

Citizens League Report

MAKE THE PRESENT AIRPORT BETTER - MAKE A NEW AIRPORT POSSIBLE

Prepared by
Airports Committee
John Cairns, Chair

Approved by the Citizens League Board of Directors
December 17, 1987

Citizens League
708 South Third Street
Suite 500
Minneapolis MN 55415
(612) 338-0791

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SUMMARY OF AIRPORTS REPORT

I. The metropolitan region should move now to find and acquire a new major airport site, in case Minneapolis/St. Paul International Airport (MSP) needs to be replaced.

Forecasts indicate the demand for air travel may outstrip MSP's capacity in the future. Acting now will lessen the risk of having to move the major airport far from a central location. A strategically located airport is important for the efficiency and convenience of travelers and businesses. A central site will also minimize any business dislocation that may occur.

- A. The Metropolitan Council should designate a search area for a potential new airport. The Council should take the lead on decisions about a new airport facility because it is in the unique position of balancing airport needs against other regional needs.
- B. The Metropolitan Airports Commission (MAC) should select, plan for, purchase and landbank a site for possible future use as the major airport.
- C. Between now and the time the actual site is established, the Metro Council should develop a model to analyze data on air travel demand and airport capacity. If this and other information indicates a new airport is not needed, the site purchase should be delayed. This information should be widely accessible to the public.

The factors that determine the demand for air travel and the capacity of the airport facilities are subject to quick changes. Questions remain about when MSP will reach its physical capacity.

- D. The Metro Council and MAC should use public dollars and airport user-fees for landbanking and the data analysis model.

The public's stake in the decisions about a new airport is high. Investing public dollars in these decisions improves the opportunities for ensuring the public's interest is served.

II. The MAC should take the steps necessary to allow use of Minneapolis/St. Paul International Airport (MSP) for as long as possible.

We do not recommend building a new airport unless it is absolutely necessary. Moreover, a new airport would require an enormous capital investment. However, the region should be willing to make such an investment to replace MSP if it is needed.

Because of MSP's strategic location for travelers and businesses, and because of the high costs of a replacement airport, the MAC should use the existing airport for as long as possible. However, some changes must occur to, first, make MSP more environmentally compatible with its surroundings and, second, continue its record as a safe facility even as air travel increases.

A. The MAC should maximize noise abatement efforts.

Even if the decision to build a new airport were made this year, the existing airport would be in use for a minimum of 10 to 15 years. The MAC's priorities in managing noise should be, to the extent possible, to direct noise toward areas with noise-compatible land uses, and to balance the residual noise among all communities around MSP. The MAC should:

1. Adopt and enforce its noise budget as an ordinance, if the negotiated noise budget agreements fail.
2. Extend runway 4/22 as planned and couple the extension with a redesigned preferential runway system to balance the distribution of the noise.
3. Expand the area within which sound insulation and home purchase assurances are provided.
4. Set airport user fees at a level sufficient to cover noise abatement costs not covered by federal funding. With the renegotiations of airline leases in 1989, MAC has a good opportunity to negotiate new local financing arrangements for noise abatement costs.

B. The MAC should develop an aggressive plan to phase-in the movement of most general aviation (GA) aircraft operations from MSP to reliever airports.

Diverting GA traffic will allow the airport to extend its use of the preferential runway system. Further into the future, the movement of GA to the relievers will allow MSP to handle safely the increased air carrier traffic expected then.

1. The MAC should impose significantly increased landing fees at MSP to induce general aviation to use reliever airports.
2. The MAC should continue to improve the reliever airports to attract general aviation traffic.

C. The Metropolitan Council should examine the possibility of charging significantly higher user fees for travel during the peak periods of the day.

Using price incentives to spread the use of the airport outside the traditional peak hours would extend its useful life while maintaining its safety.

MAKE THE PRESENT AIRPORT BETTER - MAKE A NEW AIRPORT POSSIBLE

I. The metropolitan region should move now to find and acquire a new major airport site, in the event Minneapolis/St. Paul International Airport (MSP) needs to be replaced.

The Metropolitan Council should designate a search area for a potential new airport. The Metropolitan Airports Commission should select, plan for, purchase and landbank a site, unless new information indicates these actions are unwarranted. To assist this process, the Metro Council should develop a model to analyze data on air travel demand and airport capacity. Public dollars should be used along with airport user-fees to pay for the landbanking and data analysis model.

A. The Metropolitan Council should designate a search area for a potential new airport and take the lead on decisions about a new airport facility.

1. The Council is in the unique position of balancing airport needs against other regional needs, unlike other agencies with authority that affects the airport system. (See appendix for list of agencies with jurisdiction over the airports and their various responsibilities.) By statute, the Council has the responsibility to decide whether new airports are needed in the region and to establish airport search areas. The Council has developed land use policy contours to reflect what land uses are compatible in areas around airports.

Because the Metro Council is charged with the planning and coordination of the metro region's development, it must weigh the competing needs of the region as the Council plans for highways and transit, sewers, parks, housing, air and water quality, and airports.

B. The Metropolitan Airports Commission (MAC) should select, plan for, purchase, and landbank a site for possible future use as the region's major airport.

1. While the need for a new airport has yet to be determined, action is needed now to lessen the risk of having to move the major airport far from a central location in the region, and to provide insurance against the risk that MSP will be incapable of handling our air transportation needs after the turn of the century.
 - a. Many indicators point to a demand in the future that may surpass current MSP capacities and force a move from a site that is strategically located. MSP has limited capacity for expansion.

- (1.) The Federal Aviation Administration (FAA) estimates that operations at MSP will increase 31 percent from 1985 to the year 2000, for a total of 476,000

operations. (A landing and a takeoff each constitute operations; therefore a complete landing/takeoff cycle is two operations.) (See appendix for the assumptions that underlie these and other demand estimates.)

2. The Metropolitan Airports Commission's (MAC) forecasts for future operations closely parallel the FAA's estimates. MAC's 1987 revised forecasts estimate that annual operations will increase 23 percent from 1985 to the year 2000, for a total of 479,000 operations.

Table 1
Operations Forecast for MSP
(in thousands)

	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>
FAA	362	426	454	476	-
MAC	390	424	452	479	509

Sources: "FAA Aviation Forecasts Fiscal Years 1987-1998," Federal Aviation Administration, Feb. 1987; "MSP Master Plan Update," Howard Needles Tammen & Bergendoff for MAC, January 1987.

3. The Metropolitan Council estimated for the 1986 Aviation Development Guide a demand in the year 1993 of 335,900 operations, and by 2003 of 418,000 operations for MSP. These estimates were made in 1983-84, and are therefore not as recent as the FAA and MAC forecasts.
4. The capacity of MSP is limited: MAC's latest estimate of capacity is 500,000 operations. If the original assumptions in the latest estimate of MSP's capacity were correct, MSP would reach capacity by the year 2005.
 - a. A MAC 1977 master plan for MSP, the latest estimate of MSP's capacity, projected that with specific improvements to the road access system, parking facilities and terminal facilities, MSP could accommodate about 35 million passengers, approximately five times the number of passengers in 1977. (This includes both connecting and originating passengers.) In the master plan the MAC estimated the airway capacity at about 500,000 operations yearly, given some operational changes.

An updated master plan for MSP is now underway and scheduled for completion by the end of 1988.

In the 1977 master plan the MAC analyzes: 1) highway access capacity, 2) landside-passenger terminal capacity, 3) airside and runway capacity, and 4) environmental impacts.

The 1977 plan assumed noise would decrease with time because of newer, quieter aircraft engines. It did not set an environmental capacity limit, although it did call for a plan to ameliorate the noise disturbance for existing residential areas. The 1977 master plan also assumed major capital improvements, including an addition to the existing passenger terminal.

- b. Changes since the 1977 master plan--In the 1977 estimate the MAC could not foresee the effect that hubbing operations would have on the airport facilities, nor did it anticipate the lower fuel prices that occurred. The hub and spoke system, spurred by deregulation of the airlines, has led to heavy growth in operations. The plan assumed more people would be flying in larger aircraft; although more wide-body aircraft are coming into use now, this did not happen to the extent expected.
5. FAA's estimate of capacity is similar to MAC's--The FAA, in its latest update of the Terminal Area Forecast and System Plan for MSP, forecasts the capacity of MSP in the range of 480,000 to 500,000 operations annually.

The Twin Cities is not on the FAA's "top ten" list of metro areas in critical need of further airport development, according to the FAA's Office of Aviation Policy and Plans. However, this region is identified as one of the 20 metro areas with a potential for routine and chronic delays in the future if action is not taken. Further, when the regional director of the FAA's Great Lakes region visited Minneapolis in the winter of 1986, he urged the Twin Cities to begin a new airport site study.

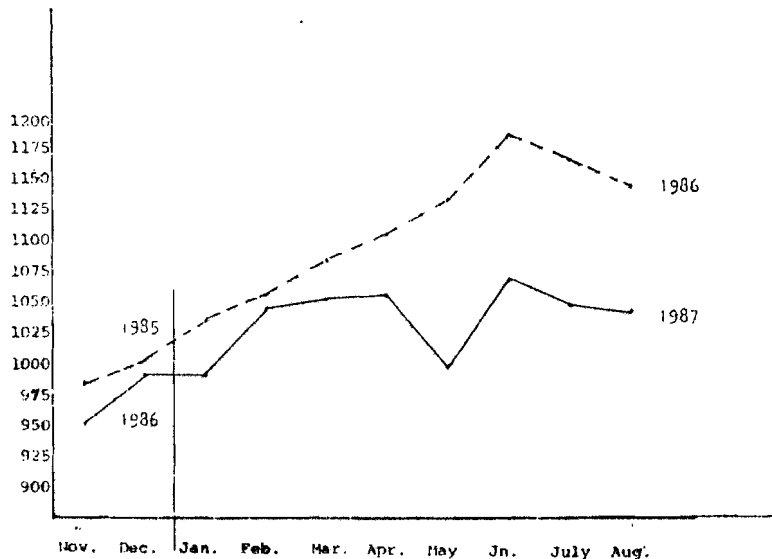
- a. Other metropolitan areas with even more critical capacity problems have also been identified by the FAA, and include Los Angeles, Chicago, Atlanta, Dallas-Fort Worth, New York and Denver. Some areas, including Chicago and the area around Los Angeles on the west coast, are exploring the option of building new airports, but have not yet decided to proceed. Some have begun planning runway additions or other capacity enhancements. Because of the interdependence of the major airports around the country, congestion at one airport can break down the flow of air traffic at others. The capacity of an airport is at least partially dependent upon the capacity of airports elsewhere.
- b. In 1986 MSP was ninth out of 22 major airports in terms of operations delayed: 3.9 percent of operations at MSP were delayed 15 minutes or more. (This is the equivalent of 39 delays for every 1,000 flights.) The median at major airports around the country was 3.2 percent. About two-thirds of these delays were attributed to weather problems.

(Delays under 15 minutes are not recorded, nor are delays which are caused by mechanical breakdowns, etc.; therefore, not all delay in the system is measured. Most delays are under 15 minutes in duration.) [2]

The Department of Transportation reported that for the month of September 1987, 85 percent of all major carriers' flight operations at MSP departed on time. The on-time departures at 27 major airports around the country that month ranged from 91 percent to 74.9 percent of operations. [3]

6. In the past year, the number of operations decreased even as the number of passengers increased. Largely because of the merger between Northwest and Republic in the fall of 1986, the number of operations at MSP in 1987 have declined relative to the previous year. (See graph 1.) Through the first 10 months of 1987, the total operations are 4.7 percent lower than through the same time span in 1986.

Graph 1
Average Daily Operations
at MSP
1986-1987

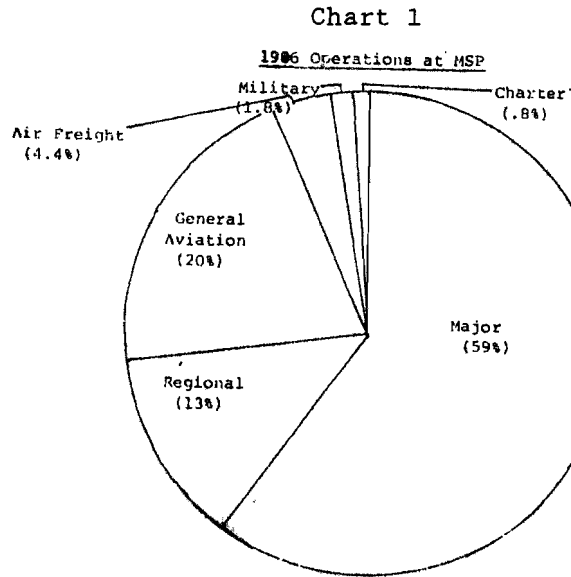


Source: "Operations and Noise Complaint Summary," Metropolitan Aircraft Sound Abatement Council.

However, as the number of operations decreased, the number of passengers increased. The total number of passengers (enplanements and deplanements) increased 5.9 percent for the first 10 months of 1987 over a comparable 1986 time period. Increased passenger loads explain how more passengers were accommodated with fewer flights.

Prior to the merger, operations growth increased fairly steadily. In the last four years operations at MSP averaged a 7 percent annual increase (following the air traffic controllers strike during which time the Control Tower operated under reduced hours).

- a. Most operations at MSP were by the major air carriers--Of all operations at MSP in 1986, about 59 percent were by major carriers, 20 percent by general aviation (GA), 13 percent by regional carriers, 4 percent by air freight, 1.8 percent by military, and .8 percent by charters. (See chart 1.)



Source: "Draft **1988 Operating Budget**," Metropolitan Airports Commission.

- b. Greatest growth at MSP was by regional carriers--In recent years military and charter operations have been declining as other types of operations have grown. The greatest growth at MSP has been by regional carriers which increased 61 percent from over 31,000 operations to nearly 51,000 between 1985 and 1986.
- c. As a result of the merger, Northwest accounts for about 80 percent of the air carrier operations at MSP. The number of average daily Northwest operations declined 17 percent between August 1986 (prior to the merger) and June 1987, according to MAC.

