146,940	2,298,418	249,622,814	0.92%
1991	251,565	50,251	286,916	1,043,220	488,277	60,328	152,340	2,332,897	252,980,941	0.92%
1992	257,253	52,089	296,694	1,050,216	491,517	62,549	158,392	2,368,710	256,514,224	0.92%
1993	261,729	54,436	305,852	1,059,615	492,298	65,393	166,677	2,406,000	259,918,588	0.93%
1994	268,278	56,936	311,008	1,069,030	493,614	68,352	173,796	2,441,014	263,125,821	0.93%
1995	273,226	59,644	319,218	1,076,932	495,857	70,987	179,062	2,474,926	266,278,393	0.93%
1996	278,260	62,197	328,159	1,083,757	498,326	73,883	183,824	2,508,406	269,394,284	0.93%
1997	282,976	63,939	335,640	1,089,694	502,514	77,754	188,208	2,540,725	272,646,925	0.93%
1998	288,089	65,838	343,231	1,099,002	506,075	80,878	192,341	2,575,454	275,854,104	0.93%
1999	293,599	68,181	350,520	1,109,634	509,175	85,094	197,391	2,613,594	279,040,168	0.94%
2000	299,754	70,862	357,873	1,118,377	511,629	91,084	202,537	2,652,116	282,194,308	0.94%
2001	304,984	73,107	363,610	1,125,610	513,256	97,214	206,673	2,684,454	285,112,030	0.94%
2002	309,066	75,693	368,275	1,124,701	511,199	103,206	209,263	2,701,403	287,888,021	0.94%
2003	312,222	78,410	372,100	1,124,394	506,457	108,025	212,425	2,714,033	290,447,644	0.93%
2004	317,286	81,053	377,009	1,125,515	501,889	113,764	214,030	2,730,546	293,191,511	0.93%
2005	320,626	83,995	381,608	1,124,933	498,369	118,629	217,609	2,745,769	295,895,897	0.93%
2006	323,954	86,438	385,827	1,128,798	497,815	122,893	222,009	2,767,734	298,754,819	0.93%
				Average Annual Growth Rate						
1980-2006	1.9%	3.3%	2.6%	0.7%	0.3%	4.0%	2.6%	1.3%	1.1%	
1980-1990	2.2%	2.7%	3.6%	0.9%	0.5%	2.8%	2.6%	1.4%	0.9%	
1990-2006	1.8%	3.7%	2.1%	0.5%	0.1%	4.8%	2.6%	1.2%	1.1%	

(a) Seven-county Metropolitan Council share of U.S.

Source: United States Department of Commerce, Bureau of Economic Analysis.

Table A.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Population

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US
				Metropolitan Council - Regional Development Framework (RFD) Forecasts (a)						
2000	298,084	70,205	355,904	1,116,206	511,035	89,498	201,130	2,642,062	n/a	n/a
2005 (b)	*329,177*	*90,373*	*392,382*	*1,165,728*	*529,368*	*117,919*	*229,836*	2,854,782	n/a	n/a
2010	360,270	110,540	428,860	1,215,250	547,700	146,340	258,542	3,067,502	n/a	n/a
2015 (b)	*383,990*	*136,920*	*458,655*	*1,263,840*	*559,280*	*166,570*	*287,313*	3,256,568	n/a	n/a
2020	407,710	163,300	488,450	1,312,430	570,860	186,800	316,083	3,445,633	n/a	n/a
2025 (b)	*416,485*	*179,015*	*504,080*	*1,350,165*	*584,880*	*204,285*	*340,837*	3,579,747	n/a	n/a
2030	425,260	194,730	519,710	1,387,900	598,900	221,770	365,590	3,713,860	n/a	n/a
				Average Annual Growth Rate						
2005-2030	1.0%	3.1%	1.1%	0.7%	0.5%	2.6%	1.9%	1.1%	n/a	n/a
				Woods & Poole (W&P) Forecasts (c)						
2000	299,855	70,886	357,929	1,117,817	511,411	91,125	202,666	2,651,689	282,216,952	0.94%
2005	323,403	84,930	383,368	1,118,746	494,883	120,008	220,167	2,745,505	296,507,061	0.93%
2010	359,221	95,792	432,334	1,144,752	496,227	137,776	258,174	2,924,276	311,884,330	0.94%
2015	398,993	105,974	487,066	1,172,696	499,931	154,669	299,132	3,118,461	327,310,599	0.95%
2020	439,273	116,295	542,351	1,203,116	504,780	171,743	340,347	3,317,905	343,360,101	0.97%
2025	480,429	126,849	598,683	1,236,422	510,889	189,151	382,180	3,524,603	360,201,776	0.98%
2030	523,268	137,848	657,111	1,274,061	518,788	207,221	425,352	3,743,649	378,316,819	0.99%
				Average Annual Growth Rate						
2005-2030	1.9%	2.0%	2.2%	0.5%	0.2%	2.2%	2.7%	1.2%	1.0%	
	Metropolitan Council - Regional Development Framework (RFD) Forecasts Adjusted for Base Year and Scaled to W&P (d)									
2000	298,084	70,205	355,904	1,116,206	511,035	89,498	201,130	2,642,062	282,194,308	0.94%
2005	320,626	83,995	381,608	1,124,933	498,369	118,629	217,609	2,745,769	295,895,897	0.93%
2006	323,954	86,438	385,827	1,128,798	497,815	122,893	222,009	2,767,734	298,754,819	0.93%
2007 (b)	329,904	90,282	392,704	1,137,143	501,109	128,644	227,153	2,806,940	301,876,482	0.93%
2010	347,756	101,815	413,334	1,162,177	510,991	145,897	242,587	2,924,557	311,241,470	0.94%
2015	372,306	126,676	444,023	1,214,039	524,124	166,807	270,785	3,118,761	326,635,942	0.95%
2020	397,498	151,921	475,492	1,267,710	537,945	188,104	299,554	3,318,224	342,652,363	0.97%
2025	415,194	170,290	501,753	1,333,517	563,563	210,342	330,284	3,524,942	359,459,324	0.98%
2030	434,032	189,648	529,624	1,403,414	590,808	233,780	362,703	3,744,009	377,558,394	0.99%
				Average Annual Growth Rate						
2006-2030	1.2%	3.3%	1.3%	0.9%	0.7%	2.7%	2.1%	1.3%	1.0%	

(a) Metropolitan Council, Regional Development Framework 2030 Forecasts, revised January 2007.

(b) Interpolated.

(c) Woods & Poole Economics, The Complete Economic and Demographic Data Source (CEDDS) 2007.

(d) Forecast growth rates for each county applied to actual 2005 base year data and then adjusted proportionately so that the sum for the seven counties is equal to the Woods and Poole projection for the seven-counties.

Sources: As noted and HNTB analysis.

Table A.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Employment

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US (a)
1980	71,250	15,375	76,173	726,794	315,451	18,189	36,572	1,259,804	114,231,200	1.10%
1981	71,162	15,860	76,664	726,485	312,531	18,278	38,320	1,259,300	115,304,000	1.09%
1982	71,292	15,540	76,468	713,831	306,446	18,298	38,283	1,240,158	114,557,300	1.08%
1983	74,117	15,820	79,088	720,189	308,835	18,809	40,821	1,257,679	116,056,700	1.08%
1984	80,808	16,400	88,692	767,297	326,963	19,872	42,907	1,342,939	121,091,100	1.11%
1985	83,765	17,772	95,754	796,146	333,929	21,181	45,079	1,393,626	124,509,700	1.12%
1986	86,853	17,955	100,331	815,034	337,165	22,056	47,560	1,426,954	126,970,300	1.12%
1987	92,616	19,427	110,435	850,058	345,939	23,435	51,691	1,493,601	130,400,400	1.15%
1988	97,741	20,399	121,207	872,162	352,956	24,674	53,311	1,542,450	134,506,900	1.15%
1989	101,414	21,904	127,684	889,872	354,128	25,081	54,815	1,574,898	137,199,800	1.15%
1990	104,479	24,435	133,888	901,274	356,281	26,151	56,536	1,603,044	139,380,900	1.15%
1991	107,472	25,900	137,606	893,801	355,350	27,208	57,844	1,605,181	138,605,800	1.16%
1992	109,571	28,192	143,206	902,511	356,107	29,476	59,225	1,628,288	139,162,100	1.17%
1993	112,016	30,810	147,745	919,139	359,840	31,925	61,093	1,662,568	141,779,400	1.17%
1994	116,186	32,959	155,510	941,673	366,900	33,997	66,184	1,713,409	145,223,600	1.18%
1995	120,102	35,477	163,862	966,633	375,292	36,571	68,914	1,766,851	148,982,800	1.19%
1996	123,382	36,117	170,393	983,582	377,989	38,314	72,478	1,802,255	152,150,200	1.18%
1997	125,877	37,155	174,971	996,767	383,013	39,100	77,642	1,834,525	155,608,200	1.18%
1998	130,644	39,013	181,302	1,023,599	390,128	38,829	80,646	1,884,161	159,628,200	1.18%
1999	139,474	39,878	192,330	1,038,891	393,937	41,487	81,993	1,927,990	162,955,300	1.18%
2000	144,501	41,954	199,367	1,057,734	398,286	44,544	85,883	1,972,269	166,758,800	1.18%
2001	149,589	43,660	205,024	1,046,186	401,445	47,128	88,983	1,982,015	167,014,700	1.19%
2002	149,633	45,119	211,387	1,022,064	398,008	49,058	89,580	1,964,849	166,633,100	1.18%
2003	152,965	46,126	218,313	1,014,417	397,044	50,534	92,016	1,971,415	167,553,500	1.18%
2004	157,055	47,710	224,025	1,027,266	400,767	53,808	93,903	2,004,534	170,512,700	1.18%
2005	161,903	49,337	229,914	1,045,476	406,265	55,483	96,690	2,045,068	174,176,400	1.17%
2006	165,173	51,726	235,730	1,063,321	411,180	57,291	98,306	2,082,727	178,332,900	1.17%
				Average Annual Growth Rate						
1980-2006	3.3%	4.8%	4.4%	1.5%	1.0%	4.5%	3.9%	2.0%	1.7%	
1980-1990	3.9%	4.7%	5.8%	2.2%	1.2%	3.7%	4.5%	2.4%	2.0%	
1990-2006	2.9%	4.8%	3.6%	1.0%	0.9%	5.0%	3.5%	1.6%	1.6%	

(a) Seven-county Metropolitan Council share of U.S.

Source: United States Department of Commerce, Bureau of Economic Analysis.

Table A.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Employment

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US
				Metropolitan Council - Regional Development Framework (RFD) Forecasts (a)						
2000	110,050	28,740	154,242	877,346	333,305	34,931	67,649	1,606,263	n/a	n/a
2005 (b)	*118,365*	*34,300*	*166,876*	*923,618*	*352,668*	*38,621*	*77,580*	*1,712,027*	n/a	n/a
2010	126,680	39,860	179,510	969,890	372,030	42,310	87,510	1,817,790	n/a	n/a
2015 (b)	*133,305*	*45,645*	*189,425*	*1,007,750*	*388,205*	*46,020*	*98,460*	*1,908,810*	n/a	n/a
2020	139,930	51,430	199,340	1,045,610	404,380	49,730	109,410	1,999,830	n/a	n/a
2025 (b)	*145,920*	*55,175*	*206,745*	*1,075,420*	*416,910*	*52,960*	*118,980*	*2,072,110*	n/a	n/a
2030	151,910	58,920	214,150	1,105,230	429,440	56,190	128,550	2,144,390	n/a	n/a
				Average Annual Growth Rate						
2005-2030	1.0%	2.2%	1.0%	0.7%	0.8%	1.5%	2.0%	0.9%	n/a	n/a
				Woods & Poole (W&P) Forecasts (c)						
2000	144,501	41,954	199,370	1,057,730	398,290	44,540	85,880	1,972,265	166,758,782	1.18%
2005	160,813	48,710	229,193	1,044,860	405,789	54,435	96,931	2,040,731	174,249,503	1.17%
2010	183,125	54,726	275,188	1,106,756	431,709	62,424	114,840	2,228,768	188,632,666	1.18%
2015	205,420	60,747	321,257	1,168,320	457,551	70,425	132,793	2,416,513	203,211,415	1.19%
2020	227,692	66,757	367,358	1,229,573	483,311	78,431	150,772	2,603,894	217,790,437	1.20%
2025	249,927	72,766	413,460	1,290,518	508,977	86,439	168,770	2,790,857	232,369,644	1.20%
2030	272,120	78,762	459,543	1,351,166	534,550	94,435	186,771	2,977,347	246,949,026	1.21%
				Average Annual Growth Rate						
2005-2030	2.1%	1.9%	2.8%	1.0%	1.1%	2.2%	2.7%	1.5%	1.4%	0.1%
				Metropolitan Council - Regional Development Framework (RFD) Forecasts Adjusted for Base Year and Scaled to W&P (d)						
2000	144,501	41,954	199,370	1,057,730	398,290	44,540	85,880	1,972,265	166,758,800	1.18%
2005	161,903	49,337	229,914	1,045,476	406,265	55,483	96,690	2,045,068	174,176,400	1.17%
2006	165,173	51,726	235,730	1,063,321	411,180	57,291	98,306	2,082,727	178,332,900	1.17%
2007	168,380	53,519	240,314	1,079,440	418,450	58,579	101,740	2,120,421	180,868,281	1.17%
2010	178,002	58,898	254,066	1,127,796	440,259	62,441	112,041	2,233,505	188,474,425	1.19%
2015	193,182	69,560	276,502	1,208,548	473,799	70,045	130,012	2,421,649	203,040,944	1.19%
2020	208,343	80,525	298,953	1,288,334	507,073	77,767	148,432	2,609,428	217,607,736	1.20%
2025	224,568	89,294	320,486	1,369,626	540,366	85,604	166,844	2,796,788	232,174,713	1.20%
2030	240,832	98,228	341,968	1,450,008	573,380	93,562	185,696	2,983,675	246,741,864	1.21%
				Average Annual Growth Rate						
2006-2030	1.6%	2.7%	1.6%	1.3%	1.4%	2.1%	2.7%	1.5%	1.4%	0.1%

(a) Metropolitan Council, Regional Development Framework 2030 Forecasts, revised January 2007.

(b) Interpolated.

(c) Woods & Poole Economics, The Complete Economic and Demographic Data Source (CEDDS) 2007.

(d) Forecast growth rates for each county applied to actual 2005 base year data and then adjusted proportionately so that the sum for the seven counties is equal to the Woods and Poole projection for the seven-counties.

Sources: As noted and HNTB analysis.

Table A-5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Real Personal Income (thousands of 2007 dollars)

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US (a)
1980	4,341,846	873,889	4,885,448	27,267.470	11,756,339	1,019,856	2,726,291	52,871,140	5,060,724,147	1.04%
1981	4,390,053	903,009	5,085,472	27,715.947	11,976,872	1,045,639	2,868,254	53,985,246	5,217,389,016	1.03%
1982	4,497,178	919,724	5,290,286	28.412,643	12,268,235	1,071,951	3,000,269	55,460,285	5,296,835,932	1.05%
1983	4,697,950	938,368	5,543,281	29,091,493	12,556,249	1,104,152	3,155,976	57,087,469	5,417,993,354	1.05%
1984	5,110,128	1,046,108	6,183,164	31,369,038	13,421,846	1,218,911	3,490,491	61,839,685	5,797,560,589	1.07%
1985	5,354,877	1,121,987	6,622,046	32,852,275	13,868,745	1,301,183	3,722,022	64,843,136	6,015,647,383	1.08%
1986	5,586,886	1,187,157	6,946,592	34,139,548	14,270,959	1,372,541	3,934,719	67,438,403	6,201,603,062	1.09%
1987	5,795,677	1,262,713	7,428,358	35,343,546	14,569,361	1,437,358	4,158,870	69,995,883	6,359,769,435	1.10%
1988	5,999,111	1,310,308	7,968,063	36,518,410	14,803,519	1,497,616	4,349,422	72,446,449	6,588,444,519	1.10%
1989	6,234,736	1,435,645	8,512,581	37,789,563	15,047,374	1,564,501	4,453,908	75,038,307	6,810,199,511	1.10%
1990	6,331,356	1,490,907	8,774,152	38,320,257	15,397,098	1,604,223	4,628,653	76,546,647	6,926,166,002	1.11%
1991	6,427,510	1,528,169	8,930,113	37,972,071	15,328,535	1,634,537	4,746,609	76,567,544	6,917,693,527	1.11%
1992	6,755,005	1,649,320	9,496,386	39,276,719	15,500,991	1,755,850	5,118,397	79,552,668	7,147,658,117	1.11%
1993	7,063,311	1,760,463	9,792,387	39,233,088	15,407,133	1,856,596	5,379,193	80,492,172	7,246,034,072	1.11%
1994	7,492,448	1,902,716	10,403,238	40,551,201	15,891,803	1,991,746	5,813,786	84,046,939	7,462,056,021	1.13%
1995	7,808,920	2,073,229	10,933,901	42,501,645	16,423,333	2,141,947	6,122,551	88,005,525	7,694,597,707	1.14%
1996	8,210,585	2,249,883	11,657,436	44,015,722	17,058,709	2,333,739	6,439,804	91,965,878	7,983,358,284	1.15%
1997	8,632,107	2,425,659	12,436,733	46,616,925	17,372,205	2,554,379	6,836,601	96,874,609	8,327,007,875	1.16%
1998	9,348,352	2,696,896	13,631,738	50,203,159	18,485,815	2,809,731	7,468,835	104,644,525	8,860,326,633	1.18%
1999	9,905,016	2,889,691	14,239,847	52,265,375	18,714,918	3,089,573	7,904,400	109,008,820	9,162,408,511	1.19%
2000	10,579,530	3,162,800	15,010,929	55,208,023	19,582,125	3,522,466	8,466,433	115,532,307	9,658,013,360	1.20%
2001	10,667,823	3,321,840	15,020,668	54,937,230	19,843,169	3,660,273	8,717.724	116,168,728	9,791,183,200	1.19%
2002	10,953,161	3,418,339	15,332,408	54,473,382	20,183,427	3,746,493	8,847,508	116,954,718	9,826,896,157	1.19%
2003	11,138,031	3,473,898	15,701,219	55,119,438	20,076,235	3,872,888	9,084,137	118,465,846	9,936,957,925	1.19%
2004	11,396,520	3,668,390	16,172,984	57,204,756	20,952,455	4,114,863	9,592,481	123,102,449	10.274,287,328	1.20%
2005	11,404,951	3,905,705	16,355,470	58.278,620	20,897,566	4,371,509	9.613,791	124,827,612	10.568,865,149	1.18%
2006	11,545,682	4,100,882	16,627,273	59,719,128	21,305,673	4,531,505	9,905,571	127,735,714	10,968,393,000	1.16%
					Average Annual Growth Rate					
1980-2006	3.8%	6.1%	4.8%	3.1%	2.3%	5.9%	5.1%	3.5%	3.0%	
1980-1990	3.8%	5.5%	6.0%	3.5%	2.7%	4.6%	5.4%	3.8%	3.2%	
1990-2006	3.8%	6.5%	4.1%	2.8%	2.1%	6.7%	4.9%	3.3%	2.9%	

(a) Seven-county Metropolitan Council share of U.S.

Source: United States Department of Commerce, Bureau of Economic Analysis.

Table A.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Income (thousands of 2007 dollars)

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US
				Metropolitan Council - Regional Development Framework (RFD) Forecasts (a)						
2000	10,520,589	3,133,476	14,928,339	55,100,853	19,559,391	3,461,131	8,407,618	115,111,397	n/a	n/a
2005	12,106,832	4,206,551	17,138,150	60,935,566	22,823,530	4,346,946	10,429,764	131,987,340	n/a	n/a
2010	14,480,133	5,155,589	19,838,886	64,184,074	25,159,646	5,324,903	12,618,837	146,762,069	n/a	n/a
2015	16,294,134	6,657,861	22,710,559	71,092,477	27,655,274	6,395,413	14,570,920	165,376,638	n/a	n/a
2020	18,325,027	8,316,242	25,901,694	78,770,188	30,420,976	7,589,637	16,773,772	186,097,535	n/a	n/a
2025	19,880,844	9,581,629	28,647,432	86,583,059	33,619,700	8,803,016	19,021,861	206,137,542	n/a	n/a
2030	21,588,027	10,975,626	31,649,702	95,120,643	37,128,330	10,144,820	21,518,362	228,125,510	n/a	n/a
				Average Annual Growth Rate						
2005-2030	2.3%	3.9%	2.5%	1.8%	2.0%	3.4%	2.9%	2.2%	n/a	n/a
				Woods & Poole (W&P) Forecasts (b)						
2000	10,579,530	3,162,800	15,010,929	55,208,023	19,582,125	3,522,466	8,466,433	115,532,307	9,658,013,360	1.20%
2005	11,894,469	3,953,220	16,744,444	58,479,698	21,336,740	4,423,954	9,990,993	126,823,519	10,778,993,325	1.18%
2010	14,437,972	4,467,742	19,999,592	60,460,684	22,795,135	5,013,283	12,600,876	139,775,284	12,001,400,561	1.16%
2015	16,930,767	5,153,083	24,117,346	65,965,520	24,720,585	5,938,477	15,170,340	157,996,119	13,401,838,907	1.18%
2020	19,743,665	5,922,458	28,759,975	72,209,316	26,899,590	6,977,875	18,061,404	178,574,283	14,989,247,349	1.19%
2025	22,933,201	6,789,487	34,023,827	79,288,975	29,366,597	8,150,864	21,329,214	201,882,165	16,791,490,920	1.20%
2030	26,563,334	7,769,569	40,017,254	87,318,612	32,161,850	9,479,279	25,035,910	228,345,809	18,840.803,785	1.21%
				Average Annual Growth Rate						
2005-2030	3.3%	2.7%	3.5%	1.6%	1.7%	3.1%	3.7%	2.4%	2.3%	0.1%
				Metropolitan Council - Regional Development Framework (RFD) Forecasts Adjusted for Base Year and Scaled to W&P (c)						
2000	10,579,530	3,162,800	15,010,929	55,208,023	19,582,125	3,522,466	8,466,433	115,532,307	9,658,013,360	1.20%
2005	11,404,951	3,905,705	16,355,470	58,278,620	20,897,566	4,371,509	9,613,791	124,827,612	10,568,865,149	1.18%
2006	11,545,682	4,100,882	16,627,273	59,719,128	21,305,673	4,531,505	9,905,571	127,735,714	10,968,393,000	1.16%
2007	12,038,763	4,261,618	17.161,109	59,997,720	21,686,605	4,725,339	10,310,930	130,182,083	11,168,155,374	1.17%
2010	13,518,004	4,743,825	18,762,619	60,833,494	22,829,400	5,306,839	11,527,008	137,521,190	11,767,442,497	1.17%
2015	15,279,365	6,153,455	21,574,365	67,681,996	25,205,886	6,402,165	13,369,595	155,666,827	13,140,580,376	1.18%
2020	17,279,137	7,728,849	24,742,396	75,407,540	27,880,498	7,639,811	15,476,238	176,154,470	14,697,043,513	1.20%
2025	19,168,137	9,105,310	27,981,239	84,752,688	31,505,682	9,060,680	17,945,490	199,519,226	16,464,153,733	1.21%
2030	21,309,537	10,678,264	31,649,499	95,325,987	35,621,847	10,690,294	20,783,923	226,059,350	18,473,516,821	1.22%
				Average Annual Growth Rate						
2006-2030	2.6%	4.1%	2.7%	2.0%	2.2%	3.6%	3.1%	2.4%	2.2%	0.2%

(a) Metropolitan Council, Regional Development Framework 2030 Forecasts for population (Table A.2) multiplied by W&P forecasts for per capita income (Table A.8).
(b) Woods & Poole Economics, The Complete Economic and Demographic Data Source (CEDDS) 2007.
(c) Population forecasts adjusted for base year and scaled (Table A.2) multiplied by per capita income forecasts adjusted for base year (Table A.8).

Sources: As noted and HNTB analysis.

Table A.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Real Per Capita Personal Income (2004 dollars)

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US (a)
1980	22,047	23,463	24,985	28,875	25,503	23,159	23,871	26.525	22,272	119.1%
1981	21,926	23,788	25,412	29,064	25,776	23,263	24,623	26,751	22,737	117.7%
1982	22,133	23,879	25,830	29.552	26,225	23,404	25,243	27,181	22,864	118.9%
1983	22,876	24,185	26,698	30,088	26,759	24,001	26,246	27.791	23,174	119.9%
1984	24,463	26,590	28,894	32,244	28,564	25,831	28,484	29,806	24,584	121.2%
1985	25,098	27,905	29,931	33,332	29,268	26,562	29,833	30,760	25,284	121.7%
1986	25.592	28.770	30,339	34,227	29,802	27,230	30,855	31,472	25,826	121.9%
1987	25,778	29,543	30,788	35,145	30,315	27,343	31,706	32,125	26.249	122.4%
1988	25,817	29,304	31,244	35,844	30,618	27,281	31,728	32,540	26,947	120.8%
1989	26,215	31,005	32,052	36,807	30,985	27,713	31,468	33,202	27,592	120.3%
1990	25,815	30,798	31,577	37,020	31,647	27,524	31.500	33,304	27,747	120.0%
1991	25,550	30,411	31,124	36,399	31,393	27,094	31,158	32,821	27,345	120.0%
1992	26,258	31,664	32,007	37,399	31,537	28,072	32,315	33,585	27,865	120.5%
1993	26,987	32,340	32,017	37,026	31,296	28,391	32,273	33,455	27,878	120.0%
1994	27,928	33,418	33,450	37,933	32,195	29,140	33,452	34,431	28,359	121.4%
1995	28,580	34,760	34,252	39,465	33,121	30,174	34,192	35,559	28,897	123.1%
1996	29,507	36,173	35.524	40,614	34,232	31,587	35,032	36,663	29,634	123.7%
1997	30,505	37,937	37,054	42,780	34,571	32,852	36,325	38,129	30,541	124.8%
1998	32,450	40,963	39,716	45,681	36,528	34,740	38,831	40,631	32,120	126.5%
1999	33,737	42,383	40.625	47,101	36,755	36,308	40,044	41,708	32,835	127.0%
2000	35,294	44,633	41,945	49,364	38,274	38,673	41,802	43,562	34,225	127.3%
2001	34,978	45,438	41,310	48,807	38,661	37,652	42,181	43,275	34,342	126.0%
2002	35,440	45.161	41.633	48,434	39,483	36,301	42,279	43,294	34,134	126.8%
2003	35,673	44,304	42,196	49,021	39,641	35,852	42,764	43,649	34,213	127.6%
2004	35,919	45,259	42,898	50,825	41,747	36,170	44,818	45,083	35,043	128.7%
2005	35,571	46.499	42,859	51,806	41,932	36,850	44,179	45,462	35,718	127.3%
2006	35,640	47,443	43,095	52,905	42,798	36,874	44,618	46,152	36,714	125.7%
Average Annual Growth Rate										
1980-2006	1.9%	2.7%	2.1%	2.4%	2.0%	1.8%	2.4%	2.2%	1.9%	0.2%
1980-1990	1.6%	2.8%	2.4%	2.5%	2.2%	1.7%	2.8%	2.3%	2.2%	0.1%
1990-2006	2.0%	2.7%	2.0%	2.3%	1.9%	1.8%	2.2%	2.1%	1.8%	0.3%

(a) Seven-county Metropolitan Council share of U.S.

Source: United States Department of Commerce, Bureau of Economic Analysis.

