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MICHIGAN

(1970 - 1975)

STATE AIRPORT PLAN

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MICHIGAN
STATE AIRPORT PLAN
(1970-1975)

DEPARTMENT OF COMMERCE
MICHIGAN AERONAUTICS COMMISSION

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Lynn D. Allen, O.D., Vice Chm.

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STATE OF MICHIGAN



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Gaylord A. Walker

AERONAUTICS COMMISSION
CAPITAL CITY AIRPORT
LANSING, MICHIGAN 48906

April, 1971

Honorable William G. Milliken
Governor of Michigan
Lansing, Michigan

Dear Governor Milliken:

In keeping with our policy of improving the quality of aviation within the state of Michigan, we are happy to submit the 1970 - 1975 Michigan State Airport Plan.

The Plan shows the five year aviation needs as determined by the staff of the Michigan Aeronautics Commission. It is our hope that the information contained herein will be helpful to state and local officials in establishing priorities for airport development.

During the preparation of this Plan, the aeronautical needs of every community of over 1,000 population were analyzed. The results of our studies show the need for improvements at most of the existing publicly owned airports and the need for numerous new facilities, from 2,500 foot turf airports to major air carrier airports.

In addition to the section on recommended development (Chapter Seven), we have included several chapters which we hope will give the reader a better understanding of Michigan's entire aviation picture.

This Five Year Plan represents the first phase of Michigan's continuing aviation planning program. The next phase will be an intermediate and long range study of the aviation needs of the state for the years 1985 and 2000.

Sincerely,


James D. Ramsey, Director
MICHIGAN AERONAUTICS COMMISSION

mrw/EAM



Acknowledgements

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OBJECTIVES OF THE STATE AIRPORT SYSTEM PLAN

- a. To provide an orderly and timely development of a system of airports adequate to meet air transportation needs of the state.
- b. To provide a framework for airport development programs consistent with short, intermediate and long-range needs.
- c. To assure compatibility with the National Airport Systems Plan so applicable portions may be integrated into the national plan.
- d. To provide a basis for coordination of individual airport plans with the planning by state, metropolitan and urban agencies in the areas of transportation, land use, economic development and resource utilization; and for coordination with airport system plans in adjoining states.
- e. To inform local, state and national political and individual interests of aviation facility requirements, and to bring an awareness to the general public of the need for a systems approach to airport planning and development.
- f. To make possible long-range coordination of airport development, air navigation facilities, airspace use, and air traffic control procedures.
- g. To provide a document for use at the local level in:
 - (i) Preliminary planning
 - (ii) Master planning
 - (iii) Detail planning
 - (iv) Estimating cost of development
- h. To identify the general locations of all the airports, by type and size, required to make air transportation reasonably accessible to every community in the state.
- i. To provide for the orderly allocation of land for airport purposes.
- j. To minimize airport related environmental problems.

SUMMARY

SUMMARY

From its very inception, the aviation industry has been a growth industry in Michigan. For the past 40 years the Michigan Aeronautics Commission has been guiding the development of aviational facilities in the state. In manufacturing, air transportation, and air-field construction, Michigan has achieved remarkable progress through the years, often outpacing national rates of aviation development.

Surveys of Michigan aviation activity play an important part in measuring, recording, and analyzing the actual scope of aviation in the state. The 1962 Fact Finder Survey of activity at all licensed airports in Michigan was the first one of its kind in the nation. This and subsequent surveys in 1964 and 1965 provided the Michigan Aeronautics Commission a basis for planning airports and aviation facility development.

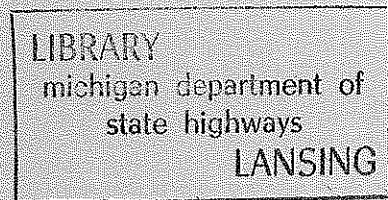
Michigan has experienced much growth in aviation activity as measured by the increase in the following: control tower operations, air carrier passenger and volume of airline cargo. The state's existing airport system includes 294 licensed or approved airports; 32 have runways of 4000' or longer; 65 have published instrument approach procedures; 84 are lighted and paved; 21 have commercial air carrier service and 12 have air traffic control towers. The present systems of airline service, general aviation and private flying all require continuing official concern, to assure re-

tention and expansion of Michigan's outstanding aviation facilities.

The environment of an airport influences its growth and operation. Factors of great importance in relation to airport locations, aviation facility development, and management of air traffic operations include: climatic conditions, airport access, height and land use zoning and noise.

Federal, state and local resources have been well-invested in reaching the present level of aviation development. To supplement limited federal funds for airport development, the Michigan Aeronautics Commission has initiated and sponsored several additional state programs: State-Local, Small Airports; Small Loan; Hazard Removal; Airport Marking; Air Marking; Navigational Aids; and Traffic Counter. Public financial assistance is essential to further aviation development and should be sufficiently increased to provide for adequate aviation programs in the years ahead.

To meet the essential needs of the Michigan Airports System for the next five years, the Michigan Aeronautics Commission recommends the addition of 73 new airports, 57 of which would be minimum turf facilities and 16 would have paved runways. Expansion programs or additions to existing facilities are recommended at 137 airports.



BACKGROUND OF MICHIGAN AVIATION

Chapter One

Background of Michigan Aviation

HISTORY OF MICHIGAN AVIATION

Through the years, Michigan has played a prominent role in the progress of aviation since shortly after the Wright Brothers' first flight in 1903.

In those early years, aviation looked to Michigan for essential manufacturing skills, experience and leadership. Also, during this period, Michigan played a leading role in the utilization of aircraft.

Mail-carrying flights were made between Saginaw and Flint in October, 1915. Aeromarine flying boats, in one two-year period, carried more than 8,000 passengers between Detroit and Cleveland. The Ford Motor Company began its own airline in 1925.

During the 1920's, Michigan officials recognized the need for state regulation of the aviation industry.

Flight operations in the '20's were frequently conducted with very little regard for the safety of the passengers, the public, or the pilot himself. The frequency of airplane accidents in this era convinced the Legislature of the necessity to establish minimum standards for flying fields and flight schools.

Just two years after Lindbergh's non-stop flight from New York to Paris, the 1929 Michigan Legislature created the Michigan Board of Aeronautics. The initial construction program of the Board called for the establishment of landing fields along a north-south route through the center of the Lower Peninsula, and continuing east-west through the center of the Upper Peninsula. During the first two years of this program, a total of twenty landing fields, spaced at about 25-mile intervals, were constructed along the planned routes.

During the Federal Civil Works Administration Program in 1931, followed by two subsequent recovery programs—the Federal Emergency Relief Program and the Works Progress Administration Program—more fields were added, pushing the total to 89 landing fields, sponsored, engineered and supervised by the Michigan Board of Aeronautics.

When Civilian Conservation Corps camps were established in northern Michigan, the Board, in cooperation with the State Department of Conservation, constructed 14 airports in wooded areas of that region. Then, in the period of 1935 to 1937, under the National Youth Administration Program, 40 seaplane bases were established throughout Michigan, along the Great Lakes shorelines and on inland lakes. By this time, the Board had achieved its goal of requiring registration of all aircraft in the state.

Another progressive program which the Board sponsored was the introduction of an aviation educational program in the public schools. An initial effort in this area came in 1934, when all of the physics textbooks were amended, with assistance from this agency, modernizing aeronautics chapters. Aeronautical information was also incorporated into basic courses such as social science, geography and mathematics. In 1935 and 1936, the Department sponsored an aviation ground school program in some 40 communities around the state. Over 2,000 students participated in this program.

These efforts in aviation education proved to be of vital importance to a generation of young people growing up in the air age.

World War II changed the course of history. The Aeronautics Board priorities and goals had to be deferred, and the primary activity of the Board became enforcement of wartime requirements. For example, in 1942, there were 39 airports under 24-hour guard in accordance with CAA requirements.

With the end of World War II, the growth and expansion of aviation in Michigan resumed at an even greater pace than before. A new set of challenges faced aviation officials.

The continuing growth of aviation brought new and more complex problems, and Michigan met the need for broader legislation. The 1945 Legislature enacted Public Act 327, which became known as the Aeronautics Code. The bill provided that the aviation governing body be elevated to department status.

The major impetus for the post-war airport planning and development program came with the Federal Airport Act of 1946. This act authorized \$500 million for the construction and improvement of public airports throughout the United States. Of this sum, Michigan expended \$7.5 million during the first eight years of the program.

Under the new State Constitution of 1961, the Michigan Department of Aeronautics became the Michigan Aeronautics Commission, within the Department of Commerce. The duties and responsibilities of the agency remained the same as before.

To fulfill a long-standing need for detailed aviation information, the Michigan Aeronautics Commission conducted an extensive survey to be used as the basis of a Master Plan for Michigan airports. Known as Michigan Aviation "Fact Finder," the survey was con-

ducted from July 28 to August 3, 1962, with all 137 licensed airports participating.

Data of the Fact Finder is periodically updated to provide a basis for projection of Michigan's future aviation needs and prospects, and are the Aeronautics Commission's contribution to the State Resource Development Study.

In the past decade, two planning surveys have been updated. In 1964, a re-survey was conducted at 10 representative airports around the state. In addition, tower counts were obtained from Michigan's 11 control towers. In 1965, a summer-long survey running three and four days at a time, was conducted at 36 representative airports throughout the state. Chapter II of this report analyzes and compares the results of the 1962 Fact Finder survey with the 1964 & 1965 summer surveys.

GROWTH IN MICHIGAN AVIATION

Figures 1 and 2 portray the long-range growth pattern of aviation in Michigan.

(NOTE: 1946 was used as the base year for these calculations because World War II restrictions on airport operations resulted in airport licensing criteria different from normal years. Figures from the war years are thus statistically inconsistent with those of peacetime years.)

Privately owned airports not open to the public are not included in the tables and graph.

Figure 1 shows that the number of aircraft registered in Michigan has climbed from 1,621 in 1946 to 5,333 in 1969, an increase of 229%. *This is more than double the national growth rate for the same time period, which was 105%.*

Figure 2 lists the number of airports in the state from 1947 to 1969, classified by category (licensed commercial or approved non-commercial) and by ownership. Note that the number of licensed airports decreased in the early 1950's, and then gradually increased up to the present date. (After the end of World War II, there came a great surge of flying by returning veterans enrolled in aviation training programs under the GI Bill. Many schools were opened at that time, but a number of these schools and airports terminated operations as the benefits of the GI Bill were exhausted.)

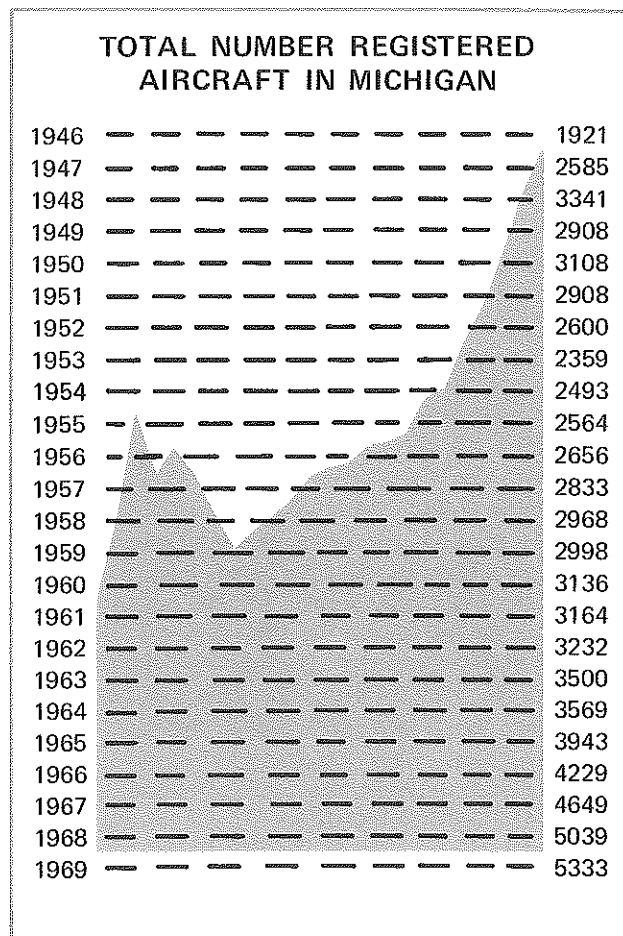


FIGURE 1

Approved non-commercial fields have increased at a rapid rate in the last decade. A number of communities—to keep pace with growing industrial demand—have established minimum capability airports. Although these communities do not feel they require full service airports (i.e., gas, hangers, attendant, etc.), they are able to meet the limited needs of local industry. Airports without commercial operations are classified as approved non-commercial fields by the Aeronautics Commission.

MICHIGAN AIRPORTS OF RECORD
(Seaplane bases and Heliports are not Included)

YEAR	LICENSED COMMERCIAL— PUBLIC USE			APPROVED NON- COMMERCIAL PUBLIC USE	GRAND TOTAL
	PUBLICLY OWNED	PRIVATELY OWNED	TOTAL	TOTAL	
1946			181		181
1947	89	120	209		209
1948	99	107	206	30	236
1949	97	92	189	59	248
1950	96	94	190	56	246
1951	89	80	169	74	243
1952	79	58	137	98	235
1953	78	57	135	99	234
1954	80	52	132	100	232
1955	82	48	130	93	223
1956	82	49	131	83	214
1957	82	49	131	85	216
1958	84	50	134	86	220
1959	87	53	140	69	209
1960	87	50	137	75	212
1961	86	47	133	79	213
1962	85	51	136	83	216
1963	86	51	137	93	230
1964	88	50	138	98	236
1965	88	53	141	110	251
1966	91	50	141	112	253
1967	94	53	147	113	260
1968	90	52	142	117	261
1969	94	57	151	119	270

FIGURE 2

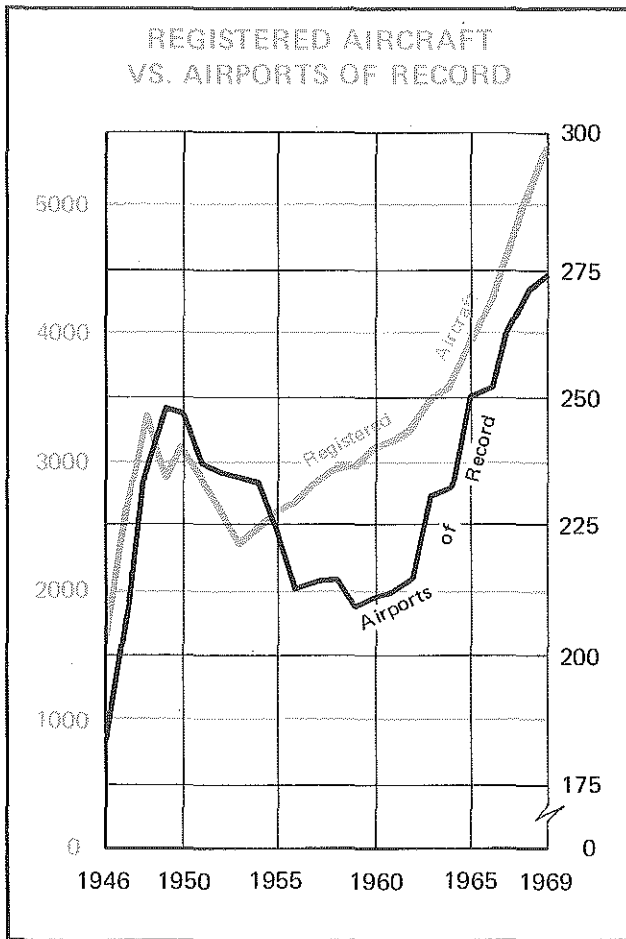


FIGURE 3

The two superimposed graphs in Figure 3 indicate a definite relationship between the number of registered aircraft in the state and the total amount of established airports. Both categories are nearly parallel. However, note that the decreases and subsequent increases both occur sooner in registered aircraft than in airports. This suggests a cause and effect relationship between the number of registered aircraft and the number of airport establishments and abandonments.

Michigan aviation has come a long way since the beginning of the Air Age in the first decade of the Twentieth Century. This state can be justly proud of its contributions to aviation progress, and its part in the growth of a great industry.

The achievements of the past and the dynamic aviation industry of today give Michigan the basis for further progress in the future. To put the outlook for the future in airman's terminology: "C-A-V-U"—ceiling and visibility unlimited!

PREVIOUS MICHIGAN AVIATION SURVEYS

Chapter Two

Previous Michigan Aviation Surveys

SURVEYING MICHIGAN AVIATION

The Michigan Aeronautics Commission has long recognized the great importance of collecting and organizing detailed information on Michigan aviation activity. Such data is essential for aeronautical planning purposes.

The Commission maintains records of state aviation for over 20 years. This data includes registered aircraft (by county and by airport within the county); number of airline passengers, mail and cargo at airports offering scheduled air carrier service; and operations per month at airports where traffic is controlled by FAA towers.

These methods do not provide a comprehensive picture for one very important part of the total aviation scene—general aviation, which comprises that aeronautical activity which is other than air carrier and military operations. Some information in this area is obtained from control tower airports, and a number of non-tower airport managers have made estimates of their general aviation operations, but a truly definitive measurement of this major aviation segment remains to be accomplished.

The Commission conducted its Michigan Aviation Fact Finder at 137 licensed airports within the state

for seven days—July 28 to August 3, 1962. A summary of the survey results was issued as "Fact Finder Survey Report No. 1" in June, 1963. A follow-up survey at 10 representative airports was conducted in the same seven-day period of 1964; and in 1965, 36 airports were similarly surveyed at varying periods of time during June, July and August.

Analysts found a number of interesting comparisons of the results obtained from these surveys. These comparisons are expressed on a percentage basis because of the wide differences in actual numbers of aircraft surveyed. In 1965, the only questions surveyors asked were on flight origin and destination data, and type of aircraft. The 1962 and 1964 surveys both sought data on the navigational and radar equipment used by pilots interviewed.

The following graphs portray the comparative results of the three aviation surveys.

Figure 4 shows the incidence of radio contact reported by surveyed aircraft in 1962 and 1964. The significant change in this statistic is that the number of pilots making some radio contact increased from under 80% to over 90% of those surveyed.

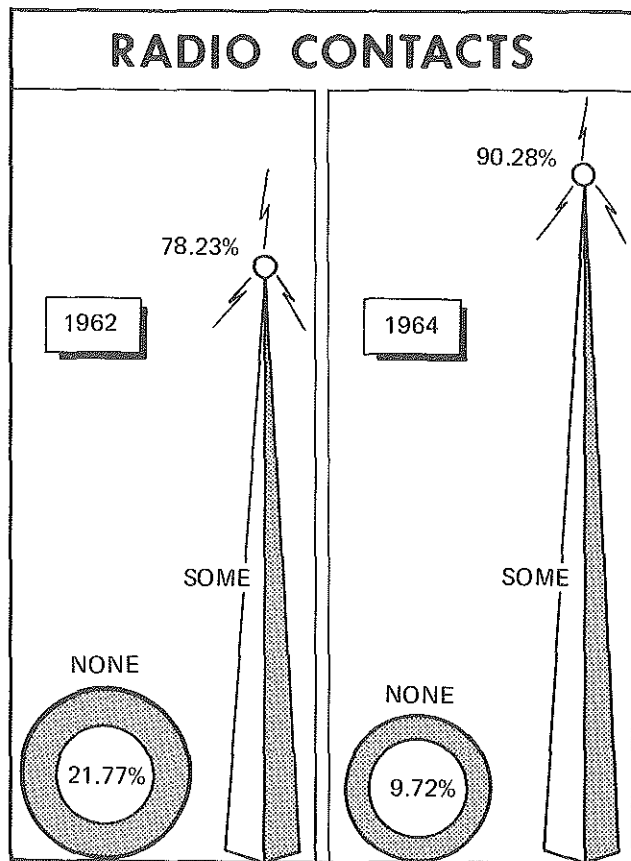


FIGURE 4

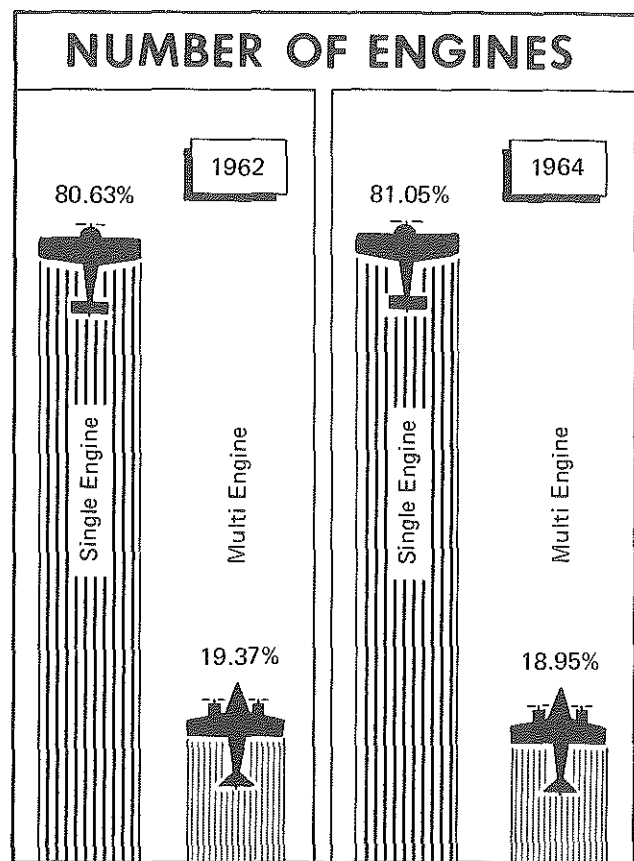


FIGURE 5

The proportion of surveyed aircraft by single-engine and multi-engine classifications is shown in Figure 5. While the percentage of multi-engine aircraft in use was known to be increasing both in Michigan and the nation, the percentage of multi-engine aircraft surveyed showed less than ½% decrease in 1964 from the 1962 ratio. It is relevant to point out that these survey results cover aircraft that were actually in the air during the survey period, and do not necessarily reflect the actual percentage of registered aircraft in the state.