Northwest has significantly increased the number of passengers carried per plane (referred to as the passenger load factor). Through the first six months of 1987, Northwest's load factor has averaged 64 percent compared to a 58.6 percent load factor for the same time period in 1986, according to Aviation Daily.
[1]

7. The number of passengers boarding aircraft is forecast to increase--Both the FAA and MAC estimate that MSP will have approximately 15 million enplanements annually by the year 2000. Enplanements represent the number of passengers boarding aircraft, including those whose trip originated at MSP and those who connected to another flight. These estimates do not include passengers deplaning.
- a. The FAA projects enplanements will increase 94 percent between 1985 and the year 2000 at MSP in its aviation forecasts for fiscal years 1987-1998. (See table below.) This assumes steady economic growth and stable aviation fuel costs.
- b. The MAC's revised forecasts (January, 1987) for future enplanements are very close to those of the FAA. The MAC forecasts enplanements will increase 88 percent by the year 2000. A larger share of the future enplanements is expected to be connecting passengers, as opposed to people beginning their trips at MSP, according to the MAC's Master Plan Update.

Table 2

Passenger Enplanements Forecast for MSP
(millions)

	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>
FAA	7.468	10.244	12.654	14.476	-
MAC	7.42	10.273	11.980	13.96	15.34

Sources: "FAA Aviation Forecasts, Fiscal Years 1987 - 1998," Federal Aviation Administration, Feb. 1987; "MSP Master Plan Update," Howard Needles Tammen & Bergendoff for MAC, January 1987.

- c. In a technical report to the Metropolitan Council's Aviation Development Guide, enplanements are forecast to increase from 5.8 million in 1983 to 9.7 million in 1993, and to 14.5 million in 2003.
8. The Metropolitan Council is now studying the adequacy of MSP--In the 1986 Aviation Development Guide, the Metro Council did not call for a new major airport. But it did request the MAC to complete a long term comprehensive plan for MSP (and for the reliever airports in later years).

In 1987 the Metropolitan Council created a task force to analyze the long term adequacy of MSP. Its results are expected in late 1988.

Also, the Council agreed to analyze the needs for a new minor airport in northwestern Hennepin County. This analysis began in early 1987 and is expected to be completed around January, 1988. If this work determines a need for a minor airport, and that the current search area is viable, the MAC will be directed to assess the actual sites within the search area.

9. Some Minneapolis officials and residents have advocated alternatives to MSP--Because of ongoing aircraft noise problems and a concern about the number of operations at MSP, some Minneapolis officials and residents have advocated building a new airport.

In 1986 one Minneapolis city councilman requested that the Metro Council analyze the need for measures to relieve MSP, including a new airport. This request led to the Metro Council's long-term adequacy task force on MSP. At a January 1987 MAC public hearing on noise abatement proceedings, Minneapolis Mayor Fraser testified that the region needs alternatives to MSP.

Although the Minneapolis City Council has not yet acted on a new airport, the city's planning commission was reviewing a policy statement during the fall of 1987 for the city's comprehensive plan that called for consideration of alternatives to MSP. The policy statement will eventually go before the city council for review and approval.

A Minneapolis citizens' group calls for a new airport--The South Metro Airport Action Council (SMAAC) organized in 1985 in reaction to increasing aircraft noise from MSP. These residents of neighborhoods impacted by airport noise have called for a feasibility study to provide for a new airport, among other noise abatement measures.

10. If air travel growth is as great as some unconstrained projections suggest, it is likely that the existing site will reach capacity.

Many constraints inhibit reconfiguring the physical layout of the existing airport to improve its capacity. Not the least of these constraints is the land use around the site: dense residential areas, a national cemetery, and major roadways. For these reasons, expanding the current site seems infeasible.

Changes to the site within its existing boundaries are possible, but limited by space constraints. For instance, adding a parallel runway to the existing crosswind runway (runway 4/22) is constrained to the east by the existing terminal building. On the west, property limitations would permit only a short runway incapable of handling major air carrier traffic.

11. Not building a new airport poses potential costs to the region. If a new airport is not built in the Twin Cities, and the number of increased flights causes additional delays, those who rely on the airport (i.e., residents, airport users, and businesses) could face certain costs. As with the costs of building a new airport, the costs of not building a new airport (delay, risks of inconvenience, and economic loss) have not been quantified. The possible risks include the costs of delay to airlines, their passengers, other airline commerce, and businesses dependent upon the airport.

The disadvantages of aircraft noise pose significant local costs to the noise-impacted neighborhoods, albeit non-quantifiable costs. The potential health effects of constant noise, the disruption of daily activities and outdoor activities, and noise interference with church, school and other community activities, increase as the noise levels increase and are concentrated in localized areas beneath the flight paths.

- b. A strategic, central location for the airport is important to air travelers and business and is to the economic advantage of the region. Waiting to site a potential airport is undesirable because other development might preempt a strategic location. If a new airport must be sited far from the demographic and economic centers of the region, it lessens the convenience and efficiency for travelers and businesses that rely on the airport. A central location will also minimize any business dislocation that may result from a new airport.

Because the development and growth of the region is expected to continue, the convenience and efficiency of a centrally located airport could be lost if a new airport is necessary and we are forced to look far beyond the immediate metro area for a site.

- (1.) The airport has a significant impact on the region, in terms of jobs and economic vitality. It can be measured in different ways including the many jobs that are created, the dollar output of the airline industry, and the amount of personal income generated.

(a.) About 16,000 individuals are directly employed at MSP, about 1.4 percent of employment in the region. The airlines at MSP employ between 15,000 - 16,000 employees, and the MAC employs about 300 people.

(b.) The airline industry creates jobs outside the industry--For every airline job, a second job is created, according to a Minnesota revenue model used by the Department of Trade and Economic Development. The employment multiplier is 1.987, meaning 15,000 airline

jobs create a total employment of just under 30,000 jobs. (As a comparison, in the service industry across the state the multiplier ranges from 1.25 to 1.6 per job.)

- (c.) Airline industry output in the state is significant--The airline industry generates about \$154 million in output for every 1,000 airline jobs, or a total of over \$2.3 billion, according to the Minnesota revenue model which traces the interactions between Minnesota's airline industry and travel agencies, freight forwarders, ground transportation, and other related businesses.
- (d.) The airline industry in Minnesota generates income that is spent in the state--For every \$1 million in airline expenditures in Minnesota, the personal income generated is about \$64 million. (As a comparison, the non-electrical manufacturing industry, including computers, generates \$54 million in personal income for every \$1 million in expenditures.)
- (e.) Over 101,000 tons of freight, mail and express are flown out of MSP each year. MAC estimates this tonnage will continue to increase through the year 2005.

Table 3

Forecast of Freight, Express and Mail Tonnage at MSP

<u>Year</u>	<u>Tonnage</u>	<u>Percent Growth</u>
1985	101,426	--
1990	107,903	6.3%
1995	123,499	14.5%
2000	135,582	9.8%
2005	144,746	6.8%

Source: "MSP Master Plan Update," MAC, January 1987.

- (f.) Although estimates of the airport system's impacts on the economic health of the region differ, the impacts are significant.--In its 1986 Aviation Development Guide, the Metropolitan Council estimated the total economic impact of the aviation industry in the region at \$2.1 billion a year, with another \$1 billion contributed by the air passengers using MSP.

One FAA evaluation results in an estimated \$1 billion/year impact from MSP. [4]

The Air Transport Association estimated in January 1987 that the airline industry at MSP created an economic impact on the region of over \$3.3 billion annually. This estimate included payroll for airline employees, spending by employees, airline purchases, air travelers' expenditures, airline-paid taxes and fees.

What can legitimately be included in an estimate of the airline industry's local economic impact is debatable.

- (g.) Northwest Airlines has a particularly important impact in the Twin Cities--With about 13,300 employees, Northwest Airlines is the largest employer at MSP. Over 12,000 of these employees live in the Twin Cities and about 5,540 live near the airport.

Total payroll for Northwest Airlines employees is \$575 million, with a \$265 million payroll for employees living near the airport. [5]

- (2.) If a new airport replaces MSP, it could shift the economic costs and benefits for the local communities surrounding the current site. The extent of the local impacts is unclear.

- (a.) Although they have not quantified the impacts of the airport, communities around the airport perceive the airport as having a major benefit on local businesses.

- ([1.]) Bloomington has 7,000 hotel/motel rooms (more than Minneapolis or St. Paul) with business dependent in part upon air travelers. Additional construction of hotel rooms is planned.

- ([2.]) Eagan is the site of many firms which located there in part because of proximity to MSP, including Northwest Airlines corporate headquarters, UPS, and Cray Research.

- ([3.]) In recent years, the southwest quadrant of the metropolitan area has experienced a boom in office space growth. The area stretching along Interstate 494 from the airport westward to Highway 18 contains over 11 million square feet of office

space, second only to downtown Minneapolis. Between 1983 and 1985 the amount of office space there increased over 21 percent. [6]

- (b.) The redevelopment of the existing airport site could prove advantageous to the surrounding communities. Although discussion of how the existing airport land might be used if a new airport replaces MSP is speculative at this point, Denver's experience could provide some insight. New airport planning there includes plans for redeveloping the existing Stapleton airport with commercial, industrial, and residential uses. Because many of the hospitality businesses are located between the new airport site and downtown Denver, they will be able to compete for business by intercepting travelers heading downtown.
- (c.) Some development might shift from current locations toward the new site. It can not be predicted how much development around the new site will be net, new development in the region, or simply a shift to a different location in the region.

- C. Between now and the time the actual site is established, the Metropolitan Council should develop a model to analyze the data on air travel demand and airport capacity. If this and other information indicates a new airport is not needed, purchase of the site should be delayed. This information should be widely accessible to the public.

The data analysis model ought to include a risk analysis of the factors that influence airport capacity and demand. Further, the model ought to determine specific levels of activity or degrees of change which, when reached, would alert decision-makers to the need for action.

- 1. Many of the factors that determine the level of demand are dynamic and in flux over time. None of the analyses available today can react adequately to changing conditions in the market place, to technology, to the regulatory environment, and to the area at and around MSP.
 - a. Demand for air travel is elastic relative to the cost of the trip. Of all trip costs, fuel and labor costs dominate 23 percent and 40 percent of total costs respectively, according to Boeing estimates.

- b. The amount of air travel varies with economic conditions. Factors that will influence travel demand include the cost of the trip, world oil demand and production, discretionary income levels, and overall economic activity as influenced by interest rates, inflation, and budget and trade deficits. An increase in oil prices, for instance, could significantly change fares and affect demand for air travel.
- c. Population, employment, and personal income growth in an area are prime determinants of the demand for local air travel. Unexpected changes in these factors will affect demand for service at MSP.

Since 1980, the population of the Twin Cities region has grown by more than one percent annually, according to the Metropolitan Council. The Metro Council's latest forecasts for 1990 and the year 2000 are lower than those made in the late 1970s to reflect a national trend of a decline in growth rates.

Table 4

Percent of Estimated Growth in the Twin Cities Region

Population		Employment	
<u>1980-1990</u>	<u>1990-2000</u>	<u>1980-1990</u>	<u>1990-2000</u>
11%	4.8%	20.7%	8.8%

Source: "Metropolitan Development and Investment Framework," Metropolitan Council, 1986.

- d. Airport capacity and demand are functions of many factors.--To be reliable as possible, estimates of capacity and demand must include an analysis of at least the following factors and the interplay between them:
- technological changes in aircraft design affecting carrying capacity,
 - world economy impacts on air travel,
 - level of safe operations,
 - increases in capacity at other major airports in the U.S.,
 - regulatory changes affecting spacing of aircraft,
 - changes in travel demand resulting from economic factors, including landing fees or other user-charge increases that might affect peak hour travel,
 - fare changes resulting from additional costs of noise abatement, air traffic control equipment, or other costs,
 - demographic changes including population and personal income levels,
 - trends in number of operations and enplanements,
 - level of environmental capacity.

2. Questions remain about whether MSP will reach capacity, and by what approximate time period. Although several estimates of future demand at MSP have been calculated, the estimates cannot account for possible changes in the factors that affect demand. It is nearly impossible to pinpoint when the airport might reach capacity.

- a. Nearly twenty years ago the debate over the need for a new airport faded because of revised assumptions and operational changes--In the late 1960's, the Twin Cities area was involved in a debate over the need for a new airport. Assertions that a new airport was urgently required were changed after some growth assumptions changed, wider-body aircraft came into use, and some operational changes occurred at MSP.

At the time, a search for a new airport site commenced with considerable controversy over whether the site should be in the northern or southern part of the region, i.e., the Ham Lake controversy. People arguing against the northern site said a southern locale would provide the fewest flights over the most densely populated areas, and a more direct stop for the majority of flights which came in from the east, west, or south. The Metropolitan Council twice rejected the Ham Lake site suggested by the MAC. Following the rejections, the MAC decided not to pursue the matter further.

- b. The airport's capacity can be affected by technological improvements and operational changes. Certain procedures could alter the capacity at MSP without changing the physical characteristics of the airport or decreasing safety. Many of these changes would increase the number of landings and takeoffs attainable under poorer weather and visibility conditions (instrument flight rules) to that now attainable under good conditions (visual flight rules). Many of these changes are still under development. Some are listed below.

- (1.) Microwave landing system--The microwave landing system (MLS) is a guidance system for the approach and landing of aircraft. Unlike the standard instrument landing system in use today, the MLS would allow planes to fly any of several approach angles to the runway. One benefit of the MLS would be enhanced capacity resulting from approach paths that shorten the approach time or avoid air turbulence created by a preceding aircraft.

The extent to which a microwave landing system would benefit MSP has not been calculated. The FAA estimates that, generally, the benefits of such a system could range between a 10 and 15 percent improvement in capacity, depending upon how often instrument meteorological conditions occur at an airport. [7] Further, the system is at least 10 years away from implementation at MSP, according to Jeff Hamiel, executive director of MAC.

- (2.) Reduced longitudinal separation between aircraft on runway approach--The length of separation between aircraft on approach to a runway impacts that runway's capacity. In a simplified example, reducing the separation between aircraft approaching at the same speed (120 knots) from 3.0 miles to 2.5 miles would increase runway capacity 20 percent, according to the Industry Task Force on Airport Capacity Improvement (1982).