Table A.8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Per Capita Income

Year	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	7-County Total	United States	Share of US
				Metropolitan Council - Regional Development Framework (RFD) Forecasts (a)						
2000	35,294	44,633	41,945	49,364	38,274	38,673	41,802	43,562	n/a	n/a
2005	36,779	46,547	43.677	52,273	43,115	36,864	45,379	46,234	n/a	n/a
2010	40,192	46,640	46,260	52,816	45,937	36,387	48,808	47,844	n/a	n/a
2015	42,434	48,626	49,516	56.251	49,448	38,395	50,715	50,782	n/a	n/a
2020	44,946	50,926	53,028	60,019	53,290	40,630	53,068	54,010	n/a	n/a
2025	47,735	53,524	56,831	64,128	57,481	43,092	55,809	57,584	n/a	n/a
2030	50,764	56,363	60,899	68,536	61,994	45,745	58,859	61,425	n/a	n/a
				Average Annual Growth Rate						
2005-2030	1.3%	0.8%	1.3%	1.1%	1.5%	0.9%	1.0%	1.1%	n/a	n/a
				Woods & Poole (W&P) Forecasts (b)						
2000	35,282	44,618	41,938	49,389	38,290	38,655	41,775	43,569	34,222	127.31%
2005	36,779	46,547	43,677	52.273	43,115	36,864	45,379	46,193	36,353	127.07%
2010	40,192	46,640	46,260	52,816	45,937	36,387	48,808	47,798	38,480	124.21%
2015	42,434	48,626	49,516	56,251	49,448	38,395	50,715	50,665	40,945	123.74%
2020	44,946	50,926	53,028	60,019	53,290	40,630	53,068	53,821	43,655	123.29%
2025	47,735	53,524	56,831	64,128	57,481	43,092	55,809	57,278	46,617	122.87%
2030	50,764	56,363	60,899	68,536	61,994	45,745	58,859	60,996	49,802	122.48%
				Average Annual Growth Rate						
2005-2030	1.3%	0.8%	1.3%	1.1%	1.5%	0.9%	1.0%	1.1%	1.3%	-0.1%
				Woods & Poole Forecasts Adjusted for Base Year (c)						
2000	35,294	44,633	41,945	49,364	38,274	38,673	41,802	43,562	34,225	127.28%
2005	35,571	46,499	42,859	51,806	41,932	36,850	44,179	45,462	35,718	127.28%
2006	35,640	47,443	43,095	52,905	42,798	36,874	44,618	46,152	36,714	125.71%
2007	36,448	47,230	43,670	52,765	43,268	36,749	45,343	46,370	36,987	125.37%
2010	38,872	46,592	45,393	52,344	44,677	36,374	47,517	47,023	37,808	124.37%
2015	41,040	48,576	48,588	55,749	48,091	38,381	49,373	49,913	40,230	124.07%
2020	43,470	50,874	52,035	59,483	51,828	40,615	51,664	53,087	42,892	123.77%
2025	46,167	53,469	55,767	63,556	55,904	43,076	54,334	56,602	45,803	123.58%
2030	49,097	56,306	59,758	67,924	60,293	45,728	57,303	60,379	48,929	123.40%
				Average Annual Growth Rate						
2005-2030	1.3%	0.8%	1.3%	1.1%	1.5%	0.9%	1.0%	1.1%	1.3%	-0.1%

(a) Assumed to be the same as the Woods & Poole forecasts.
(b) Woods & Poole Economics, The Complete Economic and Demographic Data Source (CEDDS) 2005.
(c) Woods & Poole forecasts adjusted for 2003 base year.

Sources: As noted and HNTB analysis.

Table B.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Active General Aviation Aircraft in the United States

Year	Piston Single Engine	Piston Multi-Engine	Piston Other	Total Piston	Turbo-prop	Turbo-jet	Rotor-craft	Experi-mental (a)	Sport	Other (b)	TOTAL
1980	168,435	24,366	212	193,013	4,090	2,992	6,001	NA	NA	4,945	211,045
1981	167,898	25,356	114	193,368	4,660	3,171	6,974	NA	NA	5,049	213,226
1982	164,173	24,882	140	189,195	5,186	3,996	6,169	NA	NA	5,233	209,779
1983	166,427	24,909	143	191,479	5,453	3,898	6,539	NA	NA	5,923	213,293
1984	171,922	25,258	262	197,442	5,809	4,320	7,096	NA	NA	6,275	220,943
1985	153,400	22,100	100	175,600	5,000	4,100	6,000	NA	NA	5,800	196,500 (c)
1986	160,300	22,100	100	182,500	5,600	4,200	6,500	NA	NA	6,500	205,300 (c)
1987	159,700	21,700	100	181,500	4,900	4,000	5,900	NA	NA	6,300	202,700 (c)
1988	153,700	21,200	100	175,000	4,900	3,900	6,000	NA	NA	6,400	196,200 (c)
1989	158,900	21,800	100	180,800	5,900	4,100	7,000	NA	NA	7,200	205,000 (c)
1990	154,000	21,100	100	175,200	5,300	4,100	6,900	NA	NA	6,600	198,000 (c)
1991	152,836	20,551	131	173,518	4,941	4,126	6,238	NA	NA	8,051	196,874 (d)
1992	144,837	17,966	77	162,881	4,786	4,004	5,979	NA	NA	8,000	185,650 (d)
1993	133,516	15,626	14	149,156	4,116	3,663	4,721	10,426	NA	5,037	177,120 (d)
1994	127,351	14,801	NA	142,152	4,092	3,914	4,728	12,144	NA	5,906	172,936 (d)
1995	137,049	15,739	NA	152,788	4,995	4,559	5,830	15,176	NA	4,741	188,089 (d)
1996	137,401	16,150	NA	153,551	5,716	4,424	6,570	16,625	NA	4,244	191,129
1997	140,038	16,017	NA	156,055	5,619	5,178	6,785	14,680	NA	4,092	192,414
1998	144,234	18,729	NA	162,963	6,174	6,066	7,426	16,502	NA	5,580	204,710
1999	150,886	21,038	NA	171,924	5,679	7,120	7,448	20,528	NA	6,765	219,464
2000	149,422	21,091	140	170,653	5,762	7,001	7,150	20,407	NA	6,700	217,533
2001	145,034	18,281	NA	163,315	6,596	7,787	6,783	20,421	NA	6,545	211,447
2002	143,503	17,584	NA	161,087	6,841	8,355	6,648	21,936	NA	6,377	211,244
2003	143,265	17,673	NA	160,938	7,689	7,997	6,526	20,550	NA	6,088	209,606
2004	146,613	18,576	NA	165,189	8,379	9,298	7,821	22,800	NA	5,939	219,426
2005	148,101	19,507	NA	167,608	7,942	9,823	8,728	23,627	170	6,454	224,352
2006	145,036	18,708	NA	163,743	8,063	10,379	9,159	23,047	1,273	6,277	221,943
2007	144,580	18,555	NA	163,135	8,190	10,997	9,685	23,920	2,700	6,380	225,007 (e)

(a) Amateur, exhibition and other.

(b) Gliders and lighter-than-air craft.

(c) Revised to correct for nonresponse bias on FAA G.A. Activity Survey.

(d) Revised due to change in estimating procedures for the 1996 FAA G.A. Activity Survey.

(e) Estimate from FAA Aerospace Forecast Fiscal Years 2008-2025.

Sources: Federal Aviation Administration and Aircraft Owners and Pilots Association.

Table B.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Ratio of MAC Based Aircraft to U.S. Active Fleet

Year	US Active Aircraft (a)	MAC Based Aircraft (b)	Ratio Based AC to US Active Fleet (c)
1980	211,045	1,689	0.0080
1981	213,226	1,731	0.0081
1982	209,779	1,827	0.0087
1983	213,293	1,791	0.0084
1984	220,943	1,858	0.0084
1985	196,500	n/a	n/a
1986	205,300	n/a	n/a
1987	202,700	n/a	n/a
1988	196,200	n/a	n/a
1989	205,000	n/a	n/a
1990	198,000	n/a	n/a
1991	196,874	n/a	n/a
1992	185,650	n/a	n/a
1993	177,120	n/a	n/a
1994	172,936	n/a	n/a
1995	188,089	n/a	n/a
1996	191,129	n/a	n/a
1997	192,414	n/a	n/a
1998	204,710	n/a	n/a
1999	219,464	1,893	0.0086
2000	217,533	1,821	0.0084
2001	211,447	1,737	0.0082
2002	211,244	1,765	0.0084
2003	209,606	1,808	0.0086
2004	219,426	1,763	0.0080
2005	224,352	1,743	0.0078
2006	221,943	1,718	0.0077
2007	225,007	1,600	0.0071

(a) Table B.1
(b) Based aircraft at MAC airports fromTable 2.
(c) Ratio of based aircraft at MAC airports to U.S. Active Fleet.

Sources: As noted and HNTB analysis.

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
			Total Aircraft						
Crystal	6	3	2	192	20	1	1	19	244
Airlake	0	1	104	16	3	21	0	17	162
Lake Elmo	1	0	11	8	51	0	142	16	229
Anoka County/Blaine - Janes Field	177	1	8	96	100	2	14	39	437
Flying Cloud	1	16	22	296	4	31	2	49	421
MSP	0	0	0	12	0	0	0	12	24
St. Paul Downtown-Holman Field	0	0	3	24	44	0	6	6	83
Total MAC Airports	185	21	150	644	222	55	165	158	1600
			Total Aircraft - Distribution						
Crystal	0.0324	0.1429	0.0133	0.2981	0.0901	0.0182	0.0061	0.1203	0.1525
Airlake	0.0000	0.0476	0.6933	0.0248	0.0135	0.3818	0.0000	0.1076	0.1013
Lake Elmo	0.0054	0.0000	0.0733	0.0124	0.2297	0.0000	0.8606	0.1013	0.1431
Anoka County/Blaine - Janes Field	0.9568	0.0476	0.0533	0.1491	0.4505	0.0364	0.0848	0.2468	0.2731
Flying Cloud	0.0054	0.7619	0.1467	0.4596	0.0180	0.5636	0.0121	0.3101	0.2631
MSP	0.0000	0.0000	0.0000	0.0186	0.0000	0.0000	0.0000	0.0759	0.0150
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0200	0.0373	0.1982	0.0000	0.0364	0.0380	0.0519
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
			Single Engine Piston						
Crystal	6	3	2	173	19	1	1	18	223
Airlake	0	1	91	16	3	19	0	16	146
Lake Elmo	1	0	11	8	50	0	131	14	215
Anoka County/Blaine - Janes Field	152	1	5	74	87	2	13	25	359
Flying Cloud	0	14	19	233	3	28	2	37	336
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	3	14	0	3	1	23
Total MAC Airports	159	19	130	507	176	50	150	111	1302
			Single Engine Piston Aircraft - Distribution (a)						
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622	0.1713
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441	0.1121
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261	0.1651
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252	0.2757
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333	0.2581
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090	0.0177
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
				Multi-Engine Piston					
Crystal	0	0	0	11	1	0	0	0	12
Airlake	0	0	10	0	0	1	0	0	11
Lake Elmo	0	0	0	0	1	0	7	2	10
Anoka County/Blaine - Janes Field	18	0	3	10	8	0	1	11	51
Flying Cloud	0	1	1	25	1	3	0	6	37
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	4	0	2	0	7
Total MAC Airports	18	1	14	47	15	4	10	19	128
				Multi Engine Piston Aircraft - Distribution (a)					
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000	0.0938
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000	0.0859
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053	0.0781
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789	0.3984
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158	0.2891
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000	0.0547
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
			Turboprop						
Crystal	0	0	0	1	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	6
Flying Cloud	1	1	0	18	0	0	0	0	20
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	8
Total MAC Airports	2	1	0	25	5	1	0	2	36
			Turboprop Aircraft - Distribution (a)						
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000	0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000	0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000	0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
				Microjets					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	0	0	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports	1	0	0	0	0	0	0	0	1
				Microjet Aircraft - Distribution (b)					
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000	0.0139
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0289
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088	0.1383
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588	0.3928
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529	0.1200
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794	0.3061
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
				Other Jets					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	3	0	0	0	0	0	3
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	7	1	0	0	2	11
Flying Cloud	0	0	2	19	0	0	0	2	23
MSP	0	0	0	12	0	0	0	12	24
St. Paul Downtown-Holman Field	0	0	1	18	18	0	1	1	39
Total MAC Airports	1	0	6	56	19	0	1	17	100
				Other Jet Aircraft - Distribution (a)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0300
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176	0.1100
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176	0.2300
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059	0.2400
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588	0.3900
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
				Helicopter					
Crystal	0	0	0	7	0	0	0	1	8
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	2	0	2
Anoka County/Blaine - Janes Field	4	0	0	1	3	0	0	0	8
Flying Cloud	0	0	0	1	0	0	0	4	5
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	3	0	0	3	6
Total MAC Airports	4	0	0	9	6	0	2	8	29
				Helicopter - Distribution (a)					
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250	0.2759
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0690
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000	0.2759
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000	0.1724
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750	0.2069
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table B.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Distribution of Based Aircraft by Airport and County and Aircraft Category

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other (c)**	**Total**
				Other (c)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	1
Lake Elmo	0	0	0	0	0	0	2	0	2
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports	0	0	0	0	1	0	2	1	4
				Other Aircraft - Distribution (a)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000

(a) Distribution of registered aircraft in each county by airport at which they are based. Registered aircraft that are not based at a MAC airport are excluded.
(b) Assumed to be average distribution of turboprops and other jets.
(c) Balloons, gliders and ultralight aircraft.

Sources: Minnesota Department of Transportation Based Aircraft Reports and HNTB analysis.

Table B.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Aircraft Operations: Anoka County Airport (a)

Year	Air Carrier	Air Taxi	GA Itinerant	Military Itinerant	GA Local	Military Local	Total
1997	-	3,920	59,719	687	78,251	486	143,063
1998	-	5,309	57,612	314	80,516	230	143,981
1999	-	2,908	63,486	688	82,420	267	149,769
2000	-	3,082	68,460	183	84,551	270	156,546
2001	-	3,605	63,433	413	68,947	494	136,892
2002	-	3,773	64,129	664	69,641	728	138,935
2003	-	4,733	60,954	715	65,099	644	132,145
2004	-	3,656	53,950	361	51,610	276	109,853
2005	-	3,296	50,878	314	46,370	414	101,272
2006	-	3,127	48,252	271	40,941	356	92,947
2007	-	2,762	43,131	200	34,134	290	80,517

(a) Does not include operations occurring when ATCT is closed.

Source: FAA, ATADS database.

Table B.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Aircraft Operations: Flying Cloud Airport (a)

Year	Air Carrier	Air Taxi	GA Itinerant	Military Itinerant	GA Local	Mil Local	Total
1990	0	55	89,967	125	136,563	700	227,410
1991	0	72	79,572	206	106,165	488	186,503
1992	0	840	82,411	193	114,128	734	198,306
1993	0	1,546	90,774	282	124,990	1,051	218,643
1994	0	1,644	98,038	248	138,314	794	239,038
1995	0	1,479	104,096	227	109,693	814	216,309
1996	0	2,442	112,622	180	97,230	221	212,695
1997	0	3,477	102,597	563	91,399	163	198,199
1998	0	3,347	104,955	82	102,218	306	210,908
1999	0	1,012	104,126	138	87,378	92	192,746
2000	0	1,225	97,868	42	86,921	22	186,078
2001	0	2,532	93,724	69	89,188	80	185,593
2002	0	2,892	87,577	534	85,296	109	176,408
2003	0	3,740	81,235	347	70,395	120	155,837
2004	282	3,991	78,123	313	76,782	157	159,648
2005	0	3,754	79,366	128	74,365	97	157,710
2006	0	3,612	70,803	106	69,554	103	144,178
2007	0	3,489	59,283	146	55,070	190	118,178

(a) Does not include operations occurring when ATCT is closed.

Source: FAA, ATADS database.

Table B.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Aircraft Operations: St. Paul Downtown Airport (a)

Year	Air Carrier	Air Taxi	GA Itinerant	Military Itinerant	GA Local	Mil Local	Total
1990	0	9,440	104,152	9,302	63,808	3,805	190,507
1991	0	7,821	94,318	7,409	56,567	2,335	168,450
1992	0	4,614	86,057	10,109	48,512	3,086	152,378
1993	0	4,345	74,134	9,180	40,214	3,515	131,388
1994	23	8,013	83,525	8,596	43,060	3,622	146,839
1995	10	7,402	78,286	6,980	37,878	3,130	133,686
1996	1	4,804	85,531	6,104	41,098	1,518	139,056
1997	0	4,351	83,289	3,922	42,311	1,206	135,079
1998	2	5,314	97,106	3,648	48,494	4,141	158,705
1999	0	5,673	93,296	5,057	49,665	5,117	158,808
2000	0	8,333	89,642	3,791	51,073	5,377	158,216
2001	0	8,058	74,469	5,278	47,862	7,127	142,794
2002	0	11,103	87,443	6,271	59,826	6,985	171,628
2003	0	10.345	63,048	5,265	48,922	4,214	131,794
2004	8	11,948	61,726	4,330	45,884	3,582	127,478
2005	0	10,865	65,472	4,464	46,316	4,591	131,708
2006	0	12,117	68,055	4,914	44,794	5,276	135,156
2007	0	11,851	63,986	3,882	34,475	3,783	117,977

(a) Docs not include operations occurring when ATCT is closed.

Source: FAA, ATADS database.

Table B.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

2007 Aircraft Operations by Month: Anoka County Airport

Month	Air Carrier	Air Taxi	GA Itinerant	Military Itinerant	GA Local	Mil Local	Total	Tower Coverage (a) Daytime	Tower Coverage (a) Nighttime
Raw Tower Count (b)									
January	-	235	3,419	22	3,350	16	7,042	93.3%	0.0%
February	-	258	2,453	20	2,188	34	4,953	93.3%	0.0%
March	-	227	3,262	16	2,874	44	6,423	93.3%	0.0%
April	-	220	3,980	8	3,532	20	7,760	93.3%	0.0%
May	-	249	4,179	26	3,988	26	8,468	100.0%	0.0%
June	-	256	4,605	16	3,470	42	8,389	100.0%	0.0%
July	-	232	4,824	12	3,298	6	8,372	100.0%	0.0%
August	-	236	3,861	20	3,034	12	7,163	100.0%	0.0%
September	-	214	3,783	20	2,506	20	6,543	100.0%	0.0%
October	-	227	4,079	3	2,414	22	6,745	93.3%	0.0%
November	-	197	3,000	27	2,314	30	5,568	93.3%	0.0%
December	-	211	1,686	10	1,166	18	3,091	93.3%	0.0%
Total	-	2,762	43,131	200	34,134	290	80,517		
Adjusted for Missing Daytime Coverage (c)									
January	-	252	3,663	24	3,589	17	7,545		
February	-	276	2,628	21	2,344	36	5,307		
March	-	243	3,495	17	3,079	47	6,882		
April	-	236	4,264	9	3,784	21	8,314		
May	-	249	4,179	26	3,988	26	8,468		
June	-	256	4,605	16	3,470	42	8,389		
July	-	232	4,824	12	3,298	6	8,372		
August	-	236	3,861	20	3,034	12	7,163		
September	-	214	3,783	20	2,506	20	6,543		
October	-	243	4,370	3	2,586	24	7,227		
November	-	211	3,214	29	2,479	32	5,966		
December	-	226	1,806	11	1,249	19	3,312		
Total	-	2,875	44,694	208	35,408	303	83,487		
								Non T&C	Touch&Go
Total Nighttime Operations (d)	-	166	2,583	12	585	5	3,351	2761	590
Estimated Nighttime Operations (e)									
January	-	15	212	1	59	0	287		
February	-	16	152	1	39	1	208		
March	-	14	202	1	51	1	269		
April	-	14	246	0	63	0	323		
May	-	14	242	2	66	0	324		
June	-	15	266	1	57	1	340		
July	-	13	279	1	54	0	347		
August	-	14	223	1	50	0	288		
September	-	12	219	1	41	0	274		
October	-	14	253	0	43	0	310		
November	-	12	186	2	41	1	241		
December	-	13	104	1	21	0	139		
Total	-	166	2,583	12	585	5	3,351		
Estimated Total Operations (f)									
January	-	266	3,875	25	3,649	17	7,832		
February	-	292	2,780	23	2,383	37	5,515		
March	-	257	3,697	18	3,130	48	7,150		
April	-	249	4,511	9	3,847	22	8,638		
May	-	263	4,421	28	4,054	26	8,792		
June	-	271	4,871	17	3,527	43	8,729		
July	-	245	5,103	13	3,352	6	8,719		
August	-	250	4,084	21	3,084	12	7,451		
September	-	226	4,002	21	2,547	20	6,817		
October	-	257	4,623	3	2,629	24	7,537		
November	-	223	3,400	31	2,520	33	6,207		
December	-	239	1,911	11	1,270	20	3,451		
Total	-	3,041	47,277	220	35,993	308	86,838		
Peak Month	-	292	5,103	29	4,054	48	8,792		
Peak Month Percent	0.0%	9.6%	10.8%	13.9%	11.3%	15.6%	10.1%		

(a) Percent of the time that tower is operated. Daytime is defined as 7 am to 10 pm and nighttime as 10 pm to 7 am.
(b) Tower operations reported in FAA ATADS data base.
(c) Raw tower operations divided by percentage of daytime coverage.
(d) Nighttime operations from ANOMS data. Non-touch and go operations allocated proportionately to itinerant categories. Touch and go operations allocated proportionately to local operations.
(e) Monthly distribution of nighttime operations assumed to be the same as the monthly distribution of adjusted daytime operations in each category.
(f) Adjusted daytime operations plus estimated nighttime operations.

Source: FAA, ATADS database and HNTB analysis.

Table B.8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

2007 Aircraft Operations by Month: Flying Cloud Airport

								Tower Coverage (a)	
Month	**Air Carrier**	**Air Taxi**	**GA Itinerant**	**Military Itinerant**	**GA Local**	**Military Local**	**Total**	**Daytime**	**Nighttime**
				Raw Tower Count (b)					
January	-	249	4,200	13	3,874	4	8,339	93.3%	0.0%
February	-	198	2,944	10	2,484	4	5,640	93.3%	0.0%
March	-	240	4,295	20	3,735	34	8,324	93.3%	0.0%
April	-	414	5,308	-	4,858	4	10,584	100.0%	0.0%
May	-	374	5,637	17	5,585	9	11,622	100.0%	0.0%
June	-	351	6,373	10	5,319	12	12,065	100.0%	0.0%
July	-	239	6,729	3	6,038	2	13,011	100.0%	0.0%
August	-	353	5,972	17	5,270	19	11,630	100.0%	0.0%
September	-	323	5,522	27	5,714	30	11,616	100.0%	0.0%
October	-	322	5,333	15	6,022	23	11,715	100.0%	0.0%
November	-	263	4,285	9	4,045	38	8,640	93.3%	0.0%
December	-	164	2,685	5	2,126	12	4,992	93.3%	0.0%
Total	-	3,489	59,283	146	55,070	190	118,178		
			Adjusted for Missing Daytime Coverage (c)						
January	-	266	4,500	14	4,151	4	8,935		
February	-	212	3,154	11	2,661	4	6,043		
March	-	257	4,602	21	4,002	36	8,919		
April	-	414	5,308	-	4,858	4	10,584		
May	-	374	5,637	17	5,585	9	11,622		
June	-	351	6,373	10	5,319	12	12,065		
July	-	239	6,729	3	6,038	2	13,011		
August	-	353	5,972	17	5,270	18	11,630		
September	-	323	5,522	27	5,714	30	11,616		
October	-	322	5,333	15	6,022	23	11,715		
November	-	282	4,591	10	4,334	41	9,257		
December	-	176	2,877	5	2,278	13	5,349		
Total	-	3,569	60,598	150	56,232	197	120,745		
								Non T&G	**Touch&Go**
Total Nighttime Operations (d)	-	155	2,631	7	1,028	4	3,824	2792	1032
				Estimated Nighttime Operations (e)					
January	-	12	195	1	76	0	283		
February	-	9	137	0	49	0	195		
March	-	11	200	1	73	1	286		
April	-	18	230	-	89	0	337		
May	-	16	245	1	102	0	364		
June	-	15	277	0	97	0	390		
July	-	10	292	0	110	0	413		
August	-	15	259	1	96	0	372		
September	-	14	240	1	105	1	360		
October	-	14	232	1	110	0	357		
November	-	12	199	0	79	1	292		
December	-	8	125	0	42	0	175		
Total	-	155	2,631	7	1,028	4	3,824		
				Estimated Total Operations (f)					
January	-	277	4,695	15	4,227	4	9,218		
February	-	221	3,291	11	2,710	4	6,238		
March	-	268	4,802	22	4,075	37	9,204		
April	-	432	5,538	-	4,947	4	10,921		
May	-	390	5,882	18	5,687	9	11,986		
June	-	366	6,650	10	5,416	12	12,455		
July	-	249	7,021	3	6,148	2	13,424		
August	-	368	6,231	18	5,366	18	12,002		
September	-	337	5,762	28	5,819	31	11,976		
October	-	336	5,565	16	6,132	23	12,072		
November	-	294	4,790	10	4,413	41	9,549		
December	-	183	3,002	6	2,320	13	5,523		
Total	-	3,723	63,229	157	57,260	200	124,569		
Peak Month	-	432	7,021	27	6,148	41	13,424		
Pear Month Percent	0.0%	11.6%	11.1%	18.0%	10.7%	20.7%	10.8%		

(a) Percent of the time that tower is operated. Daytime is defined as 7 am to 10 pm and nighttime as 10 pm to 7 am.
(b) Tower operations reported in FAA ATADS data base.
(c) Raw tower operations divided by percentage of daytime coverage.
(d) Nightime operations from ANOMS data. Non-touch and go operations allocated proportionately to itinerant categories. Touch and go operations allocated proportionately to local operations.
(e) Monthly distribution of nighttime operations assumed to be the same as the monthly distribution of adjusted daytime operations in each category.
(f) Adjusted daytime operations plus estimated nighttime operations.

Source: FAA, ATADS database and HNTB analysis.

Table B.9

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

2007 Aircraft Operations by Month: St. Paul Downtown

Month	Air Carrier	Air Taxi	GA Itinerant	Military Itinerant	GA Local	Military Local	Total	Tower Coverage (a) Daytime	Tower Coverage (a) Nighttime
				Raw Tower Count (b)					
January	-	932	4,509	492	2,940	458	9,331	100.0%	7.9%
February	-	906	4,078	426	2,651	497	8,558	100.0%	7.9%
March	-	942	5,140	385	2,998	332	9,797	100.0%	7.9%
April	-	961	5,200	313	2,568	358	9,400	100.0%	7.9%
May	-	1,238	6,014	374	2,888	366	10,880	100.0%	7.9%
June	-	959	5,711	214	2,978	200	10,062	100.0%	7.9%
July	-	975	5,702	306	3,372	342	10,697	100.0%	7.9%
August	-	1,139	6,092	243	3,098	184	10,756	100.0%	7.9%
September	-	972	6,013	264	2,872	236	10,357	100.0%	7.9%
October	-	1,123	6,240	351	3,642	252	11,608	100.0%	7.9%
November	-	891	5,302	256	2,844	150	9,443	100.0%	7.9%
December	-	813	3,985	258	1,624	408	7,088	100.0%	7.9%
Total	-	11,851	63,986	3,882	34,475	3,783	117,977		
				Adjusted for Missing Daytime Coverage (c)					
January	-	932	4,509	492	2,940	458	9,331		
February	-	906	4,078	426	2,651	497	8,558		
March	-	942	5,140	385	2,998	332	9,797		
April	-	961	5,200	313	2,568	358	9,400		
May	-	1,238	6,014	374	2,888	366	10,880		
June	-	959	5,711	214	2,978	200	10,062		
July	-	975	5,702	306	3,372	342	10,697		
August	-	1,139	6,092	243	3,098	184	10,756		
September	-	972	6,013	264	2,872	236	10,357		
October	-	1,123	6,240	351	3,642	252	11,608		
November	-	891	5,302	256	2,844	150	9,443		
December	-	813	3,985	258	1,624	408	7,088		
Total	-	11,851	63,986	3,882	34,475	3,783	117,977		
								Non T&G	**Touch&Go**
Total Nighttime Operations (d)	-	976	5,269	320	1,207	133	7,905	6565	1340
				Estimated Additional Nighttime Operations (e)					
January	-	71	342	37	95	15	559		
February	-	69	309	32	85	16	512		
March	-	71	390	29	97	11	598		
April	-	73	394	24	83	12	585		
May	-	94	456	28	93	12	683		
June	-	73	433	16	96	6	624		
July	-	74	432	23	109	11	649		
August	-	86	462	18	100	6	672		
September	-	74	456	20	93	8	650		
October	-	85	473	27	117	8	710		
November	-	68	402	19	92	5	585		
December	-	62	302	20	52	13	449		
Total	-	898	4,851	294	1,112	122	7,278		
				Estimated Total Operations (f)					
January	-	1,003	4,851	529	3,035	473	9,890		
February	-	975	4,387	458	2,736	513	9,070		
March	-	1,013	5,530	414	3,095	343	10,395		
April	-	1,034	5,594	337	2,651	370	9,985		
May	-	1,332	6,470	402	2,981	378	11,563		
June	-	1,032	6,144	230	3,074	206	10,686		
July	-	1,049	6,134	329	3,481	353	11,346		
August	-	1,225	6,554	261	3,198	190	11,428		
September	-	1,046	6,469	284	2,965	244	11,007		
October	-	1,208	6,713	378	3,759	260	12,318		
November	-	959	5,704	275	2,936	155	10,028		
December	-	875	4,287	278	1,676	421	7,537		
Total	-	12,749	68,837	4,176	35,587	3,905	125,255		
Peak Month	-	1,332	6,713	492	3,759	513	12,318		
Peak Month Percent	0.0%	10.4%	9.8%	12.7%	10.6%	13.1%	9.8%		

(a) Percent of the time that tower is operated. Daytime is defined as 7 am to 10 pm and nighttime as 10 pm to 7 am.

