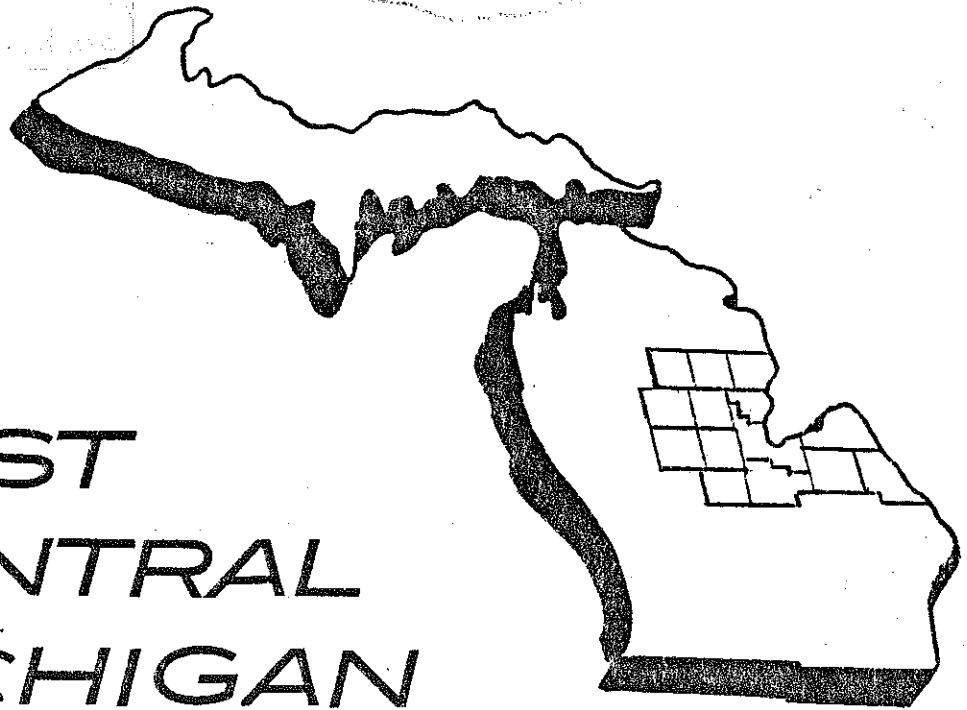


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*EAST
CENTRAL
MICHIGAN
TRANSPORTATION
STUDY*



PRESENTED BY THE MICHIGAN DEPARTMENT OF TRANSPORTATION
IN COOPERATION WITH THE EAST CENTRAL MICHIGAN PLANNING
AND DEVELOPMENT REGION.

J. P. WOODFORD, DIRECTOR

MICHIGAN DEPARTMENT OF TRANSPORTATION

June, 1979

This report represents the findings and/or professional opinions of the Michigan Department of Transportation staff and is not an official opinion of the Michigan Transportation Commission.

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Carl V. Pellonpaa

Weston E. Vivian

Lawrence C. Patrick, Jr.

William C. Marshall

Rodger D. Young

Director

John P. Woodford



REGION 7 LOCATION MAP
MICHIGAN DEPARTMENT OF TRANSPORTATION

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SECTION A

INTRODUCTION

The Constitution and Statutes of the State of Michigan establishes the Michigan Transportation Commission's responsibility for planning, building and maintaining a transportation system for our State. To fulfill these responsibilities the Michigan Department of Transportation has developed a process to guide the State and its governmental units in analyzing the adequacy of existing transportation systems and preparing plans for future systems and facilities.

Traditionally, the planning process has been divided into two phases; systems planning and project planning (see page 4). Systems planning consists of analyzing transportation system needs and developing alternative proposals designed to satisfy those needs. The process begins with the analysis of existing systems and facilities and their relationship to goals and objectives of the State and local governmental units of the State. It extends through the establishment of a set of priorities for the improvement of the system by capital investment projects. Systems planning studies provide a general overview of how all modes of transportation interact in a given area. They address the physical and functional components of the various transportation systems and consider the impacts to its users and non-users. The contents of this report represent a systems planning study as it relates to the East Central Region (Region 7).

Project planning is the process of analyzing all practical alternatives to improve specific transportation facilities. This is done until all but one alternative is eliminated. Because project planning deals with

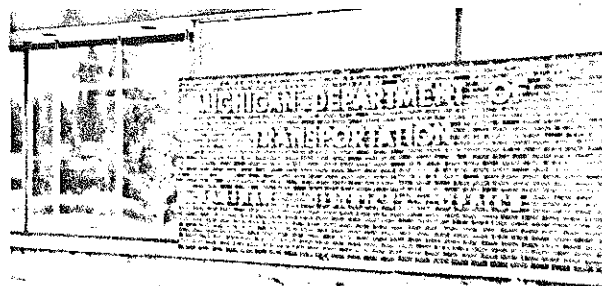
specific facility location and design, an Environmental Impact Statement (EIS) may be required, depending on the extent of improvements and the intensity of impacts.

STUDY AREA

The geographic area considered in this transportation study coincides with the 14 county jurisdiction of the East Central Michigan Regional Planning and Development Commission. This agency has been designated by the Governor as the multi-county regional planning agency for this area. The overall objective of this action is to better coordinate state programs with one another along with federal, regional, local and private sector programs. The East Central Regional Transportation Study represents the Department of Transportation's pledge to meeting this objective.

PURPOSE OF STUDY

The East Central Regional Transportation Study was initiated in 1975. The purpose of the study is to identify current and future deficiencies. This study will recommend sub-area corridor and project studies that will result in recommendations for improving various transportation modes operating in the fourteen county East Central Region.



STATE PLANNING AND DEVELOPMENT REGIONS



LEGEND:

1. Southeast Michigan Council of Governments
2. Region II Planning Commission
3. South Central Michigan Planning & Development Council of Region III
4. Southwestern Michigan Regional Planning Commission
5. G-L-S Regional Planning Commission
6. Tri-County Regional Planning Commission
7. East Central Michigan Planning & Development Regional Commission
8. West Michigan Regional Planning Commission
9. Northeast Michigan Council of Governments
10. Northwest Michigan Regional Planning & Development Commission
11. Eastern Upper Peninsula Regional Planning & Development Commission
12. Central Upper Peninsula Planning & Development Regional Commission
13. Western Upper Peninsula Regional Planning Commission
14. West Michigan Shoreline Regional Development Commission



Regional Planning Commissions, as established under Public Act 281, Public Acts of 1945, as amended, exist in multi-jurisdictional areas throughout Michigan. The state regions are funded by money from local, state and federal sources and work in the program areas of land use, environmental protection, transportation, housing, economic development, water resources, law enforcement, waste management, recreation, manpower and other programs.