In 1986, the FAA reduced the distance required between aircraft on the final approach to a runway from 3 miles down to 2.5 miles, under conditions of restricted visibility. Using a reduced standard would allow more planes to land in a shorter amount of time.

Only those airports where aircraft leave the runway in 50 or fewer seconds can apply to use the reduced standard. The MSP control tower has not applied to use the reduced separation standard because the average runway occupancy time has averaged over 52 seconds in the past year. Representatives of the air traffic control tower estimated that up to 10 percent more flights could be accommodated per hour if the new standard were to be used.

- (3.) Parallel runway separation--The FAA is studying the reduction of a standard that now requires a 4,300 foot separation between parallel runways for independent instrument approaches. (The distance between the parallel runways at MSP is 3,380 feet.) Such a reduction would permit simultaneous approaches to the parallel runways at MSP. Allowing simultaneous approaches would bring the throughput attainable under instrument flight rules closer to that reached under visual flight rules. This could allow up to 70,000 additional operations per year, according to the 1977 Master Plan.

In its estimate of capacity at MSP, the 1977 Master Plan assumed the standard would have been changed by 1995 to allow simultaneous approaches to the parallel runways under instrument flight conditions.

- (4.) Improved aircraft guidance procedures--Improvements to aircraft guidance and communication systems can enhance an airport's capacity. Many technological advancements are currently being researched and tested. [8] These include:

- Low level wind shear alert systems--Such a system would monitor winds and alert pilots when hazardous conditions exist.

- Runway visual range equipment--This equipment would allow aircraft to operate at lower minimum altitudes because of more precise knowledge about visibility conditions on the runway in poor weather.
- Terminal radar enhancements--Improved radar technology can reduce delays by increasing automation. The automated radar terminal system is being designed to maintain capacity at acceptable levels as demand increases.
- Mode S data link--This technology will provide improved data communications between the aircraft and the ground.

- (5.) Passenger load factors--The average number of persons per plane affects the number of takeoffs from an airport. As mentioned earlier, Northwest's average load factor increased after the merger, reflecting a more efficient routing of passengers and fewer operations than those provided by Republic and Northwest together.

Load factors have generally increased across the airline industry in 1987. The FAA estimates the domestic load factor will decline slightly from 60 percent in 1987 to 59.2 percent in 1989, and then increase gradually to 63.1 percent in 1998. [9]

- (6.) Airline mergers--As airlines merge, their operations change, sometimes resulting in fewer operations and thereby freeing up airport capacity. Of course, Northwest's merger held the most significant impact for MSP. Although some effect might be felt at MSP from other airline mergers, the extent of that impact is unknown.
- (7.) Average aircraft size--Larger aircraft can mean more passengers carried per plane and fewer operations at an airport. The FAA estimates a 177 average seating capacity for aircraft in domestic service by 1998, up from today's average of 153 seats.
- (8.) Substitution of telecommunication for air travel--Although the growth in telecommunications has already been significant and is expected to continue, its effects on air travel have not been noticeable. One airline industry analyst said even though local companies have expressed a need in the past to cut travel for budgetary reasons, the decreases have not been evident.

- (9.) Technological improvements in aircraft, including vertical takeoff aircraft--Aircraft design and material production have the potential to affect airport operations. For instance, research into materials that provide reduced drag on the plane, and therefore increased lift, could allow a plane to carry heavier loads or reach altitudes more quickly.

Now under development are aircraft with the capability to lift off the ground like a helicopter, and then proceed in flight like a jet turboprop. These craft, also known as tiltrotors, have propellers that actually shift from a vertical to a horizontal position after takeoff. Such craft would not have to be mixed into the regular, fixed-wing aircraft utilizing the runways. Although the technology has already been tested, the FAA expects the greatest use of tiltrotors would be in feeder situations where 30 to 40 seat aircraft are used.

- (10.) Change in the share of passengers that begin their trip at MSP--In large part because of hubbing, the share of passengers using MSP to connect with other flights has increased in recent years and is expected to continue. Today more passengers use MSP to begin their trips than to connect with other flights. In 1985 about 55 percent of enplanements originated their trip at MSP, and 45 percent connected with other flights, according to the MAC's Master Plan Update. This is forecast to reverse by 1990: 53 percent connecting passengers, and 47 percent originating passengers.

D. Because the public (i.e., non-airport user) interest must be served, the Metro council and MAC should use public dollars and the traditional user-fee revenues in the work leading up to and including the purchase of land for a replacement airport. This includes the data-analysis model, the actual purchase of land, and other actions leading up to the land acquisition.

1. Public dollars are appropriate because the public stakes are high in the decisions regarding where the search for an airport site takes place, what its impacts will be, and whether or not a new airport should be built.

Investing public dollars in these decisions improves the opportunities for ensuring the public's interest is served.

- a. Typically, revenues for capital expenses at MSP are generated by user fees, grants, and the MAC's bonding authority. The MAC is currently not levying public tax dollars.

Capital projects in 1987 totaled \$102 million. For 1988 the capital improvement projects for MSP are estimated to total \$116.6 million; improvements at the reliever airports add another \$9.8 million for a total of \$126 million in capital improvements. Financing sources for the capital projects are:

- (1.) funds from internal operations (53 percent of total capital financing in 1987);
- (2.) general obligation revenue bonds (24 percent of the total);
 - (a.) Bonding authority is limited by the state Legislature. Bonds are backed by MAC revenues and the authority to levy taxes on the assessed valuation of the seven county area.
- (3.) State and federal grants (24 percent of the total). (See appendix for detail on state and federal financing.)

If only the traditional user fees are used, the incentives to proceed with searching for a site might be different than if public dollars are also invested. The major tenants of the current airport might not view it in their best interests to pay for the planning and site acquisition of a new airport because such steps could ultimately lead to additional airline competition at the new site. Public dollars would help ensure the public interest is served.

- b. MAC has the authority to levy up to one-twentieth of a mill on all property in the metropolitan area for the debt service on its general obligation financing projects. The MAC has utilized user fees since 1969 for this purpose and has not levied property taxes since that date.
 - (1.) Bonds have been underwritten with the full faith and credit of the tax base of Minneapolis and St. Paul up to 1974. After 1974, the tax base was expanded to include all of the metropolitan area. From 1944 to 1969, a total of \$19.8 million in taxes from Minneapolis and St. Paul were used for the debt service on general obligation bonds, according to MAC.
 - (2.) Land grants from Minneapolis, St. Paul (at the direction of the Legislature) and the federal Veterans Administration in part allowed the construction of Wold Chamberlain on its existing site. The MAC purchased additional land from the city of Richfield and other landowners.

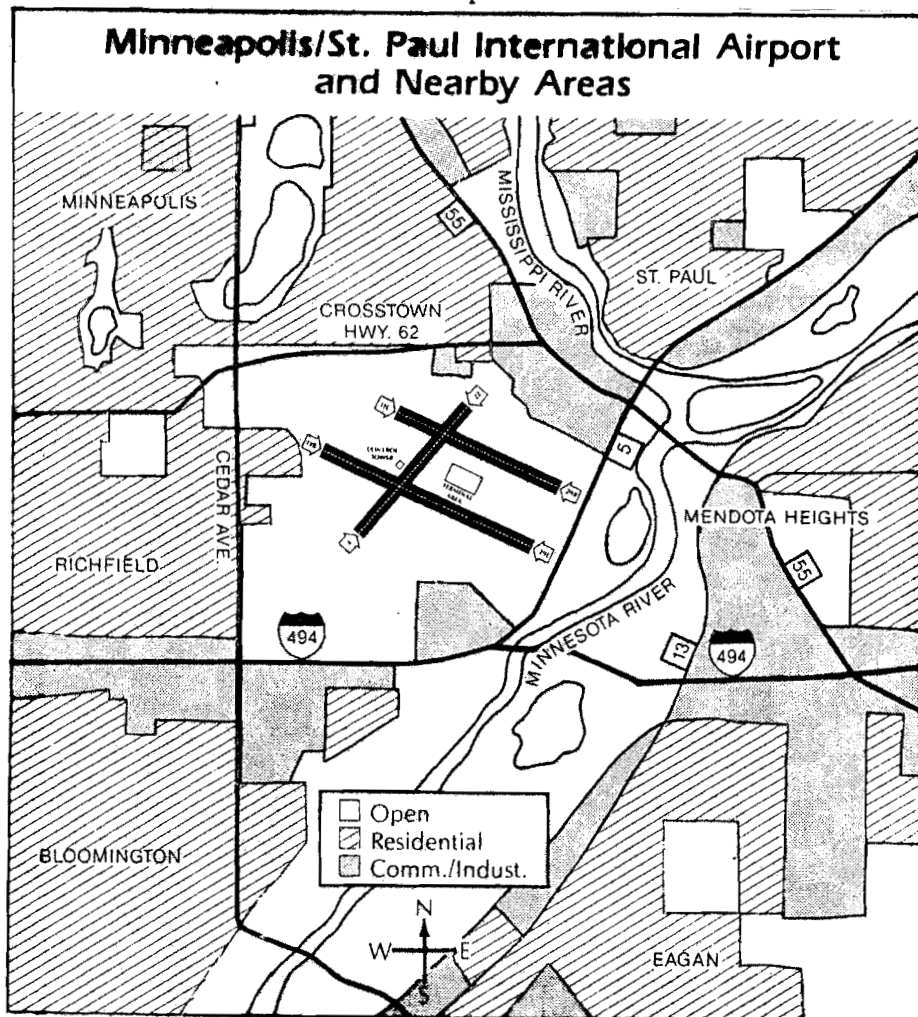
- c. MAC has the authority to levy up to one-third of a mill on all property in the metropolitan area for operating and maintaining the metropolitan airport system, but has not used the levy for years. This offers the revenue potential of about \$5.5 million, in 1986 tax dollars.

Although considerable local public financial support was used in the early development of the airport system, user fees have generated operating revenues since 1969. Property taxes from Minneapolis and St. Paul paid for a total of \$2.9 million in operating deficits from 1944 to 1961.

II. The MAC should take the steps necessary to allow use of MSP for as long as possible.

MSP is centrally located in the region. MSP is convenient to air passengers, airport employees, and businesses dependent upon the airport. Unlike many airports in other major cities, and to the substantial advantage of the Twin Cities, MSP lies in the heart of our metropolitan area's economic and population centers. (See map.)

Map 1



Source: "Airport Fact Sheet 103," Metropolitan Aircraft Sound Abatement Council.

We do not want to build on the new site to replace MSP unless it is absolutely necessary. Moreover, building a new airport will require an enormous capital investment. (See appendix for potential capital requirements.) However, the region should be willing to make the investment to replace MSP with a new airport if it is needed.

Because of MSP's strategic location for travelers and businesses, and because of the high costs of a new replacement airport, the MAC should take steps to allow the use of the existing airport for as long as possible. However, some changes must occur: first, to make MSP more environmentally compatible with its surroundings, and second, to continue its record as a safe facility even as air travel increases.

The necessary steps are maximizing the abatement of airport noise, diverting much of the general aviation traffic from MSP to reliever airports, and examining the possibility of managing demand at the airport through charging different user fees.

A. The MAC should maximize noise abatement efforts.

Even if the decision to proceed with a new airport is made within the next several years, the existing airport will be in use for a minimum of ten to fifteen years while the MAC is searching for the site, gaining the required permits and approvals, planning, and constructing phases of the new airport.

The MAC should distribute aircraft noise in such a way that:

- to the extent possible, the noise affects areas with noise-compatible land uses, and
 - the residual noise burden is better balanced among all communities surrounding the airport, given limitations of wind, traffic load, runway configurations, and safety. Because of weather constraints and the use of the parallel runways during heavy traffic times, distributing the air traffic so that all communities receive the same level of noise would be impossible. However, some changes can be made to lessen the imbalance.
1. The MAC must ensure that if the negotiated noise agreements are violated, the noise budget ordinance is enacted and enforced.
 - a. The noise budget abates noise by providing incentives for carriers to use quieter aircraft. The noise budget resulted from a 27-point noise abatement plan approved by MAC in 1986. The Governor had called for such a program following the recommendations of a 1985 Governor's Task Force on Airport Noise.

Specifically, the noise abatement plan established a working group to evaluate the feasibility of a noise budget for MSP. A noise budget was thought to be a way of reducing the number of noisy aircraft using MSP. This group recommended setting a cap on the level of aircraft noise by the scheduled air carriers. Noise levels emitted in 1984 were set as the goal.

Under the provisions of the original noise budget, noise energy levels would have to be reduced initially 18 percent from August 1986 levels. A second reduction of the allowable noise in 1990 would produce a total of 22 percent noise reduction.

The noise budget allows airlines to continue or increase the number of their operations, as long as they meet the budgeted noise amount. That is, they can fly less noisy planes and actually increase the number of flights at MSP if they choose to.

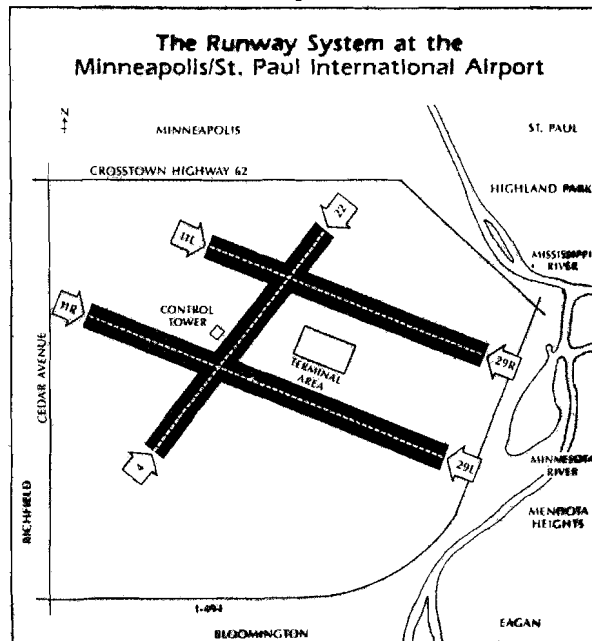
- b. Instead of enacting the noise budget as an ordinance, the MAC voted to negotiate with the airlines for voluntary compliance. MAC has reserved the option to enact the noise budget as an ordinance, should the voluntary agreements fail. MAC commissioners also changed the noise reductions to an 11 percent initial reduction and a 24 percent total reduction.
- c. Effectiveness of negotiated noise budget--The MAC has calculated an 18 percent reduction in noise levels between August 1986 and October 1987, through a complicated formula. [10]

Only Northwest has been able to meet its budgeted noise level consistently. But because Northwest accounts for so many operations at MSP, the airport's total budgeted noise level has been met each month since June 1987. Texas Air Corporation has also met its budgeted noise levels most months, but the remaining airlines have exceeded their budgeted amounts most months.

