AIRLAKE AIRPORT
LONG-TERM COMPREHENSIVE PLAN UPDATE

October 1997

MINNEAPOLIS SAINT PAUL
METROPOLITAN AIRPORTS COMMISSION

THE AIRPORT TECHNOLOGY AND PLANNING GROUP, INC.
Technical Report

Airlake Airport
Long-Term Comprehensive Plan Update

Prepared for:
Metropolitan Airports Commission

October 1997

Prepared by:
The Airport Technology and Planning Group, Inc. (AirTech)
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXECUTIVE SUMMARY</strong></td>
<td></td>
</tr>
<tr>
<td>1. Project Overview</td>
<td>1</td>
</tr>
<tr>
<td><strong>CHAPTER ONE - PROJECTIONS OF AVIATION DEMAND</strong></td>
<td></td>
</tr>
<tr>
<td>1. Metropolitan Area Aircraft Projections</td>
<td>1-2</td>
</tr>
<tr>
<td>2. Previous Based Aircraft Projections</td>
<td>1-5</td>
</tr>
<tr>
<td>3. Based Aircraft Projections</td>
<td>1-7</td>
</tr>
<tr>
<td>4. Based Aircraft Fleet Mix Projections</td>
<td>1-12</td>
</tr>
<tr>
<td>5. Aircraft Operations Projections</td>
<td>1-14</td>
</tr>
<tr>
<td>6. Airport Peaking Characteristics</td>
<td>1-24</td>
</tr>
<tr>
<td>7. Summary</td>
<td>1-24</td>
</tr>
<tr>
<td><strong>CHAPTER TWO - FACILITY REQUIREMENTS</strong></td>
<td></td>
</tr>
<tr>
<td>1. Airfield Demand/Capacity Analysis</td>
<td>2-1</td>
</tr>
<tr>
<td>2. Airside Facility Requirements</td>
<td>2-4</td>
</tr>
<tr>
<td>3. Landside Facility Requirements</td>
<td>2-30</td>
</tr>
<tr>
<td>4. Summary</td>
<td>2-34</td>
</tr>
<tr>
<td><strong>CHAPTER THREE - ENVIRONMENTAL REVIEW</strong></td>
<td></td>
</tr>
<tr>
<td>1. Noise</td>
<td>3-1</td>
</tr>
<tr>
<td>2. Water Quality</td>
<td>3-14</td>
</tr>
<tr>
<td><strong>APPENDIX A - SUPPLEMENTAL ANALYSIS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>APPENDIX B - HEARING OFFICER'S REPORT</strong></td>
<td></td>
</tr>
</tbody>
</table>
# LIST OF TABLES

## Table

1-1 Registered Aircraft ................................................................. 1-4  
1-2 Comparison of Based Aircraft Projections .................................. 1-6  
1-3 Based Aircraft Projections Population ......................................... 1-8  
1-4 Based Aircraft Projection Market Share ....................................... 1-10  
1-5 Based Aircraft Fleet Mix ............................................................ 1-13  
1-6 Comparison of Operational Forecasts .......................................... 1-16  
1-7 Operations Projections .............................................................. 1-17  
1-8 Operations Projections - Local and Itinerant ................................ 1-20  
1-9 Total Airport Operations ............................................................ 1-22  
1-10 Operational Fleet Mix ............................................................... 1-23  
1-11 Peaking Characteristics ............................................................. 1-25  
2-1 FAA Design Standards ................................................................. 2-5  
2-2 FAA Design Criteria ................................................................. 2-8  
3-1 Surface Water Runoff ................................................................. 3-29  
3-2 Circular 39 Wetland Types ......................................................... 3-31
# LIST OF EXHIBITS

Exhibit

<table>
<thead>
<tr>
<th>Exhibit</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Possible Development</td>
<td>4</td>
</tr>
<tr>
<td>2-1</td>
<td>Typical Operating Aircraft</td>
<td>2-7</td>
</tr>
<tr>
<td>2-2</td>
<td>Obstacle Free Zone</td>
<td>2-14</td>
</tr>
<tr>
<td>2-3</td>
<td>Runway Protection Zone</td>
<td>2-16</td>
</tr>
<tr>
<td>2-4</td>
<td>FAR Part 77 Surfaces</td>
<td>2-18</td>
</tr>
<tr>
<td>2-5</td>
<td>Existing NAVAID Requirements</td>
<td>2-28</td>
</tr>
<tr>
<td>3-1</td>
<td>Decibel Scale</td>
<td>3-3</td>
</tr>
<tr>
<td>3-2</td>
<td>FAA Land Use Guidelines</td>
<td>3-5</td>
</tr>
<tr>
<td>3-3</td>
<td>1995 Noise Contour</td>
<td>3-10</td>
</tr>
<tr>
<td>3-4</td>
<td>2015 Noise Contour With Crosswind</td>
<td>3-11</td>
</tr>
<tr>
<td>3-4A</td>
<td>Flight Tracks</td>
<td>3-12</td>
</tr>
<tr>
<td>3-5</td>
<td>2015 Noise Contour -No Build-</td>
<td>3-13</td>
</tr>
<tr>
<td>3-6</td>
<td>2015 L_{16} Contour</td>
<td>3-15</td>
</tr>
<tr>
<td>3-7</td>
<td>Area Watermain Distribution System</td>
<td>3-18</td>
</tr>
<tr>
<td>3-8</td>
<td>Area Sanitary Sewer System</td>
<td>3-19</td>
</tr>
<tr>
<td>3-9</td>
<td>Area Storm Sewer System</td>
<td>3-21</td>
</tr>
<tr>
<td>3-10</td>
<td>Area Gas Mains</td>
<td>3-22</td>
</tr>
<tr>
<td>3-11</td>
<td>Location of Future Runway and Buildings</td>
<td>3-23</td>
</tr>
<tr>
<td>3-12</td>
<td>Drainage Areas</td>
<td>3-25</td>
</tr>
<tr>
<td>3-13</td>
<td>Floodplain Zone Designation</td>
<td>3-28</td>
</tr>
<tr>
<td>3-14</td>
<td>Area Wetlands</td>
<td>3-33</td>
</tr>
<tr>
<td>3-15</td>
<td>Area Fuel Storage Tanks</td>
<td>3-36</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

This summary provides an overview of the forecast and possible development options for Airlake Airport as reported in the Comprehensive Development Plan Update. This summary also discusses the key community and environmental impacts identified during the planning process.

1. PROJECT OVERVIEW

The Metropolitan Airports Commission (MAC) initiated this comprehensive planning study to update the 1989 Airlake Airport Comprehensive Development Plan. Since the 1989 study was completed, conditions in the Twin Cities area, the Lakeville area, and at the Airport have changed. In addition, the Federal Aviation Administration (FAA) revised its design standards in November 1994. This analysis follows guidelines defined by the FAA and the Metropolitan Council. An Advisory Committee, made up of representatives from Lakeville, Eureka Township, Airport businesses, Metropolitan Council, Minnesota Department of Transportation, and MAC reviewed the planning study as it was prepared.

Since a Comprehensive Plan was completed in 1989, the key focus of the analysis was to update the forecast of aviation activity and revise the facility requirements analysis. Environmental impacts, including a noise analysis and a review of water quality issues, were also examined. The Airport's Long-Term Comprehensive Development Plan Update was divided into three primary chapters of which key points are summarized below.

A. Projections of Aviation Demand

For the nation as a whole, and the Great Lakes Region in particular, general aviation activity has been declining. The Minneapolis-St. Paul area, however, has not followed this trend due to a robust economic climate and a steady growth in population. The demand for additional aviation facilities has expanded as the number of aircraft at the Airport has increased. In January, 1996, the Airport was home to an estimated 179 based aircraft. By the end of the 20-year planning period, the number of based aircraft is expected to grow to 280 based aircraft. The number of annual operations is projected to increase from 75,397 in 1995 to more than 126,000 by 2015. Almost all of the based and operating fleet using Airlake Airport will consist of small single- and twin-engine aircraft. Since the Airport serves as an instrument landing system (ILS) training facility and is a designated reliever for Minneapolis-St. Paul International, there will be a limited number of business jets using the Airport.
B. Facility Requirements

While the majority of the projected operations will be performed by light single-engine and multi-engine piston aircraft weighing less than 12,500 pounds, the Airport will accommodate a small number of operations by larger turboprop and business class jet aircraft. Examples of the aircraft that the Airport should be designed to accommodate include the Beechcraft King Air and the Citation II. Based on the wingspans and approach speeds of these aircraft, Airlake Airport is classified within the FAA’s airport reference code system (ARC) as a B-II facility.

While the current runway length is adequate to serve most of the projected operating fleet, the possibility of a runway extension to improve the Airport’s ability to accommodate business aircraft flying longer stage lengths was explored. The location of Highview Avenue, railroad tracks, and the adjacent buildings seriously limit the feasibility of an extension to the northwest without investing in major road and railroad relocations.

The location of Cedar Avenue limits the potential for a runway extension to the southeast. The maximum extension that can be accommodated, without relocating Cedar Avenue, is 500 feet. Even with a 500-foot extension to the southeast, the threshold for Runway 29 would remain at its current location in order to maintain a clear inner approach obstacle free zone (OFZ) surface over Cedar Avenue. With a 500 foot extension to the southeast, the runway length available for landing on Runway 29 would remain at approximately 3,700 feet.\(^1\) The 500-foot runway extension would make approximately 4,600 feet of pavement available for departures to the east and/or west and landings to the east. The MALS for the approach into Runway 29 would have to be embedded in the extended pavement.

Based on the impact of neighboring roads and buildings, the maximum feasible runway length that can be obtained at Airlake Airport without a major road relocation is approximately 4,600 feet. Preliminary cost estimates (construction and engineering) indicate that a 500-foot runway/taxiway extension would cost approximately $225,000. Embedding the MALSR is estimated to cost an additional $175,000.

The construction of a 3,500 foot long crosswind runway (Runway 4/22) was proposed in the 1989 Comprehensive Development Plan. Since Runway 11/29 only provides 84 percent crosswind coverage at 10.5 knots and 91 percent coverage at 13 knots, the development of Runway 4/22 is justified. A crosswind runway with a length of 2,500 feet should meet the needs for the planning period. Preliminary cost estimates (construction, land acquisition, and engineering for a 2,500 foot long crosswind runway/taxiway is approximately $2.2 million.

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\(^1\) Runway 29's threshold is currently displaced by 400 feet.
Other facility issues that should be addressed include providing a minimum taxiway centerline to runway centerline separation of 240 feet for all existing and planned taxiways. The existing northwestern 1,100 feet of the parallel taxiway currently has a separation of only 200 feet. All taxiways should be maintained at a 40-foot width to meet MAC guidelines. Relocating the taxiway to recommended design standards are estimated to cost $250,000 (construction and engineering).

The NAVAIDs currently in use will be adequate for the planning period. However, PAPI's and REIL's should be installed for Runway 29. A nonprecision GPS approach for Runway 29 should also be pursued as such approaches become available. Additional hangar space will be required to meet the demand for aircraft storage. MAC is currently planning a new building area on the south side of the Airport. This area should accommodate the projected demand for aircraft storage.

Several existing hangars are within the runway's primary surface. According to FAA standards, buildings are prohibited within the primary surface. Several buildings penetrate the transitional surface, which extends at a 7:1 slope from the primary surface, defining the building restriction line (BRL). As a result of the hangar area, the BRL on the northern side of the Airport has been set at 380 feet by the FAA. The buildings currently penetrating FAA control surfaces may limit the ability of the Airport to decrease approach minimums below one mile, the current minimum. Due to the large number of existing and potential obstructions, any plans to improve the Airport's minimums would require a detailed airspace review by the FAA. Exhibit 1 depicts the potential development at the Airport.

C. Environmental Review

This chapter focused on noise and water quality issues. Noise contours were defined using both FAA standards and Metropolitan Council guidelines. The FAA has prepared guidelines that indicate that residential land uses are typically incompatible with noise levels in excess of 65 DNL. The noise modeling procedures indicated that no homes are currently contained inside the 65 DNL contour. While future contours will expand somewhat, no additional homes will be contained in the 65 DNL noise contours. All of the 65 DNL contour is contained on Airport property. While the 65 DNL noise contour will increase in size as the number of operations increase, it is expected to remain entirely on Airport property throughout the planning period.

The Metropolitan Council requires that noise contours of 55 DNL be prepared. Aircraft noise in these zones can be annoying in some instances. Due to the proximity to other noise generators (i.e., railroads, streets, etc.) in the area of the Airport, in all likelihood, the airport is not the sole generator of noise in much of the 55 DNL contour area. The noise contours depicted in this document reflect noise stemming only from Airport operations.
No major water quality issues were identified; however, all federal, State, and local government unit (LGU) guidelines must be met for all proposed development. The Airport will undergo an Environmental Audit to detail areas of concern.

MAC staff and legal council are in the process of developing a comprehensive environmental audit program for its tenants. This program would identify regulatory deficiencies of MAC tenants at Airlake Airport with regard to existing environmental regulations. Typical compliance checks would include hazardous waste generation, hazardous materials storage, storage tanks, wells, septic systems, stormwater runoff, fuel spills, and air emissions. In addition, MAC is in the process of developing a Reliever Airport Sewer and Water Utility Master Plan. This information, together with the existing Stormwater Pollution Prevention Plan, the Watershed Management Plan, and the Spill Prevention Control and Countermeasures Plan will provide adequate environmental documentation necessary for the Airport.
CHAPTER ONE

PROJECTIONS OF AVIATION DEMAND

Projecting aviation demand for an airport is a critical element in the overall planning process. This process determines an airport's ability to accommodate aircraft and operations and, thus, determines the type, size, and timing of airside and landside facility development. Projections of aviation demand through 2015 were prepared for based aircraft, aircraft operations, and the based and operational aircraft fleet mix for Airlake Airport.

This forecast analysis includes methodologies that consider historical aviation trends at the Airport, within the Metropolitan Area, and throughout the nation. In addition, quantitative demographic data for the Metropolitan Area were used to assess local trends and conditions that often have an impact on general aviation. Projections of aviation activity for Airlake Airport were prepared for the 5-, 10-, 15-, and 20-year timeframes. These projections should be considered unconstrained; they assume the Airport will be able to develop storage facilities for based aircraft and that future operational capacity will be capable of accommodating the projected number of operations.

The forecasting of general aviation activity is often linked to available historical data for a particular area or airport. Historical based aircraft and operational data for Airlake Airport were obtained from MAC records, FAA 5010 Forms, 1989 Airlake Airport Comprehensive Airport Development Plan, and from the 1990 Regional System Reliever Airports Study. Since the Airport does not have an air traffic control tower (ATCT), the named sources were also used to estimate historical operational activity at the Airport.

This chapter discusses the findings and the methodologies used to project based aircraft and operations for Airlake Airport. The projections of aviation demand are documented in the following sections:

- Metropolitan Area Aircraft Projections
- Previous Based Aircraft Projections
- Based Aircraft Projections
- Based Aircraft Fleet Mix Projections
- Aircraft Operations Projections
- Airport Peaking Characteristics
- Summary
1. METROPOLITAN AREA AIRCRAFT PROJECTIONS

In order to project airport-specific based aircraft, it is useful to develop an understanding of potential demand for aviation in the region. Regional aviation demand can then be related to the number of based aircraft or market share of a specific airport. A market share methodology attempts to tie the number of based aircraft (aircraft permanently residing) at a specific airport or registered in a region to accepted projections. Often, it is possible to relate the number of registered aircraft in an area or based at a specific airport to FAA projections of active aircraft. The FAA tracks the number of active general aviation aircraft (aircraft that are flown a minimum of one hour annually) and prepares projections of active general aviation aircraft for each region of the country. The FAA projects that the nation as a whole and the FAA's Great Lakes Region, which contains Minnesota, will experience a decline in their number of active general aviation aircraft during the next decade. In 1995, the Great Lakes Region contained an estimated 30,900 active aircraft. By 2007, this number is expected to decrease to 30,000. It is likely that much of the decline throughout the Great Lakes Region can be attributed to declining or flat population and the lack of economic growth in large industrial areas. The overall decline in the number of pilots, the limited number of new light aircraft being manufactured, and the expense of owning aircraft (insurance, fuel, etc.) will also contributed to this decline. In addition, many rural areas in the Great Lakes Region, such as those in North and South Dakota, have experienced a decline in aircraft.

While the Great Lakes Region, as a whole, has experienced a decline in based aircraft, not every geographical area of this region is following this trend. The Minneapolis-St. Paul area is one of the few expanding markets in this region. Based on the historical increases in aviation activity and the economic growth in the Minneapolis-St. Paul area, it is unlikely that the Twin Cities area will follow Great Lakes Region or national trends toward fewer active general aviation aircraft. The Minneapolis-St. Paul area is home to numerous Fortune 500 companies, as well as to a very active small business environment. As the number of jobs, population, and area income rise, the use of business aircraft will continue to expand. The Twin Cities area has a strong history of promoting aviation and has an excellent system of general aviation airports that are conveniently located in the high growth portions of the Metropolitan Area. The combination of a strong economy, population growth, and good airport infrastructure will insure that the Minneapolis-St. Paul area will outpace much of the region and the nation in the growth of general aviation activity.

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2 The Great Lakes Region consists of Minnesota, Wisconsin, Michigan, Ohio, North Dakota, South Dakota, Illinois, and Indiana.
Since 1980, the number of aircraft registered in the seven-county Minneapolis metropolitan area has increased from 2,558 to 2,852 in 1994. This increase of nearly 300 aircraft represents an annual growth rate of just less than 1 percent.

There is often a correlation between regional registered aircraft and the population of that same region. The number of persons in the seven-county Metropolitan Area has also been experiencing growth. Between 1980 and 1995, the Metropolitan Area has added more than 460,000 persons, an average annual growth rate of 1.4 percent. Table 1-1 presents historical numbers of registered aircraft, as reported by the FAA, in the seven-county area since 1980. Historical and projected population estimates for this same area are also presented. In this table, population growth rates, as projected by the Metropolitan Council, were used to develop three scenarios projecting regional registered aircraft through 2015.

A. Rapidly Declining Share

To relate the population projections developed by Metropolitan Council to the future number of registered aircraft in the region, an aircraft per capita ratio was developed. Since 1980, the number of aircraft per 1,000 persons has shown a declining trend. The Rapidly Declining Share scenario assumes the ratio will continue to decrease at the historic rate. This decline in aircraft per 1,000 persons has occurred despite an overall increase in population and regional aircraft. Using this method, by the end of the planning period the total number of registered aircraft would increase to 3,010. This scenario is considered a very conservative estimate of future registered aircraft for the region.

B. AverageDeclining Share

Similar to the scenario described above, the Average Declining Share scenario assumes the number of aircraft per 1,000 persons will continue to decline. This scenario, however, holds the rate of decline to the same general rate experienced over the last 10 years. By using this methodology, the number of registered aircraft in the seven-county region is expected to surpass 3,200 by the year 2015. While providing a conservative approach, this scenario represents a moderate level of growth that duplicates the actual increase in registered aircraft experienced over the last 10 years.

C. Constant Share

The Constant Share scenario holds the number of aircraft per capita constant at the 1994 level. Although the historical trend in the aircraft per capita ratio has been downward, there have been periods of upward movement. This scenario would be useful if the upward trends experienced in the mid-1980's return during the planning period. By the end of the planning period, this methodology yields more than 3,380 regional registered aircraft. This scenario
TABLE 1-1
Airlake Airport
Long-Term Comprehensive Plan Update

REGISTERED AIRCRAFT

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Metropolitan Area Population</th>
<th>Aircraft Per Capita (000's)</th>
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<tr>
<td>1980</td>
<td>2,558</td>
<td>1,986,873</td>
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<tr>
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<td>2,552</td>
<td>1,993,510</td>
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<tr>
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<td>2,516</td>
<td>2,001,999</td>
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<td>2,561</td>
<td>2,032,867</td>
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<tr>
<td>1984</td>
<td>2,662</td>
<td>2,057,150</td>
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<td>1985</td>
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<td>1987</td>
<td>2,765</td>
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<tr>
<td>1988</td>
<td>2,714</td>
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<tr>
<td>1989</td>
<td>2,782</td>
<td>2,240,850</td>
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<tr>
<td>1990</td>
<td>2,813</td>
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<td>1991</td>
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Projected

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<th>Rapidly Declining Share</th>
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<th>Metropolitan Area Population</th>
<th>Aircraft Per Capita (000's)</th>
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<tbody>
<tr>
<td>2000</td>
<td>2,937</td>
<td>2,554,300</td>
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<td>2005</td>
<td>2,960</td>
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<td>2010</td>
<td>2,989</td>
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<td>2015</td>
<td>3,010</td>
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<th>Average Declining Share</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Metropolitan Area Population</th>
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<td>2000</td>
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<td>3,066</td>
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<td>2010</td>
<td>3,141</td>
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<th>Constant Share</th>
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<th>Metropolitan Area Population</th>
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<td>2000</td>
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<td>2010</td>
<td>3,268</td>
<td>2,767,600</td>
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<td>2015</td>
<td>3,385</td>
<td>2,866,600</td>
<td>1.181</td>
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Source: FAA Census of Civil Aircraft 1980 - 1994
Metropolitan Council Population Households and Employment 1990 to 2020
The Airport Technology and Planning Group, Inc.
represents a high growth projection that should be considered as the upper limit of registered aircraft for the Metropolitan Area.

D. Preferred Registered Aircraft Projection

The three scenarios represent a low, middle, and high range for regional registered aircraft. Based on the most recent trends in registered aircraft in relation to regional population, the Rapidly Declining Share does not represent the most probable scenario. The Constant Share scenario also does not fit the most recent historical trend. Therefore, the Average Declining Share scenario, which mirrors the historical growth of registered aircraft in the region, was selected as the preferred projection for regional registered aircraft. This projection of regional aircraft will be used to establish the potential for aircraft to base at Airlake Airport.

2. PREVIOUS BASED AIRCRAFT PROJECTIONS

There are two recent forecast efforts that have projected the future number of based aircraft at Airlake Airport. Table 1-2 presents these forecasts with along with MAC estimates of historical based aircraft since 1984. As shown, the 1989 Airlake Airport Comprehensive Development Plan projects a rather dramatic increase in based aircraft. Comparing the historical data to the 1989 Airlake Airport Comprehensive Development Plan projection indicates that actual growth in based aircraft has been significantly less than previously forecast. This discrepancy between 1996 actual and 1996 projected data can largely be attributed to the limited amount of historical data available at the time the 1989 Airlake Airport Comprehensive Development Plan was completed. In addition, the rapid growth in based aircraft experienced between 1985 and 1987 represents the completion of the MAC hangar area. The forecast contained in the 1990 Regional System Reliever Airports Study exhibits a more conservative growth rate. The System Plan projections for Airlake Airport held the Airport's share of regional based aircraft constant. This method did not take into account the recent population and employment growth experienced in Dakota County, the demand for new storage facilities at Airlake Airport, and growth constraints at other Metropolitan area reliever airports.

Historically, the number of based aircraft at Airlake Airport have increased significantly, especially during the early and mid-1980's. In 1984, MAC reported 61 based aircraft. By 1987, 153 aircraft were reportedly based at Airlake Airport. This period of growth represents the completion of a hangar area with approximately 50 parcels. Since 1987, the rapid growth has stabilized to an increase of approximately 1.75 percent annually. Historic increases in based aircraft have been closely tied to the availability of storage facilities at Airlake Airport. For years in which new hangars are developed, based aircraft numbers increase.
<table>
<thead>
<tr>
<th>Year</th>
<th>Historical Based Aircraft</th>
<th>Regional System Reliever Airports Study</th>
<th>1989 Airlake Airport Comprehensive Development Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>61</td>
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<td>153</td>
</tr>
<tr>
<td>1985</td>
<td>63</td>
<td></td>
<td>165</td>
</tr>
<tr>
<td>1986</td>
<td>93</td>
<td>153</td>
<td>176</td>
</tr>
<tr>
<td>1987</td>
<td>153</td>
<td>152</td>
<td>188</td>
</tr>
<tr>
<td>1988</td>
<td>153</td>
<td>149</td>
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</tr>
<tr>
<td>1989</td>
<td>140</td>
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<td>200</td>
</tr>
<tr>
<td>1990</td>
<td>140</td>
<td>151</td>
<td>212</td>
</tr>
<tr>
<td>1991</td>
<td>140</td>
<td>149</td>
<td>219</td>
</tr>
<tr>
<td>1992</td>
<td>165</td>
<td>147</td>
<td>227</td>
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<td>1993</td>
<td>179</td>
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<td>1994</td>
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<td>1995</td>
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<tr>
<td>1996</td>
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<tr>
<td>1997</td>
<td>155</td>
<td></td>
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<tr>
<td>1998</td>
<td>157</td>
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<td>279</td>
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<tr>
<td>1999</td>
<td>159</td>
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<td>289</td>
</tr>
<tr>
<td>2000</td>
<td>161</td>
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<td>298</td>
</tr>
<tr>
<td>2001</td>
<td>164</td>
<td></td>
<td>308</td>
</tr>
<tr>
<td>2002</td>
<td>166</td>
<td></td>
<td>318</td>
</tr>
<tr>
<td>2003</td>
<td>168</td>
<td></td>
<td>328</td>
</tr>
<tr>
<td>2004</td>
<td>170</td>
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<tr>
<td>2005</td>
<td>172</td>
<td></td>
<td>348</td>
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<tr>
<td>2006</td>
<td>175</td>
<td></td>
<td>348</td>
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<tr>
<td>2007</td>
<td>177</td>
<td></td>
<td>348</td>
</tr>
<tr>
<td>2008</td>
<td>179</td>
<td></td>
<td>348</td>
</tr>
</tbody>
</table>

Source: Regional System Reliever Airports Study  
1989 Airlake Comprehensive Development Plan  
MAC Data
3. BASED AIRCRAFT PROJECTIONS

As previously indicated, historical activity at the Airport serves as the basis for projecting future aviation activity. Two methodologies were used to develop based aircraft projections for Airlake Airport. The first methodology in this analysis correlates the number of based aircraft with relevant socioeconomic indicators. For this analysis, population for the Metropolitan Area was selected as a possible indicator. The second methodology used to develop based aircraft projections for Airlake Airport is the market share approach. This methodology examines the number of potential based aircraft as a percentage of registered aircraft in the seven-county Metropolitan Area. Historical and projected population data were obtained from the Metropolitan Council. Both the population and market share methodologies are discussed in greater detail in the following sections.

A. Population Methodology

The population methodology relates the number of based aircraft at an airport, the dependent variable, to relevant independent variables. For this analysis, population in the seven-county Metropolitan Area was selected as the most suitable independent variable. This type of projection assumes that as the region increases in population, the economy will continue to expand, and the demand for general aviation services will also increase.

Population projections prepared by the Metropolitan Council were used to develop based aircraft projections (see Table 1-3). The ratio of based aircraft per capita was examined. To relate population to based aircraft, the number of aircraft per 1,000 persons was calculated. This ratio has historically grown from a low of 0.030 in 1984 to a high of 0.075 in 1993. Because the historic ratios have fluctuated, three scenarios were forecast for the 20-year planning period: a constant share scenario, a moderate growth scenario, and a high growth scenario.

1. Constant Share Scenario (Population)

A constant share scenario, where the ratio is held constant at the 1995 level, is useful to set the lower limits of based aircraft at Airlake Airport. This projection scenario estimates that 210 aircraft could be based at the Airport by the end of the planning period.

2. Moderate Growth Scenario (Population)

The moderate growth scenario provides a baseline projection in which the ratio of aircraft per capita is increased at the actual average rate experienced between 1987 and 1993; 1993 was the year when the Airport’s available storage capacity was reached. The projected increase in population, combined with this scenario’s projected increase in aircraft per capita, indicates that by 2015, the number of based aircraft could increase to 258.
### TABLE 1-3

**Airlake Airport**

**Long-Term Comprehensive Plan Update**

**BASED AIRCRAFT PROJECTIONS**

**POPULATION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Population</th>
<th>Airlake Airport Based Aircraft</th>
<th>Aircraft Per Capita (000's)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>2,057,150</td>
<td>61</td>
<td>0.030</td>
</tr>
<tr>
<td>1985</td>
<td>2,086,350</td>
<td>63</td>
<td>0.030</td>
</tr>
<tr>
<td>1986</td>
<td>2,118,445</td>
<td>93</td>
<td>0.044</td>
</tr>
<tr>
<td>1987</td>
<td>2,153,533</td>
<td>153</td>
<td>0.071</td>
</tr>
<tr>
<td>1988</td>
<td>2,200,321</td>
<td>153</td>
<td>0.070</td>
</tr>
<tr>
<td>1989</td>
<td>2,240,850</td>
<td>140</td>
<td>0.062</td>
</tr>
<tr>
<td>1990</td>
<td>2,288,729</td>
<td>140</td>
<td>0.061</td>
</tr>
<tr>
<td>1991</td>
<td>2,318,532</td>
<td>140</td>
<td>0.060</td>
</tr>
<tr>
<td>1992</td>
<td>2,352,121</td>
<td>165</td>
<td>0.070</td>
</tr>
<tr>
<td>1993</td>
<td>2,383,725</td>
<td>179</td>
<td>0.075</td>
</tr>
<tr>
<td>1994</td>
<td>2,415,207</td>
<td>179</td>
<td>0.074</td>
</tr>
<tr>
<td>1995 (est)</td>
<td>2,447,000</td>
<td>179</td>
<td>0.073</td>
</tr>
</tbody>
</table>

**Projected**

<table>
<thead>
<tr>
<th>Year</th>
<th>Constant Share (Population)</th>
<th>Moderate Growth (Population)</th>
<th>High Growth (Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,554,300</td>
<td>2,554,300</td>
<td>2,554,300</td>
</tr>
<tr>
<td>2005</td>
<td>2,666,500</td>
<td>2,666,500</td>
<td>2,666,500</td>
</tr>
<tr>
<td>2010</td>
<td>2,767,600</td>
<td>2,767,600</td>
<td>2,767,600</td>
</tr>
<tr>
<td>2015</td>
<td>2,866,600</td>
<td>2,866,600</td>
<td>2,866,600</td>
</tr>
<tr>
<td></td>
<td>187</td>
<td>199</td>
<td>222</td>
</tr>
<tr>
<td></td>
<td>195</td>
<td>219</td>
<td>277</td>
</tr>
<tr>
<td></td>
<td>202</td>
<td>238</td>
<td>346</td>
</tr>
<tr>
<td></td>
<td>210</td>
<td>258</td>
<td>427</td>
</tr>
</tbody>
</table>

**Source:** Metropolitan Council Population, Households, and Employment 1990 to 2020

The Airport Technology and Planning Group, Inc.
3. **High Growth Scenario (Population)**

This scenario is based on an unconstrained growth using the rate of increase in the aircraft per capita rate experienced between 1990 and 1995. This period represents one of the most rapid five year increases in aircraft per capita. Using this scenario, the number of based aircraft is expected to increase to 427 by 2015. This scenario is useful in setting the upper limit of based aircraft that could be anticipated at the Airport.