SECTION B

PLANNING TECHNIQUE

This study is being conducted by a multi-disciplinary planning team made up of professionals who have diverse educational backgrounds with different perspectives. They can and do provide ideas that can be applied to problem identification and solution. Typical membership of this study team includes engineers, planners, social scientists, economists and ecologists. The study team has members representing the East Central Michigan Planning and Development Region (Region 7) and the Federal Highway Administration.

A key element of this document is the requirement to encourage public involvement in the early planning stages for major transportation facilities. To accomplish this, a 3-step meeting process has been established, consisting of: 1) Pre-Study Public Meetings, 2) Public Hearings and, 3) Post-Decision Meetings. These meetings are generally required for both the systems and project level planning steps. Thus, the general public will have opportunities to become involved in the planning process and to review and comment on transportation proposals affecting their area. The contents of this report were assembled in preparation for the second meeting, a Public Hearing on the Transportation Study for the East Central Region.

In addition to the prescribed public meetings, the study team utilizes many other sources to obtain public input into the planning process. These sources include questionnaires, travel surveys, correspondence, newspaper articles, interviews with local officials, public information meetings, the involvement of special interest groups, citizen advisory groups and local planning

organizations. Information gathered from these sources has assisted in identifying many important transportation needs. The current planning efforts will illustrate how various future growth projections and energy situations could affect the existing and future travel demands by mode of travel. By analyzing these future conditions, the study team will be in a better position to continue planning efforts on those projects which show the greatest need and are common to: 1) existing deficiencies, 2) expected future deficiencies without new improvements, and 3) diversion to other modes of travel in future years.

In the travel analysis distribution phase, energy availability and growth trends are factored into trips by different transportation modes by trip length and trip purpose for each future period.

Travel projections are first made on the existing highway network using low, medium, and high population projections to the year 2,000. Projected traffic volumes for each future year are then compared with the existing facilities and deficiencies are identified. After this evaluation, a diversion of trips from the highway system is made to other modes of transportation based upon population levels and energy availability. Highways which continue to be deficient from a capacity standpoint are included as projects to be studied in greater detail. These are the highways which cannot be relieved with a diversion of trips to other modes of transportation as the cost would be prohibitive or because continuity of through trips on the system would be broken.

PLANNING

SYSTEMS PLANNING

Determine Need, Priorities and General Corridor Location

PROJECT PLANNING

Deals with Specific Locations and Types of Facility Designs

STATEWIDE SYSTEMS PLANNING

Deals with State & National Transportation Needs - Results in Broad Policy Determination

STATE MODAL PLANS

1. Airports
2. Busses
3. Highways
4. Railroads
5. Waterways

REGIONAL SYSTEMS PLANNING *

Relates Statewide Planning to all Regions to Insure Consideration of Local Goals

REGIONAL TRANSPORTATION STUDIES

1. Northeast Michigan Region
2. Northwest Michigan Region
3. East Central Michigan Region
4. etc.
5. etc.

CORRIDOR LOCATION STUDIES

Required When Facility must be Relocated or Major Problems Anticipated. Determines General Corridor Location

DESIGN STUDIES

Evaluates Specific Locations and Facility Types Within the General Corridor



THE CONCERN OF THIS STUDY

FIGURE 1

ESTIMATED MODE SPLIT BY TRIP LENGTH, TRIP PURPOSE AND ENERGY FUTURE

MODE SPLIT PERCENTAGES

ABUNDANT ENERGY SUPPLY

TRIP* PURPOSE	TRAVEL REDUCTION	MODE	TRIP LENGTH (MIN) ^{5/}					
			0-30	31-60	61-90	91-121	121-300	300+
WORK	0%	Auto	99.9	99.6	98.6	97.0	94.6	88.8
		Bus	0.1	0.2	0.6	1.0	2.0	2.0
		Rail	0.0	0.2	0.8	2.0	2.0	2.0
		Air	0.0	0.0	0.0	0.0	1.4	7.2
VACATION	0%	Auto	99.9	99.6	98.6	97.0	96.2	90.1
		Bus	0.1	0.2	0.6	1.0	2.0	2.0
		Rail	0.0	0.2	0.8	2.0	1.0	1.5
		Air	0.0	0.0	0.0	0.0	0.8	6.4
OTHER	0%	Auto	99.9	99.6	98.6	97.0	94.7	88.7
		Bus	0.1	0.2	0.6	1.0	2.0	2.0
		Rail	0.0	0.2	0.8	2.0	2.5	2.5
		Air	0.0	0.0	0.0	0.0	0.8	6.8

CONSERVED ENERGY SUPPLY

TRIP PURPOSE	TRAVEL REDUCTION	MODE	TRIP LENGTH (MIN)					
			0-30	31-60	61-90	91-120	121-300	300+
WORK	0%	Auto	93 ^{1/}	93 ^{2/}	97	94	91	84
		Bus	5	2	1	2	4	4
		Rail	0	0	2	4	4	4
		Air	0	0	0	0	1	8
VACATION	-5%	Auto	100	99	97	96	93	87
		Bus	0	1	1	2	4	4
		Rail	0	0	2	2	2	2
		Air	0	0	0	0	1	7
OTHER	-5%	Auto	95	99	97	93	90	84
		Bus	5	1	1	3	4	4
		Rail	0	0	2	4	5	5
		Air	0	0	0	0	1	7

RESTRICTED ENERGY SUPPLY

TRIP PURPOSE	TRAVEL REDUCTION	MODE	TRIP LENGTH (MIN)					
			0-30	31-60	61-90	91-120	121-300	300+
WORK	0%	Auto	85 ^{3/}	84 ^{4/}	97	93	87	81
		Bus	10	5	1	3	5	5
		Rail	0	1	2	4	7	7
		Air	0	0	0	0	1	7
VACATION	-20%	Auto	100	98	97	94	90	84
		Bus	0	1	1	3	4	4
		Rail	0	1	2	3	5	6
		Air	0	0	0	0	1	6
OTHER	-20%	Auto	90	95	97	91	85	78
		Bus	10	4	1	4	6	6
		Rail	0	1	2	5	8	10
		Air	0	0	0	0	1	6

* Work Trips Include: Work, Shopping, Personal Business 1/ Reflects 2% Car Pools for 0-30 min "Work" Trips
 Vacation Trips Include: Vacation 2/ Reflects 5% Car Pools for 31-60 min "Work" Trips
 Other Trips Include: Social, Recreation, and all others 3/ Reflects 5% Car Pools for 0-30 min "Work" Trips
 4/ Reflects 10% Car Pools for 31-60 min "Work" Trips
 5/ Based on Approximate Auto Driving Time (Minutes)