- d. The amount of the noise reduction is disputed. The airport does not measure the actual noise emitted by each plane to determine if an airline has met its budgeted noise level. In the calculation of the average daily noise energy for the airport, a certain noise level (measured in EPNdBs) is assigned to each type of aircraft. In this way all aircraft of a certain type, 727-100s for example, theoretically emit the same level of noise. Because actual noise levels are not measured, some people argue the true levels of noise reduction are not known.
2. The Metropolitan Council should approve, and the MAC proceed with, extending runway 4/22 to the southwest. MAC should couple the extension with a different preferential runway system which balances the distribution of the noise among all communities, to the extent possible.
- a. The preferential runway system was designed in 1968 to route airplanes in such a way that the noise would be shifted away from the most heavily populated areas. Adhering to the preferential runway system, or PRS, was another key element of the MAC's 27-point noise abatement program. The PRS was implemented fully in 1971.

When in effect, the PRS channels the heaviest traffic on priority runways. Under PRS, flights arrive and depart on the parallel runways from the southeast over Eagan, or from the southwest over Bloomington. (See map.) This tends to relieve noise for the populations in South Minneapolis and Highland Park, and increase noise over Eagan/Mendota Heights, and Bloomington.

Map 2



Source: Metropolitan Aircraft Sound Abatement Council.

The PRS is only useful during periods of moderate traffic levels, and under certain weather conditions.

- b. To complement the design of the original preferential runway system, the cities of Eagan and Mendota Heights planned commercial and industrial land uses for the land beneath the flight tracks off the parallel runways. Their plan was to develop only noise-compatible developments beneath the flight tracks, realizing that most of the airport's traffic would be directed their way.
- c. The PRS is less effective today in managing noise because it is infrequently used. Mostly because of high traffic levels the PRS has only been in effect an average of three hours during the day between 6:00 a.m. and 11:00 p.m.

If the number of flights exceeds 50 per hour, the air traffic control tower will abandon the routing called for by the PRS. Excessive winds can also limit the use of the PRS. Up to 1982 the PRS was used frequently except during the peak hours of 8:00 to 9:30 a.m. and 4:00 to 7:00 p.m.

- d. Increasing the use of PRS can be accomplished by extending runway 4/22, but generally at the expense of residents located near the southern end of that runway. One way of approximately doubling the usage of the PRS, according to MAC, is extending the crosswind runway 4/22 to the southwest, so its operations do not conflict with those on runway 11 left.

However, extending the runway might exacerbate the noise problem off the southwestern end of runway 4/22. Relatively few aircraft are directed over Highland Park in St. Paul because of the priority given to other runways in the PRS, and in part because of wind conditions.

For instance, in June 1987 only 0.4 percent of the airport's scheduled takeoffs and 0.3 percent of the scheduled landings were to the northeast over St. Paul. (See table below.) On Runway 4/22's southern end, Bloomington received 10.2 percent of the scheduled takeoffs, and 4 percent of the scheduled landings.

Another concern voiced over the runway 4/22 extension is the timing and duration of the construction. Residents in the noise-impacted neighborhoods advocate having the construction done in as short a time period as possible to minimize the length of time the runway will be out of commission.

MAC's proposal to extend runway 4/22 by 2,750 feet has been on MAC's agenda for many years. An environmental assessment of the extension is now being done by the MAC. The Metro Council decided against approving the extension until the master plan for MSP has been completed.

- e. Efforts are underway to redesign the PRS. A task force of the Metropolitan Airport Sound Abatement Council (MASAC) was working through the summer and fall of 1987 to redesign the PRS in a way to redistribute noise more equitably. With the help of the FAA this task force determined what percent of operations each runway could hold, given wind constraints and traffic patterns. The following table depicts for June 1987 what the actual runway usage was and what it could have been under a different PRS.

Table 5

Actual and Potential Use of MSP Runways
June, 1987

<u>Runway</u> <u>Configu-</u> <u>ration</u>	<u>Actual</u>		<u>Potential</u>	
	<u>% of</u> <u>Scheduled</u> <u>Takeoffs</u>	<u>% of</u> <u>Scheduled</u> <u>Landings</u>	<u>% of</u> <u>Scheduled</u> <u>Takeoffs</u>	<u>% of</u> <u>Scheduled</u> <u>Landings</u>
Over Bloomington	10.2	4.0	8.5	9.5
Over St. Paul	0.4	0.3	4.0	5.5
Over Mpls.	41.2	38.6	36.5	35.0
Over Eagan	48.2	57.1	51.0	50.0

Source: "MSP Runway Usage Maps," Metro Aircraft Sound Abatement Council, September 22, 1987 meeting.

In addition, an ad hoc group spearheaded by Minneapolis Councilman Steve Cramer proposed a distribution of traffic that would distribute five percent of operations over St. Paul, 15 percent over Bloomington, 25 percent over Minneapolis, and 55 percent over Eagan. This distribution did not take into account limitations that might be caused by wind direction and other weather considerations.

- f. The corridors of noise-compatible land uses planned by suburbs to the southeast of the airport are not consistently used. The cities of Eagan and Mendota Heights have planned land uses that are compatible with aircraft noise under the flight tracks of planes using the parallel runways. However, not all planes have been following these flight tracks and residential areas have suffered from the resulting noise.

MASAC also designated a subcommittee to analyze this problem and propose solutions. The subcommittee was continuing its work through the fall of 1987.

3. The MAC should extend its recommendations for home purchase assurances and sound insulation to noise-impacted homes and public buildings beyond the area now designated for such efforts (delineated by the Ldn 65 contour). (See noise exposure map.) These areas are not eligible for the federal funding available for noise abatement. Currently, MAC has no plans for noise abatement measures in these areas.
- a. The noise insulation program developed by the MAC in 1987, was part of a "Part 150 Plan" which details a comprehensive set of noise abatement strategies. "Part 150" refers to Federal Aviation Regulation 150 that outlines a process for noise compatibility planning at airports. The MAC is now awaiting review and approval of the plan by the FAA. Part 150 studies are required if airports wish to be eligible to receive federal dollars for noise abatement programs.

The Part 150 plan proposes a variety of strategies for abating noise and for managing land uses around the airport. (See appendix for partial listing of Part 150 noise abatement and land use management strategies.)

- b. MSP's total Part 150 program totals about \$71 million, the majority of which is expected from the federal government. However, federal dollars are not available for noise abatement beyond the Ldn 65 contour. MAC is eligible to receive up to 80 percent of the financing from the federal government, although this amount is not guaranteed. (Administrative costs are not included in the cost estimate.)

- (1.) Soundproofing of homes and providing purchase assurances are the most costly of the Part 150 proposals. This strategy includes soundproofing homes and providing purchase assurances. Soundproofing will be done at public expense in exchange for avigational easements on the property. The purchase assurance program is for individuals who are unable to sell their homes and find soundproofing to be inadequate. In these cases the MAC will purchase, soundproof, and resell the homes.

This strategy is estimated to cost \$60 million, with about half for soundproofing and half for the purchase assurance program. The approximate number of dwelling units is 5836. The MAC estimates that about two-thirds of the single-family residences and all multi-family residences in the affected area would be soundproofed, and 35 percent of single-family residences would prefer purchase assurances.

Soundproofing buildings only alleviates the noise problem to the extent persons remain indoors. It is viewed as a partial remedy, but not a solution to the noise problem.

Nonetheless, many homes are expected to be soundproofed. With the increasing concern about radon concentrations in airtight houses, care is needed so that ameliorating one environmental problem does not produce another.

- (2.) Although some buyout of properties is proposed, it is expected to be minimal. Buyout is considered a last resort and will occur only if the action is initiated by the affected community and the owners are willing to sell. The properties bought would be cleared and used as buffer or developed with noise compatible uses.

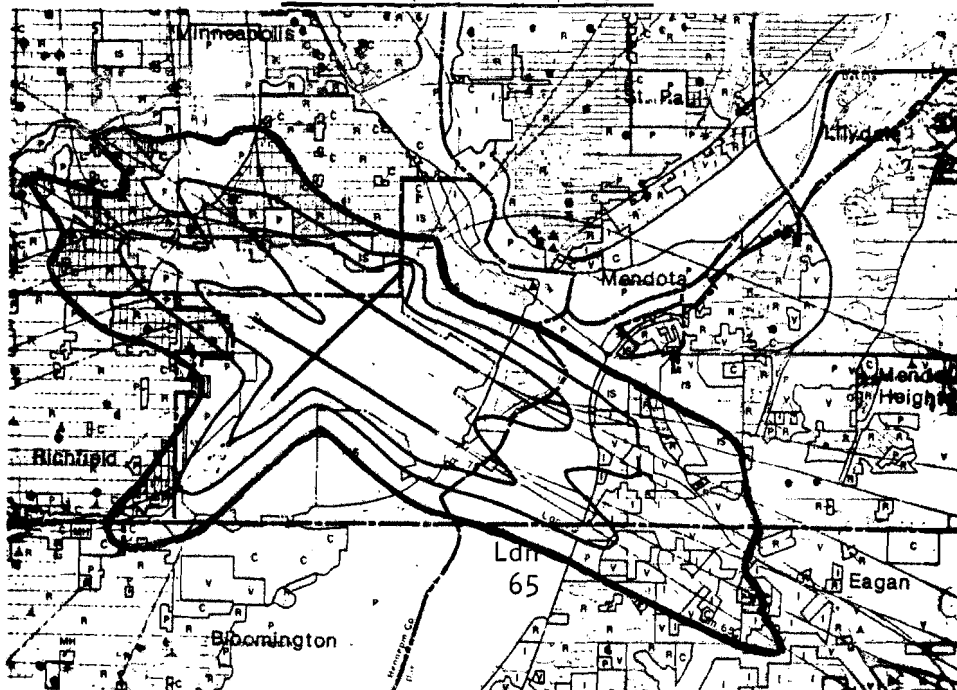
The estimated cost of buying out homes ranges from \$86,000 to \$104,000 per residence. This strategy will be principally aimed at the most severely noise-impacted area (within the 75 Ldn contour). The Ldn contours are boundaries which designate the gradation of the noise impact in areas around MSP. (See map.) (The 75 Ldn contour includes homes receiving very severe noise impacts. The 70 - 75 Ldn contours include areas with somewhat less but still very strong noise impacts.)

If all homes in this area are bought, the cost could range from \$1.8 million to \$2.3 million. (The cost estimate does not include costs for the many homes outside the 75 Ldn.)

- c. Implementing the strategies in the Part 150 plan will reduce the number of people severely affected by aircraft noise. The MAC estimates that the total number of people residing within the 65 Ldn (an area which includes the people receiving the greatest noise impacts) will decrease between 1987 and 1992 by 26 percent, from 18,500 to 13,600 people. Further, the measures could prevent the development of 450 new dwelling units in areas that are not noise-compatible. Corrective measures are expected to improve the compatibility for about 5,800 dwelling units.

Map 3

Noise Exposure Map 1987



Bold line delineates 65 Ldn contour.

Source: "Draft Part 150 Submittals," MAC, April, 1987.

This would result in part from Part 150 strategies, and in part from operational changes that are expected to occur regardless of the Part 150 study, e.g., turnover in aircraft fleet to quieter planes. By 1992 the MAC estimates that the number of people residing in the most severely noise impacted area, commonly referred to as the area bounded by the 75 Ldn contour, will be reduced about 75 percent, down to 53 people.

- d. Federal funding for Part 150 strategies is limited to only some of the noise impacted neighborhoods. According to federal regulations, only areas within the 65 Ldn line are eligible for federally-funded noise abatement money. However, in Bloomington, Richfield and particularly in Minneapolis many noise-impacted residents live outside the 65 Ldn line.
- e. The cost of extending sound insulation and purchase assurances beyond the 65 Ldn boundary will depend upon the number of households that want to participate. In the Southwest and Nokomis communities in Minneapolis, over 15,000 and 13,000 dwelling units are single family units, respectively. [11] It is unknown how many of these households are impacted by airport noise, nor how many more households in other communities would be affected.

Soundproofing is estimated to cost an average \$8,000 per single family dwelling unit and \$4,000 per multifamily dwelling unit. The cost of purchase assurances ranges from \$103,000 to \$159,000. Some of this cost would be recouped upon resale of the home.

- 4. The MAC should set airport user fees at a level sufficient to cover noise abatement costs not covered by federal funding. The user fees could include any of the sources of revenue now generated for operating MAC airports. Local, public tax dollars should not be used for noise abatement purposes.

The users of the airport should be responsible for the cost of programs to abate the noise created by the airport.

- a. Airport user-fees consist of: concessions, terminal rental fees, and air traffic landing fees. (See chart 2.) In its 1988 budget for operating the airport, MAC estimates these user fees will generate revenues of \$62.5 million. MAC estimates \$54.0 million in expenses, with an excess of revenues over expenses equalling \$8.5 million. The excess is applied toward debt service payments and construction program financing.

- (1.) Concessions--Concession revenues consist mainly of parking revenues and rental car revenues, but also come from food, drink and other personal services. All concession revenues account for over 40 percent of the estimated annual operating revenues for 1988.

MAC contracts with a parking lot operator to operate the parking facilities and receives 100 percent of the parking revenues after paying the parking employees and a management fee. Auto parking produces 67 percent of total concession revenues.