Another interesting comparison is found in the national figures of 1965—84% of the country's registered aircraft were of the single-engine type, higher than the Michigan survey results in both 1962 and 1964.

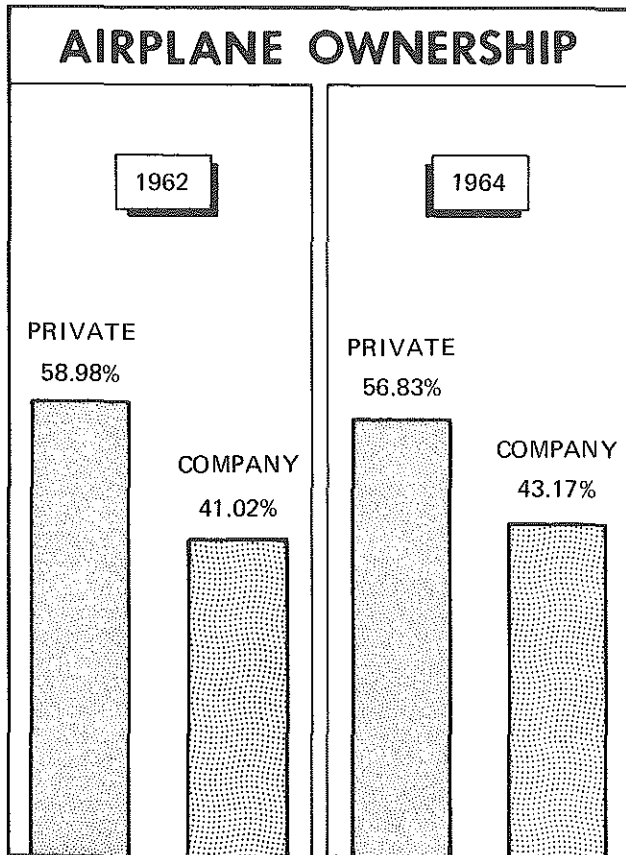


FIGURE 6

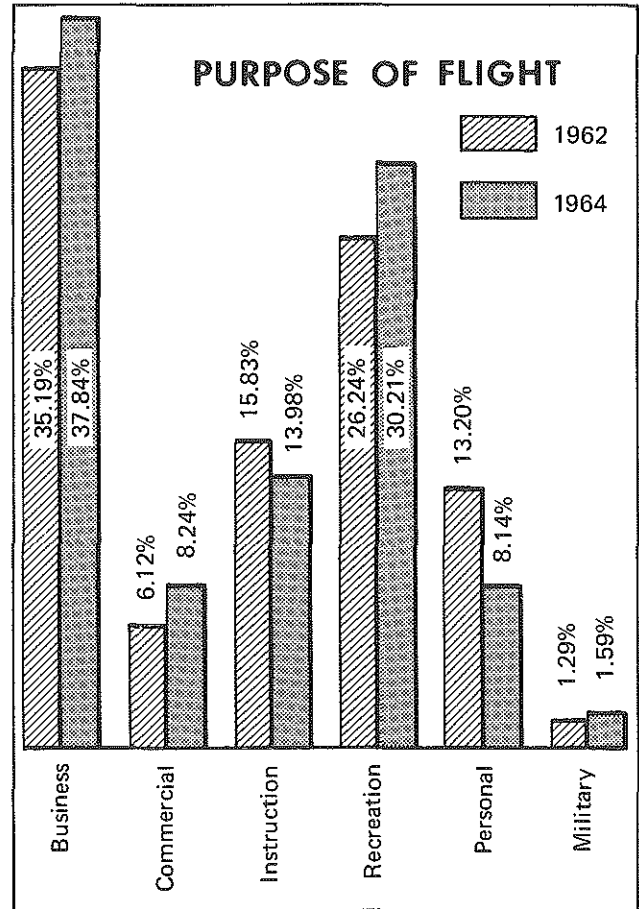


FIGURE 7

The proportion of company ownership to private owner of surveyed aircraft increased by 2% in 1964 over 1962, as shown in Figure 6. In 1962, national figures of the FAA indicated that business ownership accounts for about 23% of all aircraft. The Michigan survey shows a much higher percentage, or 41%.

Another comparison of special interest is illustrated in Figure 7, concerning the purpose of flights. Business, commercial and recreational uses were the leading purposes given for aircraft trips in 1962, and again in 1964. Both categories showed an average increase of under 5%.

Figure 8 shows the percentage of total operations per day of the week. The busiest single day in the 1962 and 1964 surveys occurred on a weekday, while Sunday had the greatest activity in 1965. In all three survey years, over 70% of operations took place during the normal business day of 8:00 a.m. to 5:00 p.m.

The particular nature of various flights at different times of the day is also of significant interest. Figure 9 presents this hourly activity in divisions of itinerant and local operations. In all three survey years, the hour of the day with the highest percentage of itinerant operations was 7:00 p.m., while the busiest hour of the day for local operations was 4:00 p.m. The average percentage of itinerant operations during normal business hours (from 8:00 a.m. to 5:00 p.m.) for the three surveys is 66%. For the same three survey years, the percentage of local operations averages 76%. Ninety percent (90%) of all operations occur in the daylight hours.

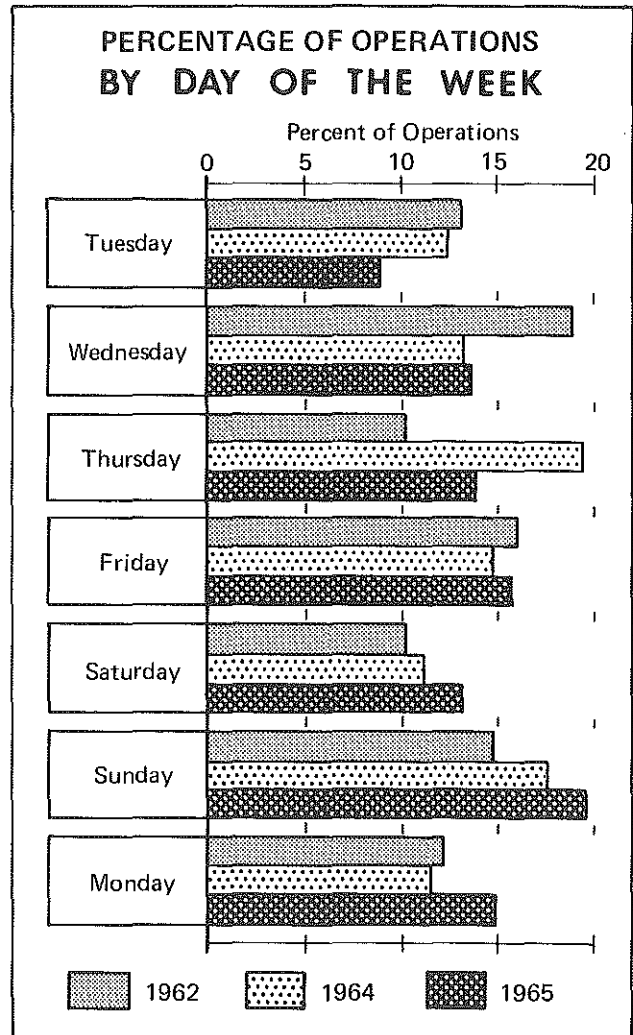
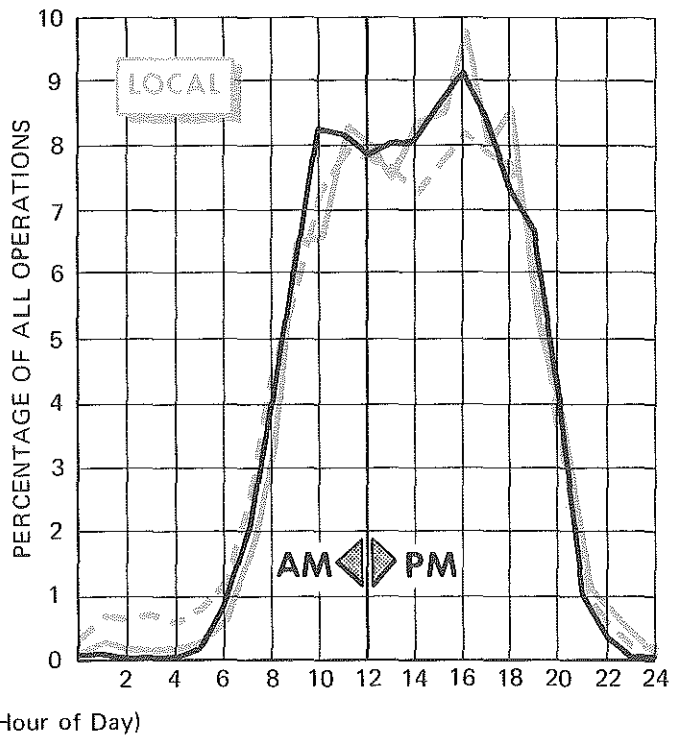
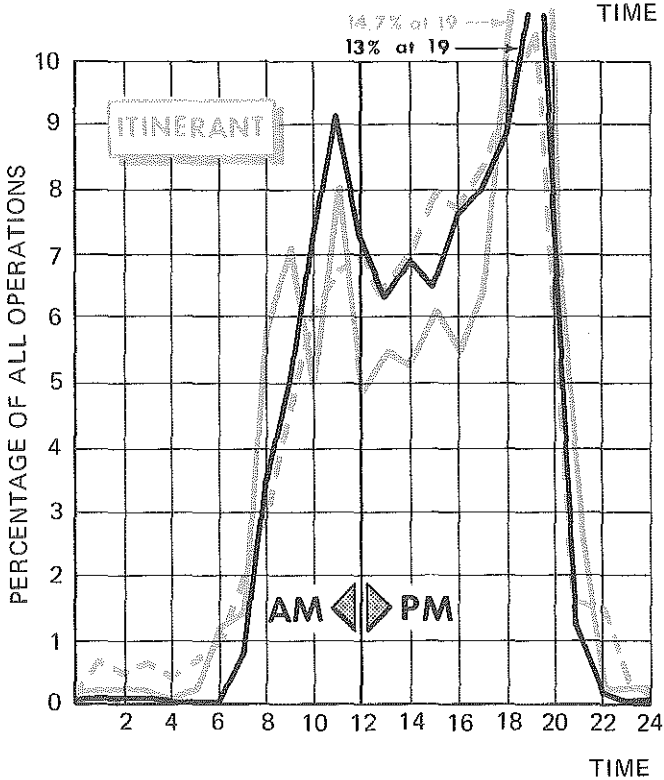
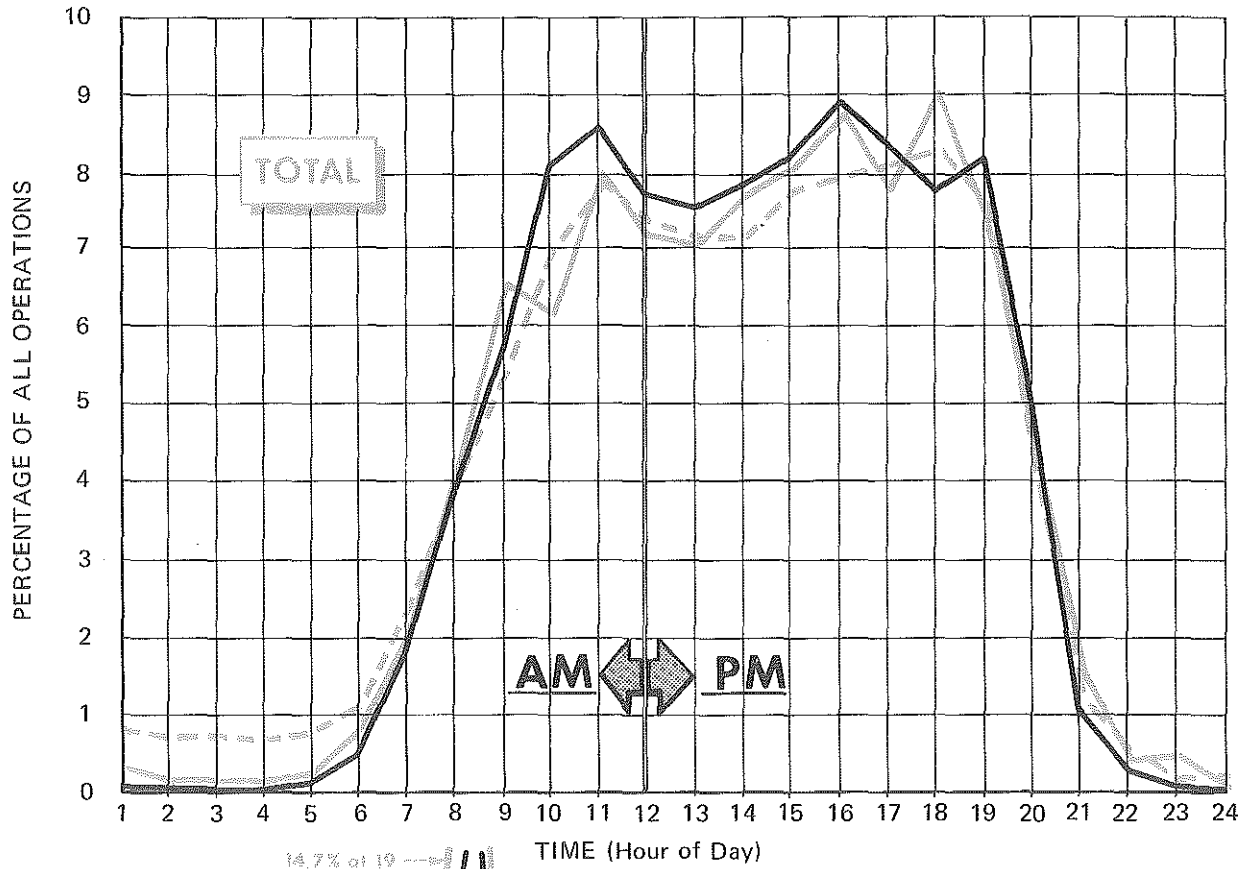


FIGURE 8

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NUMBER OF OPERATIONS PER HOUR OF DAY



- - - 1962
— 1964
— 1965

INVENTORY OF EXISTING AIRPORT SYSTEMS

Chapter Three

Inventory of Existing Airport Systems

INVENTORY OF EXISTING AIRPORT FACILITIES

The Michigan Aeronautics Commission has established two types of classifications for airports open to the general public—licensed commercial airports and approved non-commercial airports.

Licensed Commercial Airports

All airports, landing fields, seaplane bases, heliports, and other aeronautical facilities conducting a commercial business for the general public must be licensed, and meet the minimum requirements of the Rules and Regulations of the Michigan Aeronautics Commission. Airports with commercial licenses are classified as Class A, Class B, or Class C, depending on the aeronautical facilities offered to the public. Licenses are granted annually, and airports are inspected annually. Every licensed airport must meet the minimum safety requirements of the Michigan Aeronautics Commission. Licensed facilities appear on the state aeronautical chart and other aviation publications made available to the public.

A licensed commercial airport does not necessarily have airline service, but must have a commercial aviation business or fixed base operation.

Approved Non-Commercial Airports

Airports, landing fields, seaplane bases, and other aeronautical facilities which cannot meet, or do not wish to meet, the minimum requirements of a licensed facility, can be approved as non-commercial fields if they meet certain minimum requirements. According to the Michigan Aeronautics Commission Rules and Regulations, these are classified as Class D substandard non-commercial fields. No commercial activity is allowed. No licenses are granted to these facilities—but they are inspected annually, and must meet the minimum safety requirements of the Aeronautics Commission. Approved fields appear on the state aeronautical chart and other aviation publications made available to the public. These airfields are available to the public at the pilot's discretion.

Existing Facilities—1970

Michigan's existing airport system is comprised of 294 licensed or approved airports, 6 seaplane bases, 2 heliports and 4 military fields. In addition, there are some 467 personal use landing strips throughout the state which are not licensed, approved or charted on the state aeronautical chart.

Following is a condensed summary of the type of airport facilities now established in Michigan:

Lighted airports	107
Paved airports	96
Lighted and paved airports	84
Airports with 4000' runway or longer	32
Airports with published instrument approach procedures	65
Publicly owned airports	118
Privately owned airports	176
Airports with commercial air-carrier service	21
Airports with scheduled air taxi service	12
Airports with FAA control towers	12

GENERAL AVIATION AIRPORTS

National statistics available show that approximately 95% of the total operations in the United States are conducted by the general aviation fleet. By comparison, the same statistics show that general aviation activity in Michigan comprises 80% of the total operations at control tower airports. Further underscoring its importance in Michigan is the "Fact Finder Survey" indication that more than 90% of total operations conducted in this state were by the general aviation fleet. This finding in itself attests to the impact of this segment of aviation on Michigan.

Practically speaking, all of Michigan's 294 licensed or approved airports are general aviation airports. However, 21 of these have a primary interest in commercial air carrier service; therefore, Michigan devotes 273 licensed or approved airports to general aviation.

Although more than half of Michigan's general aviation fleet is privately owned, its predominant utilization is for business purposes. The "Fact Finder" revealed the following:

<i>Purpose of Flight</i>	<i>Percent of Total</i>
Business	51.0%
Recreation	18.5%
Instruction	10.5%
Personal	10.5%
Commercial	6.0%
Cargo Flight	2.0%
Military	1.5%
	100.0%

Of the 273 general aviation airports in Michigan, 97 are publicly owned and 176 are privately owned. Many of the privately owned airports were developed at recreational areas and resorts. This usage is particularly evident in the northern half of the state, where recreational activities are predominant the year around.

inherent in having good airline service for the locality. In this connection, a vigorous informational and promotional program may prove very helpful to communities working to retain or improve their airline service. It is logical to expect that if airlines begin to lose passengers and profits, they will want to reduce the number of flights into a particular location, thereby reducing the convenience of air travel to and from that location.

* * *

AIRLINE SERVICE

The allocation of certificated airline (air carrier) service to communities is made on the federal level by the Civil Aeronautics Board. "Air carrier" is defined as the carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft.

The Federal Act of 1958 pertains to commercial air carriers. There are 15 separate titles in this Act, most of which pertain to areas of regulation unrelated to the economics of transportation. However, there are four sections of the Aeronautics Act which significantly affect airport planning, as follows:

1. *Sec. 401.* No air carrier shall engage in air transportation unless it has a certificate issued by the Board.
2. *Sec. 401 (j).* No air carrier shall abandon any route, or part of a route, for which a certificate has been issued by the Board, unless . . . the Board . . . find such abandonment to be in the public interest. . . . The Board may . . . authorize . . . temporary suspension of service as may be in the public interest. . . . a carrier must serve the points listed in its certificate, . . . the carrier, if it so chooses, can provide nonstop service.
3. *Sec. 401 (g).* The Board . . . may amend or suspend any certificate in whole or in part if the public convenience and necessity require it.
4. *Sec. 401 (3) (4).* The Board cannot restrict the right of an air carrier to add or change schedules, equipment, accommodations and facilities for performing the authorized transportation and service as the development of the business and the demands of the public shall require. . . .

It is important that all citizens, and especially businessmen, be made fully aware of the many values

There are now 21 airports in Michigan which offer regularly scheduled commercial airline service. The Air Carrier Route Structure serving these points as of January, 1971, is illustrated on map 5 (Michigan's Air Carrier Routes).

Cities receiving direct nonstop service from Detroit are shown on map 6 (Non-Stop Airline Service from Detroit). This transportation information is often used by organizations interested in economic expansion as one means of promoting advantages of Michigan to prospective industrial concerns. Although, obviously, you can fly anywhere in the United States or abroad, via connecting flights, this map shows direct nonstop service as of January, 1971.