MULTI-MODAL TRAFFIC ASSIGNMENT PROCESS

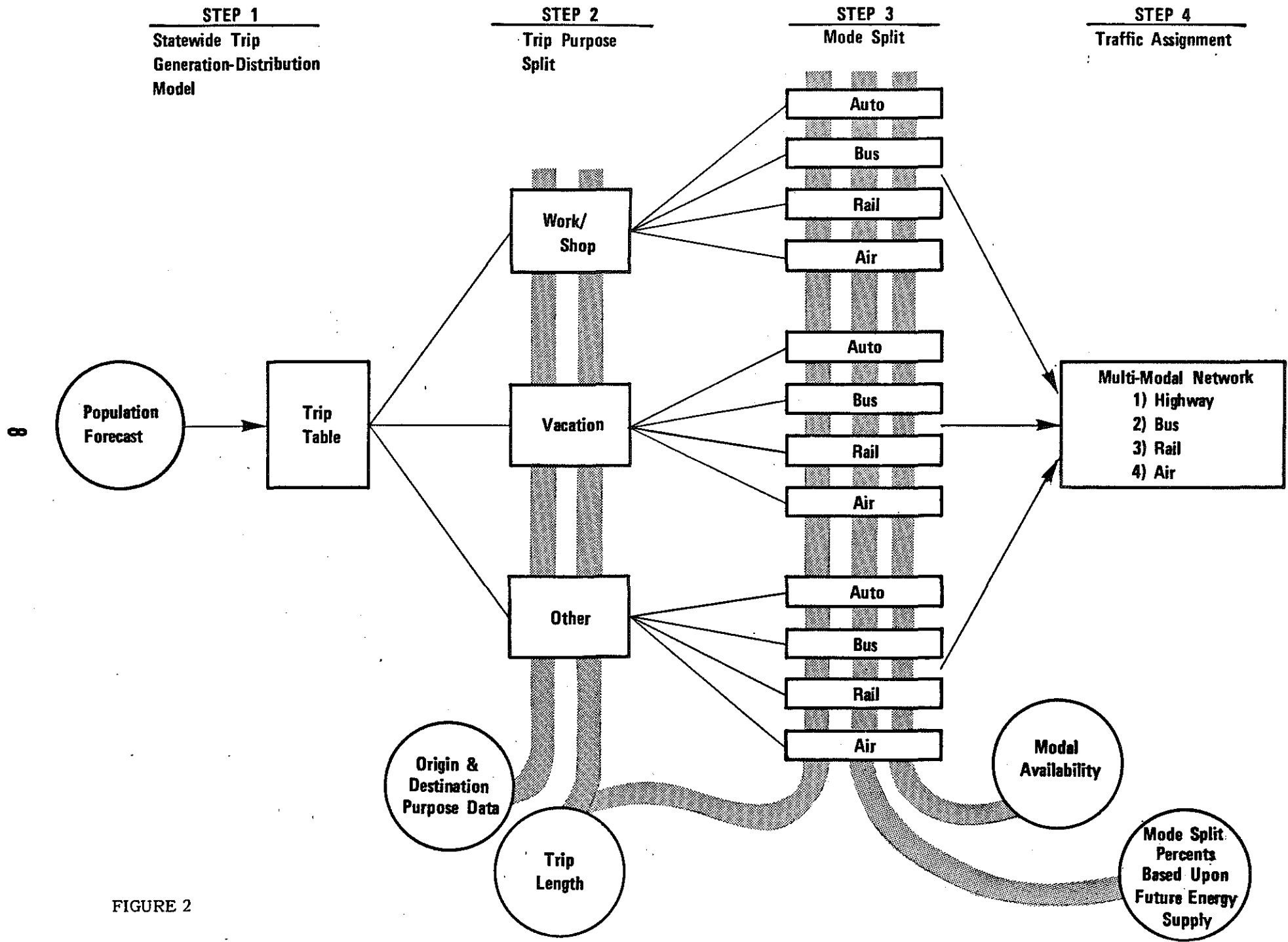


FIGURE 2

SECTION D

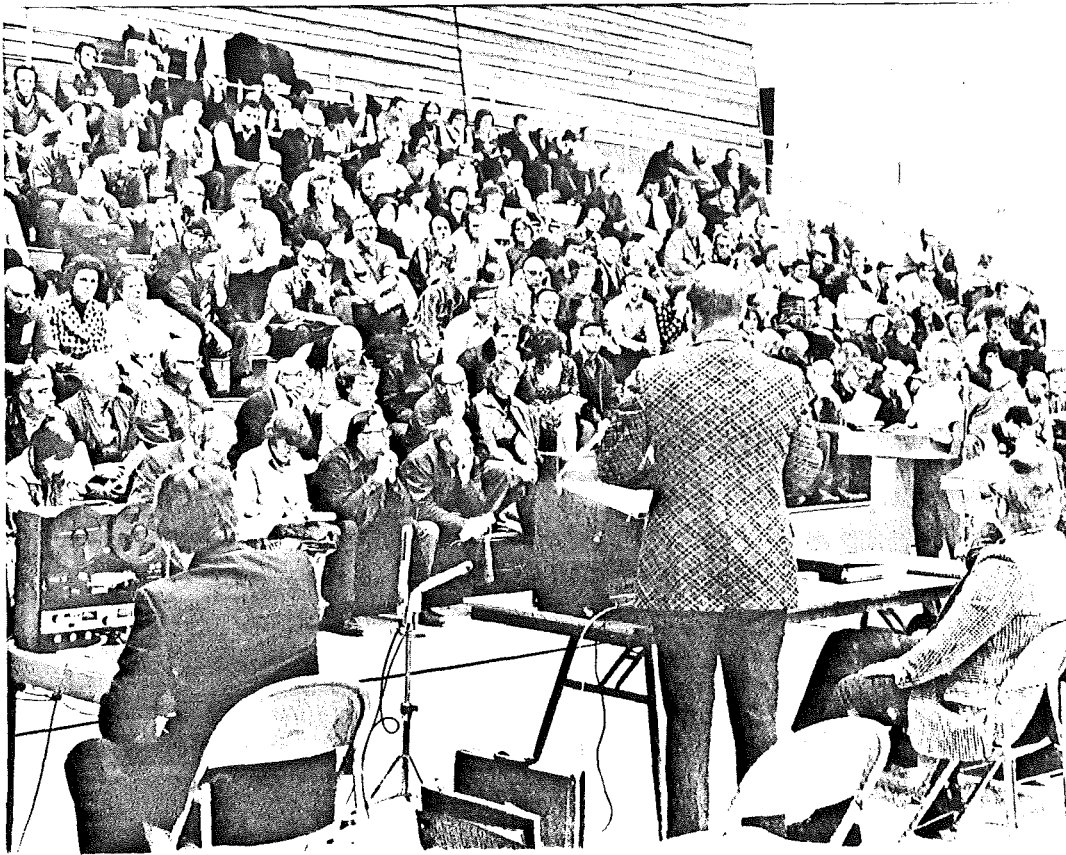
TRANSPORTATION ISSUES GOALS AND OBJECTIVES

On the following pages, we have summarized the concerns of citizens and public agencies expressed at the 1976 public meetings. When these meetings were scheduled, the Department asked for input from the general public concerning the direction transportation planning should take in Region 7.