The car rental companies are charged for their ticket counter space, the ground space for the cars, and the "ready car spaces" outside the terminal building where customers pick up their rented cars. In addition the rental companies submit a guaranteed bid to MAC for operating at the airport, and pay a percentage of their gross receipts for any amount of earned revenues over this bid. Auto rentals produce 17 percent of total concession revenue.

Food, news, and gifts concessions make a minimum bid for operating at the airport, and pay a percentage of their gross receipts for any earned revenues over this bid.

- (2.) Terminal rental fees--The terminal building is rented to airlines at a certain cost per square foot, ranging from about \$13 to \$19. The space includes ticket counters, baggage area and office space. This does not include the public space like the hallways, restrooms, and staircases; MAC is responsible for the public space. Separate agreements exist for the Green and Gold concourses which were constructed for specific airlines. Terminal rental revenues account for over 34 percent of 1988 operating revenues.
- (3.) Air traffic landing fees--Air traffic revenues come from landing fees and ramp fees, which together account for 22 percent of total 1988 operating revenues.

Each year the MAC calculates a landing fee based on the costs of operating the airfield and runways and the expected landed weight of the aircraft. The costs include a certain amount for the police, fire, administration, maintenance, and other services that can be attributed to the airfield. In 1988 MAC will charge \$.56 per 1,000 pounds of landed weight. This is the equivalent of about \$80 for a 727 aircraft, according to MAC. Landing fees are expected to generate 18 percent of total operating revenues for 1988.

Landing fees of \$.52 per thousand pounds at MSP in 1985 were slightly below the average landing fee of \$.59 found at eleven similar airports around the

country. [12] MAC's determination of the landing fee is similar to the process of setting such fees at other large airports around the country.

General aviation and military carriers are also charged but at a different rate and on a different accounting system than the major airlines; GA landing at MSP pays \$.60 per 1,000 pounds of landed weight to one of the fixed-base operators which contracts with MAC for space at MSP.

MAC calculates ramp fees by estimating the terminal ramp expenses and dividing them by the lineal feet of ramp available. This covers the aircraft parking areas located adjacent to the terminal building concourses. The \$204.48 per lineal foot for 1988 will generate three percent of total operating revenues.

- (4.) Miscellaneous operating revenues--MAC also receives revenues from billing for utilities it provides to the airport users. Utilities account for 1.4 percent of 1988 revenues. Finally, MAC's miscellaneous revenues account for 1.7 percent of operating revenues.
- b. Current lease arrangements could limit the extent to which MAC charges airlines for the local share of noise abatement costs. Any major additions or changes to the noise abatement program must be negotiated with the airlines. The airlines have the right to review and approve any project in excess of \$100,000 per project or over \$600,000 per year overall. This veto authority has not been used to date. The MAC has the option of making noise abatement costs a separate charge, with the intention of defining the specific costs of noise abatement and generating a source of revenue to cover airport noise abatement expenses. (See appendix for additional details on financing the operations of MSP.)
- (1.) As a result of the lease agreements between the airlines and MAC, airlines' landing fees pay only for the cost of operating the runways. MAC expenditures for noise abatement are not a separate item for which revenues can be readily increased when needed. Currently, MAC rolls the expenditures for noise abatement into the costs of the runways.
 - (2.) Parking fees and other concession revenues pay for operating and maintaining the public spaces in the terminal building, roadways, parking lot areas and other airport space. Airlines pay terminal rental fees for the space they occupy and the carousel and baggage areas.

- c. Because airline leases at MSP expire in 1989, the MAC has the opportunity to negotiate new local financing arrangements for noise abatement costs.

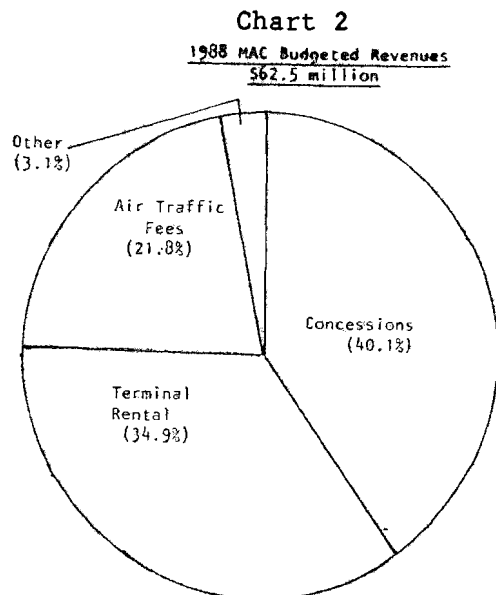
- (1.) Airline leases for use of the airfield and terminal building that MAC negotiated in the mid-1960s

expire in 1989. In any new agreements negotiated, the MAC should insist that a significant amount of noise abatement costs is provided.

Interim negotiations for renewing the leases with airlines occurred in the late 1970s in anticipation of lease expirations in January, 1989. At that time MAC did not propose coverage of noise abatement, but rather that the new agreement allow MAC to set airline terminal rentals at a rate that, when added to other terminal building rentals, would pay for the costs of the public space in the terminal building. Currently, public space expenditures are paid for with concession revenues.

MAC also proposed that landing fees be set so that MAC would have full recovery of all costs of the airfield and other cost centers including the reliever airports. A credit would go to airlines if revenues from the other cost centers exceeded expenses. Negotiations on the renewal of the leases continue.

- (2.) MAC officials expect the new airline leases will not be for as long a term as the current 27 year leases. However, MAC has an incentive to negotiate for the longer term leases which provide MAC with security needed for issuing bonds.



Source: "Draft 1988 Operating Budget," Metropolitan Airports Commission.

- d. The noise problem has intensified as the number of operations at MSP increased. Noise complaints have been on the rise, particularly since 1982. In the mid-1960s aircraft noise had become a concern for those adjacent to MSP because of the increases in air travel and use of jet engine aircraft. The number of complaints increased gradually over the years until they more than doubled between 1982 and 1983.

This was the period of time following the federal government's deregulation of the airlines in which many additional takeoffs and landings occurred.

Although the number of complaints does not necessarily serve as a proxy for the extent of the noise problem, complaints have risen appreciably during the years of increased operations at MSP. (See table.) However, unlike that trend, the number of complaints in 1987 has kept pace with that of 1986 even though the number of operations decreased.

Table 6
Number of Noise Complaints* and Operations at MSP

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987**</u>
Com- plaint	601	1,044	1,395	2,976	4,874	5,961	15,927	15,144
Opera- tions (x 1000)	282	265	252	308	338	372	389	314

*Counts include all complaints registered, including those for reliever airports; however, the overwhelming majority of complaints are aimed at MSP.

**Through October.

Sources: Operations Statistics Memorandum to MAC Operations and Environmental Committee, May 6, 1987; "Operations and Noise Complaint Summary," Metropolitan Aircraft Sound Abatement Council, various months. MAC and Metropolitan Aircraft Sound Abatement Council

- (1.) Lengthy exposure to excessive noise levels can be harmful. In May, 1986 the Minneapolis Health Department completed a review of literature analyzing the health effects of noise. Unfortunately studies linking long term airport noise to specific health effects have not had much priority historically. Nevertheless, after reviewing the relevant studies on health effects of noise, the Health Department concluded:

Exposure to noise of any type may have short-term effects on the sensory, cardiovascular, respiratory, endocrine and digestive systems of the body; and

Some evidence shows an association between noise exposure and hearing loss, hypertension in adults, low birthweights, reduced growth rates in children, and mental health effects.

Other analyses of the effects of noise indicate measurable losses in "learning ability, social interaction, and productivity in noisy environments." [13]

- (2.) Noise can diminish the liveable quality of neighborhoods in proximity to the airport. A recent Minneapolis survey on neighborhood appearance and livability reveals that, a high percentage of households in the Nokomis and Southwest communities near the airport believe noise needs attention. This was one problem frequently noted by homeowners in an area where over 95 percent rated their neighborhoods as "good" or "fair."
- (3.) Although the MAC has been involved with noise abatement efforts for many years, its efforts must be even more rigorous. (See appendix for information on noise abatement efforts at other airports in the U.S.)
 - (a.) One of the MAC's earlier efforts was the creation of the Metropolitan Aircraft Sound Abatement Council (MASAC). MASAC was incorporated in 1969. It is a private, non-profit organization with members from the public and the airline industry. Members are charged with controlling aircraft noise on a mutually agreeable basis.

MASAC collaborated with the MAC on the planning of 17 noise abatement strategies in the 1970s and early 1980s. (For a complete list of the strategies, see appendix.)
 - (b.) More recently, the MAC has completed two major plans regarding noise abatement, referred to above. One is a 27-point noise abatement program adopted by MAC in 1986. The other is the Part 150 Study, required by the federal government in exchange for federal dollars to implement the noise program. Several of the same noise abatement tactics are included in both plans.

The MAC has not calculated what amount of noise reduction can be expected by implementation of the full 27-point program. Some elements of the noise abatement program are key to a reduction in or better management of noise levels. Others are important but by themselves will not represent significant noise reductions.

B. The MAC should develop an aggressive plan to phase-in the movement of most general aviation (GA) aircraft operations from MSP to reliever airports.

Diverting GA traffic will allow the airport to extend its use of the preferential runway system. Further into the future, the movement of GA to the relievers will allow MSP to safely handle the increased air carrier traffic expected then.

1. The MAC should continue to improve and fully utilize the reliever airports for general aviation traffic.

The six minor and intermediate airports under MAC's operating authority have the potential to be more effective reliever airports for MSP. (See map of airports in the metro area.)

a. System-wide the relievers have sufficient capacity to meet demand past the year 2003. However, the Metropolitan Council concluded in its 1986 Aviation Development Guide that the distribution of demand would differ widely and could require a new minor airport in the western half of the metro area.

In the Aviation Guide the Metropolitan Council estimates the reliever airports (see map of regional airports) had a total capacity in 1983 of 1.7 million operations, about twice the amount of demand which was at 860,000 operations that year.

The Council estimated with improvements the relievers have the potential capacity of 2.3 million operations. With expansions on existing sites the storage system has capacity for 900 additional aircraft.

During the past four years, the number of operations at the reliever airports grew about 4.4 percent annually.

Map 4

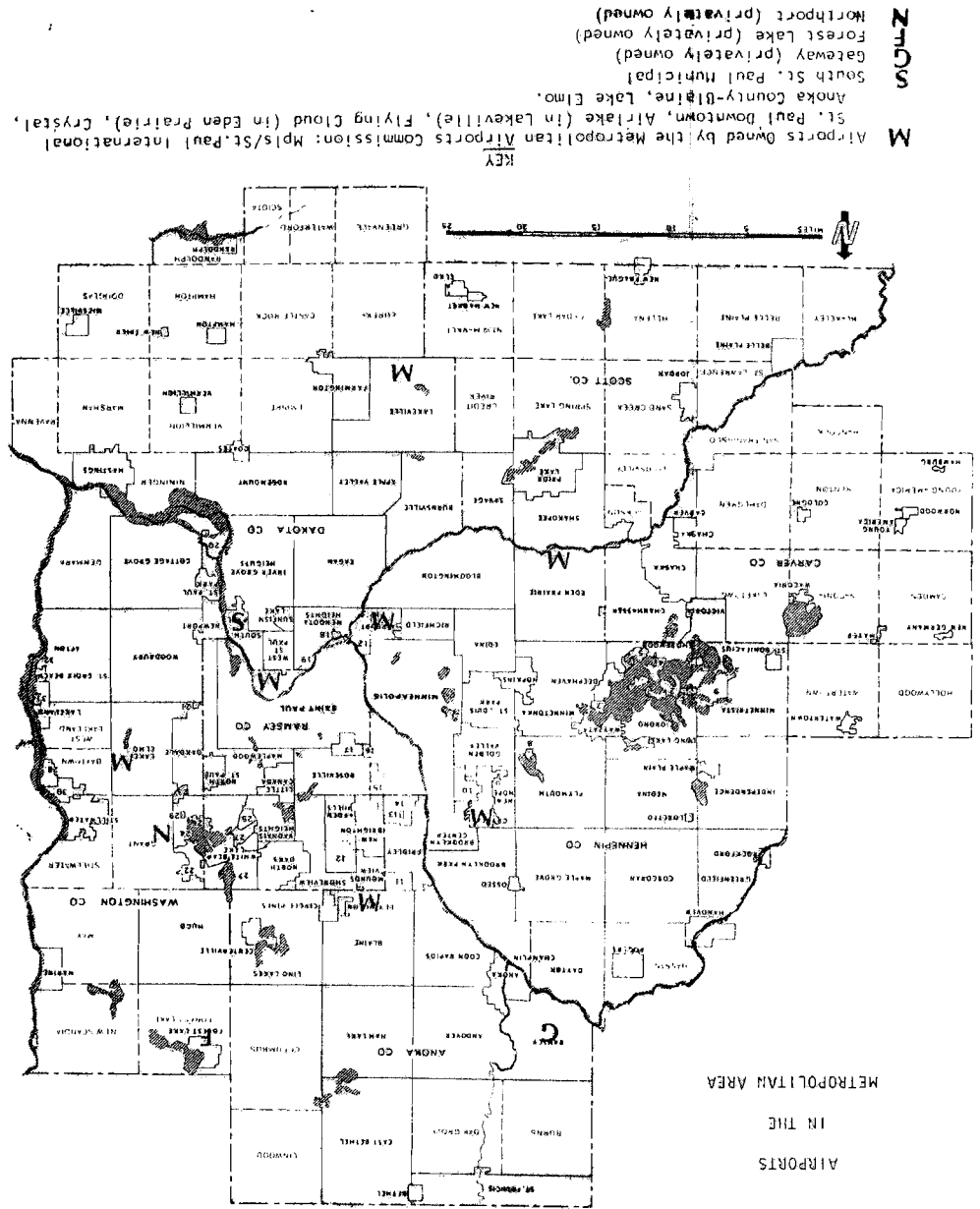


Table 7
Capacity and Demand of Operations at Reliever Airports
(thousands)

Airport	Existing Capacity	1983 Demand	2003 Demand
St. Paul	375	98	131
Airlake	190	20	27.7
Anoka	220	190	296.5
Crystal	385	135.6	187.6
Flying Cloud	385	165.9	229.5
Lake Elmo	220	90	141.8

Source: "Aviation Development Guide," Metropolitan Council, 1986

- b. In terms of hangar storage capacity at the reliever airports, the Metro Council reported that only Crystal and Flying Cloud were near their existing or potential capacity. These airports do not have space on which to build additional hangars.
- c. Major improvements are in process or have been recently completed at some of the relievers, notably downtown St. Paul, Anoka County-Blaine, and Airlake. (See appendix for specific improvements.)