**B. Market Share Methodology**

Historically, the number of registered aircraft within a region has been shown to be an important factor in determining the ultimate number of based aircraft that a specific airport can expect to attract. As reported by MAC, the number of based aircraft at Airlake Airport increased from 61 in 1984 to more than 179 by January 1, 1996. **Table 1-4** relates Airlake Airport's based aircraft to Metropolitan Area registered aircraft since 1984. While the Airport's market share increased significantly in the early to mid-1980's, the market share of Airlake's based aircraft to the Metropolitan Area's registered aircraft since 1987 has been increasing steadily, but has not been nearly as robust as the earlier portion of the decade when significant unoccupied hangar areas were made available for lease.

Using the market share methodology depicted in Table 1-4, based aircraft projections were developed for three individual scenarios depicting a range of possible demand conditions. These scenarios include:

- Constant market share scenario
- Moderate growth market share scenario
- High growth market share scenario

**I. Constant Market Share Scenario**

In 1994, the Airport was home to 6.3 percent of the Metropolitan Area's registered aircraft. This scenario assumes the ratio between the number of registered aircraft in the Metropolitan Area and based aircraft at the Airport will remain constant throughout the planning period. In this scenario, 202 aircraft are projected to be based at the Airport by the end of the planning period. This scenario represents a "lower end" projection of future based aircraft based on the current rates of growth. This scenario is comparable to the projection methodology used in the Regional System Reliever Airports System Plan and does not account for demand that could be attracted by the planning building area expansion.
### TABLE 1-4

**Airlake Airport**  
**Long-Term Comprehensive Plan Update**  
**BASED AIRCRAFT PROJECTION**  
**MARKET SHARE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Airlake Airport Based Aircraft</th>
<th>Share of Registered Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Historical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>2,662</td>
<td>61</td>
<td>2.3%</td>
</tr>
<tr>
<td>1985</td>
<td>2,685</td>
<td>63</td>
<td>2.3%</td>
</tr>
<tr>
<td>1986</td>
<td>2,761</td>
<td>93</td>
<td>3.4%</td>
</tr>
<tr>
<td>1987</td>
<td>2,765</td>
<td>153</td>
<td>5.5%</td>
</tr>
<tr>
<td>1988</td>
<td>2,714</td>
<td>153</td>
<td>5.6%</td>
</tr>
<tr>
<td>1989</td>
<td>2,782</td>
<td>140</td>
<td>5.0%</td>
</tr>
<tr>
<td>1990</td>
<td>2,813</td>
<td>140</td>
<td>5.0%</td>
</tr>
<tr>
<td>1991</td>
<td>2,820</td>
<td>140</td>
<td>5.0%</td>
</tr>
<tr>
<td>1992</td>
<td>2,858</td>
<td>165</td>
<td>5.8%</td>
</tr>
<tr>
<td>1993</td>
<td>2,838</td>
<td>179</td>
<td>6.3%</td>
</tr>
<tr>
<td>1994</td>
<td>2,852</td>
<td>179</td>
<td>6.3%</td>
</tr>
<tr>
<td>1995</td>
<td>NA</td>
<td>179</td>
<td>NA</td>
</tr>
<tr>
<td>1996</td>
<td>NA</td>
<td>179</td>
<td>NA</td>
</tr>
</tbody>
</table>

| **Projected** |                                       |                               |                              |

**Constant Market Share**

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Airlake Airport Based Aircraft</th>
<th>Share of Registered Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,976</td>
<td>187</td>
<td>6.3%</td>
</tr>
<tr>
<td>2005</td>
<td>3,066</td>
<td>192</td>
<td>6.3%</td>
</tr>
<tr>
<td>2010</td>
<td>3,141</td>
<td>197</td>
<td>6.3%</td>
</tr>
<tr>
<td>2015</td>
<td>3,211</td>
<td>202</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

**Moderate Growth Market Share**

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Airlake Airport Based Aircraft</th>
<th>Share of Registered Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,976</td>
<td>200</td>
<td>6.7%</td>
</tr>
<tr>
<td>2005</td>
<td>3,066</td>
<td>224</td>
<td>7.3%</td>
</tr>
<tr>
<td>2010</td>
<td>3,141</td>
<td>251</td>
<td>8.0%</td>
</tr>
<tr>
<td>2015</td>
<td>3,211</td>
<td>280</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

**High Growth Market Share**

<table>
<thead>
<tr>
<th>Year</th>
<th>Metropolitan Area Registered Aircraft</th>
<th>Airlake Airport Based Aircraft</th>
<th>Share of Registered Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,976</td>
<td>214</td>
<td>7.2%</td>
</tr>
<tr>
<td>2005</td>
<td>3,066</td>
<td>248</td>
<td>8.1%</td>
</tr>
<tr>
<td>2010</td>
<td>3,141</td>
<td>283</td>
<td>9.0%</td>
</tr>
<tr>
<td>2015</td>
<td>3,211</td>
<td>321</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

Source: FAA Census of Civil Aircraft 1980 - 1994  
MAC Records  
The Airport Technology and Planning Group, Inc.
2. **Moderate Growth Market Share Scenario**

This methodology assumes moderate growth in Airlake Airport's market share of regional registered aircraft. Historically, the Airport's market share increased rapidly when new hangar facilities became available. It is likely that similar growth trends will occur as Airlake Airport opens new aircraft storage areas on the Airport. Using a moderate increase in the market share, an estimated 280 based aircraft are projected by 2015.

3. **High Growth Market Share Scenario**

While the high growth scenario uses many of the same assumptions as the moderate growth scenario, this projection scenario increases Airlake's 2015 market share to 10 percent of the registered aircraft in the seven-county Metropolitan Area. This scenario produces a projection of 321 based aircraft by the end of the planning period. This scenario is useful in identifying the upper limit of aircraft that could be based at Airlake Airport if the Airport were to attract a significantly expanded share of the regional market. This rate of growth is comparable to that projected in the 1989 Airport Comprehensive Development Plan.

C. **Preferred Projection Methodology**

While both the market share and the population-based socioeconomic methodologies produce relatively similar growth projections that are useful for setting upper and lower limits for future based aircraft, the moderate growth market share was selected as the preferred scenario. This scenario was selected as the preferred forecast in order to relate based aircraft to regional aviation activity. This method also takes advantage of the Metropolitan Council's population forecasts in that projections for Metropolitan Area registered aircraft were developed using accepted population estimates. The moderate growth market share scenario produces results that are relatively consistent with actual historical growth that has occurred since 1987. This level of growth should account for the future opening of new hangar areas.

For a 20-year period, a moderate market share growth scenario is typically preferred to the highest or lowest scenarios. It is important to note that all scenarios indicate that some growth in based aircraft is likely. Growth is anticipated for Airlake Airport because it is the only reliever airport in the rapidly growing southern-most section of the Metropolitan Area. In addition, unlike some of the other reliever airports in the metropolitan system, Airlake Airport has substantial landside expansion potential.
The preferred based aircraft projection using the Moderate Growth Market Share approach for the Airlake Airport is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Based Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>1996</td>
</tr>
<tr>
<td>Projected</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>2005</td>
</tr>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>2015</td>
</tr>
</tbody>
</table>

In both the market share and the population projection methodologies, the high growth scenarios were judged to be overly optimistic and not likely reflective of future trends. These two high growth scenarios are useful, however, for setting the upper limits of the Airport's based aircraft potential. The two constant growth scenarios are also considered unlikely based on the historical increase in the Airport's number of based aircraft and imminent plans to open a new section of the Airport for aircraft hangar development.

4. BASED AIRCRAFT FLEET MIX PROJECTIONS

An airport's based aircraft fleet mix is one indication of its operational role. The future based aircraft fleet mix for the Airport was projected using the historical data as reported in the Regional System Reliever Airports Study, 1989 Airlake Airport Comprehensive Airport Development Plan, and FAA 5010 Forms. In addition, discussions with a fixed base operator (FBO) at Airlake Airport and MAC personnel were used to supplement these data. Currently, approximately 92 percent (165 aircraft) of the aircraft fleet based at the Airport consists of single-engine aircraft. Approximately 7 percent (12 aircraft) of the based fleet is made up of multiengine aircraft. There are no jet aircraft or helicopters currently based at Airlake Airport. It is important to note that the number of aircraft fluctuates somewhat throughout the year and that the current number of reported aircraft was as of January 1, 1996.

The future based aircraft fleet mix for the Airport is presented in Table 1-5. The percentage of based aircraft by type is projected to remain relatively constant throughout the planning period. This trend is based on historical data. The FAA asserts that the national general aviation fleet mix will exhibit a gradual change. The number of active single-engine aircraft is expected to decline annually through the end of the century. The FAA also asserts that the number of multiengine aircraft will

---

3 As of January 1, 1996.
TABLE 1-5

Airlake Airport
Long-Term Comprehensive Plan Update

BASED AIRCRAFT FLEET MIX

<table>
<thead>
<tr>
<th>Year</th>
<th>Single-engine Number</th>
<th>Single-engine Percent</th>
<th>Multiengine Number</th>
<th>Multiengine Percent</th>
<th>Jet Number</th>
<th>Jet Percent</th>
<th>Helicopter Number</th>
<th>Helicopter Percent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Historical</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1986</td>
<td>136</td>
<td>88.9%</td>
<td>13</td>
<td>8.5%</td>
<td>0</td>
<td>0.0%</td>
<td>4</td>
<td>2.6%</td>
<td>153</td>
</tr>
<tr>
<td>1988</td>
<td>141</td>
<td>92.2%</td>
<td>8</td>
<td>5.2%</td>
<td>0</td>
<td>0.0%</td>
<td>4</td>
<td>2.6%</td>
<td>153</td>
</tr>
<tr>
<td>1995</td>
<td>165</td>
<td>92.2%</td>
<td>12</td>
<td>6.7%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projected</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>182</td>
<td>91.0%</td>
<td>16</td>
<td>8.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>200</td>
</tr>
<tr>
<td>2005</td>
<td>204</td>
<td>91.0%</td>
<td>20</td>
<td>9.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>224</td>
</tr>
<tr>
<td>2010</td>
<td>227</td>
<td>90.6%</td>
<td>23</td>
<td>9.0%</td>
<td>1</td>
<td>0.4%</td>
<td>0</td>
<td>0.0%</td>
<td>251</td>
</tr>
<tr>
<td>2015</td>
<td>251</td>
<td>89.6%</td>
<td>28</td>
<td>10.0%</td>
<td>1</td>
<td>0.4%</td>
<td>0</td>
<td>0.0%</td>
<td>280</td>
</tr>
</tbody>
</table>

Source: Regional System Reliever Airports Study
MAC Records
The Airport Technology and Planning Group, Inc.
decline through the mid-1990's, then recover. The decrease in the active single-engine and multiengine fleet is expected to be countered by an increase in the active turboprop and business jet fleet.

By the end of the planning period, it is projected that approximately 251 single-engine aircraft will be based at the Airport. The number of multiengine based aircraft is projected to increase to 28 aircraft by 2015. There are currently no turbojet aircraft based at the Airport. National and regional aviation trends, however, indicate that it is possible jet aircraft may be based at Airlake Airport. By the end of the planning period, it may be feasible for a limited number of jet aircraft to be based at Airlake Airport. This assumes the Airport is able to resolve issues related to extending the runway and maintaining an obstruction-free approach. A detailed analysis of facility requirements will be presented in a subsequent chapter.

5. AIRCRAFT OPERATIONS PROJECTIONS

Data on historical aircraft operations for Airlake Airport were obtained from MAC records. As previously indicated, all historical operational figures are considered estimates, since the Airport does not have an Air Traffic Control Tower (ATCT). Trends from other recent Airlake Airport forecasts were also analyzed. In order to project future operations for Airlake Airport, a methodology was developed that compares the number of historical based aircraft to the historical number of operations. Possible trends in future operations per based aircraft (OPBA) were then developed based on the preferred based aircraft projection. The preferred operations projection was then used to develop projections for the following:

- Local and itinerant operations
- Total airport operations by type (general aviation, military, and air taxi)
- Operating fleet mix

It should be noted that all projections of general aviation operations that show substantial growth are considered unconstrained; these scenarios assume the Airport will provide the facilities and capacity needed to accommodate the projected demand.

A. Comparison of Previous Aircraft Operations Projections

Previously completed operations projections for Airlake Airport were reviewed to identify future trends in operational activity. Previously completed studies reviewed include:

- Regional System Reliever Airports Study (System Plan)
- 1989 Airlake Airport Comprehensive Development Plan
Table 1-6 presents the forecasts from these two studies, as well as the Airport’s historical number of aircraft operations contained in MAC records. These two studies used different base years and different planning periods in their forecast development. In addition, the two previous forecasts utilized very different growth rates. The 1989 Airlake Airport Comprehensive Development Plan’s average annual growth rate of 5.5 percent indicated that the Airport would surpass 150,000 annual operations by the end of the planning period for this study (2015). The Regional System Reliever Airports Study’s projected average annual growth rate of 1.8 percent results in approximately 92,000 annual operations by 2008. Based on recent historical trends, projections using the trends from the 1989 Comprehensive Development Plan were considered overly optimistic, while the 1989 System Plan's growth rate does not account for actual operational growth at the Airport in recent years.

B. General Aviation Operations

Historically (1984-1995), the number of operations at Airlake Airport, as estimated by MAC, has shown an overall increase. In 1984, the estimated number of annual operations was placed at 23,000. By 1990, the number of operations was estimated at approximately 68,000. The 1995 estimate was 75,397 annual operations. These estimates indicate that the number of operations has grown rapidly through the mid-1980's, as the number of based aircraft increased. Since 1988, the number of annual operations has remained relatively constant, with slight operational increases of about 1.1 percent annually. The operational downtown between the 1994 and 1995 estimates can be attributed to economic conditions. General aviation airports throughout the MAC system, and throughout the country, experienced a general decline in corporate activity. Poor weather may have also affected local training activity in this most recent period.

Future operational activity for the Airport was projected using an operations per based aircraft (OPBA) methodology. OPBAs are obtained by dividing the number of total annual general aviation operations by the number of based aircraft. This methodology analyzes historical OPBA ratios, then projects future ratios based on historical trends. It should be noted that OPBAs include all operations at an airport, including transient flights and training. The OBPA ratio does not indicate that each based aircraft will actually conduct that number of operations. The OPBA is a methodology recognized by the FAA to relate total general aviation airport activity to a known variable, in this case, based aircraft.

Table 1-7 presents the historical OPBAs for the Airport, as well as three future OPBA scenarios. A review of the historical OPBA at the Airport indicates that the OPBA has followed no evident trend. Over the last 11 years, the OPBA has ranged from a high of 556 (1985) to a low of 340 (1987). Since the OPBA at Airlake Airport does not appear to be following a set pattern, three possible scenarios were examined using the previously
### TABLE 1-6

Airlake Airport
Long-Term Comprehensive Plan Update

**COMPARISON OF OPERATIONAL FORECASTS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Historical Operations</th>
<th>Regional System Reliever Airports Study</th>
<th>1989 Airlake Airport Comprehensive Development Plan</th>
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<td>1986</td>
<td>40,000</td>
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<td>1987</td>
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<td>1989</td>
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</tr>
<tr>
<td>1990</td>
<td>67,980</td>
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<tr>
<td>1991</td>
<td>74,745</td>
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<tr>
<td>1992</td>
<td>81,087</td>
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<td></td>
<td></td>
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<td>91,976</td>
</tr>
</tbody>
</table>

**Source:**
Regional System Reliever Airports Study
1989 Airlake Comprehensive Development Plan
### OPERATIONS PROJECTIONS

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<th>Year</th>
<th>Total Operations</th>
<th>Based Aircraft</th>
<th>Operations Per Based Aircraft</th>
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<td>461</td>
</tr>
<tr>
<td>1995</td>
<td>75,397</td>
<td>179</td>
<td>421</td>
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<tr>
<td></td>
<td>Average 1984 - 1995</td>
<td></td>
<td>453</td>
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<td></td>
<td>Projected</td>
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<td></td>
<td>Decreasing OPBA</td>
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<td></td>
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<tr>
<td>2000</td>
<td>80,100</td>
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<td>400</td>
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<tr>
<td>2005</td>
<td>84,000</td>
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<tr>
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<td>90,200</td>
<td>251</td>
<td>360</td>
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<tr>
<td>2015</td>
<td>95,300</td>
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<td>92,100</td>
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<td>460</td>
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<td>2010</td>
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<td>520</td>
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<tr>
<td>2015</td>
<td>155,800</td>
<td>280</td>
<td>556</td>
</tr>
</tbody>
</table>

Source: MAC Records
The Airport Technology and Planning Group, Inc.
developed preferred projection of based aircraft. These three scenarios are summarized below.

1. **Decreasing OPBA Scenario**

Between 1984 and 1995, the OPBA at Airlake Airport fluctuated from 556 to 340. This scenario assumes that as the number of based aircraft increases at Airlake Airport, the Airport's OPBA will decline to the historical low of 340. This scenario produces an estimate of 95,300 annual operations by 2015. Using this scenario, the number of operations exhibit a slight upward trend from the Airport’s current levels. This scenario is used to show a possible lower limit for the annual OPBA and is considered a very conservative estimate of future operational activity.

2. **Average OPBA Scenario**

According to operations and based aircraft data provided by MAC, the average OPBA for the Airport between 1984 and 1995 was 453 (see Table 1-7). Historically, the OPBA has fluctuated from a high of 556 (1985) to a low of 340 (1987). This scenario holds the future OPBA constant at the average OPBA (453). When the average OPBA is applied to the projected number of based aircraft, the number of annual Airport operations is projected to increase to 126,900 by the end of the planning period.

3. **Increasing OPBA Scenario**

This scenario assumes the OPBA will increase to the historical high experienced in 1985, duplicating the period of rapid growth that occurred in the mid-1980's. This scenario projects the total number of annual operations to reach 155,800 by 2015.

4. **Preferred General Aviation Projection of Operations**

Of the three scenarios, the average OPBA scenario was selected for use as the preferred projection. Considering the historical fluctuation in the OPBA, the average OPBA scenario appears prudent for the 20-year projection. This scenario also assumes a steady increase in annual operations, comparable to actual growth experienced since 1984. The decreasing OPBA scenario was considered too low given the relatively strong regional aviation environment. The increasing OPBA scenario was not selected based on the general historical trend of a decreasing OPBA since 1990. This scenario does, however, represent the upper limit of potential operational demand that is possible at the Airport.
The preferred unconstrained Airlake Airport aircraft operations projections for the planning period are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Operations</th>
</tr>
</thead>
<tbody>
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<td>Historical</td>
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</tr>
<tr>
<td>1994</td>
<td>82,500</td>
</tr>
<tr>
<td>1995</td>
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<tr>
<td>2000</td>
<td>90,600</td>
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<tr>
<td>2005</td>
<td>101,400</td>
</tr>
<tr>
<td>2010</td>
<td>113,400</td>
</tr>
<tr>
<td>2015</td>
<td>126,900</td>
</tr>
</tbody>
</table>

C. General Aviation Local and Itinerant Operations

As defined by the FAA, local operations are performed by aircraft that:

- Operate in the local traffic pattern or within sight of an airport
- Are known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of an airport
- Are executing simulated instrument, nonprecision, or visual approaches or low passes at an airport (touch-and-go operations)

Itinerant operations are all other operations.

The 1995 FAA 5010 Form for Airlake Airport indicates that approximately 21.2 percent of the annual operations are a result of itinerant aircraft. In 1993, the 5010 Form indicated that itinerant traffic accounted for 20.5 percent of the Airport's operations. The Regional System Reliever Airports Study data stated that approximately 30 percent of the flights were itinerant in 1988. In 1986, itinerant flights were estimated at 15 percent in the Airport's Comprehensive Development Plan. Estimates of local and itinerant operations are presented in Table 1-8.

For projection purposes, the future itinerant operations were increased from the current estimate of 21.2 percent to the historical high percentage of approximately 30 percent (1986). This growth is distributed over the 20-year planning period (see Table 1-8). This increase in itinerant operations follows the national trend towards increased usage of aircraft for business purposes. Currently, the national trend for aircraft operations shows an overall increase in itinerant activity.
<table>
<thead>
<tr>
<th>Year</th>
<th>Local Operations</th>
<th>Percent Local</th>
<th>Itinerant Operations</th>
<th>Percent Itinerant</th>
<th>Total Operations</th>
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</thead>
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<td><strong>Historical</strong></td>
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<td></td>
</tr>
<tr>
<td>1986</td>
<td>34,000</td>
<td>85.0%</td>
<td>6,000</td>
<td>15.0%</td>
<td>40,000</td>
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<td>1988</td>
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<td>20,736</td>
<td>32.4%</td>
<td>64,000</td>
</tr>
<tr>
<td>1993</td>
<td>64,464</td>
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<td>16,623</td>
<td>20.5%</td>
<td>81,087</td>
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<td>1995</td>
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<td>15,984</td>
<td>21.2%</td>
<td>75,397</td>
</tr>
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<td><strong>Projected</strong></td>
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<td></td>
</tr>
<tr>
<td>2000</td>
<td>69,853</td>
<td>77.1%</td>
<td>20,900</td>
<td>23.1%</td>
<td>90,600</td>
</tr>
<tr>
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<td>26,100</td>
<td>25.7%</td>
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</tr>
<tr>
<td>2010</td>
<td>81,988</td>
<td>72.3%</td>
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<td>88,830</td>
<td>70.0%</td>
<td>38,100</td>
<td>30.0%</td>
<td>126,900</td>
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</table>

Source: Regional System Reliever Airports Study
FAA 5010 Forms
MAC Records
D. Total Aircraft Operations

Total aircraft operations at Airlake Airport include general aviation and air taxi operations. The estimates for these categories are presented in Table 1-9. According to the FAA 5010 Form, a total of 1,000 air taxi operations occurred in 1995. Over the planning period, it was assumed that air taxi operations would increase by approximately 4 percent annually through 1998, based on projections prepared by the FAA for air taxi operations nationwide. This growth is expected to continue, though at a slightly less robust level, throughout the planning period. This increase corresponds with the Airport FBO's plans to expand their air taxi operations. There is no history of military operations at the Airport. It is assumed that the Airport will follow its historical pattern, and that it will not attract military operations in the future. In 1995, the Airport accommodated nearly 74,400 general aviation operations. By 2015, 125,400 general aviation (excluding military and air taxi) operations are projected.

E. Operating Fleet Mix

The existing and projected operating fleets at Airlake Airport are depicted in Table 1-10. While exact percentages of the aircraft in the Airport's operating fleet mix were unavailable, ratios were derived using the data presented in the FAA 5010 Form, the based aircraft fleet mix, and by counts conducted by the FBO in 1991. Currently, an estimated 92 percent of the Airport's operational fleet mix is composed of single-engine aircraft. Multiengine aircraft operations are estimated to make up approximately 7.0 percent of the Airport's total operations. Jet activity accounts for approximately 0.5 percent of current operations. Helicopters comprise the remaining 0.5 percent of the operating fleet.

Future operating fleet mixes were developed based on projected increases in the number of hours flown nationally as well as on projected increases in the based aircraft fleet. The overall percentage of multiengine activity is projected to increase slightly at the Airport based on FAA assumptions that business aircraft will likely see more use in the future. Multiengine operations are expected to increase from 5,280 (7 percent) in 1995 to 12,700 (10 percent) by the end of the planning period. Single-engine operations will increase from 69,317 in 1995 to an estimated 112,900 by the end of the planning period. The overall percentage of single-engine aircraft activity will decline slightly as business aircraft percentages (multiengine) increase. Both the percentage of helicopter operations and jet aircraft were held constant at their estimated 1995 levels (0.5 percent). Helicopters operations are expected to increase from 400 in 1995 estimates to 600 by 2015. Jet operations at the Airport are also expected to increase from approximately 400 in 1995 to 600 by 2015. Jet and helicopter operations will make up a minor percentage of the total number of operations by the end of the planning period.
### TABLE 1-9

Airlake Airport
Long-Term Comprehensive Plan Update

TOTAL AIRPORT OPERATIONS

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<thead>
<tr>
<th>Year</th>
<th>General Aviation</th>
<th>Military</th>
<th>Air Taxi</th>
<th>Total</th>
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<tr>
<td><strong>Historical</strong></td>
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<td>81,500</td>
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<td>82,500</td>
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<td>1,000</td>
<td>75,397</td>
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<td>2015</td>
<td>125,400</td>
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Source: MAC Records
The Airport Technology and Planning Group, Inc.
TABLE 1-10
Airlake Airport
Long-Term Comprehensive Plan Update
OPERATIONAL FLEET MIX

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<tr>
<th>Year</th>
<th>Single-engine Number</th>
<th>Percent</th>
<th>Multiengine Number</th>
<th>Percent</th>
<th>Jet Number</th>
<th>Percent</th>
<th>Helicopter Number</th>
<th>Percent</th>
<th>Total</th>
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<tr>
<td>1995</td>
<td>69,317</td>
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<tr>
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<td>500</td>
<td>0.5%</td>
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</tr>
<tr>
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<td>9.0%</td>
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<td>0.5%</td>
<td>500</td>
<td>0.5%</td>
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</tr>
<tr>
<td>2010</td>
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<td>0.5%</td>
<td>600</td>
<td>0.5%</td>
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</tr>
<tr>
<td>2015</td>
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<td>10.0%</td>
<td>600</td>
<td>0.5%</td>
<td>600</td>
<td>0.5%</td>
<td>126,900</td>
</tr>
</tbody>
</table>

MAC Records
The Airport Technology and Planning Group, Inc.
6. AIRPORT PEAKING CHARACTERISTICS

Because many facility needs are related to activity levels during peak demand periods, projections were developed for peak month, average day, and peak hour operations at the Airport (Table 1-11). The peak operating month for Metropolitan Area airports typically occurs in the summer in July or August. Peak month operations are estimated to represent approximately 12 percent of total annual operations. For projection purposes, it was assumed that this monthly peaking factor would remain constant throughout the planning period. Average daily operations were estimated by dividing the peak month by 31 days. To develop peak hour operations projections, an hourly peaking factor was applied to the number of average daily operations. Past studies have shown this factor to be between 15 and 20 percent for airports with activity levels comparable to those levels projected for the Airport. A 17 percent hourly peaking factor was chosen to account for brief periods of relatively heavy use, such as when several aircraft are in the pattern performing touch-and-go operations.

As shown, peak month operations are expected to increase from 9,048 in 1995 to 15,228 in 2015. Average day operations should increase from 292 to 491 over this same time period. It should be noted that peak day operations could surpass this figure during very busy periods. Peak hour activity can be expected to increase from 50 to 84 operations by the end of the planning period. Again, these projections represent averages, rather than absolute peak numbers. Therefore, the hourly and daily peaks may be exceeded during exceptionally active periods.

7. SUMMARY

The aviation demand projections for the Airport are summarized as follows:

- All forecasts developed as part of this study are based on historical Airport activity, regional trends, and FAA projections. These trends were tempered with specific knowledge of local conditions.

- All forecasts should be considered as unconstrained.

- Based on historical trends and population projections, the number of registered general aircraft in the seven-county Metropolitan Region is projected to increase from 2,852 in 1994 to more than 3,200 by the end of the planning period.

- Two methodologies, market share and population, were analyzed to determine potential based aircraft demand for Airlake Airport. While both methods produced similar results, the

---

4 Average peak hour operations are operations that occur during the peak hour of an average day in the peak month.
<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Operations</th>
<th>Peak Month</th>
<th>Average Day</th>
<th>Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>82,500</td>
<td>9,900</td>
<td>319</td>
<td>54</td>
</tr>
<tr>
<td>1995</td>
<td>75,397</td>
<td>9,048</td>
<td>292</td>
<td>50</td>
</tr>
<tr>
<td>Projected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>90,600</td>
<td>10,872</td>
<td>351</td>
<td>60</td>
</tr>
<tr>
<td>2005</td>
<td>101,400</td>
<td>12,168</td>
<td>393</td>
<td>67</td>
</tr>
<tr>
<td>2010</td>
<td>113,400</td>
<td>13,608</td>
<td>439</td>
<td>75</td>
</tr>
<tr>
<td>2015</td>
<td>126,900</td>
<td>15,228</td>
<td>491</td>
<td>84</td>
</tr>
</tbody>
</table>

Source: MAC Data
The Airport Technology and Planning Group, Inc.
Moderate Growth Market Share scenario was selected as the preferred forecast for the Airport. Using this methodology, based aircraft are expected to increase from the current level of 179 to more than 280 by the end of the planning period.