The Michigan Department of Transportation is concerned about the specific desires of the general public relative to transportation projects, however, the end product of the Regional System Study will be a

formal list of transportation problems needing detailed analysis rather than the preparation of a list of specific transportation projects to be constructed. Once the needs are identified and verified, the Department will issue a report outlining the recommended future transportation studies for Region 7.

All of the concerns voiced at previous public meetings have been considered in determining the data to be collected and presented in the report.



IDENTIFICATION OF ISSUES FROM PRESTUDY MEETINGS

Major Issues Identified (A summary)

(Based on a review of meeting transcripts and questionnaire comments.)

Tawas City - July 27, 1976

1. Taking of prime agricultural land for highway construction.
2. Relocation of US-23 around Standish.
3. Improvement of US-23 from Standish to Alpena.
4. State land versus private land for highway construction.
5. Noise pollution and sound barriers.
6. Reconstruction of US-23 to 4-lanes on existing Right-of-Way.
7. Rail passenger service on improved D & M Railroad.
8. Improvements to Iosco County Airport.
9. Construction of bike paths along US-23 and from East Tawas to Tawas Point State Park.
10. Improved Mass Transit.
11. New highway construction to handle peak period travel.

West Branch - July 28, 1976

1. Improved public transportation.
2. Improved east/west highway service.
3. Construction of bike paths.
4. Safer highways.

Mt. Pleasant - July 29, 1976

1. Improve M-20 to 4-lanes from Midland to Muskegon.
2. Concern of the extent of public impact on transportation plans.
3. Integration of and improved bus transportation.
4. Retention of rail services.
5. Improvements to M-46 from Alma to Saginaw.
6. Economic Development.
7. Improved public transportation for the elderly and handicapped in Gratiot County.
8. Improved bike paths.

Cass City - August 3, 1976

1. Improvement to existing rail facilities.
2. Improvements to M-53, M-81 and M-25.
3. Upgrade roads to all weather routes.
4. Economic development of the thumb.
5. Continuation of rail service.
6. Construction of bike paths.
7. Employment opportunities.
8. Reevaluation of M-24 Corridor.

9. Improved bus service.

Delta College - August 4, 1976

1. Improved passenger train service.
2. Improve Tri-City Airport to a regional facility.
3. Expanded bus service.
4. Continue to use abandoned railroads for non-motorized purposes.
5. Public transportation for Chesaning/St. Charles area.
6. Unemployment.

The following transportation issues were presented by the Saginaw Metropolitan Area Transportation Study by letter:

1. Construction of an interchange at Shattuck Road and I-675.
2. Development of Tittabawassee Road as a major regional highway.
3. Construction of a new freeway paralleling I-75 west of Saginaw.
4. Reconstruction of M-46 to limited access between Alma and Saginaw.
5. Improvements to Tri-City Airport to facilitate use by larger aircraft.
6. Improvement of Harry W. Browne Airport.
7. Development of high-speed public transit to connect Bay City/ Saginaw with southwestern Michigan.
8. Navigation improvements along the Saginaw River.
9. Interchange construction on I-75 at Hess and Freeland Roads.

STATE TRANSPORTATION GOALS

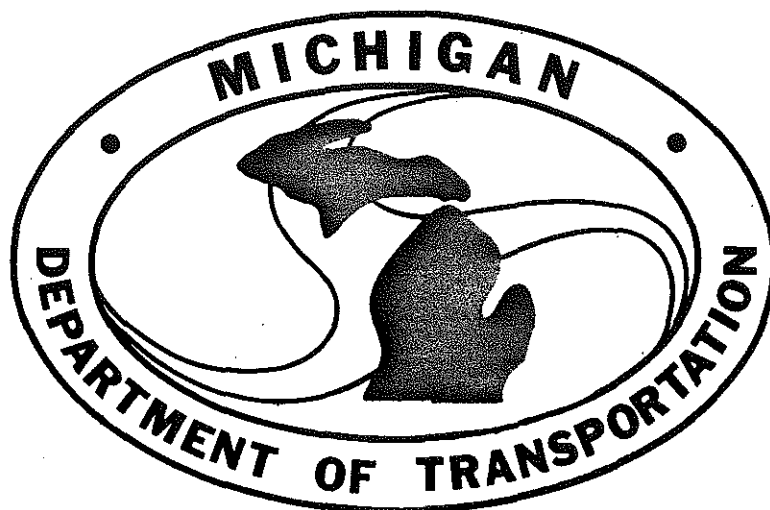
State transportation goals provide a focus for modal goals, service standards and plans. The draft goals which have been developed through the State Needs Study and are being proposed for final approval by the transportation commission are as follows:

STATEMENT OF PURPOSE

To ensure a level of mobility for Michigan citizens, visitors and commerce that is reasonable in terms of the social, economic and environmental values of the State.

GOALS

- I. To provide adequate transportation services to meet the mobility needs of people and goods.
- II. To provide for the safe movement of people and goods.
- III. To enhance desired social, economic and environmental values in the planning, development and operation of transportation systems.
- IV. To optimize transportation investments.



"Few aspects of our society are so important as our transportation system. It is the lifeline of our economy. Without a good network of roads and highways, railroads and air services, Michigan would quickly founder in its efforts to maintain economic growth and stay competitive with other states. Manufacturing, tourism, agriculture — our three largest industries — depend absolutely on good transportation."