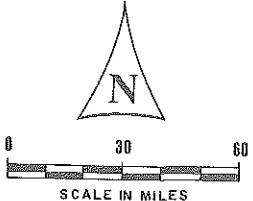
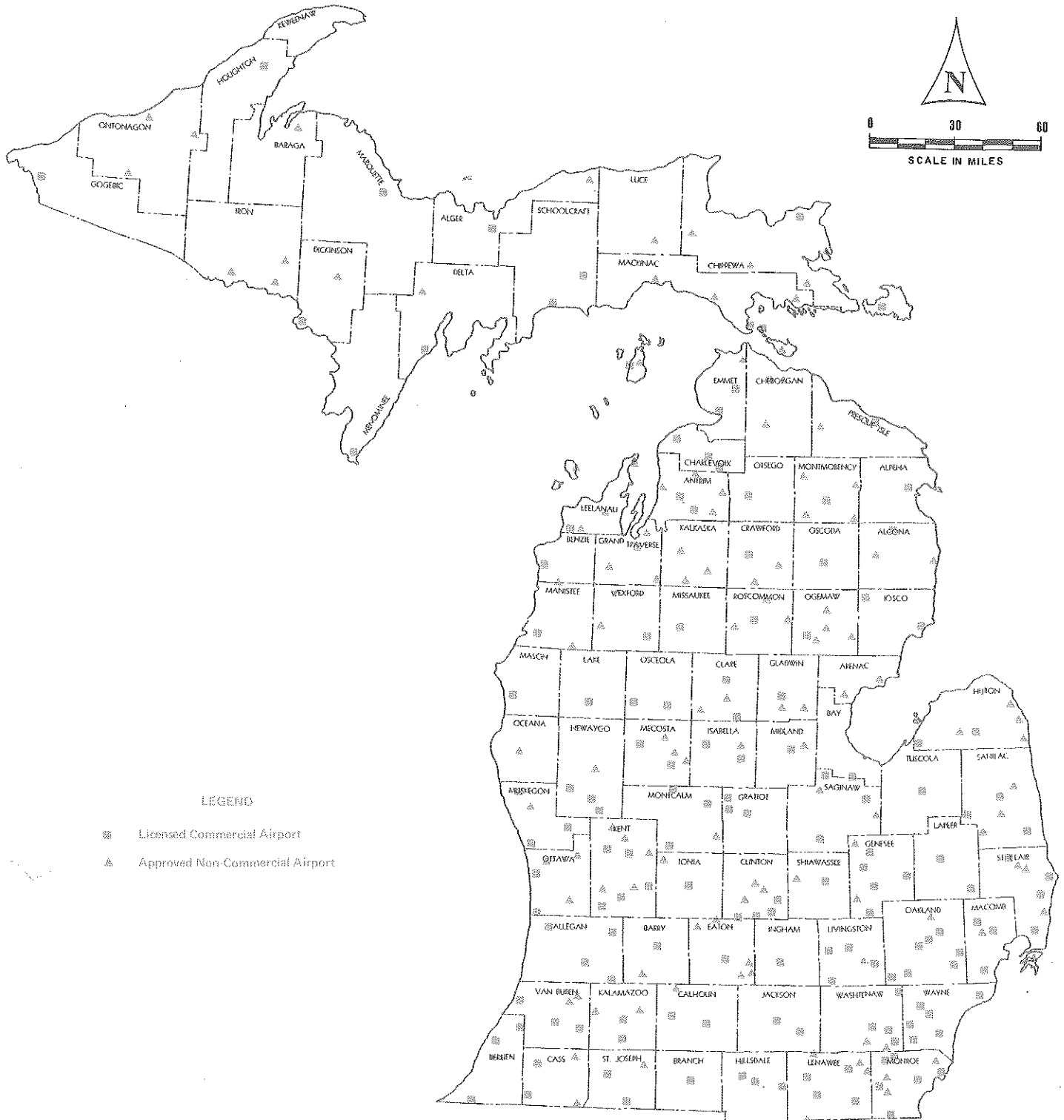
The growth in passenger and cargo traffic is significant in Michigan's contemporary aviation picture. Figure 10 lists the total number of airline passengers and total pounds of air cargo at each air carrier airport for 1962 and 1970 and indicates the percentage of increase for each category in that period of time.

A detailed listing of Michigan's air carrier airports is presented in Figure 11, giving the airline(s) serving each airport, the type of equipment each airline is presently using, and the critical aircraft proposed for future use at each airport.

(NOTE: The term "critical aircraft" means the type of aircraft which puts the greatest demands on the airport in terms of required runway length and pavement thickness.)

It is highly important for planners and public officials to know what the critical aircraft needs will be at each airport, in order to plan future construction and improvements to keep pace with airline service demands. When planning Michigan's airports of tomorrow, advances in aircraft technology must always be considered.

MICHIGAN'S AIRPORTS



LEGEND

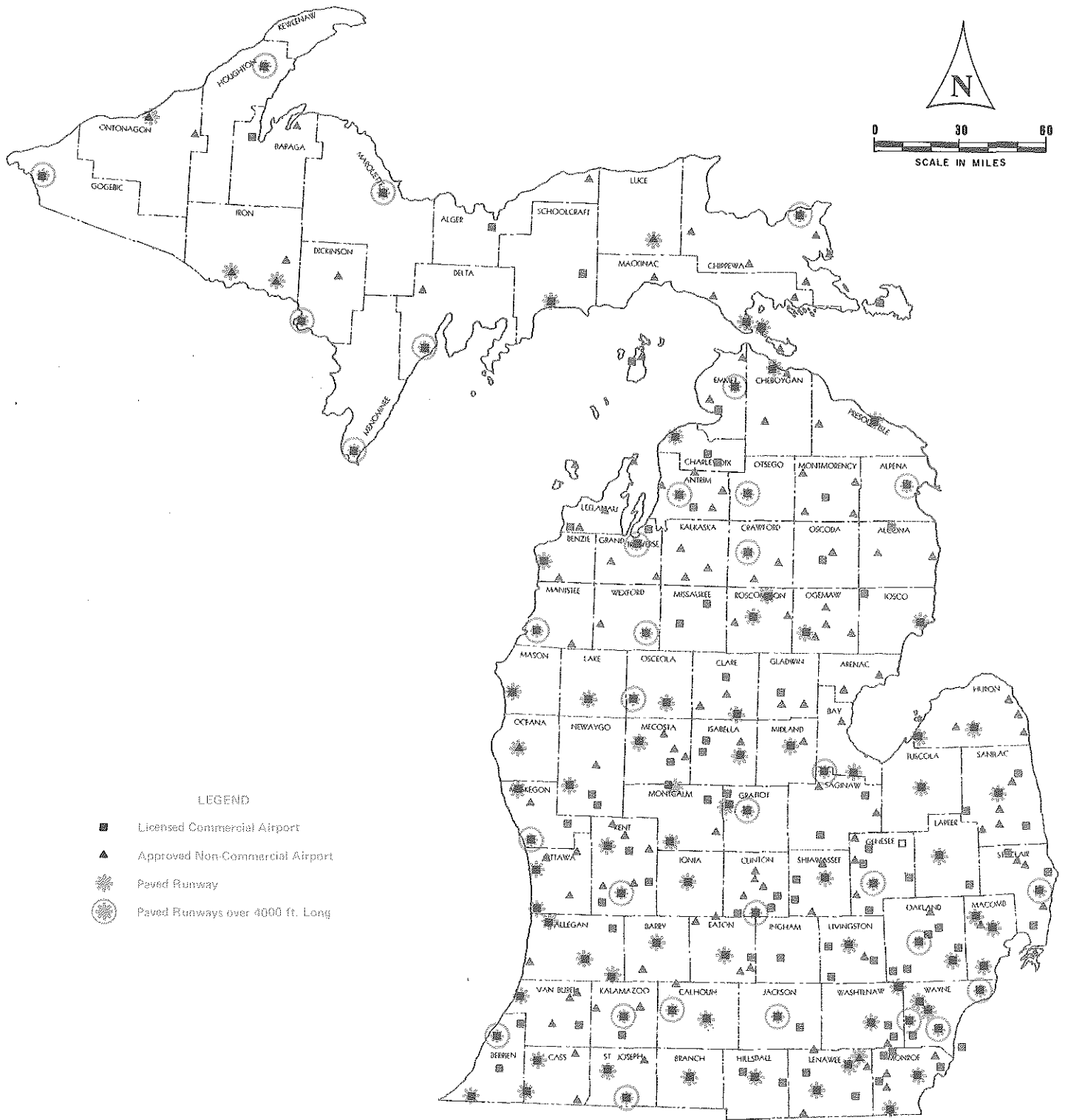
- Licensed Commercial Airport
- ▲ Approved Non-Commercial Airport

Source: Engineering Division
MICHIGAN AERONAUTICS COMMISSION

MAP 1

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

MICHIGAN'S PAVED AIRPORTS



Source: MICHIGAN AERONAUTICS COMMISSION January, 1971

MAP 2

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

MICHIGAN'S LIGHTED AIRPORTS



LEGEND

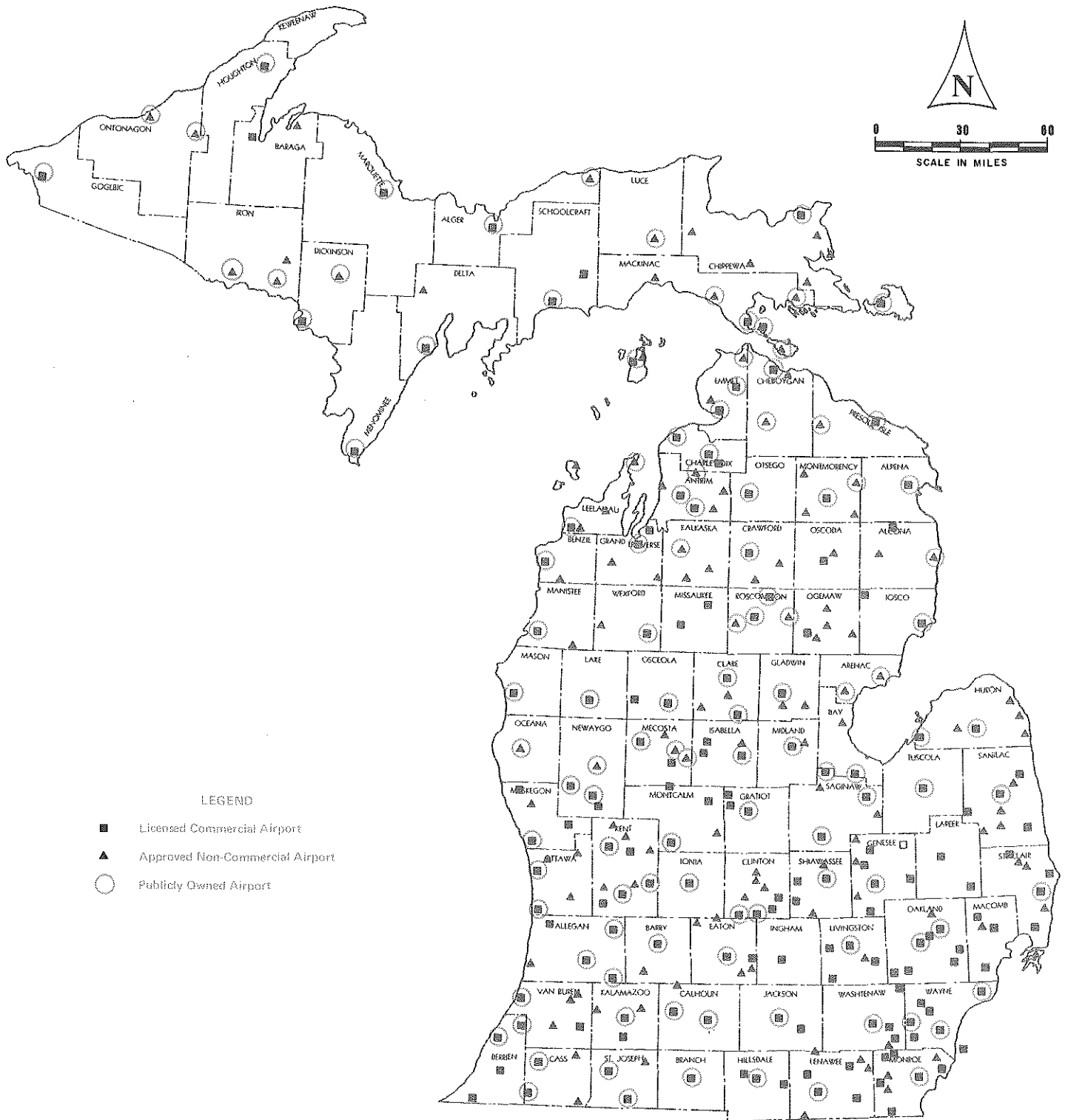
- Licensed Commercial Airport
- ▲ Approved Non-Commercial Airport
- ✴ Airports With Runway Lights

Source: MICHIGAN AERONAUTICS COMMISSION January, 1971

MAP 3

Prepared By The Engineering Division
 MICHIGAN AERONAUTICS COMMISSION
 DEPARTMENT OF COMMERCE

MICHIGAN'S PUBLICLY OWNED AIRPORTS

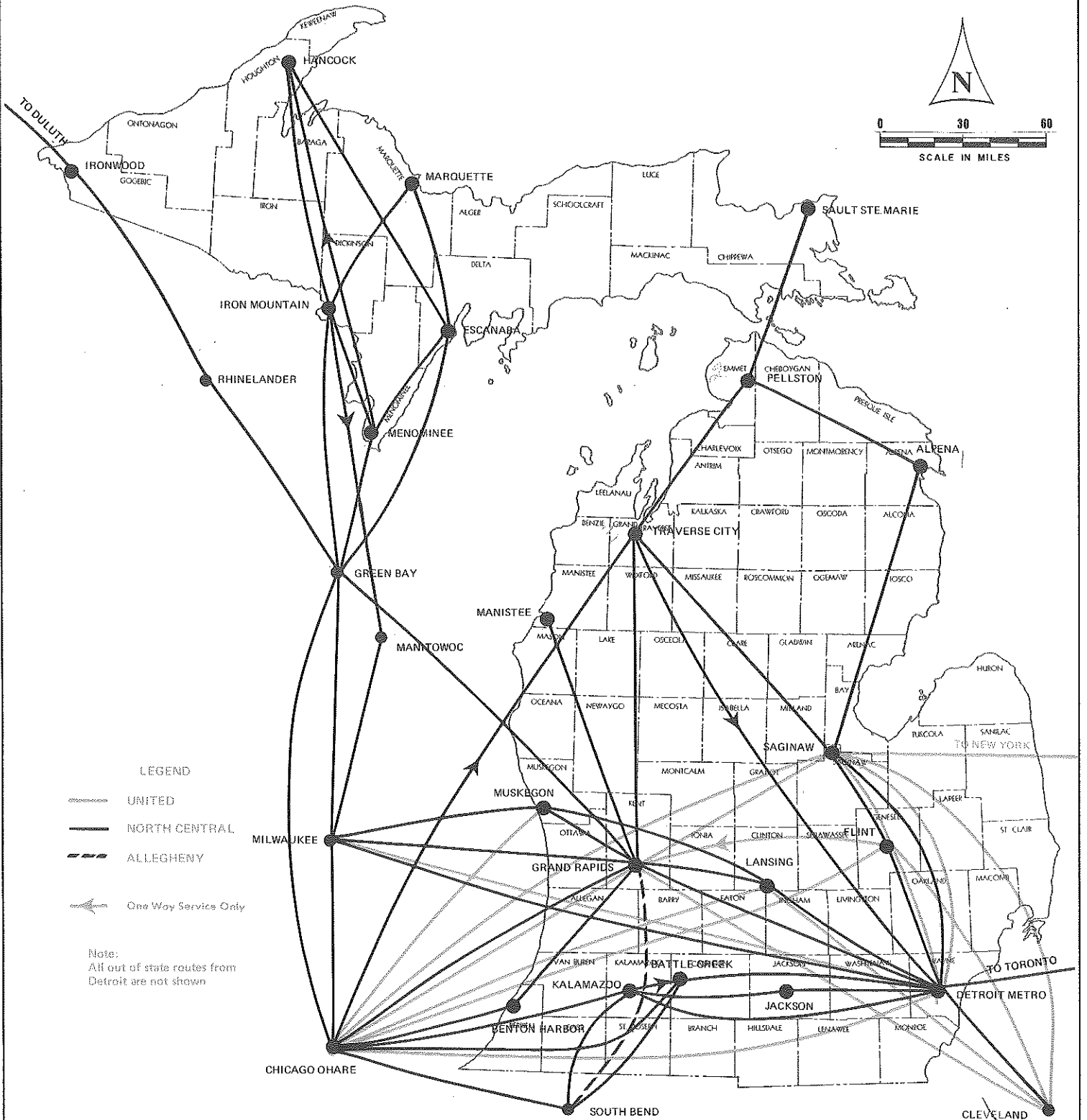


Source: MICHIGAN AERONAUTICS COMMISSION January, 1971

MAP 4

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

MICHIGAN'S AIR CARRIER ROUTES (January 1971)



LEGEND

----- UNITED

———— NORTH CENTRAL

..... ALLEGHENY

← One Way Service Only

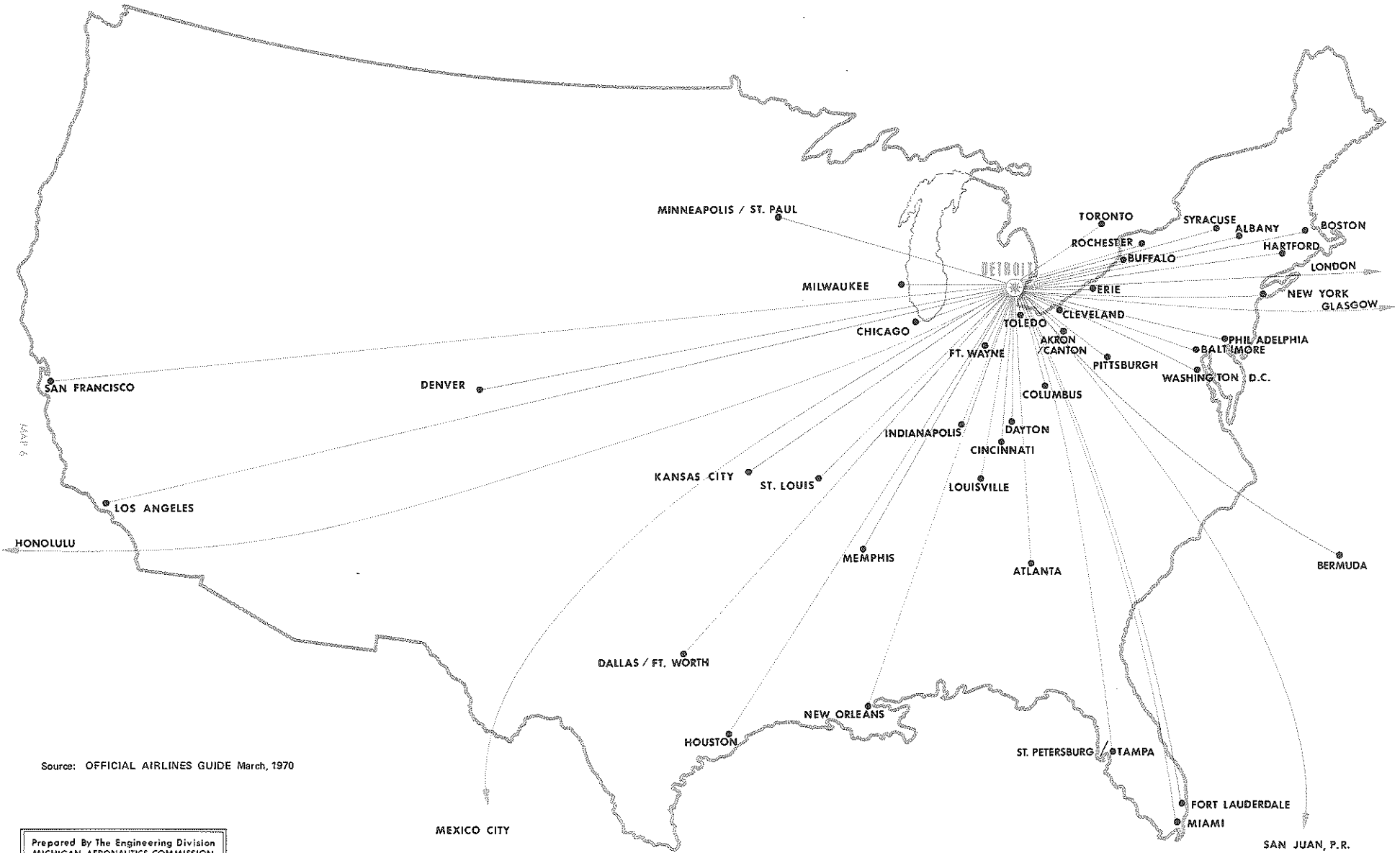
Note:
All out of state routes from
Detroit are not shown

Source: MICHIGAN AERONAUTICS COMMISSION

MAP 5

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

Cities Having Direct, Non-Stop, Scheduled Airline Service From DETROIT METROPOLITAN AIRPORT Jan., 1971



31

MAP 6

Source: OFFICIAL AIRLINES GUIDE March, 1970

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

AIR CARRIER AIRPORTS

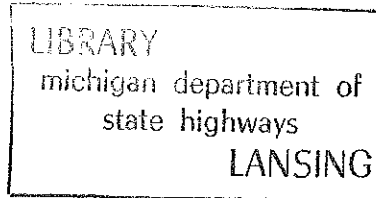
Pounds of Air Cargo and Number of Airline Passengers

CITY	AIRPORT	AIRLINE PASSENGERS			AIRLINE CARGO (OUT BOUND IN POUNDS— EXCLUDING MAIL)		
		1962	1970	% INCREASE 1962-1970	1962	1970	% INCREASE 1962-1970
Alpena	Phelps-Collins	4,050	12,922	219	43,070	286,426	565
Battle Creek	W. K. Kellogg Regional Airfield	28,320	57,464	103	129,976	170,921	31
Benton Harbor	Ross Field	14,444	44,288	206	267,383	496,524	85
Detroit	Detroit Metropolitan	2,886,134*	7,141,398*	147	71,901,200*	162,858,703*	126
Escanaba	Escanaba Municipal	9,602	28,169	193	40,225	98,657	145
Flint	Bishop	45,180	156,992	247	763,607	1,628,047	113
Grand Rapids	Kent County	200,636	437,220	118	2,010,535	5,583,983	178
Hancock	Houghton County Memorial	11,434	34,883	205	19,358	227,798	1,076
Iron Mountain	Ford	10,840	25,904	138	51,742	140,979	172
Ironwood	Gogebic County	4,964	15,433	210	4,946	23,200	369
Jackson	Reynolds Municipal	5,158	10,754	108	173,903	167,660	-3
Kalamazoo	Kalamazoo Municipal	50,286	125,736	150	732,682	1,235,732	68
Lansing	Capital City	90,746	238,165	162	564,739	1,319,050	133
Manistee	Manistee County— Blacker	4,268	4,453	4	43,818	104,841	139
Marquette	Marquette County	19,190	49,050	155	27,429	190,308	594
Menominee	Menominee County	6,530	16,540	153	48,948	229,554	369
Muskegon	Muskegon County	54,382	124,451	129	797,465	2,606,850	227
Pellston	Emmet County	16,222	31,411	93	90,746	267,409	194
Saginaw	Tri-City	96,310	277,696	188	808,005	2,043,418	152
Sault Ste. Marie	Sault Ste. Marie Municipal	13,108	18,463	41	22,677	40,062	77
Traverse City	Cherry Capital	26,224	72,835	177	90,356	530,026	486
TOTALS		3,598,028	8,924,227	148	78,632,809	180,250,148	129

*The 1962 Detroit total includes cargo and passenger figures from Willow Run, Metro and City Airports. The 1970 Detroit total includes cargo and passenger figures from Metro and City Airports, as the commercial airlines left Willow Run Airport in 1966.