- Based on recent Airport-specific and national trends, the percentage of single-engine aircraft will make up a slightly smaller percentage of the locally based fleet. The actual number of single-engine aircraft, however, will increase from 165 to over 250 by the end of the planning period. The percentage of multiengine aircraft is projected to increase slightly. Multiengine aircraft are projected to increase from 12 to 28 by the end of the planning period. It is projected that a limited number of jet aircraft may be based at the Airport by the end of the planning period.

- Using an operations per based aircraft methodology, the number of operations is expected to increase to 126,900 by the end of the planning period.

- Itinerant operations currently account for an estimated 21.2 percent (15,984 operations) of the total Airport traffic. The percentage of itinerant operations is expected to increase to 30 percent by 2015.

- General aviation activity comprises the majority of the Airport's operations. Air taxi operations, however, are projected to increase from 1,000 operations in 1995 to approximately 1,500 in 2015.

- The operating fleet mix is projected to see a moderate increase in the percentage of multiengine aircraft using the Airport. Single-engine aircraft will continue to comprise the majority of the Airport's operations.

- The average number of peak hour operations is estimated to increase from 50 in 1995 to 84 by the end of the planning period.
CHAPTER TWO

FACILITY REQUIREMENTS

This section of the Long-Term Comprehensive Development Plan Update identifies airside and landside facility requirements for Airlake Airport through the year 2015. Existing and future facility requirements and development standards were identified by comparing the Airport’s capacity, or its ability to process or accommodate demand, to the Airport’s projected demand levels. The Airport’s ability to accommodate future aviation demand is reviewed in the following sections:

- Airfield Demand/Capacity Analysis
- Airside Facility Requirements
- Landside Facility Requirements
- Summary

1. AIRFIELD DEMAND/CAPACITY ANALYSIS

Airfield capacity is defined as the number of aircraft operations that an airfield configuration can accommodate during a specified interval of time, when there is a continuous demand for service (i.e., an aircraft is always waiting to depart or land). This definition is referred to as the practical capacity or the maximum throughput rate. This methodology focuses on both peak hour capacity and annual operating capacity. The Airport's annual service volume (ASV) serves as one quantifiable capacity measure, while hourly operating capacity is used as another capacity measure in determining specific facility needs.

Several factors contribute to the capacity of a given airfield. These include:

- Airfield layout and runway configurations
- Weather conditions
- Aircraft fleet mix
- Touch-and-go operations
- Peak hour airfield capacity
- Annual service volume (ASV)

A. Airfield Layout and Runway Configurations

Airfield layout and runway configuration are the most critical variables in determining Airfield capacity and delay, since these are typically the most constraining features. Airlake Airport currently has a single runway. Runway 11/29 is 4,098 feet long and 75 feet wide. This runway is supported by a full-length parallel taxiway. The runway and taxiway are connected via five exit taxiways, among which are two end taxiways, and three connecting
taxiways, two of which are at mid-field and a third near the displaced threshold of Runway 29. The sooner an arriving aircraft can exit the runway, the sooner it is available for the next operation, thereby minimizing delay. Therefore, the number and location of exit taxiways is significant in determining airfield capacity.

The number and location of exit taxiways at Airlake Airport maximizes the efficiency with which aircraft are able to enter and exit Runway 11/29. Therefore, additional exit taxiways would not increase airfield capacity.

B. Weather Conditions

Weather conditions can impact the capacity of an airport by closing the airport for operations or by reducing the number of operations which can occur. Weather conditions are typically divided into two categories: visual flight rule (VFR) and instrument flight rule (IFR). VFR minimums occur when the ceiling is at least 1,000 feet above the Airport elevation and the visibility is at least three statute miles. Published instrument approaches are assigned minimums which vary based on the type of navigational aids (NAVAIDs) and surrounding objects that may affect approach and departure. The ILS approach at Airlake Airport has a minimum ceiling height of 250 feet above ground level (AGL) and a visibility range of one mile, while the localizer approach to this runway has a minimum ceiling of 442 feet AGL and a visibility range of one mile. The VOR or GPS approach to Runway 11 has a minimum ceiling of 580 feet AGL and a visibility range of one mile. However, if distance measuring equipment (DME) is used on this approach, the ceiling may be reduced to 480 feet.

The distinction between IFR and VFR is important because, with all other conditions being equal, fewer aircraft operations can occur during IFR conditions. VFR weather occurs in the metropolitan area approximately 93.5 percent of the time, while IFR conditions occur 6.5 percent of the time. During IFR conditions, it is estimated that the Airport is able to remain open for operation approximately 80 percent of the time.

Crosswind coverage for Runway 11/29 is approximately 84 percent at 10.5 knots and 91 percent at 13 knots. Therefore, with a single runway configuration, unfavorable crosswinds make the runway unusable for small aircraft 16 percent of the time and unusable for larger aircraft 9 percent of the time; the addition of a crosswind runway would increase overall airport capacity at the Airlake Airport.

C. Aircraft Fleet Mix

The aircraft operational fleet mix is an important factor in determining an airport's operational capacity. For the purpose of calculating capacity, aircraft are categorized according to their approach speed and size. Operational capacity typically decreases as the diversity of aircraft approach speeds increases. This is because aircraft following each other,
either on takeoff or departure, are spaced according to the difference in their air speeds. Also, aircraft create wake vortices which require greater spacing for small aircraft following larger aircraft. The greater the difference in size and speed of the aircraft in the fleet, the greater the space required between aircraft and, therefore, the lower the operational capacity.

A projected operational aircraft fleet mix for Airlake Airport was developed as part of the forecasting task. Because the forecasts are used for a variety of different analyses within the study (i.e., noise analysis, capacity analysis, runway length, strength requirements analysis, etc.), detailed fleet mix projections were developed. The aircraft fleet mix at Airlake consists mostly of Class A single-engine aircraft and Class B multi-engine aircraft under 12,500 pounds. While some operations are expected by aircraft in Class C, (multi-engine aircraft over 12,500 pounds), this is not expected to have a significant impact on airfield capacity. Aircraft in Class D, those with maximum gross takeoff weights in excess of 300,000 pounds, will not be operating at the Airport during the planning period. Therefore, the homogeneous operating fleet enhances the Airport's ability to process the maximum number of operations.

D. Touch-and-Go Operations

Touch-and-go operations are defined as operations by a single aircraft that lands and departs on a runway without stopping or exiting the runway. Such operations are typically associated with flight training as well as with pilots wishing to log additional operations. Pilots conducting touch-and-go operations usually stay within the airport traffic pattern. Touch-and-go operations utilize minimal runway time. Therefore, airport capacity typically increases as the ratio of touch-and-go operations to total operations increases. Due to the high percentage of local operations expected during the planning period, it is estimated that touch-and-go operations will account for approximately 60 percent of the Airport's total operations, thereby increasing the Airport's operational capacity.

E. Peak Hour Airfield Capacity and Annual Service Volume

The peak hour airfield capacity is defined as the number of aircraft operations that can take place on the runway system in an hour with minimal capacity-related delay. With the exception of the lack of an air traffic control tower (ATCT), the conditions at Airlake Airport fall within parameters which allow for the use of standard tables in the Airport Capacity and Delay Advisory Circular. According to this document, an airport with a single runway configuration will achieve a maximum peak hour rate of 98 operations during VFR conditions and 59 operations during IFR conditions. Peak hour demand in 1995 was estimated at 50 operations; this number is expected to increase to 84 by 2015.

Annual service volume (ASV) for a single runway without an air traffic control tower is estimated at 200,000 operations. This capacity is compared to 75,397 operations in 1995 and
126,900 operations projected by 2015. The operational level forecast by 2015 will be approximately 63 percent of the Airport’s total annual operational capacity. Typically, significant delays are not encountered until operations surpass 80 percent of available capacity.

F. Summary

To summarize, the results of the airfield capacity analysis indicate that the Airport will have sufficient airside capacity in order to efficiently and conveniently accommodate projected demand levels throughout the 20-year planning period.

2. AIRSIDE FACILITY REQUIREMENTS

Airside facility requirements were developed for each of the following areas at the Airport:

- Primary runway requirements
- Taxiway requirements
- Potential crosswind runway
- FAA airfield safety areas
- Part 77 surfaces
- Minnesota safety zones
- Navigational aids (NAVAIDs)
- Airspace

Airside facilities needed at Airlake Airport to accommodate aviation demand were determined using applicable FAA standards and requirements for various airside components. The planning and design of an airport is based on an airport’s role, its number of operations, and the "critical" aircraft expected to use the airport. The critical, or design aircraft, is defined as the most demanding aircraft that operates at an airport on a regular basis. Typically, an aircraft or type of aircraft must have 500 or more annual operations to be considered as the critical aircraft.

For geometric design purposes, it was necessary to establish applicable design standards for existing and future runway and taxiway development at Airlake Airport. The FAA provides guidance for the planning and design of airport facilities through FAA Advisory Circulars that promote airport safety, economy, efficiency, and longevity. Information from FAA Advisory Circular 150/5300-13, "Airport Design," was used to determine the Airport Reference Code (ARC) for Airlake Airport. The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at an airport.

The ARC has two components which relate to an airport’s design using the critical aircraft. The first component, depicted by a letter, is the aircraft approach category, as determined by the approach speed of the critical aircraft (see Table 2-1).
### FAA Aircraft Approach Categories

<table>
<thead>
<tr>
<th>Approach Category</th>
<th>Approach Speed (Knots)</th>
<th>Typical Aircraft Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Less than 91</td>
<td>Beech Baron 55, Cessna 172</td>
</tr>
<tr>
<td>B</td>
<td>91 but less than 121</td>
<td>King Air, Citation II, Metroliner</td>
</tr>
<tr>
<td>C</td>
<td>121 but less than 141</td>
<td>Lear 25, Gulfstream III</td>
</tr>
<tr>
<td>D</td>
<td>141 but less than 166</td>
<td>Gulfstream II and IV</td>
</tr>
</tbody>
</table>

### FAA Wingspan Design Groups

<table>
<thead>
<tr>
<th>Design Group</th>
<th>Wingspan (feet)</th>
<th>Typical Aircraft Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Less than 49</td>
<td>Beech Baron 55, Cessna 172 Cessna 414, King Air F90</td>
</tr>
<tr>
<td>II</td>
<td>49 but less than 79</td>
<td>Falcon 50, Beech King Air E-90 Gulfstream i, Citation II, DHC-6</td>
</tr>
<tr>
<td>III</td>
<td>79 but less than 118</td>
<td>B-727, B-737, BAC-111, DC-9, Convair 580</td>
</tr>
<tr>
<td>IV</td>
<td>118 but less than 171</td>
<td>A-300, B-707, DC-8, B-757, B-767, L-1011, DC-10</td>
</tr>
<tr>
<td>V</td>
<td>171 but less than 197</td>
<td>B-747</td>
</tr>
<tr>
<td>VI</td>
<td>197 but less than 262</td>
<td>Lockheed C-5B</td>
</tr>
</tbody>
</table>

Source: FAA Advisory Circular 150/5300-13, "Airport Design"
The second component, depicted by a Roman numeral, is the airplane design group, as determined by the wingspan of the critical aircraft (see Table 2-1). Generally, aircraft approach speed applies to runways and runway-related facilities. Airplane wingspan relates primarily to separation criteria involving taxiways and taxilanes.

To be considered as an airport’s critical aircraft, the aircraft (or type of aircraft) must annually perform 250 landings (500 total operations). According to Airport data, most of the aircraft operating at the Airport are small airplanes which have maximum gross takeoff weights of 12,500 pounds or less. The Cessna Citation II is representative of the largest class of aircraft which conducts more that 500 annual operations. With an approach speed of 108 knots, a wingspan of 51.7 feet, and a maximum gross takeoff weight of 13,300 pounds, this is classified as a large aircraft, and is included in ARC B-II. In addition, several turboprop aircraft, such as the King Air E-90 falls into the ARC B-II classification. Typical design aircraft operating at the Airport are illustrated on Exhibit 2-1. Table 2-2 depicts the applicable standards for ARC B-II runways and taxiways. These standards should remain applicable throughout the 20-year planning period.

The following sections discuss the specific runway requirements for both the primary and crosswind runways.

A. Primary Runway Requirements

The runway and taxiway dimensions required to meet projected aviation demand at Airlake Airport were based on the types of aircraft projected to operate regularly from the Airport. The runways and taxiways at the Airport should be designed in accordance with the standards developed by the FAA, using the ARC system previously discussed. In the future, any improvements to the airfield should incorporate these standards, except in cases where existing conditions and constraints make it impractical to provide fully conforming facilities.

1. Runway Length

FAA Advisory Circular 150/5325-4 and the FAA’s Airport Design computer program provide guidance on determining runway length requirements. The method for determining the recommended primary runway length is based on either a family of aircraft having similar operating characteristics or by analysis of a specific aircraft. The Airport’s critical aircraft with regard to approach speed includes multiengine aircraft with maximum gross takeoff weights greater than 12,500 pounds but less than 60,000 pounds.

The above referenced FAA circular and computer program provide runway length curves for various percentages of the operating fleet falling into this classification of aircraft. An aircraft’s operating load will vary, depending on its payload, fuel load, and intended trip length. In determining the required runway length for the Airport, the daily mean maximum
**DESIGN AIRCRAFT**

**CITATION II**
- Wingspan: 51.7 ft
- Length Overall: 47.2 ft
- Max T-O Weight: 13,300 lb
- Approach Speed: 106 knots
- ARC: B-II

**BEECHCRAFT KING AIR**
- Wingspan: 50.2 ft
- Length Overall: 35.5 ft
- Max T-O Weight: 9,650 lb
- Approach Speed: 106 knots
- ARC: B-II

**TYPICAL OPERATING AIRCRAFT**

**CESSNA 172**
- Wingspan: 35.5 ft
- Length Overall: 27.2 ft
- Max T-O Weight: 2,500 lb
- Approach Speed: 64 knots
- ARC: A-I

**BEECHCRAFT BARON**
- Wingspan: 37.8 ft
- Length Overall: 29.8 ft
- Max T-O Weight: 6,200 lb
- Approach Speed: 101 knots
- ARC: B-I
<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>ARC B-II Approach Visibility Minimums Lower Than 3/4 mile</th>
<th>ARC B-II Approach Visibility Minimums Not Lower Than 3/4 mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway Width</td>
<td>100 ft</td>
<td>75 ft</td>
</tr>
<tr>
<td>Runway Centerline to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Taxiway centerline</td>
<td>300 ft</td>
<td>240 ft</td>
</tr>
<tr>
<td>- Aircraft parking area</td>
<td>400 ft</td>
<td>250 ft</td>
</tr>
<tr>
<td>- Holdline</td>
<td>250 ft</td>
<td>200 ft</td>
</tr>
<tr>
<td>Runway Object Free Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Length beyond runway end</td>
<td>600 ft</td>
<td>300 ft</td>
</tr>
<tr>
<td>- Width</td>
<td>800 ft</td>
<td>500 ft</td>
</tr>
<tr>
<td>Runway Obstacle Free Zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Length beyond runway end</td>
<td>200 ft</td>
<td>200 ft</td>
</tr>
<tr>
<td>- Width</td>
<td>400 ft</td>
<td>400 ft</td>
</tr>
<tr>
<td>Runway Safety Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Length beyond runway end</td>
<td>600 ft</td>
<td>300 ft</td>
</tr>
<tr>
<td>- Width</td>
<td>300 ft</td>
<td>150 ft</td>
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<tr>
<td>Taxiway Width 2/</td>
<td>35 ft</td>
<td>35 ft</td>
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<tr>
<td>Taxiway Centerline To:</td>
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<td></td>
</tr>
<tr>
<td>- Fixed or movable object</td>
<td>65.5 ft</td>
<td>65.5 ft</td>
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<tr>
<td>Taxiway Object Free Area (Width)</td>
<td>131 ft</td>
<td>131 ft</td>
</tr>
<tr>
<td>Taxiway Safety Area (Width)</td>
<td>79 ft</td>
<td>79 ft</td>
</tr>
<tr>
<td>Runway Shoulder Width</td>
<td>10 ft</td>
<td>10 ft</td>
</tr>
</tbody>
</table>

1/ It is unlikely that visibility minimums below 3/4 mile can be obtained. These design standards are depicted for comparison.

2/ MAC typically designs taxiways with a width of 40 feet to improve safety and to facilitate snow removal.

Source: Airport Design FAA AC:150/5300-13 Change 4
temperature of the hottest month (85° Fahrenheit), and the Airport's elevation (960 feet mean sea level or MSL) were applied.

The existing runway length of 4,098 feet is adequate for 100 percent of the small piston-engine aircraft that operate at the Airport. There are, however, operations projected by larger turboprop and jet aircraft. While many of these aircraft can operate on a 4,000-foot runway, FAA runway length calculations indicate that a runway length of 4,850 feet would be more ideal in order to accommodate 75 percent of large aircraft at 60 percent useful load. Runway 11/29, at 4,098 feet in length, would require an extension in order to accommodate a wider segment of the business jet fleet. A runway extension yielding a total length of 5,000 feet could be warranted in order to accommodate more demanding business jets. However, extending Runway 11/29 in either direction is complicated by the location of Cedar Avenue and 225th Street to the south and east and the Minneapolis, Northfield and Southern Railroad tracks, Highview Ave., and several buildings to the west. The maximum feasible runway length will be addressed later in the chapter.

2. **Runway Width**

A runway width of 75 feet is required by the FAA for runways designed to support the operation of aircraft in ARC B-II with approach visibility minimums not lower than 3/4 of a mile. Therefore, the current 75-foot width of Runway 11/29 is adequate. If the visibility minimums are reduced to less than 3/4 mile, the runway should be widened to 100 feet.

3. **Runway Pavement Strength**

Runway pavement strength may be expressed by single-wheel loading, dual-wheel loading, and dual-tandem wheel loading capabilities. The aircraft gear type and configuration dictate how the weight of the aircraft is distributed over the pavement and determines pavement response to loading. Examination of gear configuration, tire contact areas, and tire pressure indicates that pavement strength is related to an aircraft's maximum takeoff weight.

According to the Airlake Airport listing in the 1996 Airport/Facility Directory, Runway 11/29 has a pavement strength of 30,000 pounds single-wheel loading (SWL). This should be adequate for the planning period.

**B. Taxiway Requirements**

Taxiways may be categorized as parallel, exit, and hangar/apron access. Runway 11/29 is supported by a thirty-foot wide, full length parallel taxiway located on the north side of the runway. The runway-taxiway separation (the distance from the runway centerline to the taxiway centerline) varies along the length of this taxiway. This separation is 200 feet along
the western 1,100 feet of the taxiway and transitions to a separation of 300 feet for the remaining length of taxiway.

FAA standards suggest that taxiways be at least 35 wide for ARC B-II aircraft. MAC typically designs taxiways at a 40-foot width for an added margin of safety and to facilitate snow removal. In addition, the runway-centerline-to-taxiway-centerline separation for B-II aircraft operating on runways with approach visibility minimums of 3/4 of a mile or greater must be at least 240 feet. Therefore, in order to comply with FAA criteria, the runway-taxiway separation for the western 1,100 feet of the parallel taxiway should be increased to at least 240 feet. This section of taxiway currently has a 200-foot separation. Since the eastern 2,800 feet of the parallel taxiway has a 300-foot runway-taxiway separation, it is recommended that the western 1,100 feet of taxiway also be developed with a 300-foot runway-taxiway separation. A 300-foot separation would be required if the visibility minimums were ever reduced to below 3/4 mile.

Five exit taxiways connect Runway 11/29 with the parallel taxiway. These include two end taxiways and three connecting taxiways that are thirty feet wide. The MAC standard of 40-foot wide taxiways for ARC B-II aircraft applies to exit taxiways as well as to parallel taxiways. Therefore, these taxiways should also be widened to 40 feet.

A parallel taxiway has been planned to serve the south side of Runway 11/29 where MAC is currently developing an additional building area. This taxiway, and all associated exit taxiways, should also be at least 40 feet wide to meet MAC standards. A minimum taxiway centerline to runway centerline separation of 240 feet is required to meet FAA B-II design standards for a runway with visibility minimums as low as 3/4 mile.

C. Potential Crosswind Runway

When winds are not directly aligned with the runway, pilots calculate a crosswind component to determine if a runway is usable. The lighter the aircraft, the more susceptible it is to crosswinds during takeoff and landing. FAA recommends that crosswind coverage be at least 95 percent at 10.5 knots for aircraft in ARC A-I and thirteen knots for aircraft in ARC B-II. Runway 11/29 provides crosswind coverage for a 10.5 knot wind approximately 84 percent of the time and 91 percent coverage for a thirteen knot crosswind. Since crosswind coverage at Airlake Airport does not meet FAA criteria, a crosswind runway should be considered. FAA standards indicate that a crosswind runway length should be at least 80 percent of the primary runway’s length, however, a shorter runway can be acceptable.

The 1989 Master Plan indicated that a 3,500-foot long runway would be adequate to serve the Airport’s crosswind runway needs throughout the planning period. Runway 4/22, as depicted on the Airport’s current ALP, is 75 feet wide and has a pavement strength of 12,500
pounds single-wheel loading. The supplemental analysis, contained in Appendix I indicates that a 2,500-foot long crosswind runway will be adequate for Airlake Airport.

According to the FAA Runway Length Circular and Design Program, a 2,500-foot long crosswind runway will accommodate the light single-and twin-engine aircraft expected to use the crosswind runway. It is important to note that a crosswind runway does not typically increase the operational capacity of an airport. The benefit from a crosswind runway is that the airport can remain open to safe operations in wider range of wind conditions.

The crosswind runway, as planned, would be supported by a full-length parallel taxiway with runway-taxiway separation of at least 240 feet. The runway and parallel taxiway should be connected by at least three exit taxiways, consisting of two end, and one connecting taxiway near the mid-point of the runway. The parallel taxiway as well as all exit taxiways should be at least 40 feet wide to adhere to MAC's taxiway width policy.

D. FAA Airfield Safety Areas

This section presents FAA standards for runways and runway-related elements including runway protection zones (RPZs), runway safety areas (RSAs), obstacle free zones (OFZs), and object free areas (OFAs). These standards are discussed for the primary runway's existing conditions (one mile visibility), as well as possible future conditions accommodating improved visibility minimums. Minnesota-specific requirements will be presented later in this analysis. The following discussion lists the standard widths and lengths for runway and runway-related safety elements.

1. Runway Object Free Area (OFA)

The runway OFA is a two-dimensional imaginary surface surrounding the runway in which the presence of parked aircraft and objects, other than NAVAID's and objects with locations which are fixed by function, is prohibited.

a. Existing Conditions

Because Runway 11/29 has an approach visibility of one mile and is used by aircraft in ARC B-II, an OFA 500 feet wide extending 300 feet beyond either runway end is required. This OFA dimension is compatible with visibility minimums "not lower than 3/4 mile" or higher. Currently, the OFAs are fully within airport property and is clear of obstructions.

b. Future Conditions

A B-II runway with visibility minimums lower than 3/4 mile would increase the dimensions of the OFA to a width of 800 feet and a length of 600 feet. It is unlikely that the Airport
could achieve visibility minimums lower than 3/4 mile due to the location of on-Airport and neighboring buildings that would penetrate an expanded OFA.

c.  **Future Crosswind Runway**

The OFA for a future B-1 crosswind runway for small aircraft with visibility minimums not lower than 3/4 mile would be 250 feet wide and extend 240 feet beyond either runway end. The entire OFA should be controlled in fee by MAC.

2.  **Runway Safety Area (RSA)**

The RSA is a graded area surrounding the runway, the purpose of which is to accommodate aircraft which overrun or stray from the runway. This area must be graded to prevent the accumulation storm water and, under dry conditions, be able to support aircraft, as well as snow removal and airport rescue and fire fighting (ARFF) equipment. General requirements for the grading of this area is a 0 to -3 degree grade for the first 200 feet from the runway end. The remaining longitudinal grade should ensure that no part of the RSA penetrate that approach surface or drop below a -5 degree grade.

a.  **Existing Conditions**

Currently, FAA Design Standards for Runway 11/29 (B-II runways with an approach visibility not lower than 3/4 of a mile) require an RSA of 150 feet in width that extends 300 feet beyond the end of the runway. The RSA for Runway 11/29 meets FAA requirements and should be maintained at this standard. The existing RSA's for all runway ends are completely owned by MAC and are currently free of obstructions and are properly graded.

b.  **Future Conditions**

In order for the Airport to accommodate approach visibility minimums lower than 3/4 mile, the RSA would have to be expanded to a width of 300 feet and to a length of 600 feet beyond the runway end. Due to the location of on-Airport and neighboring buildings, it is unlikely that a approach with visibility minimums lower than 3/4 mile can be achieved.

c.  **Future Crosswind Runway**

The RSA for the proposed crosswind runway should meet B-I (small aircraft) standards for runways with visibility minimums not lower than 3/4 mile. The crosswind runway's RSA would also be 120 feet wide and extend 240 feet beyond either runway end. As will be the case with the OFA for this runway, MAC should plan to acquire sufficient land to maintain all RSA's on Airport property.
3. **Obstacle Free Zone (OFZ)**

The OFZ is a three-dimensional volume of airspace that supports the transition of ground to airborne operations (or vice versa). The OFZ clearing standards prohibit taxiing and parked airplanes and other objects, except frangible NAVAIDs or objects which are fixed by function, from penetrating this zone. The OFZ consists of a volume of airspace centered on the runway.

a. **Existing Conditions**

The existing OFZ is 400 feet wide and extends 200 feet beyond either runway end. Because Runway 29 has an approach lighting system (ALS) an inner-approach OFZ is required. The inner approach OFZ is a defined volume of airspace which begins 200 feet beyond the runway threshold and ends 200 feet beyond the last light of the ALS. This imaginary surface, which extends at a 50:1 slope, has a beginning elevation equal to that of the runway threshold. The existing inner-approach OFZ for Runway 11/29 is not obstructed. Exhibit 2-2 presents an existing OFZ diagram.

b. **Future Conditions**

The existing Airport’s existing OFZ will accommodate approach visibility minimums not lower than 3/4 mile. If the visibility minimums are ever reduced to less than 3/4 mile, an inner-transitional OFZ with a 6:1 slope would be required. The inner-transitional OFZ is a defined volume of airspace along the sides of the inner-approach OFZ as well as the runway. Due to the location of on-Airport and neighboring buildings, it is unlikely that an approach with visibility minimums lower than 3/4 mile can be achieved. Exhibit 2-2 also depicts the visual layout of all OFA surfaces.

c. **Crosswind Runway**

A future crosswind runway would require an OFZ 250 feet wide that would extend 200 feet beyond the runway ends. Inner-transitional and inner-approach OFZs will not be required for a future crosswind runway since this runway would not have a precision approach.

4. **Runway Protection Zone (RPZ)**

The RPZ, formerly known as the runway clear zone, is a trapezoidal-shaped imaginary surface which is centered on the extended runway centerline. The function of the RPZ is to enhance the protection of people and property on the ground. This is typically achieved through airport owner control over the RPZ through acquisition. A portion of the OFA extends into the RPZ. That portion of the RPZ outside of the OFA is known as the controlled activity area, and should be free of land uses which create glare and smoke. Also,
OFZ - VISIBILITY MINIMUMS ≥ 3/4 MILE

Primary Surface
Runway OFZ
Runway
RPZ
Inner Approach OFZ*

OFZ - VISIBILITY MINIMUMS < 3/4 MILE

Inner-Transitional Surface OFZ**
150' Above Airport Elevation
Runway OFZ
3:1
Runway
Primary Surface
RPZ
Inner Approach OFZ*

*Only with an Approach Light System.

**Applies only to runway with visibility minimums less than 3/4 mile.

SOURCE: FAA Advisory Circular 150/5300-13, "Airport Design"
construction of residences, fuel-handling facilities, churches, schools, and offices is not recommended within the controlled activity area. While roads are permitted within this area, this practice is typically discouraged. While it is desirable to clear all objects from the RPZ, some uses are permitted, provided they do not attract wildlife, and are outside the OFA and do not interfere with NAVAIDs. Golf courses and agricultural operations are permitted. Prohibited land uses include places of public assembly and residential activities.

The RPZ begins 200 feet beyond the end of the runway pavement that is usable for takeoff and landing. Displacing the landing or takeoff threshold does not change the beginning point of the RPZ. If runway pavement is used for either takeoff or landing, the start of the RPZ remains at the 200-foot standard. The actual length and width of the RPZ is contingent upon the size of aircraft operating on the runway as well as on the approach visibility minimum. Generally, as the approach visibility minimum decreases, the dimensions of the RPZ increase.

a. Existing Conditions

The approach to Runway 11 is nonprecision, while the approach to Runway 29 is precision. However, since both runway ends have approach visibility minimums of one mile, the RPZ dimensions are the same. The existing approach RPZ’s for Runway 11/29 are 1,000 feet in length, with an inner width of 500 feet and an outer width of 700 feet.

An examination of the RPZ’s for Runway 11/29 reveals that, with the exception of 225th Street and Cedar Avenue, the entire RPZ of Runway 29 is on Airport property. The only portions of the RPZ for Runway 11 not on Airport property traverse Highview Avenue, the land on which the Minneapolis, Northfield and Southern Railroad tracks are located, and a small portion of the Watkins Pattern Building. An avigation easement, however, has been acquired for the section of RPZ which is located in the industrial park. It is desirable for RPZ’s to be entirely on Airport property in order to prevent incompatible land uses.

b. Future Conditions

Should visibility minimums be dropped below one mile, the dimensions of the RPZ would increase. RPZ dimensions for approaches with visibility minimums not lower than 3/4 mile increase to 1,700 feet in length, with an inner width of 1,000 feet and an outer width of 1,510 feet. For approaches with visibility minimums lower than 3/4 mile the RPZ dimensions increase to a length of 2,500 feet, with an inner width of 1,000 feet and an outer width of 1,750 feet. With the exception of existing roads, railroads, and industrial buildings, the Airport currently controls property to accommodate RPZs for approach visibility minimums less than 3/4 mile for the existing runway length.