Governor William G. Milliken, address to
Michigan Road Builders Association,
Aug. 19, 1978

The following goal and objectives are those of the East Central Michigan Planning and Development Region:

TRANSPORTATION PLANNING
GOALS AND OBJECTIVES
FOR REGION 7

- | | | |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| GOAL: | To provide a balanced, multi-model transportation system which will facilitate the efficient movement of goods and services, including people, in East Central Michigan. | Support efforts to more fully utilize the commercial port facilities in the region. |
| OBJ: | Develop a transportation system which will encourage a desired pattern of land use development. | Assist in the development of a network of general aviation airports to serve the Region as part of the State Airport Plan. |
| | Develop an integrated transportation system which allows efficient access among modes. | Encourage further development of public transportation to aid in personal mobility. |
| | Determine the locations of new transportation facilities in response to the natural and cultural environments. | Encourage development of a transportation system which is energy efficient. |
| | Support efforts to maintain and improve rail service to and within the region. | Encourage improvements to the highway system to increase the safety of its users. |
| | | Develop a transportation system which increases the accessibility to community facilities. |

SECTION E

EXISTING TRANSPORTATION SERVICES

The following sections discuss the various transportation modes. These modes include:

Aviation

Commercial Water Transportation

Highways

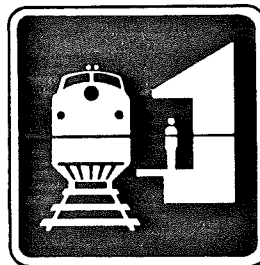
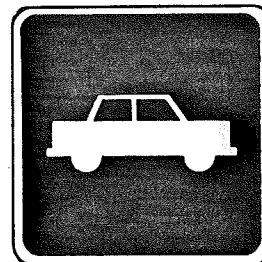
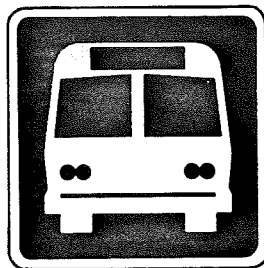
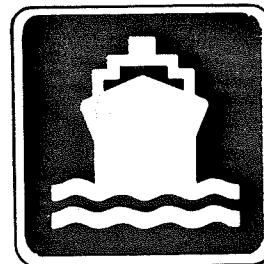
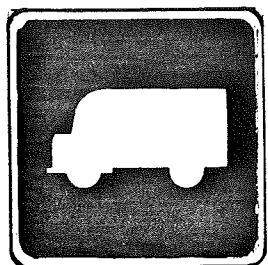
Non-Motorized Transportation

Public Transportation

Railroads

In these sections the discussion centers around the general condition of each system and how it complements other systems.

Discussion of problems expected in the future for each mode of transportation will be highlighted in the conclusion of this report.





SECTION F

AVIATION

The Department's role in air transportation is to insure an orderly and timely development of the State's Aviation System. To assist in this task, the Michigan Aeronautics Commission, in 1974, adopted a Michigan Airport System Plan (MASP) for the years 1975, 1980, and 1990.

A major purpose of the Plan is to show various communities their projected level of aviation demand for future time periods. This will enable them to begin an assessment of potential community and environmental impacts associated with airport development. Depending upon the extent of these improvements, these considerations can be addressed in more detail as local airport master plans are prepared or updated.

The accompanying map illustrates the 1990 recommended airport system for the East Central Region as contained in the MASP. These airports are classified into two basic service-related categories: Air Carrier Airports and General Aviation Airports.

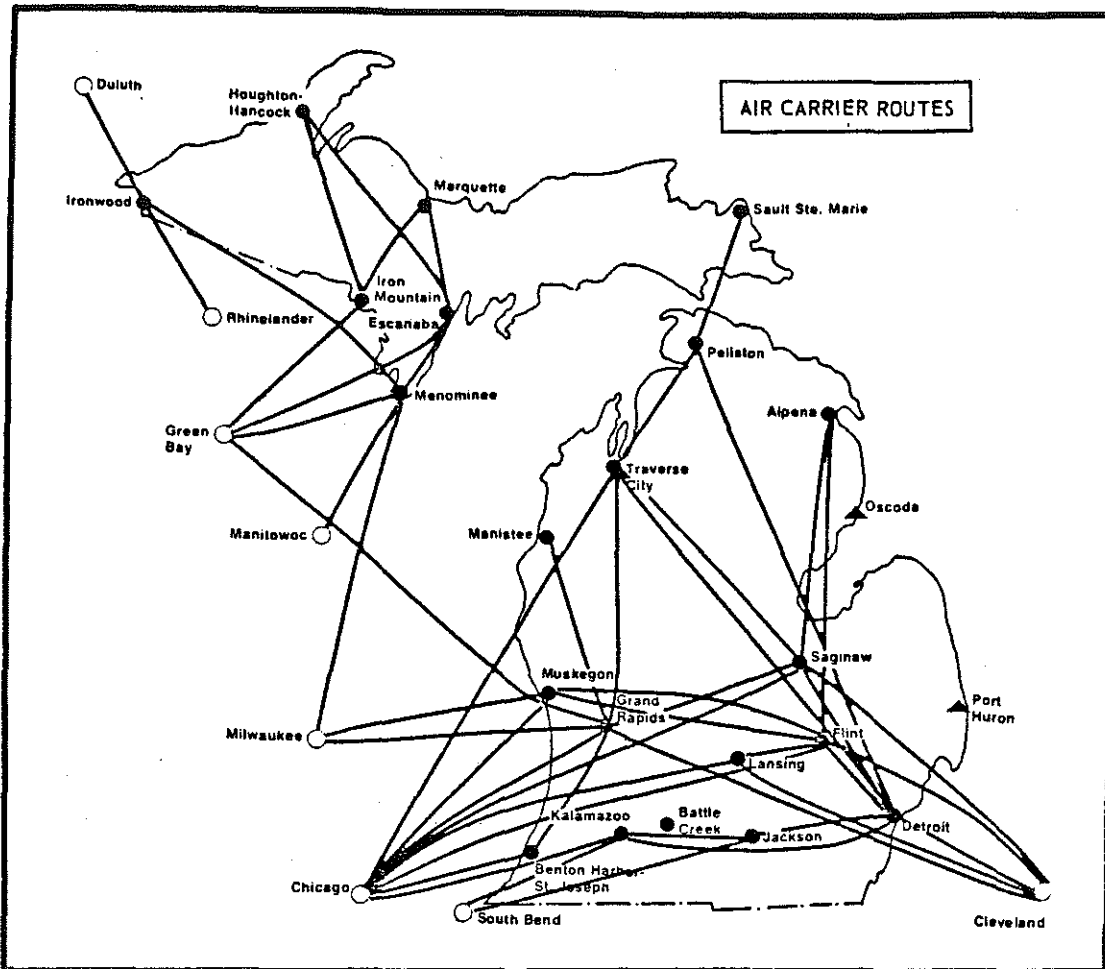
AIR CARRIER SYSTEM

An Air Carrier Airport is an airport used by certificated scheduled airline service. At present, SEACO Airlines, North Central, and United are the certified carriers providing passenger service to the Tri-City Airport, the sole Air Carrier Airport in the region. As of September 15, 1978, North Central provided Tri-City with seven flights a day, while United offered ten daily flights. SEACO Airlines provides a commuter service to Oscoda (Wurtsmith Air Force Base).