SOURCE: Michigan Aeronautics Commission, *Airline Records*, 1962 and 1970.

FIGURE 10



STATE OF MICHIGAN
AIR CARRIER AIRPORTS

Airport Location	Airport Name	Airline Serving	Equipment Currently Used	Proposed Critical Aircraft		
Alpena	Phelps Collins	North Central	CV-580 DC-9	DC-9-31		
Battle Creek	W. K. Kellogg Regional Airfield	North Central	CV-580 DC-9	DC-9-31		
Benton Harbor	Ross Field	North Central	CV-580	CV-580		
Detroit	Detroit Metropolitan—Wayne County	American Aero Navis De Mexico Allegheny BOAC Braniff Delta Eastern Flying Tiger Mohawk Northwest Orient Pan American Seaboard World Trans World Airlines United	All makes and models of jet and piston aircraft	B-747		
Escanaba	Escanaba Municipal	North Central			CV-580 DC-9	DC-9-31
Flint	Bishop	North Central United			CV-580 DC-9 B-737 B-727	B-737-200 B-727-200
Freeland	Tri-City	North Central United			CV-580 DC-9 B-737 B-727	B-737-200
Grand Rapids	Kent County	Allegheny North Central United			Nord 262 CV-580 DC-9 B-737	B-727-200
Hancock	Houghton County Memorial	North Central			CV-580	DC-9-31
Iron Mountain	Ford	North Central			CV-580 DC-9	DC-9-31
Ironwood	Gogebic County	North Central			CV-580	CV-580
Jackson	Reynolds Municipal	North Central			CV-580	CV-580
Kalamazoo	Kalamazoo Municipal	North Central			CV-580	CV-580
Lansing	Capital City	North Central United	CV-580 DC-9 B-737	B-727-200		
Manistee	Manistee County—Blacker	North Central	CV-580	CV-580		
Marquette	Marquette County	North Central	CV-580 DC-9	DC-9-31		
Menominee	Menominee County	North Central	CV-580	CV-580		
Muskegon	Muskegon County	North Central United	CV-580 DC-9 B-737	B-737-200 B-727-200		
Pellston	Emmet County	North Central	CV-580 DC-9	DC-9-31		
Saginaw	(See Freeland)					
Sault Ste. Marie	Sault Ste. Marie Municipal	North Central	CV-580	DC-9-31		
Traverse City	Cherry Capital	North Central	CV-580 DC-9	DC-9-31		

SOURCE: Michigan Aeronautics Commission Airline Records and Air Transport Association Recommendations—Fall 1970.

FIGURE 11

COMMUTER AIRLINES

In the last few years, there has been a tremendous increase in commuter air transportation in the United States, and in Michigan. In 1961, there were only 12 third-level operators in the entire United States. By 1967—just six years later—there were from 175 to 225 operators, utilizing some 700 airplanes. In 1968 the FAA reported approximately 250 operators utilizing 1,272 aircraft, and in 1969 it had decreased to 153 operators using 864 aircraft.

Recent developments in insurance requirements have reduced the number of small operators entering the field. At the same time, many of the larger and generally more stable operators have merged with the smaller airlines. The result has been fewer, but better functioning, commuter operations. In July of 1969, the National Air Transportation Conference reported that 648 cities in the U.S. were receiving scheduled airline service. 83% (538) of these cities are served by scheduled certificated airlines; 17% are served by 110 commuter air carriers.

POPULATION OF CITIES SERVED BY COMMUTER AIR CARRIERS

<i>Population</i>	<i>Number of Cities Served</i>
Under 5,000	55
5,001 - 15,000	67
15,001 - 25,000	49
25,001 - 50,000	62
50,001 -100,000	44
100,001-500,000	60
500,001-1,000,000	17
Over 1 million	5

*Source: National Air Transportation Conference (1969)

Unlike the local and trunk airlines, the commuter airlines operate under a Civil Aeronautics Board exemption. To remain within this exemption, the commuter must operate aircraft under 12,500 pounds gross weight. (Gross weight includes the weight of

the airplane, passengers, fuel and cargo.) Under this exemption, commuter airlines are free of the route and rate controls placed on the local and trunk operators.

In the past, these small airlines were known by various names—commuter airlines, third-level airlines, and air taxis. Now, as of July, 1969, they are officially called commuter air transports, if they have at least five scheduled operations per week. The Michigan Aeronautics Commission has adopted regulations requiring commuter air transport operators to notify the Commission of their route structures if 50% or more of their business is within the state of Michigan. There are at present three commuter air transports doing 50% or more of their route mileage within Michigan. (See Map 7 Michigan Commuter Air Service). These are Air Michigan, Welch Aviation, and Trans-Michigan Airlines.

There are four other commuter air transports with less than 50% of their route mileage in Michigan, but their operations are extensive enough to have a definite impact on aviation in the state. Air Wisconsin operates on two routes from Detroit Metropolitan Airport to Sheboygan and Manitowoc, Wisconsin. Hub Airlines operates two routes from Detroit City Airport to Chicago Meigs Field and Fort Wayne, Indiana. Wright and TAG Airlines both operate routes between Detroit City Airport and Cleveland Lakefront Airport. TAG Airlines operates under a CAB certificate which allows use of aircraft larger than 12,500 pounds.

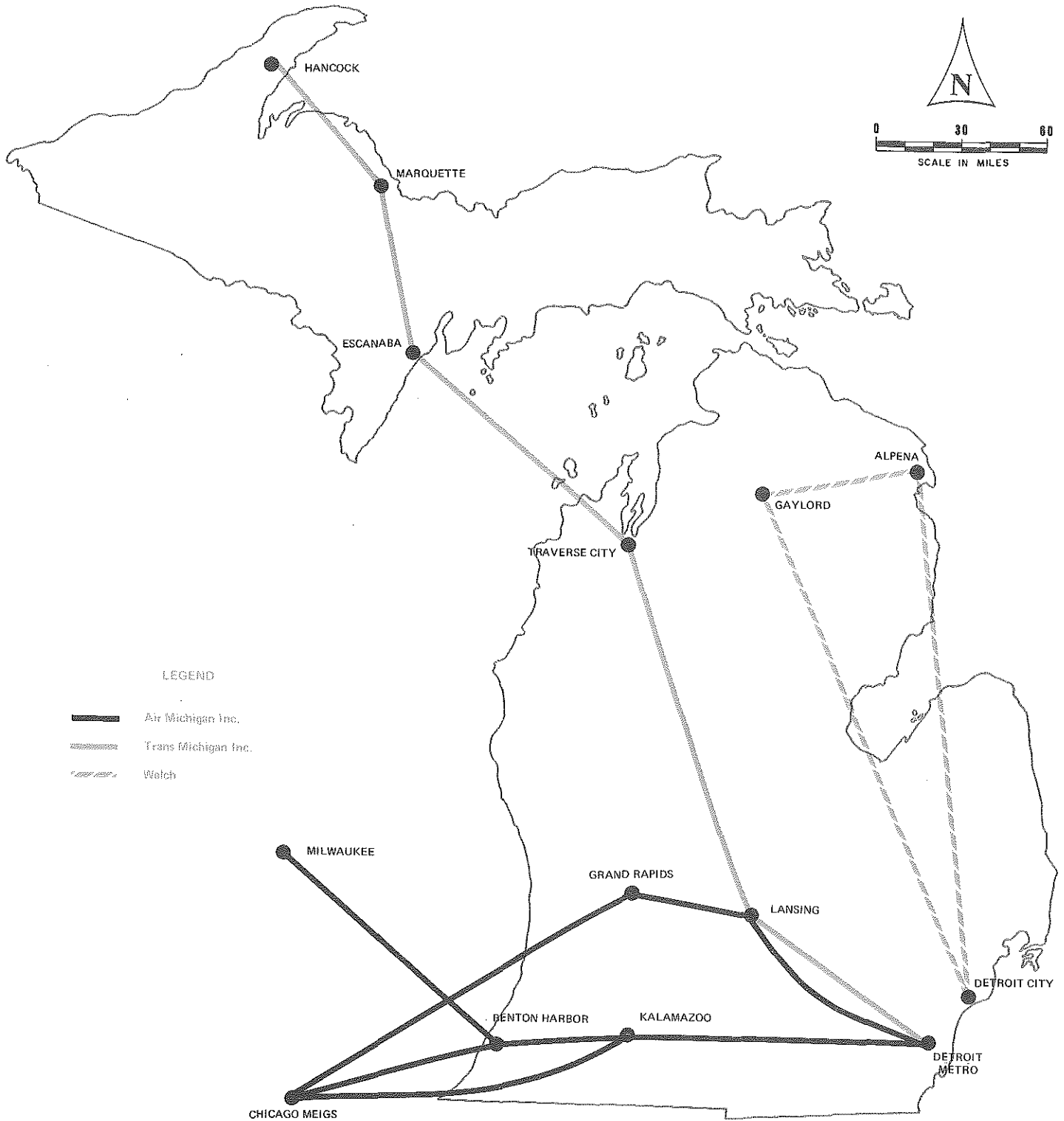
At the present time, the major role of the commuter air transport line is to directly link communities which have common business interests but which lack adequate airline service.

The commuter airlines should not compete or conflict with local and trunk airlines. They do, in fact, provide a service that the airlines cannot, and usually do not wish to provide. It is relevant to point out that commuters are going into cities that would probably never generate enough traffic to warrant local or trunk service. The commuter service lines shown on the map clearly indicate there is presently very little duplication of service.

MICHIGAN'S COMMUTER AIR SERVICE

INTRASTATE SCHEDULE

(January 1971)



Sources: OFFICIAL AIRLINE GUIDE &
MICHIGAN AERONAUTICS COMMISSION

MAP 7

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

AIRPORT ENVIRONS

Chapter Four

Airport Environs

AIRPORT ENVIRONMENT

Just as the environment of our homes influences the way we live, the environment of the airport influences its growth and operation. Climatic conditions, topography, airport access, height and land use zoning are important factors in planning an effective aviation facility.

AIRPORT HEIGHT ZONING

Airport height restriction zoning prevents the establishment of structures or natural growth which would jeopardize air traffic. An airport zoning ordinance can be an effective means of controlling obstructions, as well as establishing compatible land uses around airports. In considering airport zoning, planners need to apply reasonable judgment. For example, the ordinance should not zone height restrictions so low that an owner's interest in his land is unreasonably encroached. The basic problem with height zoning is formulating reasonable height limitations.

In Michigan, Act 23, Public Acts of 1950 (Extra Session), enables the Michigan Aeronautics Commission, municipalities, and other political subdivisions to formulate, adopt, establish, administer, and enforce airport zoning restrictions limiting the height of structures and objects of natural growth, and otherwise regulating the use of property in the vicinity of publicly owned airports. Through purchase, grant, or condemnation, they may acquire air rights and other interests in land surrounding publicly owned airports.

An airport zoning ordinance can be adopted and made effective in Michigan by either a Joint Airport Zoning Board or by resolution of the County Board of Commissioners. An ordinance, comprising text, zoning plans and permit maps, covers the ultimate development of the current airport master plan. Normally, it is made effective from 25 feet above ground level to 500 feet above the established airport elevation within a ten-mile radius of the airport. The airport approach standards used in preparing the zoning plans are those approved by the Commission.

It is the intent of the Commission to establish airport zoning regulations on all publicly owned airports with special priority given to air carrier airports, high activity general aviation airports, and airports with published instrument approach procedures.

LAND USE ZONING

Land use zoning of airports attempts to establish compatible land use between the airport and the surrounding area. Compatible land use includes the "open space" operations of agriculture, golf courses, forest preserves, parks, etc. Certain industrial enterprises are acceptable, such as warehouses, allied aircraft industries, and light manufacturing, providing they are not smoke producing or have electrical equipment that would interfere with aircraft radio communications and navigation units.

Zoning, whether it be height zoning or land use zoning, is not retroactive, and cannot be used to remove existing structures. Therefore, zoning should be done early, before the airport needs to expand, and before the surrounding land use encompasses the airport and restricts its expansion. Zoning around airports should be a part of the comprehensive development plan of every city. In past years, absence of such comprehensive plans has enabled incompatible land uses to develop which have curtailed necessary airport expansion at several locations.

The Department of Housing and Urban Development (HUD) "701" Program has stimulated many Michigan communities and regional areas to initiate comprehensive and long-range programs. Although the Commission does not direct responsibility in the formulation of such plans, it strives to coordinate the existing and future needs of an area with proposed land use. This is being accomplished in two ways:

1. Coordination with the Community Planning Division of the Michigan Department of Commerce, which is responsible for the administration of all "701" Planning Grants in Michigan.
2. Direct contact with the sponsoring agent (city, township, county, region) of a comprehensive planning project.

Through continued emphasis by national, state, and local planning agencies on comprehensive land use planning, Michigan's airport system is growing into a pattern more compatible with that of neighboring states.

TALL STRUCTURES

In 1959, the State Legislature passed the Tall Structures Act. The purpose of this Act is to "promote the safety, welfare, and protection of persons and property in the air and on the ground by regulating the height, location, and visual and aural identification characteristics of certain structures."

Under this Act, a person must receive a permit from the Michigan Aeronautics Commission before altering a structure that is greater than 500 feet above the highest point of land within a one-mile radius. The law prohibits any structure greater than 1,000 feet above the highest point of land within the one-mile limit, unless the structure is less than 50 feet above the highest structure in existence on the effective date of this law (March 19, 1960) within the one-mile limit.

The Tall Structures Act protects the air space around public use airports that do not have adequate zoning ordinances. It serves as a supplement to the Airport Zoning Act and other Federal aviation regulations.

AIRPORT ACCESS

The U.S. Department of Transportation, through its "Highway Access to Airports" program, is conducting a study of the access problem in urban areas with 50,000 or greater population. Partial findings indicate that since Michigan's airport access is provided entirely by vehicular traffic, the main congestion problems are those during peak-hour highway traffic. To relieve future congestion problems, new airport sites and administration area development should be planned with access from a major county or state highway. The study group, in cooperation with the Michigan Aeronautics Commission, Michigan Department of State Highways, and local airport officials, indicates that general aviation airports do not have the access congestion problems associated with air carrier airports. However the future necessity of good access systems should not be overlooked.

NOISE

The advent of the jet airliner and business jet brought a new problem to city and airport planners—noise. Planners should definitely consider aircraft noise factors. A key point to keep in mind is this: noise in the airport environment is of particular concern in residential developments. The simplest way to reduce noise complaints is to keep people away from the source of the noise. Much has been said about noise, and many studies have been performed, but people still want to build close to airports. Despite the fact that most complaints concerning aircraft noise are from residential areas, developers are still constructing new housing projects in high noise impact areas, generally with the consent of local officials.

While open space and industrial developments are more compatible with air traffic noise, residential developments can continue if certain precautions are taken. The most obvious (and usually the most neglected) protection is the effective use of soundproofing materials during construction.

Noise is an extremely complicated phenomenon to deal with, since there are so many variables associated with the problem. Therefore, it is extremely difficult to determine which areas around airports are most likely to experience noise at a problem level.

One study of Michigan airport environs, conducted by the Detroit Metropolitan Area Regional Planning Commission (1964), studied effective control of noise on residential areas bordering airports. The Commission's principal suggestion stressed the need for consistent and thoughtful zoning actions. The Commission cited the Detroit Metropolitan Wayne County Airport plan, whereby the areas affected by noise or noise potential have been zoned industrial, commercial, agricultural, or simply remained open space. Again, this type of planning demands a long range master plan, and requires close coordination of the Commission with local airport and planning officials. Zoning authorities must exercise their responsibility for the proper zoning of land uses in the airport environs and enforce the regulations, including control of the height of structures and the density of occupancy. It is the responsibility of the Commission and other state planning officials to promote, encourage, guide and advise the local officials whenever possible.

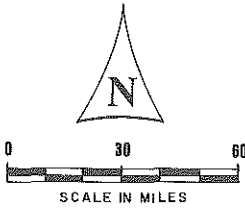
CLIMATIC CONDITIONS

Lake Influence

NOTE: Map 8 shows the location of the 79 weather stations and 12 U.S. National Weather Service offices throughout the state.

The Great Lakes have many fascinating influences on Michigan's climate. The arrivals of both summer and winter are delayed due to the water's slow response to temperature changes, coupled with the dominating westerly winds. In spring, cooler temperatures slow the development of vegetation until the danger of frost is past. Fall's warmer lake waters temper the first outbreaks of cold air, allowing additional time for crops to mature or reach a stage which is free from damage by frost. This lake effect is best seen by comparing stations at similar latitudes in Wisconsin and Michigan. In July, the mean temperature at Madison, Wisconsin, is 71 degrees, while Lansing, Michigan has a mean of 71.1 degrees and Muskegon, Michigan, 69.9 degrees. In January, this trend is reversed, with Madison having a mean temperature of 17.5 degrees, Lansing with a mean of 24.3 degrees and Muskegon, 26 degrees.

MICHIGAN'S WEATHER REPORTING STATIONS



LEGEND

- ★ WEATHER STATION
(weather bureau climatological station, keeps daily records of precipitation and temperature)
- WEATHER BUREAU OFFICE
(staffed by weather bureau personnel, makes weather observations and provides services)

Source: ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

MAP B

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

CLIMATIC CONDITIONS (Cont.)

With the first cold air outbreak in the fall, Michigan experiences a considerable increase in cloudiness. When cold air passes over the warmer lake water, a shallow layer of unstable, moisture-laden air develops in the lower levels of the atmosphere. This air, when forced to rise, produces the increased cloudiness and frequent snow flurry activity observed in the fall and early winter months. These variables have definite effects on the operation of air traffic. It should be noted that weather conditions in different areas require consideration in planning for aviation facilities.

On warm summer days when prevailing winds are generally light, the lake shore area frequently develops a localized wind pattern, or "lake breeze," which may extend inland only several miles. This develops when the warmer air over the land mass begins to rise, allowing the cooler air over the lake to move inland. At night this pattern may be reversed, creating what is known as "land breeze." A wind of this type may also be observed, but on a smaller scale, along the shores of the large inland lakes.

Rainfall

Precipitation is another factor influencing efficient air operations. The frequency of precipitation shows a large variation from the western coast of Lake Michigan to the east. In January, Milwaukee experiences measurable precipitation on about 20% of the days, or an average of once every five days, while Muskegon, with 40%, can expect measurable precipitation almost every other day. In June, the reverse is true. Milwaukee's frequency rate is up to 25% while Muskegon plunges to 15%.

A knowledge of precipitation patterns of the state is essential in planning efficient airport facilities. Michigan averages about 31 inches of precipitation per year, with 55 to 60% of this recorded during the normal growing season. Summer precipitation falls primarily in the form of showers or thundershowers (thunderstorms), while a more steady type of precipitation of light intensity dominates the winter months.

The annual number of thunderstorms decreases from 40 in the south to about 25 in the Upper Peninsula, with nearly 50% of these recorded during the summer months. The average annual number of thunderstorm days is shown pictorially on Map 9.

Special Weather Conditions

The frequency of floods is quite low in Michigan, although the greatest likelihood occurs in later winter or early spring when sudden warming and rain may be combined with melting snow. Mild meteorological drought conditions are not uncommon in Michigan, but meteorological droughts reaching severe conditions are infrequent and generally of short duration. The normally stable distribution of precipitation and higher humidities is helpful in reducing the high demands for moisture, as experienced in other areas of the upper Midwest.

Damaging storms do not occur as frequently as in the states to the south and west. Recorded tornado occurrences have averaged four per year for the period 1916-1965. However, there has been an average of about nine per year during the last decade. The increase is attributed primarily to better reporting services and tracking networks. About 90% of these tornadoes occurred in the southern half of the Lower Peninsula.

Damaging wind storms and blizzards are not as frequent, but do cause considerable damage from time to time.

Hail is most often observed in the spring months, but the total damage caused by hail storms has been small. A higher frequency of hail noted during the fall months over the northwestern section of the Lower Peninsula is attributed to the strong lake influence.

Snowfall

The amount of snowfall is a primary consideration in the design and operation of many northern Michigan airports where a large amount of snow stays on the ground for a long period of time. These large quantities of snow require taller runway and taxiway lights, wider runways, taxiways and aprons to protect the aircraft from snow piles. It also influences the size and locations of drainage structures.

Michigan receives some of the largest annual snowfall totals east of the Rockies, except for some isolated points in New England. The maximum average annual snowfall of over 170 inches is located along the escarpment at the western end of the Upper Peninsula, which rises abruptly to an elevation of over 1400 feet above Lake Superior. Another area with amounts exceeding 120 inches is centered in the western section of the

tableland region of the Lower Peninsula. The reason for the heavy snowfall in this region is simple. The lower levels of the prevailing westerlies become moisture laden over the lake, and when forced upward by the land mass drop the excessive moisture in the form of snow squalls.

The record seasonal snowfall total of 276.5 inches was recorded at Calumet during the winter of 1949-50. The 24-hour record of 27 inches was established on October 23, 1929 at Ishpeming, and was equaled at Dunbar on March 29, 1947. Map 10 shows the average annual snowfall for the years 1931-1960.