Exhibit 2-3 depicts the existing and potential FAA RPZ dimensions.
**Visual and Approach Visibility Minimauns Not Lower Than 1 Mile**

<table>
<thead>
<tr>
<th>Runway</th>
<th>W1</th>
<th>W2</th>
<th>L</th>
<th>R</th>
<th>Q</th>
<th>RPZ Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/22 (PROPOSED)</td>
<td>250</td>
<td>450</td>
<td>1,000</td>
<td>240</td>
<td>250</td>
<td>8.035</td>
</tr>
</tbody>
</table>

**Visual and Approach Visibility Minimauns Not Lower Than 1 Mile**

<table>
<thead>
<tr>
<th>Runway</th>
<th>W1</th>
<th>W2</th>
<th>L</th>
<th>R</th>
<th>Q</th>
<th>RPZ Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/29 (EXISTING)</td>
<td>500</td>
<td>700</td>
<td>1,000</td>
<td>300</td>
<td>500</td>
<td>13.770</td>
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</tbody>
</table>

**Approach Visibility Minimauns Not Lower Than 3/4 Mile**

<table>
<thead>
<tr>
<th>Runway</th>
<th>W1</th>
<th>W2</th>
<th>L</th>
<th>R</th>
<th>Q</th>
<th>RPZ Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/29</td>
<td>1,000</td>
<td>1,510</td>
<td>1,700</td>
<td>600</td>
<td>800</td>
<td>48.978</td>
</tr>
</tbody>
</table>

**Approach Visibility Minimauns Lower Than 3/4 Mile**

<table>
<thead>
<tr>
<th>Runway</th>
<th>W1</th>
<th>W2</th>
<th>L</th>
<th>R</th>
<th>Q</th>
<th>RPZ Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/29</td>
<td>1,000</td>
<td>1,750</td>
<td>2,500</td>
<td>600</td>
<td>800</td>
<td>78.917</td>
</tr>
</tbody>
</table>

**SOURCE:** FAA Advisory Circular 150/5300-13, "Airport Design"
E. Part 77 Surfaces

Federal Aviation Regulation (FAR) Part 77, Objects Affecting Navigable Airspace, establishes standards for determining whether structures pose potential obstructions to air navigation. Part 77 does this through defining specific airspace areas around an airport that cannot contain any protruding objects. These airspace areas are referred to as "Imaginary Surfaces." Objects affected include existing or proposed objects of natural growth; terrain; or permanent or temporary construction, including equipment, which is permanent or temporary in character. The imaginary surfaces outlined in FAR Part 77 include:

- Primary surface
- Transitional surface
- Horizontal surface
- Conical surface
- Approach surface

Dimensions of Part 77 surfaces, like RPZs, vary depending upon runway approach instrumentation. Exhibit 2-4 graphically illustrates the FAR Part 77 "Imaginary Surfaces" in both plan view and profile view representations.

Although the FAA can determine which structures are obstructions to air navigation, the FAA is not authorized to regulate tall structures. Under FAR Part 77, an aeronautical study may be undertaken by FAA to determine whether the structure in question would be a hazard to air navigation. However, there is no specific authorization in any statute which permits FAA to limit structure heights or determine whether structures should be lighted or marked. In fact, in every aeronautical study determination, the FAA acknowledges that state or local authorities have control over the appropriate use of property beneath an airport's airspace.

Definitions for the FAR Part 77 surfaces are as follows:

I. Primary Surface

The primary surface is longitudinally centered on a runway. For paved runways, as is the case for Runway 11/29, the primary surface extends 200 feet beyond each runway end. The width of the primary surface varies depending upon the critical approach to the airport and the size of aircraft expected to use the runway. Since Runway 11/29 has a precision approach and serves large aircraft, the primary surface is 1,000 feet wide (500 feet on either side of the runway centerline).

Several buildings north of the runway are within the primary surface. This includes Le Jeune Bolt, all seven individual buildings on the northwest side of the runway, and eighteen hangars in the northeast building area are fully, or at least partially, within the primary
surface. While FAA has allowed several of these buildings to remain, they do constitute obstructions. While it is unlikely that the hangars in the northeast building area will be relocated, it is recommended that the other buildings in the primary surface be relocated when it is feasible. Older buildings immediately adjacent to the runway are currently being removed.

2. **Transitional Surface**

Transitional surfaces extend outward and upward at right angles to the runway centerline at a slope of seven (7) feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to where they intercept the horizontal surface at a height of 150 feet above the runway elevation.

The minimum distance from the runway in which a building may be placed is determined by an application of the transitional surface. Since the transitional surface extends at a 7:1 slope, a structure may be one foot in height for every seven feet it is located from the primary surface. The standard building restriction line on an ALP reflects a 35 foot tall structure, and therefore, is located 245 feet from the primary surface (745 feet from the runway centerline).

A review of the developed areas at Airlake Airport reveals that many of the buildings are within the primary surface of Runway 11/29, including all seven of the on-airport buildings northwest of Runway 11/29 and 19 hangars in the building area. Assuming that these buildings are twenty feet in height, they should be no closer than 640 feet from the runway centerline. Some of these buildings, however, are as close as 400 from the runway centerline. FAA has allowed these buildings to remain by establishing a BRL of 380 from the runway centerline and increasing the decision height for Runway 29 from 1,208 feet MSL to 1,258 feet and raising the visibility minimum from 3/4 of a mile to one mile.

In order to improve the Airport's decision height and visibility minimums, it is likely that most, if not all, of the buildings penetrating the primary and transitional surfaces would need to be relocated. An airspace review by the FAA would be required to determine what benefits could be obtained by demolishing or relocating specific buildings.

Despite the existing variances allowed by FAA, any future development should be located so as not to further interfere with the primary or transitional surfaces.

3. **Horizontal Surface**

The horizontal surface is a horizontal plane located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter is constructed by swinging arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to these areas. The radius of each arc is 5,000
feet for all runways with visual approaches or those designated as utility runways, and 10,000 feet for all other runways. In all cases, the arcs from both ends of a runway have the same value. Since Runway 11 has a nonprecision approach and Runway 29 has a precision approach, arcs delineating the horizontal surface have a radius of 10,000 feet.

According to the existing Part 77 drawing, there are several obstructions penetrating the horizontal surface. These include a silo, various trees, and a water tank.

4. Conical Surface

The conical surface is a surface extending upward and outward from the periphery of the horizontal surface at a 20:1 slope, for a horizontal distance of 4,000 feet. According to the Part 77 drawing, there are no obstructions penetrating the conical surface.

5. Approach Surface

Longitudinally centered on the extended runway centerline, the approach surface extends outward and upward from the end of the primary surface at a slope determined by the sophistication of the approach to that runway end. According to FAA criteria, this slope is 20:1 for runways with visual approaches, 34:1 for those with nonprecision approaches, or 50:1 for precision runways. The inner width of the approach surface is the same as that of the primary surface (1,000 feet), while the outer width is dependent upon the approach to the runway.

Using FAA standards, Runway 11 has a nonprecision approach with a 34:1 approach surface that extends 10,000 feet to a width of 3,500 feet. Runway 29 has a precision approach, therefore, the approach surface has a slope of 50:1 which extends for 10,000 feet followed by a 40:1 slope which extends an additional 40,000 feet. The outer width of this surface is 16,000 feet. An object is considered to be an obstruction if it penetrates the approach slope. However, to allow for the height of vehicles on traverseways, the approach slope must clear interstate highways by 17 feet, all other roads by 15 feet, and railroad tracks by 23 feet. Minnesota approach surface standards, which are in some cases more demanding, will be addressed later in this chapter.

The 1994 draft approach plan indicates that eight objects, consisting of the railroad track, various road locations, trees, and Watkins Pattern, are considered obstructions for Runway 11's approach surface. Five objects, consisting of trees, 225th Street, and a hill, are listed as obstructions to Runway 29's approach surface. These obstructions should be removed when possible to improve the approach minimums.
F. Threshold Siting Criteria

The thresholds of Runway 11/29 were sited as per FAA Advisory Circular 150/5300-13, Appendix Two, "Threshold Siting Requirements." The shape, size, and slope of the surface used to site a runway threshold varies, depending upon the size of the critical aircraft using the runway, the visibility minimum, and the type of instrumentation available.

Runway 11/29 has been designed to meet the needs of aircraft in ARC B-II. Runway 11 has a nonprecision approach with a visibility minimum of one mile. Runway 29 has a precision approach. While most precision runways have visibility minimums of 3/4 of a mile or less, due to obstructions, the visibility minimum for Runway 29 has been increased to one mile. Currently, 225th Street is reportedly the controlling object for Runway 29's displaced threshold. The siting criteria for both runway ends is based on standards for large aircraft operating on a runway with a visibility minimum of one mile or greater.

FAA standard threshold siting locates the threshold such that no object may penetrate an imaginary surface with a 20:1 slope. This surface begins at the runway threshold at the runway centerline elevation and extends for 10,000 feet. At the runway threshold, this surface has a width of 200 feet on either side of the runway centerline. The width expands over a 1,500 foot interval, until it is 500 feet wide on either side of the runway centerline. The surface remains at this width for the remaining 8,500 feet of the threshold siting surface. It is important to note that thresholds may also be sited based on OFA and RSA requirements.

Including the required 23-foot clearance to allow for the height of rolling stock, the elevation of the railroad track is 993 feet MSL. The elevation of the threshold of Runway 11 is currently 960.13 MSL. The railroad track crosses the threshold siting surface approximately 715 feet from the runway end. At a 20:1 slope, the threshold siting surface would cross the railroad tracks at an elevation of at least 995, clearing the tracks by at least two feet. Therefore, the threshold of Runway 11 is at an adequate distance from the railroad track.

When this procedure was repeated for Runway 29, the existing threshold was determined to more than clear Cedar Avenue and 225th Street.

The location of the runway threshold using the 20:1 threshold siting criteria are useful when applying the declared distance concept. This concept is defined in the following section.

G. Declared Distances

A runway extension would not be compatible with many of the FAA required imaginary surfaces which surround the runway using standard design and Part 77 criteria. In special circumstances, the use of the declared distance concept can extend the amount of pavement
available for landing and takeoff in a particular direction. Declared distances evaluate each parameter of the runway independently in order to provide the maximum usable length possible for takeoff and landing in each direction. The most critical of these distances are takeoff runway available (TORA) and landing distance available (LDA).

TORA is defined as the length of runway declared available and suitable for satisfying takeoff run requirements. TORA is measured from the beginning of full strength pavement to a point 200 feet from the departure runway protection zone (RPZ). Adequate OFA and RSA are not necessary behind the start of takeoff, since these surfaces do not affect a departing aircraft.

LDA is the length of runway declared available and suitable for satisfying landing distance requirements. There must be adequate OFA and RSA beyond both runway ends.

Various scenarios were developed using the declared distance concept at Airlake Airport. These are discussed in the following sections.

1. **Existing Conditions**

According to FAA AC 150/5300-13, there must be adequate runway object free area (OFA) width at the start of takeoff. Since Runway 29 has an approach visibility minimum of one mile, the OFA must be 500 feet wide along the length of runway used for takeoff. In addition, there must be an "adequate" departure RPZ starting 200 feet beyond the departure end of the runway. The OFA width is currently adequate along the entire length of the existing runway. In addition, with the exception of a small portion of Watkins Pattern's building, the RPZs starting 200 feet beyond each runway end are free of incompatible land uses. Therefore, the entire 4,098 feet of runway is available for takeoff and landing in either direction using declared distance. It is important to note that declared distance does not address FAA Part 77 requirements.

2. **Potential For Extending Runway 11-29**

Four scenarios have been studied that address the possible extensions for Runway 11/29.

a. **Extend Runway to Northwest**

The first scenario involves extending Runway 11/29 to the northwest such that the OFA ends as close to the railroad tracks and Highview Avenue as possible. In order to retain the necessary 300 feet of OFA beyond the runway end, the maximum runway extension achievable with this scenario is approximately 375 feet, resulting in a total runway length of 4,475 feet. The only objects affecting the lengthened runway would be the railroad tracks and Highview Avenue, which would penetrate the 20:1 slope of the threshold sitting surface.
order to correct this situation, the threshold of Runway 11 would have to be displaced by approximately 200 feet, requiring aircraft arriving on Runway 11 to land beyond the displacement. Thus the entire 4,475 feet of runway would be usable for aircraft taking off on both Runway 11 and 29 and those landing on Runway 29. Landing distance available on Runway 11 would be approximately 4,275 feet.

Declared distances for an extension to the northwest would be as follows:

<table>
<thead>
<tr>
<th>Runway 11</th>
<th>Runway 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>TORA</td>
<td>4,475 feet</td>
</tr>
<tr>
<td>LDA</td>
<td>4,275 feet</td>
</tr>
</tbody>
</table>

Extending Runway 11/29 to the northwest would also extend the runway's Part 77 primary surface. By extending the primary surface, Watkin's Pattern and LeJeune Bolt would then become obstructions. Again, declared distances do not address Part 77 concerns.

b. **Extend Runway to Northwest and Southeast**

This scenario extends the runway to the northwest and to the southeast. The maximum extension attainable to the southeast would be 300 feet from the point where the OFA meets Cedar Avenue, resulting in an extension of approximately 500 feet. With the extension to the northwest (discussed above), the runway could be extended by a total of approximately 875 feet, resulting in a total runway length of 4,975 feet.

The threshold sitting surface has a 20:1 slope beginning at the runway end. Therefore, it was determined that this surface will clear Cedar Avenue by approximately 17 feet, two feet more than the 15 feet normally required for such roads. However, since Runway 29 has a MALSR, an inner approach OFZ is required beginning 200 feet from the runway threshold to 200 feet beyond the last runway alignment indicator light (RAIL). This surface has a 50:1 slope, and therefore would be obstructed by Cedar Avenue. In order to rectify this situation, the MALSR could remain in its current location and be embedded in the runway surface. While such a procedure is feasible, the potential cost and engineering concerns associated with the MALSR decreases the viability of an extension to the southeast.

Using this alternative, however, the threshold of Runway 29 would remain displaced at its current location. The TORA for Runways 11 and 29 would include the entire 4,975 feet of the runway. The LDA for Runway 11 would be 4,775 feet, while the LDA for Runway 29 would be 4,475 feet.
Declared distances for this scenario would be as follows:

<table>
<thead>
<tr>
<th>Runway</th>
<th>Runway 11</th>
<th>Runway 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>TORA</td>
<td>4,975 feet</td>
<td>4,975 feet</td>
</tr>
<tr>
<td>LDA</td>
<td>4,775 feet</td>
<td>4,475 feet</td>
</tr>
</tbody>
</table>

Extending Runway 11/29 to the northwest would also extend the runway's primary surface. By extending the primary surface, Watkin's Pattern and LeJeune Bolt would then become obstructions. The MALSR would require embedding in the runway surface to accommodate an extension to the southeast.

c. Relocation of Highview Avenue/Railroad

This scenario involves relocation of Highview Avenue and the Minneapolis, Northfield and Southern Railroad tracks. Because no obstruction exist beyond these traverseways, the Airport could extend Runway 11/29 to a maximum 5,000 foot length without declaring distances if both the railroad and Highview Avenue could be relocated. Thus the entire 5,000 foot length would be usable for takeoff and landing in both directions. The 1989 Airlake Airport Comprehensive Development Plan indicated that to accommodate a 900 foot long extension to runway 11, the tracks would have to be increased with a maximum 2 degrees of curve along a 680 foot length.

Railroad relocations tend to be very costly (several million dollars per mile). This is because of, first, the intense labor involved, and secondly, the fact that railroad tracks require very large turn radii and therefore would involve a large section of track. The cost, excluding utility relocation, was estimated at $1.86 million in the 1989 study; this does not reflect the additional cost for the actual runway extension.

Extending Runway 11/29 to the northwest would also extend the runway's primary surface. As previously indicated, Part 77 requires a 1,000 foot wide primary surface (500 feet from either side of the centerline) for runways with a precision approach. By extending the runway and subsequently, the primary surface, Watkin's Pattern and LeJeune Bolt would become obstructions. In order to insure a clear primary surface for the extended runway these buildings would have to be demolished. An FAA waiver could be requested for these buildings (a number of buildings in the hangar area are obstructions to the existing primary surface and reportedly have waivers).
d. Relocation of Cedar Avenue

Runway 11/29 could be extended to a length of 5,000 feet with a 900 foot extension to the southwest. An extension to the southwest would require that Cedar Avenue be relocated. The 1989 Comprehensive Development Plan indicates that MnDOT and Dakota County officials were strongly opposed to any plan requiring the relocation of Cedar Avenue. Costs for rerouting Cedar Avenue were estimated at $3.3 million in the 1989 Study.

e. Extend Runway to Southeast

The location of Highview Avenue, railroad tracks, and the adjacent buildings seriously limit the feasibility of an extension to the northwest without investing in major road and railroad relocations. The location of Cedar Avenue limits the potential for a runway extension to the southeast.

The maximum extension to the southeast that can be accommodated, without relocating Cedar Avenue, is 500 feet. Even with a 500-foot extension to the southeast, the threshold for Runway 29 would remain at its current location in order to maintain a clear inner approach obstacle free zone (OFZ) surface over Cedar Avenue. With a 500 foot extension to the southeast, the runway length available for landing on Runway 29 would remain at approximately 3,700 feet. The 500-foot runway extension would make approximately 4,600 feet of pavement available for departures to the east and/or west and landings to the east. The MALSR for the approach into Runway 29 would have to be embedded in the extended pavement. Declared distance is not necessary for a 500-foot extension to the southeast.

f. Findings

Technically, declared distance will allow the extension of the available runway length, however, objects in the primary surface (i.e., LeJeune Bolt, Watkins Pattern, and several hangars) are not addressed using this method. Considering the expense of relocating roads and railroads and the impact from buildings in the primary surface, it is not feasible to develop a 5,000-foot long runway at Airlake Airport. A 500-foot extension to the southeast will maximize the available runway length by providing approximately 4,600 feet of usable pavement for departures to the east and/or west and landings to the east. Runway 29's threshold must remain at its current location to maintain a clear inner approach OFZ over Cedar Avenue. Therefore, a 500-foot extension to the southeast is considered as the ultimate development scenario for Runway 11/29.

---

1 Runway 29's threshold is currently displaced by approximately 400 feet.
H.  Minnesota Safety Zones

The Minnesota Department of Transportation (MnDOT) has established distinct safety zones located off each runway end to prevent incompatible development. These guidelines should be used to establish zoning ordinances to protect the airspace surrounding an airport and to prevent incompatible land uses from being developed. Minnesota guidelines, which are composed of three safety zones, are as follows:

1.  Safety Zone A

Safety Zone A extends outward from the end of the primary surface a distance equal to two-thirds of the existing or planned runway length. Safety Zone A shall contain no buildings, temporary structures, exposed transmission lines, or similar land use. Land uses in an established residential neighborhood in a built-up urban area constructed prior to June 1, 1979 may be allowed to continue as a conforming use or may be purchased if they are deemed to present a safety hazard.

The lateral boundaries of these safety zones are similar to an extension of the FAA RPZ lateral boundaries. Typically, the FAA RPZ is contained within Zone A. In addition to the zoning requirements of the safety zones, MnDOT recommends that an airport control the first 2,000 feet of the safety zone (2,500 feet for a precision approach). The first 1,000 feet of the safety zone should be owned. If it is not practical to own the remaining property, an avigation easement may be substituted.

Since Runway 29 has a precision approach, the inner width of Safety Zone A is 1,000 feet. Currently, Runway 11/29 is 4,100 feet long. For the current runway length, Safety Zone A extends 2,733 feet from the end of the primary surface. If the runway is extended to 4,600 feet, Zone A would extend 3,066 feet from the end of the primary surface. Zone A for the proposed 2,500-foot crosswind runway would extend 1,665 feet from the primary surface beyond either runway end.

2.  Safety Zone B

This zone extends outward from Safety Zone A at a distance equal to one-third the existing runway length or planned runway length. Building sites located in Zone B are restricted to not less than three acres. Zone B currently extends 1,368 feet beyond Zone A for Runways 11 and 29. With a proposed runway extension, Runway 11/29 will approximately 4,600 feet in length. Therefore, Zone B would extend 1,534 feet beyond Zone A. For the proposed crosswind runway, Zone B would extend 835 feet from the outer end of Zone A.
3. **Safety Zone C**

Safety Zone C is established to prohibit uses that may cause glare, confusing lights, impair a pilot’s visibility, or interfere with the operation of aircraft or an airport’s electronic equipment. Safety Zone C consists of the horizontal surface exclusive of Safety Zones A and B.

4. **Approach Zone**

The State of Minnesota has established approach surfaces for runways that are slightly more demanding than FAA approach surfaces. For paved runways, without a precision instrument approach, a 40:1 approach surface is required. For precision runways, MnDOT has adopted the FAA standard of a 50:1 slope for 10,000 feet, followed by 40:1 slope for an additional 40,000 feet.

I. **Navigational Aids (NAVAIDs)**


NAVAIDs provide services related to airport operations, precision guidance to a specific runway end, and nonprecision or visual guidance to a runway or an airport. The distinction between precision, nonprecision, and visual NAVAIDs is that the former provides electronic descent and alignment guidance, while the latter provides only alignment or visual information. An airport is equipped with either precision, nonprecision, or visual capability in accordance with design standards that are based on safety considerations and airport operational needs. The type, mission, and volume of aeronautical activity using an airport in association with meteorological, airspace, and capacity data determine an airport’s eligibility and need for various NAVAIDs.

Existing lighting systems and/or instrumentation identified for Airlake Airport are summarized in **Exhibit 2-5**. Suggested upgrades to these systems are discussed in detail in the following sections; potential lighting and NAVAID improvements are also shown in Exhibit 2-5.

According to the terminal instrument procedures (TERPS) manual, a precision runway with a visibility minimum of one mile or greater does not require an airport lighting system (ALS). However, given the high number of training operations on Runway 11/29, an ALS is desirable and should, therefore, be maintained.
## Lighting / NAVAIDS

<table>
<thead>
<tr>
<th>RUNWAY</th>
<th>VASI-4</th>
<th>PAPI</th>
<th>MIRL</th>
<th>REIL</th>
<th>Nonprecision Approach</th>
<th>Precision Approach</th>
<th>MALS R</th>
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</thead>
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<tr>
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<td></td>
</tr>
</tbody>
</table>

- ■: Existing
- □: Future

**VASI-4**: Visual Approach Slope Indicator (4 Boxes)
**PAPI**: Precision Approach Path Indicator
**MIRL**: Medium Intensity Runway Lights
**REIL**: Runway End Identifier Lights
**MALS R**: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

Source: The Airport Technology and Planning Group, Inc.
A rotating beacon, which universally indicates the presence of an airport, is located northeast of the terminal area. The beacon is equipped with the standard white and green lights which denote a civilian land airport. In order to provide pilots with an indication of wind direction, a wind cone is located on the south side of the runway.

Runway 11/29 is equipped with medium intensity runway lighting (MIRL). Runway 11 is equipped with a four box visual approach slope indicator (VASI) as well as runway end indicator lights (REILs). Runway 29 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). All of the airfield lighting systems are pilot controlled. These systems are activated by depressing the microphone key switch with the aircraft radio tuned to a specific frequency. The highest frequency is selected by keying the microphone seven times in five seconds; the medium setting, five times in five seconds; and the lowest setting, three times in five seconds.

As was previously mentioned, Airlake Airport does not have an ATCT. While such a facility would enhance the efficiency of airport operations, FAA typically requires an operational level approaching 200,000 annual operations before considering such a facility. Since annual operations are projected to reach only 126,800 by the end of the planning period, it is unlikely that the Airport will qualify for an FAA ATCT.

The installation of REIL's and precision path indicator lights (PAPI) would enhance the safety of the approach on Runway 29. Once the VASI's on Runway 11 are no longer serviceable, it is suggested that this system be replaced with PAPI's, which are more considered by the industry to be more accurate and reliable.

The crosswind runway depicted on the current ALP, when developed will have visual approaches to both ends. It is suggested that this runway have basic runway markings and that it be equipped with low intensity runway lighting (LIRL), as well as PAPI's to serve both runway ends. In order to provide a positive indication of each runway end, it is recommended that both ends of the crosswind runway be equipped with REILs.

Airlake Airport currently has a straight-in VOR or GPS approach to Runway 11 and an ILS and localizer approach to Runway 29. With the recent maturation in technology enabling precision and nonprecision approaches to be made using the global positioning system (GPS), it is also recommended that a stand-alone GPS approach be established for Runway 29 at Airlake Airport.

GPS is the global navigation satellite system (GNSS) developed by the Department of Defense (DOD). The system consists of a "constellation" of 26 satellites. Each satellite contains an atomic clock from which the satellite transmits the time. In order for a GPS receiver to determine its position, at least three satellites must be "in view." The receiver then triangulates its position based on its distance from each satellite. In order to correct any
error, a forth satellite is used, thereby increasing the accuracy of the system. GPS is a passive system; therefore, there is no limit to the number of concurrent users.

Because of the relatively low cost of both ground-based and airborne equipment, most runways can acquire a nonprecision GPS approach. Until recently, all GPS approaches were overlays of existing VOR, NDB and other traditional nonprecision approaches. The FAA has begun establishing stand-alone GPS nonprecision approaches at a few select airports. It is expected that FAA will begin to approve additional stand-alone GPS approaches.

While the GPS approach is a cost effective and accurate alternative to traditional nonprecision approaches, as of now, minimums are based on existing standards. Therefore, existing towers and other obstructions that affect the minimums of existing approaches are still the determining factor for GPS minimums. Hence, until such a time as GPS standards become less restrictive than those for traditional NAVAIDS, those obstructions currently constraining Airlake Airport and contributing to the Airport's higher approach minimums will continue to be limiting factors.

J. Airspace

Located in the Minneapolis-St. Paul Metropolitan Area, Airlake Airport is in the shadow of the Class B airspace (formerly known as a terminal control area) surrounding Minneapolis-St. Paul International Airport (MSP). The Class B airspace above Airlake Airport exists between 4,000 and 8,000 feet MSL. Pilots operating at Airlake Airport wishing to traverse this airspace must have a mode C transponder and obtain clearance before entering. Those pilots not able to meet these requirements must remain clear of the Class B airspace. Because of the proximity of MSP, airspace around the Airport tends to be crowded, requiring extra caution.

3. LANDSIDE FACILITY REQUIREMENTS

Landside facility requirements were developed for aircraft storage and other airfield services based on projected aviation demand and the Airport's developable land envelope. Since there is undeveloped land on the Airport, construction of additional facilities is possible.

A. Aircraft Storage

Storage needs for general aviation aircraft reflect local climatic conditions and the size and sophistication of the Airport's based aircraft fleet. Due to the severity of the Minnesota winters, most aircraft owners prefer to store their aircraft in a hangar. Aircraft with higher values are also more likely to be stored in large, more secure facilities.
There are two primary types of aircraft storage in use at Airlake Airport: hangar storage and tie-downs. There are currently 83 conventional hangars on the Airport. While there is a tie-down area, it is used primarily by transient or visiting aircraft. It is assumed that approximately 95 percent of the aircraft based at Airlake Airport utilize hangar space.

1. **Hangar Storage**

Of the hangars described above, 80 are located on a twelve-acre building area on the northeast side of Runway 11/29, while three are located northwest of the runway. These hangars provide approximately 200,000 square feet of aircraft storage space. For planning purposes, it is estimated that 95 percent of the current 179 based aircraft reported in 1996 utilize hangar space. This yields an aircraft to hangar space ratio of approximately 1,200 square feet per based aircraft. In order to maintain this ratio for the 280 aircraft which are forecast to be based at Airlake Airport by 2015, a minimum of 319,200 square feet of hangar space will be required. This represents an addition of more than 119,000 square feet of hangar storage space. It should be noted that a ratio of 1,200 square feet per based aircraft is somewhat less than is currently found at other MAC airports. It is likely, however, that aircraft owners may construct private hangars that will individually house one or two aircraft when a building area becomes available. Therefore, it is possible that demand will surpass 119,000 square feet of storage space identified using a ratio of 1,200 square feet of hangar space per aircraft.

There is clearly adequate undeveloped land on the Airport on which to construct additional hangars to meet forecast demand for additional hangar storage. One that MAC has considered developing is south of Runway 11/29. Hangars constructed in this area must be located such that they do not penetrate the primary surface or transitional surface for Runway 11/29. Hangars which are 20 feet high require a BRL of 640 feet from the runway centerline.

2. **Aircraft Tie-Down Storage**

Based aircraft not stored in hangar facilities require parking positions on the apron. In addition, itinerant aircraft as well as those aircraft removed from hangars in order to allow sufficient space for maintenance also utilize tie-down space. Currently, an area of approximately 12,500 square yards west of the main hangar area is reserved for aircraft tie-down storage. Using a planning standard of 250 square yards of tie-down space per aircraft indicates that approximately 50 based and itinerant aircraft can be stored on the existing apron. It should be noted that a higher aircraft parking density can be utilized during busy periods.

In order to calculate the demand for itinerant apron the following methodology was used:

- *Estimate the number of itinerant operations (Chapter 1, Table 1-8).*
The number of annual itinerant operations is multiplied by 50 percent (50 percent of the operations equals departures), divided by 12 (12 months per year), and divided again by 31 (days in peak month). This number is assumed to be the average daily number of itinerant arrivals.

This number is increased by 10 percent to account for busy periods.