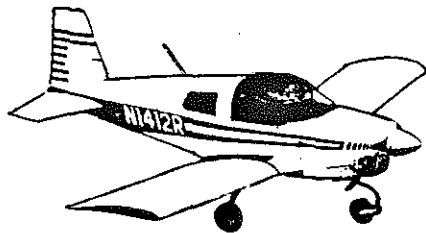
These 17 flights provided direct (same plane) service to Alpena, Atlanta, Boston, Chicago, Cleveland, Denver, Detroit, Flint, Lincoln, Neb., Philadelphia, Salt Lake City, San Francisco, and Toronto. Of these destinations, non-stop service, on a daily basis, was available to and/or from Alpena, Chicago, Cleveland, Denver, Detroit, and Flint.

Tri-City Airport possesses excellent facilities to handle the larger commercial aircraft. The main northeast-southwest runway is 6,500 feet long, while the northwest-southeast crosswind runway is 5,475 feet long. The airport is capable of servicing the 727, 737, and DC9 jets currently operated by North Central and United. In addition, many smaller general aviationtype aircraft are served at the Tri-City facility, including business jets and single- and multi-engine propeller craft. The instrument landing system allows all-weather operations by both commercial and general aviation aircraft.

For the East Central Region, as for most of the state, the recommended air carrier system of airports for 2000 will remain about the same as that in service today. The steadily increasing level of passengers at Tri-City, and the forecast of ever-increasing passenger loads in the future, necessitate planning for future expansion and improvement of existing facilities. Additionally, the trend of the commercial aviation industry toward the use of larger jet aircraft will add to the need for improved ground facilities. The surge of air passengers that took place in 1978 is expected to continue, and increase, into the 1990's and 2000's. No new air carrier airports

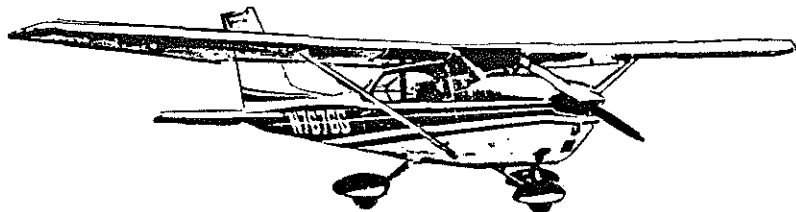
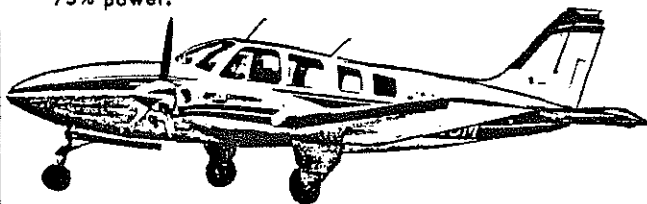


GENERAL AVIATION AIRCRAFT



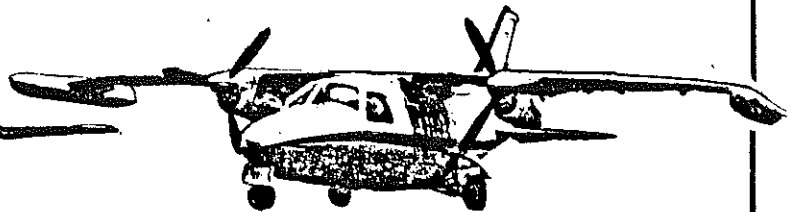
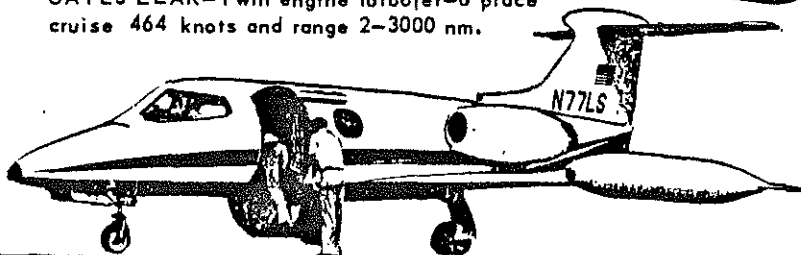
GRUMMAN AMERICAN—Single engine, 2 place cruise 108 knots and range 378 nm at 75% power.

BEECH BARON—Twin engine piston, 4-6 place cruise 198 knots and range 1306 nm at 75% power.



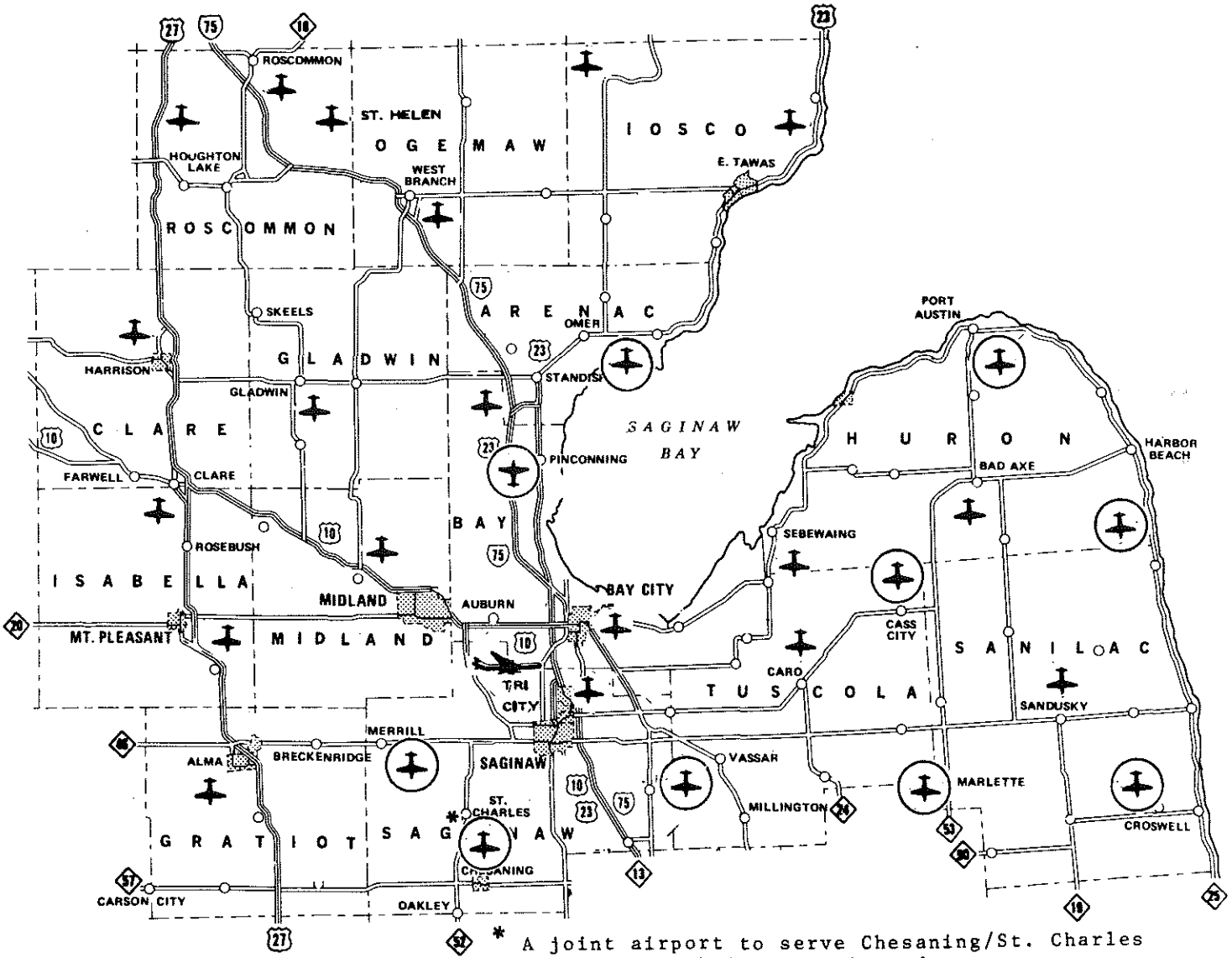
CESSNA 172—Single engine, 4 place cruise 120 knots and range 691 nm at 75% power.