(b) Tower operations reported in FAA ATADS data base.

(c) Raw tower operations divided by percentage of daytime coverage.

(d) Nighttime operations from ANOMS data. Non-touch and go operations allocated proportionately to itinerant categories. Touch and go operations allocated proportionately to local operations.

(e) Monthly distribution of nighttime operations assumed to be the same as the monthly distribution of adjusted daytime operations in each category. Estimated additional nighttime operations adjusted downward by percent of nighttime tower coverage to avoid double-counting nighttime operations already included in ATADS counts.

(f) Adjusted daytime operations plus estimated nighttime operations.

Source: FAA ATADS database and HNTB analysis.

Table C.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

General Aviation Operating Cost Adjustment Factors

	Fuel&Oil (a)	Total (b)	2001	2005	2006	2007	2008	2010	2015	2020	2025
Unadjusted Case											
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (c)			25.79	47.21	59.95	60.78	86.35	75.26	73.36	80.36	87.22
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (e)			30.97	51.66	63.27	62.67	86.35	72.09	62.72	61.32	59.40
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	359.5	343.4	332.8	331.2	329.1
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	794.4	744.0	710.9	705.9	699.1
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2007.5	1892.7	1817.3	1806.1	1790.6
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	3734.7	3496.1	3339.3	3315.9	3283.8
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	5512.6	5174.4	4952.0	4918.8	4873.2
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	719.5	701.3	689.3	687.5	685.1
Adjusted Case											
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (g)			25.79	47.21	59.95	60.78	118.14	123.33	138.17	154.82	173.47
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (h)			30.97	51.66	63.27	62.67	118.14	118.14	118.14	118.14	118.14
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	395.3	395.3	395.3	395.3	395.3
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	906.8	906.8	906.8	906.8	906.8
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2263.3	2263.3	2263.3	2263.3	2263.3
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	4266.6	4266.6	4266.6	4266.6	4266.6
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	6266.9	6266.9	6266.9	6266.9	6266.9
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	760.2	760.2	760.2	760.2	760.2
Price Elasticity (I)											
Single Engine Piston								-2.00	-2.00	-2.00	-2.00
Multi Engine Piston								-1.00	-1.00	-1.00	-1.00
Turboprop								-1.00	-1.00	-1.00	-1.00
Microjet								-0.80	-0.80	-0.80	-0.80
Jet								-0.80	-0.80	-0.80	-0.80
Helicopter								-1.00	-1.00	-1.00	-1.00
Adjustment Factors (J)											
Single Engine Piston								0.754	0.709	0.702	0.693
Multi Engine Piston								0.821	0.784	0.779	0.771
Turboprop								0.836	0.803	0.798	0.791
Microjet								0.853	0.822	0.817	0.811
Jet								0.858	0.828	0.824	0.818
Helicopter								0.923	0.907	0.904	0.901

(a) Average hourly fuel and oil costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(b) Total hourly costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(c) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(d) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(e) Refiners' Acquisition Cost coverted to 2007 prices using CPI index.
(f) Fuel and oil component of hourly cost assumed to increase with real Refiners' Acquisition Cost. Other hourly costs assumed to remain constant.
(g) Adjusted Refiners' Acquisition Cost converted to nominal prices using CPI Index.
(h) Real Refiners' Acquisition Cost assumed to be same as Energy Information Administration's estimate for May 2008.
(i) Estimated price elasticity from FAA Airport Benefit-Cost Analysis Guidance, December 15, 1999. Table C.2 in Appendix C.
(j) Calculated using following formula:

$$AF = (AC/UC)^E$$

where:

AF = Adjustment Factor
AC = Adjusted hourly cost
UC = Undadjusted hourly cost
E = elasticity.

Sources: As noted and HNTB analysis.

Table C.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Fuel Cost Adjustments to FAA Forecast of US Active Aircraft

Year	Unadjusted U.S. Active Aircraft (a)	Estimated Unadjusted Retired Aircraft (b)	Unadjusted New Aircraft (c)	Adjustment Factor (d)	Adjusted New Aircraft (e)	Adjusted Retired Aircraft (f)	Adjusted U.S. Active Aircraft (g)
				Single Engine Piston Aircraft			
2005	148,101						148,101
2007	144,580						144,580
2010	144,015	8,675	8,110	0.754	6,119	8,675	142,024
2015	145,620	14,402	16,007	0.709	11,344	14,202	139,166
2020	150,035	14,562	18,977	0.702	13,322	13,917	138,571
2025	157,400	15,004	22,369	0.693	15,498	13,857	140,213
				Multi Engine Piston Aircraft			
2005	19,412						19,412
2007	18,555						18,555
2010	18,055	1,113	613	0.821	503	1,113	17,945
2015	17,245	1,806	996	0.784	780	1,794	16,931
2020	16,455	1,725	935	0.779	728	1,693	15,965
2025	15,650	1,646	841	0.771	648	1,597	15,017
				Turboprop Aircraft			
2005	7,942						7,942
2007	8,190						8,190
2010	8,565	491	866	0.836	725	491	8,423
2015	9,310	857	1,602	0.803	1,286	842	8,867
2020	10,110	931	1,731	0.798	1,381	887	9,361
2025	10,820	1,011	1,721	0.791	1,362	936	9,787
				Microjets			
2005	-						-
2007	143						143
2010	1,395	-	1,252	0.853	1,068	-	1,211
2015	3,645	-	2,250	0.822	1,849	-	3,060
2020	5,895	365	2,615	0.817	2,137	306	4,891
2025	8,145	590	2,840	0.811	2,303	489	6,705
				Other Jet Aircraft			
2005	9,823						9,823
2007	10,854						10,854
2010	12,825	651	2,622	0.858	2,250	651	12,452
2015	16,200	1,283	4,658	0.828	3,858	1,245	15,065

Table C.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Fuel Cost Adjustments to FAA Forecast of US Active Aircraft

Year	Unadjusted U.S. Active Aircraft (a)	Estimated Unadjusted Retired Aircraft (b)	Unadjusted New Aircraft (c)	Adjustment Factor (d)	Adjusted New Aircraft (e)	Adjusted Retired Aircraft (f)	Adjusted U.S. Active Aircraft (g)
2020	19,005	1,620	4,425	0.824	3,645	1,506	17,204
2025	21,370	1,901	4,266	0.818	3,488	1,720	18,972
				Helicopters			
2005	8,728						8,728
2007	9,685						9,685
2010	11,300	581	2,196	0.923	2,026	581	11,130
2015	13,545	1,130	3,375	0.907	3,060	1,113	13,077
2020	15,210	1,355	3,020	0.904	2,731	1,308	14,501
2025	16,855	1,521	3,166	0.901	2,853	1,450	15,904
				Other Aircraft			
2005	30,256						30,256
2007	33,000						33,000
2010	38,395	1,980	7,375	0.754	5,564	1,980	36,584
2015	46,720	3,840	12,165	0.709	8,621	3,658	41,547
2020	52,230	4,672	10,182	0.702	7,148	4,155	44,540
2025	56,260	5,223	9,253	0.693	6,411	4,454	46,498
				Total Aircraft			
2005	224,262						224,262
2007	225,007						225,007
2010	234,550						229,769
2015	252,285						237,713
2020	268,940						245,034
2025	286,500						253,094

(a) FAA Aerospace Forecasts: Fiscal Years 2008-2025.
(b) Existing aircraft assumed to be retired at a rate of 2 percent per year. See text for details.
(c) New aircraft estimated by subtracting previous year's forecast level from current year's forecast level and then subtracting estimated retirements.
(d) Table C.1.
(e) Unadjsted new aircraft multiplied by adjustment factor.
(f) Retirement factor of 2 percent per year applied to adjusted U.S. active aircraft total.
(g) Previous year's total plus adjusted new aircraft less adjusted retired aircraft.

Sources: As noted and HNTB analysis.

Table C.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Fuel Cost Adjustments to FAA Forecasts of Hours Flown by U.S. General Aviation Aircraft

Year	Unadjusted Forecast (a)	Adjustment Factor (b)	Adjusted Forecast (c)
		Single Engine Piston Aircraft	
2007	13,501	1.0000	13,501
2010	13,301	0.7545	10,035
2015	13,516	0.7087	9,579
2020	14,618	0.7020	10,262
2025	16,233	0.6929	11,247
		Multi Engine Piston Aircraft	
2007	2,527	1.0000	2,527
2010	2,418	0.8205	1,984
2015	2,076	0.7840	1,628
2020	2,010	0.7785	1,565
2025	2,035	0.7710	1,569
		Turboprop Aircraft	
2007	2,187	1.0000	2,187
2010	2,283	0.8363	1,909
2015	2,458	0.8030	1,974
2020	2,567	0.7980	2,048
2025	2,698	0.7912	2,135
		Microjets	
2007	57	1.0000	57
2010	1,211	0.8527	1,032
2015	3,060	0.8220	2,515
2020	4,891	0.8174	3,998
2025	6,705	0.8110	5,438
		Other Jet Aircraft	
2007	4,348	1.0000	4,348
2010	5,004	0.8579	4,293
2015	7,064	0.8283	5,851
2020	8,636	0.8238	7,115
2025	10,038	0.8177	8,209
		Helicopters	
2007	3,629	1.0000	3,629
2010	4,190	0.9226	3,866
2015	4,996	0.9068	4,530
2020	5,639	0.9044	5,100
2025	6,295	0.9012	5,673
		Other Aircraft	
2007	1,616	1.0000	1,616
2010	1,898	0.7545	1,432
2015	2,456	0.7087	1,741
2020	2,907	0.7020	2,041
2025	3,308	0.6929	2,292
		Total Aircraft	
2007	27,865	-	27,865
2010	30,305	-	24,552
2015	35,626	-	27,818
2020	41,268	-	32,129
2025	47,312	-	36,562

(a) FAA Aerospace Forecasts: Fiscal Years 2008-2025.
(b) Table C.1.
(c) Unadjusted flight hours multiplied by adjustment factor.

Sources: As noted and HNTB analysis.

Table C.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Historical Registered Aircraft at Met Council Counties

Year	Seven County Income Share (a)	Based AC to US Active Ratio (b)	Regional Aircraft Ratio Divided by Income Share (c)	Index (d)
1999	0.0119	0.0086	0.7250	
2000	0.0120	0.0084	0.6998	
2001	0.0119	0.0082	0.6924	
2002	0.0119	0.0084	0.7020	
2003	0.0119	0.0086	0.7235	118.6
2004	0.0120	0.0080	0.6706	
2005	0.0118	0.0078	0.6578	107.8
2006	0.0116	0.0077	0.6647	
2007	0.0117	0.0071	0.6100	100.0
2010	0.0117		0.6334	99.2
2015	0.0118		0.5974	93.6
2020	0.0120		0.5634	88.3
2025	0.0121		0.5314	83.3

(a) Seven county share of U.S. income from Table 1.

(b) Table B.2 in Appendix B.

(c) Ratio of Based Aircraft to US Active Aircraft divided by income share. Assumed to continue to change at historical trends.

(d) Ratio of Based Aircraft to US Activie Aircraft divided by income share converted in index in which 2007 equals 100.

Sources: As noted and HNTB analysis.

Table D.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Anoka County and Based at MAC Airports

Year	US Income (a)	Anoka Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
			Single Engine Piston Aircraft			
2005	$10,568,865,149	$11,404,951	100.1	148,101	108	
2007	$11,168,155,374	$12,038,763	100.0	144,580	100	159
2010	$11,767,442,497	$13,518,004	106.6	142,024	99	165
2015	$13,140,580,376	$15,279,365	107.9	139,166	94	155
2020	$14,697,043,513	$17,279,137	109.1	138,571	88	147
2025	$16,464,153,733	$19,168,137	108.0	140,213	83	139
			Multi Engine Piston Aircraft			
2005	$10,568,865,149	$11,404,951	100.1	19,412	108	
2007	$11,168,155,374	$12,038,763	100.0	18,555	100	18
2010	$11,767,442,497	$13,518,004	106.6	17,945	99	18
2015	$13,140,580,376	$15,279,365	107.9	16,931	94	17
2020	$14,697,043,513	$17,279,137	109.1	15,965	88	15
2025	$16,464,153,733	$19,168,137	108.0	15,017	83	13
			Turboprop Aircraft			
2005	$10,568,865,149	$11,404,951	100.1	7,942	108	
2007	$11,168,155,374	$12,038,763	100.0	8,190	100	2
2010	$11,767,442,497	$13,518,004	106.6	8,423	99	2
2015	$13,140,580,376	$15,279,365	107.9	8,867	94	2
2020	$14,697,043,513	$17,279,137	109.1	9,361	88	2
2025	$16,464,153,733	$19,168,137	108.0	9,787	83	2
			Microjets			
2005	$10,568,865,149	$11,404,951	100.1	-	108	0
2007	$11,168,155,374	$12,038,763	100.0	143	100	1
2010	$11,767,442,497	$13,518,004	106.6	1,211	99	1
2015	$13,140,580,376	$15,279,365	107.9	3,060	94	2
2020	$14,697,043,513	$17,279,137	109.1	4,891	88	4
2025	$16,464,153,733	$19,168,137	108.0	6,705	83	5
			Other Jet Aircraft			
2005	$10,568,865,149	$11,404,951	100.1	9,823	108	
2007	$11,168,155,374	$12,038,763	100.0	10,854	100	1

Table D.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Anoka County and Based at MAC Airports

Year	US Income (a)	Anoka Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767,442.497	$13,518,004	106.6	12,452	99	1
2015	$13,140,580,376	$15,279,365	107.9	15,065	94	1
2020	$14,697,043,513	$17,279,137	109.1	17,204	88	2
2025	$16.464,153,733	$19,168,137	108.0	18,972	83	2
			Helicopters			
2005	$10,568,865,149	$11,404,951	100.1	8,728	108	
2007	$11,168,155,374	$12,038,763	100.0	9,685	100	4
2010	$11,767,442,497	$13,518,004	106.6	11,130	99	5
2015	$13,140,580,376	$15,279,365	107.9	13,077	94	5
2020	$14,697,043,513	$17,279,137	109.1	14,501	88	6
2025	$16,464,153,733	$19,168,137	108.0	15,904	83	6
			Other Aircraft			
2005	$10,568,865,149	$11,404,951	100.1	30,256	108	
2007	$11,168,155,374	$12,038,763	100.0	33,000	100	0
2010	$11,767,442,497	$13,518,004	106.6	36,584	99	0
2015	$13,140,580,376	$15,279,365	107.9	41,547	94	0
2020	$14,697,043,513	$17,279,137	109.1	44,540	88	0
2025	$16,464,153,733	$19,168.137	108.0	46,498	83	0
			Total Aircraft			
2005						
2007						185
2010						192
2015						182
2020						176
2025						167

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Carver County and Based at MAC Airports

Year	US Income (a)	Carver Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$3,905,705	96.8	148,101	119	
2007	$11,168,155,374	$4,261,618	100.0	144,580	100	19
2010	$11,767,442,497	$4,743,825	105.6	142,024	99	20
2015	$13,140,580,376	$6.153,455	122.7	139,166	94	21
2020	$14,697,043,513	$7,728,849	137.8	138,571	88	22
2025	$16.464,153.733	$9.105,310	144.9	140,213	83	22
		Multi Engine Piston Aircraft				
2005	$10.568,865,149	$3.905,705	96.8	19,412	119	
2007	$11,168,155,374	$4,261,618	100.0	18,555	100	1
2010	$11,767,442,497	$4,743,825	105.6	17,945	99	1
2015	$13,140,580,376	$6,153.455	122.7	16,931	94	1
2020	$14,697,043,513	$7,728,849	137.8	15,965	88	1
2025	$16,464,153,733	$9,105.310	144.9	15,017	83	1
		Turboprop Aircraft				
2005	$10,568,865,149	$3,905,705	96.8	7,942	119	
2007	$11,168,155,374	$4,261,618	100.0	8,190	100	1
2010	$11,767,442,497	$4,743,825	105.6	8,423	99	1
2015	$13,140,580,376	$6,153,455	122.7	8,867	94	1
2020	$14,697,043,513	$7,728,849	137.8	9,361	88	1
2025	$16,464,153,733	$9,105,310	144.9	9,787	83	1
		Microjets				
2005	$10,568,865,149	$3,905,705	96.8	-	119	
2007	$11,168,155,374	$4,261,618	100.0	143	100	0
2010	$11,767,442,497	$4,743,825	105.6	1,211	99	0
2015	$13,140,580,376	$6,153,455	122.7	3,060	94	0
2020	$14,697,043,513	$7,728,849	137.8	4,891	88	0
2025	$16,464,153,733	$9,105,310	144.9	6,705	83	0
		Other Jet Aircraft				
2005	$10,568,865,149	$3,905,705	96.8	9,823	119	
2007	$11,168,155,374	$4,261,618	100.0	10,854	100	0

Table D.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Carver County and Based at MAC Airports

Year	US Income (a)	Carver Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767.442,497	$4,743,825	105.6	12,452	99	0
2015	$13,140,580,376	$6,153,455	122.7	15,065	94	0
2020	$14,697,043,513	$7,728,849	137.8	17,204	88	0
2025	$16,464,153,733	$9,105.310	144.9	18,972	83	0
			Helicopters			
2005	$10,568,865,149	$3,905,705	96.8	8,728	119	
2007	$11,168,155,374	$4,261,618	100.0	9,685	100	0
2010	$11,767.442,497	$4,743,825	105.6	11,130	99	0
2015	$13,140,580,376	$6,153,455	122.7	13,077	94	0
2020	$14,697.043,513	$7,728,849	137.8	14,501	88	0
2025	$16,464,153,733	$9.105,310	144.9	15,904	83	0
			Other Aircraft			
2005	$10,568,865,149	$3,905,705	96.8	30,256	119	
2007	$11,168,155,374	$4,261,618	100.0	33,000	100	0
2010	$11.767,442,497	$4,743,825	105.6	36,584	99	0
2015	$13,140,580,376	$6,153,455	122.7	41,547	94	0
2020	$14,697,043,513	$7,728,849	137.8	44,540	88	0
2025	$16,464,153,733	$9,105,310	144.9	46,498	83	0
			Total Aircraft			
2005						
2007						21
2010						22
2015						23
2020						24
2025						24

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Dakota County and Based at MAC Airports

Year	US Income (a)	Dakota Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$16,355,470	100.7	148.101	119	
2007	$11,168,155,374	$17.161.109	100.0	144,580	100	130
2010	$11,767,442,497	$18,762,619	103.8	142,024	99	132
2015	$13,140,580,376	$21,574,365	106.8	139,166	94	125
2020	$14,697,043,513	$24,742,396	109.6	138,571	88	121
2025	$16,464.153,733	$27,981,239	110.6	140,213	83	116
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$16,355,470	100.7	19,412	119	
2007	$11,168,155,374	$17,161,109	100.0	18,555	100	14
2010	$11,767,442,497	$18,762,619	103.8	17,945	99	14
2015	$13,140,580,376	$21,574,365	106.8	16,931	94	13
2020	$14,697,043,513	$24,742.396	109.6	15,965	88	12
2025	$16,464,153.733	$27,981,239	110.6	15,017	83	10
		Turboprop Aircraft				
2005	$10,568,865,149	$16,355,470	100.7	7,942	119	
2007	$11,168,155,374	$17,161,109	100.0	8,190	100	0
2010	$11,767,442,497	$18,762,619	103.8	8,423	99	0
2015	$13,140,580,376	$21,574,365	106.8	8,867	94	0
2020	$14,697,043,513	$24,742,396	109.6	9,361	88	0
2025	$16,464,153,733	$27,981,239	110.6	9,787	83	0
		Microjets				
2005	$10,568,865,149	$16,355,470	100.7	-	119	
2007	$11,168,155,374	$17,161,109	100.0	143	100	0
2010	$11,767,442,497	$18,762,619	103.8	1,211	99	0
2015	$13,140,580,376	$21,574,365	106.8	3,060	94	1
2020	$14,697,043,513	$24,742,396	109.6	4,891	88	2
2025	$16,464,153,733	$27,981,239	110.6	6,705	83	2
		Other Jet Aircraft				
2005	$10,568,865.149	$16,355,470	100.7	9,823	119	
2007	$11,168,155,374	$17,161,109	100.0	10,854	100	6

Table D.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Dakota County and Based at MAC Airports

Year	US Income (a)	Dakota Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767,442,497	$18,762,619	103.8	12,452	99	7
2015	$13,140,580,376	$21,574,365	106.8	15,065	94	8
2020	$14,697,043.513	$24,742,396	109.6	17,204	88	9
2025	$16,464,153,733	$27,981,239	110.6	18,972	83	10
			Helicopters			
2005	$10,568,865,149	$16,355,470	100.7	8,728	119	
2007	$11,168,155,374	$17,161,109	100.0	9,685	100	0
2010	$11,767,442,497	$18,762,619	103.8	11,130	99	0
2015	$13,140,580,376	$21,574,365	106.8	13,077	94	0
2020	$14,697,043,513	$24,742,396	109.6	14,501	88	0
2025	$16,464.153,733	$27,981,239	110.6	15,904	83	0
			Other Aircraft			
2005	$10,568,865,149	$16,355,470	100.7	30,256	119	
2007	$11,168,155,374	$17,161,109	100.0	33,000	100	0
2010	$11,767,442,497	$18,762,619	103.8	36,584	99	0
2015	$13,140,580,376	$21,574,365	106.8	41,547	94	0
2020	$14,697,043,513	$24,742,396	109.6	44.540	88	0
2025	$16,464,153,733	$27,981,239	110.6	46,498	83	0
			Total Aircraft			
2005						
2007						150
2010						153
2015						147
2020						144
2025						138

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Hennepin County and Based at MAC Airports

Year	US Income (a)	Hennepin Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$58,278,620	102.6	148,101	119	
2007	$11,168,155,374	$59,997,720	100.0	144,580	100	507
2010	$11,767,442,497	$60,833,494	96.2	142,024	99	476
2015	$13,140,580,376	$67,681,996	95.9	139,166	94	438
2020	$14,697,043,513	$75,407,540	95.5	138,571	88	410
2025	$16,464,153,733	$84,752,688	95.8	140,213	83	392
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$58,278,620	102.6	19,412	119	
2007	$11,168,155,374	$59,997,720	100.0	18,555	100	47
2010	$11,767,442,497	$60,833,494	96.2	17,945	99	43
2015	$13,140,580,376	$67,681,996	95.9	16,931	94	38
2020	$14,697,043,513	$75,407,540	95.5	15,965	88	34
2025	$16,464,153,733	$84,752,688	95.8	15,017	83	30
		Turboprop Aircraft				
2005	$10,568,865,149	$58,278,620	102.6	7,942	119	
2007	$11,168,155,374	$59,997,720	100.0	8,190	100	25
2010	$11,767,442,497	$60,833,494	96.2	8,423	99	25
2015	$13,140,580,376	$67,681,996	95.9	8,867	94	24
2020	$14,697,043,513	$75,407,540	95.5	9,361	88	24
2025	$16,464,153,733	$84,752,688	95.8	9,787	83	24
		Microjets				
2005	$10,568,865,149	$58,278,620	102.6	-	119	
2007	$11,168,155,374	$59,997,720	100.0	143	100	0
2010	$11,767,442,497	$60,833,494	96.2	1,211	99	5
2015	$13,140,580,376	$67,681,996	95.9	3,060	94	12
2020	$14,697,043,513	$75,407,540	95.5	4,891	88	18
2025	$16,464,153,733	$84,752,688	95.8	6,705	83	23
		Other Jet Aircraft				
2005	$10,568,865,149	$58,278,620	102.6	9,823	119	
2007	$11,168,155,374	$59,997,720	100.0	10,854	100	56

Table D.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Hennepin County and Based at MAC Airports

Year	US Income (a)	Hennepin Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767,442,497	$60,833,494	96.2	12,452	99	61
2015	$13,140,580,376	$67,681,996	95.9	15,065	94	70
2020	$14,697,043,513	$75,407,540	95.5	17,204	88	75
2025	$16,464,153,733	$84,752,688	95.8	18,972	83	78
			Helicopters			
2005	$10,568,865,149	$58,278,620	102.6	8,728	119	
2007	$11,168,155,374	$59,997,720	100.0	9,685	100	9
2010	$11,767,442,497	$60,833,494	96.2	11,130	99	10
2015	$13,140,580,376	$67,681,996	95.9	13,077	94	11
2020	$14,697,043,513	$75,407,540	95.5	14,501	88	11
2025	$16,464,153,733	$84,752,688	95.8	15,904	83	12
			Other Aircraft			
2005	$10,568,865,149	$58,278,620	102.6	30,256	119	
2007	$11,168,155,374	$59,997,720	100.0	33,000	100	0
2010	$11,767,442,497	$60,833,494	96.2	36,584	99	0
2015	$13,140,580,376	$67,681,996	95.9	41,547	94	0
2020	$14,697,043,513	$75,407,540	95.5	44,540	88	0
2025	$16,464,153,733	$84,752,688	95.8	46,498	83	0
			Total Aircraft			
2005						
2007						644
2010						620
2015						593
2020						572
2025						559

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Ramsey County and Based at MAC Airports

Year	US Income (a)	Ramsey Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$20,897,566	101.8	148,101	119	
2007	$11,168,155,374	$21,686,605	100.0	144,580	100	176
2010	$11,767,442,497	$22,829,400	99.9	142,024	99	171
2015	$13,140,580,376	$25,205,886	98.8	139,166	94	157
2020	$14,697,043,513	$27,880,498	97.7	138,571	88	145
2025	$16,464,153,733	$31,505,682	98.5	140,213	83	140
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$20,897,566	101.8	19,412	119	
2007	$11,168,155,374	$21,686,605	100.0	18,555	100	15
2010	$11,767,442,497	$22,829,400	99.9	17,945	99	14
2015	$13,140,580,376	$25,205,886	98.8	16,931	94	13
2020	$14,697,043,513	$27,880,498	97.7	15,965	88	11
2025	$16,464,153,733	$31,505,682	98.5	15,017	83	10
		Turboprop Aircraft				
2005	$10,568,865,149	$20,897,566	101.8	7,942	119	
2007	$11,168,155,374	$21,686,605	100.0	8,190	100	5
2010	$11,767,442,497	$22,829,400	99.9	8,423	99	5
2015	$13,140,580,376	$25,205,886	98.8	8,867	94	5
2020	$14,697,043,513	$27,880,498	97.7	9,361	88	5
2025	$16,464,153,733	$31,505,682	98.5	9,787	83	5
		Microjets				
2005	$10,568,865,149	$20,897,566	101.8	-	119	
2007	$11,168,155,374	$21,686,605	100.0	143	100	0
2010	$11,767,442,497	$22,829,400	99.9	1,211	99	2
2015	$13,140,580,376	$25,205,886	98.8	3,060	94	4
2020	$14,697,043,513	$27,880,498	97.7	4,891	88	6
2025	$16,464,153,733	$31,505,682	98.5	6,705	83	7
		Other Jet Aircraft				
2005	$10,568,865,149	$20,897,566	101.8	9,823	119	
2007	$11,168,155,374	$21,686,605	100.0	10,854	100	19