It is assumed that 35 percent of the busy day arrivals will be on the apron at any one time.

A standard FAA ratio of 250 yards of apron is used to calculate apron requirements per aircraft.

Following this method, there is currently a demand for approximately 2,250 square yards of itinerant apron. By the end of the planning period, an estimated 5,000 square yards of itinerant apron could be required in order to accommodate projected demand.

Based aircraft currently require an estimated 2,250 square yards of apron storage, assuming 5 percent of the based fleet requires tie-down storage. By the end of the planning period, approximately 3,500 square yards will be required to accommodate based aircraft, assuming 5 percent of the based fleet requires tie-down storage.

By the end of the planning period, a minimum of 8,500 square yards of apron will be needed to accommodate based and transient aircraft. The existing apron area appears adequate for the planning period. This apron should be situated such that aircraft tail heights do not penetrate the transitional surface. For example, the tail height of the Airport's critical aircraft, the Cessna Citation II, is fifteen feet. Therefore, such an aircraft should be parked at least 605 feet from the runway centerline. The location of most of the current tie-down area meets this criteria. That portion of the tie-down area that does not meet this criteria may be used for smaller aircraft. For example, a Cessna 172 has a tail height of only eight feet, ten inches; this aircraft may be parked 562 feet from the runway centerline. Therefore, the extreme southern corner of the parking apron should not be used for aircraft parking. It should be noted that neighboring hangars present a greater impact to the primary and transitional surfaces.

B. Other Airfield Services

Ancillary facilities needed to support the operation of the Airport were identified. General requirements were developed for the following areas:

- Automobile parking
• Airport signage
• Fuel facilities

1. Airport Automobile Parking

While automobile parking requirements vary greatly for each FBO, based on individual needs, the number of employees, the number of customers, the number of visitors, etc., a general estimate of the total number of auto parking spaces the Airport requires for general aviation users can be obtained by using the following methodology. At general aviation airports, a rule-of-thumb is that approximately 2.2 parking spots per peak hour operation are required to accommodate pilots and passengers. By following these general guidelines, Airlake Airport currently requires a minimum of 117 parking stalls. By 2015, an estimated 183 auto parking spaces will be required. It is important to note that this number does not account for parking stalls for FBO employees, delivery vehicles, guests, and other related parking.

Adequate vehicle parking for Airlake Airport is currently provided by each lessee. There are no dedicated public parking lots to serve general aviation operations, other than those provided by the FBO. It is the custom for private hangar owners to park their automobiles in or adjacent to their hangars when they are using their aircraft. This practice maximizes the use of space and should be adequate for the planning period. The current parking situation is expected to be adequate for the planning period.

2. Airport Signage

FAA has issued new signage regulations. As funds become available, the Airport would benefit by updating its signage as required.

3. Fuel facilities

Currently, aircraft fueling is provided by Flyte Line Services, the Airport’s FBO. Flyte Line Services owns two 12,000-gallon underground tanks, one for aviation gasoline and one for jet fuel. An additional 5,000 gallon tank is also available, but currently it is not in use. Given the number of operations projected by the end of the planning period, it appears that the current capacity of 17,000 gallons of aviation gasoline and 12,000 gallons of jet fuel will be sufficient to meet the Airport’s fueling demands. As operations increase, it will be more cost efficient to accept fuel deliveries more often, rather than constructing new facilities. All fuel facilities should meet Environmental Protection Agency (EPA) and Minnesota State guidelines.
C. Industrial Park

With ready access to Airlake Airport, the industrial park north of the Airport provides a convenient location for companies to establish light manufacturing facilities. As was previously mentioned, two industrial facilities are located within the BRL or primary surface of Runway 11/29. Any further development in the industrial park should be closely monitored by the Airport to ensure that no additional obstructions are created.

4. SUMMARY

An analysis of Airlake Airport's ability to meet projected demand indicates that several improvements are warranted in order for the Airport to accommodate projected 20-year demand. The following paragraphs summarize these facility requirements:

- The Airport has an annual service volume of approximately 200,000 annual operations. From a capacity standpoint, the existing facilities should be adequate to accommodate the projected operational demand throughout the planning period.

- The current runway length is adequate to serve most of the projected operating fleet, which will predominately consist of single and multi-engine aircraft weighing less than 12,500 pounds. Unless existing obstructions (buildings, roads, railroads, etc.) are relocated, there would be little benefit from a cost perspective to extending the runway.

- The NAVAIDs currently in use will be adequate for the planning period. However, PAPIs and REILs should be installed for Runway 29. A nonprecision GPS approach for Runway 29 should also be pursued, as they become available.

- Several hangars are within the primary surface for Runway 11/29. According to FAA standards, buildings are discouraged within the primary surface.

- Currently, 225th Street is reportedly the controlling object for the Runway 29's displaced threshold. There are several buildings and a non-standard taxiway separation that also impact the Airport's approach minimums.

- Several buildings penetrate the transitional surface, which extends at a 7:1 slope from the primary surface, defining the BRL. As a result of the existing hangar area, the BRL on the northern side of the Airport has been set at 380 feet by the FAA.

- Obstructions to the Airport's Part 77 primary, and transitional surfaces as well as the location of Cedar Avenue, Highview Avenue, and a railroad limit the ability of the airport to achieve a 5,000 foot runway. An 500-foot extension to Runway 29 will yield a runway length of approximately 4,600 feet. A 4,600 foot long runway can be accomplished without road relocations.
- FAA airspace review will be required to determine the impact of controlling obstructions should the Airport proceed to secure reduced minimums or runway extensions.

- Runway-taxiway separation (the distance from the runway centerline to the taxiway centerline) varies along the length of Runway 11/29. This separation is 200 feet along the western 1,100 feet of the taxiway and transitions to 300 feet for the remaining length of taxiway. According to FAA standards, recommended runway-taxiway separation for runways with 3/4 mile or greater visibility minimums in airport reference code (ARC) B-II is a minimum of 240 feet. A future taxiway to serve the planned southern building area should also be developed with a minimum runway centerline to taxiway centerline separation of 240 feet.

- Runway 11/29 provides approximately 84 percent crosswind coverage at 10.5 knots and 91 percent coverage at 13 knots. Since the FAA typically recommends 95 percent coverage, a crosswind runway is justified. A crosswind runway should be designed to B-II standards. A runway length of 3,500 feet is justified based on FAA guidelines.

- A minimum of an additional 119,000 square feet of hangar space will be required during the planning period. Aircraft owner's preference for private hangars will likely create a demand in excess of this number.

- The existing apron/tie-down area will be adequate for both itinerant and based aircraft over the planning period.

- A 2,500-foot long crosswind runway is recommended. This runway would be designed to primarily serve light single-and twin-engine aircraft.
CHAPTER THREE

ENVIRONMENTAL REVIEW

This chapter serves as an overview for two major areas of environmental concern: noise and water quality. National, State, and Metropolitan Area airport-related guidelines for these two environmental areas are reviewed in the following sections.

1. NOISE

The last noise contours generated for Airlake Airport were prepared as part of the 1989 Comprehensive Airport Development Plan. Since the completion of these noise contours, the computer program for generating noise data has been refined slightly by the FAA. In addition, the number of aircraft operations projected for Airlake Airport has been revised based on current conditions. The number of operations at the Airport in 1995 was estimated at more than 75,390. Demand at Airlake Airport is projected to increase over the planning period, with an estimated 126,900 annual operations projected to occur by 2015. Therefore, an updated noise analysis was considered prudent as part of this planning update.

The FAA sets forth noise standards for airports in the "Airport Environmental Handbook, Order 5050.4A." In addition to the FAA's requirements, The Minnesota Pollution Control Agency (MPCA) has set statewide standards for noise. The Metropolitan Council Guidelines suggest additional analysis, based on the FAA's standards, for airports within its seven-county area.

The FAA's Integrated Noise Model (INM) was used to evaluate existing and future (2015) noise impacts at Airlake Airport. The following subsections summarize the physics and measurement of noise, the history of the FAA's approach, the noise modeling analysis performed, the general assumptions used during the modeling process, and the noise impacts for the existing base case and for projected 2015 impacts.

A. Physics and Measurement of Noise

Noise is typically defined as an unwanted sound. Sound and noise are thus physically the same with the difference being determined by the opinion of the receiver. As a sound source vibrates, it introduces vibrations into the air, causing fluctuations in the atmospheric pressure.

Sound is measured by its pressure or energy. The unit of measure for this sound energy is known as a decibel (dB). A decibel is a unit which measures the difference between
atmospheric pressure with no sound and the total pressure with the sound. Decibels are logarithmic and, therefore, cannot be added to produce a total. For example, two 70 dB sound sources added together produce a total sound energy of 73 dB. When the decibel count goes up by ten, the perceived sound level is two times as loud. The decibel scale from zero to 120 covers most of the range of everyday sounds, as shown in Exhibit 3-1. Two important factors that influence noise perception are frequency and duration. Frequency reflects the pitch of the sound, measured in cycles per second, or Hertz. Duration refers to the length of a particular noise event, such as an aircraft flyover, or a series of events.

B. History of FAA Accepted Approach

In 1979, the Aviation Safety and Noise Abatement Act required the FAA to designate a single methodology for measuring and describing noise. In 1981, the Federal Aviation Administration formally adopted day-night average sound level (DNL) as the single system for determining exposure of individuals to airport noise.¹ According to the FAA, DNL is the most widely accepted descriptor for aviation noise because of the following characteristics:

- DNL is a measurable quantity.
- DNL is relatively simple to understand and use by airport planners and the public who are not familiar with acoustics or acoustical theory.
- DNL provides a simple method to compare the effectiveness of alternative airport scenarios
- DNL is a "figure of merit" for noise impacts which is based on a community's reactions to environmental noise.
- DNL is the best measure of noise exposure to identify significant impacts on the quality of the human environment.
- By Federal interagency agreement, DNL is the best descriptor of all noise sources for land use compatibility planning.
- DNL is the only metric with a substantial body of scientific survey data on the reactions of people to noise.

¹DNL has also been abbreviated as LDN.
Common Sound Levels

DB 110 Rock Band
100 Gas Lawn Mower at 3ft.
90 Food Blender at 3ft.
80 Garbage Disposal at 3ft.
70 Vacuum Cleaner at 10ft.
60 Ordinary Conversation
50 Dishwasher in Next Room
40 Small Theater
30 Watch Ticking
20 Quiet Rural Nighttime
10 Rustling Leaves
0

dB - Sound level in decibel units
DNL is the 24-hour average sound level, in decibels, obtained from the accumulation of all sound events. This includes the addition of a 10-decibel penalty for sounds occurring at night between 10 p.m. and 7 a.m. The weighting of nighttime events accounts for the usual increased interfering effects of noise during the night, when ambient levels are lower and people are trying to sleep.

Recent studies continue to indicate that DNL is the descriptor of choice in representing community reaction to noises of all kinds. A recent study to assess the nighttime weighting factor used in DNL concluded that there is no credible evidence to use anything other than the accepted DNL ("Cumulative Airport Noise Exposure Metrics: An Assessment of the Evidence for Time-of-Day Weightings," DOT/FAA/EE-86/10). Another study concluded that DNL satisfactorily represented surveyed community annoyance from helicopter noise for flyovers as infrequent as one operation per day ("A Community Exposure Conditions," NASA Tech. Memo 86400). Given that annoyance is a phenomenon for which there is no perfect descriptor, all known research illustrates that DNL provides an excellent portrayal of airport noise exposure for the purposes of assessing land use compatibility and for controlling noise. Recent joint governmental task forces have reasserted the use of the DNL method for use in airport analysis.

C. Noise Contour Generation

Noise contours presented in the following sections were generated using the Integrated Noise Model (INM). This model is the FAA's state-of-the-art approved computer model which is used to predict the noise impacts that occur as a result of aircraft operations. The INM program will predict the values or contours of equal noise exposure for select points on the ground. The FAA currently requires that three different DNL levels (65, 70, and 75 DNL) be modeled. The Metropolitan Council suggests that the 55 DNL contour be included for Minor airports. A Minor airport classification, as defined by the Metropolitan Council, is a general aviation airport with a primary runway length of 2,500 to 5,000 feet.

The higher the DNL value, the more severe the noise impact. For example, the 75 DNL contour contains 10 times as much sound energy as the 65 DNL contour. Noise sensitive land uses are generally considered clearly unacceptable for noise levels greater than 75 DNL. A sound level of over 65 DNL is normally considered unacceptable for residential uses according to FAA standards. Exhibit 3-2 presents the land use compatibility guidelines for noise as developed by the FAA.

In the case of airports located in the Metropolitan Area, there are additional criteria that need to be evaluated in relation to noise exposure. The Metropolitan Council's Aviation Chapter of the Metropolitan Development Guide classifies noise exposure in four different zones.
<table>
<thead>
<tr>
<th>Land Uses</th>
<th>Yearly Day-Night Average Sound Level (DNL) in Decibels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55 - 65</td>
</tr>
<tr>
<td>Residential, other than mobile homes, transient lodgings</td>
<td>Y</td>
</tr>
<tr>
<td>Mobile home parks / Mobile homes</td>
<td>Y</td>
</tr>
<tr>
<td>Transient lodgings (motels, hotels)</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Public Use</strong></td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>Y</td>
</tr>
<tr>
<td>Churches, auditoriums, concert halls, hospitals, nursing homes</td>
<td>Y</td>
</tr>
<tr>
<td>Governmental services</td>
<td>Y</td>
</tr>
<tr>
<td>Transportation/Parking</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
</tr>
<tr>
<td>Offices-business and professional</td>
<td>Y</td>
</tr>
<tr>
<td>Wholesale/retail-materials, hardware and farm equipment</td>
<td>Y</td>
</tr>
<tr>
<td>Retail trade-general</td>
<td>Y</td>
</tr>
<tr>
<td>Utilities</td>
<td>Y</td>
</tr>
<tr>
<td>Communications</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
<td></td>
</tr>
<tr>
<td>Manufacturing-general</td>
<td>Y</td>
</tr>
<tr>
<td>Photographic and optical</td>
<td>Y</td>
</tr>
<tr>
<td>Agriculture (except livestock) and forestry</td>
<td>Y</td>
</tr>
<tr>
<td>Livestock farming and breeding</td>
<td>Y</td>
</tr>
<tr>
<td>Mining and fishing, resource production and extraction</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Recreational</strong></td>
<td></td>
</tr>
<tr>
<td>Outdoor sports arenas/spectator sports</td>
<td>Y</td>
</tr>
<tr>
<td>Outdoor music shells, amphitheaters</td>
<td>Y</td>
</tr>
<tr>
<td>Nature exhibits and zoos</td>
<td>Y</td>
</tr>
<tr>
<td>Amusement parks, resorts, camps</td>
<td>Y</td>
</tr>
<tr>
<td>Golf courses, riding stables, water recreation</td>
<td>Y</td>
</tr>
</tbody>
</table>

The designations contained in this table do not constitute a Federal determination that any use of land covered by the local program is acceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally 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.

SEE NEXT PAGE FOR NOTES AND A KEY TO THE TABLE.
KEY
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.
DNL Average Day-Night Sound Level
25, 30, 35 Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, 35 dB must be incorporated into design and construction of structure.

NOTES
1. Where the community determines that residential or school uses must be allowed, measures to achieve an 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. The use of NLR criteria will not, however, 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 dB.

7. Residential Buildings require an NLR of 30 dB.


Source: F.A.R. Part 150, Appendix A, Table 1.
These noise exposure criteria also use the annualized DNL noise exposure metric. These zones are summarized as follows:

- **Noise Exposure Zone A** - Zone A is exposed to aircraft noise greater than 70 DNL and is typically on airport property within the control of the airport operator. The area adjacent to airport property can generally be described as having a serious noise problem. In addition to the noise intensity, the noise exposure can also be considered permanent. It is an area frequently affected by both takeoff and landing operations. In addition, the proximity of the airport operating areas reduces the probability of relief resulting from future changes in the operating characteristics of either the aircraft or the airport.

Given that both existing and expected noise intensity in this area are serious and permanent, no new development, other than that dedicated to non-noise-sensitive land uses should be considered.

- **Noise Exposure Zone B** - Noise exposure from aircraft operations is between 65 and 70 DNL and could be considered a nuisance in Zone B. Residential development should be discouraged. Based on the proximity of the affected area to the airport, the seriousness of the noise exposure is such that speech interference can be routinely expected. In addition, given that aircraft operations are still relatively close to the extended runway centerlines, repeated and annoying noise can be expected. Because of the noise intensity in this area, new development should be limited to commercial and industrial uses that do not require large numbers of people.

- **Noise Exposure Zone C** - Zone C is exposed to aircraft noise of 60 to 65 DNL. Public sensitivity to aircraft in Zone C may be evident in locations affected by frequent operations. Aircraft noise impact can be categorized as annoying. However, the intensity is such that it should be considered somewhat less than a nuisance. The noise exposure is enough to be of some concern, but common building construction makes the indoor environment acceptable for sleeping. The outdoor environment should be reasonably pleasant for recreation and play. For airports in an urban environment, Zone C or the 60 DNL is the lowest noise contour that is required by the Metropolitan Council for urban airports.

- **Noise Exposure Zone D** - Minimal noise exposure from aircraft operations (55 to 60 DNL) is anticipated within Zone D. In the urban environment, aircraft noise tends to blend into the daytime noise environment where normal day-to-day activity involves greater than 60 dBA noise levels. In low-density or undeveloped areas, where outdoor activities are desired, this zone should be used as an initial threshold.
level for protecting very sensitive land uses. Much of the land surrounding Airlake Airport is outside the Metropolitan Urban Service Area (MUSA) and is therefore considered rural. Zone D noise exposure levels were therefore calculated.

D. Noise Modeling Assumptions

A variety of data from a number of sources are required in order to use the INM in the analysis of aircraft noise. The necessary data used in generating the noise contours include aircraft activity levels, fleet mix, flight track utilization patterns, and time of operation. Data from Chapter 1, Projections of Aviation Demand; the 1989 Comprehensive Airport Development Plan; current industry trends; and Airport operation procedures were used in preparing the data required for entry into the noise model.

- Aircraft Activity - Aircraft activity levels for 1995 were estimated at 75,397 operations. Future projections through 2015 are presented in Chapter 1. A summary of the total number of projected operations is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>75,397</td>
</tr>
<tr>
<td>2000</td>
<td>90,600</td>
</tr>
<tr>
<td>2005</td>
<td>101,400</td>
</tr>
<tr>
<td>2010</td>
<td>113,400</td>
</tr>
<tr>
<td>2015</td>
<td>126,900</td>
</tr>
</tbody>
</table>

- Fleet Mix - The fleet mix for the airport was based on current conditions as estimated in Chapter 1. Table 1-10 presents the estimated fleet mix for 1995 and 2015. Although the total operations for Airlake Airport are expected to increase from 1995 to 2015, the fleet mix is anticipated to remain relatively constant, with the exception of a slight increase in the percentage of multi-engine operations. Single-engine aircraft will account for approximately 89 percent of all operations in 2015.

- Flight Tracks/Runway Use - Flight track patterns and utilization were based on data contained in the 1989 Comprehensive Airport Development Plan and conversations with Airport FBOs. Departure, arrival, and touch-and-go flight tracks were developed for current and future scenarios.

- 1995 (Base Case) - The majority of the operations at Airlake Airport occur on Runway 29 (approximately 60 percent). Nighttime operations account for approximately 5 percent of all Airport operations.
- Touch-and-go operations were assumed to operate on a right-hand pattern when departing Runway 11 and a left-hand pattern when departing Runway 29. Touch-and-go operations accounted for approximately 65 percent on all operations.

- 2015 (No Crosswind) - Assumed the same flight track pattern as the 1995 scenario.

- 2015 (With Crosswind Runway) - Flight track patterns for the 2015 scenario were adjusted to reflect the addition of a crosswind runway (Runway 4/22). In this scenario, touch-and-go operations were divided between the two runways. Approximately 36 percent of the touch-and-goes were assigned to Runway 4/22. Touch-and-go departures on Runway 4 followed a right-hand pattern while touch-and-go departures on Runway 22 followed a left-hand pattern. All jet and turboprop operations were assigned to Runway 11/29.

E. Noise Impacts

Activity levels and operational characteristics were input into the FAA’s INM computer program to generate DNL contours for the existing Airport conditions and for two 2015 scenarios. Future scenarios included a crosswind and a no-build scenario. To evaluate the impact of aircraft noise on sensitive land uses, the noise contours generated by the INM were overlaid on the project map. Baseline (1995) noise contours are presented in Exhibit 3-3. Noise contours for the future condition with a crosswind runway are shown in Exhibit 3-4. Exhibit 3-4A depicts the proposed flight track pattern for the crosswind scenario. It should be noted that flight tracks for Runway 11/29 are the same for the existing, future crosswind, and future no-build scenarios. Noise contours for the future condition with the existing runway configuration (No-Build) is presented in Exhibit 3-5.

The total area within the 1995 55 DNL contour (Zone D) is approximately 448 acres while the area within the 65 DNL contour is approximately 64 acres. As indicated above, the FAA recognizes the 65 DNL contour as the maximum noise limit for residential land uses. While the INM analysis for Airlake Airport generated 70 and 75 DNL contours, these contours are not depicted on the exhibits due to their relatively small size. These contours are centered around the runway. While the FAA 65 DNL and the Zone C (60 DNL) contour are contained within Airport property, the 55 DNL contours extends off Airport property.

For the 2015 scenario with the proposed crosswind runway, the area within the 55 DNL (Zone D) contour increased to approximately 832 acres while the area within the 65 DNL contour increases to approximately 128 acres. With the purchase of additional property for
the construction of the crosswind, the 60 and 65 DNL contours for the 2015 scenario would generally fall within airport property. As with the 1995 base-case scenario, the 55 DNL contour extends off Airport property.

The 2015 No-Build alternative presents the future noise contour without the addition of a crosswind runway. The 55 DNL contour (Zone D) contains approximately 768 acres. The 65 DNL contour contains approximately 128 acres.

F. **L\(_{10}\)65 Contour Analysis**

\(L_{10}\) standards were adopted by the Minnesota Pollution Control Agency (MCPA) in 1974 for defining compatible land uses in different noise zones. The MCPA noise levels are specified in terms of maximum permissible hourly "\(L_{10}\)" values. The \(L_{10}\)65 value identifies the area where 65 dBA is exceeded 10 percent (6 minutes) in a given hour.

**Exhibit 3-6** shows the \(L_{10}\)65 contour developed for the year 2015 for Airlake Airport. While this contour is relatively large, it is important to note that the \(L_{10}\)65 does not take into account other background noise such as automobile traffic, passing trains, and other sounds. For this reason, the size of the \(L_{10}\)65 contour can overstate the area negatively impacted by airport noise. While the \(L_{10}\)65 contour can be useful for determining the area affected by sound the FAA approved DNL is often a better measure of impact.

2. **WATER QUALITY**

Water quality on an airport, or any comparable urban development, can be impacted by a variety of factors. This section contains an overview of eight areas of potential concern. They include:

- MAC Environmental Audit Program
- Existing airport water quality permits
- Utilities and services
- Drainage
- Wetlands
- Stormwater runoff quality
- Potential groundwater contaminants
- Generation of wastewater
- Surface Water Management Plan

These nine areas are discussed in the following sections.
A. MAC Environmental Audit Program

MAC staff and legal council has developed a comprehensive environmental audit program for its reliever airports. This program is currently being implemented. This program identifies regulatory deficiencies of MAC tenants with regard to existing environmental regulations.

Typical compliance checks include hazardous waste generation, hazardous materials storage, storage tanks, wells, septic systems, stormwater runoff, fuel spills, and air emissions. This information, together with the existing Stormwater Pollution Prevention Plan, the Water Management Plan, and the Spill Prevention Control and Countermeasures Plan will provide the environmental documentation necessary at all MAC Reliever Airports.

B. Existing Airport Water Quality Permits

Airlake Airport has acquired a Hazardous Waste License in the event of future waste removal. A Hazardous Waste License is required for any State Business that generates hazardous waste. Minnesota Hazardous Waste Rules (Chapter 7045) state that "anyone who produces or manages a waste must evaluate that waste." Evaluating a waste means determining whether or not the waste is hazardous. If the waste is hazardous, a Hazardous Waste License is required. The license is issued by Dakota County, Minnesota. The term of the license is annual and for a minimum of (3) years, the following records should be maintained:

- Manifests
- Manifest exception reports
- License application
- License renewal
- Analytical and other reports
- Training documents
- Inspection logs

Local authorities must be notified of the kinds and amounts of hazardous waste stored at the site. Emergency response and spill equipment shall be made available and personnel shall be knowledgeable of the hazards associated with hazardous waste material.

Airlake Airport has a National Pollution Discharge Elimination System permit (NPDES). This stormwater discharge permit is issued by the MPCA. It regulates the discharge of storm water to waters of the State from industrial activities. A general permit covers categories
with operations, emissions, activities, discharges, or facilities that are the same or similar in context. The permit is issued for a term of five years.

Planned airport improvements involving construction activities disturbing more than five acres of land which discharge to surface waters of the state require a MPCA NPDES Construction Stormwater Permit. This general permit requires permits to develop and implement a storm water erosion control plan and a storm water management plan that eliminates or reduces the amount of pollutants and sediment in storm water. The erosion control plan must be developed prior to the initiation of construction activities, and the storm water management plan must be in place prior to the completion of construction activity at the permitted site.

C. Utilities and Services

Utilities serving Airlake Airport include public water and sewer service, natural gas, electricity, and telephone service. The majority of the MAC property is located outside of the Corporate limits of Lakeville - Eureka Township. The northern part of the airport has utilities supplied by the City of Lakeville.

The Airport has adequate fire protection. A 12-inch looped water main is located along 220th Street. A 500,000-gallon reservoir is located one-quarter mile south of State Highway 50 and is approximately 165 feet above ground. This water system is connected to Lakeville's entire system of six wells and 3.5 million gallons of storage. Along this main are fire hydrants which are accessible to all of the airport facilities. An 8-inch looped water main services the hangar area. The water line also has several hydrants to serve as fire protection. See Exhibit 3-7.

Domestic water is tapped off of the 12-inch water main which serves the facilities along 220th Street and Hamberg Avenue. An existing building west of the MAC Maintenance Building, which is abandoned, has a well for domestic water purposes. The existing system has adequate pressure and capacity for future development at the Airport.

Sanitary sewer service consists of a 12-inch sanitary line along 220th Street and a 9-inch sanitary line along Hamberg Avenue. See Exhibit 3-8. All of the facilities along 220th Street are served by this line. Exceptions to this include the hangar area. These buildings are not served with sanitary sewer but have holding tanks which are maintained and serviced by the occupant. Although there are no current plans to connect the hangar area to the municipal sanitary sewer system. Any problems associated with the existing individual on-site sanitary sewer systems will be identified when the environmental audit is conducted at the Airport. Tenants will be notified of problems and the required action that must be taken.
ensure that sewage holding tanks are functioning adequately and being maintained. Tenants will be held responsible for replacing nonconforming waste disposal systems. Furthermore, the MAC is initiating a feasibility study process for all reliever airports to evaluate the type and extent of urban services, if any, that should be extended onto airport property.

At present, Dakota County does not have a permitting process for the abandonment or placement of holding tanks. Future additional holding tanks or the abandonment of such a tank should be coordinated between MAC and the MPCA, Eureka Township, and the Department of Health. The existing system has adequate capacity for future development.

The Airport and surrounding area storm sewer system consists of culverts, swales, and open ditches. See Exhibit 3-9. This system is discussed in greater detail in the drainage section. Outside of airport property the system is similar. Storm water runoff is generally directed east through drainage swales and culverts to an open ditch. The system is considered adequate and has been sized to accommodate future development.

Area gas mains are as shown on Exhibit 3-10. Transmission line from Great Lakes Pipeline Company and Northern Natural Gas Company cross the Airport. The storm sewer system and the facilities have been positioned or designed to accommodate these transmission lines. A 3-inch and 4-inch gas line services the facilities along 220th Street and Hamberg Avenue. These lines are adequate to accommodate future development.

Electricity is provided by Northern States Power from a 69,000 volt sub-station located at State Highway 50 and Hamberg Avenue West.

Exhibit 3-11 depicts the proposed future layout of the crosswind runway and building area. The future development of the proposed crosswind runway and southern building area will encounter existing gas mains. The location of these gas mains may dictate the grade and location of the proposed items.

D. Drainage

MAC is currently preparing water management plans for the reliever airports. Plans have been completed for Flying Cloud and Anoka County-Blaine airports and such as plan is now underway for St. Paul Downtown Airport. Water management plans for the remaining three airports will be initiated in subsequent years.

The water management plan defines existing and future water management systems, addresses specific water management issues and concerns, and defines permitting
requirements for planned airport expansions. The plan also provides a comprehensive discussion of the major water management issues for each airport. These issues include:

- Storm water
- Wetlands
- Erosion and sediment control
- Groundwater quality
- County ditches
- Floodplains
- Wildlife

The general drainage of the Airport is north and east through numerous culverts and swales toward a well-defined drainage way and a wetland area at the northeast corner of the site (see Exhibit 3-9). Pavement gradients and cross slopes are in the range of 0.5 to 1.5 percent, based on FAA criteria. There are grassed safety areas on both sides of the runways and taxiways. The safety area is fairly flat, with a cross slope of 1.5 to 5 percent.

The Airport has been divided into eight differing subdrainage areas (see Exhibit 3-12). These eight areas are so divided to show total discharge at critical locations. The ultimate receiving water body is the Vermillion River.

Subdrainage Area No. 1 consists of an open grass and agricultural crop area. Flow is directed north to the open ditch and wetland area. This wetland area was recently modified and relocated to facilitate the expansion of Ryt-way Packaging Corp. This wetland area has been constructed to discourage any attraction for waterfowl; therefore, it is free of ponding except under periods of storm-event runoff.