GATES LEAR—Twin engine turbojet—8 place cruise 464 knots and range 2-3000 nm.






MITSUBISHI MU-2—Twin engine turboprop, 7-9 place cruise 308 knots and range 1349 nm.

AVIATION



* A joint airport to serve Chesaning/St. Charles is currently being reevaluated.

-  Existing AIR CARRIER Airport
-  Existing GENERAL AVIATION Airport
-  Proposed New Site



are currently planned for the East Central Region, but continual improvement, modernization, and expansion of present Tri-City facilities will likely be required to properly serve these passengers.

In 1977, a study of Michigan's Air Carrier Airports was conducted under the auspices of the Department of Transportation. Results from that study indicate that passenger service to and from the East Central Region was generally perceived to be satisfactory by residents of the area. Chicago was the predominant final destination for air travelers from the region, with New York, Cleveland, and Washington, D.C. also attracting large numbers of air travelers. Service problems at Saginaw primarily involve service frequencies to Detroit. Travel demand to Detroit, along with the need for connections to Atlanta, New York, Cleveland, Philadelphia, Washington, D.C., and Tampa point to the need for a new midmorning flight from Tri-City to Detroit, and a late evening flight back. Current service appears to adequately meet the demand to Chicago and points southwest and west.

In 1977, over 400,000 passengers flew in and out of the Tri-City Airport, a 9% increase over 1976. Preliminary data indicates that 1978 traffic to-date is 18% higher than a comparable period in 1977, verifying the current surge of popularity that commercial aviation enjoys. Only two airports in Michigan handle more passengers than Tri-City Airport, making it one of the vital links in Michigan's transportation system.

GENERAL AVIATION SYSTEM

General Aviation Airports provide a basic level of air service for local communities. These airports offer

such communities, and businesses, the ability to assess the vast market area provided by the entire air transportation system. In the East Central Region, these airports are accommodating up to 44 locally based aircraft. Typical main runway lengths vary from 2,100 feet (turf) at South Branch to the 5,000 foot paved runway at Alma's Gratiot Community Airport. Business jets and air freight aircraft are able to utilize the airports with the longer runways.

In general, the basic measures used to determine the need for these airports were:

1. To provide aviation capacity sufficient to accommodate forecasted levels of general aviation activity in a given geographical area.
2. To provide a reasonable geographic distribution of airports throughout the State.

The Michigan Airport System Plan (MASP) lists 162 general aviation airports, of which 56 are recommended as new airports. Nineteen of the existing airports in the MASP are in the Region 7, as are 10 of the recommended new airport sites. Planning activities have been underway for a number of these recommended new airports, including Chesaning and Vassar/Millington. Existing airports are recommended to receive generally minor improvements in the MASP. Their function (i.e. size and quantity of aircraft that can land and take off there) is not expected to change drastically in the future.

FUNDING SOURCES

Although the MASP is a product of local, state, and federal planning efforts, it is the responsibility of the local community, or airport authority,