Table D.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Ramsey County and Based at MAC Airports

Year	US Income (a)	Ramsey Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767,442,497	$22,829,400	99.9	12,452	99	22
2015	$13,140,580,376	$25,205,886	98.8	15,065	94	24
2020	$14,697,043,513	$27,880,498	97.7	17,204	88	26
2025	$16,464,153,733	$31,505,682	98.5	18,972	83	27
			Helicopters			
2005	$10,568,865,149	$20,897,566	101.8	8,728	119	
2007	$11,168,155,374	$21,686,605	100.0	9,685	100	6
2010	$11,767,442,497	$22,829,400	99.9	11,130	99	7
2015	$13,140,580,376	$25,205,886	98.8	13,077	94	7
2020	$14,697,043,513	$27,880.498	97.7	14,501	88	8
2025	$16,464,153,733	$31,505,682	98.5	15,904	83	8
			Other Aircraft			
2005	$10,568,865.149	$20,897,566	101.8	30,256	119	
2007	$11,168,155,374	$21,686,605	100.0	33,000	100	1
2010	$11,767,442,497	$22,829,400	99.9	36,584	99	1
2015	$13,140,580,376	$25,205,886	98.8	41,547	94	1
2020	$14,697,043,513	$27,880,498	97.7	44,540	88	1
2025	$16,464,153,733	$31,505,682	98.5	46,498	83	1
			Total Aircraft			
2005						
2007						222
2010						222
2015						211
2020						202
2025						198

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Scott County and Based at MAC Airports

Year	US Income (a)	Scott Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$4,371,509	97.8	148,101	119	
2007	$11,168,155,374	$4,725,339	100.0	144,580	100	50
2010	$11,767,442,497	$5,306,839	106.6	142,024	99	52
2015	$13,140,580,376	$6,402,165	115.1	139,166	94	52
2020	$14,697,043,513	$7,639,811	122.9	138,571	88	52
2025	$16,464,153,733	$9,060,680	130.1	140,213	83	53
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$4,371,509	97.8	19,412	119	
2007	$11,168,155,374	$4,725,339	100.0	18,555	100	4
2010	$11,767,442,497	$5,306,839	106.6	17,945	99	4
2015	$13,140,580,376	$6,402,165	115.1	16,931	94	4
2020	$14,697,043,513	$7,639,811	122.9	15,965	88	4
2025	$16,464,153,733	$9,060,680	130.1	15,017	83	4
		Turboprop Aircraft				
2005	$10,568,865,149	$4,371,509	97.8	7,942	119	
2007	$11,168,155,374	$4,725,339	100.0	8,190	100	1
2010	$11,767,442,497	$5,306,839	106.6	8,423	99	1
2015	$13,140,580,376	$6,402,165	115.1	8,867	94	1
2020	$14,697,043,513	$7,639,811	122.9	9,361	88	1
2025	$16,464,153,733	$9,060,680	130.1	9,787	83	1
		MicroJets				
2005	$10,568,865,149	$4,371,509	97.8	-	119	
2007	$11,168,155,374	$4,725,339	100.0	143	100	0
2010	$11,767,442,497	$5,306,839	106.6	1,211	99	0
2015	$13,140,580,376	$6,402,165	115.1	3,060	94	0
2020	$14,697,043,513	$7,639,811	122.9	4,891	88	0
2025	$16,464,153,733	$9,060,680	130.1	6,705	83	0
		Other Jet Aircraft				
2005	$10,568,865,149	$4,371,509	97.8	9,823	119	
2007	$11,168,155,374	$4,725,339	100.0	10,854	100	0

Table D.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Scott County and Based at MAC Airports

Year	US Income (a)	Scott Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11.767,442,497	$5,306,839	106.6	12,452	99	0
2015	$13,140,580,376	$6,402,165	115.1	15,065	94	0
2020	$14,697,043,513	$7,639,811	122.9	17,204	88	0
2025	$16,464,153,733	$9,060,680	130.1	18,972	83	0
			Helicopters			
2005	$10,568,865,149	$4,371,509	97.8	8,728	119	
2007	$11,168,155.374	$4.725,339	100.0	9,685	100	0
2010	$11,767,442,497	$5,306,839	106.6	11,130	99	0
2015	$13,140,580,376	$6,402,165	115.1	13,077	94	0
2020	$14,697,043,513	$7,639,811	122.9	14,501	88	0
2025	$16,464,153,733	$9,060,680	130.1	15,904	83	0
			Other Aircraft			
2005	$10,568,865,149	$4,371,509	97.8	30,256	119	
2007	$11,168,155,374	$4,725,339	100.0	33,000	100	0
2010	$11,767,442,497	$5,306,839	106.6	36,584	99	0
2015	$13,140,580,376	$6,402,165	115.1	41,547	94	0
2020	$14,697,043,513	$7,639,811	122.9	44,540	88	0
2025	$16,464,153,733	$9,060,680	130.1	46,498	83	0
			Total Aircraft			
2005						
2007						55
2010						57
2015						57
2020						57
2025						58

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Washington County and Based at MAC Airports

Year	US Income (a)	Washington Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$9,613,791	98.5	148,101	119	
2007	$11,168,155,374	$10,310,930	100.0	144,580	100	150
2010	$11,767,442,497	$11.527,008	106.1	142,024	99	155
2015	$13,140,580,376	$13,369,595	110.2	139,166	94	149
2020	$14,697,043,513	$15,476,238	114.1	138,571	88	145
2025	$16,464,153,733	$17,945,490	118.1	140,213	83	143
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$9,613.791	98.5	19,412	119	
2007	$11,168,155,374	$10,310,930	100.0	18,555	100	10
2010	$11,767,442,497	$11,527,008	106.1	17,945	99	10
2015	$13,140,580,376	$13,369.595	110.2	16,931	94	9
2020	$14,697,043,513	$15,476,238	114.1	15,965	88	9
2025	$16,464,153,733	$17,945,490	118.1	15,017	83	8
		Turboprop Aircraft				
2005	$10,568,865,149	$9,613,791	98.5	7,942	119	
2007	$11,168,155,374	$10,310,930	100.0	8,190	100	0
2010	$11,767,442,497	$11,527,008	106.1	8,423	99	0
2015	$13,140,580,376	$13,369,595	110.2	8,867	94	0
2020	$14,697,043,513	$15,476,238	114.1	9,361	88	0
2025	$16,464,153,733	$17,945,490	118.1	9,787	83	0
		Microjets				
2005	$10,568,865,149	$9,613,791	98.5	-	119	
2007	$11.168,155,374	$10,310,930	100.0	143	100	0
2010	$11,767,442,497	$11,527,008	106.1	1,211	99	0
2015	$13,140,580,376	$13,369,595	110.2	3,060	94	0
2020	$14,697,043,513	$15,476,238	114.1	4,891	88	0
2025	$16,464,153,733	$17,945,490	118.1	6,705	83	0
		Other Jet Aircraft				
2005	$10,568,865,149	$9,613,791	98.5	9,823	119	
2007	$11,168,155,374	$10,310,930	100.0	10,854	100	1

Table D.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Washington County and Based at MAC Airports

Year	US Income (a)	Washington Cty Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11,767,442,497	$11,527,008	106.1	12,452	99	1
2015	$13,140,580,376	$13,369,595	110.2	15,065	94	1
2020	$14,697,043,513	$15,476,238	114.1	17,204	88	2
2025	$16,464,153,733	$17,945,490	118.1	18,972	83	2
			Helicopters			
2005	$10,568,865,149	$9,613,791	98.5	8,728	119	
2007	$11,168,155,374	$10,310,930	100.0	9,685	100	2
2010	$11,767,442,497	$11,527,008	106.1	11,130	99	2
2015	$13,140,580,376	$13,369,595	110.2	13,077	94	3
2020	$14,697,043,513	$15,476,238	114.1	14,501	88	3
2025	$16,464,153,733	$17,945,490	118.1	15,904	83	3
			Other Aircraft			
2005	$10,568,865,149	$9,613,791	98.5	30,256	119	
2007	$11,168,155,374	$10,310,930	100.0	33,000	100	2
2010	$11,767,442,497	$11,527,008	106.1	36,584	99	2
2015	$13,140,580,376	$13,369,595	110.2	41,547	94	3
2020	$14,697,043,513	$15,476,238	114.1	44,540	88	3
2025	$16,464,153,733	$17,945,490	118.1	46,498	83	3
			Total Aircraft			
2003						
2005						165
2010						170
2015						165
2020						162
2025						159

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table D.8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Non-Met Council Counties and Based at MAC Airports

Year	US Income (a)	US Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
		Single Engine Piston Aircraft				
2005	$10,568,865,149	$10,568,865,149	100.0	148,101	119	
2007	$11,168,155,374	$11,168,155,374	100.0	144,580	100	111
2010	$11.767,442,497	$11.767,442,497	100.0	142,024	99	108
2015	$13,140,580,376	$13,140,580,376	100.0	139,166	94	100
2020	$14,697,043,513	$14,697,043,513	100.0	138,571	88	94
2025	$16,464,153,733	$16,464,153,733	100.0	140,213	83	90
		Multi Engine Piston Aircraft				
2005	$10,568,865,149	$10,568,865,149	100.0	19,412	119	
2007	$11,168,155,374	$11,168,155,374	100.0	18,555	100	19
2010	$11,767,442,497	$11,767,442.497	100.0	17,945	99	18
2015	$13,140,580,376	$13,140,580,376	100.0	16,931	94	16
2020	$14,697,043,513	$14,697,043,513	100.0	15,965	88	14
2025	$16,464,153,733	$16.464,153,733	100.0	15,017	83	13
		Turboprop Aircraft				
2005	$10,568,865,149	$10,568,865,149	100.0	7,942	119	
2007	$11,168,155,374	$11,168,155,374	100.0	8,190	100	2
2010	$11,767,442.497	$11,767.442,497	100.0	8,423	99	2
2015	$13,140,580,376	$13,140,580,376	100.0	8,867	94	2
2020	$14,697,043,513	$14,697,043,513	100.0	9,361	88	2
2025	$16,464,153,733	$16,464,153,733	100.0	9,787	83	2
		MicroJets				
2005	$10,568,865,149	$10,568,865,149	100.0	-	119	
2007	$11,168,155,374	$11,168,155,374	100.0	143	100	0
2010	$11,767,442,497	$11,767,442,497	100.0	1,211	99	1
2015	$13,140,580,376	$13,140,580,376	100.0	3,060	94	3
2020	$14,697,043,513	$14,697,043,513	100.0	4,891	88	4
2025	$16,464,153,733	$16,464,153,733	100.0	6,705	83	6
		Other Jet Aircraft				
2005	$10,568,865,149	$10,568,865,149	100.0	9,823	119	
2007	$11,168,155,374	$11,168,155,374	100.0	10,854	100	17

Table D.8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Forecast of Based Aircraft Registered in Non-Met Council Counties and Based at MAC Airports

Year	US Income (a)	US Income (b)	Income Index (c)	US Active Aircraft (d)	Based AC Index (e)	Based AC (f)
2010	$11.767,442,497	$11,767,442,497	100.0	12,452	99	19
2015	$13,140,580,376	$13,140,580.376	100.0	15,065	94	22
2020	$14,697.043,513	$14,697,043,513	100.0	17,204	88	24
2025	$16,464,153,733	$16,464,153,733	100.0	18,972	83	25
			Helicopters			
2005	$10,568,865,149	$10,568,865,149	100.0	8,728	119	
2007	$11,168,155,374	$11,168,155,374	100.0	9.685	100	8
2010	$11,767,442,497	$11,767,442,497	100.0	11,130	99	9
2015	$13,140,580,376	$13,140,580,376	100.0	13,077	94	10
2020	$14,697,043.513	$14,697,043,513	100.0	14,501	88	11
2025	$16,464,153,733	$16,464,153,733	100.0	15,904	83	11
			Other Aircraft			
2005	$10,568,865,149	$10,568.865,149	100.0	30,256	119	
2007	$11,168,155,374	$11,168,155,374	100.0	33.000	100	1
2010	$11,767,442,497	$11,767,442,497	100.0	36,584	99	1
2015	$13,140,580,376	$13,140,580,376	100.0	41,547	94	1
2020	$14,697,043.513	$14,697,043,513	100.0	44,540	88	1
2025	$16,464,153,733	$16,464,153,733	100.0	46,498	83	1
			Total Aircraft			
2005						
2007						158
2010						158
2015						154
2020						150
2025						148

(a) Table 1.
(b) Table 1.
(c) County income as share of U.S. income, with 2007 share indexed to equal 100.
(d) Table C.2 in Appendix C.
(e) Table C.4 in Appendix C.
(f) Projected to increase at same rate as U.S. Active Aircraft in that category adjusted by income index and based aircraft index.

Sources: As noted and HNTB analysis.

Table E.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Total Aircraft (a)					
Crystal	6	3	2	181	19	1	1	19	232
Airlake	0	1	107	15	3	22	0	17	165
Lake Elmo	1	0	11	8	50	0	147	16	233
Anoka County/Blaine - Janes Field	184	1	8	92	97	2	14	37	435
Flying Cloud	1	17	22	283	4	32	2	50	411
MSP	0	0	0	14	0	0	0	13	27
St. Paul Downtown-Holman Field	0	0	3	27	49	0	6	6	91
Total MAC Airports	192	22	153	620	222	57	170	158	1594
				Total Aircraft - Distribution					
Crystal	0.0313	0.1364	0.0131	0.2919	0.0856	0.0175	0.0059	0.1203	0.1455
Airlake	0.0000	0.0455	0.6993	0.0242	0.0135	0.3860	0.0000	0.1076	0.1035
Lake Elmo	0.0052	0.0000	0.0719	0.0129	0.2252	0.0000	0.8647	0.1013	0.1462
Anoka County/Blaine - Janes Field	0.9583	0.0455	0.0523	0.1484	0.4369	0.0351	0.0824	0.2342	0.2729
Flying Cloud	0.0052	0.7727	0.1438	0.4565	0.0180	0.5614	0.0118	0.3165	0.2578
MSP	0.0000	0.0000	0.0000	0.0226	0.0000	0.0000	0.0000	0.0823	0.0169
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0196	0.0435	0.2207	0.0000	0.0353	0.0380	0.0571
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Single Engine Piston (b)					
Crystal	6	3	2	162	18	1	1	18	211
Airlake	0	1	93	15	3	20	0	16	148
Lake Elmo	1	0	11	8	49	0	136	14	219
Anoka County/Blaine - Janes Field	158	1	5	69	84	2	13	24	356
Flying Cloud	0	15	19	219	3	29	2	35	322
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	3	14	0	3	1	23
Total MAC Airports (c)	165	20	132	476	171	52	155	108	1279
				Single Engine Piston Aircraft - Distribution (d)					
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622	0.1650
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441	0.1157
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261	0.1712
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252	0.2783
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333	0.2518
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090	0.0180
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Multi-Engine Piston (b)					
Crystal	0	0	0	10	1	0	0	0	11
Airlake	0	0	10	0	0	1	0	0	11
Lake Elmo	0	0	0	0	1	0	7	2	10
Anoka County/Blaine - Janes Field	18	0	3	9	7	0	1	10	48
Flying Cloud	0	1	1	23	1	3	0	6	35
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	4	0	2	0	7
Total MAC Airports (c)	18	1	14	43	14	4	10	18	122
				Multi Engine Piston Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000	0.0902
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000	0.0902
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053	0.0820
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789	0.3934
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158	0.2869
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000	0.0574
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table E.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Turboprop (b)					
Crystal	0	0	0	1	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	6
Flying Cloud	1	1	0	18	0	0	0	0	20
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	8
Total MAC Airports (c)	2	1	0	25	5	1	0	2	36
				Turboprop Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000	0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000	0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000	0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
				Microjets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	1	0	0	0	0	2
Flying Cloud	0	0	0	2	0	0	0	1	3
MSP	0	0	0	1	0	0	0	0	1
St. Paul Downtown-Holman Field	0	0	0	1	2	0	0	0	3
Total MAC Airports (c)	1	0	0	5	2	0	0	1	9
				Microjet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088	0.2222
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588	0.3333
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529	0.1111
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794	0.3333
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000	1.0000
				Other Jets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	4
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	8	1	0	0	2	12
Flying Cloud	0	0	2	20	0	0	0	3	25
MSP	0	0	0	13	0	0	0	13	26
St. Paul Downtown-Holman Field	0	0	1	20	21	0	1	1	44
Total MAC Airports (c)	1	0	7	61	22	0	1	19	111
				Other Jet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0360
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176	0.1081
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176	0.2252
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059	0.2342
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588	0.3964
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table E.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Helicopter (b)					
Crystal	0	0	0	8	0	0	0	1	9
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	2	0	2
Anoka County/Blaine - Janes Field	5	0	0	1	4	0	0	0	10
Flying Cloud	0	0	0	1	0	0	0	5	6
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	3	0	0	3	6
Total MAC Airports (c)	5	0	0	10	7	0	2	9	33
				Helicopter - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250	0.2727
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0606
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000	0.3030
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000	0.1818
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750	0.1818
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
				Other (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	1
Lake Elmo	0	0	0	0	0	0	2	0	2
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports (c)	0	0	0	0	1	0	2	1	4
				Other Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total MAC Airports (c)	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000

(a) Sum of forecasts for individual aircraft categories.
(b) Total MAC based aircraft in county multiplied by distribution going to each airport.
(c) Appendix D.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table E.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2015

Airport	County of Registration								
	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Total
				Total Aircraft (a)					
Crystal	6	3	2	168	18	1	1	17	216
Airlake	0	1	101	14	3	22	0	15	156
Lake Elmo	1	0	11	7	46	0	142	15	222
Anoka County/Blaine - Janes Field	174	1	8	89	90	2	14	37	415
Flying Cloud	1	18	22	268	4	32	2	46	393
MSP	0	0	0	16	0	0	0	16	32
St. Paul Downtown-Holman Field	0	0	3	31	50	0	6	8	98
Total MAC Airports	182	23	147	593	211	57	165	154	1532
				Total Aircraft - Distribution					
Crystal	0.0330	0.1304	0.0136	0.2833	0.0853	0.0175	0.0061	0.1104	0.1410
Airlake	0.0000	0.0435	0.6871	0.0236	0.0142	0.3860	0.0000	0.0974	0.1018
Lake Elmo	0.0055	0.0000	0.0748	0.0118	0.2180	0.0000	0.8606	0.0974	0.1449
Anoka County/Blaine - Janes Field	0.9560	0.0435	0.0544	0.1501	0.4265	0.0351	0.0848	0.2403	0.2709
Flying Cloud	0.0055	0.7826	0.1497	0.4519	0.0190	0.5614	0.0121	0.2987	0.2565
MSP	0.0000	0.0000	0.0000	0.0270	0.0000	0.0000	0.0000	0.1039	0.0209
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0204	0.0523	0.2370	0.0000	0.0364	0.0519	0.0640
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Single Engine Piston (b)					
Crystal	6	3	2	149	17	1	1	16	195
Airlake	0	1	87	14	3	20	0	14	139
Lake Elmo	1	0	11	7	45	0	130	13	207
Anoka County/Blaine - Janes Field	148	1	5	64	77	2	13	23	333
Flying Cloud	0	16	18	201	3	29	2	33	302
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	3	12	0	3	1	21
Total MAC Airports (c)	155	21	125	438	157	52	149	100	1197
				Single Engine Piston Aircraft - Distribution (d)					
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622	0.1629
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441	0.1161
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261	0.1729
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252	0.2782
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333	0.2523
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090	0.0175
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Multi-Engine Piston (b)					
Crystal	0	0	0	9	1	0	0	0	10
Airlake	0	0	9	0	0	1	0	0	10
Lake Elmo	0	0	0	0	1	0	6	2	9
Anoka County/Blaine - Janes Field	17	0	3	8	7	0	1	9	45
Flying Cloud	0	1	1	20	1	3	0	5	31
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	6
Total MAC Airports (c)	17	1	13	38	13	4	9	16	111
				Multi Engine Piston Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000	0.0901
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000	0.0901
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053	0.0811
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789	0.4054
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158	0.2793
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000	0.0541
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table E.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2015

	County of Registration								
Airport	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Total
				Turboprop (b)					
Crystal	0	0	0	1	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	6
Flying Cloud	1	1	0	17	0	0	0	0	19
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	8
Total MAC Airports (c)	2	1	0	24	5	1	0	2	35
				Turboprop Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0286
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0286
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000	0.1714
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000	0.5429
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000	0.2286
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
				Microjets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	3	0	0	0	1	6
Flying Cloud	0	0	0	6	0	0	0	0	6
MSP	0	0	0	1	0	0	0	1	2
St. Paul Downtown-Holman Field	0	0	0	2	4	0	0	1	7
Total MAC Airports (c)	2	0	1	12	4	0	0	3	22
				Microjet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0455
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088	0.2727
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588	0.2727
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529	0.0909
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794	0.3182
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000	1.0000
				Other Jets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	4
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	9	1	0	0	3	14
Flying Cloud	0	0	3	23	0	0	0	3	29
MSP	0	0	0	15	0	0	0	15	30
St. Paul Downtown-Holman Field	0	0	1	23	23	0	1	1	49
Total MAC Airports (c)	1	0	8	70	24	0	1	22	126
				Other Jet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0317
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176	0.1111
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176	0.2302
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059	0.2381
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588	0.3889
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table E.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2015

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Helicopter (b)					
Crystal	0	0	0	9	0	0	0	1	10
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	5	0	0	1	4	0	0	0	10
Flying Cloud	0	0	0	1	0	0	0	5	6
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	3	0	0	4	7
Total MAC Airports (c)	5	0	0	11	7	0	3	10	36
				Helicopter - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250	0.2778
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0833
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000	0.2778
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000	0.1667
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750	0.1944
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
				Other (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	1
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports (c)	0	0	0	0	1	0	3	1	5
				Other Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.2000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.6000
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000

(a) Sum of forecasts for individual aircraft categories.
(b) Total MAC based aircraft in county multiplied by distribution going to each airport.
(c) Appendix D.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table E.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2020

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Total Aircraft (a)					
Crystal	6	3	2	158	17	1	1	16	204
Airlake	0	1	97	13	2	22	0	15	150
Lake Elmo	1	0	10	6	42	0	138	13	210
Anoka County/Blaine - Janes Field	167	1	8	84	83	2	14	35	394
Flying Cloud	2	19	23	260	3	32	2	44	385
MSP	0	0	0	18	0	0	0	19	37
St. Paul Downtown-Holman Field	0	0	4	33	55	0	7	8	107
Total MAC Airports	176	24	144	572	202	57	162	150	1487
				Total Aircraft - Distribution					
Crystal	0.0341	0.1250	0.0139	0.2762	0.0842	0.0175	0.0062	0.1067	0.1372
Airlake	0.0000	0.0417	0.6736	0.0227	0.0099	0.3860	0.0000	0.1000	0.1009
Lake Elmo	0.0057	0.0000	0.0694	0.0105	0.2079	0.0000	0.8519	0.0867	0.1412
Anoka County/Blaine - Janes Field	0.9489	0.0417	0.0556	0.1469	0.4109	0.0351	0.0864	0.2333	0.2650
Flying Cloud	0.0114	0.7917	0.1597	0.4545	0.0149	0.5614	0.0123	0.2933	0.2589
MSP	0.0000	0.0000	0.0000	0.0315	0.0000	0.0000	0.0000	0.1267	0.0249
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0278	0.0577	0.2723	0.0000	0.0432	0.0533	0.0720
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Single Engine Piston (b)					
Crystal	6	3	2	140	16	1	1	15	184
Airlake	0	1	84	13	2	20	0	14	134
Lake Elmo	1	0	10	6	41	0	126	12	196
Anoka County/Blaine - Janes Field	140	1	5	60	72	2	13	21	314
Flying Cloud	0	17	18	189	2	29	2	31	288
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	2	12	0	3	1	20
Total MAC Airports (c)	147	22	121	410	145	52	145	94	1136
				Single Engine Piston Aircraft - Distribution (d)					
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622	0.1620
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441	0.1180
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261	0.1725
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252	0.2764
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333	0.2535
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090	0.0176
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Multi-Engine Piston (b)					
Crystal	0	0	0	8	1	0	0	0	9
Airlake	0	0	8	0	0	1	0	0	9
Lake Elmo	0	0	0	0	1	0	6	1	8
Anoka County/Blaine - Janes Field	15	0	3	7	5	0	1	9	40
Flying Cloud	0	1	1	18	1	3	0	4	28
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	6
Total MAC Airports (c)	15	1	12	34	11	4	9	14	100
				Multi Engine Piston Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000	0.0900
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000	0.0900
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053	0.0800
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789	0.4000
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158	0.2800
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000	0.0600
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table E.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2020

	County of Registration								
Airport	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Total
				Turboprop (b)					
Crystal	0	0	0	1	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	6
Flying Cloud	1	1	0	17	0	0	0	0	19
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	8
Total MAC Airports (c)	2	1	0	24	5	1	0	2	35
				Turboprop Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0286
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0286
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000	0.1714
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000	0.5429
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000	0.2286
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
				Microjets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	3	0	0	3	0	0	0	1	7
Flying Cloud	1	0	1	9	0	0	0	0	11
MSP	0	0	0	2	0	0	0	2	4
St. Paul Downtown-Holman Field	0	0	0	4	6	0	0	1	11
Total MAC Airports (c)	4	0	2	18	6	0	0	4	34
				Microjet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0294
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088	0.2059
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588	0.3235
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529	0.1176
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794	0.3235
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000	1.0000
				Other Jets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	4
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	9	1	0	0	3	15
Flying Cloud	0	0	3	26	0	0	0	3	32
MSP	0	0	0	16	0	0	0	17	33
St. Paul Downtown-Holman Field	0	0	2	24	25	0	2	1	54
Total MAC Airports (c)	2	0	9	75	26	0	2	24	138
				Other Jet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0290
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176	0.1087
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176	0.2319
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059	0.2391
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588	0.3913
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table E.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2020

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Helicopter (b)					
Crystal	0	0	0	9	0	0	0	1	10
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	6	0	0	1	4	0	0	0	11
Flying Cloud	0	0	0	1	0	0	0	6	7
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	4	0	0	4	8
Total MAC Airports (c)	6	0	0	11	8	0	3	11	39
				Helicopter - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250	0.2564
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0769
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000	0.2821
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000	0.1795
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750	0.2051
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
				Other (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	1
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports (c)	0	0	0	0	1	0	3	1	5
				Other Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.2000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.6000
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000

(a) Sum of forecasts for individual aircraft categories.
(b) Total MAC based aircraft in county multiplied by distribution going to each airport.
(c) Appendix D.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table E.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2025

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Total Aircraft (a)					
Crystal	5	3	2	152	16	1	1	16	196
Airlake	0	1	94	12	2	22	0	14	145
Lake Elmo	1	0	10	6	41	0	136	12	206
Anoka County/Blaine - Janes Field	159	1	6	81	80	2	13	34	376
Flying Cloud	2	19	22	254	3	33	2	43	378
MSP	0	0	0	19	0	0	0	20	39
St. Paul Downtown-Holman Field	0	0	4	35	56	0	7	9	111
Total MAC Airports	167	24	138	559	198	58	159	148	1451
				Total Aircraft - Distribution					
Crystal	0.0299	0.1250	0.0145	0.2719	0.0808	0.0172	0.0063	0.1081	0.1351
Airlake	0.0000	0.0417	0.6812	0.0215	0.0101	0.3793	0.0000	0.0946	0.0999
Lake Elmo	0.0060	0.0000	0.0725	0.0107	0.2071	0.0000	0.8553	0.0811	0.1420
Anoka County/Blaine - Janes Field	0.9521	0.0417	0.0435	0.1449	0.4040	0.0345	0.0818	0.2297	0.2591
Flying Cloud	0.0120	0.7917	0.1594	0.4544	0.0152	0.5690	0.0126	0.2905	0.2605
MSP	0.0000	0.0000	0.0000	0.0340	0.0000	0.0000	0.0000	0.1351	0.0269
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0290	0.0626	0.2828	0.0000	0.0440	0.0608	0.0765
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Single Engine Piston (b)					
Crystal	5	3	2	134	15	1	1	15	176
Airlake	0	1	81	12	2	20	0	13	129
Lake Elmo	1	0	10	6	40	0	125	11	193
Anoka County/Blaine - Janes Field	133	1	4	57	70	2	12	20	299
Flying Cloud	0	17	17	181	2	30	2	30	279
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	2	11	0	3	1	19
Total MAC Airports (c)	139	22	116	392	140	53	143	90	1095
				Single Engine Piston Aircraft - Distribution (d)					
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622	0.1607
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441	0.1178
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261	0.1763
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252	0.2731
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333	0.2548
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090	0.0174
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
				Multi-Engine Piston (b)					
Crystal	0	0	0	7	1	0	0	0	8
Airlake	0	0	7	0	0	1	0	0	8
Lake Elmo	0	0	0	0	1	0	5	1	7
Anoka County/Blaine - Janes Field	13	0	2	6	4	0	1	8	34
Flying Cloud	0	1	1	16	1	3	0	4	26
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	6
Total MAC Airports (c)	13	1	10	30	10	4	8	13	89
				Multi Engine Piston Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000	0.0899
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000	0.0899
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053	0.0787
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789	0.3820
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158	0.2921
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000	0.0674
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table E.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2025