Subdrainage Area No. 2 consists of a hangar and taxiway area. All of the surface water flows north along the roadway to an existing swale that intercepts this flow and directs it to the open ditch. This flow enters a 12-inch culvert which has a rock dam constructed directly above for emergency overflow situations. All of Area No. 2 enters Area No. 1 via this culvert dam structure.

Subdrainage Area No. 3 consists of open grassed areas, industrial/commercial buildings, parking, taxiways, and road surfaces. This area has a swale system that directs the runoff east to the open ditch. The swale has numerous culverts under drives that directs flow east.

Subdrainage Area No. 4 consists of taxiways, runway, grassed area, and road surface. All of the surface runoff is directed east via a grassed swale through taxiway culverts to the open ditch. All of this area is directed to Area No. 3.
Subdrainage Area No. 5 is similar to No. 4 in that it consists of taxiways, runway, and grassed areas. Surface runoff is directed west via a grassed swale through taxiway culverts to the open ditch.

Subdrainage Area No. 6 consists of grassed areas, agricultural land, road surfaces, and railroad surfaces. Surface runoff is directed to the open ditch which is directed to area No. 3. This area receives flow from the open ditch which enters the area through two 60-inch culverts below Highview Avenue.

Subdrainage Area No. 7 consists of grassed areas, agricultural land, road surfaces, and a wooded marsh area. Surface runoff is directed north to a 24-inch culvert that crosses the runway and directs the flow to Area No. 5.

Subdrainage Area No. 8 consists of grassed areas, agricultural land, road surfaces, runway surface, and wooded areas. Surface runoff is directed north and east to a taxiway culvert where flow enters Area No. 5. The discharge from this area can change dramatically depending on the type of cover and time of year for the agricultural areas. As shown, runoff values assume a midsummer situation.

A Storm Water Management Plan has recently been developed for the City of Lakeville. This plan details the existing and the future drainage throughout the area. This plan indicates several storm event situations for flow through the Airport area. For a 10-year storm event, the existing flow entering the two 60-inch culverts in Subdrainage Area No. 6 is approximately 257 CFS. In the future, flow could increase to approximately 396 CFS as off-airport development increases. The existing culverts are of adequate size to handle this additional flow.

Airlake Airport is located in the Vermillion River Watershed Management Organization (WMO). This Watershed encompasses an area of approximately 293 square miles and extends from the Mississippi River to an area west of Interstate 35. The WMO is a watershed unit in the Twin Cities Metropolitan Area that participates in water planning and implementation under the Metropolitan Water Management Act, Chapter 103B.227 of Minnesota Statutes. WMOs work to help the Metropolitan area deal with its unique water concerns, such as urban development and its effect on water quality.

Airlake Airport lies entirely within the jurisdiction of the Vermillion River Watershed Management Organization (VWMO). In accordance with the Metropolitan Surface Watershed Management Act, the VWMO was formed in 1984 under a Joint Powers Agreement among the cities and townships having land partially or wholly within the boundaries of the Vermillion River watershed. The VWMO is governed by a board of
managers and is responsible for protecting and managing water resources within the watershed. The VWMO has an existing watershed management plan which defines general water management strategies, requirements, and administrative duties.

Designated 100-year flood planes occur at the northeast and southeast portions of the airport. Flood potential along the drainage courses is greatest during intense summer storms. See Exhibit 3-13 for floodplain zone designation. As indicated on this exhibit, the surveyed limits of the floodplain end at the corporate limits.

The volume of runoff resulting from existing Airport development is related to the storm event of interest, the time of concentration, whether the ground surface is grassed or paved, and the subdrainage area location. The Rational Formula was used to determine the approximate discharges. Table 3-1 presents a listing of runoff volumes for the eight subdrainage areas. The methodology used in this table is summarized in the following paragraph.

The storm event used for this analysis is the 10-year event. Due to the generally flat swales (the slopes are in the range of 0.3 percent) and long meandering distance the surface water must travel, the time of concentration will generally be 60 minutes or more. The intensity of rainfall will be approximately 1.50 inches per hour. This intensity is lower than area standards due to the relatively flat area and travel time. The ground surface generally is either a paved (concrete or bituminous) surface or a grassed area. The runoff coefficient is calculated based on the ground surface. The value represents the amount of runoff per inch of rain. For instance, a concrete surface is impermeable, therefore, its runoff would be 90 to 100 percent of the rainfall. Whereas a grassed area is permeable and would generate somewhere between 20 to 40 percent runoff of the rainfall. The runoff coefficient will be a weighted average of the resulting areas.

Table 3-1 indicates that the discharge from the Airport property is an appreciable amount. This flow is significant, however, the existing culvert system is adequate to meet these flows. Subdrainage areas No. 6, No. 7, and No. 8 encompass areas that have the largest discharge values. Most of this area is undeveloped and future development will increase the discharge values.

According to the planned areas of development as shown on Exhibit 3-11 the affected areas will be Subwatershed Areas No. 6, No. 7, and No. 8. The future building area will discharge to Areas No. 6 and No. 7. The runoff from this area will increase, but the two 60-inch culverts are adequately sized for this additional flow. Runoff in Subwatershed Areas 6 and 7 can be expected to increase between 20 to 30 percent as a result of additional impervious surfaces stemming from the future construction of hangars and access taxiways. Detailed
<table>
<thead>
<tr>
<th>Drainage Sub Area</th>
<th>Area (Acres)</th>
<th>Runoff Coefficient</th>
<th>Intensity (Inches/Hour)</th>
<th>Runoff Flow (Cubic Ft/Second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42.6</td>
<td>0.25</td>
<td>1.50</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>43.1</td>
<td>0.60</td>
<td>1.50</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>26.0</td>
<td>0.45</td>
<td>1.50</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>13.1</td>
<td>0.35</td>
<td>1.50</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>20.7</td>
<td>0.35</td>
<td>1.50</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>55.2</td>
<td>0.30</td>
<td>1.50</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>66.3</td>
<td>0.30</td>
<td>1.50</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>57.6</td>
<td>0.30</td>
<td>1.50</td>
<td>26</td>
</tr>
<tr>
<td>9</td>
<td>236.0</td>
<td>0.35</td>
<td>1.75</td>
<td>145</td>
</tr>
</tbody>
</table>

Note: Subwatershed's 6, 7, and 8 encompass the greatest discharge areas. Future building area development could increase runoff 20 to 30 percent in Subwatershed Area 6 and 7.

Source: Enviroscience
engineering addressing runoff analysis should be required when development plans are proposed.

The proposed crosswind runway as shown on Exhibit 3-11 extends outside the existing MAC property. The surface runoff from this runway will be directed south and east towards the Vermillion River. The proposed runway will not increase the runoff discharge dramatically. Grasse swales and fully vegetated approach zones will replace the previous agricultural areas. The direction and point of discharge will be changed according to design requirements. The following items will need to be addressed before the proposed development can occur:

- Watershed Permits
- NPDES Permit
- City Permits
- Land Acquisition
- Utility Extension Permits
- Wetland Delineation
- Erosion and Sediment Control Plans
- Easements and Right of Way

E. Reliever Airport Sewer and Water Utility Master Plan

A sanitary Sewer and Water Utility Master Plan is under development for the MAC system of reliever airports. This plan will serve as a guide for providing potable water and sanitary sewer service for each of the general aviation reliever airports. The plan will document existing sewer and water uses and needs at each airport. Identification of the size, type, and age of such utilities are important when considering future development or expansion. The plan is intended to set policy and provide direction on the feasibility and practicality of providing sanitary sewer and water services to the airports or portions thereof. Adjacent community policy and standards will be researched and local input solicited.

A preliminary Sanitary Sewer and Water Master Plan layout for each airport will be developed. Further, a report documenting potential service improvements, costs of upgrading services, sewer connection fees, regulatory agency requirements, among other things, will be included.

F. Wetlands

The United States Fish and Wildlife Service has developed two wetland classification systems to identify wetlands. The first system, called Circular 39, identifies wetlands according to "type," of which there are eight in Minnesota (Table 3-2). Wetland type classification is based primarily on vegetation and water depth.
### TABLE 3-2

Airlake Airport Long-Term Comprehensive Plan Update

**CIRCULAR 39 WETLAND TYPES**

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Seasonally flooded basin. Basin is flooded only briefly during heavy rains or spring runoff. Vegetation is generally floodplain forest, weeds, or cultivated crops.</td>
</tr>
<tr>
<td>Type 1L</td>
<td>Bottomland hardwood forest associated with a river or waterway. Typical tree species include cottonwood, green ash, silver maple, black willow, elm, and river birch.</td>
</tr>
<tr>
<td>Type 2</td>
<td>Sedge Meadow. Shallow, grassy wetland with little open water which may only have waterlogged soil during dry periods. Vegetation is typically grasses or sedges.</td>
</tr>
<tr>
<td>Type 3</td>
<td>Shallow Marsh. Wetland basin is usually covered with six inches to two feet of water and is heavily vegetated with cattails, bulrushes, or broad-leaved aquatic plants. Small patches of open water may occur.</td>
</tr>
<tr>
<td>Type 4</td>
<td>Deep Marsh. Wetland basin with permanent water depths from two to four feet. Open water areas are fringed by cattails, bulrushes, etc.</td>
</tr>
<tr>
<td>Type 5</td>
<td>Shallow Lake and Pond. Open water basin from four to ten feet in depth which is too shallow to support permanent gamefish populations.</td>
</tr>
<tr>
<td>Type 6</td>
<td>Shrub Swamp. Shallow wetland basin which may only have waterlogged soil during dry periods and is heavily vegetated with alder, willow, or dogwood.</td>
</tr>
<tr>
<td>Type 7</td>
<td>Wooded Swamp. Wetland may have standing water but typically has only waterlogged soil and is vegetated with tamarack, black spruce, red maple, and black ash.</td>
</tr>
<tr>
<td>Type 8</td>
<td>Bogs. Low lying or floating vegetative mat with waterlogged soils, supporting spongy covering of mosses, sedges or heathlike shrubs.</td>
</tr>
</tbody>
</table>

A second system was later developed by Cowardin, et. al. This system uses more complex criteria, including seasonality of the water level, type of substrate, whether or not the wetland is associated with another water body such as a river or lake, and other conditions, such as excavation, drainage, or farming. The Cowardin method was used to develop National Wetlands Inventory (NWI) maps, which classify wetlands throughout the United States. Both the Circular 39 and the Cowardin classification systems are used in discussing wetlands and can be roughly correlated.

According to the area NWI maps, the Airlake Airport has six potential wetlands or portions of wetlands located on the Airlake property (Exhibit 3-14). The U. S. Fish and Wildlife Service NWI maps are commonly used to make preliminary evaluations of wetlands. It should be noted that NWI maps were prepared based on interpretation of high altitude aerial photography and limited field checks to classify and delineate approximate wetland locations. NWI map users are cautioned that final wetland determinations are subject to on-site field inspections which may result in revisions of the wetland interpretations that were based on aerial photography. The wetland types and NWI categories are summarized below:

<table>
<thead>
<tr>
<th>No. of Airlake Wetlands</th>
<th>NWI Classification</th>
<th>Circular 39 Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PEMAd</td>
<td>Type 1</td>
</tr>
<tr>
<td>4</td>
<td>PEMC</td>
<td>Type 3</td>
</tr>
<tr>
<td>1</td>
<td>PSS1C</td>
<td>Type 6</td>
</tr>
</tbody>
</table>

The NWI map shows that the largest wetland is a type 3 wetland of about 10 acres in size, located in the southeastern part of the property. All the other wetlands are less than one acre. The "d" in the NWI classification indicates partial drainage. These wetlands still maintain functional wetland properties.

Table 3-2 provides a description of the wetland types found in Minnesota. Type 1 wetlands are seasonally flooded, often having water for a few weeks or less during the growing season. Types 2, 3, 4, and 5 have progressively more water - up to 10 feet in Type 5. Type 6 is a shrub wetland and type 7 is wooded.
See text for explanation of wetland types.

SCALE: 1 inch = 2,000 feet

The Minnesota Department of Natural Resources (DNR) identifies certain wetlands as Protected Waters or Wetlands. The DNR designates all Type 3, 4, and 5 wetlands that have not been designated Protected Waters, which are 10 or more acres in size in unincorporated areas, or 2.5 or more acres in size in incorporated areas as Protected Wetlands.

No DNR Protected Waters or Wetlands are identified on the Airlake Airport property.

The proposed runway and building areas as shown on Exhibit 3-11 do not interfere with wetland areas. A more detailed survey and field investigation will be needed before the proposed development takes place to verify that no wetlands are impacted.

G. Stormwater Runoff Quality

Stormwater runoff quality can be affected by airport operations and maintenance. Contaminants common to the apron and building areas are oil and fuel spills from filling operations and parked aircraft and automobiles. Aircraft must be washed regularly to remove dirt and other foreign material to maximize flight efficiency. Urea is used on runways and taxiways after snowplowing as a de-icer. Sand and salt typically are not used at airports because of the corrosive and damaging effects on aircraft. Additional contaminants to stormwater may include fertilizers, deicing fluids, pesticides, grass clippings, and soil erosion.

The harmful effects of the aforementioned contaminants are lessened by the long meandering rate of stormwater through the grassed swales before entering south creek and ultimately the Vermillion River. Oil and fuel drippings washed from runways and taxiways by stormwater are only trace amounts and are absorbed by the grassed infield areas. For large spills at the apron areas, all commercial operators have absorbents on hand to absorb spills. The Airport has a Spill Control Plan in effect. MAC also has absorbents at its maintenance building. Soil erosion is negligible after the establishment of turf in non-paved areas. Grass clippings decay rapidly and return to the earth.

Deicing at Airlake Airport is conducted the FBO on a limited basis by portable sprayers in isolated apron areas. As an alternative, aircraft are typically brought into heated hangars to thaw during inclement weather. The MAC is in the process of reviewing deicing operations at the Airport.

The quality of stormwater runoff is not significantly impacted by the operations of the Airport. As previously discussed, the layout of the drainage system lessens effects of possible contaminants entering the wetland areas. Future development will require detailed
engineering analyses to determine the need, location, and size of possible detention areas and drainage. All future development must meet federal, State, and local guidelines.

H. Potential Groundwater Contaminants

Groundwater impact can occur by spillage of degreasers, oil, AvGas, jet fuel, paints, and paint thinners, if these materials are improperly managed. Discharges to the groundwater can occur without immediate detection include leakage of fuel from an underground storage tank and leakage of fuel from fuel pipeline transfer systems. Small amounts of AvGas and waste oil may be entering the surface and groundwater from the practice of emptying aircraft fuel water traps on the ground, from the floor drain in hangars without floor drain holding tanks, and from improper management of fuel and oil in the private hangar area. A portion of the fuel spills is likely to evaporate prior to entering the surface and groundwater. These petroleum products are often trapped in the soil materials by capillary action and are found to migrate slower than groundwater flow. The current waste management procedures in use at the Airport appear to be working fairly well. In addition, an environmental audit is planned for the future.

According to the Metropolitan Airports Commission and the Minnesota Pollution Control Agency (MPCA), Airlake Airport has two registered underground storage tanks at Flyte Line Services. Both are 12,000-gallon tanks containing aviation gasoline and Jet A fuel. There are two above ground tanks. One 250-gallon tank used for the storage of waste oil is located at the MAC maintenance facility. The second is owned by John W. Okeefe and is a 265-gallon tank containing heating fuel. See Exhibit 3-15.

Two petroleum containment sites have been reported at the Airport. One site is located at the airport's FBO (Flyte Line) and the other is at Dagon Aviation. The MPCA assigned these two sites leak numbers of 3,161 and 9054, respectively. The two sites were investigated and closed by the MPCA. No further actions are anticipated.

In addition, the following leak and spill sites are located within one-half mile of the property:

- Fredrickson Excavating, 8777 215th St W
- Star Tex Corporation, 8235 220th St W
- Alcorn Beverage Co., 7870 218th St W

In addition, the following two sites are listed by the MPCA as sites of potential contamination.

- Aptus Cedar, 21700 Cedar Ave S, Lakeville
Bradford Johnson Dump, northwest approximately one-fourth mile from Hamburg Ave and 210th St. W, Lakeville

The first site is a facility that handles solid or hazardous wastes. The second site is a waste disposal site. Releases may not have occurred at either site. The location of these sites should not impact Airlake Airport.

The MAC has undertaken the task of preparing and implementing the Spill Prevention and Control and Countermeasure (SPCC) Plan. The SPCC Plan, March 1992, contains the recommended spill prevention plan. This SPCC Plan was prepared in accordance with MPCA requirements of the Minnesota Spill Bill. This document is available for review at MAC offices.

The purpose of the SPCC Plan is to prevent discharge of oil into or upon navigable waters of the United States or adjoining shorelines, as well as emergency response actions in the event of a release. In case a discharge occurs, the plan also identifies control and cleaning measures. If a spill occurs or other concerns arise regarding the SPCC Plan or its implementation, the MAC should be contacted immediately.

I. Generation of Wastewater

The existing volume of wastewater is determined by the baseline employment. For a facility of this type, the wastewater generated is approximately 50 gallons per employee per day. The data presented below depict expected wastewater volumes for Airlake Airport based on the estimated number of employees at the Airport.

<table>
<thead>
<tr>
<th>Year</th>
<th>Employment</th>
<th>Projected Wastewater Volume</th>
<th>Projected Wastewater Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gallons per Day</td>
<td>Annual (Gallons)</td>
</tr>
<tr>
<td>1993</td>
<td>50</td>
<td>2,500</td>
<td>0.91 million</td>
</tr>
<tr>
<td>1995</td>
<td>55</td>
<td>2,750</td>
<td>1.00 million</td>
</tr>
<tr>
<td>2000</td>
<td>60</td>
<td>3,000</td>
<td>1.10 million</td>
</tr>
<tr>
<td>2005</td>
<td>65</td>
<td>3,250</td>
<td>1.19 million</td>
</tr>
<tr>
<td>2010</td>
<td>70</td>
<td>3,500</td>
<td>1.28 million</td>
</tr>
</tbody>
</table>

Existing practices for wastewater disposal at the hangar area involve the use of watertight holding tanks. Wastewater flows into these tanks and the wastewater is removed by truck on an as-needed basis.
Proposed development in the hangar area includes the use of concrete watertight holding tanks. As with the existing practice, no wastewater would be discharged into the ground. All wastes would enter the Metropolitan Wastewater Treatment Plant for treatment and disposal.

The existing system utilized by the tenants is presently adequate to meet the wastewater volumes. The existing system is adequate to meet the projected growth and the existing sanitary sewer lines are of sufficient size for future connection.

J. Surface Water Management Plan

Additional development is expected to occur at Airlake Airport. Therefore, a Surface Water Management Plan should be implemented and enforced. This plan should be designed to help personnel become aware of urban nonpoint pollution problems and to provide detailed information about management practices to help prevent and control it. As indicated in a previous section, MAC will prepare an environmental audit for each of its reliever airports.

MAC has completed a Stormwater and Pollution Prevention Plan. This plan will help personnel become aware of urban nonpoint pollution problems and to provide information about management practices to help prevent and control it. Even though the Airport has limited existing runoff volumes and adequate existing drainage facilities; implementation of this plan will protect both the existing and future level of water quality.
APPENDIX A

SUPPLEMENTAL ANALYSIS
SUPPLEMENTAL ANALYSIS

CROSSWIND RUNWAY ALTERNATIVES ANALYSIS

SUMMARY

The 1989 Master Plan reviewed possible crosswind runway alignments. This document recommended a 3,500-foot long runway with a 4/22 alignment. As a result of the 1996 public hearing for the LTCP Update, the owners of the Airlake Industrial Park, located northeast of the Airport, expressed concern that the Minnesota Protection Zone requirements for the crosswind runway would impact their ability to develop a section of their property. Therefore, MAC initiated a review of possible alternatives to the proposed 3,500-foot long crosswind runway. Alternatives discussed include:

- No-Build alternative
- Maintaining the crosswind runway length of 3,500 feet
- Reducing the crosswind runway length to 2,500 feet (three scenarios)

Without a crosswind runway, the Airport does not meet the 95 percent wind coverage recommended by the FAA. The majority of the aircraft operating at the airport are light single- and twin-engine aircraft that are impacted by crosswinds. A crosswind runway would allow the Airport to remain open for safe operations in a wider range of wind conditions.

The key issues related to each alternative are summarized below:

1. No Build alternative

This alternative would not result in any associated development costs, impacts to surrounding land uses, or require the closure of area roads. With only one runway, the Airport would be closed to operations during crosswind conditions. According to area wind data, small aircraft, which make up approximately 99 percent of the Airport’s based and operating fleet, would be impacted by crosswinds approximately 16 percent of the time.

2. Alternative 2 - 3,500 foot crosswind runway

This alternative was originally recommended in the 1989 Master Plan. Approximately 128 acres would be required to secure the MnDOT protection zone for runway end 4. An additional 45 acres (minimum) would be required for Runway end 22. Hamburg Avenue and 225th Street would require closure. The cost estimate for this alternative is $4.7 million.
3. **Alternative 3A - 2,500 foot crosswind runway**

A 2,500 foot long runway would prove adequate for almost all of the aircraft impacted by crosswinds on a regular basis. The land envelope required could be reduced to as little as 90 acres (Rwy 4) and 16 acres (Rwy 22). Hamburg Avenue and 225th Street would still require closure. The cost estimate for this alternative is $2.7 million.

4. **Alternative 3B - 2,500 foot crosswind runway**

This alternative moves the crosswind runway as far to the southwest as allowed by the railroad track. The land envelope for Rwy 4's MnDOT protection zone, and associated property, increases to 108 acres; Rwy 22's MnDOT protection zone decreases to three acres. Hamburg Avenue and 225th Street would still require closure. The cost estimate for this alternative is $2.2 million.

5. **Alternative 3C - 2,500 foot turf crosswind runway**

A turf strip would decrease the land envelope by 200 feet on each runway end, since the RPZ and the MnDOT protection zones start at the runway end for unpaved runways. The land envelope for Rwy 4's MnDOT protection zone and associated property decreases to 102 acres; Rwy 22's MnDOT protection zone decreases to approximately one acre. Hamburg Avenue and 225th Street would still require closure. The cost estimate for this alternative is $1.2 million.

6. **Conclusion**

It is the conclusion that a crosswind runway is warranted at Airlake Airport for several reasons. The primary justifications include:

- A single runway will limit the ability of the airport to accommodate many smaller aircraft during crosswind conditions. Approximately 99 percent of the aircraft operations are performed by light single-engine and multiengine aircraft.

- A crosswind runway will enhance safety during crosswind conditions.

- Airlake Airport is the only MAC facility having a single runway. A single runway at a MAC-owned reliever airport is contrary to MAC’s Strategic Plan.

- The land envelop necessary for the development of a crosswind runway is today vacant. Development pressures may change this as the southern portion of the Metropolitan Area continues to experience strong growth. On-airport development (hangars, taxiways, etc.), which are currently being considered, should be planned in concert with a new crosswind runway.

Based on the evaluation of area impacts, estimated development costs, and the needs of the airports current and future users, a paved runway with a length of approximately 2,500 feet is warranted.
While MAC should protect the land envelop for this project in the near term, actual development of a paved runway and taxiway will depend on the availability of funding. In addition, an environmental assessment will be required to evaluate impacts in more detail.

TECHNICAL ANALYSIS

The primary objective of this supplemental analysis is to analyze potential alternatives related to a future crosswind runway at Airlake Airport. This analysis focuses on the runway alignment currently depicted on the Airport’s draft ALP (Runway 4/22). The 1989 Master Plan (Long Term Comprehensive Plan) contained an extensive review of possible crosswind runway alignments; a 3,500-foot long runway with a 4/22 alignment was selected as the most feasible alternative in the 1989 document. As a result of the 1996 public hearing for the Long Term Comprehensive Plan Update, the owners of the Airlake Industrial Park, located northeast of the Airport, expressed concern that the Minnesota Protection Zone requirements for the crosswind runway would impact their ability to develop a section of their property. As a response to this concern, MAC initiated a review of possible alternatives to the proposed 3,500-foot long crosswind runway. Alternatives discussed include:

- No-Build alternative
- Maintaining the crosswind runway length of 3,500 feet
- Reducing the crosswind runway length to 2,500 feet (three scenarios)

1. AVIATION NEEDS ASSESSMENT

As discussed in Long-Term Comprehensive Plan Update, the predominant justification for the proposed crosswind runway at Airlake Airport centers on the lack of adequate crosswind coverage provided by the primary runway (Runway 11/29). FAA design standards recommend that an airport provide 95 percent crosswind coverage for any aircraft using or projected to use the airport on a regular basis. Wind coverage recommendations are 10.5 knots for aircraft in Airport Reference Code (ARC) A-I and 13 knots for aircraft in ARC B-II. These runway recommendations are based on the fact that slower, smaller aircraft are more affected by crosswind conditions. Runway 11/29 currently provides 10.5-knot crosswind coverage approximately 84 percent of the time. Using a 13-knot component, 91 percent coverage is provided. According to FAA planning recommendations, a crosswind runway is justified at Airlake Airport to provide 95 percent coverage. With the addition of an ARC B-I crosswind runway, wind coverage reaches 95 percent using a 10.5-knot crosswind component and more than 97 percent using a 13-knot crosswind component.

As discussed in the Projections of Aviation Demand chapter, approximately 99 percent of the Airport’s operations are performed by light single and multi-engine aircraft. These smaller aircraft would be the primary benefactors of a crosswind runway. More demanding aircraft typically used for business will be able to operate in stronger wind conditions, therefore, a crosswind runway is not as critical for these operations. Since the Airport’s existing runway (Runway 11/29) is designed to meet ARC B-II standards and has a width of 75 feet, crosswind operational tolerances are increased somewhat for light aircraft most impacted by crosswinds. The actual decision to use a runway is
dependent on individual aircraft performance characteristics and pilot skill. Still, without a crosswind runway, the Airport does not meet the 95 percent wind coverage recommended by the FAA. A crosswind runway would allow the Airport to remain open for safe operations in a wider range of wind conditions.

Airlake Airport is the only MAC facility having a single runway. A single runway at a MAC-owned reliever airport is contrary to MAC’s Strategic Plan which has a stated goal of maximizing the utilization of the reliever airport system. As stated above, a single runway will limit the ability of the airport to accommodate many smaller aircraft during crosswind conditions. With a crosswind runway in place, safety would be enhanced during crosswind conditions.

Another factor to consider with regard to the need to develop a crosswind runway is the growing development pressures common in the southern part of the Metropolitan area. While the land identified for the crosswind runway is currently vacant, it is possible that all or a portion of this property could be developed in the future. In addition, expectations for a continued increase in aviation demand at Airlake Airport are consistent with other regional aviation projections for the Metropolitan area, especially Anoka County-Blaine Airport and Flying Cloud Airport. Considering the increasing demand for on-airport services, land use changes surrounding the airport, and the growth in the area’s economy, delaying planning for a crosswind runway now may limit the viability of such a project in the future. This is especially true if development occurs in the area proposed for the crosswind runway.

2. RUNWAY LENGTH ANALYSIS

According to the current FAA runway length computer program, a runway length of approximately 3,200 feet at Airlake Airport will support just over 95 percent of all small aircraft with less than 10 seats during dry runway conditions. To allow for wet and slippery conditions, a runway length of approximately 3,500 feet will accommodate itinerant and training operations by most of the Airport’s single and light twin-engine fleet, as well as provide an added margin of safety when the weather conditions create a less than ideal runway surface. In addition, a crosswind runway length of 3,500 feet is consistent with current or planned crosswind runway lengths at other MAC reliever airports.

While a runway length of 3,500 feet can be supported, the evaluation of a shorter crosswind runway is warranted considering the possible constraints to neighboring development. A runway with a length of 2,500 feet will still accommodate approximately 70 percent of the small aircraft fleet. Performance tables for many small aircraft, such as the Cessna 172, also indicate that a runway with a length of 2,500 feet is more than adequate for landings and departures of small aircraft. Based aircraft data, contained in Chapter One of the Long-Term Comprehensive Plan Update, indicates that over 92 percent of the existing based aircraft and operating fleet at Airlake Airport is composed of small, single-engine aircraft. While larger, more demanding aircraft, are based at the Airport, these aircraft are not as severely impacted by crosswind conditions. Therefore, a crosswind runway length of 2,500 feet could be considered if issues such as development costs, land acquisition constraints, and proposed development prohibit the development of a 3,500-foot long runway.
3. EVALUATION CRITERIA

There are three primary evaluation criteria there were analyzed in determining the feasibility of developing a crosswind runway for Airlake. These criteria include:

- Development costs
- Impacted land envelope
- Impacts to surrounding roads

A general discussion of these criteria is provided below.

A. Development Costs

In order to estimate the development costs for each alternative, the Airport’s engineer, HNTB, was contracted to provide general development costs for the proposed development scenarios. CAD drawings of each scenario were submitted to HNTB for evaluation. Costs were developed related to development of the runway and the associated parallel taxiway. These costs included excavation, base preparation and paving, NAVAIDs, and associated engineering. A 20 percent contingency was included to cover the abandonment of the power lines on 225th Street as well as possible pavement removal. Estimates were also prepared related to land acquisition costs. The land needed to secure the approach from the southwestern is zoned for agricultural use. The land located in the Airlake Industrial Park was valued based on an ultimate industrial use. Land values for agricultural properties south of the Airport were derived from estimates obtained from planners with the City of Lakeville. The land value for the Airlake Industrial Park is based on data provided by the owner of the industrial park. These relative property values were substantiated with the City of Lakeville. It is important to note that all land values are considered estimates. A detailed appraisal would be required to identify actual land values surrounding the Airport. The land values used in this analysis are for planning purposes only.