Temperature

Temperature and elevation work together in determining the flight capabilities of an airplane. Generally, higher elevations and hotter temperatures reduce the lifting capability and require a longer runway. Therefore, airports designed to accommodate certain craft might require a 3200 foot runway at one location and a 3400 foot runway at another location (the difference in runway lengths being determined by the differences in mean temperature and elevation). When designing a runway for a particular location it is important to know the mean maximum temperature for the hottest month—which is the *average high* temperature for the *hottest month* of the year. This is not to be confused with the average yearly temperature, which is usually much lower. If the airport is built to accommodate the aircraft during the hottest time of the year, when lift efficiency is lowest, it should be adequate during the rest of the year. Map 11 shows the mean maximum temperature for various locations throughout the state. Temperatures in Michigan vary

considerably between the Upper and Lower Peninsulas. For instance, the average January temperature for the Upper Peninsula is 17 degrees, the northern Lower Peninsula is 20 degrees, while the southern Lower Peninsula reaches 26 degrees. The average summer temperatures vary from 67 degrees in the Upper Peninsula, 68 degrees in northern lower Michigan, and 73 degrees in the southern region.

The coldest temperature recorded in Michigan was -51 degrees at Vanderbilt on February 9, 1934. The highest, 112 degrees, occurred July 13, 1936, at Mio. Temperatures lower than -40 degrees have been recorded in most interior sections of the state, but seldom have reading of -20 degrees been observed in the immediate vicinity of the Great Lakes.

Winds

While latitude, which determines the amount of solar insulation, is the major climatic control, the Great Lakes plus the variations in land elevation have an important effect on Michigan's winds. Because of its mid-latitude location, the prevailing winds are westerlies. During the summer months winds are dominantly from the southwest when the semi-permanent Bermuda High Pressure Center is located over the southeastern United States. During the winter the prevailing winds are west to northwest, but change quite often for short periods.

One exception occurs in the eastern portion of the Upper Peninsula where easterly winds prevail during the late fall and early winter months. This is the result of early winter anti-cyclones moving eastward across Canada, and the major storm track beginning to push southward.

AVERAGE ANNUAL SNOWFALL - Inches (1931 - 1960)

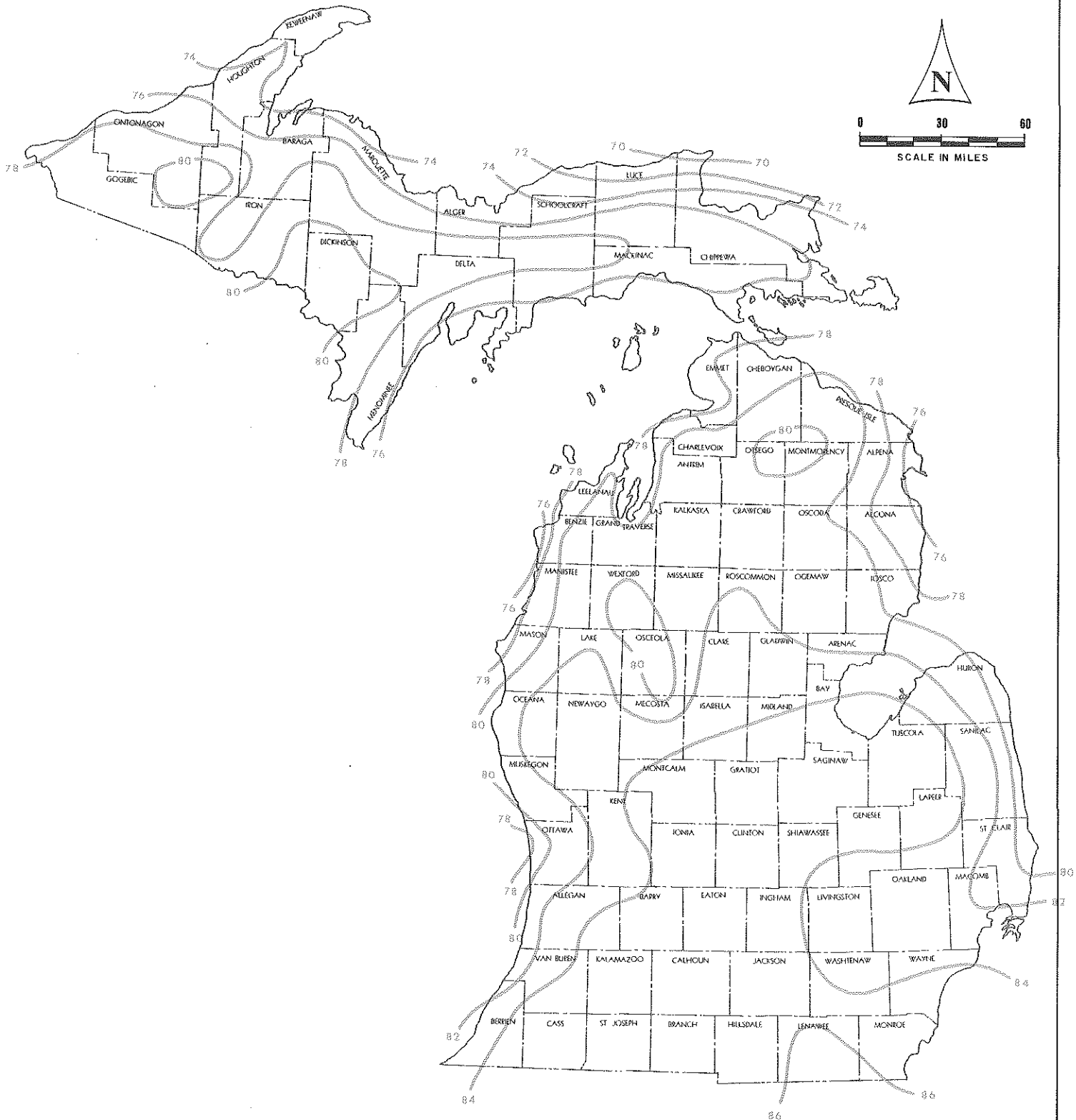


Source: MICHIGAN WEATHER SERVICES

MAP 10

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

MEAN MAXIMUM TEMPERATURES - July (1931 - 1960)



Source: ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

MAP 11

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

EXISTING AVIATION PROGRAMS

Chapter Five

Existing Aviation Programs

EXISTING AVIATION PROGRAMS

Public assistance has become increasingly imperative in the development of efficient airport facilities across the nation. Of Michigan's 294 airports, almost one-half were improved with the assistance of public funding.

The source of public funds for airport development, up to June 30, 1970, has been by the Federal-Aid Airport Program (July 1, 1970) a new federal assistance program was enacted, which is called the "Airport Development Aid Program") and/or the State-Local Program. The Michigan Aeronautics Commission recently initiated two new programs: the Small Airports Program and the Small Loan Program.

The Michigan Aeronautics Commission also initiated and administers the Airport Marking, Air Marking, Hazard Removal and State Nav-Aid Programs, all designed to assist the local airports, and those using the airspace of Michigan, to increase safety and utility.

FEDERAL FUNDING PROGRAMS (FAAP-ADAP)

Federal Aid Airport Program (FAAP)

In 1947, Congress passed the Federal Airport Act, establishing the FAAP Program, which provided grants-in-aid to public agencies who owned or proposed to develop an airport.

Each year the Federal Aviation Administration prepared a "National Airport Plan" defining the types of development that were needed to form an adequate system of public airports. Federal grants were allocated only for projects specifically included in the "National Airport Plan" (presently called "National Airport System Plan").

In most states, including Michigan, the federal government provides up to 50% of approved costs of a project. Eligible work included land, construction and improvement of all or part of a public airport, including lowering, removing, relocating and marking airport hazards. Only work on buildings to house facilities or activities directly related to safety of persons at the airport was eligible for the program.

The Aeronautics Code of the state of Michigan (Act 327, P.A. 1945) appointed the Michigan Aeronautics Commission to act as agent for local political subdivisions in the development of aeronautical facilities involving federal financial aid.

Since the FAAP started in 1947, and through 1970, there were 307 projects under grants, totalling \$88 million—in which the federal government participated to the extent of \$37 million. The highest annual federal share was \$2,954,660 in 1969. The average annual total cost was \$3,673,687. Seventy-nine of the 118

publicly owned airports in Michigan have had one or more federal grants. Figure 12 shows, by year, the number of federal projects, the number of airports receiving grants, the federal participation of the project costs, and the total project costs.

As the agent for political subdivisions involved in the FAAP Program, the Commission furnished engineering or other technical service to the local airport sponsor. The state also participated financially in the FAAP projects by matching, where possible, local funds for airport construction. Therefore, for the entire program, the federal government paid 40% of the cost, the state 20% and the local community carried the remainder, or 40%.

Airport Development Aid Program (ADAP)

The Airport/and Airways Development Act of 1970 established the Airport Development Aid Program (ADAP) which replaces the Federal Aid Airport Program. Under this new act the responsibilities of the federal, state and local government agencies are almost the same as under the 1947 act.

The major change under this new act is the amount of money that is to be made available for airport and airways development. Under this act the following amount of money is authorized each year through 1975:

\$ 15,000,000 for planning aviation facilities
\$250,000,000 for air carrier and general aviation reliever airports
\$ 30,000,000 for general aviation airports that do not relieve air carrier airports
\$250,000,000 for air navigation facilities
\$ 50,000,000 for research and development

The \$250,000,000 appropriated for air carrier and reliever airports will be distributed to each state in the following manner: one-third based on each state's area and population; one-third based on the ratio of passengers enplaned at each certified air carrier airport to the total number of passengers enplaned at all such airports in that state; and one-third on a discretionary basis by the Secretary of Transportation.

The \$30,000,000 appropriated for general aviation airports will be distributed to each state in the following manner: 73% based on each state's area and population; 1½% for Hawaii, Puerto Rico, Guam and the Virgin Islands, and 25% at the discretion of the Secretary of Transportation.

To pay for the development under this act, the following taxes have been levied on the flying public:

- 8% domestic passenger ticket tax
- 5% domestic cargo tax
- \$ 3 head tax on international passengers
- \$25 aircraft registration fee for all aircraft, plus 2¢ for each pound over 2,500 pounds gross weight (piston aircraft).

3½¢ for each pound over 2,500 pounds gross weight (turbine aircraft).

7¢ per gallon tax on fuel used for non-commercial operations

Items eligible under this act are the same as under the previous act, with the exception that land may be purchased prior to actual airport development and expansion.

COSTS OF FAAP PROJECTS

<i>Project Year</i>	<i>Number of Projects</i>	<i>Number of Airports</i>	<i>Federal Participation of Project Costs</i>	<i>Total Costs of Projects*</i>
1947	22	21	\$1,013,106	\$2,099,815
1948	11	9	1,129,574	2,269,324
1949	8	8	1,270,544	2,537,722
1950	21	13	1,749,993	4,582,278
1951	12	9	906,148	1,742,754
1952	4	4	638,678	1,295,247
1953	8	7	431,754	881,241
1954	0	0	0	0
1955	7	7	410,494	942,517
1956	6	6	350,413	707,880
1957	13	12	2,778,752	9,995,905
1958	23	22	2,310,343	5,917,183
1959	23	21	2,053,641	4,451,113
1960	20	17	2,888,162	6,357,204
1961	19	19	2,578,552	5,695,789
1962	9	9	1,128,980	2,353,672
1963	18	16	1,731,752	3,750,679
1964	15	14	2,755,416	7,424,965
1965	8	8	1,927,336	4,629,677
1966	19	19	2,470,427	6,076,656
1967	8	8	624,046	1,432,948
1968	14	14	1,289,804**	3,511,925
1969	11	11	2,954,660**	6,166,831
1970	8	7	1,455,033**	3,345,184
Totals	307		\$36,847,608	\$88,168,509

*Actual expenditures as of June 30, 1970.

**Federal funds for 1968, 1969, and 1970 include \$760,520 in Upper Great Lakes and Economic Development Administration Funds.

FIGURE 12

STATE-LOCAL PROGRAMS

The Michigan Aeronautics Commission, through financial assistance on a matching "50-50" basis, aids local units of government in the development and improvement of small airports which do not qualify for federal assistance. The responsibility and procedures of this program are similar to those under the federal program except for federal non-participation. In this program, the state does not participate in land acquisition or hangar construction. However, unlike the federal program, the state program does participate in terminal building construction.

The State-Local Program, our oldest state airport matching program, originated with the Board of Aeronautics in 1931. Nearly \$750,000 was spent on more than 100 airports and landing field projects prior to 1946. This period also saw many projects developed with planning, design, and supervision by the Board of Aeronautics, and financed by federal relief programs under the Federal Emergency Relief Administration or the Works Progress Administration.

Since 1953, there have been 200 airport projects developed under the State-Local Program. Total cost of these projects exceeds \$2,800,000, with an average cost per project of \$12,850.

SMALL AIRPORT PROGRAM

The Small Airport Program was initiated to assist communities without an airport which can be adequately served by a landing facility of 3,500 feet or less.

To qualify, the airport sponsor must select a site that is expandable to at least 3,500 feet, with adequate property interest for terminal and tie-down area development and clear, unobstructed 20:1 approaches. After the Commission approves the site, it provides the necessary engineering services and construction supervision. Reasonable land and construction costs are shared by the state and the airport sponsor on a "50-50" basis.

Prior to construction, the political entity must enter into an agreement with the Commission to operate and maintain the facility (including the runway approach area), and to establish an adequate budget for necessary operation and maintenance. Airport zoning must be adopted concurrently with the airport development.

It is expected that the Small Airport Program will encourage new industry in the establishment of eligible areas which will, in turn, bolster the economy of that area. At some future date, as traffic increases to these communities, they will be eligible to receive federal assistance in further development of the airport.

SMALL LOAN PROGRAM

Under the Small Loan Program, the Commission is authorized to make loans to counties, cities, townships, incorporated villages, or any combination thereof, to assist them in the construction and improvement of publicly owned airports and landing fields within the state of Michigan.

Small public airports would be eligible for loans up to ninety percent of their local share, or \$25,000—whichever is the lesser amount. The loans are to be repaid within ten years.

HAZARD REMOVAL PROGRAM

This program was designed to clear up the approaches to the public-use airports, primarily by relocating utility lines. This program will involve the utility companies, the local airport owner and the state, with each paying one-third of the cost of clearing approach areas. Where other obstructions exist, such as trees, the state and the airport owners will share expenses evenly.

This program and the Displaced Threshold Program, are two of three grant-in-aid projects available also to privately owned *public use* airports. Because many privately owned airports substitute for needed public facilities in the area, it is important that the state do everything possible to insure their continued operational safety.

AIRPORT MARKING PROGRAM

The state has a continuing program of painting airport runways and taxiways every two years on airline airports, and every three years on general aviation airports.

In addition to the monetary benefits, the continuing marking program results in safety of aircraft operation in take off and landing, resulting in better utilization of the state's airports, and improving their appearance. All markings, such as displaced threshold, precision and non-precision and basic markings are done in accordance with current FAA and Michigan Aeronautics Commission standards.

AIR MARKING PROGRAM

The Michigan Aeronautics Commission also sponsors an Air Marking Program, utilizing the rooftops of large buildings as aerial signboards to help the disoriented pilot find the nearest airport. Each air-marker consists of the following:

- (1) Name of the town or city, in ten-foot high letters
- (2) A direction marker consisting of a circle, a directional arrow, and the numeral indicating the number of miles from the marker to the nearest airport

This is an annual program, with approximately 70 to 100 locations being marked or remarked each year.

There are approximately 450 serviceable air markers at any one time.

NAVIGATIONAL AIDS PROGRAM

The aircraft's primary asset is to transport people and objects between two points faster than any other means of transportation. Once reaching the terminal point, the aircraft often must descend through overcast skies or the darkness of night for landing at an airport. To achieve our primary goal of providing all-weather capability, enroute navigational aids must first be provided, and secondly, airport landing aids should be made available.

Four requirements are necessary:

1. A pilot properly trained and equipped for instrument flight.
2. An aircraft equipped with radio navigational communication and flight attitude equipment.
3. Sufficient enroute ground navigation and communication facilities to provide enroute navigational information and adequate airport separation.
4. An airport with a radio approach facility, so that a safe descent and landing can be executed in an area known to be free of obstructions.

The first two requirements are personal responsibilities; however, requirement three and four are primarily governmental responsibilities. The first governmental step has been to establish an enroute navigation aid and communication system, and in the airport areas, landing aids and local communication control. In the high density areas, this has been assumed by the FAA in the establishment of the VOR radio navigation system, FSS communications system, control towers, and the ILS and its component parts.

In the lower density areas, the Michigan Aeronautics Commission has embarked on a supplemental program to provide a VOR navigation system for the entire state, and has initiated a program to provide instrument approach procedures at all of Michigan's primary general aviation airports.

This is being accomplished by three methods:

1. Utilizing existing radio facilities in the federal VOR system and the state VOR system.
2. Low frequency non-directional beacons, commonly called "homers" or "H" facilities.
3. In the case of "jet" aircraft requiring a more sophisticated approach, the use of low cost solid-state ILS systems and component parts.

Any of the three methods can be accomplished at nominal costs to the local airport through the Commission's matching grant-in-aid program. The existing and proposed facilities making up Michigan's Navigational Program are illustrated on the following maps.

TRAFFIC COUNTER PROGRAM

One of the greatest problems we have had in aviation planning in the past is determining accurately the aircraft activity at various airports. Michigan has only 12 control towers where accurate air traffic tabulation is maintained by controllers counting each takeoff and landing. At non-tower airports, there has been no method of getting accurate traffic data.

Since only about one-fourth of the pilots using Michigan airfields signed the aircraft registers, officials explored the possibility of developing a traffic counter that would automatically record aircraft traffic. The Engineering and Operations Divisions of the Michigan Aeronautics Commission, designed a pneumatic traffic counter, now manufactured by the Abrams Instrument Corporation of Lansing.

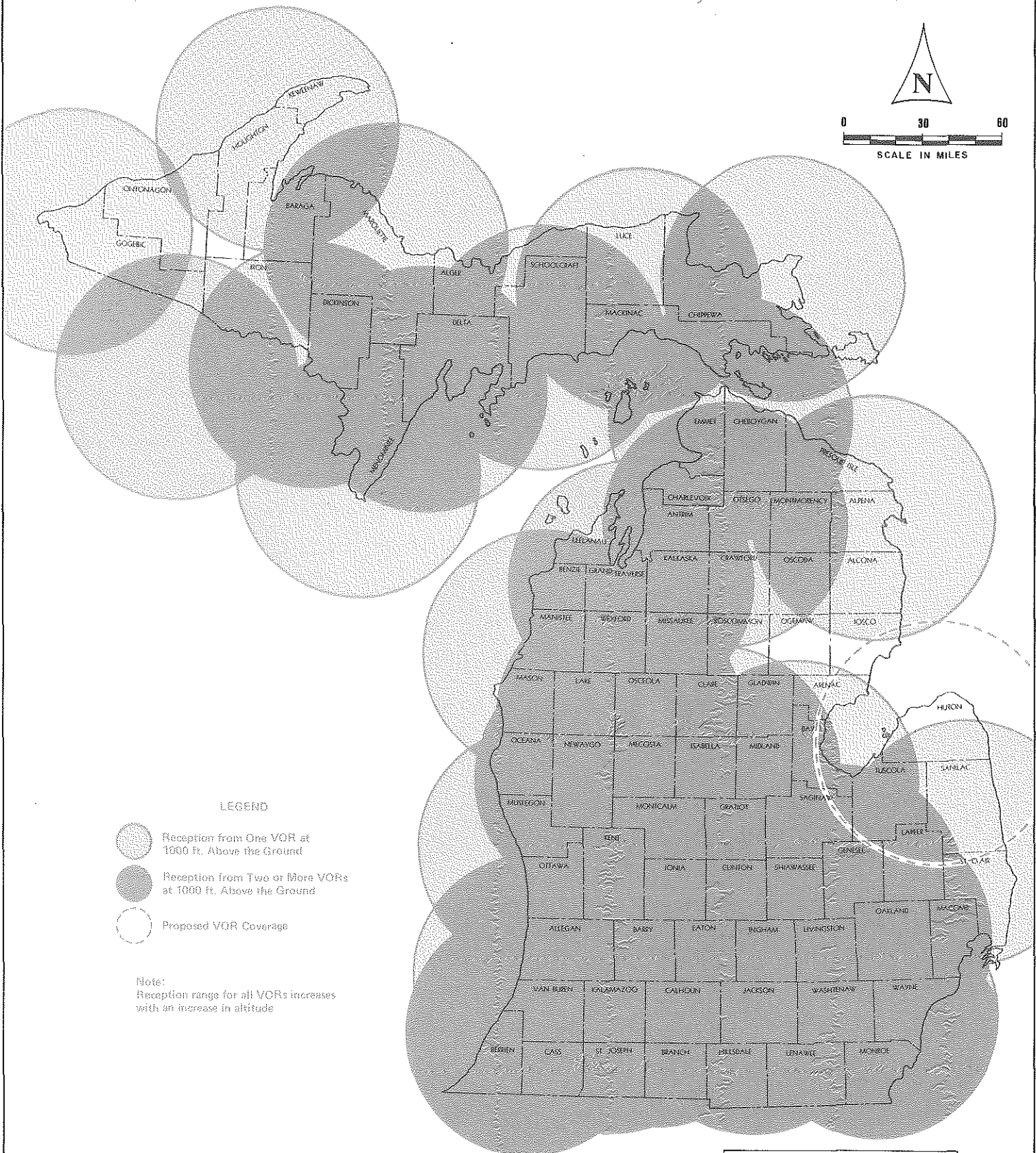
The air traffic counter works on the same principle as a highway traffic counter, with modifications: the device is set to record traffic moving in only one direction, and to count an aircraft just once, even when multi-wheeled craft cross the counting hose. The air traffic counter has demonstrated nearly 100% degree of accuracy—plans call for traffic counts at all public use airports in the state in the near future. Data from these air traffic counts will enable more accurate estimates and forecasts of future operation levels—which is the key to a sound basis for planning future development.