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Turboprop (b)					
Crystal	0	0	0	1	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	6
Flying Cloud	1	1	0	17	0	0	0	0	19
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	8
Total MAC Airports (c)	2	1	0	24	5	1	0	2	35
				Turboprop Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0286
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0286
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000	0.1714
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000	0.5429
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000	0.2286
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
				Microjets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	4	0	0	3	0	0	0	2	9
Flying Cloud	1	0	1	13	0	0	0	0	15
MSP	0	0	0	2	0	0	0	2	4
St. Paul Downtown-Holman Field	0	0	0	5	7	0	0	2	14
Total MAC Airports (c)	5	0	2	23	7	0	0	6	43
				Microjet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088	0.2093
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588	0.3488
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529	0.0930
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794	0.3256
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000	1.0000
				Other Jets (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	5	0	0	0	0	0	5
Lake Elmo	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	10	1	0	0	3	16
Flying Cloud	0	0	3	26	0	0	0	3	32
MSP	0	0	0	17	0	0	0	18	35
St. Paul Downtown-Holman Field	0	0	2	25	26	0	2	1	56
Total MAC Airports (c)	2	0	10	78	27	0	2	25	144
				Other Jet Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0347
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176	0.1111
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176	0.2222
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059	0.2431
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588	0.3889
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

Table E.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Unconstrained Distribution of Based Aircraft by Airport and County: 2025

	County of Registration								
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Total**
				Helicopter (b)					
Crystal	0	0	0	10	0	0	0	1	11
Airlake	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	6	0	0	1	4	0	0	0	11
Flying Cloud	0	0	0	1	0	0	0	6	7
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	4	0	0	4	8
Total MAC Airports (c)	6	0	0	12	8	0	3	11	40
				Helicopter - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250	0.2750
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0750
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000	0.2750
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000	0.1750
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750	0.2000
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
				Other (b)					
Crystal	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	1
Lake Elmo	0	0	0	0	0	0	3	0	3
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0
Total MAC Airports (c)	0	0	0	0	1	0	3	1	5
				Other Aircraft - Distribution (d)					
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.2000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.6000
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000

(a) Sum of forecasts for individual aircraft categories.
(b) Total MAC based aircraft in county multiplied by distribution going to each airport.
(c) Appendix D.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table F.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Estimated Distribution of Aircraft on Waiting Lists

	Total post 2002 (a)	90% of total (b)	SEP	MEP	TP	Microjets	Other Jet	HEL	Other	Total
			Estimated Distribution by Type (c)							
Crystal	59	53	49	2	0	0	0	2	0	53
Airlake	61	55	50	4	0	0	1	0	0	55
Lake Elmo	43	39	35	2	0	0	0	1	1	39
Anoka	41	37	26	4	1	1	4	1	0	37
Flying Cloud	18	16	8	1	1	1	4	1	0	16
Holman Field	10	9	0	1	1	1	5	1	0	9
Total			168	14	3	3	14	6	1	209
			Distribution of Existing Based Aircraft by Type (d)							
Crystal			195	10	1	0	0	10	0	216
Airlake			139	10	1	1	4	0	1	156
Lake Elmo			207	9	0	0	0	3	3	222
Anoka			333	45	8	7	49	7	0	449
Flying Cloud			302	31	35	22	126	36	5	557
Holman Field			21	6	8	7	49	7	0	98

(a) Metropolitan Airports Commission.
(b) Assumed that 90 percent of aircraft on waiting list would be attracted under unconstrained conditions. See text for details.
(c) Distribution of aircraft on waiting list by type assumed to be the same as projection of 2015 unconstrained based aircraft at each airport.
(d) Table E-2 in Appendix E. Assumes new aircraft reflect 2015 fleet mix.

Sources: As noted and HNTB analysis.

Table F.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Total Aircraft (b)						
Crystal	6	3	2	181	19	1	1	19	29	261
Airlake	0	1	107	15	3	22	0	17	30	195
Lake Elmo	1	0	11	8	50	0	147	16	20	253
Anoka County/Blaine - Janes Field	184	1	8	92	97	2	14	37	20	455
Flying Cloud	1	17	22	283	4	32	2	50	9	420
MSP	0	0	0	14	0	0	0	13	0	27
St. Paul Downtown-Holman Field	0	0	3	27	49	0	6	6	4	95
Total MAC Airports	192	22	153	620	222	57	170	158	112	1706
				Total Aircraft - Distribution						
Crystal	0.0313	0.1364	0.0131	0.2919	0.0856	0.0175	0.0059	0.1203		0.1530
Airlake	0.0000	0.0455	0.6993	0.0242	0.0135	0.3860	0.0000	0.1076		0.1143
Lake Elmo	0.0052	0.0000	0.0719	0.0129	0.2252	0.0000	0.8647	0.1013		0.1483
Anoka County/Blaine - Janes Field	0.9583	0.0455	0.0523	0.1484	0.4369	0.0351	0.0824	0.2342		0.2667
Flying Cloud	0.0052	0.7727	0.1438	0.4565	0.0180	0.5614	0.0118	0.3165		0.2462
MSP	0.0000	0.0000	0.0000	0.0226	0.0000	0.0000	0.0000	0.0823		0.0158
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0196	0.0435	0.2207	0.0000	0.0353	0.0380		0.0557
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Single Engine Piston (c)						
Crystal	6	3	2	162	18	1	1	18	27	238
Airlake	0	1	93	15	3	20	0	16	27	175
Lake Elmo	1	0	11	8	49	0	136	14	19	238
Anoka County/Blaine - Janes Field	158	1	5	69	84	2	13	24	14	370
Flying Cloud	0	15	19	219	3	29	2	35	4	326
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	3	14	0	3	1	0	23
Total MAC Airports	165	20	132	476	171	52	155	108	91	1370
				Single Engine Piston Aircraft - Distribution (d)						
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622		0.1713
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441		0.1121
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261		0.1651
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252		0.2757
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333		0.2581
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090		0.0177
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Multi-Engine Piston (c)						
Crystal	0	0	0	10	1	0	0	0	1	12
Airlake	0	0	10	0	0	1	0	0	2	13
Lake Elmo	0	0	0	0	1	0	7	2	1	11
Anoka County/Blaine - Janes Field	18	0	3	9	7	0	1	10	2	50
Flying Cloud	0	1	1	23	1	3	0	6	1	36
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	4	0	2	0	1	8
Total MAC Airports	18	1	14	43	14	4	10	18	8	130
				Multi Engine Piston Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000		0.0938
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000		0.0859
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053		0.0781
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789		0.3984
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158		0.2891
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000		0.0547
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000

Table F.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Turboprop (c)						
Crystal	0	0	0	1	0	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	1	7
Flying Cloud	1	1	0	18	0	0	0	0	1	21
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	1	9
Total MAC Airports	2	1	0	25	5	1	0	2	3	39
				Turboprop Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000		0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000		0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000		0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000		0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000		0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000		1.0000
				Microjets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	1	0	0	0	0	0	2
Flying Cloud	0	0	0	2	0	0	0	1	0	3
MSP	0	0	0	1	0	0	0	0	0	1
St. Paul Downtown-Holman Field	0	0	0	1	2	0	0	0	0	3
Total MAC Airports	1	0	0	5	2	0	0	1	0	9
				Microjet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000		0.0139
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000		0.0289
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088		0.1383
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588		0.3928
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529		0.1200
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794		0.3061
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000		1.0000
				Other Jets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	1	5
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	8	1	0	0	2	2	14
Flying Cloud	0	0	2	20	0	0	0	3	2	27
MSP	0	0	0	13	0	0	0	13	0	26
St. Paul Downtown-Holman Field	0	0	1	20	21	0	1	1	2	46
Total MAC Airports	1	0	7	61	22	0	1	19	7	118
				Other Jet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0300
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176		0.1100
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176		0.2300
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059		0.2400
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588		0.3900
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000

Table F.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2010

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Helicopter (c)						
Crystal	0	0	0	8	0	0	0	1	1	10
Airlake	0	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	2	0	0	2
Anoka County/Blaine - Janes Field	5	0	0	1	4	0	0	0	1	11
Flying Cloud	0	0	0	1	0	0	0	5	1	7
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	3	0	0	3	0	6
Total MAC Airports	5	0	0	10	7	0	2	9	3	36
				Helicopter - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250		0.2759
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.0690
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000		0.2759
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000		0.1724
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750		0.2069
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000
				Other (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	0	1
Lake Elmo	0	0	0	0	0	0	2	0	0	2
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0	0
Total MAC Airports	0	0	0	0	1	0	2	1	0	4
				Other Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000		0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000		0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000		1.0000

(a) Assumed to increase at same rate as total based aircraft in category.
(b) Sum of forecasts for individual aircraft categories.
(c) Unconstrained aircraft from Appendix E with aircraft that cannot be accommodated at MSP or Holman Field redistributed. See text for details.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table F.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2015

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Total Aircraft (b)						
Crystal	6	3	2	168	18	1	1	17	53	269
Airlake	0	1	101	14	3	22	0	15	55	211
Lake Elmo	1	0	11	7	46	0	142	15	39	261
Anoka County/Blaine - Janes Field	174	1	8	89	90	2	14	37	37	452
Flying Cloud	1	18	22	270	4	32	2	46	16	411
MSP	0	0	0	14	0	0	0	16	0	30
St. Paul Downtown-Holman Field	0	0	3	31	50	0	6	8	9	107
Total MAC Airports	182	23	147	593	211	57	165	154	209	1741
				Total Aircraft - Distribution						
Crystal	0.0330	0.1304	0.0136	0.2833	0.0853	0.0175	0.0061	0.1104		0.1545
Airlake	0.0000	0.0435	0.6871	0.0236	0.0142	0.3860	0.0000	0.0974		0.1212
Lake Elmo	0.0055	0.0000	0.0748	0.0118	0.2180	0.0000	0.8606	0.0974		0.1499
Anoka County/Blaine - Janes Field	0.9560	0.0435	0.0544	0.1501	0.4265	0.0351	0.0848	0.2403		0.2596
Flying Cloud	0.0055	0.7826	0.1497	0.4553	0.0190	0.5614	0.0121	0.2987		0.2361
MSP	0.0000	0.0000	0.0000	0.0236	0.0000	0.0000	0.0000	0.1039		0.0172
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0204	0.0523	0.2370	0.0000	0.0364	0.0519		0.0615
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Single Engine Piston (c)						
Crystal	6	3	2	149	17	1	1	16	49	244
Airlake	0	1	87	14	3	20	0	14	50	189
Lake Elmo	1	0	11	7	45	0	130	13	35	242
Anoka County/Blaine - Janes Field	148	1	5	64	77	2	13	23	26	359
Flying Cloud	0	16	18	201	3	29	2	33	8	310
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	3	12	0	3	1	0	21
Total MAC Airports	155	21	125	438	157	52	149	100	168	1365
	155	**21**	**125**	**438**	**157**	**52**	**149**	**100**		
				Single Engine Piston Aircraft - Distribution (d)						
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622		0.1713
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441		0.1121
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261		0.1651
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252		0.2757
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333		0.2581
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090		0.0177
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Multi-Engine Piston (c)						
Crystal	0	0	0	9	1	0	0	0	2	12
Airlake	0	0	9	0	0	1	0	0	4	14
Lake Elmo	0	0	0	0	1	0	6	2	2	11
Anoka County/Blaine - Janes Field	17	0	3	8	7	0	1	9	4	49
Flying Cloud	0	1	1	20	1	3	0	5	1	32
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	1	7
Total MAC Airports	17	1	13	38	13	4	9	16	14	125
	17	**1**	**13**	**38**	**13**	**4**	**9**	**16**		
				Multi Engine Piston Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000		0.0938
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000		0.0859
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053		0.0781
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789		0.3984
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158		0.2891
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000		0.0547
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000

Table F.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2015

Airport	County of Registration									
	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Wait List (a)	Total
				Turboprop (c)						
Crystal	0	0	0	1	0	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	1	7
Flying Cloud	1	1	0	17	0	0	0	0	1	20
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	1	9
Total MAC Airports	2	1	0	24	5	1	0	2	3	38
	2	1	0	24	5	1	0	2		
				Turboprop Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000		0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000		0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000		0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000		0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000		0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000		1.0000
				Microjets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	3	0	0	0	1	1	7
Flying Cloud	0	0	0	7	0	0	0	0	1	8
MSP	0	0	0	0	0	0	0	1	0	1
St. Paul Downtown-Holman Field	0	0	0	2	4	0	0	1	1	8
Total MAC Airports	2	0	1	12	4	0	0	3	3	25
	2	0	1	12	4	0	0	3		
				Microjet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000		0.0139
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000		0.0289
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088		0.1383
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588		0.3928
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529		0.1200
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794		0.3061
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000		1.0000
				Other Jets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	1	5
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	9	1	0	0	3	4	18
Flying Cloud	0	0	3	24	0	0	0	3	4	34
MSP	0	0	0	14	0	0	0	15	0	29
St. Paul Downtown-Holman Field	0	0	1	23	23	0	1	1	5	54
Total MAC Airports	1	0	8	70	24	0	1	22	14	140
	1	0	8	70	24	0	1	22		
				Other Jet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0300
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176		0.1100
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176		0.2300
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059		0.2400
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588		0.3900
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000

Table F.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2015

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Helicopter (c)						
Crystal	0	0	0	9	0	0	0	1	2	12
Airlake	0	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	5	0	0	1	4	0	0	0	1	11
Flying Cloud	0	0	0	1	0	0	0	5	1	7
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	3	0	0	4	1	8
Total MAC Airports	5	0	0	11	7	0	3	10	6	42
	5	0	0	11	7	0	3	10		
				Helicopter - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250		0.2759
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.0690
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000		0.2759
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000		0.1724
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750		0.2069
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000
				Other (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	0	1
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0	0
Total MAC Airports	0	0	0	0	1	0	3	1	1	6
	0	0	0	0	1	0	3	1		
				Other Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000		0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000		0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000		1.0000

(a) Assumed to increase at same rate as total based aircraft in category.
(b) Sum of forecasts for individual aircraft categories.
(c) Unconstrained aircraft from Appendix E with aircraft that cannot be accommodated at MSP or Holman Field redistributed. See text for details.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table F.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2020

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Total Aircraft (b)						
Crystal	6	3	2	158	17	1	1	16	50	254
Airlake	0	1	97	13	2	22	0	15	53	203
Lake Elmo	1	0	10	6	42	0	138	13	37	247
Anoka County/Blaine - Janes Field	167	1	8	85	83	2	14	37	36	433
Flying Cloud	2	19	23	262	3	32	2	46	17	406
MSP	0	0	0	15	0	0	0	15	0	30
St. Paul Downtown-Holman Field	0	0	4	33	55	0	7	8	11	118
Total MAC Airports	176	24	144	572	202	57	162	150	204	1691
				Total Aircraft - Distribution						
Crystal	0.0341	0.1250	0.0139	0.2762	0.0842	0.0175	0.0062	0.1067		0.1502
Airlake	0.0000	0.0417	0.6736	0.0227	0.0099	0.3860	0.0000	0.1000		0.1200
Lake Elmo	0.0057	0.0000	0.0694	0.0105	0.2079	0.0000	0.8519	0.0867		0.1461
Anoka County/Blaine - Janes Field	0.9489	0.0417	0.0556	0.1486	0.4109	0.0351	0.0864	0.2467		0.2561
Flying Cloud	0.0114	0.7917	0.1597	0.4580	0.0149	0.5614	0.0123	0.3067		0.2401
MSP	0.0000	0.0000	0.0000	0.0262	0.0000	0.0000	0.0000	0.1000		0.0177
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0278	0.0577	0.2723	0.0000	0.0432	0.0533		0.0698
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Single Engine Piston (c)						
Crystal	6	3	2	140	16	1	1	15	46	230
Airlake	0	1	84	13	2	20	0	14	48	182
Lake Elmo	1	0	10	6	41	0	126	12	33	229
Anoka County/Blaine - Janes Field	140	1	5	60	72	2	13	21	25	339
Flying Cloud	0	17	18	189	2	29	2	31	8	296
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	2	12	0	3	1	0	20
Total MAC Airports	147	22	121	410	145	52	145	94	160	1296
	147	22	121	410	145	52	145	94		
				Single Engine Piston Aircraft - Distribution (d)						
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622		0.1713
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441		0.1121
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261		0.1651
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252		0.2757
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333		0.2581
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090		0.0177
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Multi-Engine Piston (c)						
Crystal	0	0	0	8	1	0	0	0	2	11
Airlake	0	0	8	0	0	1	0	0	4	13
Lake Elmo	0	0	0	0	1	0	6	1	2	10
Anoka County/Blaine - Janes Field	15	0	3	7	5	0	1	9	4	44
Flying Cloud	0	1	1	18	1	3	0	4	1	29
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	1	7
Total MAC Airports	15	1	12	34	11	4	9	14	14	114
	15	1	12	34	11	4	9	14		
				Multi Engine Piston Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000		0.0938
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000		0.0859
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053		0.0781
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789		0.3984
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158		0.2891
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000		0.0547
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000

Table F.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2020

Airport	County of Registration									
	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Wait List (a)	Total
				Turboprop (c)						
Crystal	0	0	0	1	0	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	1	7
Flying Cloud	1	1	0	17	0	0	0	0	1	20
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	1	9
Total MAC Airports	2	1	0	24	5	1	0	2	3	38
	2	1	0	24	5	1	0	2		
				Turboprop Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000		0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000		0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000		0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000		0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000		0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000		1.0000
				Microjets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	3	0	0	3	0	0	0	2	1	9
Flying Cloud	1	0	1	10	0	0	0	1	2	15
MSP	0	0	0	1	0	0	0	0	0	1
St. Paul Downtown-Holman Field	0	0	0	4	6	0	0	1	2	13
Total MAC Airports	4	0	2	18	6	0	0	4	5	39
	4	0	2	18	6	0	0	4		
				Microjet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000		0.0139
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000		0.0289
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088		0.1383
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588		0.3928
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529		0.1200
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794		0.3061
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000		1.0000
				Other Jets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	4	0	0	0	0	0	1	5
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	10	1	0	0	4	4	21
Flying Cloud	0	0	3	27	0	0	0	4	4	38
MSP	0	0	0	14	0	0	0	15	0	29
St. Paul Downtown-Holman Field	0	0	2	24	25	0	2	1	6	60
Total MAC Airports	2	0	9	75	26	0	2	24	15	153
	2	0	9	75	26	0	2	24		
				Other Jet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0300
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176		0.1100
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176		0.2300
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059		0.2400
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588		0.3900
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000

Table F.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2020

	County of Registration									
Airport	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Wait List (a)	Total
				Helicopter (c)						
Crystal	0	0	0	9	0	0	0	1	2	12
Airlake	0	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	6	0	0	1	4	0	0	0	1	12
Flying Cloud	0	0	0	1	0	0	0	6	1	8
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	4	0	0	4	1	9
Total MAC Airports	6	0	0	11	8	0	3	11	6	45
	6	0	0	11	8	0	3	11		
				Helicopter - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250		0.2759
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.0690
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000		0.2759
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000		0.1724
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750		0.2069
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000
				Other (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	0	1
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0	0
Total MAC Airports	0	0	0	0	1	0	3	1	1	6
	0	0	0	0	1	0	3	1		
				Other Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000		0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000		0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000		1.0000

(a) Assumed to increase at same rate as total based aircraft in category.
(b) Sum of forecasts for individual aircraft categories.
(c) Unconstrained aircraft from Appendix E with aircraft that cannot be accommodated at MSP or Holman Field redistributed. See text for details.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table F.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2025

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Total Aircraft (b)						
Crystal	5	3	2	152	16	1	1	16	48	244
Airlake	0	1	94	12	2	22	0	14	50	195
Lake Elmo	1	0	10	6	41	0	136	12	37	243
Anoka County/Blaine - Janes Field	159	1	6	82	80	2	13	36	35	414
Flying Cloud	2	19	22	257	3	33	2	46	17	401
MSP	0	0	0	15	0	0	0	15	0	30
St. Paul Downtown-Holman Field	0	0	4	35	56	0	7	9	11	122
Total MAC Airports	167	24	138	559	198	58	159	148	198	1649
				Total Aircraft - Distribution						
Crystal	0.0299	0.1250	0.0145	0.2719	0.0808	0.0172	0.0063	0.1081		0.1480
Airlake	0.0000	0.0417	0.6812	0.0215	0.0101	0.3793	0.0000	0.0946		0.1183
Lake Elmo	0.0060	0.0000	0.0725	0.0107	0.2071	0.0000	0.8553	0.0811		0.1474
Anoka County/Blaine - Janes Field	0.9521	0.0417	0.0435	0.1467	0.4040	0.0345	0.0818	0.2432		0.2511
Flying Cloud	0.0120	0.7917	0.1594	0.4597	0.0152	0.5690	0.0126	0.3108		0.2432
MSP	0.0000	0.0000	0.0000	0.0268	0.0000	0.0000	0.0000	0.1014		0.0182
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0290	0.0626	0.2828	0.0000	0.0440	0.0608		0.0740
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Single Engine Piston (c)						
Crystal	5	3	2	134	15	1	1	15	44	220
Airlake	0	1	81	12	2	20	0	13	46	175
Lake Elmo	1	0	10	6	40	0	125	11	33	226
Anoka County/Blaine - Janes Field	133	1	4	57	70	2	12	20	23	322
Flying Cloud	0	17	17	181	2	30	2	30	7	286
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	2	2	11	0	3	1	0	19
Total MAC Airports	139	22	116	392	140	53	143	90	153	1248
	139	**22**	**116**	**392**	**140**	**53**	**143**	**90**		
				Single Engine Piston Aircraft - Distribution (d)						
Crystal	0.0377	0.1579	0.0154	0.3412	0.1080	0.0200	0.0067	0.1622		0.1713
Airlake	0.0000	0.0526	0.7000	0.0316	0.0170	0.3800	0.0000	0.1441		0.1121
Lake Elmo	0.0063	0.0000	0.0846	0.0158	0.2841	0.0000	0.8733	0.1261		0.1651
Anoka County/Blaine - Janes Field	0.9560	0.0526	0.0385	0.1460	0.4943	0.0400	0.0867	0.2252		0.2757
Flying Cloud	0.0000	0.7368	0.1462	0.4596	0.0170	0.5600	0.0133	0.3333		0.2581
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0154	0.0059	0.0795	0.0000	0.0200	0.0090		0.0177
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
				Multi-Engine Piston (c)						
Crystal	0	0	0	7	1	0	0	0	2	10
Airlake	0	0	7	0	0	1	0	0	3	11
Lake Elmo	0	0	0	0	1	0	5	1	2	9
Anoka County/Blaine - Janes Field	13	0	2	6	4	0	1	8	3	37
Flying Cloud	0	1	1	16	1	3	0	4	1	27
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	1	3	0	2	0	1	7
Total MAC Airports	13	1	10	30	10	4	8	13	12	101
	13	**1**	**10**	**30**	**10**	**4**	**8**	**13**		
				Multi Engine Piston Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.2340	0.0667	0.0000	0.0000	0.0000		0.0938
Airlake	0.0000	0.0000	0.7143	0.0000	0.0000	0.2500	0.0000	0.0000		0.0859
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.7000	0.1053		0.0781
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.2143	0.2128	0.5333	0.0000	0.1000	0.5789		0.3984
Flying Cloud	0.0000	1.0000	0.0714	0.5319	0.0667	0.7500	0.0000	0.3158		0.2891
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0213	0.2667	0.0000	0.2000	0.0000		0.0547
Total MAC Airports	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000

Table F-5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2025

	County of Registration									
Airport	**Anoka**	**Carver**	**Dakota**	**Hennepin**	**Ramsey**	**Scott**	**Washington**	**Other**	**Wait List (a)**	**Total**
				Turboprop (c)						
Crystal	0	0	0	1	0	0	0	0	0	1
Airlake	0	0	0	0	0	1	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	1	0	0	4	0	0	0	1	1	7
Flying Cloud	1	1	0	17	0	0	0	0	1	20
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	2	5	0	0	1	1	9
Total MAC Airports	2	1	0	24	5	1	0	2	3	38
	2	**1**	**0**	**24**	**5**	**1**	**0**	**2**		
				Turboprop Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000		0.0278
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000		0.0278
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.5000	0.0000	0.0000	0.1600	0.0000	0.0000	0.0000	0.5000		0.1667
Flying Cloud	0.5000	1.0000	0.0000	0.7200	0.0000	0.0000	0.0000	0.0000		0.5556
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0800	1.0000	0.0000	0.0000	0.5000		0.2222
Total MAC Airports	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000		1.0000
				Microjets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	1	0	0	0	0	0	0	1
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	4	0	0	3	0	0	0	3	2	12
Flying Cloud	1	0	1	14	0	0	0	1	3	20
MSP	0	0	0	1	0	0	0	0	0	1
St. Paul Downtown-Holman Field	0	0	0	5	7	0	0	2	2	16
Total MAC Airports	5	0	2	23	7	0	0	6	7	50
	5	**0**	**2**	**23**	**7**	**0**	**0**	**6**		
				Microjet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0200	0.0000	0.0000	0.0000	0.0000		0.0139
Airlake	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000		0.0289
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	0.7500	0.0000	0.0000	0.1425	0.0263	0.0000	0.0000	0.3088		0.1383
Flying Cloud	0.2500	0.0000	0.1667	0.5296	0.0000	0.0000	0.0000	0.0588		0.3928
MSP	0.0000	0.0000	0.0000	0.1071	0.0000	0.0000	0.0000	0.3529		0.1200
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0833	0.2007	0.9737	0.0000	0.5000	0.2794		0.3061
Total MAC Airports	1.0000	0.0000	0.5000	1.0000	1.0000	0.0000	0.5000	1.0000		1.0000
				Other Jets (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	5	0	0	0	0	0	1	6
Lake Elmo	0	0	0	0	0	0	0	0	0	0
Anoka County/Blaine - Janes Field	2	0	0	11	1	0	0	4	5	23
Flying Cloud	0	0	3	28	0	0	0	5	4	40
MSP	0	0	0	14	0	0	0	15	0	29
St. Paul Downtown-Holman Field	0	0	2	25	26	0	2	1	6	62
Total MAC Airports	2	0	10	78	27	0	2	25	16	160
	2	**0**	**10**	**78**	**27**	**0**	**2**	**25**		
				Other Jet Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0300
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1250	0.0526	0.0000	0.0000	0.1176		0.1100
Flying Cloud	0.0000	0.0000	0.3333	0.3393	0.0000	0.0000	0.0000	0.1176		0.2300
MSP	0.0000	0.0000	0.0000	0.2143	0.0000	0.0000	0.0000	0.7059		0.2400
St. Paul Downtown-Holman Field	0.0000	0.0000	0.1667	0.3214	0.9474	0.0000	1.0000	0.0588		0.3900
Total MAC Airports	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000

Table F.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Projected Constrained Distribution of Based Aircraft by Airport and County: 2025

Airport	County of Registration									
	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Other	Wait List (a)	Total
				Helicopter (c)						
Crystal	0	0	0	10	0	0	0	1	2	13
Airlake	0	0	0	0	0	0	0	0	0	0
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	6	0	0	1	4	0	0	0	1	12
Flying Cloud	0	0	0	1	0	0	0	6	1	8
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	4	0	0	4	1	9
Total MAC Airports	6	0	0	12	8	0	3	11	6	46
	6	0	0	12	8	0	3	11		
				Helicopter - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.7778	0.0000	0.0000	0.0000	0.1250		0.2759
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.0690
Anoka County/Blaine - Janes Field	1.0000	0.0000	0.0000	0.1111	0.5000	0.0000	0.0000	0.0000		0.2759
Flying Cloud	0.0000	0.0000	0.0000	0.1111	0.0000	0.0000	0.0000	0.5000		0.1724
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.3750		0.2069
Total MAC Airports	1.0000	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000		1.0000
				Other (c)						
Crystal	0	0	0	0	0	0	0	0	0	0
Airlake	0	0	0	0	0	0	0	1	0	1
Lake Elmo	0	0	0	0	0	0	3	0	1	4
Anoka County/Blaine - Janes Field	0	0	0	0	1	0	0	0	0	1
Flying Cloud	0	0	0	0	0	0	0	0	0	0
MSP	0	0	0	0	0	0	0	0	0	0
St. Paul Downtown-Holman Field	0	0	0	0	0	0	0	0	0	0
Total MAC Airports	0	0	0	0	1	0	3	1	1	6
	0	0	0	0	1	0	3	1		
				Other Aircraft - Distribution (d)						
Crystal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Airlake	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000		0.2500
Lake Elmo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000		0.5000
Anoka County/Blaine - Janes Field	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000		0.2500
Flying Cloud	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
MSP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
St. Paul Downtown-Holman Field	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total MAC Airports	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000		1.0000

(a) Assumed to increase at same rate as total based aircraft in category.
(b) Sum of forecasts for individual aircraft categories.
(c) Unconstrained aircraft from Appendix E with aircraft that cannot be accommodated at MSP or Holman Field redistributed. See text for details.
(d) Table B.3 in Appendix B.