B. Impacted Land Envelope

In order for MAC to develop Runway 4/22, it will be necessary to acquire property not only to support the actual runway, but to also ensure that FAA development criteria and MnDOT zoning recommendations are fulfilled. The 1989 study recommended that MAC purchase the FAA’s Runway Protection Zone (RPZ). Based on the comments received at the 1997 Public Hearing for the Long-Term Comprehensive Plan Update, MAC has also decided to evaluate the impacts to the area that would fall under the proposed MnDOT protection zones. The general area and requirements for the FAA RPZ and the MnDOT protection zones are highlighted below.

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1 A detailed discussion of required FAA design criteria is contained in Chapter Two, Facility Requirements.
1. FAA Runway Protection Zone

The RPZ is trapezoidal in shape and is centered on the extended runway centerline. The function of the RPZ is to enhance the protection of people and property on the ground. This is typically achieved through airport owner control over the RPZ through acquisition. The RPZ begins 200 feet beyond the end of the runway pavement usable for takeoff and landing. For turf (unpaved) runways, the RPZ begins at the end of the runway. The actual length and width of the RPZ is contingent on the size of the aircraft operating on the runway, as well as on the type of approach available. Since Runway 4/22 would be designed to accommodate aircraft of 12,500 pounds or less (small aircraft), the RPZ for Runway 4/22 would have an inner width of 250 feet, an outer width of 450 feet, and a length of 1,000 feet.

2. MnDOT Protection Zones

MnDOT has established distinct zones located off each runway end to prevent incompatible development. The start of the MnDOT protection zone is the same as the location of the RPZ - 200 feet for paved runways and at the threshold for turf runways. These safety zones are used to establish zoning ordinances to protect the airspace surrounding an airport and to prevent incompatible land uses from being developed. Minnesota guidelines are composed of three safety zones: Safety Zone A, Safety Zone B, and Safety Zone C. Safety Zone A, which is two-thirds the length of the runway, restricts all buildings, temporary structures, exposed transmission lines, or similar types of use. Safety Zone B, which is one-third the length of the runway, is restricted to building sites not less than three acres. Safety Zone C prohibits uses that may cause glare, confusing lights, impair a pilot’s visibility, or interfere with the operation of aircraft or an airport’s electronic equipment. A more detailed discussion of the MnDOT protection zones is contained in the Long Term Comprehensive Plan Update. It should be noted that the Airlake Airport currently does not have airport zoning in place to control development. For the purpose of this analysis, it is assumed that MAC would obtain control of the entire FAA RPZ and MnDOT Zones A and B.

C. Impacts to Surrounding Roads

In addition to land acquisition concerns created by the crosswind runway alternative, concerns have been voiced regarding impacts to the area road network. These concerns are primarily related to possible closures of 225th Street and Hamburg Avenue. 225th Street is a two-lane, gravel township road between Dodd Road (County State Aid Highway 9) on the west and Denmark Avenue (County Road 31) on the east - a distance of about five miles. Hamburg Avenue is also a two-lane, gravel township road between 225th Street on the north and 240th Street on the south - a distance of about one and one-half miles. Both roads serve rural residential and agricultural land uses and, according to the Dakota County Comprehensive Plan, land use in the area will remain the same. 225th Street and Hamburg Avenue do not serve any town centers. MAC commissioned a study by HNTB to determine the traffic impacts of closing a portion of 225th Street and a portion of Hamburg Avenue in
Eureka Township to accommodate the alignment of a crosswind runway at Airlake Airport. The findings of this study were incorporated into this crosswind runway analysis.

According to traffic counts collected, there is an average of 90 vehicle trips per day currently occurring on 225th Street and an average of 30 vehicle trips per day on Hamburg Avenue at these locations. The peak hour on 225th Street occurs between 3:00 and 4:00 p.m., with an average volume of 10 vehicles. The peak hour on Hamburg Avenue occurs between 11:00 a.m. and 12:00 p.m., with an average volume of six vehicles.

There are several viable alternatives for traffic relocated due to the possible closure of area roads. Traffic wishing to continue on 225th Street can use County Road 70 to the north via Highview Avenue and Cedar Avenue. Highview Avenue is a north-south gravel road, very similar to 225th Street, on the west side of Airlake Airport. County Road 70 (215th Street) is a paved east-west route and had an average annual daily traffic (AADT) count of 8,200 vehicles in 1994. Cedar Avenue (County Road 233) is a paved north-south route on the east side of Airlake Airport and had an AADT count of 5,500 vehicles in 1994. Cedar Avenue and Highview Avenue can also serve as acceptable north-south alternatives to Hamburg Avenue.

A second alternative for traffic wishing to continue on 225th Street is 240th Street, which is linked to 225th Street via Highway Avenue and Cedar Avenue. 240th Street is an east-west gravel road, similar to 225th Street. An alternative direct east-west route is County Road 50 which links the downtown’s of Lakeville and Farmington. County Road 50 was recently reconstructed between Lakeville and Farmington and had an AADT count of 6,000 vehicles in 1994. The additional traffic distributed to these alternate routes due to the closing of 225th Street and Hamburg Avenue will not adversely impact traffic operations on these routes. Therefore, HNTB’s analysis concluded that there would be no significant impact to area traffic by closing these roads.

4. ALTERNATIVE EVALUATION

The following sections discuss the possibilities of four different crosswind runway alternatives. These alternatives include a "No Build" alternative, a 3,500-foot crosswind runway, and two alternatives with crosswind runway lengths of 2,500 feet. Table 1 presents the key impacts associated with each alternative. The four alternatives are discussed and evaluated in the following sections.

A. "No Build" Alternative

A No Build alternative (see Exhibit 1) would not result in any associated development costs, impacts to surrounding land uses, or require the closure of area roads. With only one runway, the Airport would be closed to operations during crosswind conditions. According to area wind data, small aircraft, which make up approximately 99 percent of the Airport’s based and operating fleet, would be impacted by crosswinds approximately 16 percent of the time. Due
<table>
<thead>
<tr>
<th></th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3A</th>
<th>Alternative 3B</th>
<th>Alternative 3C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway length</td>
<td>NA</td>
<td>3,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2500-Turf</td>
</tr>
<tr>
<td>Wind Coverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 10.5 Knot</td>
<td>84%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>- 13 Knot</td>
<td>91%</td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
</tr>
<tr>
<td>Land To Be Acquired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Runway end 4</td>
<td>0</td>
<td>128 acres</td>
<td>90 acres</td>
<td>108 acres</td>
<td>102 acres</td>
</tr>
<tr>
<td>- Runway end 22 (minimum)</td>
<td>0</td>
<td>45 acres</td>
<td>16 acres</td>
<td>3 acres</td>
<td>1 acres</td>
</tr>
<tr>
<td>- Runway end 22 (maximum)</td>
<td>0</td>
<td>202 acres</td>
<td>100 acres (est)</td>
<td>3 acres</td>
<td>1 acres</td>
</tr>
<tr>
<td>Road Impact</td>
<td>None</td>
<td>Closure of 225th St and Hamburg Ave</td>
<td>Closure of 225th St and Hamburg Ave</td>
<td>Closure of 225th St and Hamburg Ave</td>
<td>Closure of 225th St and Hamburg Ave</td>
</tr>
<tr>
<td>Construction/Engineering Cost</td>
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<td>$1,654,650</td>
<td>$1,358,100</td>
<td>$1,392,150</td>
<td>$501,000</td>
</tr>
<tr>
<td>Minimum Land Acquisition Cost</td>
<td>$0</td>
<td>$3,018,000</td>
<td>$1,340,000</td>
<td>$798,000</td>
<td>$662,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$0</td>
<td>$4,672,650</td>
<td>$2,698,100</td>
<td>$2,190,150</td>
<td>$1,163,000</td>
</tr>
</tbody>
</table>
to the fact that Runway 11/29 is developed to B-II standards and offers a runway width of 75 feet, operational tolerances are increased for light aircraft. It should be noted that discussions with Airport users and lack of comments received related to a crosswind runway during the 1997 public hearing process indicate there is little perceived need by users at the Airport. According to the 1989 Master Plan, public opinion regarding the need for a crosswind runway was mixed.

B. Alternative 2 - Crosswind Runway with a Length of 3,500 Feet

The 1989 Airlake Airport Master Plan identified a preferred runway length, orientation, and placement for the proposed crosswind runway (see Exhibit 2). The 1989 plan recommended a 3,500-foot by 75-foot crosswind runway (Runway 4/22). The runway centerline is located approximately 450 feet east of Runway end 29's threshold.

The MnDOT Protection Zones located off the proposed Runway end 22 transverse a large parcel of land located east of Cedar Avenue. This property is currently undeveloped and located within the Airlake Industrial Park, owned by Airlake Development, Inc. The Minnesota Protection Zone A for Runway end 22 would impact approximately 23 acres of the Airlake Industrial Park. Zone B would overlay approximately 22 acres of the industrial park. In total, development on approximately 45 acres of property would be restricted by MnDOT zoning standards. This represents the minimum land envelope that would be recommended for acquisition off Runway end 22. It is possible that an area encompassing the entire industrial park (202.71 acres - see shaded area on Exhibit 2) located east of Cedar Avenue could be impacted since the protection zones completely bisect this parcel. Cost estimates for each land acquisition contingency were prepared. The acquisition of 45 acres of the industrial park is estimated at $2.25 million ($50,000 per acre). As previously stated a land value of $50,000 per acre was suggested by the owner. The appraised value may vary significantly. If the entire 202.71 acres were acquired, land acquisition would increase to $10.1 million, assuming a price of $50,000 per acre. In addition, 128 acres of agricultural property would be required to control Zones A and B for Runway end 4. It is estimated that agricultural property is valued at $6,000 per acre. Therefore, the acquisition Runway end 4's Zone A and B will cost and estimated $768,000. Again, all land values are considered estimates; a detailed appraisal should be conducted to develop definitive property values.

Development costs, independent of land acquisition, for construction and engineering costs for a 3,500-foot long crosswind runway were estimated at $1,654,650. Total costs for each scenario are estimated as follows:

<table>
<thead>
<tr>
<th>Alternative 2 - Only acquiring MnDOT Zone A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Construction with Engineering</td>
</tr>
<tr>
<td>Land Acquisition - Runway end 4 (128 acres)</td>
</tr>
<tr>
<td>Land Acquisition - Runway end 22 (45 acres)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Alternative 2 - Purchase Industrial Park

Total Construction with Engineering $1,654,650
Land Acquisition - Runway end 4 (128 acres) $768,000
Land Acquisition - Runway end 22 (202.7 acres) $10,135,500
Total $12,558,150

Detailed cost estimates are presented in Table 2.

The construction of this alternative would require the closure of both 225th Street and Hamburg Avenue. The results of the traffic study conducted by HNTB concluded that there will be no significant traffic impacts as a result of the closure of 225th Street between Highview Avenue and Cedar Avenue or the closure of Hamburg Avenue between 225th and 240th Streets.

C. Alternative 3A - Crosswind Runway With a Length of 2,500 feet

Alternative 3A also depicts a 4/22 runway orientation. This alternative, however, proposes only a 2,500-foot runway. As discussed, a runway length of approximately 2,500 feet would support approximately 70 percent of all small aircraft with less than 10 seats. Considering the Airport’s current and projected based and operating fleet mix, a crosswind runway 2,500 feet in length will be adequate to provide a crosswind alternative to the primary runway.

Exhibit 3a depicts a 2,500-foot crosswind runway. Proposed Runway end 4 is in the same location as Alternative 2; Runway end 22 has been relocated 1,000 feet to the southeast for a total runway length of 2,500 feet. By reducing the runway length by 1,000 feet, MnDOT Protection Zones A and B are reduced by 1,000 feet at each end. This subsequently results in less property being affected. Approximately 16 acres are located in the A and B zones for Runway end 22. It is possible that additional property in the southern portion of the industrial park, not overlaid by the MnDOT Protection Zones, would be impacted as a result of limited access, reduced road frontage, or irregular shape. The owner of the industrial park may contend that additional property would need to be acquired by MAC should this alternative be developed.

The minimum acquisition of 16 acres of the industrial park is estimated at $800,000 ($50,000 per acre). If additional land were acquired, land acquisition costs would increase. In addition, 90 acres of agricultural property would be required to control Zones A and B for Runway end 4. It is estimated that agricultural property is valued at $6,000 per acre. Therefore, the acquisition Runway end 4's Zone A and B would cost and estimated $540,000. All land values are considered estimates; a detailed appraisal should be conducted in order to develop a more exact property valuation.

Development costs, independent of land acquisition, for construction and engineering for a 2,500-foot long crosswind runway were estimated at $1,358,100. Total costs for Alternative 3A are estimated as follows:
TABLE 2
Airlake Airport
Long-Term Comprehensive Plan Update
Supplemental Analysis
COST ESTIMATE - 3,500' RUNWAY (ALT 2)

<table>
<thead>
<tr>
<th>Paving Items</th>
<th>Quantity</th>
<th>Unit</th>
<th>Estimated Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization</td>
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<td>LS</td>
<td>$53,000</td>
<td>$53,000</td>
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<tr>
<td>Excavation</td>
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<td>$4</td>
<td>$280,000</td>
</tr>
<tr>
<td>12&quot; Select Granular Material</td>
<td>17,000</td>
<td>CY</td>
<td>$6</td>
<td>$102,000</td>
</tr>
<tr>
<td>6&quot; Aggregate Base</td>
<td>8,100</td>
<td>CY</td>
<td>$16</td>
<td>$129,600</td>
</tr>
<tr>
<td>3&quot; Bituminous Pavement</td>
<td>10,000</td>
<td>Ton</td>
<td>$35</td>
<td>$350,000</td>
</tr>
<tr>
<td>LIRLs</td>
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<td>LS</td>
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<td>$67,000</td>
</tr>
<tr>
<td>Taxiway Reflectors</td>
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<td>LS</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>7.5kW Regulator</td>
<td>2</td>
<td>EA</td>
<td>$7,000</td>
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</tr>
<tr>
<td>PAPI, 4-Box System</td>
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<td>EA</td>
<td>$20,000</td>
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<tr>
<td>Split Steel Casing - Pipeline Crossing</td>
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<tr>
<td>Turf Establishment</td>
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<td>AC</td>
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<td>$40,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
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<td>$1,103,100</td>
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<tr>
<td>20% Contingency</td>
<td></td>
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<td>$220,620</td>
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<tr>
<td>TOTAL CONSTRUCTION</td>
<td></td>
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<td>$1,323,720</td>
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<tr>
<td>25% Engineering</td>
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<td>$330,930</td>
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<tr>
<td>TOTAL CONSTRUCTION/ENGINEERING</td>
<td></td>
<td></td>
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<tr>
<td>Land Acquisition - Estimate</td>
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</tr>
<tr>
<td>Farmland (Rwy 4)</td>
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<tr>
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Source: HNTB
Total Construction with Engineering $1,358,100
Land Acquisition - Runway end 4 (90 acres) $540,000
Land Acquisition - Runway end 22 (16 acres) $800,000
Total $2,698,100

If additional land is acquired in the industrial park, the total cost could increase significantly. Detailed cost estimates are presented in Table 3.

The construction of this alternative would require the closure of both 225th Street and Hamburg Avenue. The results of the traffic study conducted by HNTB conclude that there will not be significant impacts on traffic as a result of closing 225th Street between Highview Avenue and Cedar Avenue or closing Hamburg Avenue between 225th and 240th Streets.

D. Alternative 3B - Crosswind Runway With a Length of 2,500 Feet

Exhibit 3b depicts a 2,500-foot long crosswind runway with a relocated Runway end 4. The objective of this alternative was to place the proposed runway as far southwest as possible and still clear the Minnesota Northfield and Southern Railroad by 23 feet on approach to Runway 4. FAA Part 77 standards dictate that the approach surface clear railroad tracks by 23 feet. Although taxiing time will be increased with this alternative, it does remove all but approximately three acres of the Minnesota Protection Zone from the industrial park. Approximately 108 acres of agricultural land, contained in Runway end 22's MnDOT Zones A and B, will be impacted. The estimated cost to acquire the 108 acres of MnDOT Zone A and Zone B located in Runway end 4 is approximately $648,000. Acquiring three acres of industrial park property is estimated at $150,000.

All land values are considered estimates; a detailed appraisal should be conducted in order to develop a definitive property value.

Development costs, independent of land acquisition, for construction and engineering for a 2,500-foot long crosswind runway as depicted in this alternative are estimated at $1,392,150. Total costs for Alternative 3B are estimated as follows:

Total Construction with Engineering $1,392,150
Land Acquisition - Runway end 4 (108 acres) $648,000
Land Acquisition - Runway end 22 (3 acres) $150,000
Total $2,190,150

Detailed cost estimates are presented in Table 4.

The construction of this alternative would require the closure of both 225th Street and Hamburg Avenue. The results of the traffic study conducted by HNTB concluded that there will be no significant impacts on traffic due to the closure of 225th Street between Highview...
# TABLE 3

Airlake Airport  
Long-Term Comprehensive Plan Update  
Supplemental Analysis

COST ESTIMATE - 2,500' RUNWAY (ALT 3A)

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<tr>
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Subtotal                                 |          |      |                     | $905,400    |
20% Contingency                          |          |      |                     | $181,080    |
TOTAL CONSTRUCTION                        |          |      |                     | $1,086,480  |
25% Engineering                          |          |      |                     | $271,620    |
TOTAL CONSTRUCTION/ENGINEERING           |          |      |                     | $1,358,100  |

Land Acquisition - Minimum Recommended   |          |      |                     |             |
Farmland (Rwy 4)                          | 90       | AC   | $6,000              | $540,000    |
Industrial Park Land (Rwy 22)             | 16       | AC   | $50,000             | $800,000    |
TOTAL - LAND ACQUISITION                  |          |      |                     | $1,340,000  |

PROJECT TOTAL                             |          |      |                     | $2,698,100  |

Source: HNTB
TABLE 4
Airlake Airport
Long-Term Comprehensive Plan Update
Supplimental Analysis

COST ESTIMATE - 2,500' RUNWAY (ALT 3B)

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Subtotal                                  $928,100
20% Contingency                           $185,620
TOTAL CONSTRUCTION                        $1,113,720
25% Engineering                           $278,430
TOTAL CONSTRUCTION/ENGINEERING            $1,392,150

Land Acquisition - Minimum Recommended
Farmland (Rwy 4)                           108      | AC    | $6,000              | $648,000   |
Industrial Park Land (Rwy 22)              3        | AC    | $50,000             | $150,000   |
TOTAL - LAND ACQUISITION                   $798,000

PROJECT TOTAL                              $2,190,150

Source: HNTB
Avenue and Cedar Avenue or the closure of Hamburg Avenue between 225th and 240th Streets.

E. **Alternative 3C - Turf Crosswind Runway With a Length of 2,500 Feet**

Alternative 3C is similar to Alternative 3B, except that the runway is a 2,500-foot long turf strip. For this analysis, it was assumed that the turf strip would be constructed to a width of 250 feet, the minimum recommended by MnDOT. A runway of these dimensions would require the clearing, grading, and soil compacting of a 15 acre area. It should be noted that while MnDOT requires that a primary runway for any public airport contain at least 2,500 feet of usable length, there is no minimum required length for a crosswind runway. If necessary, the runway length could be reduced slightly, though operational characteristics would be eroded with a significant reduction. Lighting and other NAVAIDs were not included for the turf runway. FAA and MnDOT design standards for a turf runway allow the approach surface to start at the end of the runway. This removes all but one acre of the industrial park from the MnDOT protection zone. Approximately 102 acres of agricultural land, contained in Runway end 22's MnDOT Zones A and B, will be impacted. The estimated cost to acquire the 102 acres of MnDOT Zone A and Zone B located in Runway end 4 is approximately $612,000. Acquiring one acre of industrial park property is estimated at $50,000.

All land values are considered estimates; a detailed appraisal should be conducted in order to develop a definitive property value.

Development costs, independent of land acquisition, for construction and engineering for a 2,500-foot long turf crosswind runway for this alternative are estimated at $501,000. This estimate is based on mobilization and excavation costs associated with Alternative 3B. Total costs for Alternative 3C are estimated as follows:

- Total Construction with Engineering: $501,000
- Land Acquisition - Runway end 4 (102 acres): $612,000
- Land Acquisition - Runway end 22 (1 acre): $50,000

Total: $1,163,000

Detailed cost estimates are presented in Table 5.

The construction of this alternative would require the closure of both 225th Street and Hamburg Avenue. The results of the traffic study conducted by HNTB concluded that there will be no significant impacts on traffic due to the closure of 225th Street between Highview Avenue and Cedar Avenue or the closure of Hamburg Avenue between 225th and 240th Streets.
<table>
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Source: AirTech
APPENDIX B

HEARING OFFICER’S REPORT
HEARING OFFICER'S REPORT
AILLAKE AIRPORT LONG TERM COMPREHENSIVE PLAN UPDATE

On Wednesday, November 13, 1996, at approximately 7:00 p.m., a public hearing was held at the Lakeville City Hall regarding the Airlake Airport Long-Term Comprehensive Development Plan Update. This public hearing was held in conformance with the Commission action of October 28, 1996. MAC Commissioners John Dowdle and Richard Long were present. Commissioner Dowdle served as the hearing officer.

In addition to MAC Commissioners, also present at the hearing were Mark Ryan and Gary Schmidt from MAC, and Barbara Fritsche and Scott Sanders of The Airport Technology and Planning Group, Inc. (AirTech), consultants to the Commission. The purpose of the public hearing was to receive input regarding the various findings and recommendations included in the Airport Long-Term Comprehensive Development Plan Update.

No oral statements were presented for the record, however, written comments were accepted through November 27, 1996. Written statements from Eureka Township and Airlake Development, Inc. were received. In general, these two letters expressed concern regarding the planned crosswind runway. Eureka Township states that closing 225th Street will disrupt a major east/west road serving Dakota County. Airlake Development Inc., which owns the remaining undeveloped land in Airlake Industrial Park, is concerned that the potential crosswind runway will diminish the value of property they own in Zone A and Zone B. Copies of these letters and responses are contained in Appendix A which is attached. A transcript of the public hearing was prepared by a court reporter. This transcript is contained in the attached Appendix B.

BACKGROUND

The Metropolitan Airports Commission (MAC) initiated this comprehensive planning study to update the 1989 Airlake Airport Comprehensive Development Plan. Since the 1989 study was completed, conditions in the Twin Cities area, the Lakeville area, and at the Airport have changed. In addition, the Federal Aviation Administration (FAA) revised its design standards in November 1994. The Long-Term Comprehensive Development Plan Update follows guidelines defined by the FAA and the Metropolitan Council. An Advisory Committee, made up of representatives from Lakeville, Eureka Township, Airport businesses, Metropolitan Council, Minnesota Department of Transportation, and MAC reviewed the planning study as it was prepared.

Since the Airport's Comprehensive Development Plan was completed in 1989, the key focus of this study’s analysis was to update the forecast of aviation activity and revise the facility requirements analysis. Environmental impacts, including a noise analysis and a review of water quality issues, were also examined.

REVIEW OF ISSUES

In January, 1996, the Airport was home to an estimated 179 based aircraft. By the end of the 20-year planning period, the number of based aircraft is expected to grow to 280 based aircraft. The number of annual operations is projected to increase from 75,397 in 1995 to more than 126,000 by 2015. Almost all of the based and operating fleet using Airlake Airport will consist of single- and twin-engine aircraft. Since the Airport serves as an instrument landing system (ILS) training facility

Attachment 1
and is a designated reliever for Minneapolis-St. Paul International, there will be a limited number of business jets using the Airport. Examples of the aircraft that the Airport should be designed to accommodate include the Beechcraft King Air and the Citation II. Based on the wingspans and approach speeds of these aircraft, Airlake Airport is classified within the FAA’s airport reference code system (ARC) as a B-II facility.

While the current runway length is adequate to serve most of the projected operating fleet, the possibility of a runway extension to improve the Airport’s ability to accommodate business aircraft flying longer stage lengths was explored. The location of Highview Avenue, railroad tracks, and the adjacent buildings seriously limit the feasibility of an extension to the northwest without investing in major road and railroad relocations. The location of Cedar Avenue limits the potential for a runway extension to the southeast. The maximum extension that can be accommodated, without relocating Cedar Avenue, is 500 feet. Based on the impact of neighboring roads and buildings, the maximum feasible runway length that can be obtained at Airlake Airport without a major road relocation is approximately 4,600 feet.

The construction of a 3,500-foot long crosswind runway (Runway 4/22) was proposed in the 1989 Comprehensive Development Plan. The primary need of the crosswind runway is to enhance flight training operations by light single-engine aircraft during crosswind conditions. Light single-engine aircraft comprise approximately 22 percent of the operating fleet. Since Runway 11/29 only provides 84 percent crosswind coverage at 10.5 knots and 91 percent coverage at 13 knots, the development of Runway 4/22 is justified. In addition, Airlake Airport is the only MAC facility having a single runway. Finally, the land envelop necessary for the development of a crosswind runway is today vacant. Development pressures may change surrounding land use as the southern portion of the Metropolitan Area continues to experience strong growth. On-airport development (hangars, taxiways, etc.) which are currently being considered, should be planned in concert with a new crosswind runway. A crosswind runway with a length of 2,500 feet should meet the needs of the Airport for the planning period.

Supplemental analysis indicated that a 3,500-foot long runway would cost approximately $4.2 million to develop. Much of this cost is a result of land use impacts to the Airlake Industrial Park, located northeast of the Airport. A 2,500-foot long runway, which would avoid significant impacts to the Airlake Industrial Park, could be developed for approximately $2.2 million.

Other facility issues that were identified include providing a minimum taxiway centerline to runway centerline separation of 240 feet for all existing and planned taxiways. The existing northwestern 1,100 feet of the parallel taxiway currently has a separation of only 200 feet. All taxiways should be maintained at a 40-foot width to meet MAC guidelines.

The NAVAIDs currently in use will be adequate for the planning period. However, PAPIs and REILs should be installed for Runway 29. A nonprecision GPS approach for Runway 29 should also be pursued. Additional hangar space will be required to meet the demand for aircraft storage. MAC is currently planning a new building area on the south side of the Airport. This area should accommodate the projected demand for aircraft storage.

Several existing hangars are within the runway’s primary surface. According to FAA standards, buildings are prohibited within the primary surface. Several buildings penetrate the transitional surface, which extends at a 7:1 slope from the primary surface, defining the building restriction line (BRL). As a result of the hangar area, the BRL on the northern side of the Airport has been set at 380 feet by the FAA. The buildings penetrating the Part 77 surfaces and TERPS surfaces will limit
the ability of the Airport to decrease approach minimums below their existing minimum of one mile.

An environmental review was completed that focused on noise and water quality issues. Noise contours were defined using both FAA standards and Metropolitan Council guidelines. All of the 65 DNL contour is contained on Airport property. While the 65 DNL noise contour will increase in size as the number of operations increase, it is expected to remain entirely on Airport property throughout the planning period. The Metropolitan Council requires that noise contours of 55 DNL be prepared. It is likely that other noise sources (i.e., railroads, streets, etc.) produce a significant level of background noise in much of the Airport's 55 DNL contour area.

MAC staff and legal council are in the process of developing a comprehensive Environmental Management Program (Audit). This program would identify regulatory deficiencies of MAC tenants at the Airport with regard to existing environmental regulations. Typical compliance checks would include hazardous waste generation, hazardous materials storage, storage tanks, wells, septic systems, stormwater runoff, fuel spills, and air emissions. In addition, MAC is in the process of developing a Reliever Airport Sewer and Water Utility Master Plan. No major water quality issues were identified; however, all federal, State, and local government unit (LGU) guidelines must be met for all proposed development. The Airport is undergoing an Environmental Management Program (Audit) to detail areas of concern.

Height and land use zoning in conformance with MNDOT rules requires that a Joint Zoning Board be established. This zoning board would be comprised of representatives of each community affected by the proposed zoning as well as MAC. Prior efforts to form such a Board were not successful. MAC will again solicit participation in a Joint Zoning Board from the adjacent communities.

CONCLUSIONS

The Long-term Comprehensive Development Plan Update generally validates the findings of the 1989 plan. Major differences are a recommendation of a 4,600-foot long primary runway rather than a 5,000-foot long runway. Furthermore, the recommended plan includes a 2,500-foot long, rather than a 3,500-foot long, crosswind runway to support light aircraft during crosswind conditions. Recommendations for taxiway improvements and additional hangar space are consistent with the 1989 plan. Estimated costs for key projects are as follows:

- Extend Runway 11/29/extend taxiway/embed MALSR - $400,000
- Relocate/widen taxiway - $250,000
- Construct 2,500 foot long crosswind/taxiway/land acquisition - $2.2 million

Major development projects will require the completion of a Federal Environmental Assessment/State Environmental Impact Statement prior to construction. MAC will again solicit the formation of a Joint Airport Zoning Board to protect the Airport from non-compatible encroachment.
RESPONSE TO COMMENTS

No oral statements were presented. Written comments on the Long-Term Comprehensive Development Plan were accepted through November 27, 1996. Two letters were received. A summary of the comment letters as well as responses are presented below.

LETTER #1 - Airlake Development Inc., Sean O. Regan, November 24, 1996

Comment 1: Airlake Development, Inc. recognizes and supports the need for a crosswind runway.

Response 1: Comment noted.

Comment 2: Airlake Development, Inc. objects to the determination that a 2,600-foot clear zone encompassing all of Approach/Safety Zone A and believes that much of Zone B is not necessary. Zones A and B encroach well beyond the 11 acres recommended for acquisition. These zones would also impact the development potential on property adjacent to them. Airlake Development, Inc. propose that the land contained in Zones A and B be acquired.