Some smaller jets such as those used in corporate aviation may fly into the airports at St. Paul, Airlake, Anoka, and Flying Cloud, but none of the relievers is designed with the runway length or strength to accommodate air carrier jet aircraft, such as a Boeing 727, according to standards set by the FAA. [14]

- 2. The MAC should institute a program of significantly increased landing fees to induce general aviation to use the reliever airports.

Without a price disincentive general aviation aircraft are unlikely to move their operations off MSP.

- a. Over 90 percent of the 823,600 general aviation operations in the metropolitan airports system in 1986 occurred at the six reliever airports. The remainder (79,691) occurred at MSP.

The types of general aviation operations at MSP in 1986 broke down in the following manner:

Table 8
General Aviation at MSP
1986

<u>Type of General Aviation</u>	<u>Percent of Total</u>
Air Taxi	7.5 %
Corporate (Business)	65.9
Private Aviation	10.5
Undetermined	16.1

Source: General Aviation Operations memorandum to MAC Operations and Environmental Committee, May 28, 1987.

- b. MAC's current efforts to divert general aviation aircraft to reliever airports are aimed at increasing MSP's capacity for air carriers.--MAC is in the process of improving three of the reliever airports in ways that could increase their attractiveness to general aviation. The improvements include lengthening runways, adding building area improvements, pavement rehabilitation, and installing navigational aides.

General aviation traffic does not pay landing fees like the major air carriers do. (See section on revenues for airport financing.) At the relievers GA pays a surtax on fuel and other purchases from the fixed base operator (FBO). At MSP, GA pays a landing fee to the FBOs.

- c. Effectiveness of MAC's diversion strategy is unknown--Whether or not the improvements are sufficient to attract general aviation traffic away from MSP remains to be seen. Many of the improvements have either been very recently completed or will not be completed for several years. According to MAC, airport proprietors do not have the legal authority to prohibit certain types of aircraft from landing at MSP. Such action would be considered discriminatory, and in violation of federal law.

The number of general aviation operations increased between 1985 and 1986 at both MSP and the reliever airports. In the reliever system of airports, operations increased 5.6 percent between 1985 and 1986. At MSP, general aviation operations increased 11.3 percent, after declining slightly between 1983 and 1985, according to MAC. Over the past five years, the number of operations at the reliever airports increased 27 percent.

- d. Corporate aviation generally prefers use of MSP--Approximately 70 percent of the flights by business aircraft are flown from MSP, according to the Minnesota Business Aviation Association. Comparatively few of the corporate operations occur at the reliever airports, with the exception of Holman Field in downtown St. Paul which is the home base for the 3M Company's eight aircraft.

Because many of the businesses with corporate jets are located on the western and southwestern sides of the metro area, and because the corporate operations often provide feeder service to the air carriers, representatives of the MBAA believe most of the corporate operations will remain at MSP.

- C. The Metropolitan Council should examine how significantly increasing user fees might redistribute the demand at MSP.

Using price incentives to spread the use of the airport outside the traditional peak hours of use, would extend the useful life of the airport while maintaining its safety. Without additional incentives, such as pricing peak hour travel higher than travel at other times of day, major airlines are unlikely to discontinue the peak-hour travel that contributes to congestion and delay.

1. Most air travel occurs during peak hours of the day to accommodate the hub and spoke operations of major airlines. Peak hour travel is not limited to MSP, but is common throughout the national airway system. Peak hour air traffic is inherent with the hub and spoke system that produces a large volume of passengers connecting with other flights to reach their final destinations. When congestion breaks down the flow of traffic at one airport, people at a network of airports can experience late arrivals and missed connecting flights.

- a. Distribution of operations throughout the day--Largely as a result of hubbing operations, many aircraft want to land one hour, drop off some passengers, pick up others, and take off the next hour.

The FAA estimates that MSP can handle between 120 and 130 operations per hour, given good visibility (visual flight conditions). The banks of incoming flights generally occur at MSP between 8:00-9:00 a.m., noon-1:00 p.m., 4:00-5:00 p.m., and again from 8:00-9:00 p.m. Many outgoing flights take off between 9:00-10:00 a.m., 1:00-2:00 p.m., 5:00-6:00 p.m., and 8:00-10:00 p.m. [15]

The total number of operations for an average day in August 1986 peaked during the following hours:

Table 9
Peak Number of Operations Distributed by Scheduled
Hourly Arrivals and Departures
August, 1986

<u>Hour</u>	<u>% of Total Daily Air Carrier Operations</u>	<u>Number of Operations*</u>
8-9:00 a.m.	9.5 %	109
Noon-1:00 p.m.	8.8	101
1-2:00 p.m.	8.9	102
4-5:00 p.m.	9.1	104
5-6:00 p.m.	9.8	112
8-9:00 p.m.	7.7	88

*Number of air carrier, commuter, GA, military, and air freight operations out of a total 1,145 average daily operations. This table assumes that all types of traffic, not only the air carriers, land and take off at the same hours, which may not be the typical case.

Source: "MSP Master Plan Update," MAC, January 1987; "Operations and Noise Complaint Summary," Metropolitan Aircraft Sound Abatement Council, August 1987.

2. Currently, the landing fee for airliners at MAC is the same regardless of the time of day.

CITATIONS

- [1] Aviation Daily, Vol. 289, No. 22, July 31, 1987.
- [2] "Airport Capacity Enhancement Plan," FAA, 1987.
- [3] "Air Travel Consumer Report," U.S. Dept. of Transportation, Nov. 1987.
- [4] "Measuring the Regional Economic Significance of Airports," FAA, Oct., 1986.
- [5] "Office Construction Update 1983-1985," Metropolitan Council.
- [6] Testimony at MAC public hearing on the proposed noise budget, January 1987.
- [7] Airport System Development, Office of Technology Assessment, p. 64.
- [8] "Airport Capacity Enhancement Plan," FAA, 1987.
- [9] "Aviation Forecasts," FAA, 1987.
- [10] The noise budget is allocated among airlines in a measurement known as average daily noise energy, or ADNE. The ADNE represents the noise generated by the landings and takeoffs of an air carrier on an average weekday for a specific amount of time. It is expressed in units of Environmental Perceived Noise levels measured in Decibels, or EPNdBs. Calculating ADNE requires a logarithmic equation taking into account the airline's average daily landing/takeoff cycles for a specific aircraft type, and the EPNdBs for that type of aircraft.

As of October, 1987 the average daily noise energy for the airport was 124.4 EPNdB, down from the August, 1986 level of 125.4 EPNdB, approximately an 18 percent reduction.
- [11] "State of the City 1986," Minneapolis Planning Department, 1987
- [12] "Differential Landing Fees," HNTB, February, 1986.
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- [14] "Airport Design Standards-Transport Airports," FAA, 1983.
- [15] "MSP Master Plan Update," Metropolitan Airports Commission, January 1987.

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GLOSSARY

Air Line Pilots Associations (ALPA) -- The union of pilots who serve commercial airlines. ALPA is a member of the Metropolitan Aircraft Sound Abatement Council (MASAC).

Airlines -- The Minneapolis/St. Paul International Airport serves 13 scheduled airlines, seven regional airlines, 12 charter carriers and 23 air freight carriers. On the average weekday, the major and regional airlines account for about 80 percent of the landings and takeoffs at the International Airport, and general aviation accounts for about 20 percent, according to MAC. The number of scheduled airlines operating at the International Airport is limited only by the availability of gate space.

Northwest Airlines -- Northwest operates as a major hub out of the International Airport and, with the takeover of Republic Airlines last fall, accounts for about 75 percent of passengers coming through the airport on a major airline.

Northwest controls 54 of the 68 gates at the airport. It leases the gold concourse from MAC and controls all operations in that concourse including the hallways, restrooms, and other public common space.

Average Daily Noise Energy (ADNE) -- Represents the noise generated by the flight operations (takeoff and landing cycles) of an air carrier on an average weekday for a specific amount of time. It is expressed in units of Environmental Perceived Noise Level Measured in Decibels (see EPNdB). The ADNE was used in the calculations of the noise budget now under consideration by MAC.

Aviation Safety and Noise Abatement Act (ASNA) -- In 1979 Congress passed this act granting control to the FAA over setting criteria for noise abatement programs. Planning and implementing such programs is local responsibility, and this Act provided some grants to plan noise programs. The Act expanded the January, 1985 deadline by which aircraft must reach Stage II noise levels to include all civil aircraft, not only domestic operations. It also provided exceptions to some compliance dates for meeting Stage II and III noise standards.

Bloomington-Richfield Airport Action Group (BRAAG) -- BRAAG is a group of citizens who live in the Bloomington-Richfield area and organized in June, 1986. The major reason for the group's organization is the MAC proposal to extend runway 4/22 which would move the takeoff point about 1/2 mile south. For some Bloomington and Richfield residents this proposal could mean an increase in the noise levels because planes would be flying at lower levels over some groups of homes.

Civil Aeronautics Board (CAB) -- The now-defunct CAB regulated the airlines industry prior to the Airline Deregulation Act of 1978. Air carriers had to apply to the CAB for permission to add or drop routes, or change fares.

Decibel (dB) -- A logarithmic ratio to measure the loudness of sound. dBA is noise on the "A" scale and is commonly used as a yardstick of noise pollution for surface transportation.

Conversational speech	60dBA
Heavy city traffic	92dBA
Boeing 747, at 6500 meters from takeoff	99dBA
Boeing 757, at 6500 meters from takeoff	69dBA

The federal Occupational Safety and Health Administration's (OSHA) regulations to protect against hearing loss say noise should not exceed 90 dBA for eight hours of work. OSHA has also set noise limits of 95 dBA for 4 hours of work, 100 dBA for two hours, 105 dBA for one hour, 110 dBA for thirty minutes, and 115 dBA for fifteen minutes.

Differential Landing Fees -- Fees that would require the noisier aircraft to pay a higher landing fee than quieter aircraft, for instance as an incentive to use Stage III (quieter) aircraft. Such a fee structure is not in place but is under consideration by the MAC. Currently, landing fees are charged on a weight basis.

Distributional Equity -- Distributional equity refers to directing the flight patterns in such a way that aircraft noise is distributed equally around the area of the airport and not concentrated in a few neighborhoods.

EPNdB -- Environmental perceived noise decibel, is the unit used to measure noise generated in a single event such as a takeoff or a landing. This measure factors in the duration of the noise and type of noise generated.

Federal Aviation Administration (FAA) -- The FAA is a division of the U.S. Department of Transportation and has authority over aviation safety matters. The FAA certifies pilots, aircraft, and airports. Air traffic controllers who control air traffic from the control tower at the International Airport are employed by the FAA.

FAR Part 36 -- Federal Aviation Regulation Part 36 refers to a 1969 regulation, approved by Congress, that sets noise standards for jet engines. Part 36 requires new aircraft to be quieter than old jets, and describes three stages in which jet aircraft must meet noise standards. (See Stage Aircraft.)

FAR Part 150 -- Federal Aviation Regulation Part 150 prescribes rules for developing noise abatement programs. To be eligible for a share of \$347 million from the federal government for implementing noise abatement practices, airport operators must file Part 150 noise control plans with the FAA. MAC is in the process of developing a Part 150 study and is expected to complete it in the spring of 1987 and submit it to the FAA for approval.

Fixed Base Operator (FBO) -- A concessionaire which provides services for airport users lacking facilities of their own. The FBO may sell fuel, and offer repair and maintenance services, typically for general aviation.

General Aviation (GA) -- GA represents all aviation activity other than the scheduled major airlines, regional airlines, charters, air freight, and the military. This includes aircraft used for business purposes, aerial work, flight instruction, and recreational flying.

Hub -- A hub is a geographic area such as the Minneapolis/St. Paul area from which an airline bases its operations. "Large hub" areas enplane one percent or more of total U.S. passengers. "Small hub" areas enplane .05 to .24 percent of total passengers. Minneapolis/St. Paul is a hub for Northwest Airlines and is considered by the FAA as one of the large hub airports in the country. Northwest Airlines uses the Minneapolis/St. Paul area as the center of its hub-and-spoke system with a high volume of transfer passengers.

Instrument Flight Rules (IFR) -- IFR requires flying by instruments when weather conditions or visibility fall below standards of Visual Flight Rules. Requires increased separation standards and special safeguards because of restricted visibility.

Instrument Landing System (ILS) -- The ILS is the guidance system for the approach and landing of aircraft which has been used in the U.S. for decades. ILS provides guidance by radio beams that define a straight-line path to the runway. This is a non-visual, precision approach.

Landbank -- Landbanking means buying land and holding it in reserve until a specified date or event occurs. Once purchased the land may be leased back, rented for other uses, or otherwise used in a manner that is compatible with its intended future use. Landbanking assumes the necessary environmental studies, planning, and land use analyses have been completed for the property.

Ldn -- Day/night average sound level, is one measure of the noise generated by aircraft; this measure weights more heavily the noise generated in the nighttime. The FAA uses Ldn to measure cumulative noise exposure. It has suggested residential land uses be located in areas below 65 Ldn.

LEQ -- Equivalent sound level, represents the average decibel level for a given period of time such as over 60 consecutive minutes.

L10 -- Noise level for 10 percent of a given unit of time, e.g., six minutes out of an hour.

Metropolitan Aircraft Sound Abatement Council (MASAC) -- The MASAC is a private, non-profit organization set up in 1969 as a forum to work out solutions to the noise problems. It receives its funding through MAC. MASAC consists of 26 members, both private citizens and airline industry representatives; they meet monthly. MASAC operates a 24-hour a day telephone line that receives noise complaints. In addition, MASAC researches and evaluates noise control mechanisms. MASAC also provides information to the public on noise abatement procedures and programs.