Sources: As noted and HNTB analysis

Table G.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Crystal Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	223	12	1	0	0	8	0	244
2010	238	12	1	0	0	10	0	261
2015	244	12	1	0	0	12	0	269
2020	230	11	1	0	0	12	0	254
2025	220	10	1	0	0	13	0	244
Average Annual Growth Rate								
	-0.1%	-0.9%	0.0%	-	-	2.5%	-	0.0%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Airlake Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	146	11	1	0	3	0	1	162
2010	175	13	1	0	5	0	1	195
2015	189	14	1	1	5	0	1	211
2020	182	13	1	1	5	0	1	203
2025	175	11	1	1	6	0	1	195
				Average Annual Growth Rate				
	0.9%	0.0%	0.0%	-	-	-	0.0%	0.9%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Lake Elmo Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	215	10	0	0	0	2	2	229
2010	238	11	0	0	0	2	2	253
2015	242	11	0	0	0	4	4	261
2020	229	10	0	0	0	4	4	247
2025	226	9	0	0	0	4	4	243
Average Annual Growth Rate								
	0.2%	-0.5%	-	-	-	3.5%	3.5%	0.3%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Anoka County Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	359	51	6	1	11	8	1	437
2010	370	50	7	2	14	11	1	455
2015	359	49	7	7	18	11	1	452
2020	339	44	7	9	21	12	1	433
2025	322	37	7	12	23	12	1	414
Average Annual Growth Rate								
	-0.5%	-1.6%	0.8%	-	3.8%	2.0%	0.0%	-0.3%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: Flying Cloud Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	336	37	20	0	23	5	0	421
2010	326	36	21	3	27	7	0	420
2015	310	32	20	8	34	7	0	411
2020	296	29	20	15	38	8	0	406
2025	286	27	20	20	40	8	0	401
	Average Annual Growth Rate							
	-0.8%	-1.6%	0.0%	-	2.8%	2.4%	-	-0.2%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: MSP (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
2007	0	0	0	0	24	0	0	24
2010	0	0	0	1	26	0	0	27
2015	0	0	0	1	29	0	0	30
2020	0	0	0	1	29	0	0	30
2025	0	0	0	1	29	0	0	30
Average Annual Growth Rate								
	-	-	-	-	1.0%	-	-	1.1%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.

Source: Appendix F.

Table G.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Based Aircraft Forecast: St. Paul Downtown Airport (a)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other (b)	Total
				Civil				
2007	23	7	8	0	39	6	0	83
2010	23	8	9	3	46	6	0	95
2015	21	7	9	8	54	8	0	107
2020	20	7	9	13	60	9	0	118
2025	19	7	9	16	62	9	0	122
				Average Annual Growth Rate				
	-1.0%	0.0%	0.6%	-	2.3%	2.0%	-	1.9%
				Military (c)				
2007	0	1	0	0	0	9	0	10
2010	0	1	0	0	0	9	0	10
2015	0	1	0	0	0	9	0	10
2020	0	1	0	0	0	9	0	10
2025	0	1	0	0	0	9	0	10
				Average Annual Growth Rate				
	-	0.0%	-	-	-	0.0%	-	0.0%
				Total				
2007	23	8	8	0	39	15	0	93
2010	23	9	9	3	46	15	0	105
2015	21	8	9	8	54	17	0	117
2020	20	8	9	13	60	18	0	128
2025	19	8	9	16	62	18	0	132
				Average Annual Growth Rate				
	-1.0%	0.0%	0.6%	-	2.3%	0.9%	-	1.8%

(a) Assumes closure of runway 14R/32L and turf runway 6R/24L at Crystal , and extension of Runway 4/22 to 3200 feet at Lake Elmo.
(b) Balloons, gliders, and ultralight aircraft.
(c) Assumed to remain constant.

Source: Appendix F.

Table H.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Civilian Based Aircraft Forecast (a)				
2007	359	51	6	1	11	8	1	437
2010	370	50	7	2	14	11	1	455
2015	359	49	7	7	18	11	1	452
2020	339	44	7	9	21	12	1	433
2025	322	37	7	12	23	12	1	414
				FAA Forecast of Active Aircraft (b)				
2007	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15.965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15,017	9,787	6,705	18,972	15,904	46,498	253,094
				FAA Forecast of Hours Flown (000's) (c)				
2007	13,501	2,527	2,187	57	4,348	3,629	1,616	27,865
2010	10,035	1,984	1,909	1,032	4,293	3,866	1,432	24,552
2015	9,579	1,628	1,974	2,515	5.851	4,530	1,741	27,818
2020	10,262	1,565	2,048	3,998	7,115	5,100	2,041	32,129
2025	11,247	1,569	2.135	5,438	8,209	5,673	2,292	36,562
				Forecast of Total Aircraft Operations (d)				
2007	62,203	17,126	2,554	14	1,990	2,423	-	86,310
2010	48,510	13.630	2,529	1.960	2,180	3,088	-	71,896
2015	45,852	11,614	2,484	6,613	3,157	3,080	-	72,800
2020	46,582	10,634	2,442	8,454	3,922	3,411	-	75,445
2025	47,927	9,533	2,434	11,185	4,494	3,460	-	79,032
				Forecast of Touch&Go Operations (e)				
2007	31,346	3,781	-	-	-	866	-	35,993
2010	24,446	3,009	-	-	-	1,104	-	28,558
2015	23,106	2,564	-	-	-	1,101	-	26,771
2020	23,474	2,348	-	-	-	1,219	-	27,041
2025	24,152	2,105	-	-	-	1,237	-	27,493
				Forecast of Non Touch&Go Operations (f)				
2007	30,857	13,345	2,554	14	1,990	1,557	-	50,317
2010	24,064	10,621	2,529	1,960	2,180	1,984	-	43,338
2015	22,746	9,050	2,484	6,613	3,157	1,979	-	46,029
2020	23,108	8,286	2,442	8,454	3,922	2,192	-	48,404
2025	23,775	7,428	2,434	11,185	4,494	2,223	-	51,539

(a) Table G.4.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Adjusted for higher fuel prices.
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft. Adjusted for higher fuel prices.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTH analysis.

Table H.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Military Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
			Military Based Aircraft Forecast (a)					
2007	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0
			Forecast of Total Aircraft Operations (b)					
2007	-	52	8	-	2	466	-	528
2010	-	52	8	-	2	466	-	528
2015	-	52	8	-	2	466	-	528
2020	-	52	8	-	2	466	-	528
2025	-	52	8	-	2	466	-	528
			Forecast of Touch&Go Operations (c)					
2007	-	31	-	-	-	277	-	308
2010	-	31	-	-	-	277	-	308
2015	-	31	-	-	-	277	-	308
2020	-	31	-	-	-	277	-	308
2025	-	31	-	-	-	277	-	308
			Forecast of Non Touch&Go Operations (d)					
2007	-	21	8	-	2	189	-	220
2010	-	21	8	-	2	189	-	220
2015	-	21	8	-	2	189	-	220
2020	-	21	8	-	2	189	-	220
2025	-	21	8	-	2	189	-	220

(a) Assumed to remain constant.
(b) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(c) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(d) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: Anoka County Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
Total Based Aircraft Forecast (a)								
2007	359	51	6	1	11	8	1	437
2010	370	50	7	2	14	11	1	455
2015	359	49	7	7	18	11	1	452
2020	339	44	7	9	21	12	1	433
2025	322	37	7	12	23	12	1	414
Forecast of Total Civil and Military Aircraft Operations (a)								
2007	62,203	17,178	2,562	14	1,992	2,889	-	86,838
2010	48,510	13,682	2,537	1,960	2,182	3,554	-	72,424
2015	45,852	11,666	2,492	6,613	3,159	3,546	-	73,328
2020	46,582	10,685	2,450	8,454	3,924	3,877	-	75,973
2025	47,927	9,584	2,442	11,185	4,496	3,926	-	79,560
Forecast of Civil and Military Touch&Go Operations (a)								
2007	31,346	3,812	-	-	-	1,143	-	36,301
2010	24,446	3,040	-	-	-	1,381	-	28,867
2015	23,106	2,595	-	-	-	1,378	-	27,079
2020	23,474	2,378	-	-	-	1,497	-	27,349
2025	24,152	2,135	-	-	-	1,514	-	27,801
Forecast of Civil and Military Non Touch&Go Operations (a)								
2007	30,857	13,366	2,562	14	1,992	1,746	-	50,537
2010	24,064	10,642	2,537	1,960	2,182	2,173	-	43,558
2015	22,746	9,071	2,492	6,613	3,159	2,168	-	46,249
2020	23,108	8,307	2,450	8,454	3,924	2,381	-	48,624
2025	23,775	7,449	2,442	11,185	4,496	2,412	-	51,759

(a) Sum of civil and military activity from Tables H.1 and H.2.

Sources: As noted and HNTB analysis.

Table H.4

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Civilian Based Aircraft Forecast (a)				
2007	336	37	20	0	23	5	0	421
2010	326	36	21	3	27	7	0	420
2015	310	32	20	8	34	7	0	411
2020	296	29	20	15	38	8	0	406
2025	286	27	20	20	40	8	0	401
				FAA Forecast of Active Aircraft (b)				
2007	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15,965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15,017	9,787	6,705	18,972	15,904	46,498	253,094
				FAA Forecast of Hours Flown (000's) (c)				
2007	13,501	2,527	2,187	57	4,348	3,629	1,616	27,865
2010	10,035	1,984	1,909	1,032	4,293	3,866	1,432	24,552
2015	9,579	1,628	1,974	2,515	5,851	4,530	1,741	27,818
2020	10,262	1,565	2,048	3,998	7,115	5,100	2,041	32,129
2025	11,247	1,569	2,135	5,438	8,209	5,673	2,292	36,562
				Forecast of Total Aircraft Operations (d)				
2007	96,356	13,614	5,916	4	3,528	4,794	-	124,212
2010	70,740	10,753	5,273	2,631	3,565	6,221	-	99,183
2015	65,531	8,311	4,931	6,763	5,056	6,205	-	96,798
2020	67,319	7,680	4,848	12,610	6,017	7,200	-	105,674
2025	70,455	7,622	4,832	16,682	6,627	7,302	-	113,520
				Forecast of Touch&Go Operations (e)				
2007	51,395	4,729	-	-	-	1,136	-	57,260
2010	37,732	3,735	-	-	-	1,474	-	42,941
2015	34,953	2,887	-	-	-	1,470	-	39,311
2020	35,907	2,668	-	-	-	1,706	-	40,281
2025	37,580	2,648	-	-	-	1,730	-	41,958
				Forecast of Non Touch&Go Operations (f)				
2007	44,961	8,885	5,916	4	3,528	3,658	-	66,952
2010	33,008	7,018	5,273	2,631	3,565	4,747	-	56,242
2015	30,578	5,424	4,931	6,763	5,056	4,735	-	57,487
2020	31,412	5,012	4,848	12,610	6,017	5,494	-	65,393
2025	32,875	4,974	4,832	16,682	6,627	5,572	-	71,562

(a) Table G.5.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Adjusted for higher fuel prices
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft. Adjusted for higher fuel prices.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.5

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Military Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Military Based Aircraft Forecast (a)				
2007	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0
				Forecast of Total Aircraft Operations (b)				
2007	-	34	10	-	2	310	-	357
2010	-	34	10	-	2	310	-	357
2015	-	34	10	-	2	310	-	357
2020	-	34	10	-	2	310	-	357
2025	-	34	10	-	2	310	-	357
				Forecast of Touch&Go Operations (c)				
2007	-	20	-	-	-	180	-	200
2010	-	20	-	-	-	180	-	200
2015	-	20	-	-	-	180	-	200
2020	-	20	-	-	-	180	-	200
2025	-	20	-	-	-	180	-	200
				Forecast of Non Touch&Go Operations (d)				
2007	-	14	10	-	2	130	-	157
2010	-	14	10	-	2	130	-	157
2015	-	14	10	-	2	130	-	157
2020	-	14	10	-	2	130	-	157
2025	-	14	10	-	2	130	-	157

(a) Assumed to remain constant.
(b) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(c) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(d) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.6

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: Flying Cloud Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Total Based Aircraft Forecast (a)				
2007	336	37	20	0	23	5	0	421
2010	326	36	21	3	27	7	0	420
2015	310	32	20	8	34	7	0	411
2020	296	29	20	15	38	8	0	406
2025	286	27	20	20	40	8	0	401
				Forecast of Total Civil and Military Aircraft Operations (a)				
2007	96,356	13,648	5,926	4	3,530	5,104	-	124,569
2010	70,740	10,788	5,283	2,631	3,567	6,531	-	99,540
2015	65,531	8,345	4,941	6,763	5,058	6,516	-	97,154
2020	67,319	7,714	4,858	12,610	6,019	7,510	-	106,030
2025	70,455	7,656	4,842	16,682	6,629	7,613	-	113,876
				Forecast of Civil and Military Touch&Go Operations (a)				
2007	51,395	4,749	-	-	-	1,316	-	57,460
2010	37,732	3,755	-	-	-	1,654	-	43,141
2015	34,953	2,907	-	-	-	1,651	-	39,511
2020	35,907	2,688	-	-	-	1,886	-	40,481
2025	37,580	2,668	-	-	-	1,910	-	42,158
				Forecast of Civil and Military Non Touch&Go Operations (a)				
2007	44,961	8,899	5,926	4	3,530	3,788	-	67,109
2010	33,008	7,032	5,283	2,631	3,567	4,877	-	56,399
2015	30,578	5,438	4,941	6,763	5,058	4,865	-	57,644
2020	31,412	5,026	4,858	12,610	6,019	5,624	-	65,550
2025	32,875	4,988	4,842	16,682	6,629	5,702	-	71,719

(a) Sum of civil and military activity from Tables H.4 and H.5.

Sources: As noted and HNTB analysis.

Table II.7

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
Civilian Based Aircraft Forecast (a)								
2007	23	7	8	0	39	6	0	83
2010	23	8	9	3	46	6	0	95
2015	21	7	9	8	54	8	0	107
2020	20	7	9	13	60	9	0	118
2025	19	7	9	16	62	9	0	122
FAA Forecast of Active Aircraft (b)								
2007	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15,965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15.017	9,787	6,705	18.972	15,904	46,498	253,094
FAA Forecast of Hours Flown (000's) (c)								
2007	13,501	2,527	2,187	57	4,346	3,629	1,616	27,865
2010	10,035	1,984	1,909	1,032	4,293	3,866	1.432	24,552
2015	9,579	1,628	1,974	2,515	5,851	4,530	1,741	27,818
2020	10,262	1,565	2,048	3,998	7,115	5,100	2,041	32,129
2025	11,247	1,569	2,135	5,438	8,209	5,673	2,292	36,562
Forecast of Total Aircraft Operations (d)								
2007	55,485	21,131	7,848	22	16,448	16,239	-	117,173
2010	41,984	19,605	7,494	2,957	16,697	15,052	-	103,789
2015	37,344	14,916	7,360	7,601	22,080	20,018	-	109,318
2020	38,263	15,207	7,235	12,282	26,123	22,864	-	121,975
2025	39,374	16,212	7,211	15,000	28,243	23,190	-	129,229
Forecast of Touch&Go Operations (e)								
2007	24,107	5,675	-	-	-	5,805	-	35,587
2010	18,241	5,265	-	-	-	5,381	-	28,887
2015	16,225	4,006	-	-	-	7,156	-	27,386
2020	16,624	4,084	-	-	-	8,173	-	28,882
2025	17,107	4,354	-	-	-	8,290	-	29,750
Forecast of Non Touch&Go Operations (f)								
2007	31,379	15,456	7,848	22	16,448	10,434	-	81,587
2010	23,743	14,340	7,494	2,957	16,697	9,671	-	74,902
2015	21,119	10,910	7,360	7,601	22,080	12,862	-	81,932
2020	21,639	11,123	7,235	12,282	26,123	14,691	-	93,093
2025	22,267	11,858	7,211	15,000	28,243	14,900	-	99,479

(a) Table G.7.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Adjusted for higher fuel prices.
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft. Adjusted for higher fuel prices
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.8

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Military Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
			Military Based Aircraft Forecast (a)					
2007	-	1	0	0	0	9	0	10
2010	-	1	0	0	0	9	0	10
2015	-	1	0	0	0	9	0	10
2020	-	1	0	0	0	9	0	10
2025	-	1	0	0	0	9	0	10
			Forecast of Total Aircraft Operations (b)					
2007	-	807	16	-	-	7,258	-	8,081
2010	-	807	16	-	-	7,258	-	8,081
2015	-	807	16	-	-	7,258	-	8,081
2020	-	807	16	-	-	7,258	-	8,081
2025	-	807	16	-	-	7,258	-	8,081
			Forecast of Touch&Go Operations (c)					
2007	-	391	-	-	-	3,514	-	3,905
2010	-	391	-	-	-	3,514	-	3,905
2015	-	391	-	-	-	3,514	-	3,905
2020	-	391	-	-	-	3,514	-	3,905
2025	-	391	-	-	-	3,514	-	3,905
			Forecast of Non Touch&Go Operations (d)					
2007	-	416	16	-	-	3,744	-	4,176
2010	-	416	16	-	-	3,744	-	4,176
2015	-	416	16	-	-	3,744	-	4,176
2020	-	416	16	-	-	3,744	-	4,176
2025	-	416	16	-	-	3,744	-	4,176

(a) Assumed to remain constant.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(c) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(d) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.9

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Civil and Military Aircraft Operations Forecast: St. Paul Downtown Airport

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	MicroJets	Other Jets	Helicopter	Other	Total
Total Based Aircraft Forecast (a)								
2007	23	8	8	0	39	15	0	93
2010	23	9	9	3	46	15	0	105
2015	21	8	9	8	54	17	0	117
2020	20	8	9	13	60	18	0	128
2025	19	8	9	16	62	18	0	132
Forecast of Total Civil and Military Aircraft Operations (a)								
2007	55,485	21,938	7,864	22	16,448	23,497	-	125,254
2010	41,984	20,412	7,510	2,957	16,697	22,310	-	111,870
2015	37,344	15,723	7,376	7,601	22,080	27,276	-	117,399
2020	38,263	16,014	7,251	12,282	26,123	30,122	-	130,056
2025	39,374	17,019	7,227	15,000	28,243	30,448	-	137,310
Forecast of Civil and Military Touch&Go Operations (a)								
2007	24,107	6,066	-	-	-	9,319	-	39,492
2010	18,241	5,656	-	-	-	8,895	-	32,792
2015	16,225	4,397	-	-	-	10,670	-	31,291
2020	16,624	4,475	-	-	-	11,687	-	32,787
2025	17,107	4,745	-	-	-	11,804	-	33,655
Forecast of Civil and Military Non Touch&Go Operations (a)								
2007	31,379	15,872	7,864	22	16,448	14,178	-	85,763
2010	23,743	14,756	7,510	2,957	16,697	13,415	-	79,078
2015	21,119	11,326	7,376	7,601	22,080	16,606	-	86,108
2020	21,639	11,539	7,251	12,282	26,123	18,435	-	97,269
2025	22,267	12,274	7,227	15,000	28,243	18,644	-	103,655

(a) Sum of civil and military activity from Tables H.7 and H.8.

Sources: As noted and HNTB analysis.

Table I-1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

General Aviation Operating Cost Adjustment Factors: High Forecast Scenario

	Fuel&Oil (a)	Total (b)	2001	2005	2006	2007	2008	2010	2015	2020	2025
					Unadjusted Case						
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (c)			25.79	47.21	59.95	60.78	86.35	75.26	73.36	80.36	87.22
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (e)			30.97	51.66	63.27	62.67	86.35	72.09	62.72	61.32	59.40
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	359.5	343.4	332.8	331.2	329.1
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	794.4	744.0	710.9	705.9	699.1
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2007.5	1892.7	1817.3	1806.1	1790.6
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	3734.7	3496.1	3339.3	3315.9	3283.8
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	5512.6	5174.4	4952.0	4918.8	4873.2
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	719.5	701.3	689.3	687.5	685.1
					Adjusted Case						
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (g)			25.79	47.21	59.95	60.78	118.14	75.26	73.36	80.36	87.22
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (h)			30.97	51.66	63.27	62.67	86.35	72.09	62.72	61.32	59.40
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	359.5	343.4	332.8	331.2	329.1
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	794.4	744.0	710.9	705.9	699.1
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2007.5	1892.7	1817.3	1806.1	1790.6
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	3734.7	3496.1	3339.3	3315.9	3283.8
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	5512.6	5174.4	4952.0	4918.8	4873.2
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	719.5	701.3	689.3	687.5	685.1
					Price Elasticity (i)						
Single Engine Piston								-2.00	-2.00	-2.00	-2.00
Multi Engine Piston								-1.00	-1.00	-1.00	-1.00
Turboprop								-1.00	-1.00	-1.00	-1.00
Microjet								-0.80	-0.80	-0.80	-0.80
Jet								-0.80	-0.80	-0.80	-0.80
Helicopter								-1.00	-1.00	-1.00	-1.00
					Adjustment Factors (j)						
Single Engine Piston								1.000	1.000	1.000	1.000
Multi Engine Piston								1.000	1.000	1.000	1.000
Turboprop								1.000	1.000	1.000	1.000
Microjet								1.000	1.000	1.000	1.000
Jet								1.000	1.000	1.000	1.000
Helicopter								1.000	1.000	1.000	1.000

(a) Average hourly fuel and oil costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(b) Total hourly costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(c) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(d) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(e) Refiners' Acquisition Cost coverted to 2007 prices using CPI index.
(f) Fuel and oil component of hourly cost assumed to increase with real Refiners' Acquisition Cost. Other hourly costs assumed to remain constant.
(g) Adjusted Refiners' Acquisition Cost converted to nominal prices using CPI Index.
(h) Real Refiners' Acquisition Cost assumed to be same as 2008 FAA Forecast.
(i) Estimated price elasticity from FAA Airport Benefit-Cost Analysis Guidance, December 15, 1999. Table C.2 in Appendix C.
(j) Calculated using following formula:

AF = (AC/UC)^E

where:

AF = Adjustment Factor
AC = Adjusted hourly cost
UC = Undadjusted hourly cost
E = elasticity.

Sources: As noted and HNTB analysis.

Table I.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

General Aviation Operating Cost Adjustment Factors: Low Forecast Scenario

	Fuel&Oil (a)	Total (b)	2001	2005	2006	2007	2008	2010	2015	2020	2025
					Unadjusted Case						
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (c)			25.79	47.21	59.95	60.78	86.35	75.26	73.36	80.36	87.22
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (e)			30.97	51.66	63.27	62.67	86.35	72.09	62.72	61.32	59.40
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	359.5	343.4	332.8	331.2	329.1
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	794.4	744.0	710.9	705.9	699.1
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2007.5	1892.7	1817.3	1806.1	1790.6
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	3734.7	3496.1	3339.3	3315.9	3283.8
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	5512.6	5174.4	4952.0	4918.8	4873.2
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	719.5	701.3	689.3	687.5	685.1
					Adjusted Case						
FAA Projections											
Refiners' Acquisition Cost (Nominal Prices) (g)			25.79	47.21	59.95	60.78	118.14	208.79	233.92	262.10	293.66
Consumer Price Index (d)			176.27	193.45	200.6	205.3	211.7	221.0	247.6	277.43	310.84
Refiners' Acquisition Cost (Real Prices) (h)			30.97	51.66	63.27	62.67	118.14	200.00	200.00	200.00	200.00
Single Engine Piston (f)	34.9	297.0	297.0	320.3	333.4	332.8	395.3	487.7	487.7	487.7	487.7
Multi Engine Piston (f)	109.5	598.7	598.7	671.8	712.8	710.7	906.8	1196.1	1196.1	1196.1	1196.1
Turboprop (f)	249.2	1561.9	1561.9	1728.3	1821.7	1816.9	2263.3	2922.0	2922.0	2922.0	2922.0
Microjet (f)	518.3	2808.1	2808.1	3154.3	3348.4	3338.5	4266.6	5636.4	5636.4	5636.4	5636.4
Jet (f)	734.9	4198.7	4198.7	4689.6	4964.9	4950.9	6266.9	8209.2	8209.2	8209.2	8209.2
Helicopter (f)	39.6	648.7	648.7	675.2	690.0	689.3	760.2	864.8	864.8	864.8	864.8
					Price Elasticity (i)						
Single Engine Piston								-2.00	-2.00	-2.00	-2.00
Multi Engine Piston								-1.00	-1.00	-1.00	-1.00
Turboprop								-1.00	-1.00	-1.00	-1.00
Microjet								-0.80	-0.80	-0.80	-0.80
Jet								-0.80	-0.80	-0.80	-0.80
Helicopter								-1.00	-1.00	-1.00	-1.00
					Adjustment Factors (j)						
Single Engine Piston								0.496	0.466	0.461	0.455
Multi Engine Piston								0.622	0.594	0.590	0.585
Turboprop								0.648	0.622	0.618	0.613
Microjet								0.682	0.658	0.654	0.649
Jet								0.691	0.667	0.664	0.659
Helicopter								0.811	0.797	0.795	0.792

(a) Average hourly fuel and oil costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(b) Total hourly costs from Economic Values for FAA Investment and Regulatory Decisions, A Guide, GRA, Inc., October 2007.
(c) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(d) FAA Aerospace Forecast: Fiscal Years 2008-2025.
(e) Refiners' Acquisition Cost coverted to 2007 prices using CPI index.
(f) Fuel and oil component of hourly cost assumed to increase with real Refiners' Acquisition Cost. Other hourly costs assumed to remain constant.
(g) Adjusted Refiners' Acquisition Cost converted to nominal prices using CPI Index.
(h) Real Refiners' Acquisition Cost assumed to rise to $200.00 by 2010.
(i) Estimated price elasticity from FAA Airport Benefit-Cost Analysis Guidance, December 15, 1999. Table C.2 in Appendix C.
(j) Calculated using following formula:

AF = (AC/UC)^E

where:

AF = Adjustment Factor
AC = Adjusted hourly cost
UC = Undadjusted hourly cost
E = elasticity.

Sources: As noted and HNTB analysis.