Figure 13 lists airports which have been counted in this program, with the projection of estimated yearly operations based on the count figures. To check the accuracy of the forecast methods and determine growth patterns in various parts of the state, a number of locations were counted twice.

Map 16 shows statewide distribution of Traffic Counters.

VOR COVERAGE

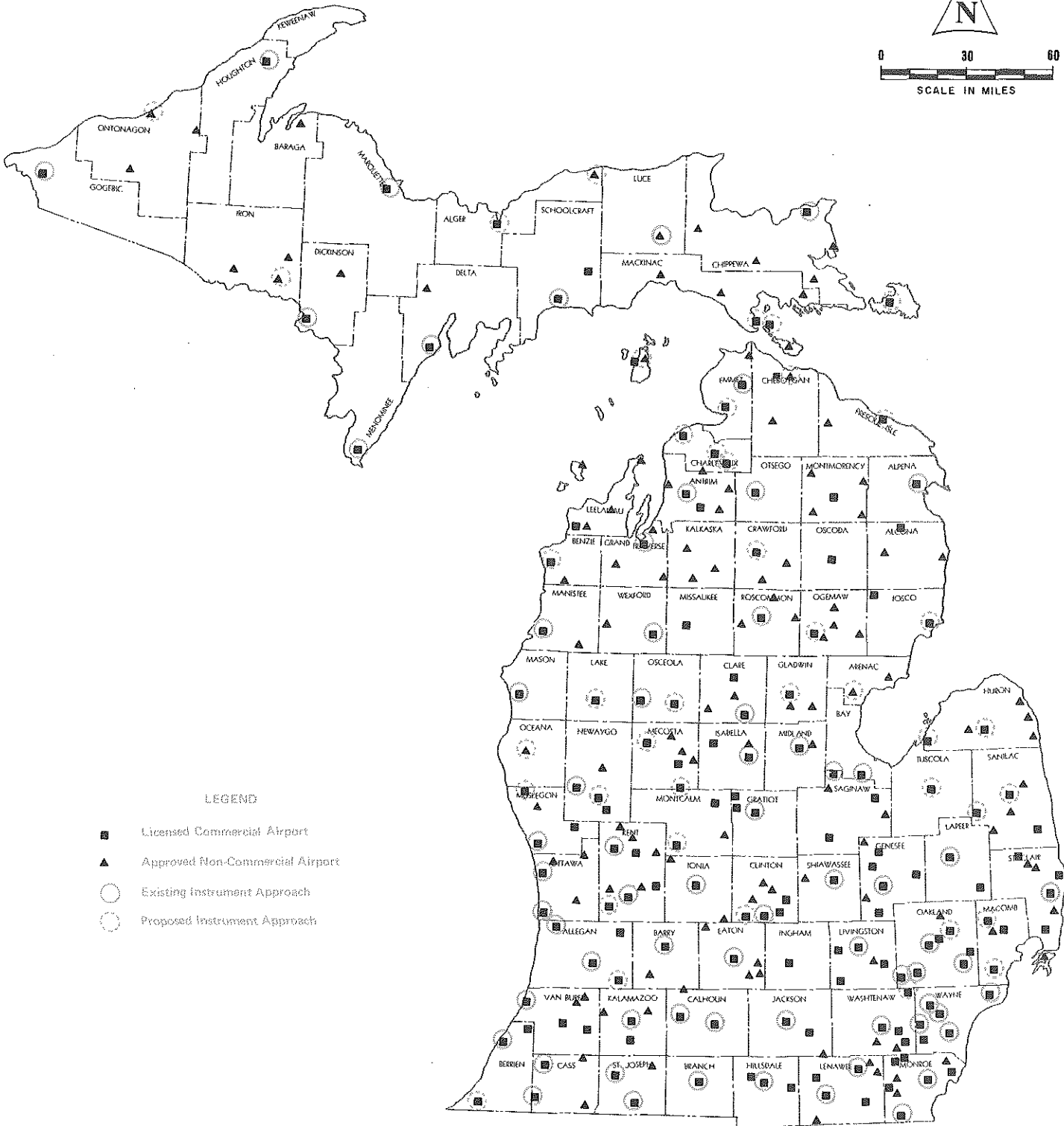
(at 1000 Feet Above the Ground, Jan. 1971)



Source: Electronic Facilities Section
MICHIGAN AERONAUTICS COMMISSION

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

AIRPORTS WITH PUBLISHED INSTRUMENT APPROACHES (January 1971)



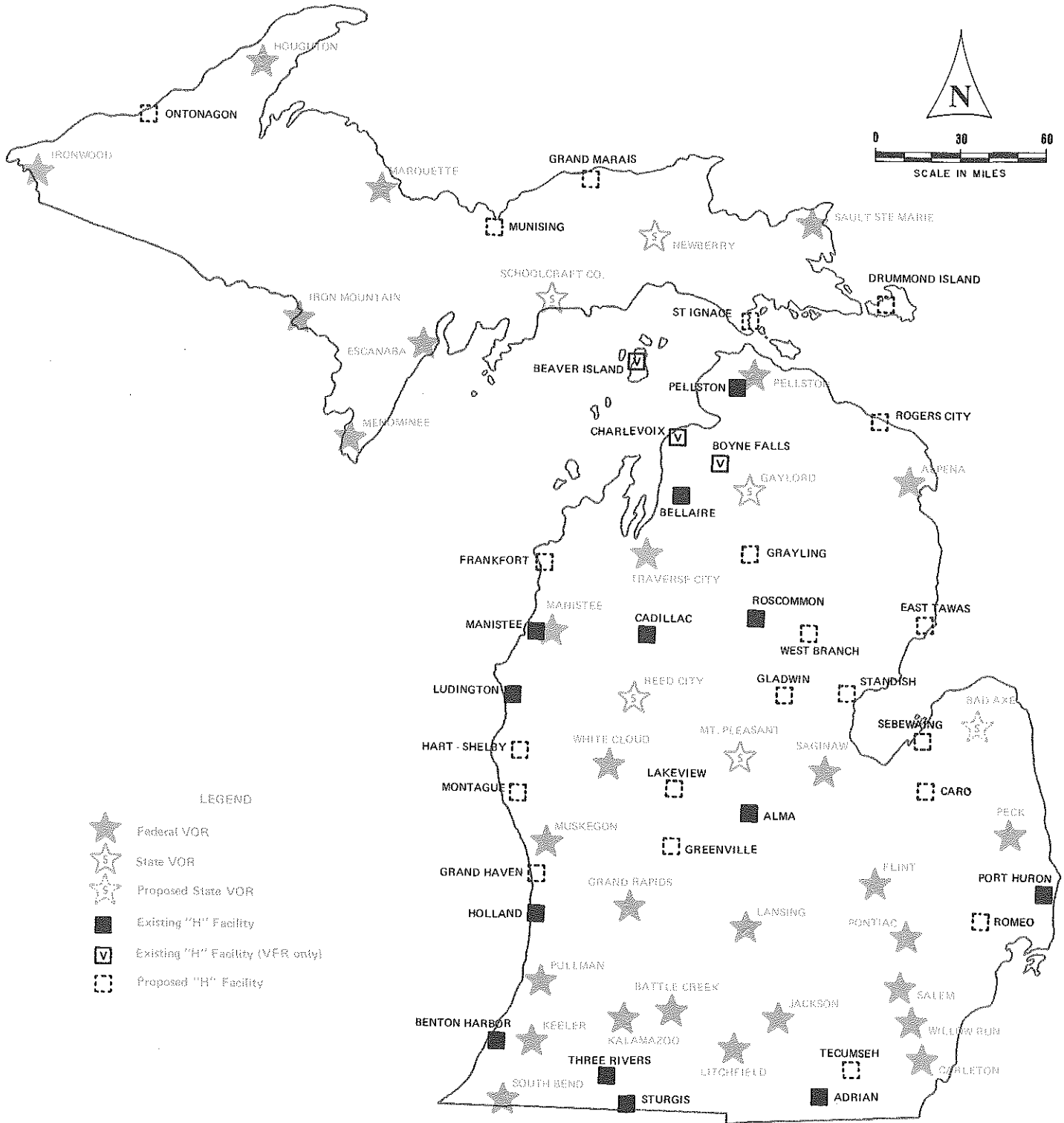
Source: Electronic Facilities Section
MICHIGAN AERONAUTICS COMMISSION

MAP 13

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

NAVIGATIONAL AID FACILITIES

(January 1971)



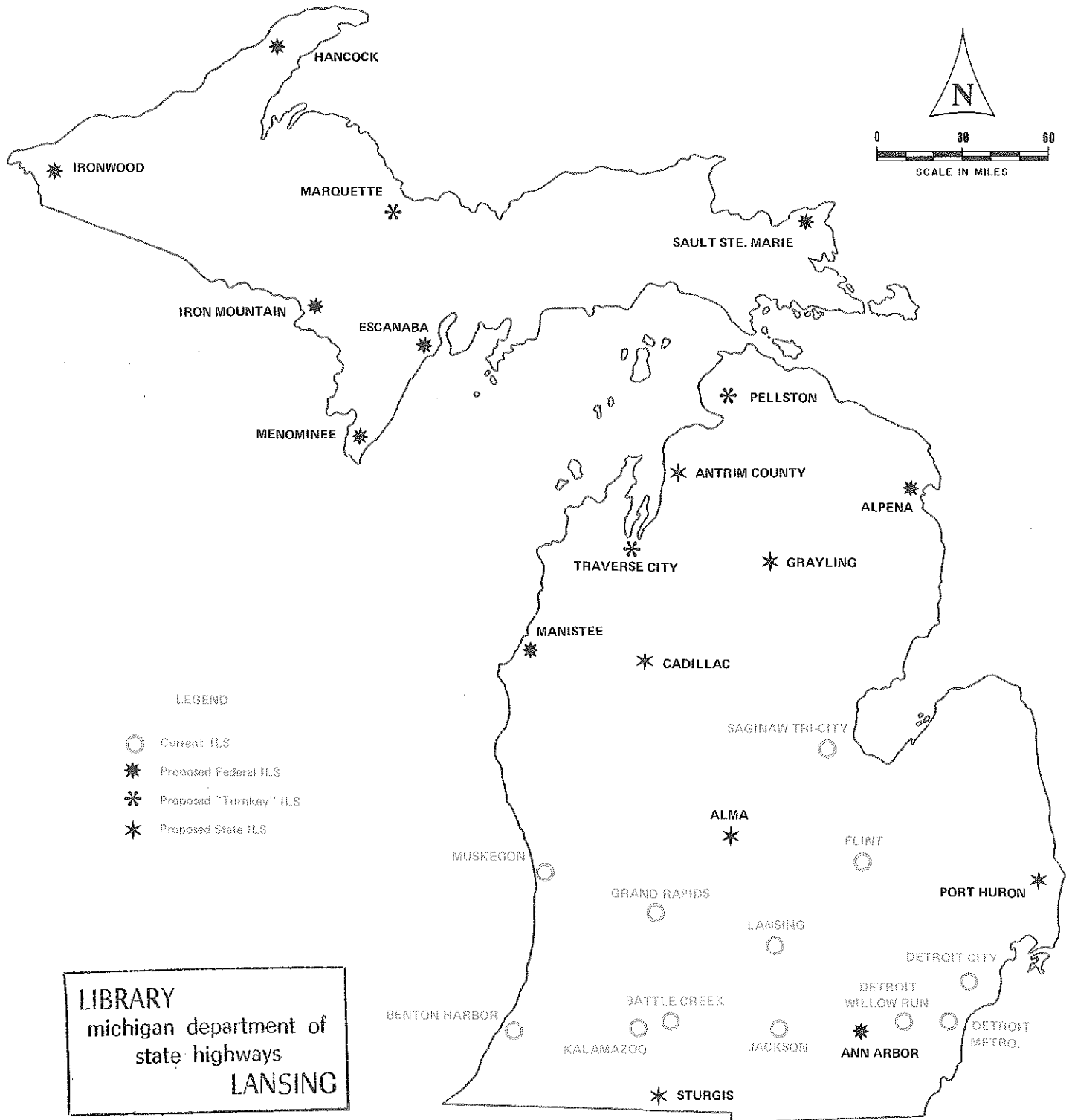
Source: Electronic Facilities Section
MICHIGAN AERONAUTICS COMMISSION

MAP 14

Prepared By The Engineering Division
MICHIGAN AERONAUTICS COMMISSION
DEPARTMENT OF COMMERCE

INSTRUMENT LANDING SYSTEM (ILS)

(January, 1971)



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Source: Electronic Facilities Section
 MICHIGAN AERONAUTICS COMMISSION

MAP 15

Prepared By The Engineering Division
 MICHIGAN AERONAUTICS COMMISSION
 DEPARTMENT OF COMMERCE

ESTIMATED AIRCRAFT OPERATIONS

CITY	AIRPORT	MONTHS COUNTED	NUMBER OF MONTHS	YEAR	ESTIMATED YEARLY OPERATIONS		
					Local	Itinerant	TOTAL
1. Adrian.....	Lenawee County.....	March-June.....	4	1970	27,200	14,400	41,600
2. Allegan.....	Padgham Field.....	July-Sept.....	3	1967	7,200	4,100	11,300
3. Alma.....	Gratiot Community.....	June-Oct.....	5	1970	11,500	6,100	17,600
4. (a) Ann Arbor.....	Municipal.....	April-Dec.....	9	1967	75,500	39,900	115,400
(b)		Jan.-June.....	6	1968	76,100	40,200	116,300
5. Bad Axe.....	Huron County Mem.....	July-Nov.....	5	1970	9,000	4,750	13,750
6. (a) Bay City.....	James Clements.....	April-May.....	2	1968	13,800	7,300	21,100
(b)		July-Sept.....	3	1970	16,800	8,900	25,700
7. Bellaire.....	Antrim County.....	August.....	1	1969	6,700	3,600	10,300
8. Benton Harbor.....	Ross Field.....	April-June.....	3	1967	51,500	27,200	78,700
9. Big Rapids.....	Roben Hood.....	July-Oct.....	4	1970	6,800	3,600	10,400
10. Birmingham.....	Berz.....	April-June.....	3	1967	60,600	32,000	92,600
11. (a) Cadillac.....	Municipal.....	July-Aug.....	2	1969	10,700	5,600	16,300
(b)		Aug.-Oct.....	3	1970	7,700	4,100	11,800
12. Caro.....	Municipal.....	July-Nov.....	5	1970	4,350	2,300	6,650
13. Charlevoix.....	Charlevoix.....	August.....	1	1969	10,900	5,800	16,700
14. Charlotte.....	Fitch H. Beach.....	March-May.....	3	1970	11,650	6,150	17,800
15. Clare.....	Municipal.....	July-Oct.....	4	1970	3,900	2,050	5,950
16. Coldwater.....	Branch County.....	March-June.....	4	1970	13,800	9,000	22,800
17. East Tawas.....	Iosco County.....	July-October.....	4	1970	5,000	2,650	7,650
18. (a) Escanaba.....	Municipal.....	May-June.....	2	1968	11,700	7,200	17,900
(b)		May-July.....	3	1969	15,200	8,000	23,200
19. Frankfort.....	City-County.....	Aug.-Nov.....	4	1970		3,000	3,000
20. Fraser.....	McKinley.....	April-June.....	3	1967	20,500	10,800	31,300
21. Fremont.....	Municipal.....	August-Sept.....	2	1970	6,650	3,500	10,150
22. (a) Gaylord.....	Otsego County.....	August-Oct.....	3	1967	6,600	3,500	10,100
(b)		August-Oct.....	3	1970	11,200	5,950	17,150
23. Gladwin.....	Municipal.....	July-October.....	4	1970	300	4,250	4,550
24. Grand Haven.....	Memorial.....	July-Sept.....	3	1970	10,600	5,600	16,200
25. Greenville.....	Greenville.....	March-June.....	4	1970	14,250	7,550	21,800
26. Harbor Springs.....	City Airport.....	August-Oct.....	3	1970	9,900	5,200	15,100
27. Hastings.....	Municipal.....	*Nov.-Oct.....	12	1969-70	8,600	26,000	34,600
28. Hillsdale.....	Municipal.....	March-June.....	4	1970	8,100	4,300	12,400
29. Holland.....	Park Township.....	May-June.....	2	1970	14,800	7,800	22,600
30. Holland.....	Tulip City.....	May-June.....	2	1970	9,000	4,750	13,750
31. Houghton-Hancock.....	Houghton County Memorial.....	May-October.....	6	1969	10,000	5,300	15,300
32. (a) Houghton Lake.....	Roscommon County.....	Feb.-Oct.....	9	1968	12,000	7,700	19,700
(b)		July-Sept.....	3	1970	9,150	4,850	14,000

SOURCE: Traffic Counters
Michigan Aeronautics Commission

FIGURE 13

ESTIMATED AIRCRAFT OPERATIONS

CITY	AIRPORT	MONTHS COUNTED	NUMBER OF MONTHS	YEAR	ESTIMATED YEARLY OPERATIONS		
					Local	Itinerant	TOTAL
33. (a) Howell	Livingston County	Feb.-July	6	1968	13,100	6,900	20,000
		March-June	4	1970	12,300	6,500	18,800
34.	Iron Mountain	Ford	3	1969	11,700	6,200	17,900
35.	Ironwood	Gogebic County	5	1969	10,600	5,600	16,200
36.	Lambertville	Wagon Wheel	3	1970	13,700	7,250	20,950
37.	Lapeer	Dupont-Lapeer	3	1970	8,800	4,650	13,450
38.	Ludington	Mason County	12	1970	8,300	4,400	12,700
39. (a) Mackinac Island	Mackinac Island	June-Sept.	4	1967		11,900	11,900
		June-Aug.	3	1968		10,400	10,400
		July-Sept.	3	1969		16,800	16,800
		Jan.-Dec.***	12	1970		9,790	9,790
40. (a) Manistee	Manistee Co. Blacker	Aug.-Oct.	3	1968	10,500	5,600	16,100
		July-Aug.	2	1969	11,700	6,200	17,900
41. (a) Manistique	Schoolcraft County	March-Oct.	8	1968	3,700	2,000	5,700
		July-Oct.	4	1969	5,000	2,600	7,600
42. (a) Marquette	Marquette County	August	1	1968	24,400	12,900	37,300
		September	1	1969	25,500	13,000	38,500
43.	Marshall	Brooks Field	4	1970	14,800	7,800	22,600
44.	Menominee	Menominee County	5	1969	18,300	9,700	28,000
45.	Midland	Jack Barstow	1	1969	15,800	8,400	24,200
46.	Monroe	Custer	4	1970	22,400	11,850	34,250
47.	Mt. Pleasant	Municipal	4	1970	9,800	5,200	15,000
48.	Newberry	Luce County	4	1969		3,200	3,200
49.	Niles	Jerry Tyler Mem.	3	1970	13,200	8,400	21,600
50.	Ontonagon	Ontonagon County	6	1969	1,650	870	2,520
51. (a) Plymouth	Mettetal	July-Sept.	3	1967	112,900	59,700	172,600
		March	1	1970	64,300	34,000	98,300
52.	Saginaw	Municipal	4	1970	7,300	3,900	11,200
53. (a) St. Ignace	Mackinac County	June-Oct.	5	1967	5,400	2,800	8,200
		August	1	1969	10,000	5,300	15,300
54.	Salem	Salem	1	1969	8,800	4,700	13,500
55.	Sandusky	City Airport	4	1970	3,850	2,050	5,900
56. (a) Sault Ste. Marie	Municipal	April-Nov.	8	1967	7,800	4,200	12,000
		May-July	3	1968	12,500	6,600	19,100
57.	Standish	Standish	4	1970	2,400	1,300	3,700
58.	Sturgis	Kirsch Municipal	2	1969	20,400	10,800	31,200
59.	Three Rivers	Dr. Haines	3	1970	8,700	4,600	13,300
60.	Traverse City	Cherry Capital	3	1968	33,000	17,500	50,500

SOURCE: Traffic Counters Michigan Aeronautics Commission

*Twelve month daily physical count by Airport Manager's office at Hastings Municipal Airport includes thousands of touch and go's by students from Kent County Municipal Airport, Grand Rapids.

**Based on Airport Manager's twelve month count.

***Not estimated—(Actual Count) Based on traffic counter count and Airport Manager's count for full twelve month period.

RECOMMENDATIONS FOR FUTURE DEVELOPMENT

Chapter Six

Recommendations For Future Developments

DEVELOPMENT GUIDELINES

The state plan should include all airports required to develop a comprehensive system of public airports adequate to provide for the social, economic, recreational and aeronautical needs of the people of all parts of the state.

The development indicated in this section is that which the Aeronautics Commission considers essential to meet the needs of the Michigan airport system for the next five years. Using criteria and standards of both the Federal Aviation Administration (FAA) and Michigan Aeronautics Commission, all areas of the state have been analyzed.

The results of this plan are based on the objective of providing the flying public with a full range of airport facilities and services throughout the state.