Metropolitan Airports Commission (MAC) -- The MAC owns and operates the system of seven metropolitan area airports and has broad statutory authority to provide for the aviation needs of the area within 35 miles of downtown Minneapolis and St. Paul.

Metropolitan Council -- The Council is charged with the planning and coordination of the Twin Cities area, including the metropolitan airports. It develops a metropolitan airports systems plan, the most recent update of which was completed in the summer of 1986. The Council also coordinates the aviation system with other regional systems and with the plans of individual cities and counties.

Microwave Landing System (MLS) -- The MLS uses a beam that scans a wider volume of airspace, permitting aircraft to fly one of several approach angles. It allows more freedom in the use of the airspace than the ILS.

Minnesota Business Aviation Association (MBAA) -- The MBAA is an association of pilots, mainly consisting of corporate pilots. The MBAA has a member on the Metro Aircraft Sound Abatement Council. The organization does not speak for the business or corporate community according to one MBAA representative.

MSP -- MSP stands for the Minneapolis/St. Paul International Airport.

Preemption -- It is the federal government's right to intercept or change local policy if the policy is deemed to be discriminatory or to violate interstate commerce laws. For instance, locally the FAA will not enforce the MAC's ordinance banning training flights because it interprets the ban as discriminatory.

Preferential Runway System (PRS) -- PRS is a MAC-approved runway use system, designed to reduce noise over highly populated areas by shifting as many flights as possible over less densely populated areas to the south and southeast of the airport, using the cross runway. Use of PRS depends on weather conditions and amount of air traffic. FAA air traffic controllers control when PRS is implemented.

Reliever Airports -- These are the six airports under MAC jurisdiction with facilities for general aviation activity. The reliever airports include: St. Paul Downtown; Airlake (located in Lakeville); Anoka; Crystal; Flying Cloud (located in Eden Prairie); and Lake Elmo.

In addition to these airports owned by MAC, the metro area has three privately-owned airports open to public use: Gateway North in Ramsey, Forest Lake, and Northport in Grant Township. An eighth public airport is South St. Paul Municipal (not under MAC jurisdiction).

Run-ups -- Engine run-ups are routine procedures for testing jet engines at high power while the plane is on the ground. The run-ups contribute to the noise coming from the airport itself. MAC has banned run-up tests at night (except for emergency situations), and limited daytime tests to one per hour.

Search Area -- The Metropolitan Council must designate the general location in which a new airport might be located. Within that general search area, the MAC has the responsibility of defining specific boundaries for the airport.

Site search -- After the Council designates the search area within which a new airport could be located, the MAC proceeds with a site search. This entails planning the site and developing a master plan for the new airport, selecting a specific site to fit the plan, and conducting the appropriate environmental studies for the site, along with holding the required public meetings and attaining governmental and public input throughout the process. The site search process is estimated to take several years.

South Metro Airport Action Council (SMAAC) -- This group of citizens affected by airport noise organized in 1983 to combat airport noise around the International Airport. SMAAC developed a legislative program in 1987 Legislature. It included proposals to:

- * Impose a moratorium on new construction at the International Airport until noise is reduced;
- * Have the chair of the MAC serve at the pleasure of the Governor instead of a fixed term;
- * Create a legislative mandate to put a noise budget into effect;
- * Impose a heavy surcharge on night flights landing after 11:00 p.m. and before 6:00 a.m.

Stage Aircraft -- Refers to the types of aircraft the FAA has differentiated by level of noise generated in its FAR Part 36.

- a. Stage I jets are the loudest and oldest aircraft, including DC8s, 707s, and early 727s and 737s. The FAA's rules require Stage I airplanes, those made prior to 1973, to meet stage II or III standards by January, 1985. An exemption in that rule for "service to small communities" allows planes seating 100 or fewer passengers to fly until January, 1988. (Exceptions to this standard have been granted in other cities.) MAC passed an ordinance in 1985 banning the takeoffs and landings of Stage I aircraft at MSP International.
- b. Stage II jets are older aircraft that have been modified or retrofitted to meet certain noise standards. Stage II aircraft make up the bulk of today's inventory of commercial airplanes and include 727s and most DC9s. An FAA rule requires all jets manufactured after 1973 to meet Stage II noise standards. The FAA has not banned the production of Stage II aircraft; some are still being manufactured.
- c. Stage III are the quietest of today's aircraft, and includes the 757 and the MD80. About 12 percent of daily operations in 1984 at the International Airport were with Stage III craft, according to the MAC. This percentage increased to 27 percent of daily operations in December, 1986. (Percentages include some of the older DC-10s and 747s that the FAA has determined meet Stage III standards, in addition to the newly-built quiet aircraft.)

Visual Flight Rules (VFR) -- VFR allows an aircraft to be operated by visual reference to the ground and to other aircraft in good weather.

APPENDICES

I. Entities with Decision Making Authority Regarding Metropolitan Airports System

- A. The Metropolitan Council--The Metro Council develops and coordinates a metropolitan airports systems plan. It monitors airports system performance. The Council is charged with reviewing and approving airport master plans, aviation-related EISs, and capital projects exceeding \$5 million at MSP and \$2 million at reliever airports.

The Council determines whether new airport facilities are needed in the region. It designates search areas within which airport sites must be located.

The Council approved guidelines for land uses that are compatible with aircraft noise. The guidelines are to encourage only certain land uses in the areas impacted by airport noise.

- B. The Metropolitan Airports Commission--MAC is the owner and operator of MSP and the six reliever airports in the Twin Cities area. MAC has a dual function of promoting air navigation and transportation, and assuring minimal environmental impacts from air transportation.

MAC is charged with operating and maintaining airport facilities. It prepares airport master plans, detailing the uses of all airports into the future.

By statute MAC is charged with identifying sites for new airports, only within areas identified as search areas by the Metropolitan Council and after the Metropolitan Council decides a search is necessary. MAC would also be responsible for purchasing land and managing its use, if a decision is made to search for a new airport site. MAC cannot acquire land for a new major airport without explicit authorization from the legislature.

The MAC has the chief responsibility for noise compatibility planning and bears the liability for airport noise. The federal government has allowed noise controls by local airport proprietors, but reserves the authority to preempt local decisions. An airport proprietor like MAC, can regulate the use of its facility in order to control noise, provided the regulations:

- are reasonable,
- are not arbitrary,
- do not discriminate among airport users, and
- do not impose an undue burden on interstate commerce.

Historically, there has not been a case where an otherwise acceptable rule issued by an airport proprietor has been thrown out on the grounds of federal preemption.

C. The State of Minnesota--The state of Minnesota, or its agencies, perform several different functions regarding airports.

1. First, the Aeronautics Division of the Minnesota Department of Transportation is the clearinghouse for federal and state aviation money. Airport sponsors, like the MAC, apply through this division for money to finance projects.

The division sets rules for aviation, including regulations on charters, commercial operations, aircraft mechanics and aerial spraying. It also regulates airport zoning, such as the hazard zoning to keep the approach areas to the landing strip clear.

2. Second, the Minnesota Pollution Control Agency has a noise program within its division of air quality. Regarding airports, employees in this program respond to citizen complaints on noise, advise the Legislature and MAC on noise issues, and conduct noise monitoring.

The PCA has set standards for the maximum level of noise allowable, but the standards have not been enforced for airport noise, in part because the federal government can preempt state noise regulations.

3. Third, the state legislature plays a role in the operations of the metropolitan airports. Not only does the legislature set the appropriations level for airport improvements, but it also controls the authority of the responsible governing authorities.

For instance, in recent legislation the legislature (we believe unwisely) prohibited MAC from upgrading any of the reliever airports from a minor to an intermediate use airport. Airports with a minor status are restricted to serving primarily personal, business, and instructional purposes. Their geographic focus is metropolitan or within the state.

D. Federal government--The Federal Aviation Administration (FAA), a division of the U.S. Transportation Dept., has the responsibility for national airport system planning. The FAA

- owns and operates the air traffic control system,
- establishes the safety and operational standards for airports,
- administers grants to airports for planning and capital improvements,
- certifies pilots and aircraft.

Congressional action in 1969 gave the FAA authority to establish jet engine noise standards. This authority resulted in manufacturing standards for engine noise. The FAA classified the oldest, noisiest engines as Stage I, the retrofitted aircraft and wide-bodied jets (like B-727s) as Stage II, and the new technology, quietest aircraft as Stage III.

1. Nearly 75 percent of today's fleet nationwide are Stage II aircraft. The turnover of the fleet to Stage III aircraft is not expected to be complete until 2010 at the earliest, according to an FAA working group. The cost of replacing the 2200 Stage II aircraft operating today would be approximately \$88 billion, excluding financing costs, which could double the estimate.
2. Locally, Northwest representatives have estimated that 24 percent of its fleet are Stage III aircraft, by 1995 about 57 percent will be Stage III, by the year 2000 about 75 percent will be Stage III, and by 2007 the full fleet will be converted to Stage III craft.

II. Assumptions Underlying Forecasts of Demand

A. The Federal Aviation Administration

1. Forecasts of Operations--The FAA's forecast for MSP assumes a steady growth in the gross national product, (3.1 percent average annual growth from 1987 to 1998), moderate increases in consumer prices (4 percent average annual growth), and moderate fuel price increases (6 percent average annual growth). However, it does not constrain the projections for possible capacity problems resulting from environmental or noise restrictions.

Aircraft operations nationwide are expected by the FAA to increase at an annual growth rate of 2.5 percent. If this national growth rate occurred at MSP the number of operations would increase to 499,000 by the year 1998, slightly more than what the FAA predicts for the MSP area.

2. Enplanements--Nationwide the FAA expects passenger enplanements to increase 4.5 percent annually between 1986 and 1998, again assuming stable economic growth and fuel prices. This national growth rate is in line with the projections for MSP. If that national growth rate holds true for the Twin Cities, enplanements at MSP would reach 13.2 million by 1998.

- B. Metropolitan Airports Commission--These forecasts assume increases in local population, employment, and personal income at rates greater than the national averages. They assume that fares will increase on average in proportion to general price inflation, (i.e., no increase in the real fare excluding inflation). Further, the forecasts assume the noise budget (see chapter on environment around airport facilities) will impact the number of operations.

- C. Metropolitan Council--The Metro Council's estimates are based on unconstrained demand, assuming no additional restrictions on flights. According to the Council at the time these forecasts were made, they could have been considered generous because they stemmed in large part from the trends begun by deregulation. However, the estimates were made before the full extent of hubbing operations were felt, and at a time when the real costs of energy were expected to increase much higher than they actually did.

The Metro Council's forecast assumes regional economic growth per year (population, employment and personal income) greater than the annual national average.

III. State and Federal Airport Financing

- A. The state of Minnesota appropriates money from a state airports fund for airport construction and improvements around the state.--For the 1988-89 biennium, the Legislature appropriated \$22.6 million for all airports in the state. Over the past five years, state dollars for MSP and the relievers in the metropolitan system averaged a total of \$1.6 million per year.

Revenues for the state airports fund come from several sources, including aviation fuel taxes and aircraft registration fees.

- B. Federal dollars for aviation use come from the Aviation Trust Fund.

1. Trust fund revenues--Revenues from an eight percent ticket tax, freight taxes, general aviation gasoline and jet fuel tax, an international departure fee, and a surtax on tires go into the trust fund. The eight percent tax on passenger tickets provides the bulk of the trust fund revenues. (See table 9 for amount of grants to MSP.)
2. Trust fund distribution--Money from the trust fund is distributed to larger airports in part through "enplanement money," based on the number of passengers served by the airport. Smaller airports receive a distribution based on an area population formula.

About 38 percent of the trust fund is designated for discretionary grants, for which airports across the country compete.

Federal aid to airports around the nation averaged about \$600 million per year for 1970-82, and was estimated to total over \$800 million in 1986, according to the Congressional Budget Office. These grants can be used for planning, constructing and upgrading runways, taxiways, terminal areas and safety and noise compatibility projects.

<u>FAA Dollars to MSP</u>			
(in millions)			
	<u>Enplanement</u>	<u>Discretionary</u>	<u>Total</u>
FY84	\$4.09	\$.047	\$4.137*
FY85	\$4.923	\$1.587	\$6.510
FY86	\$5.285	--	\$5.285
FY87	\$6.376	--	\$6.376

*MSP also received \$115,582 from the FAA for planning in FY84.

Source: Minnesota Dept. of Transportation, Office of Airport Development and Assistance.

IV. MAC's Part 150 Study

A. Included in the noise abatement strategies are (among others):

1. the noise budget,
2. differential landing fees to induce the use of quieter aircraft,
3. the extension of Runway 4/22, estimated to cost \$8-10 million.
4. incentives to relocate general aviation traffic to reliever airports,
5. installation of a microwave landing system, estimated to cost about \$1 million.

B. Included in the land use management strategies are (among others):

1. home soundproofing and purchase guarantees,
2. school and other public building soundproofing, (estimated at \$440,000 for two schools).
3. acquisition of developed property by willing sellers.

V. Potential Capital Requirements to Build a New Airport

A new airport in the Twin Cities area would require a major capital investment. The costs of building a new airport in this region have not been estimated. However, a new airport planned to replace Stapleton Airport in Denver is estimated to cost from \$1.3 billion to \$2.9 billion.

Costs will vary dramatically depending upon where the site is located, the infrastructure requirements, site acquisition and preparation costs, the political difficulty of searching for and selecting a site, and other factors.

The city and county of Denver plans to build its new airport 18 miles to the east of downtown.

- A. In its New Airport Master Plan Study, Denver estimated the site acquisition costs for the seven sites under consideration to range from \$21.4 million to \$141.5 million.
- B. Site preparation costs ranged from \$152 million to \$503 million.
- C. Construction cost estimates ranged from \$845 million to \$1.6 billion.
- D. Costs to upgrade the ground access system required to support expected airport traffic ranged from \$311 million to \$655 million. The estimates do not include costs for a proposed rail system to serve airport-based trips.
- E. Estimated total costs ranged from \$1.329 billion to \$2.899 billion. Specific costs for the selected site are being estimated in the master plan as precise facility requirements are determined.
- F. Denver expects that the major investments for the new airport will be partially offset by redeveloping the existing Stapleton airport. A mix of commercial, industrial and residential development is planned. Not included in the costs are estimates of costs to existing businesses around Stapleton, travel time and convenience costs to passengers and employees, or redevelopment costs.