Table H.1

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Aircraft Operations Forecast: Crystal

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
Based Aircraft Forecast (a)								
2005	223	12	1	0	0	8	0	244
2010	238	12	1	0	0	10	0	261
2015	244	12	1	0	0	12	0	269
2020	230	11	1	0	0	12	0	254
2025	220	10	1	0	0	13	0	244
FAA Forecast of Active Aircraft (b)								
2005	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15,965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15,017	9,787	6,705	18,972	15,904	46,498	253,094
FAA Forecast of Hours Flown (000's) (c)								
2005	13,501	2,527	2,187	57	4,348	3,629	1,616	27,865
2010	10,035	1,984	1,909	1,032	4,293	3,866	1,432	24,552
2015	9,579	1,628	1,974	2,515	5,851	4,530	1,741	27,818
2020	10,262	1,565	2,048	3,998	7,115	5,100	2,041	32,129
2025	11,247	1,569	2,135	5,438	8,209	5,673	2,292	36,562
Forecast of Total Aircraft Operations (d)								
2005	60,826	5,795	2,811	0	122	2,651	-	72,205
2010	49,121	4,704	2,386	29	120	3,071	-	59,433
2015	49,059	4,090	2,343	71	164	3,676	-	59,404
2020	49,753	3,823	2,303	112	200	3,733	-	59,923
2025	51,548	3,705	2,296	153	230	4,101	-	62,033
Forecast of Touch&Go Operations (e)								
2005	23,156	768	-	-	-	1,202	-	25,126
2010	18,700	624	-	-	-	1,392	-	20,716
2015	18,677	542	-	-	-	1,667	-	20,886
2020	18,941	507	-	-	-	1,692	-	21,140
2025	19,624	491	-	-	-	1,859	-	21,974
Forecast of Non Touch&Go Operations (f)								
2005	37,670	5,027	2,811	-	122	1,449	-	47,079
2010	30,421	4,080	2,386	29	120	1,679	-	38,717
2015	30,382	3,548	2,343	71	164	2,009	-	38,518
2020	30,812	3,316	2,303	112	200	2,041	-	38,783
2025	31,924	3,214	2,296	153	230	2,242	-	40,059

(a) Table 6.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025.
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.2

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Aircraft Operations Forecast: Airlake

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
				Based Aircraft Forecast (a)				
2005	146	11	1	0	3	0	1	162
2010	175	13	1	0	5	0	1	195
2015	189	14	1	1	5	0	1	211
2020	182	13	1	1	5	0	1	203
2025	175	11	1	1	6	0	1	195
				FAA Forecast of Active Aircraft (b)				
2005	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15,965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15,017	9,787	6.705	18,972	15,904	46,498	253,094
				FAA Forecast of Hours Flown (000's) (c)				
2005	13,739	2,677	2,160	49	3,718	3,116	1,620	27,079
2010	13,301	2,418	2,283	1,211	5,004	4,190	1,898	30,305
2015	13,516	2,076	2.458	3,060	7,064	4,996	2,456	35,626
2020	14,618	2,010	2,567	4.891	8,636	5,639	2,907	41,268
2025	16,233	2,035	2,698	6,705	10,038	6,295	3,308	47,312
				Forecast of Total Aircraft Operations (d)				
2005	50,773	2,877	2,453	0	664	234	-	57,001
2010	59,978	3,176	2.521	216	894	#DIV/0!	-	#DIV/0!
2015	67,175	3,112	2,578	546	2,662	#DIV/0!	-	#DIV/0!
2020	70,262	2,967	2,550	873	2,942	#DIV/0!	-	#DIV/0!
2025	74,145	2,702	2,564	2197	3,473	#DIV/0!	-	#DIV/0!
				Forecast of Touch&Go Operations (e)				
2005	22,477	197	-	-	-	62	0	22,736
2010	26,552	217	-	-	-	#DIV/0!	0	#DIV/0!
2015	29,739	213	-	-	-	#DIV/0!	0	#DIV/0!
2020	31.105	203	-	-	-	#DIV/0!	0	#DIV/0!
2025	32,824	185	-	-	-	#DIV/0!	0	#DIV/0!
				Forecast of Non Touch&Go Operations (f)				
2005	28,296	2,680	2,453	-	664	172	-	34,265
2010	33,426	2,959	2,521	216	894	#DIV/0!	-	#DIV/0!
2015	37,436	2,899	2,578	546	2,662	#DIV/0!	-	#DIV/0!
2020	39,157	2,764	2,550	873	2,942	#DIV/0!	-	#DIV/0!
2025	41,321	2,517	2,564	2,197	3,473	#DIV/0!	-	#DIV/0!

(a) Table 7.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025.
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Table H.3

MINNEAPOLIS-ST. PAUL RELIEVER AIRPORTS

Summary of Aircraft Operations Forecast: Lake Elmo

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Microjets	Other Jets	Helicopter	Other	Total
Based Aircraft Forecast (a)								
2007	215	10	0	0	0	2	2	229
2010	238	11	0	0	0	2	2	253
2015	242	11	0	0	0	4	4	261
2020	229	10	0	0	0	4	4	247
2025	226	9	0	0	0	4	4	243
FAA Forecast of Active Aircraft (b)								
2005	144,580	18,555	8,190	143	10,854	9,685	33,000	225,007
2010	142,024	17,945	8,423	1,211	12,452	11,130	36,584	229,769
2015	139,166	16,931	8,867	3,060	15,065	13,077	41,547	237,713
2020	138,571	15,965	9,361	4,891	17,204	14,501	44,540	245,034
2025	140,213	15,017	9,787	6,705	18,972	15.904	46,498	253,094
FAA Forecast of Hours Flown (000's) (c)								
2005	13,739	2,677	2,160	49	3,718	3,116	1,620	27,079
2010	13,301	2,418	2,283	1,211	5,004	4,190	1,898	30,305
2015	13,516	2,076	2,458	3,060	7,064	4,996	2,456	35,626
2020	14,618	2,010	2,567	4,891	8,636	5,639	2.907	41,268
2025	16,233	2,035	2,698	6,705	10,038	6,295	3,308	47,312
Forecast of Total Aircraft Operations (d)								
2005	54,471	1,976	597	0	-	623	-	57,667
2010	59,426	2,030	631	54	-	729	-	62,870
2015	62,663	1,847	679	136	-	1,480	-	66,805
2020	64,406	1,724	709	217	-	1,506	-	68,564
2025	69,759	1,670	746	298	-	1,533	-	74,006
Forecast of Touch&Go Operations (e)								
2005	22,148	212	-	-	-	80	-	22,440
2010	24,163	218	-	-	-	93	-	24,474
2015	25,479	198	-	-	-	189	-	25,866
2020	26,188	185	-	-	-	192	-	26,565
2025	28,364	179	-	-	-	196	-	28,739
Forecast of Non Touch&Go Operations (f)								
2005	32,323	1,764	597	-	-	543	-	35,227
2010	35,263	1,812	631	54	-	636	-	38,396
2015	37,184	1,649	679	136	-	1,291	-	40,939
2020	38,218	1,539	709	217	-	1,314	-	41,999
2025	41,395	1,491	746	298	-	1,337	-	45,267

(a) Table 8.
(b) FAA Aerospace Forecasts: Fiscal Years 2008-2025.
(c) FAA Aerospace Forecasts: Fiscal Years 2008-2025. Microjet hours flown estimated at 1000 hours per aircraft.
(d) Base year data from ANOMS. Future operations projected to increase at same rate as based aircraft adjusted by estimated change in utilization rate (estimated as FAA ratio of hours flown to active aircraft).
(e) Share of operations in each category consisting of touch and go operations assumed to remain constant.
(f) Total operations less touch and go operations.

Sources: As noted and HNTB analysis.

Appendix B

CORRESPONDENCE/COMMENTS

Metropolitan Council

April 22, 2010

Received

APR 2 8 2010

Airport Development

Jeffrey W. Hamiel, Executive Director
Metropolitan Airports Commission
6040 - 28th Avenue South
Minneapolis, MN 55450-2799

RE: MAC 2010 Long-term Comprehensive Plans for Anoka County-Blaine, Flying Cloud and St. Paul Downtown Airports
Metropolitan Council Transportation Committee Reports 2010-111, 2010-112 and 2010-113

Dear Mr. Hamiel:

At its meeting on April 14, 2010, the Metropolitan Council took action on the 2025 Long-term Comprehensive Plans (LTCPs) for the Anoka County-Blaine, Flying Cloud and St. Paul Downtown Airports. An overview of the actions that were approved is as follows:

- Determination that the Metropolitan Airport Commission's (MAC) 2025 LTCP's for Anoka County-Blaine, Flying Cloud and St. Paul Downtown Airports are consistent with the Metropolitan Council's development guide;

- Recommend that the MAC complete efforts to establish joint airport zoning boards at all three airports, and prepare an airport zoning ordinance that reflects the airport LTCP and system role.

- Recommend amendment of LTCPs and review by the Council when parcels on airport property are developed for non-aviation uses.

The specific comments and recommendations for each airport are included with the committee reports enclosed with this letter. These LTCPs will be reflected in the final draft of the 2030 TPP Update. We look forward to working with you on implementation of these plans.

Sincerely,

Thomas H. Weaver
Regional Administrator

Enclosure

Committee Report
Item: 2010-112
Consent

T Transportation Committee

For the Metropolitan Council meeting of April 14, 2010

DVISORY INFORMATION

Date Prepared: March 23, 2010

Subject: Flying Cloud Airport Long-term Comprehensive Plan

Proposed Action:

That the Metropolitan Council:

- Approve the Metropolitan Airport Commission's (MAC) Flying Cloud Airport 2025 Long-term Comprehensive Plan (LTCP).
- Recommend that MAC continue efforts of the joint airport zoning board, with Bloomington, Eden Prairie, Chanhassen, and Shakopee, to prepare an airport zoning ordinance, as defined under state requirements, that reflects the airport's system role.
- Recommend amendment of the LTCP and review by the Council when non-aviation development of parcels on airport property is implemented.

Summary of Committee Discussion / Questions:

Chauncey Case, MTS Senior Planner, presented this item. There were no questions or discussion by committee members.

Motion by Leppik, seconded by Scherer and passed.

Hearing no objection, Chair Meeks stated that this item could move to the full Council as a consent item.

Business Item

T Transportation Committee

Item: 2010-112

Meeting date: March 22, 2010

Metropolitan Council Meeting: April 14, 2010

ADVISORY INFORMATION	
Date:	March 15, 2010
Subject:	Flying Cloud Airport Long-term Comprehensive Plan
District(s), Member(s):	Districts: 3 – McFarlin; 4 – Peterson; and 5 - Bowles
Policy/Legal Reference:	MS 473.146, 473.165,
Staff Prepared/Presented:	Arlene McCarthy, Director MTS; 651-602-1754 Amy Vennewitz, Dep. Director MTS; 602-1058 Connie Kozlak, Mngr. Transportation Planning; 602-1720 Chauncey Case, Sr. Planner - MTS/Aviation; 602-1724 Jim Larsen, Sr. Planner, LPA; 602-1159
Division/Department:	Metropolitan Transportation Services – Air Transportation

Proposed Action

That the Metropolitan Council:

- Approve the Metropolitan Airport Commission's (MAC) Flying Cloud Airport 2025 Long-term Comprehensive Plan (LTCP).
- Recommend that MAC continue efforts of the joint airport zoning board, with Bloomington, Eden Prairie, Chanhassen, and Shakopee, to prepare an airport zoning ordinance, as defined under state requirements, that reflects the airport's system role.
- Recommend amendment of the LTCP and review by the Council when non-aviation development of parcels on airport property is implemented.

Background:

Under MS 473.611 and MS 473.165 the Council reviews the individual LTCP's for each airport owned and operated by the Metropolitan Airports Commission (MAC). The 2009 update of the LTCP replaces the 1992 plan and moves the planning horizon to 2025. The MAC has adopted a preferred development alternative for the Flying Cloud Airport that retains its system role as a *Minor* general aviation facility which is consistent with the TPP.

Rationale

Under the aviation planning process and TPP policy, airport LTCP's are to be periodically updated. MAC plans must be consistent with the Council's metropolitan development guide. LTCP's are used as basic input to the Council's update of the regional aviation system plan and referral reviews including community comprehensive plans.

Funding

This action has no funding implications for the Council.

Known Support / Opposition

The LTCP was adopted by the MAC and included a public involvement process. Airport users support the preferred concept. The MAC has responded to concerns raised by affected communities and general public prior to adopting the 2025 LTCP. The TAB recommended this LTCP on March 17, 2010.

FLYING CLOUD AIRPORT 2025 LTCP REVIEW

Authority: MS 473.611 indicates that any LTCP adopted by the Commission shall be consistent with the development guide of the Council; also, MS 473.165 states that if a plan or any part thereof is inconsistent with the guide the Council may direct the operation of the plan or such part thereof be indefinitely suspended.

Background:
The Flying Cloud Airport is located in the city limits of Eden Prairie in southwest Hennepin County, Figure 1-3. The airport opened originally as a private facility, the MAC acquired the airport in 1947. The airport is 860 acres in size, has three paved runways and 421 based aircraft, with 124,569 operations conducted in 2007. It is classified as a *Minor* airport serving general aviation in the southwest metro area. A LTCP was prepared in 1992; additional land was acquired, runways extended and building area expanded, with implementation completed by 2009.

Public Involvement:
The Flying Cloud Airport 2025 LTCP Update included meetings with the adjacent community representatives, coordination with Hennepin County, meetings with airport users, and public informational meeting for residents living around the airport. A full draft LTCP, defining the preferred alternative, was made available for a 30-day public comment period. Responses were prepared and reviewed by the MAC prior to their adoption of the LTCP.

2025 LTCP Proposal:
The LTCP serves as the basis for identifying needed projects, maintaining funding eligibility to meet state and federal financial and plan consistency requirements, and to ensure that projects are responsive to system needs and conditions. With recent completion of the main-wind parallel runway extensions, and opening of a new hangar building area, the airport development alternatives focused on the following improvements depicted in Figure ES-1.

- <u>Maintain the two parallel runways</u>
- <u>Shift crosswind runway 18/36 109' North; Extend to 2,800' total length (Preferred Alternative)</u>
- <u>Continue pavement reconstruction and rehabilitation program, including 18/36 improvements</u>
- <u>Complete the new south building area utilities</u>
- <u>Provide for Taxiway (A) object free area</u>
- <u>Relocate the Air Traffic Control Tower</u>
- <u>Continue effort to develop non-aviation uses on airport property currently not needed for aviation use</u>

<u>Existing Aviation Activity and Future Demand</u>
Forecasts were completed for both aircraft operations and based aircraft. Using 2007 as the base year, a baseline forecast was prepared assuming reasonable growth in the economy, fuel costs, fractional ownership, new very light jets (VLJs) just coming on the market, and general aviation taxes and fees. In addition to the baseline forecast, high and low range forecasts were prepared. In the high forecasts, it was assumed that the economy thrives, VLJs are very successful and fractional ownership increases; the opposite was used for the low forecasts.

Aircraft operations for 2007 were estimated at 124,569. Baseline aircraft activity by 2025 is projected to be 113,876 annual operations, and 157,204 for the high forecast. The maximum number of operations the airport can handle, the annual service volume, is about 355,000 operations. Therefore, from an airside standpoint, the airport is currently at 35 % capacity. Even under the high scenario, the forecasted number of operations in 2025 does not trigger the need for additional runways. The historical high for operations at Flying Cloud Airport occurred in 1968 with approximately 446,000 annual operations.

Existing Conditions and Future Airside Facility Needs

The existing primary runway 10R-28L is 5,000 feet, the maximum length allowed at Minor airports under state law. This runway is further restricted to 60,000 pound pavement design by agreement between the MAC and City of Eden Prairie. The existing runway length accommodates about 75% of the category BII aircraft types, at 60% useful load, currently using the airport. The forecasts assume some VLJ and other business jet aircraft operations at the airport.

Existing Conditions and Future Landside Facility Needs

Total capacity within existing and new hangars is estimated at 508 spaces. Current landside use is approximately 83 percent of future hangar space at the airport. There are sufficient vacant spaces in the existing hangars to meet current demand. Based aircraft currently number 421; the historical high number of based aircraft was in 1983 with 615 aircraft. Any new hangar space will be provided by private funding.

Conformity with Aviation System Plan:

The MAC used the Council's regional socio-economic data in preparing the aviation forecasts for the preferred development alternative. Annual runway capacity essentially stays the same, and based upon the aviation demand forecasts, there is no need for additional runways at the airport. The preferred alternative would retain the precision runway approach capability and improve airport utilization. Flying Cloud will retain its *Minor* airport system role as a reliever serving general aviation in the southwest portions of the region. The preferred development alternative maintains the airport, and is in conformance with the regional aviation system plan.

Compatibility of Airport/Community Plans

Environmental Considerations

1) Aircraft Noise - a 2007 noise contour was prepared for Flying Cloud Airport, as well as 2025 noise contour for the preferred alternative. Much of the future noise area is on the airport property or within areas that need to be controlled by the airport for safety reasons. The Council's land use compatibility guidelines for aircraft noise apply to community areas within the noise contours. The communities and the MAC should continue to coordinate their planning efforts concerning future land use changes and noise effects.

2) Sanitary Sewer and Water – adequate sewer and water services are available to the airport; changes due to implementation of non-aviation development should be included in any amendment to the LTCP.

3) Wetlands - there are existing wetlands at or near the Flying Cloud Airport that are affected by the increase in runway impervious surfaces and runoff from potential new on-airport development. The MAC has indicated that any of the development implemented at the airport will be studied closely to prevent wetland impacts. If wetlands are unavoidable, designs will be adjusted as much as possible to minimize impacts.

Land Use Considerations

1) Ground Access - capacity of the roadways adjacent to the airport are adequate to handle projected traffic needs of the airport. There are no impacts concerning the Hennepin County Road 1 and airport safety access projects.

2) Parks - the preferred development alternative does not increase potential effects on Staring Lake recreational areas or the Minnesota River Wildlife Refuge. Some parts of the airport are used for community ball fields and other recreation activities.

3) Airport Safety Zoning – there are several areas off-airport where runway safety zoning and airspace protection need to occur. The MAC, working with the affected communities through the joint zoning board, should update the airport zoning ordinance. Application of the state airport safety zoning requirements should reflect the approved LTCP for the airport.

   Section 4.3 on page 37 of the LTCP discusses the preferred alternative for modifications proposed to crosswind Runway 18-36. The modifications entail shifting and extending the runway to the north, to correct an existing non-compliant runway safety area and a non-compliant object free area.

   The Plan indicates that the "preferred (Runway 18-36 modification) alternative may require environmental review." Council staff recommends that MAC voluntarily undertake the preparation of a MN Environmental Assessment Worksheet (EAW), at a minimum, for this project. The proposed project has the potential to result in environmental degradation to Staring Lake from vegetation obstruction removal, due to encroachment of the 18-36 Runway Protection Zone further into the lake's buffer area. Staring Lake is a Metropolitan Council Priority Lake. It is surrounded by a complex of forested and non-forested wetlands. The Lake has also been designated as impaired, under Section 303(d) of the Clean Water Act, for the presence of excess nutrients. The targeted start date for preparation of the Lake's Total Maximum Daily Load study is 2012. Preparation of an EAW for the planned project would provide necessary permit information and identify ways to protect the existing impacted environment from further harm, as well as information necessary for a decision on the need for an EIS.

4) Non-Aviation Development - potential non-aviation development of airport parcels was discussed during the LTCP process; as parcels and specific land uses are selected for this revenue enhancement program a plan amendment should be reviewed by the Council and the LTCP amended as appropriate to reflect the change in land use.

Consistency with Council Policy:

Aircraft operations under the baseline forecast are expected to stabilize at current levels, but aircraft types operating at the airport are expected to include more business jets. It was recommended that the crosswind runway be shifted/extended and rehabilitated to maintain its usability and to prevent the potential for debris damage to aircraft.

The preferred alternative recognizes the need to keep the airport viable, but within the area's ability to support the investments over time. The preferred alternative preserves the safety and usability of the facility within its assigned system role. Environmental and land use considerations have been recognized and a process for implementation addressed. The proposal appears to be consistent with metro systems in general and consistent specifically with aviation policies.

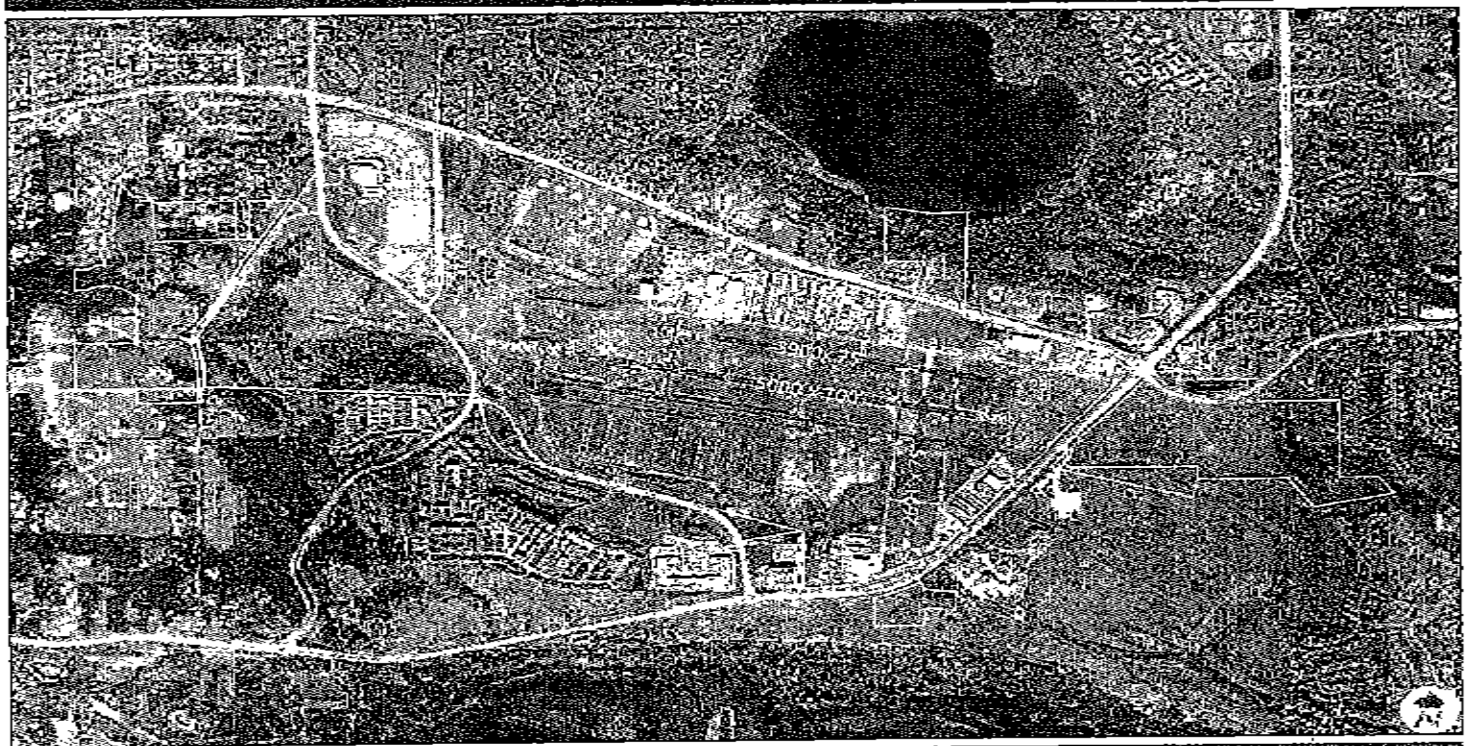
Development Costs and Implementation of Preferred Alternative

Recommendation	Estimated Cost	Timeline
Reconstruct Runway 18/36 south end, shift /extend runway to 2,800', upgrade runway lights/lighting circuits.	FAA funded $1,700,000	0-5 years
Construct North Perimeter Road	$300,000	0-5 years
Replace Runway 18/36 VASI's with PAPI's	$100 – 200,000	0-5 years
Obstruction Removal	$100,000	0-5 years
Pavement maintenance and replacement program, On-going	$2,000,000	Continuous throughout planning period
South Hangar Area Utilities	$2,100,000	0-5 years
Non-Aeronautical Land Use Dev.	(Developer Costs)	0-10 years
Clear Taxiway (A) object free area	(airport tenant cost)	15-20 years
Relocate Air Traffic Control Tower	$6 – 7,000,000)	10-15 years

Source: MAC 2010 Capital Improvement Program

Airport Layout

Figure 1-3



Flying Cloud Airport (FCM)

LTCP Plan Recommendations

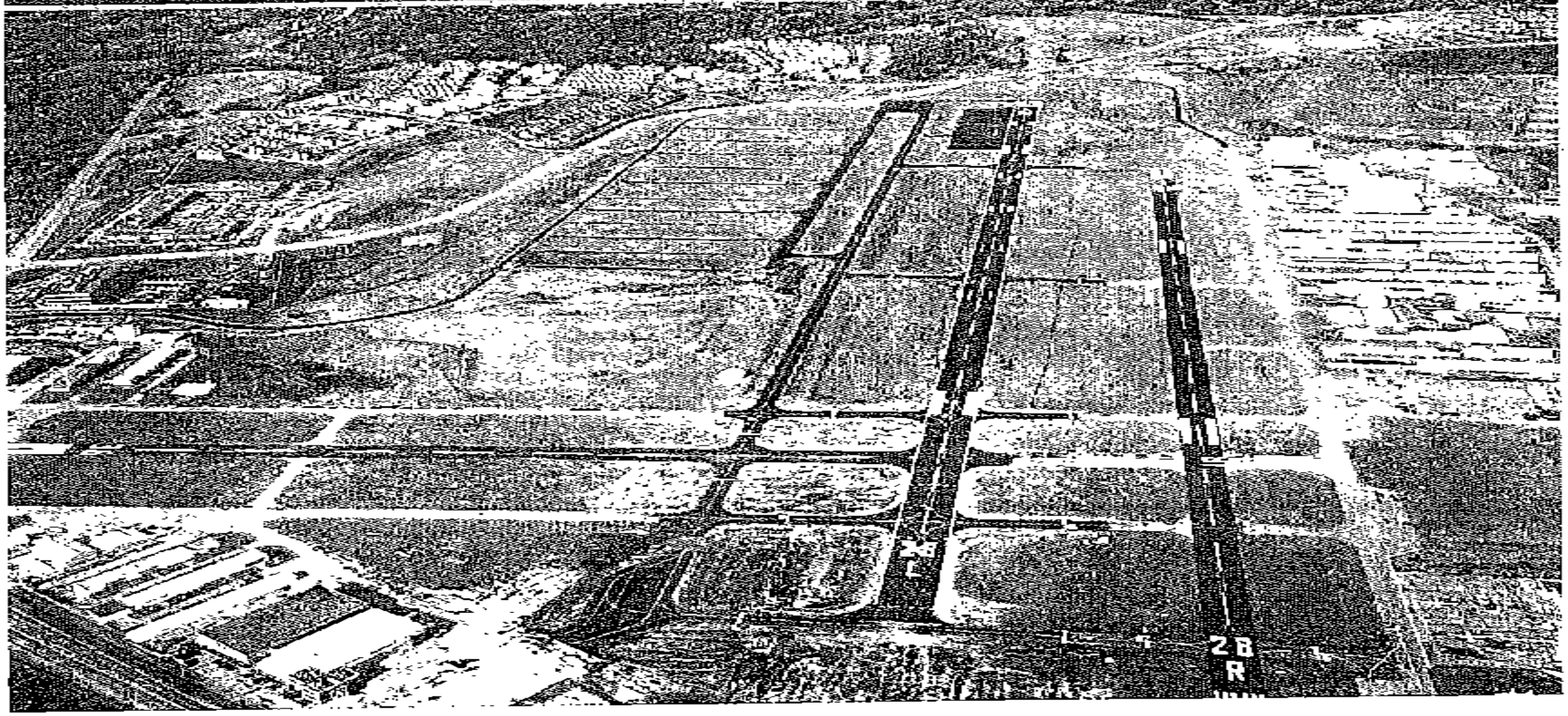
Figure ES-1

Flying Cloud Airport (FCM)

Image Source: MAC, Scale: 1"=600'

Airport Aerial 2009

Figure 1-7



Transportation Advisory Board

of the Metropolitan Council of the Twin Cities

March 18, 2010

Peter Bell, Chair
Metropolitan Council
390 Robert Street No.
St. Paul, MN 55101

Mr. Bell,

On March 17, 2010, the Transportation Advisory Board voted to recommend approval of Flying Cloud Airport 2025 Long Term Comprehensive Plan.