Comment 3: By restricting development in the approach areas, the proposed crosswind runway development will bisect the remaining property and increase the development costs. These factors warrant the consideration of the acquisition of Airlake Development property lying east of the approach zones.

Comment 4: The safety/approach zones impact the most valuable land Airlake Development owns east of Cedar Ave. The southern half is directly impacted and the northern half is indirectly impacted by being rendered an irregular shape.

Comment 5: We think it would be shortsighted to propose development around the future runway approach zones. Purchasing property today may be less costly than mitigating future situations.

Response 2 through 5: A detailed alternative analysis was prepared to assess the need for a crosswind runway and to identify scenarios that may be less restrictive to Airlake Development Property. A 2,500-foot long crosswind runway plan has now been developed that minimizes impact to Airlake Development property. The “clear zone,” as mentioned in the letter, will not impact Airlake Development property. The 11 acres recommended for acquisition in the draft document is not longer required with the shorter runway. The property is no longer bisected or significantly impacted by the “safety/approach zones” mentioned. A detailed analysis of the alternative analysis and the recommended layout is contained in Appendix A of the LTCP Update.

LETTER #2 - Eureka Township, Cheryl Shindeldecker, November 27, 1996

Comment: The crosswind runway will require the realignment/relocation of 225th Street and the closure of part of Hamburg Avenue. Since the airport is basically a recreation airport, the benefit of a crosswind runway does not seem to justify the $2 million project cost. The closure of 225th Street will disrupt a major east-west road serving communities in Dakota County.
Response: Prior to the construction of the crosswind runway, a Federal Environmental Assessment and a State Environmental Impact Statement would be required. These documents would assess the impact resulting from the closure of area roads. MAC would work with the Township and the County to develop a suitable mitigation plan to insure that area transportation was not seriously impacted. As previously discussed, actual construction of the crosswind runway will depend on funding availability.
APPENDIX A

Comment Letters
November 24, 1996

Mark Ryan
Metropolitan Airports Commission
6040 - 28th Ave. South
Minneapolis, MN 55450

RE: Airlake Airport Long Term Comprehensive Plan Update
Comments from 11/13/96 Public Hearing

Dear Mark:

As you know, Airlake Development, Inc. owns the remaining undeveloped land in the Airlake Industrial Park. The proposed crosswind runway 4-22 described in the plan presented impacts land we own, not only to the extent that the future construction would require a proposed acquisition of approximately 11 acres of our land lying to the north and east of the proposed runway, but to a greater extent for reasons to follow.

I have enclosed our marketing maps onto which I have transposed (without scientific measures) the proposed property to be acquired as well as the proposed runway.

First of all, Airlake Development recognizes and supports the need for a crosswind runway to ensure the long term safety for Airlake based operators. The airport has certainly been important to the development of the Airlake Industrial Park whose businesses now contribute several millions dollars in property taxes annually. Airlake Airport usage will greatly expand as Lakeville becomes the most heavily populated city in Dakota County as projected by the Met Council by the year 2020 and the addition of a crosswind runway will enhance its viability for business and recreational users.

We, like the M.A.C., must plan forward. Currently we have proposals out which, if accepted, could result in the sale of several larger parcels west of Cedar. These possibilities require that consider parcels we own lying east of Cedar for possible development within the next 18 months. We feel it necessary to address the issue regarding the impact of the proposed runway on our developable property east of Cedar in the very near future for this reason. Unfortunately, our timetable is ahead of yours based on comments regarding when the proposed runway 4-22 may be constructed based on M.A.C.'s capital improvement planning processes.

Nevertheless, we cannot afford to be "held hostage" by not pursuing a workable plan for our impacted property during the first six months of 1997.

We are well aware of dealings M.A.C. has had with previous owners of the park regarding this same issue and hope to resolve the issue through open discussion.

Specific comments regarding the proposed acquisition of approximately 11 acres are as follows:

1) Airlake Development would object to the determination that a 2600' clear zone encompassing all of Approach/Safety Zone A and much of Zone B is not necessary for the proposed runway which is what is provided for with the existing runway? I attempt to delineate this on the map enclosed. I also enclose the safety zone graph, Figure 4-14, related to the proposed runway 4-22 from the
10/87 Airlake Airport Comprehensive Airport Development Plan Interim Report provided by Hoyle, Tanner and Associates. This figure shows zone A and B from the proposed runway encroaching on our property well beyond the area defined by the 11 acres proposed to be acquired. Logic indicates that this property would lose attractiveness to any potential buyer. It certainly impacts areas surrounding these defined zones as well specifically in terms of the potential type of development allowed, height restrictions and building to land coverage ratios allowed. We would propose that the land to be acquired encompass these areas in addition the proposed approximately 11 acres.

2) The existence of the approach areas in which development is restricted, if not by rules and regulations, by logic, causes significantly higher development costs as the approach zones dissect the property thus creating increased infrastructure costs to access and provide utility service to less than ideal (non-rectangular) parcels far removed from the existing utilities (currently along Cedar Ave.). These factors warrant the consideration of the acquisition of Airlake property lying east of the approach zones.

3) The location of the safety/approach zones impacts the most valuable land we own east of Cedar, the frontage, either directly as in the southerly half of our property or indirectly further north as the remaining land not impacted by the approach zones along Cedar is triangular which is not as versatile for development as it might be were it not for the impact of the proposed air traffic.

4) As developers of property, we think it would be shortsighted to propose development (or be forced to propose development) around future runway approach zones. It seems to us that the way to avoid future costly “LeJeune Bolt and Watkins Pattern” situations from arising is to work out a solution that may be more costly to M.A.C. today, but less costly in terms of money, effort, and time in the long run.

We understand budgets and their constraints more than you might imagine and look forward to your response regarding these issues. Please enter this comment into the public hearing record if appropriate. Thank you for your consideration.

Sincerely,

Sean O. Regan
Treasurer/Partner

Enclosures
Installing a cross-wind runway will require a complete realignment/recallation of 225th Street and a closure of part of Hamburgh Avenue in Eureka Township.

This will require the Airlake Airport to acquire/purchase/condemn eighty to one-hundred twenty acres of additional property to accomplish this project and comply with all safety regulations.

Since Airlake Airport is basically a recreational airport, the benefit of a cross-wind runway is very nominal. It would seem that spending almost two million dollars on this project would be difficult to justify.

The closure of part of 225th Street to accommodate this project will disrupt a major east/west road serving major communities in Dakota County.
APPENDIX B

Public Hearing Transcript
PUBLIC HEARING
AIRLAKE AIRPORT LONG TERM COMPREHENSIVE PLAN UPDATE

The Metropolitan Airports Commission (MAC) will hold a Public Hearing on the Long Term Comprehensive Plan Update for the Airlake Airport. The Hearing will be held on November 13, 1996, at the Lakeville City Hall, 20195 Holyoke Avenue, Lakeville, Minnesota 55044. The Public Hearing will begin at 7:00 pm. Prior to the hearing, an "open house" opportunity to discuss the plan update will be provided between 5-7 pm.

The Update of the 1989 Long Term Plan for the airport proposes that the Airport's existing northwest-southeast runway be limited to 4,600 feet in length. Location of Highview Avenue, railroad tracks and adjacent buildings seriously limit the feasibility of expanding the previously planned 5,000 foot runway without investing in major road and railroad relocations. The plan does retain a proposal for a 3,500 foot long crosswind runway. Other improvements in the Plan include a new aircraft hangar storage area on the south side of the airport as well as improved taxiways. Neighboring land uses and environmental issues were also documented.

The Long Term Comprehensive Plan Update for the airport is available for review at the following locations: Lakeville City Hall, 20195 Holyoke Avenue, Lakeville; Farmington City Hall and Library; 335 Oak Street, Farmington; Apple Valley Galaxy Library, 14955 Galaxy Avenue, Apple Valley; Flightline Services, Airlake Airport, 22000 Hamburg Avenue, Lakeville.

For a copy of a Summary of the Plan or further information regarding the Plan, please contact Mark J. Ryan, Airport Planner, Metropolitan Airports Commission, 6040 38th Avenue South, Minneapolis, MN 55450 - Phone 612/726-8129.

Comments regarding the Long Term Comprehensive Plan will be accepted through November 27, 1996. All comments should be sent to the above address.

If paid by 03/14/97 REMIT: 2440.87

If paid after 03/14/97 REMIT (includes 2.88% late payment): INVOICE TOTAL 2497.84

This invoice is payable at the terms specified above. Past due accounts will be charged a 2% late payment charge.

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UNITED STATES • CANADA • EUROPE • JAPAN
METROPOLITAN AIRPORTS COMMISSION HEARING

November 13, 1996

Public hearing of the Metropolitan Airports Commission, taken before Holly J. Nordahl, a Notary Public in and for the County of Rice, State of Minnesota, on the 13th day of November, 1996, at the Lakeville City Hall, in the City of Lakeville, Minnesota, commencing at approximately 7:00 p.m.

*   *   *
APPEARANCES:

COMMISSION MEMBERS:

John Dowdle
Richard Long

Also present:

Mark J. Ryan, Airport Planner
R. Scott Sanders
Barbara Fritsche

* * *

WHEREUPON, the following proceedings were duly had:

* * *

COMMISSIONER DOWDLE: Good evening, ladies and gentlemen. The public hearing will now come to order. My name is Commissioner John Dowdle. We have Commissioner Dick Long here from the Metropolitan Airports Commission. A number of members of the staff from the Airports Commission are here to make a presentation today.

COMMISSIONER LONG: John, they can't hear you.
COMMISSIONER DOWDLE: Again, I'm John Dowdle, and this is Commissioner Dick Long, and a number of the Metropolitan Airports Commission staff are here to present the long range plan for the Airlake Airport.

I'm a member of the Metropolitan Airports Commission and I am part of the Planning and Environment Committee and we're here -- I'm designated as the hearing officer pursuant to actions taken by the Commission on October 21, 1996.

The purpose of this public meeting is to receive testimony regarding the update of the 1989 long-term Comprehensive Plan for the Airlake Airport.

Notice of this hearing, as well as the availability of a summary report, has been published in the Minneapolis Star-Tribune and the St. Paul Pioneer Press on October 29, 1996. Additionally, advertisements were placed in three newspapers local to the Airlake Airport.

We've got to recite this to make sure that the record indicates that we've done all these things.

This plan has been available for public review at the Lakeville City Hall, Farmington City Hall and library, the Apple Valley Galaxy Library, and the
Flightline Services at the Airlake Airport. A summary report has also been available upon request to the Metropolitan Airports Commission.

Following a few introductory comments, the format of the public hearing will be as follows:

1. We will have a brief presentation of the updated plan by Ms. Barbara Fritsche, of Airport Technology & Planning Group, Inc. (Airtech), a planning firm that has assisted the Metropolitan Airports Commission in the preparation of the document.

2. Following Ms. Fritsche's presentation, we will take comments from elected officials and then from the public.

We ask that you please provide your name and address, as you have on the attendance sheet.

In addition, there are cards for you to note if you wish to speak about the updated plan.

A court reporter is present here to record any comments. I ask those of you who wish to make statements, to please keep them brief and try to avoid excessive repetition so that all wish who speak will have an opportunity to do. Prior to your

LOGAN & STRYBICKI (612-291-1095)
statement, please state your name and address.

At the conclusion of the meeting, the record
will remain open until close of business on November
27, 1996, so that anyone wishing to submit
additional statements in writing may do so. These
statements should be submitted to Mark Ryan,
Metropolitan Airports Commission, 6040 28th Avenue
South, Minneapolis, Minnesota 55450.

Following the closing of the public record, a
hearing officer’s report will be prepared, and the
findings and conclusions based on the testimony from
the public meeting will be prepared for action by
the Commission’s Planning and Environment Committee
as well as the full Metropolitan Airports
Commission.

We’ll now collect any cards that have been
completed for those of you who wish to speak, and
we’ll proceed with the presentation by Ms. Barbara
Fritsche of Airtech.

Just a couple notes that I’d like to -- since
there’s not an overwhelming crowd here tonight, I’d
like to make this informal and as questions come up,
in other words, there’s people here that will be
able to answer many of them, and so we’ll try and do
that as we go a long.

LOGAN & STRYBICKI (612-291-1095)
So, Ms. Fritsche, if you'll make your presentation, please.

MS. FRITSCHE: Okay. Good evening. As was pointed out, this plan that we're going to be presenting tonight is actually an update of a similar plan that was completed in 1989. Since that time the FAA, who is one of the primary agencies that we look to in this country to oversee airport development, changed several of their planning guidelines, particularly as it relates to areas off the end of each runway at an active airport, that need to be protected for various safety reasons. And that was one of the primary concerns, that it needs to update this particular plan.

When we look at the Airlake Airport, it's important to remember that this airport is in fact one of several -- and I apologize that this isn't a little bit clearer, this is great technology but the resolution is a little less than we'd like -- that operates in the metropolitan area to provide an alternative for smaller, privately owned and corporately owned general aviation aircraft. We have here in the metropolitan area a system of several airports: Anoka, Crystal, Flying Cloud, South St. Paul, Lake Elmo, and then the Airlake
Airport to the south of the metropolitan area, and they're all available to provide an outlet for general aviation aircraft; otherwise, many of these planes would use Minneapolis-St. Paul International which, as we all know, is already congested to some degree in terms of its operational activity. So not only do these airports serve local demand and needs throughout the metropolitan area, but they also provide the reliever service to the major Metropolitan International Airport that serves the entire region.

When we look at the study process that we've gone through to date in the Comprehensive Plan, we have -- MAC, of course, is the sponsor of the airport, the owner and operator of the airport, and as we mentioned before, this is an update primarily of a plan that was completed in 1989. We have had input from an advisory committee that serves the airport, and we've gone through a pretty traditional planning process, looking at demand that we see the airport will have over the next 20 years, identifying facilities that will be required to meet that demand, and reviewing some of the environmental implications that may be associated with expanding the airport. And at that point in the process,
then, we have a preliminary update of the plan
that's published, it's gone to MAC, and we're in the
stage right now of the public hearing process. The
plan will eventually go back to MAC again for its
formal adoption and then on to the Metropolitan
Council.

When we look at the Airlake Airport, it has
enjoyed over recent years some pretty substantial
growth not only in terms of based aircraft -- and
when we talk about a "based aircraft," a based
aircraft is a plane that's permanently stored at a
particular airport -- but also in terms of its
annual operations. If you look at what's happened
here on this, this represents 1985 through 1995,
over the last ten years we have seen demand in terms
of the number of planes that are actually stored at
the airport increase, and we expect that by the end
of the planning period, which is represented in our
graph here as being 2015, over a 20-year time frame
we see demand growing, in terms of based aircraft,
up to about 280 planes from their current level.
Over that same time frame, historically, we've seen
activity at the airport grow, and we expect that
level of demand will continue to increase up to
about 128,000 operations by the end of that planning
period.

When we look at the kind of aircraft, the type of aircraft or the fleet mix as it's referred to, that we anticipate will be operating at the airport over the next 20 years, we really don't see a substantial change in demand in terms of the kinds of planes that are going to be operating at the airport. Almost 90 percent of the planes will continue to be small, single engine general aviation aircraft. About ten percent of the planes will be multi-engine, twin, small-type planes. We will have a few business jets. Business jets can operate at this kind of an airport in terms of facilities that it provides, but their operation is seen to be fairly limited over the planning period. The predominant kind of plane that we will be planning for in terms of the facility that we're looking at would be something similar to a King Air, and as I mentioned before, some occasional use by smaller, corporate business jet-type aircraft.

So when we look at facilities or the activity that we see happening over the long-term, we see that based aircraft will be growing from their current level of about 180 up to almost 280 by the end of the 20-year planning period. We see annual
operations -- and an operation is defined as either a takeoff or a landing, so these are -- need to be divided by two, if we're thinking about total trips in and out of the airport -- up to about 127,000 over that time frame.

In terms of the fleet mix, the kinds of planes that we see operating at the airport, again will continue to be the smaller, single engine planes that are out at the airport now, with some increase in -- moderate increase in terms of the smaller twins that would also be operating at the facility. And again, most of the traffic at the facility will continue to be what we call local operations. A local operation is defined within the aviation industry as an operation that takes place with inside of the actual air field. There's a considerable amount of training activity that takes place at the Airlake Airport, and, in fact, that's one of its designated roles within this system of reliever airports: it serves the entire metropolitan area to act as a training facility. And it actually has a training instrument landing system that's available for pilots to come in and practice instrument landings at that particular airport.

When we look at the facilities that will be
required to support this level of activity, there are several categories that we need to look at. We need to make sure there's adequate operational capacity in terms of the runway and taxiways' ability to process demand; we need to try to make sure that the airport is complying with all appropriate FAA safety and design standards; we need to look at the runway length and to make sure that that's appropriate for the kinds of planes that we see operating at the airport.

For this particular airport, because of the number of small planes that operate there and because of the wind coverage on the existing runway, there's also a need to look at whether there needs to be a crosswind runway in the long-term, and then, also, the level of storage facilities.

One of the primary projects that was examined in the update was related to the runway length at the airport. The plan that was adopted for the airport in 1989, actually recommended a runway length of 5,000 feet. With the current FAA design standards, this presents some additional challenges in terms of extending the runway at the Airlake Airport.

We basically looked at extending either to the
northwest or to the southeast. When we look at extending to the northwest, in order to get the 5,000 feet that were recommended in terms of an overall runway length in the previous plan, require about a 900-foot extension. Extending in this direction would not only impact Highview Avenue, but it would also impact the active railroad line that runs in proximity to the airport. If we look, then, at extending to the southeast, which is the other alternative, we would -- to put another 900 feet on the existing runway, we would end up impacting Cedar Avenue. So what we’ve adopted in this plan is a compromise, and we’ve recommended a 500-foot runway extension to the southeast towards Cedar Avenue. This runway extension does not impact Cedar Avenue. It would be accommodated within the airport’s existing land envelope, and it wouldn’t require any additional -- or any road closures or relocations to provide that runway length, and it would give the airport an overall runway effective landing and takeoff length of 46 hundred feet.

At this point I’m going to turn it over to Scott Sanders, also with Airtech. He’s going to talk about some of the more specific facility recommendations that came out of the study and some
of the environmental issues that we looked at in terms of addressing the airport's future needs.

MR. SANDERS: Thanks, Barb.

As Barb had indicated, one of the major projects that was part of the Comprehensive Plan was the recommendation for or looking at the recommendation of a longer runway, but along with that we looked at the FAA designed criteria that Barb had mentioned that need to be taken into account when you are planning facilities at an airport.

One of the first recommendations at the airport is, as those of you who are familiar with the airport, there's a slight jog in the taxiway on the north side; that should be straightened out so the entire taxiway is at least 240 feet from the centerline of the runway. For the type of aircraft operating at Airlake, that's one of the recommendations that the FAA has is have at least a 240-foot separation from a safety standpoint. On the given crosswind runway, it was justified based on the analysis of the wind conditions at the airport.

Another recommendation was to develop the south building area that's located on the southwestern
side of the airport. Those of you who looked at the exhibits we had over there, those are shown clearly. That’s a project that MAC has had on their boards for quite awhile and have actually initiated some of the preliminary layout work for that building area.

Widen the taxiways to 40 feet, that’s a MAC standard, and since they’ve taken over the airport, that’s something that MAC would like to do is get all the taxiways at a width of 40 feet, and that helps facilitate snow removal and it just makes the taxiway system that much better. Just for comparison, the FAA standard width for this type of airport is a 35-foot wide taxiway.

And finally, with the advent of GPS approaches -- and for those of you not familiar with those, GPS stands for --

MS. FRITSCH: Global positioning --

MR. SANDERS: Global positioning satellites, which is a system of satellites that are in orbit around -- or orbit around the earth that allow pilots or issues for a number of different transportation-related situations that would allow you to fix your position without having a true land-based system like the current IOS is that’s at the airport. That would be something that is
growing in aviation and that is something that it should be considered as part of an overlay for the existing approaches that are there at the airport.

In total, then, these recommended alternatives, as you can see, the runway extension that Barb had indicated, 500 feet, to get a total length, then, of 46 hundred feet at the airport, the building area, and straightening out of the taxiway for that 240-foot separation. The crosswind runway, again, is justified from looking at the wind conditions at the airport to help the smaller aircraft, the predominant users of the airport, that are very susceptible to those changes in wind conditions.

The driving factor behind the timing of a crosswind runway and its ultimate construction would really be an issue of cost, and the preliminary cost estimates for this project are something in the neighborhood of $1.9 million. So it's not likely that that would be a project that would occur any time in a short -- in the short time frame. It is something, though, that from a planning standpoint that should be maintained on the plan so that development can take place with the knowledge of there is a plan for a crosswind runway.

Along with that crosswind runway, that would
require a minimum land acquisition of about 80 acres
to accommodate the safety areas that Minnesota
Department of Transportation and the FAA require and
recommend be around a runway, and that's a minimum
land acquisition to accommodate those. If that land
was ever acquired, it's possible that, you know,
based on parcel sizes and making sure that unusable
parcels aren't left, it could be, you know, a
somewhat -- somewhat of a larger acquisition, but
that would be negotiated if the project ever was to
move forward.

Along with that extension or the construction
of a crosswind runway, a full environmental
assessment would have to be done as part of the
process of building a new runway, and that would
take into account issues to access. I know people
have expressed concern about the possible closing of
225 and other roads in the area that would be
required if the crosswind runway were put in, and
those would be looked at at such a time when it was
a bit more eminent.

Another part in the Comprehensive Plan was a
review of environmental issues that impact airport
development. These primarily focused on water
quality issues and issues related to noise. The
airport currently has several planning documents
that look at water quality and look at spill and
pollution prevention on the airport, and so those
documents were summarized in the Comprehensive Plan,
and MAC is currently in the process of going through
a system-wide environmental and water quality
analysis. And as those studies are completed, that
information then will be able to be dovetailed into
the analysis at Airlake.

MAC is also in the process of doing a
system-wide storm water and utility water and sewer
needs analysis, and that will be programmed
throughout the MAC reliever system, and so at some
point in the future that type of analysis then will
be available for Airlake Airport.

The Comprehensive Plan, you have noted that
those studies will be done in the future. Again,
the Comprehensive Plan reviewed, looked at drainage
on the airport wetlands, storm water, ground water,
waste water, and that's storm water on the Utility
Master Plan. Generally no problems were noted on
the airport from the existing documentation that's
been completed.

Noise contours were generated for the airport.
I'm using some standard methodologies that's been
approved by the FAA and by the Metropolitan Council that looks at -- that uses a computer program to generate noise contours for the airport. And these are, as you can see, they're contours around the airport that represent an average sound level called a day/night sound level -- it's called DNL -- and that's not the same thing, really, as a decibel level, that it's a particular noise level at any given time, but, rather, that represents a weighted average over a 24-hour period where aircraft that operate between ten o'clock at night and seven o'clock in the morning are given a ten time penalty. So one aircraft flying at night is equal to ten aircraft flying during the day, because they are perceived as being a greater nuisance and a more annoying occurrence in any environment.

Metropolitan Council requires that the noise levels out to this DNL concept of 55 DNL are generated. A DNL of 55 is -- represents a fairly quiet environment, and probably in this room was, before the presentation started, that might have been in a, just taking a guess, in a 55 DNL type of environment.

As you can see -- well, I don't know if you can see, but the noise maps over on the side will give LOGAN & STRYBICKI (612-291-1095)
everybody a better opportunity to look at that after
the meeting if they didn’t get a chance to look at
those -- most of the 55 DNL currently falls on the
existing airport property, and all of the 60 through
65 to 70 DNL contours are all on airport property.
The FAA recognizes 65 DNL as being an area that is
typically incompatible with residential land uses,
so that 65 DNL contour is all on airport property.
The 55 DNL extends slightly off of airport property.

The noise contour that was just up was the
current noise contour for 1995. This shows a 2015
contour with a single runway. As you can see, the
area that shows up in yellow is area that is outside
of the current contour, so you can see there’s just
a slight increase in the area that would be included
in that 55 DNL concept. And that’s something that
the Metropolitan Council, again, likes to have from
a landing’s planning standpoint to let people be
aware of the noise impact in those areas.

With the crosswind runway you can see that the
east-west runway is generally the same contour as
current situation, again with the crosswind runway
generating an additional noise contour that
obviously isn’t there today.

Just to wrap things up, the Comprehensive Plan
again says based aircraft will increase to about 280 airplanes by the end of the planning period which, again, is 2015. Operations will increase to somewhere in the neighborhood of 127,000 from about 75,000 currently. Runway 1129 could be extended by 500 feet for a total runway length of 46 hundred feet. Any additional extension is limited by the roads and by the buildings in the area. The airport is going through the process at some point, as part of the MAC process, of looking at airport sewer and water utility master plans. The crosswind runway is justified; however, when that would occur is based primarily on funding. And taxiway improvements in the building area will take place sometime in the fairly near future because there's a slightly higher priority than on extending the crosswind runway.

I'd like to turn it back over to the hearing officer.

COMMISSIONER DOWDLE: I just have one question. At MSP we're talking about Stage III aircraft --

COMMISSIONER LONG: Is your mike on?

COMMISSIONER DOWDLE: Sorry. We talked about Stage III aircraft versus Stage II. Is there any thought that the airplane design over the next
20 years is going to be any different, any noisier, any quieter than they are now or similar to what they are now?

MR. SANDERS: For general aviation aircraft, the jet type, the jet aircraft business jets are all moving into that Stage III area and are much quieter than their predecessors. With the smaller aircraft, like the 172 is a smaller single engine aircraft, the smaller twin engine aircraft, because of their piston engine capabilities, the newer ones may become somewhat quieter, but those aircraft are also typically used over quite a long time frame. So even over the next 20-year time period, there probably won't be a great change.

COMMISSIONER DOWDLE: The fleets are probably not going to change very much?

MR. SANDERS: Not dramatically, no.

COMMISSIONER DOWDLE: Before we take testimony, are there any questions on the presentation? Yes, sir.

VOICE: You're talking 18 years. Is that from start to finish or is there going to be some interim improvements or changes during this 18-year period? You're talking 2015.

MR. SANDERS: Right. The Comprehensive
Plan typically looks at a master plan, typically looks at a 20-year time period. That's what is looked at. They are updated periodically, though, throughout the process. Anything in the plan doesn't necessarily mean that it ever will be built: it just means that it's justified and there is a need for it today. And it doesn't mean that there are projects that could arise in the next 20 years that aren't foreseen at this time that could be built. That's a planning process. It's not a static and cast in stone type of process.

MS. FRITSCHEN: There will be -- I mean, this is not going to -- I mean, it's not like it's going to not all happen until the end of the 20-year period. Yes, things will start to happen. MAC has a capital improvement program that goes out, a detailed program for the next two years, and then the next five years they do have projects identified, not quite definitively in terms of what will happen, but, you know, as projects, you know, surface as being needed, you know. The recommendations that we have in the plan could be implemented over a 20-year period, but they will be, you know, they'll start now and they'll go on, you know, incrementally.
VOICE: That answers the question. What would be the first thing to happen, any idea?

MS. FRITSCH: In terms of what's on the --

MR. RYAN: I believe the first item that would happen would be probably the taxiway, and I guess in the longer run would be the building area. I think that's on the priority from the Commission --

VOICE: The crosswind runway, then, would --

MR. RYAN: I'm sorry?

VOICE: I said the crosswind runway would come at a later period?

MR. RYAN: At a later time, yes.

COMMISSIONER DOWDLE: At this point that's just indicating that it's justified but not -- it's certainly not funded at this point.

Let's take some -- hearing no further questions, let's proceed with any public testimony. I ask that any elected officials who want to speak speak first, and then we'll open it up to anyone else who has comments. Anyone who would like to comment for the record? No public officials? Anyone else who would like to comment for the
record?

MR. RYAN: Mr. Chairman, I just want to see if the secretary had anyone that had signed up. Has anybody signed up to speak? Apparently no one signed up.

COMMISSIONER DOWDLE: Okay. I assume that everyone is comfortable and understands the process. This will go from, as I indicated earlier, the record will remain open and anyone who has any written comments, they can certainly make those comments in writing, and the address was given to you. This will go to the Environment and Planning -- Planning and Environment Committee at MAC, and ultimately then to the full commission for approval, and the -- for the long range plan. And then funding, as those projects come up, for capital improvement, capital funding will be approved through that same process. So any other comments?

MR. RYAN: No. Mr. Chairman, I think if anybody -- like I said, the record has been opened, will be open for several more days, so if anybody wants to think about something and then send a letter in, certainly you're welcome then.

COMMISSIONER DOWDLE: To some of those new people who came, we're about to close the meeting.
Would anyone like to make a record, make a comment before we close? Okay.

If there's no further business, I want to thank you all for coming tonight, and if you have any comments, we'll be here for a few minutes and you can ask any questions, and I appreciate your participating in the process and being interested in the Airlake Airport. Thank you.

MR. RYAN: Thank you.

(Hearing ended at 7:35 p.m.)
STATE OF MINNESOTA)
)ss.
COUNTY OF RICE }

CERTIFICATE

I hereby certify that I reported the Metropolitan
Airports Commission Public Hearing taken on the 13th day
of November, 1996, in Lakeville, Minnesota;

That the hearing was transcribed under my direction
and is a true record of the proceedings of the hearing;

That the cost of the original has been charged to
the party who noticed the hearing, and that all parties
who ordered copies have been charged at the same rate for
such copies;

That I am not a relative or employee or attorney or
counsel of any of the parties, or a relative or employee
of such attorney or counsel;

That I am not financially interested in the action
and have no contract with the parties, attorneys, or
persons with an interest in the action that affects or
has a substantial tendency to affect my impartiality;

WITNESS MY HAND AND SEAL this 19th day of November,
1996.

Holly Nordahl, Court Reporter

LOGAN & STRYBICKI (612-291-1095)