VI. 17 Noise Abatement Strategies for MSP

- A. These 17 policies resulted from a joint effort of the Metropolitan Aircraft Sound Abatement Council, MAC, and the FAA. The degree of success in abating noise varies from measure to measure. Some of the strategies are no longer in use.
1. The preferential runway system.--(See glossary or text.)
 2. Restricted training flights.--Major air carriers agreed to move their training flights to other airports.
 3. Voluntary nighttime restriction.--Major airlines entered into voluntary agreements to restrict to 27 the number of flights scheduled between 11 p.m. and 6 a.m.
 4. Track modifications.--The MAC designed flight tracks over areas with commercial-industrial concentrations to keep planes away from residential areas.
 5. Noise abatement takeoff.--Northwest Airlines (and Republic at the time) adopted a takeoff procedure that put planes at higher altitudes with reduced power over residential areas.
 6. FAA "Keep-em-high" program.--FAA adopted procedures to keep aircraft at higher altitudes to alleviate noise in outlying metropolitan areas.
 7. High profile descent.--Airlines adopted a gradual descent to the final approach altitude to lessen noise.
 8. Varied turns off runway 22.--The FAA routed planes taking off in a southwesterly direction along Cedar Avenue over less densely populated areas.
 9. Instrument Landing System (ILS) glide slopes.--Pilots are instructed to use a certain glide slope (three degrees) for descent to the runway.
 10. Visual approach slope indicator.--An alternative guide for runways not equipped with ILS.
 11. Land acquisition.--MAC purchased 53 homes in Eagan to permit installation of the ILS.
 12. Ground noise attenuation.--Use of earth and concrete noise barriers to absorb noise.
 13. Field rule for engine testing.--This rule banned run-ups during nighttime hours and to one location on MSP.
 14. Gate holding.--The FAA control tower does not give an airplane clearance until it has only a minimum wait before takeoff, to keep noise near the terminal.

15. Community noise monitoring.--MAC purchased mobile noise units to measure noise levels at different locations. (A permanent noise monitoring system is now being planned.)
16. Airfield noise monitoring.--MAC installed a remote monitoring system to measure noise from run-ups.
17. Noise abatement awareness.--Airlines are requested to instruct pilots on noise abatement strategies.

II. Improvements underway or planned at reliever airports. The MAC has planned to improve the reliever airports to attract general aviation aircraft away from MSP.

A. St. Paul Downtown (Holman Field)

1. Elevate runways above 50-year flood plain level.
2. Extend main runway to provide 6,700 foot long runway.
3. Improve adjoining taxiways.
4. Install Instrument Landing System.
5. Extend the building area and hangar space.

B. Anoka County-Blaine Airport

1. Move the north-south runway to the north, away from Moundsview.
2. Extend the east-west runway about 800 feet.
3. Install Instrument Landing System.
4. Expand area for hangar construction.
5. Reconstruct local roads.

C. Airlake Airport (near Lakeville)

1. Construct a parallel runway.
2. Install instrument landing system.
3. Acquire additional land.
4. Improve buildings.

VIII. Airport authorities in other cities are employing a variety of noise reduction strategies, including both land use measures (such as major property acquisition programs), and on-site operational measures (such as noise-based landing fees).

- A. Denver--Besides planning a new airport, Denver proposed a noise cap to prevent any increase in the amount of noise emitted over a two year period ending in June, 1986. A provision to reduce an airline's noise limit by one percent annually was dropped. In its place is an agreement to reduce the total airport noise levels by three percent if the new airport is not operating by January, 1995, and an additional two percent if the new airport is not operating by 1999.

Denver is using up to \$20 million in non-federal dollars to insulate schools and churches within the 65 Ldn, and homes within the 70 Ldn area.

- B. Seattle--Seattle is involved in a \$200 million program to buy out and insulate heavily noise-impacted homes near the Seattle-Tacoma airport. The goal is to acquire all homes in the 75 Ldn area; 1,000 have already been purchased, and 400 more are in the planning stages. The homes will be either moved or destroyed and the area will be redeveloped and used for light industrial purposes.

In the 65 Ldn area home insulation pilot programs are under way. As many as 10,000 homes may be at least partially insulated.

Around \$60 million has already been spent on acquisition and insulation programs, half of which are federal dollars (both entitlement and discretionary dollars.)

- C. St. Louis--The St. Louis, MO (Lambert Field) airport began a 20 year noise program with plans to spend \$130 million to buy out and insulate noise-impacted homes and schools. About 900 homes have already been purchased. In exchange for aviation easements the airport will insulate homes that are noise-impacted. Between 60-70 percent of the program costs to date have been paid by the federal discretionary dollars.

- D. John Wayne Airport, Orange County, California--Because of the high demand at this airport and the surrounding homes, the airport has strict flight restrictions, to control noise and safety problems. Only Stage III aircraft have been allowed to land at John Wayne. If a commercial air carrier violates the permitted noise levels, the airport manager may terminate any tenancy and operating privileges at the airport. The airport is closed to most turbojet operations at night. Such restrictions are possible reportedly because other airports in the immediate vicinity are available for operations prohibited at John Wayne.

All air carriers are allotted a certain number of flights. Commuter airlines are allotted a certain number of passengers. The airport monitors the numbers of passengers and flights. Planes that do not meet the noise limits measured at John Wayne Airport's permanent monitoring stations risk losing their allowance for average daily departures.

- E. Boston Logan--Logan is surrounded by water and housing. It has a nighttime preferential runway system to route planes over the water. It also restricts nighttime flights to Stage III craft between 11:00 p.m. and 6:30 a.m.

The airport authority, Massport, has soundproofed three schools and will soundproof six more at a total cost of over \$2 million. About 150 of the most severely noise impacted homes are being insulated.

Massport instituted a noise budget that requires at least 43 percent of an airline's annual operations to be conducted by Stage III aircraft, and requires airlines to not exceed a noise per seat index.

- F. Noise reduction measures implemented at airports around the country have been paid for from federal and local user-fee sources.

1. Eight percent of the Aviation Trust Fund is currently set aside for noise compatibility programs, although the demand is greater than the availability of federal funding.

Efforts to increase the share of trust fund money allocated to noise compatibility programs are underway in the Congress. Both the U.S. House and Senate passed authorization legislation that increases the set-aside for noise programs to ten percent of the fund. The legislation is currently in conference committee.

2. Some airport authorities have used entitlement money from the federal government for noise compatibility programs. Atlanta is among those that have aggressively used federal Airport Improvement Program funds for noise mitigation activities.

In 1987 Atlanta received over \$18 million in entitlement funds and discretionary money that will be matched with city dollars and used on noise mitigation. The money will be used to acoustically treat homes affected by noise. Nearly \$150 million of federal and local dollars has been spent or committed to Atlanta's insulation program over the past nine years.

3. Some airports may not be eligible for federal dollars in the future. The FAA has ruled that approved Part 150 studies are necessary if an airport authority is to receive federal dollars for noise compatibility projects. Some airports that are surrounded by fully developed areas believe land use strategies will not help them, and therefore have not completed Part 150 studies. Some continue to press for federal dollars; whether or not they will receive money remains to be seen.

IX. Passengers at MAC

About two-thirds of passengers surveyed at MSP in 1983-84 came from within the Twin Cities metropolitan area. MAC's survey of passengers during the spring and summer of successive years indicated that 64 percent and 71 percent in 1983 and 1984, respectively, came to the MSP from the metropolitan area. Travelers originating from non-metropolitan Minnesota accounted for 31 percent in 1983 and 22 percent in 1984. Other smaller percentages of those surveyed came from Wisconsin, Iowa, and the Dakotas.

X. Financing Arrangements for Operating MSP

- A. The MAC's operating budget can be thought of as being divided into two budgets: one, including the airfield, taxiways and apron areas, that is financed on a break-even basis; and the second, including the terminal building, parking area and roadways, that is financed on a proprietary basis.
1. The airfield and runway areas operate on a breakeven basis, a financing method known as the "residual" cost approach. The airlines agree in their leases with MAC to pay the costs of the field, runway, and apron area and to make up any deficit that remains--the residual costs. The risk for paying the operating costs belongs entirely to the airlines, not to MAC.
 2. The terminal building operates on a "compensatory" cost approach which means MAC assumes the risk of the operation. MAC has leases with airlines and concessionaires that govern how the rent for use of the facilities is raised. Although the leases cover the period through 1989, they allow the MAC to raise rates on a yearly basis to cover operating costs. The leases specify how the rates are assessed. MAC will retain any surpluses generated by the terminal cost center.

Other cost centers--The parking lot areas, roadways, and other MAC space are separate cost centers with expenses paid by parking revenues and excess terminal building concession revenues.

The operation and maintenance of the reliever airports also comes from the parking and other concession revenues.

WORK OF THE COMMITTEEI. Charge to the Committee

The Citizens League Board gave the committee the following charge:

"The committee shall work to achieve a consensus on how the Minneapolis-St. Paul metropolitan area will continue to provide adequate facilities for national and international air traffic while providing a livable environment for its citizens.

The committee should evaluate:

- " * The role of the main airport in the physical, social and economic development of the metropolitan area.
- " * The physical capacity of the present airport, including the potential for construction of additional runway and terminal capacity.
- " * The potential for persuading or requiring corporate aircraft and other smaller planes to divert to satellite airports.
- " * The "environmental" capacity of the airport, in terms of acceptable noise levels, and the likelihood that various approaches to easing noise levels can be realized, including such approaches as (a) holding down the number of flights, (b) moving to quieter aircraft, (c) greater use of preferential runways, and (d) purchase and removal of dwellings in locations with the greatest noise levels and resale of the land for more compatible uses, such as industry.
- " * The likelihood that in the long run fewer airlines--using larger, quieter aircraft--will replace the large number of newcomer airlines--using smaller, noisier aircraft that have appeared under deregulation.
- " * The need for and cost of a new airport: to replace the existing airport, to relieve the existing airport, or to serve as "insurance" in case air traffic and noise exceed projections, including issues related to finding a site for a new airport.
- " * The effects that a new airport might have on existing and new development in the metropolitan area, including the issue of the dependence of certain businesses and industries on the airport at its current location."

II. Committee Membership

The following persons participated actively in the deliberations of this committee:

John Cairns, Chair	Ellen Brown, Vice-chair
Jeffrey Arnold	Thomas Baerwald
Robert Cardinal	Charles Darth
W.D. Chris Donaldson	Robert Einsweiler
David Fisher	Gene Franchett
Marvin Geisness	Sam Grais
Jon Hohenstein	Curt Hubbard*
Eldredge Jackson, III	Cyrus Knutson
David Kostik	Don Kratsch
Edward Kulczycki	Mary Lange
Dennis Luoto	Patrick Meier
Jim Newland	Michael R. Peterson
Robert G. Peterson	Ann Pollack
Donald Priebe	Rojean Rada
Leonard Ramberg	John Richter
Loren Simer	William J. Smith
William K. Smith	Kenneth E. Stabler
Russell Susag	Robert Teetshorn

*Mr. Hubbard believed additional information should have been included in the report.

The committee was assisted by Citizens League staff persons Jody Hauer, Eric Premack, Paul Gilje, Curt Johnson, Jonathan Hubschman, Nancy Jones, Deborah Kahn, and Joanne Latulippe.

The first meeting of the committee was held February 26, 1987 and the final meeting November 19, 1987. The committee met on a weekly basis, except during the summer months when it met every other week.

The committee met with a variety of resource people during its first three months. The resource people are listed below. Particularly helpful were representatives of the Metropolitan Airports Commission, the Metropolitan Council, The Federal Aviation Administration's Minneapolis Airports District Office and Air Traffic Control. Without their help and information this report would not have been possible.

Tom Anderson, general counsel, Metropolitan Airports Commission
 Frank Benson, manager, FAA Minneapolis Airport District Office
 David Braslau, Braslau & Associates
 Chauncy Case, transportation planner, Metropolitan Council
 Steve Cramer, councilman, City of Minneapolis
 Eliot Cutler, attorney, Webster & Sheffield, Wash., DC
 Bill Escher, executive director, Northern Dakota County Chamber of Commerce
 Nigel Finney, deputy executive director of operations, Metropolitan Airports Commission
 Carol Flynn, member, Metropolitan Council, chair Metropolitan Systems Committee

Tony Foster, president, Minnesota Business Aviation Association
 Donald Fraser, mayor, City of Minneapolis
 Dick Granchelek, transportation specialist, Greater Mpls Chamber of
 Commerce
 Ben Griggs, executive vice-president of operations, Northwest
 Airlines
 Don Groen, president, Bloomington Chamber of Commerce
 Harold Greenwood, chairman, Metropolitan Airports Commission
 Jeff Hamiel, executive director, Metropolitan Airports Commission
 Michael Hamilton, managing director, research department, Piper
 Jaffray & Hopwood
 Tom Hedges, administrator, City of Eagan
 Jon Hohenstein, administrative assistant, City of Eagan
 Richard Jellinger, president, South Metropolitan Airport Action
 Council
 Paul Johnson, senior manager, Federal Express
 David Kelso, noise program coordinator, Minnesota Pollution Control
 Agency
 Jerry Marko, president, Eagan Chamber of Commerce
 Mark Mahon, member, Metro Aircraft Sound Abatement Council,
 councilman, City of Bloomington
 Doug Powers, air traffic manager, FAA
 Donald Priebe, member, Metro Aircraft Sound Abatement Council
 John Richter, John T. Richter Properties
 Walter Rockenstein, II chair, Metropolitan Aircraft Sound Abatement
 Council
 James Serrin, math professor, University of Minnesota
 J. Robert Stassen, deputy executive director of administration,
 Metropolitan Airports Commission
 Bob Swenson, Van Dusen Airport Services, officer, MBAA