The TAB forwards this action to the Metropolitan Council along with additional information described in TAB action transmittal 2010-22.

Sincerely,

for Bill Hargis, Acting Chair
Transportation Advisory Board

390 No. Robert Street St. Paul, Minnesota 55101 (651) 602-1728 Fax (651) 602-1739

Transportation Advisory Committee
of the Metropolitan Council of the Twin Cities

ACTION TRANSMITTAL

No. 2010 - 22

DATE: March 18, 2010

TO: Metropolitan Council

FROM: Transportation Advisory Board

SUBJECT: Flying Cloud Airport Long-Term Comprehensive Plan Review

MOTION: The Transportation Advisory Board recommended the preferred development alternative discussed in the attached 2025 Long-term Comprehensive Plan (LTCP) for Flying Cloud Airport (FCM).

BACKGROUND AND PURPOSE OF REVIEW: The MAC periodically updates the long-term comprehensive development plans for each airport it owns/operates. The LTCP is to be consistent with the Metro Development Framework and the TPP. The MAC has completed the 2025 LTCP Update for FCM, selected a preferred development alternative, provided for public input, and has submitted it for Council review. Recommendations from the TAC/TAB review process will be included in the final staff report to the Council's Transportation Committee and Council action.

ROUTING

TO	ACTION REQUESTED	DATE COMPLETED
TAC Aviation Tech. Task Force	Review & Recommend	February 19, 2010
Technical Advisory Committee	Review & Recommend	March 3, 2010
TAB Policy Committee	Review & Recommend	March 11, 2010
Transportation Advisory Board	Review & Recommend	March 17, 2010
Metropolitan Council	Approval	

390 Robert Street North St. Paul, Minnesota (651) 602-1728 Fax (651) 602-1739

Received

DEC 22 2009

Airport Development

December 21, 2009

EDEN PRAIRIE
LIVE • WORK • DREAM

OFC 952 949 8300
FAX 952 949 8390
TDD 952 949 8399

8080 Mitchell Rd
Eden Prairie, MN
55344-4485

edenprairie.org

Ms. Bridget Rief
MAC Airport Development
6040 28th Avenue South
Minneapolis, MN 55450

SUBJECT: Review of MAC's 2009 FCM Long-Term Comprehensive Plan

Dear Ms. Rief,

Thank you for the opportunity to provide comments on MAC's 2009 Long Term Comprehensive Plan for Flying Cloud Airport. Please include these comments in the public record and revise the Long-Term Comprehensive Plan to incorporate the following recommendations.

1. **Explain what considerations may require environmental review. If environmental review is necessary, it needs to be completed prior to approval of the LTCP.**

    - The document states the preferred alternative - shift and extend - for runway 18-36 may require environmental review.

2. **Include the necessary evaluation of the imaginary surfaces to determine if any significant trees, houses, or other structures will be impacted, including the barn north of Pioneer Trail, owned by Hennepin County.**

    - The shift and extension of the runway will also shift the imaginary surfaces to the north potentially impacting trees and existing structures.

3. **Eliminate any reference to a potential expansion of the south building area for a future FBO.**

    - The document identifies a potential expansion to the south building area for a future Fixed Based Operation. This may be a violation of the Final Agreement. In the Final Agreement the "Proposed Airport Expansion" means capital improvements at the Airport proposed by MAC, described and depicted as Alternative F in the Supplement to the Draft Environmental Impact Statement, Expansion of Flying Cloud Airport (August 2001), including, but not limited to, extension of the two parallel runways, development of property for new hangar construction, acquisition of additional property, and any minor changes in the proposed capital improvements. **(see attachment A)**

4. **Incorporate upgraded building materials and aesthetics for construction of the south building area hangars as viewed from the residential areas.**

   - Construction of the hangars need to incorporate upgraded building materials such as face brick, stone and concrete, and improved aesthetics including significant tree planting to reestablish a natural treed buffer area, as had previously existed, as viewed from the residential areas.

5. **Evaluate the air traffic control tower relocation and hangar expansion area to insure that safety is not compromised.**

   - The exiting control tower will ultimately loose the direct line-of-site to the west end of runway 10R as the south building area is developed.

6. **Evaluate the impact of non–aeronautical land development on City infrastructure such as sewer, water, roads, future ball fields, adjacent land uses, including environmental impacts and a public hearing process.**

   - MAC has identified various sites within MAC owned property for non-aeronautical land development opportunities. Federal funds were used to acquire the property. The proposed development is to generate MAC revenue for airport self-sufficiency.

   - This proposal will require public hearings to amend the City's comprehensive guide plan and zoning, meet compatibility with surrounding land uses; involve significant sized buildings; potential roadway and utility improvements; and significant land alteration, all of which may require environmental review.

   - One of the sites is within an area set aside for future ball fields for the City as agreed in the Final Agreement.

7. **Address the runway length analysis which suggests the existing 5,000 foot primary runway may not meet FAA requirements. If the answer is yes, then describe the reasons for the expansion. If the answer is no, describe why the expansion is not needed.**

   - The runway length discussion in chapter 3 may suggest that the existing 5,000 foot primary runway does not meet FAA standards however, no recommendation has been made.

- In the analysis it uses FAA Advisory Circular - Runway Length Requirements for Airport Design and FAA Advisory Circular - Airport Design to calculate required runway length based on the critical aircraft or family grouping of aircraft that will use the runway, adjusted for wet and slippery conditions. This yields a runway length of 5,460 to 5,500 feet to accommodate 75% of the fleet at 60% useful load.

- Both the north parallel runway at 3,900 feet and crosswind runway proposed at 2,800 feet were evaluated and found to meet these Advisory Circulars for the particular type of aircraft anticipated for these runways.

8. **Include the Met Council approved Eden Prairie Comprehensive Plan for land uses for the Airport, Airport definition and graphics. (see attachment B)**

   - It is our understanding the **existing condition** is based upon the fully developed 5,000 foot runway and south building area, as well as all acres acquired by MAC to protect from incompatible development, rather that adopting Safety Zoning.

9. **Include the recommendations for land use and safety from the Joint Airport Zoning Board. No final action on the LTCP should be made until the ordinance has been approved by the MnDOT Office of Aeronautics.**

   - A Flying Cloud Joint Airport Zoning Board (JAZB) was established in the summer of 2009. The Board is just beginning to learn about its role and responsibilities, and the potential to modify the safety zones and development restrictions. The JAZB plays a key role in determining land use, and whether existing uses are compatible. This process and the resulting decisions must be part of the LTCP for evaluating its land use decisions within MAC's airport property.

Sincerely,

Scott H. Neal
City Manager

Flying Cloud Airport
Long Term Comprehensive Plan Update
Written Comments Received During the Comment Period

The following party submitted written comments, a copy of which is attached. MAC responses to substantive comments follow below. These responses have been forwarded to the City.

Letter from Scott Neal, City of Eden Prairie

1. Explain what considerations may require environmental review. If environmental review is necessary, it must be completed prior to the approval of the LTCP.

   Response: According to State Environmental Quality Board (EQB) rules, no environmental review would be necessary for the Runway 18-36 preferred alternative. If MAC wishes to utilize federal funds for the project, which is likely, MAC will coordinate any necessary environmental review with the FAA. The project is expected to meet the criteria of a Categorical Exclusion (i.e. no environmental study needed), which would be prepared by MAC and submitted to the FAA for review and approval. If there is a potential for some environmental impact, the FAA will require MAC to complete a Federal Environmental Assessment. At this time, no potential impacts have been identified. The proposed extension is planned to be constructed on a previously graded portion of the existing runway safety area. The LTCP update already documents that there is no increase in the noise contour from 2007 baseline to the proposed 2025 contour with the Runway 18-36 shift and extension. Finally, environmental reviews of the proposed LTCP projects are completed after submission to and acceptance by the Metropolitan Council and within a defined time period prior to the proposed construction of the project.

2. Include the necessary evaluation to determine if any significant trees, houses or other structures will be impacted.

   Response: The approved Airport Layout Plan (ALP) indentifies that the cupola on the former Sjostrand barn to be a penetration to the FAA Part 77 approach surface for Runway 18. There are also trees north of Pioneer Trail that are penetrations to the transitional Part 77 surface. These same trees are also penetrations to the Runway 36 departure surface, as is the cupola.

   MAC is beginning the process of updating the ALP to record the as-built condition of the extended east-west runways and to include the LTCP Runway 18-36 preferred alternative for shifting and extending the runway. The ALP update will include a complete survey of obstructions to verify any existing and proposed penetrations for Runway 18 as well as to indicate the ultimate mitigation of any penetrations. The receipt of any federal grants will also require the completion and approval of the ALP update.

3. Eliminate any reference to an expansion of the south building area for a future FBO.

   Response: The LTCP Update includes no recommendation for additional hangar space or FBO facilities. The Update merely suggests that should future LTCP updates identify a need for additional hangar space, an expanded portion of the south hangar area could be looked at as an option for accommodating them. This suggested “beyond-20-year expansion area” falls outside the perimeter of the hangar area defined in the Final Agreement, studied in the FEIS and outside the boundary of what has been constructed south of the runways. MAC does not believe that this is a violation of the Final Agreement.

4. Incorporate upgraded building materials and aesthetics for construction of the south building area hangars as viewed from the residential areas, including significant tree planting to reestablish the natural treed buffer, as had previously existed.

   Response: Any specific building material requirements for new hangar construction are considered a part of the MAC leasing and MAC construction approval process. The LTCP update process is a 20-year general planning document and does not address such specific details.

   The grading and landscaping plan for the south hangar area is complete and in accordance with the MAC and City of Eden Prairie Agreement. Please recall that City staff reviewed and granted a grading permit for this project based on the plans submitted that included the landscaping plans. MAC has already corresponded with the City regarding additional landscaping concerns, and will continue to do so as a project specific issue.

5. Evaluate the air traffic control tower [ATCT] relocation to insure safety is not compromised.

   Response: MAC will coordinate hangar construction in the south hangar area so that airport safety is not compromised. As is noted in the LTCP update, not all hangar locations can be developed with the ATCT in its existing location. MAC has done a comprehensive line-of-sight analysis of the building area which will be used to protect the ATC line of sight of the existing tower as hangars are built in the area.

6a. and 6c. Evaluate the impact of non-aeronautical land development on City infrastructure; MAC has identified various sites within MAC owned property for non-aeronautical land development opportunities.

Response: The LTCP update does not identify any specific locations for non-aeronautical land uses. Any discussions regarding non-aeronautical development are occurring outside the LTCP update process.

6b. The proposal will require public hearings to amend the City's comprehensive guide plan and zoning, meet compatibility with surrounding land uses; involve significant sized buildings; potential roadway and utility improvements; and significant alteration, all of which may require environmental review.

Response: In 1992, the Office of the Minnesota Attorney General provided a response to the City Attorney's question about the City's authority to enforce its zoning and subdivision regulations on land acquired by MAC for airport uses. The opinion concluded that MAC would be exempt from local zoning and subdivision ordinances. MAC intends to work with City staff to propose land uses that make sense and have the best opportunity to succeed.

No specific parcel sizes or land uses have been determined by MAC. Therefore, it cannot be assumed the building size will be significant, or that significant alteration or roadway/utility improvements would be needed. Any necessary environmental review will be completed in accordance with state and federal guidelines.

7. Address the runway length analysis which suggests the existing 5,000 foot primary runway may not meet FAA requirements.

Response: As discussed in the LTCP update, the FEIS documentation, and the previous LTCP document, the FAA recommended runway length for the Flying Cloud Airport primary runway design aircraft is greater than 5,000 feet. The City is aware that State law limits runway length at MAC owned minor airports to 5,000 feet. Therefore, MAC constructed, with FAA approval, a runway that is 5,000 feet in length. Due to the State law, MAC limited both the previous LTCP and the FEIS evaluation of impacts to a 5,000 runway. This is the same reason why this LTCP update does not include a recommendation for a runway extension.

8. Include the Met Council approved Eden Prairie Comprehensive Plan for land uses for the Airport, Airport definition, and graphics.

   Response: The figures in Chapter 6 of the FCM LTCP update show the MAC-owned parcels as “Airport”, except for Figure 6-3, which incorrectly omitted some parcels that are MAC-owned. MAC will correct this graphic for the final version of the LTCP. The Airport designation used by the City indicates that portions of Airport property will not be used for certain purposes “absent a change in the [City’s] Comprehensive Guide Plan and zoning”. MAC does not agree with the City’s position on this matter, and MAC does not intend to modify language in the FCM LTCP Update. Please see our response to Comment 6b.

9. Include the recommendations for land use and safety from the Joint Airport Zoning Board [JAZB]; no final action on the LTCP should be made until the ordinance has been approved by Mn/DOT Office of Aeronautics.

   Response: The LTCP alternatives for Runway 18-36 affect the size and boundary of the State safety zones. The LTCP must be completed so these areas can be defined for JAZB review and approval of appropriate land uses. MAC’s position is that the LTCP approval should precede the JAZB efforts.

PUBLIC NOTICE

LONG TERM COMPREHENSIVE PLAN
FLYING CLOUD AIRPORT
Comment Period Open

The Metropolitan Airports Commission (MAC) has completed a draft version of the Long Term Comprehensive Plan (LTCP) update for the Flying Cloud Airport. The general public is invited to review this document and provide written comments to the MAC.

The FLYING CLOUD AIRPORT is located in the city of Eden Prairie in Hennepin County. The draft LTCP supports a preferred alternative that includes shifting Runway 18-36 to the north 167 feet to provide a fully compliant runway safety area and extending it to a total runway length of 2,800 feet. Construction of a north perimeter road is also recommended. Other concepts reviewed for this north-south runway include shortening the runway by 58-feet, and shifting the runway to the north by 58-feet to maintain the current runway length while still achieving a compliant runway safety area. The projects currently under construction for the Runway 10R-28L extension and south hangar area are considered "existing" in this plan; they are not concepts to be analyzed or studied again.

Copies will be available for distribution and for viewing on the MAC website starting November 23, 2009 (www.metroairports.org/relievers). Written comments will be accepted until close of business on Tuesday, December 22, 2009.

Please send written comments to Ms. Bridget Rief, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450, or via e-mail: bridget.rief@mspmac.org.

A copy of the document will also be available for review at the MAC offices at the address listed above; at Eden Prairie City Hall, Planning Department, 8080 Mitchell Road, Eden Prairie, MN 55344; and at the Hennepin County Library, 565 Prairie Center Drive, Eden Prairie, MN 55344; or a request for a copy may be submitted to Ms. Rief.

PUBLIC NOTICE

LONG TERM COMPREHENSIVE PLAN
FLYING CLOUD AIRPORT

The Metropolitan Airports Commission (MAC) will be holding a second informal open house on the Long Term Comprehensive Plan (LTCP) Update for the Flying Cloud Airport.

The general public, airport users and community businesses are invited to the open house to see and learn more about LTCP alternatives studied for airport development concepts related to Runway 18-36 and the recommended preferred alternative. The meeting is designed to allow for one-on-one discussion with MAC staff. Attendance is optional; attendees can stop by anytime during the open house. A formal comment period is currently in effect for the LTCP draft document.

Monday, December 14, 2009, 5:00 to 7:00 p.m.
MCTC Aviation Center
10100 Flying Cloud Drive
Eden Prairie, MN 55347
(Located on South End of Airport, Gate A)

The draft LTCP supports a preferred alternative that includes shifting Runway 18-36 to the north 167 feet to provide a fully compliant runway safety area and extending it to a total runway length of 2,800 feet. Construction of a north perimeter road is also recommended. Other concepts reviewed for this north-south runway include shortening the runway by 58 feet, and shifting the runway to the north by 58 feet to maintain the current runway length while still achieving a compliant runway safety area.

A copy of the LTCP Draft document will be available for review at the open house. It is also available for viewing on the MAC website (www.metroairports.org/relievers). Written comments will be accepted until close of business on Tuesday, December 22, 2009. If you would like to submit comments, please send them to: Bridget Rief, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN,55450, email: bridget.rief@mspmac.org.

Long Term Comprehensive Plan Update
Flying Cloud Airport

TRANSMITTAL LETTER

TO: Hennepin County Library
565 Prairie Center Drive
Eden Prairie, MN 55344

DATE: November 20, 2009

SUBJECT: Flying Cloud Airport Long Term Comprehensive Plan Update

NOTES:

Enclosed please find one copy of the Draft Long Term Comprehensive Plan (LTCP) document that is now available for public review and comment. A copy of the advertisement is also included.

Please keep this document available for the public to review. The comment period extends from November 23, 2009 through December 22, 2009. At that time, you may dispose of the document unless notified of a comment period extension.

If you have any questions, please call me. Thank you!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
Fax: 612-794-4407
E-mail: bridget.rief@mspmac.org

Long Term Comprehensive Plan Update
Flying Cloud Airport

TRANSMITTAL LETTER

TO: Mr. Scott Kipp
Coty of Eden Prairie
8080 Mitchell Road
Eden Prairie, MN 55344

DATE: November 20, 2009

SUBJECT: Flying Cloud Airport Long Term Comprehensive Plan Update

NOTES:

Enclosed please find eleven (11) copies of the Draft Long Term Comprehensive Plan (LTCP) document that is now available for public review and comment. A copy of the advertisement is also included. Eight copies are for distribution to the FCAAC members listed below. Please note that Jeff Nawrocki received a copy of the draft plan from me via MAC inter-office mail. I have also included a copy for you to keep on file at the Planning Department desk for public review, as well as a copy for Mike Franzen.

The comment period extends from November 23, 2009 through December 22, 2009. If you or anyone from your staff has any comments, please let me know by the end of business on December 22.

If you have any questions, please call me. Thank you!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
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FCAAC Distribution List:

Chair Rick King	Vice-Chair Jeff Larsen
Judy Gentry	Mark Michelson
Greg McKewan	Kurt Scendel
Sam Clark	Tanay Mehta

Long Term Comprehensive Plan Update
Flying Cloud Airport

TRANSMITTAL LETTER

TO: Mr. Tom Johnson
Hennepin County
1600 Prairie Drive
Medina, MN 55340

DATE: November 20, 2009

SUBJECT: Flying Cloud Airport Long Term Comprehensive Plan Update

NOTES:

Enclosed please find one copy of the Draft Long Term Comprehensive Plan (LTCP) document that is now available for public review and comment. A copy of the advertisement is also included.

The comment period extends from November 23, 2009 through December 22, 2009. If you or anyone from your staff has any comments, please let me know by the end of business on December 22.

Please note that the Runway 18-36 alternatives indicate a need for MAC to work with the County on a Flying Cloud Drive right-of-way issue. I'd like to set up a meeting with you or whoever the appropriate person would be to discuss it prior to the close of the comment period.

If you have any questions, please call me. Thank you!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
Fax: 612-794-4407
E-mail: bridget.rief@mspmac.org

Long Term Comprehensive Plan Update
Flying Cloud and Anoka County - Blaine Airports

TRANSMITTAL LETTER

Mr. Glen Orcutt FAA ADO 6020 28th Avenue South Minneapolis MN 55450	Mr. Gene Scott Mn/DOT Office of Aeronautics 222 E. Plato Boulevard, Mailstop 410 St. Paul, MN 55107,
Mr. Chauncey Case Metropolitan Council 390 N Robert Street St. Paul, MN 55101	Ms. Kathy Vessely Mn/DOT Office of Aeronautics 222 E. Plato Boulevard, Mailstop 410 St. Paul, MN 55107

DATE: November 20, 2009

SUBJECT: FCM and ANE Airport Long Term Comprehensive Plan Updates

NOTES:

Enclosed please find a copy of each Draft LTCP document that is now available for public review and comment. A copy of the advertisement is also included. The comment period extends from November 23, 2009 through December 22, 2009. Please provide any written comments to MAC to my attention prior to the end of the day on December 22, 2009.

If you have any questions, please call me. Thank you!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
Fax: 612-794-4407
E-mail: bridget.rief@mspmac.org

Long Term Comprehensive Plan Update
Flying Cloud and Anoka County - Blaine Airports

TRANSMITTAL LETTER

TO: Ms. Audrey Wald
HNTB Corporation

DATE: November 20, 2009

SUBJECT: FCM and ANE Airport Long Term Comprehensive Plan Updates

NOTES:

Enclosed please find a copy of each Draft LTCP document that is now available for public review and comment. A copy of the advertisement is also included. The comment period extends from November 23, 2009 through December 22, 2009.

Copies of this document have been provided to the adjacent cities, each respective county, the FCAAC and ACAAC, county libraries, the technical group (FAA, Mn/DOT and Met Council) and interested parties.

If you have any questions, please call me. Thank you!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
Fax: 612-794-4407
E-mail: bridget.rief@mspmac.org

Long Term Comprehensive Plan Update
Flying Cloud Airport

TRANSMITTAL LETTER

TO: Ms. Molly Sigel
Commissioner
20395 Linden Road
Deephaven, MN 55331

DATE: November 24, 2009

SUBJECT: Flying Cloud Airport Long Term Comprehensive Plan Update

NOTES:

Hello Commissioner –

We have enclosed for your convenience a copy of the Draft Long Term Comprehensive Plan (LTCP) document that is now available for public review and comment. A copy of the advertisement is also included.

The comment period extends from November 23, 2009 through December 22, 2009. If you have any questions about the document or the process, please let me know.

Thank you! Happy Thanksgiving!

Bridget M. Rief, P.E.
Assistant Director – Airside Development
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450
Phone: 612-725-8371
Fax: 612-794-4407
E-mail: bridget.rief@mspmac.org

Rief, Bridget

From: Paul Jachman [pjachman@usiwireless.com]

Sent: Wednesday, March 04, 2009 12:49 PM

To: bridget.rief@mspmac.org

Cc: Dick Bihler

Subject: Tenant Meeting

Bridget Rief:

Thank you for hosting the FCM tenant meeting last night at the MCTC Aviation Center. As co-owner in hanger 52A it provided good information to us for the airport operation coming up this year.

My opinion on the runway 18-36 alternatives probably departs from most pilots who would say to never end up with a shorter runway. For me, if the logical solution, looking at it from economic and practical standpoints points to shortening a runway by 74 feet, then that's the way to go. We can learn to deal with the outcome. I'd be surprised if there is one airplane based on the property where the 74 feet would make a difference in a legal or book value for takeoff or landing. Aside from that one aircraft possibility, maybe we just need to sharpen our skills a little.

There is a very old principle called Ockam's Razor which states that "entities should not be multiplied unnecessarily." The accepted translation is that, generally speaking, the easiest or simplest solution to a problem usually is the best choice. It's hard to beat 'keep it simple.'

Thanks again,

Paul Jachman
612 824-4119

Rief, Bridget

From: Nawrocki, Jeff
Sent: Wednesday, March 04, 2009 11:01 AM
To: Rief, Bridget
Subject: FW: FCM 18-36 Considerations

From: bobkooi [mailto:bobkool@aol.com]
Sent: Wednesday, March 04, 2009 8:43 AM
To: jeff.nawrocki@mspmac.org
Subject: FCM 18-36 Considerations

This is to voice my concern and opinion about alternative considerations for Runway 18-36 at FCM.

I am a 3000 hour general aviation pilot who currently owns three small aircraft: Beech Bonanza, HK36R motorglider and a Cessna 150. The 150 is currently based at MIC and the others are at FCM where I have been actively flying since 1970.

Over the years, I have made good use of the 36 VOR approach numerous times and am disappointed to hear it most likely will disappear with the pending movement of the VOR.

Aside from the VOR movement, there is discussion about modifications to the 36 runway length due to county? concerns about the proximity of the fence on the south end to the runway threshold. Solutions go from moving the fence, moving the threshold and extending the runway to the north. I strongly favor a solution that would not shorten the runway, and if possible, actually lengthen it for safety purposes. Depending on winds, density altitude, aircraft loading and stopping distance for various runway conditions, the present length of 2691 feet can get dicey. I am hopeful a practical solution will be found that will not shorten that runway.

Sincerely,

Robert R Kooiman

Flying Cloud Airport
Long Term Comprehensive Development Plan
Public Informational Meeting
June 18th, 2009

We are looking for input regarding the Runway 18-36 concepts for the Long Term Comprehensive Plan (LTCP) Update for the Flying Cloud Airport. Please provide comments below, or e-mail comments to Bridget Rief at the Metropolitan Airports Commission (Bridget.rief@mspmac.org), or mail them to Bridget at MAC, 6040 28th Avenue South, Minneapolis MN 55450 **before June 25, 2009.**

Please see the separate handouts for information about each concept.

AFTER REVIEW OF THE OPTIONS I VOTE FOR THE SHORTER RUNWAY - WITH THE EXTENSIONS OF THE EAST WEST RUNWAYS WE SHOULD BE IN GOOD SHAPE FOR LARGER A/C AND THE SHORTENING OF 18-36 SHOULD POSE NO PROBLEM FOR THE SMALLER PLANES

Name, e-mail, and/or address (optional):

BOB KOOIMAN bobkooi@AOL.COM

Rief, Bridget

From: Robert Kratz [robert_kratz@msn.com]

Sent: Wednesday, July 08, 2009 6:55 PM

To: Rief, Bridget

Subject: Noise at Flying Cloud

Whether the airport expands or not, a major source of noise is touch and go's from student pilots who fly too low and fly the same pattern over and over again. This used to be limited to Saturday mornings but is now occurring in the evenings.

Also, particular aircraft produce a huge amount of noise, particularly twin-engine passenger air craft which fly too low on takeoff and veer off left or right at low altitudes. The same goes for pontoon planes, which are usually too heavy for their engines and the straining engines make a huge amount of noise at full throttle. Low flying helicopters are now becoming a source of noise as well.

There is a lot that MAC could do right now to reduce noise beyond making feeble suggestions to pilots and aircraft service companies. MAC could gain a lot of credibility if it would make restrictions and put some teeth behind them.

If you need to talk to me about this I'm at 937-1033.

Thanks for listening.

Rief, Bridget

From: Vicki Price [vpprice@comcast.net]
Sent: Thursday, July 02, 2009 10:41 PM
To: Rief, Bridget; Vicki Price
Cc: allcouncil@edenprairie.org; sneal@edenpralrie.org; SKipp@edenprairie.org; Rick.King@thomsonreuters.com
Subject: Re: Zero Expansion Response to LTCP for FCM and Expansion
Importance: High

NOTE: These coments to be included in the comment section of FCM's LTCP-

----- Original Message -----
From: Vicki Price
To: Rief, Bridget
Cc: Rick.King@thomsonreuters.com ; SKipp@edenprairie.org ; sneal@edenprairie.org ; allcouncil@edenprairie.org
Sent: Thursday, July 02, 2009 10:24 PM
Subject: RE: Zero Expansion Response to LTCP for FCM and Expansion

1. Berm in back of new hangars can be raised 10ft and or trees can be planted on berm. There needs to be a 3 to 1 ratio for a slope according to Kip.
But, if it were raised and or MORE trees were planted it would hide hangars on south side of airport that face the last section of the Hennepin Village development, particularly new townhomes that have not been built. This is a concern and should be addressed.

2. Screening of landing strobe lights- Hennepin Village Community Association voiced REAL concern over the new landing lights on the west side of Spring Road. These will definitely impact homes west of Spring Rd. There should be some type of screen, such as trees. This is also a concern for homes west of Spring Road.

3. Relocation of Control Tower- This is a concern especially for new townhomes going in east of Liatrus and for existing homes facing the back of the airport where new hangars will be.

4. New Gate Near Liatrus- This gate should be locked always as should all gates into the airport. Jeff Hamiel said FCM was #2 in incursions recently for unauthorized access to the airport.

5. Eden Prairie Resolution Against a 6,000ft runway or change in Minor Status by law, should be noted.

Vicki Pellar Price on behalf of Zero Expansion
Zero Expansion

www.zeroexpansion.org
transportationtalk@yahoo.com