The following guidelines are important to keep in mind when examining the recommendations for each location:

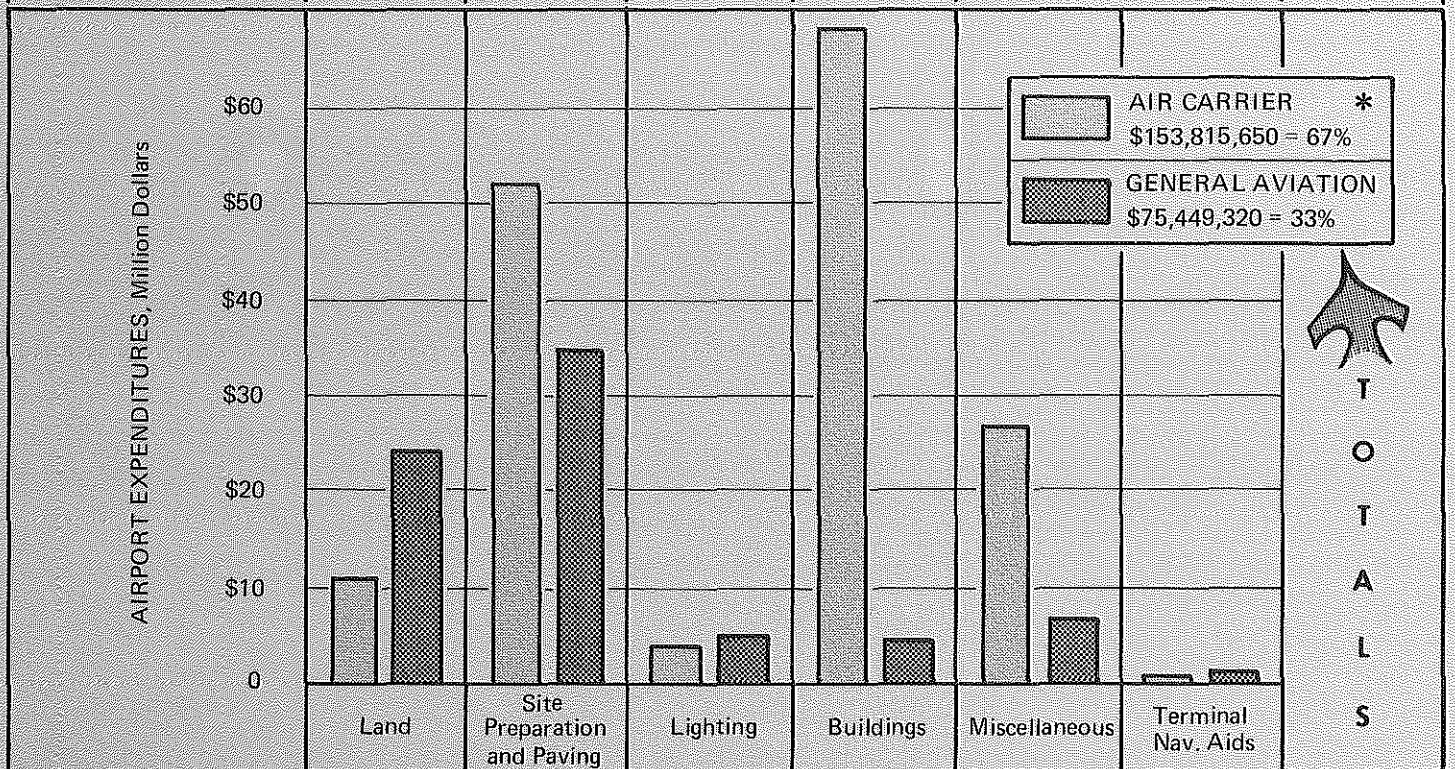
1. Since this report covers a five-year future period, any indicated development is subject to change if the local situation changes. These recommendations are based on the best knowledge and limited facts presently available.
2. The city name given in the first column of the recommended development section is intended to indicate area identification only. This designation does not necessarily mean that an airport is to be located within the physical boundaries of the named city, nor is it meant to indicate which governmental unit should own a proposed airport.
3. While some locations are presently served by privately owned, public use airports, the continued existence of such airports can only be permanently assured through acquisition or development of a publicly owned airport. This situation is especially apparent in the Detroit area, where many hitherto busy privately owned, public use airport properties have been sold for non-airport uses and therefore have been lost to the state airport system. It is imperative that present airport facilities be preserved to meet the great increase in aviation activity anticipated in such areas.
4. A minimum 2500' turf airport must have a site expandable to 3500' and must meet, at the very least, these requirements necessary for state licensing as a commercial airport. These are:
 - a. Adequate approach clearances and marking
 - b. Licensed airport manager
 - c. Telephone
 - d. Sanitary facilities
 - e. Shelter for public use
 - f. Aircraft parking and tie-down area
5. An eventual goal is to provide every county in Michigan with access to an airport having a 5000 foot runway to accommodate business jet aircraft. Wherever practical, this need is indicated in the plan. In some cases, this need will be served by a jet airport in an adjoining county. For example, Capital City Airport, which is physically located in Clinton County, also serves the business jet needs of Ingham and Eaton Counties; Tri-City Airport, physically located in Saginaw County, also serves the business jet needs of Bay and Midland Counties; and Cadillac Municipal Airport, located in Wexford County, also serves the business jet needs of Missaukee and Osceola Counties. Many counties already have, or will have, a jet airport within the planning period, but in those cases where this need is considered beyond 1975, the chart indicates a 5000' runway in Column Eight (ULTIMATE DEVELOPMENT) as a need beyond the five-year planning period.
6. Several air carrier airports have recently had runways extended to 6500 feet to accommodate larger commercial jet aircraft. At the present time, this length is considered adequate for the existing and proposed aircraft. However, due to possible environmental considerations such as noise and air pollution, longer runways or larger approach protection areas may be needed. Such extended lengths are shown in the plan to alert the affected communities to the possibility of future need for longer runways.

7. Land requirements shown in the recommended development chart are limited to the needs of the five-year period, 1970-75. Expansions beyond these projections would, of course, require additional adjacent land space. Because of rising land costs, it is very important to prepare for anticipated expansion by buying sufficient land space now.
8. Airports included in this plan are classified (in Column Four, RUNWAY TYPE) as follows:
 - a. *Landing Strip (LS)*. Turf landing facilities smaller than Basic Utility Airport—Stage I. As a minimum it contains a 2500 foot turf runway.
 - b. *Basic Utility (B-I and B-II)*. The Basic Utility type of airport is planned to accommodate 95% of the general aviation fleet, except for transport types and some twin-engine aircraft over 8,000 pounds gross weight. For purposes of stage development, the Basic Utility type is further subdivided into Stages I and II. Stage I accommodates 75% of the (1968) general aviation fleet, and normally should be capable of expansion to Stage II.
 - c. *General Utility (GU)*. The General Utility type of airport accommodates all of the current (1968) general aviation fleet except certain jets and transport type aircraft.
 - d. *Basic Transport (BT)*. The Basic Transport type of airport is planned to accommodate turbojet powered aircraft which are under 60,000 pounds gross weight, in addition to the utility grouping of aircraft. This type of airport is planned when significant use by those aircraft often referred to as "business jets," "corporate jets," and "executive jets" is anticipated.
 - e. *General Transport (GT)*. The General Transport type of airport is planned to accommodate transport category aircraft up to 175,000 pounds maximum gross takeoff weight.
 - f. *Scheduled Air Transport (LOCAL AND TRUNK)*. Airports used or to be used by Civil Aeronautics Board and state certificated air carriers which use transport category aircraft.
9. Abbreviations of terms used.
 - MIRL—Medium Intensity Runway Lights.
 - HIRL—High Intensity Runway Lights.
 - MITL—Medium Intensity Taxiway Lights.
 - REILS—Runway End Identifier Lights.
 - VOR—Very High Frequency Omnidirectional Station.
 - ALS—Approach Lighting System.
 - RVR—Runway Visual Range.

AIRPORT EXPENDITURES IN MICHIGAN

(Airport Expenditures in Michigan) shows the estimated costs of developing all the facilities recommended in the 1970-1975 plan.

	Land	Site Preparation & Paving	Lighting	Buildings	Misc.	Terminal Navigational Aids	Total
AIR CARRIER	\$10,656,000	\$51,771,350	\$3,653,950	\$60,791,000	\$26,443,350	\$500,000	*
(Percent of Total per item)	31%	60%	43%	93%	80%	36%	67%
GENERAL AVIATION							
EXISTING	\$10,917,250	\$23,597,970	\$ 3,861,200	\$3,574,000	\$ 5,981,700	\$782,800	\$48,721,720
NEW - Turf	\$1,964,000	\$5,130,000	—	—	—	—	\$7,094,000
NEW - Paved	\$11,144,000	\$6,024,800	\$887,750	\$837,500	\$639,500	\$100,000	\$19,633,600
GEN. AV. TOTAL	\$24,025,000	\$34,752,770	\$4,748,950	\$4,411,500	\$6,621,200	\$882,800	\$75,449,320
(percent of total per item)	69%	40%	57%	7%	20%	64%	33%
TOTAL each item	\$34,681,000	\$86,524,120	\$8,402,900	\$65,202,500	\$33,064,550	\$1,382,800	**



SOURCE: Michigan Aeronautics Commission Records

* Includes a Proposed Regional Airport For Battle Creek/Kalamazoo.

** Does Not Include \$60,000 for Two New State Owned Omnis.

Figure 14.

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Adrian	Lenawee County	Lenawee	BT	N/S	.....	5000	.....	Land for airport development and clear zones, taxiway and runway construction, taxiway widening, apron extension, install MIRL & MITL, Administration building, auto parking, access road, obstruction removal, marking, fencing, and road relocation.
Albion	New	Calhoun	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Algonac	New	St. Clair	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Allegan	Padgham Field	Allegan	GU	E/W	3500	3800	.....	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, obstruction removal, marking, and fencing.
Alma	Gratiot Community	Gratiot	BT	E/W	4000	5000	.....	Taxiway construction, runway extension, install MIRL & MITL, REILS, obstruction removal, and marking.
Almont	Almont	Lapeer	LS	E/W	2500*	2500*	.....	Acquire existing airport, and obstruction removal.
Alpena	Phelps-Collins	Alpena	Local	N/S	9000	7400	.....	Widen filets, apron and runway extension, taxiway strengthening, install MIRL & MITL, terminal expansion, auto parking, obstruction removal, marking, and grading for localizer and glide slope.
Ann Arbor	Municipal	Washtenaw	BT	NE/SW	3500	5400	.....	Land for airport development and clear zones, taxiway and runway construction, taxiway and runway widening, apron taxiway and runway extension, apron taxiway and runway strengthening, install, extend and relocate MIRL, install MITL, obstruction removal, relocate drainage ditch, and marking.
Atlanta	Municipal	Montmorency	LS	NW/SE	3100*	3100*	.....	Land for clear zones, administration building, auto parking grading, and tie down grading.
Au Gres	Au Gres	Arenac	LS	NW/SE	2000*	2600*	.....	Land for airport development, runway extension, and obstruction removal.
Bad Axe	Huron County	Huron	GU	NE/SW	3200	3800	5000	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, obstruction removal, marking, relocate road, and install homer or VOR.
Baldwin	Municipal	Lake	GU	E/W	3800	3800	5000	Apron and taxiway construction, runway strengthening, administration building, auto parking, access road, and fencing.
Baraga	New	Baraga	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Battle Creek	W. K. Kellogg	Calhoun	Local	NE/SW	7000	6900	.....	Land for clear zone, taxiway construction, taxiway and runway strengthening, install MITL, install REILS, obstruction removal, and marking.
Battle Creek -Kalamazoo	New Regional Airport	Kalamazoo	Local	NE/SW	.....	9000	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install HIRL, MIRL, & MITL, terminal building, access road, auto parking, obstruction removal, marking, and fencing.
Bay City	James Clements Municipal	Bay	GU	N/S	3200	3700	.....	Land for clear zones, taxiway construction, apron and runway extension, install and extend MIRL, install MITL, drainage, obstruction removal, marking and fencing.

* = turf runway

FIGURE 15

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Beaver Island	Beaver Island	Charlevoix	B-II	NW/SE	3500*	3500*	.....	Land for clear zones, obstruction removal, access road, and fencing.
Bellaire	Antrim County	Antrim	BT	N/S	5000	5000	.....	Terminal building.
Benton Harbor	Ross Field	Berrien	Local	E/W	5100	5100	.....	Land for clear zones and ALS, taxiway construction, obstruction removal, and grade for glide slope.
Berrien Springs	New	Berrien	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Big Rapids	Roben Hood	Mecosta	GU	NW/SE	3500	3900	.....	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, administration building, auto parking, obstruction removal, and marking.
Bois Blanc Island	Bois Blanc Airport	Mackinac	LS	E/W	2600*	2600*	.....	No development needed during planning period.
Boyne City	Municipal	Charlevoix	B-II	NW/SE	3240*	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, obstruction removal, marking, access road, auto parking, and fencing.
Brevort	Brevort	Mackinac	LS	E/W	2300*	2300*	.....	Obstruction removal.
Brighton	Hyne Field	Livingston	LS	NE/SW	1900*	2500*	.....	Acquire existing airport, extend turf runway, and obstruction removal.
Bronson	New	Branch	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Brown City	New	Sanilac	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Cadillac	Municipal	Wexford	BT	E/W	5000	5000	.....	Land for airport development and clear zones, apron, taxiway and runway construction, runway resurfacing, install MIRL, REIL, beacon and lighted wind cone, install MITL, administration building, auto parking and access road, obstruction removal, marking and fencing.
Carleton	New	Monroe	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Caro	Municipal	Tuscola	GU	NE/SW	3000	3800	.....	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, apron, taxiway & runway resurfacing, install MIRL, administration building, auto parking, obstruction removal, marking, access road and homer.
Carson City	New	Montcalm	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Capac	New	St. Clair	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Caseville	New	Huron	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Cass City	New	Tuscola	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.

* =turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Charlotte	Fitch H. Beach	Eaton	GU	E/W	....	3900	.....	Land for airport development and clear zones, taxiway and runway construction, apron extension, install MIRL and MITL, drainage, obstruction removal, marking, and fencing.
Charlevoix	Charlevoix	Charlevoix	BT	E/W	3500	4500	.....	Land for airport development and clear zones, taxiway construction, apron and runway extension, runway strengthening, install MIRL and MITL, obstruction removal, and fencing.
Cheboygan	Cheboygan	Cheboygan	B-II	E/W	3500	3500	5000	Land for airport development and clear zones, and turf runway construction.
Chelsea	New	Washtenaw	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Chesaning	Chesaning	Saginaw	GU	E/W	2200*	3500	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Clare	Municipal	Clare	GU	E/W	2500	3800	.....	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, obstruction removal, and fencing.
Coldwater	Branch County Memorial	Branch	GU	NE/SW	3500	4300	.....	Land for clear zones, taxiway construction, runway widening, apron and runway extension, relocate and extend MIRL, install MITL, administration building, auto parking, access road, marking, and obstruction removal.
Colon	New	St. Joseph	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Coopersville	New	Ottawa	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Croswell	New	Sanilac	B-II	E/W	....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Crystal Falls	Iron County	Iron	GU	NW/SE	3700	3900	.....	Taxiway construction, runway widening, runway extension, runway resurfacing, relocate and extend MIRL, and marking.
Detroit	Metropolitan	Wayne	Trunk	NE/SW	10500	10500	.....	Land for airport development and clear zones, taxiway and runway construction, taxiway widening, taxiway extension, runway strengthening, install HIRL and MITL, terminal expansion, marking, access road, obstruction removal, grading for glide slope, and subway under runway.
Detroit	Detroit City	Wayne	BT	NW/SE	5000	5000	.....	Land for clear zones, apron extension, runway strengthening, fire and crash building, and obstruction removal.
Detroit	Willow Run	Wayne	GT	NE/SW	7518	10200	.....	Land for airport development and clear zones, runway extension, runway strengthening, extend HIRL and MITL, marking, obstruction removal, and relocate ALS.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Detroit	New	Wayne	BT	.....	.....	5500	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, and lighted wind cone, install MITL, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Detroit	Grosse Isle	Wayne	BT	NE/SW	4980	4980	.....	Land for clear zones, taxiway construction, apron and runway strengthening, relocate MIRL, install MITL, administration building, fire and crash building, marking, and obstruction removal.
Douglas Dowagiac	See Saugatuck Cass County Memorial	Cass	GU	E/W	3800	3800	.....	Land for airport development and clear zones, taxiway and runway construction, apron extension, install MIRL and MITL, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Drummond Island	Drummond Island	Chippawa	B-II	E/W	3660*	3100	.....	Land for clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, fencing, and homer.
Durand	New	Shiawassee	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
East Jordan	East Jordan	Charlevoix	B-II	E/W	3200*	3200	.....	Land for clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, marking, fencing, and obstruction removal.
East Tawas	Iosco County	Iosco	GU	E/W	3500	3800	5000	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, obstruction removal, marking, fencing, and homer.
Eckerman	New	Chippewa	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Edmore	New	Montcalm	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Elk Rapids	New	Antrim	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport
Empire	Empire	Leelanau	LS	N/S	2700*	2700*	.....	Land for clear zones, and obstruction removal.
Escanaba	Municipal	Delta	Local	E/W	6500	7400	.....	Land for airport development and clear zones, taxiway construction, runway widening, runway extension, runway strengthening and resurfacing, install MIRL and MITL, terminal expansion, auto parking, obstruction removal, fencing, and marking.
Ewart	Municipal	Osceola	B-II	NE/SW	2200	3200	.....	Land for airport development and clear zones, runway widening, runway extension, runway resurfacing, relocate and extend MIRL, administration building, access road, obstruction removal, marking, fencing, and auto parking.
Farmington	New	Oakland	GU	.....	.....	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, and lighted wind cone, administration building, auto parking, access road, marking, obstruction removal.

* = turf runway

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Flint	Bishop	Genesee	Trunk	E/W	5600	7200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, taxiway extension, apron, taxiway and runway strengthening, runway resurfacing, install MIRL and MITL, fire and rescue building, new terminal building, access road, auto parking, obstruction removal, marking, and fencing.
Flint	New (East)	Genesee	B-II	.....	....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Flint	New (North)	Genesee	B-II	.....	....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Frankenmuth-Vassar-Millington	New	Tuscola	B-II	E/W	....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking and fencing.
Frankfort	City-County	Benzie	B-II	NW/SE	2750	3200	.....	Land for clear zones, taxiway construction, runway widening, apron and runway extension, relocate and extend MIRL, administration building, access road, auto parking, marking, obstruction removal, and homer.
Fraser	McKinley	Macomb	B-II	E/W	2900	2900	.....	Acquire existing airport, install MIRL, and obstruction removal.
Freeland (Saginaw)	Tri-City	Saginaw	Trunk	NE/SW	6500	7400	.....	Land for airport development and clear zones, taxiway and runway construction, apron, taxiway and runway extension, taxiway and runway strengthening, install and extend MIRL, install MITL, terminal expansion, obstruction removal, marking, fencing, relocate and grade for localizer, and standby power.
Fremont	Municipal	Newaygo	BT	N/S	1855*	5750	.....	Land for airport development and clear zones, taxiway and runway construction, install MIRL, terminal building, auto parking, access road, obstruction removal, marking, and fencing.
Gaylord	Otsego County	Otsego	BT	E/W	5000	5000	.....	Taxiway and runway construction, runway strengthening, install MIRL and MITL, obstruction removal, marking, and fencing.
Gladwin	Municipal	Gladwin	B-II	E/W	....	3300	5000	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL and beacon, administration building, auto parking, access road, marking, fencing, and homer.
Grand Haven	Memorial	Muskegon	GU	E/W	3750	3750	.....	Land for airport development and clear zones, taxiway construction, runway widening, apron and runway extension, runway strengthening, install MIRL and beacon, administration building, auto parking, access road, marking, obstruction removal, fencing, and homer.
Grand Ledge	Abrams	Eaton	GU	E/W	2800*	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, and marking.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Grand Marais	Grand Marais	Alger	B-II	NE/SW	4400*	3200	.....	Apron taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, fencing, and homer.
Grand Rapids	Kent County	Kent	Trunk	E/W	6600	7800	.....	Land for airport development and clear zones, taxiway and runway construction, taxiway and runway widening, apron, taxiway and runway extension, apron, taxiway and runway strengthening, install and extend MIRL, HIRL and MITL, terminal extension, extend maintenance building, relocate localizer, relocate road, marking, obstruction removal, access road, and misc. grading.
Grand Rapids	New (West)	Kent	GU	.....	.....	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Grass Lake	New	Jackson	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Grayling	Grayling Area Airport	Crawford	BT	NE/SW	5000	5000	.....	Apron and taxiway construction, install MIRL, beacon, and MITL, administration building, auto parking, access road, obstruction removal, and homer.
Greenville	Greenville	Montcalm	GU	E/W	3000	3800	.....	Land for airport development and clear zones, taxiway and runway construction, runway widening, runway extension, runway strengthening, install and extend MIRL and beacon, marking, obstruction removal, fencing, and homer.
Hancock	Houghton County Memorial	Houghton	Local	NW/SE	5200	7800	.....	Land for airport development, clear zones and ALS, apron and taxiway construction, runway extension, runway strengthening, install MIRL, and HIRL, terminal building, obstruction removal, marking, fencing, standby power, access road and auto parking.
Harbor Springs	Harbor Springs	Emmet	GU	E/W	2000*	3900	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, obstruction removal, access road, auto parking, marking, and fencing.
Harrison	Clare County	Clare	LS	N/S	3300*	3300*	.....	Obstruction removal.
Harrisville	Harrisville	Alcona	LS	E/W	.....	2500*	.....	Land for airport development and clear zones, construct turf runway, and obstruction removal
Hart-Shelby	Hart-Shelby	Oceana	B-II	E/W	1800	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, runway widening, runway extension, runway strengthening, install MIRL and beacon, administration building, auto parking, access road, obstruction removal, marking, fencing, and homer.
Hastings	Municipal	Barry	GU	NW/SE	3000	3800	.....	Land for clear zones, taxiway construction, runway widening, apron extension, extend and relocate MIRL, administration building, auto parking, access road, obstruction removal, and marking.
Hermansville	New	Menominee	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Hessel	Hessel	Mackinac	LS	E/W	3300*	3300*	.....	Obstruction removal.
Hillman	Hillman	Montmorency	LS	N/S	2400*	2400*	.....	Obstruction removal.
Hillsdale	Municipal	Hillsdale	GU	E/W	3200	4000	5000	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, install MITL, relocate road, obstruction removal, marking, and fencing.
Holland	Tulip City	Allegan	GU	NE/SW	....	3800	5000	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, install MITL, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Holly	New	Oakland	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Holt-Mason	New	Ingham	GU	.....	....	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Homer	New	Calhoun	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Houghton	See Hancock							
Houghton Lake	Roscommon County	Roscommon	GU	E/W	2900	4000	5000	Land for clear zones, runway widening, apron and runway extension, install and relocate MIRL, obstruction removal and marking.
Howard City	New	Montcalm	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Howell	Livingston County	Livingston	GU	NW/SE	3000	3900	5000	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install and extend MIRL, install MITL, obstruction removal, marking, and fencing.
Hudson	New	Lenawee	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Huron Beach	New	Presque Isle	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Indian River	Calvin Campbell	Cheboygan	B-II	E/W	3100*	3000	.....	Land for clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, marking, obstruction removal, and fencing.
Interlochen	Green Lake	Grand Traverse	LS	NE/SW	2800*	2800*	.....	Obstruction removal.
Ionia	Ionia County	Ionia	GU	E/W	3700	3900	5000	Land for airport development and clear zones, taxiway and runway construction, install MIRL, obstruction removal, and marking.
Iron Mountain (Kingston)	Ford	Dickinson	Local	N/S	6500	7500	.....	Land for clear zones and ALS, taxiway construction, runway widening runway extension, install HIRL, terminal building, access road, auto parking, marking, obstruction removal, grade for glide slope and localizer.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY				RECOMMENDED DEVELOPMENT
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED	ULTIMATE	
Ironwood	Gogebic County	Gogebic	Local	E/W	5400	5400	.....	Land for airport development and clear zones, taxiway and runway construction, install MIRL, HIRL, and MITL, terminal expansion, drainage, obstruction removal, auto parking, and marking.
Jackson	Reynolds Municipal	Jackson	Local	NE/SW	5350	5350	.....	ALS land, taxiway construction, taxiway widening, install HIRL and MITL, marking, and grading for glide slope.
Kalamazoo	Municipal	Kalamazoo	Local	N/S	5300	6500	.....	Land for clear zones and ALS, taxiway and runway construction, apron, taxiway and runway extension, apron, taxiway and runway strengthening, install MIRL, extend HIRL, install and extend MITL, relocate rail road, ALS, glide slope, middle marker, RVR transmissometer, obstruction removal, and marking.
Kalamazoo	See Battle Creek-Kalamazoo							
Kalkaska	Kalkaska	Kalkaska	LS	E/W	3600*	3600*	.....	No development needed during the planning period.
Kingston	See Iron Mountain							
Lake City	Home Acres Sky Ranch	Missaukee	B-II	E/W	2600*	3400	.....	Acquire existing airport, land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Lake Odessa	New	Ionia	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Lakeview	Lakeview	Montcalm	B-II	E/W	2500	3300	.....	Apron and runway extension, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, fencing, and homer.
Lambertville	Wagon Wheel	Monroe	GU	E/W	4000	4000	.....	Purchase existing airport, land for clear zones, runway widening, runway extension, install MIRL, obstruction removal, and marking.
Lansing	Capital City	Clinton	Trunk	E/W	6500	8100	.....	Land for airport development and clear zones, apron, taxiway and runway construction, taxiway and runway widening, apron, taxiway and runway extension, apron, taxiway and runway strengthening, install and extend MIRL, HIRL, and MITL, terminal extension, fire and crash building, install REILS, auto parking, access road, drainage, fencing, marking, relocate ALS, glide slope, middle marker, obstruction removal and stand by power.
Lapeer	Dupont-Lapeer	Lapeer	B-II	E/W	2100*	3300	5000	Acquire existing airport, land for airport development and clear zones, apron, taxiway and runway construction, runway widening, install MIRL, beacon and lighted wind cone, administration building, obstruction removal, access road, auto parking, and marking.
Leslie	New	Ingham	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Lewiston	Twin Lakes	Montmorency	LS	NE/SW	3000*	3000*	.....	Acquire existing airport, and obstruction removal.

*=turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	DIRECTION	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT
					RUNWAY LENGTH			
					EXISTING	PROPOSED	ULTIMATE	
Lowell	New	Kent	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Ludington	Mason County	Mason	BT	E/W	3000	5400	.....	Land for airport development and clear zones, taxiway construction, runway extension, runway resurfacing, extend MIRL, obstruction removal, marking, and fencing.
Luther	New	Lake	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Mackinac Island	Mackinac Island	Mackinac	B-II	E/W	3500	3500	.....	Taxiway construction, apron extension, runway surfacing, install MIRL, beacon, lighted wind cone and REILS.
Mackinaw City	Mackinaw City	Emmet	LS	E/W	2200*	2200*	.....	Obstruction removal.
Manchester	New	Washtenaw	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Manistee	Manistee County Blacker	Manistee	Local	E/W	5400	5400	.....	Land for airport development and clear zones, taxiway and runway construction, install MIRL, obstruction removal, marking, and fencing.
Manistique	Schoolcraft County	Schoolcraft	GU	E/W	3000	3700	5000	Land for airport development and clear zones, apron, taxiway and runway construction, runway extension, runway surfacing, install MIRL and REILS, administration building, access road, auto parking, relocate road and power line, obstruction removal and fencing.
Manton	New	Wexford	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Marenisco	New	Gogebic	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Marine City	Marine City	St. Clair	B-II	NE/SW	2100*	3200	.....	Acquire existing airport, land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking and fencing.
Marquette	New	Sanilac	GU	.....	....	3800	5000	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal marking, and fencing.
Marquette	Marquette County	Marquette	Local	E/W	6500	7500	.....	Land for clear zones and ALS, runway widening, runway extension, install MIRL, HIRL, and MITL, terminal expansion, snow removal equipment building, auto parking, marking, obstruction removal, and grading for localizer.
Marshall	Brooks Field	Calhoun	GU	E/W	3500	3800	5000	Land for airport development and clear zones, apron, taxiway and runway construction, runway extension, install and extend MIRL, administration building, auto parking, access road, marking, obstruction removal, and fencing.
Mason	See Holt							
Mecosta	New	Mecosta	LS	NE/SW	....	2500*	.....	Construct minimum 2500' turf airport.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Menominee-Marinette	Menominee County	Menominee	Local	NW/SE	5100	5400	.....	Land for airport development and clear zones, apron and taxiway construction, runway widening, runway extension, runway strengthening, extend and relocate MIRL, new terminal, marking, obstruction removal, road relocation, fencing, auto parking, and access road.
Merrill	New	Saginaw	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Mesick	New	Wexford	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Michigamme	New	Marquette	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Midland	Jack Barstow	Midland	GU	NE/SW	3000	3800	.....	Taxiway construction, apron and runway extension, extend MIRL, install MITL, drainage, obstruction removal, marking, and fencing.
Milan	Milan	Monroe	LS	N/S	2500*	2500*	.....	Acquire existing airport, and obstruction removal.
Milford	New	Oakland	GU	.....	.....	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, administration building, auto parking, access road, marking, and obstruction removal.
Millington	See Frankenmuth							
Minden	New	Sanilac	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Mio	Mio	Oscoda	LS	E/W	3000*	3000*	.....	Obstruction removal.
Monroe	Custer	Monroe	B-II	N/S	3500	3500	.....	No development needed for Custer Airport. Need new airport at Monroe.
Monroe	New	Monroe	BT	E/W	.....	5000	8000	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Morenci	New	Lenawee	B-II	.....	.....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, and marking.
Mt. Clemens	New	Macomb	BT	.....	.....	5000	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, lighted wind cone and MITL, administration building, auto parking, access road, obstruction removal, fencing and marking.
Mt. Pleasant	Municipal	Isabella	BT	E/W	3000	5000	.....	Taxiway and runway construction, apron and runway extension, apron, taxiway and runway strengthening, install and extend MIRL, install MITL, administration building, auto parking, access road, marking, obstruction removal and fencing.
Munising	Hanley Field	Alger	B-II	N/S	3050*	3200	.....	Apron, taxiway and runway construction, install lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, fencing, and homer.

*=turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Muskegon	Muskegon County	Muskegon	Trunk	NE/SW	6500	6500	.....	Land for clear zones, apron and taxiway extension, apron, taxiway and runway strengthening, install MITL, fire and rescue building, relocate glide slope and access road, install REILS, marking and fencing.
Nashville	New	Barry	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Naubinway	Hiawatha Club	Mackinac	LS	E/W	2150*	2500*	.....	Acquire existing airport, runway extension, and obstruction removal.
Neebish Island	New	Chippewa	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Newaygo	Newaygo	Newaygo	LS	NE/SW	3200*	3200*	.....	Obstruction removal.
Newberry	Luce County	Luce	B-II	E/W	3500	3500	5000	Runway construction, apron extension, runway resurfacing, install MIRL, beacon and lighted wind cone, administration building, auto parking, and install REILS and VOR.
Niles	Jerry Tyler Memorial	Cass	GU	NW/SE	4100	4100	5000	Land for clear zones, taxiway construction, apron extension, runway resurfacing, install and extend MIRL, install MITL, marking, and obstruction removal.
Northport	Woolsey Memorial	Leelanau	LS	N/S	2650*	2650*	.....	Land for clear zones, and obstruction removal.
Olivet	New	Eaton	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Onaway	Onaway	Presque Isle	B-I	NW/SE	3100*	2600	.....	Land for clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, marking, obstruction removal, and fencing.
Ontonagon	Ontonagon County	Ontonagon	B-II	N/S	3500	3500	5000	Runway resurfacing, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, install REILS and homer.
Otsego-Plainwell	Otsego-Plainwell	Allegan	B-I	E/W	2650	2650	4500	No development needed during planning period.
Ovid	New	Clinton	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Owosso	Owosso City	Shiawassee	GU	E/W	3000	3800	New Site	Land for airport development and clear zones, taxiway construction, runway widening, apron and runway extension, runway resurfacing, extend and relocate MIRL, install MITL, auto parking, access road, marking, and obstruction removal.
Oxbow	New	Newaygo	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Oxford	Country View	Oakland	LS	E/W	2000*	2500*	.....	Acquire existing airport, runway extension, and obstruction removal.
Paradise Tahquamenon	New	Chippewa	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Paw Paw	New	Van Buren	B-II	.....	.....	3200	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, and marking.
Pellston	Emmet County	Emmet	Local	NW/SE	6500	6500	.....	Land for clear zones and ALS, apron construction, taxiway widening, install MITL, new terminal building, snow removal equipment building, auto parking, access road, and obstruction removal.
Pentwater	New	Oceana	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Perry	New	Shiawassee	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Pinconning	New	Bay	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Plymouth	Mettetal	Wayne	GU	NE/SW	.....	3800	.....	Acquire existing airport, apron, taxiway and runway construction, runway widening, runway extension, runway resurfacing, install MIRL, beacon, lighted wind cone and MITL, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Pontiac	Oakland-Orion	Oakland	GU	N/S	2400*	3900	5000	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, lighted wind cone and MITL, administration building, auto parking, access road, obstruction removal, marking, and fencing.
Pontiac	Oakland-Pontiac	Oakland	BT	E/W	5300	5300	.....	Land for airport development and clear zones, taxiway and runway construction, apron and runway extension, install MIRL and MITL, obstruction removal, marking, and grading for localizer and glide slope.
Port Austin	New	Huron	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Port Huron	St. Clair County	St. Clair	BT	NE/SW	5100	5100	.....	Taxiway extension, taxiway and runway strengthening, install MITL, marking and fencing.
Portland	New	Ionia	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Ralph	Ralph	Dickinson	LS	NW/SE	2000*	3200*	.....	Runway extension, and obstruction removal.
Richmond	New	Macomb	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Rock	Bonnie Field	Delta	LS	NW/SE	2900*	2900*	.....	Obstruction removal.
Rogers City	Presque Isle County	Presque Isle	GU	E/W	3000	3800	.....	Land for clear zones, apron and taxiway construction, runway widening, runway extension, runway surfacing, extend MIRL, administration building, runway grading, obstruction removal, marking, fencing, and homer.
Romeo	Romeo	Macomb	B-II	E/W	3600	3600	.....	Acquire existing airport, apron and taxiway construction, runway widening, runway extension, install MIRL, beacon, lighted wind cone and MITL, administration building, auto parking, access road, obstruction removal, fencing, marking, and install homer.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Roscommon	Roscommon Conservation Airport	Roscommon	GU	E/W	3600	3600	.....	Administration building, auto parking, and obstruction removal.
Saginaw	See Freeland							
Saginaw	Municipal	Saginaw	GU	E/W	.....	3500	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon, lighted wind cone, and MITL, administration building, auto parking, access road, obstruction removal, marking, and fencing.
St. Helen	St. Helen	Roscommon	LS	E/W	2600*	2600*	.....	Obstruction removal.
St. Ignace	Mackinac County	Mackinac	GU	E/W	3200	3700	.....	Runway widening, apron and runway extension, runway resurfacing, extend and relocate MIRL, auto parking, access road, marking, and install homer.
St. James	See Beaver Island							
St. Johns	Dickinson	Clinton	LS	E/W	2100*	2500*	.....	Acquire existing airport, land for airport development and clear zones, runway extension, obstruction removal.
Sandusky	Sandusky City	Sanilac	GU	E/W	3000	3800	.....	Land for airport development and clear zones, runway construction, runway widening, apron and runway extension, runway surfacing, install MIRL, beacon and lighted wind cone, obstruction removal, auto parking, marking, and fencing.
Saugatuck-Douglas	New	Allegan	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Sault Ste. Marie	Municipal	Chippewa	BT	NW/SE	5000	5000	.....	Land for clear zones, taxiway and runway construction, install MIRL and MITL, obstruction removal, and parking.
Sault Ste. Marie	Kincheloe	Chippewa	Local	NW/SE	14000	7600	.....	Land for clear zones, taxiway and runway construction, install and relocate HIRL, install beacon, lighted wind cone, and MITL, terminal building, auto parking, access road, marking and fencing.
Sebewaing	Sebewaing	Huron	B-II	N/S	2178	2500	.....	Runway widening, runway extension, apron, taxiway and runway surfacing, install MIRL, beacon and lighted wind cone, administration building, access road, auto parking, obstruction removal, marking, fencing, and install homer.
Seney	New	Schoolcraft	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Shelby	See Hart							
Sidnaw	New	Houghton	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Simar	Simar	Ontonagon	LS	E/W	2000*	2500*	.....	Runway extension, and obstruction removal.

* = turf runway

FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
South Branch	Timbers Sky Ranch	Iosco	LS	NW/SE	2200*	2500*	.....	Purchase existing airport, runway extension, and obstruction removal.
South Haven	Municipal	Van Buren	GU	NE/SW	2900	3800	.....	Land for airport development and clear zones, taxiway and runway construction, runway widening, apron and runway extension, runway surfacing, install and extend MIRL, install MITL, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Sparta	Sparta	Kent	GU	NE/SW	2450	3800	.....	Land for airport development and clear zones, taxiway and runway construction, runway widening, apron and runway extension, install MIRL and MITL, access road, auto parking, fencing, and marking.
Stambaugh	Stambaugh	Iron	B-I	N/S	2164	2164	.....	Apron and taxiway construction, administration building, auto parking, and access road.
Standish	Standish	Arenac	GU	E/W	2800*	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, auto parking, access road, obstruction removal, marking, fencing, and install homer.
Sturgis	Kirsch Municipal	St. Joseph	BT	N/S	....	5700	.....	Land for airport development and clear zones, apron, taxiway and runway construction, taxiway widening, install MIRL, REILS, and MITL, administration building, access road, auto parking, obstruction removal, marking and fencing.
Sugar Island	New	Chippewa	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Three Oaks	Oselka	Berrien	B-I	E/W	2770	2770	.....	Acquire existing airport, land for clear zones, install MIRL, beacon and lighted wind cone, obstruction removal, and auto parking.
Three Rivers	Dr. Haines Airport	St. Joseph	GU	E/W	3700*	3900	.....	Land for airport development and clear zones, apron and runway construction, taxiway extension, runway resurfacing, install MIRL and MITL, administration building, access road, auto parking, obstruction removal, marking, and fencing.
Traverse City	Cherry Capital Airport	Grand Traverse	Local	E/W	6500	7000	.....	Land for clear zones and ALS, taxiway construction, runway extension, runway resurfacing, extend HIRL, install MITL, obstruction removal, marking, and fencing.
Union City	New	Branch	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.
Utica	New	Macomb	GU	.....	....	3800	.....	Land for airport development and clear zones, apron, taxiway and runway construction, install MIRL, administration building, auto parking, access road, marking, and obstruction removal.
Vassar	See Frankenthuth							
Vicksburg	New	Kalamazoo	LS	.....	....	2500*	.....	Construct minimum 2500' turf airport.

* =turf runway

TABLE XI

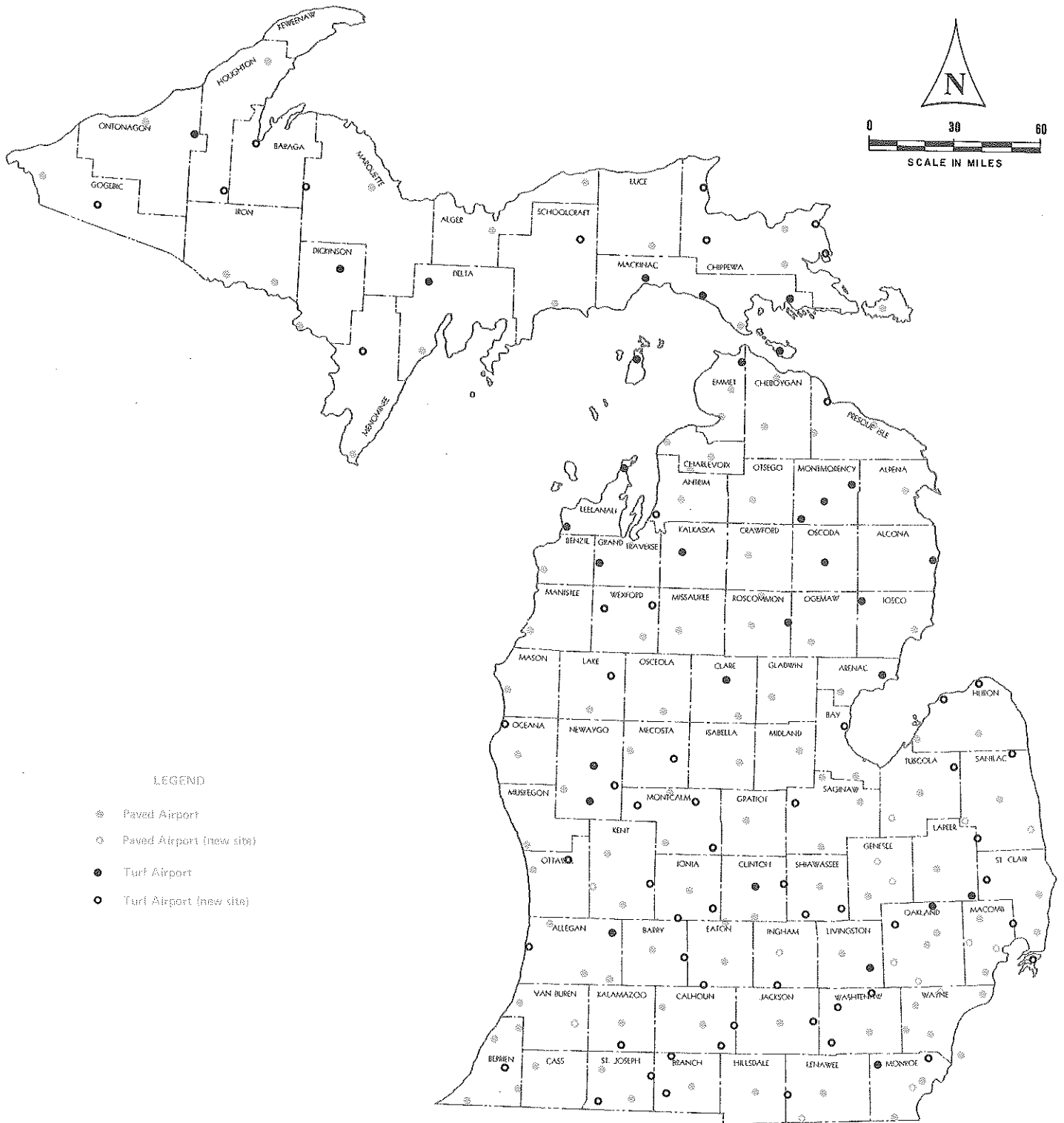
FIGURE 15 (Cont'd.)

CITY	AIRPORT NAME	COUNTY	AIRPORT TYPE	PRIMARY RUNWAY			RECOMMENDED DEVELOPMENT	
				DIRECTION	RUNWAY LENGTH			
					EXISTING	PROPOSED		ULTIMATE
Watervliet	Watervliet	Berrien	B-I	N/S	2900*	2500	.....	Apron, taxiway and runway construction, install MIRL, beacon and lighted wind cone, administration building, obstruction removal, marking, access road, and auto parking.
Wayland	Municipal	Allegan	LS	E/W	1980*	2500*	.....	Land for airport development and clear zones, runway extension, and obstruction removal.
West Branch	West Branch Community	Ogemaw	GU	E/W	3200	3800	5000	Runway construction, runway extension, install MIRL and REILS, auto parking, obstruction removal, fencing, marking, and install homer.
White Cloud	White Cloud	Newaygo	LS	N/S	1800*	2500*	.....	Runway extension, and obstruction removal.
White Pigeon	New	St. Joseph	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.
Whitmore Lake	New	Washtenaw	LS	.....	.....	2500*	.....	Construct minimum 2500' turf airport.

* = turf runway

FIGURE 15 (Concluded)

INTERIM AIRPORT PLAN STATE OF MICHIGAN, 1970-1975



Sources: Engineering Division
MICHIGAN AERONAUTICS COMMISSION

MAP IV

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