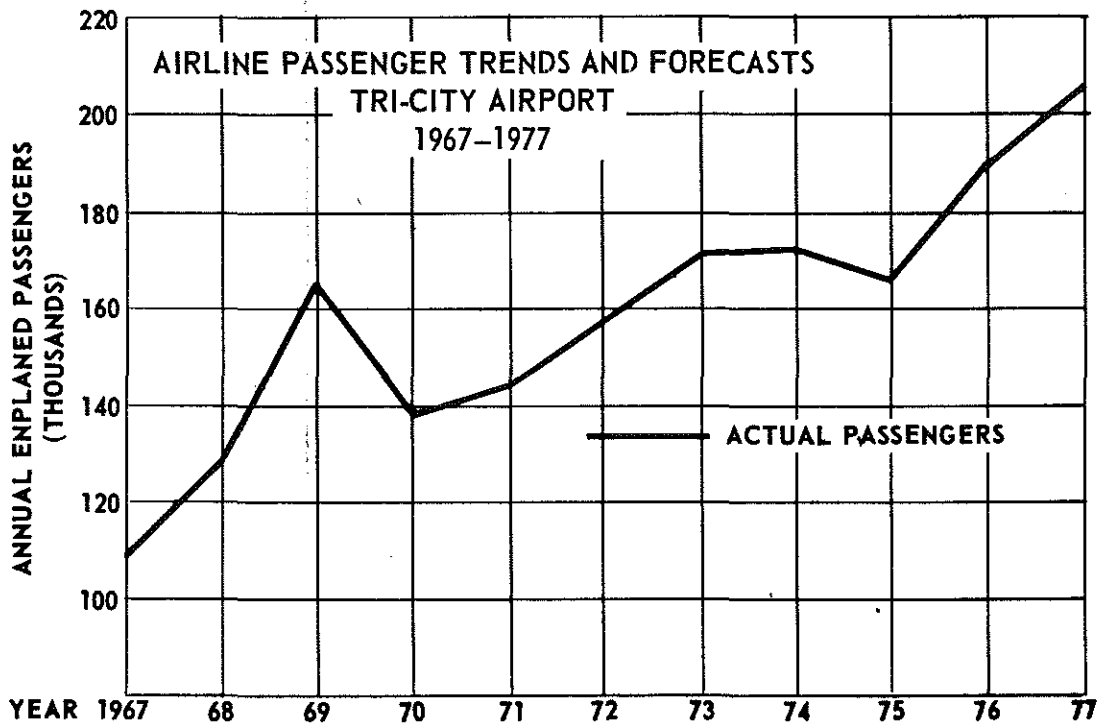
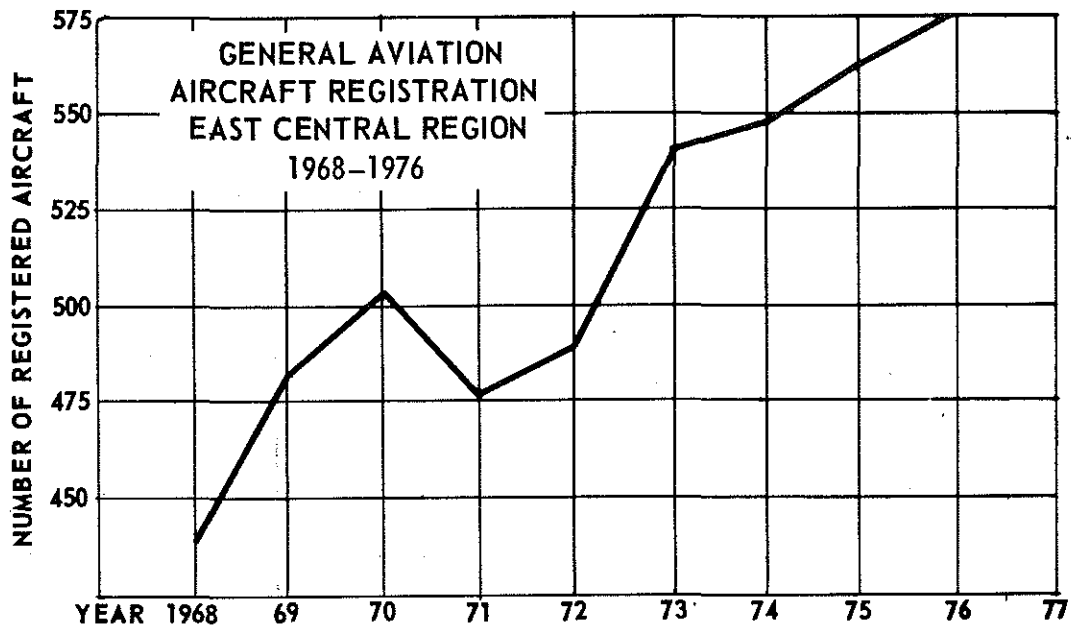


FIGURE 3

RECOMMENDED AIRPORT DEVELOPMENT PROJECTS
East Central Region

		<u>Total Estimated Cost of Project</u>	<u>Federal Funds Required</u>	<u>State Funds Required</u>	<u>Local Funds Required</u>
Roscommon-Conservation	Seal, coat, and mark existing runway, taxiway, apron. Purchase & install runway lighting, beacon, and windcone.	\$ 40,000	-0-	\$ 20,000	\$ 20,000
Tri-City Airport	Extend, light, mark runway 5/23 to 9,000 feet. Extend parallel taxiway. Relocate instrument landing system localizer.	\$ 2,830,000	\$ 2,264,000	\$ 250,000	\$ 316,000
Vassar/Millington (New Site)	Purchase of land (approx. 251 acres fee and 39 acres easement).	\$ 339,200	\$ 305,280	\$ 16,960	\$ 16,960

to initiate airport development projects. After these projects have been finalized, various financial arrangements are pursued. The present financial sources include:

- Federal Funds, through the Airport Development Aid Program (ADAP), Upper Great Lakes Regional Commission, and Federal Aviation Administration (FAA) Facility and Equipment Funds.
- State Funds, through Michigan Aeronautics Commission revenues from a tax imposed on the sale of aviation fuel.
- Local Funds, available primarily through long-term borrowing.

Figure 3 illustrates some of the airport development projects that have been requested and/or programmed for Region 7:

Figure 4 illustrates the forecasted air passenger and aircraft operations for the Tri-City Airport, the largest in the East Central Region. It is important to realize that these forecasts were based on aviation trends existing before the emergence of the "energy crises." In 1973-74, the curtailment of oil imports from the Middle East had a significant impact on some of Michigan's airports. For instance, Flint's Bishop Airport's operations were reduced by 20% during this period. However, it is interesting to note that during this same period, passenger levels at Tri-City were generally unaffected. They increased considerably from 1972 to 1973, increased slightly in 1974, dipped slightly in 1975, and showed large increases in 1976 and 1977. Because Tri-City generally "out-performed" other Michigan airports, in terms of passenger

boardings, during the energy crises and afterward, its present and future importance as an air transportation center is clearly established.

Energy Considerations

If future fuel sources do become limited, the aviation industry, along with other transportation modes, will be making some adjustments. However, such adjustments will not effect current plans for facility improvements/construction. If energy sources become "restricted" over the long-term future, expensive construction projects will logically be curtailed. However, any reduction in energy sources in the near future, i.e. into the 1990's, will be offset by reducing numbers of flights, increasing passenger loads, and developing more fuel-efficient equipment. Because fuel costs constitute such a high portion of overall operating costs for commercial airlines, they have historically outpaced other modes of transportation in adjusting to changes in fuel availability/costs by changing operating efficiencies.

Large increases in aviation activity in the future will justify long-range construction programs currently in existence. Large-scale decreases in aviation activity will not alter, or impact, existing fixed aviation facilities because the facilities have to maintain certain standards to land large aircraft. The same airport equipment and runway length may be necessary for handling one or a thousand aircraft.

BENEFITS OF THE AVIATION SYSTEM

The airport improvement projects plus other MASP recommendations, are expected to produce a wide range of benefits to a broad spectrum of Michigan residents and visitors. The benefits that will accrue from the

FIGURE 4

Tri-City Airport
Operational Forecasts

	Base Year <u>1970</u>	Current Data <u>1977</u>	Forecasted	
			<u>Intermediate</u> 1978-82	<u>Long-Range</u> 1983-92
Air Carrier Operations	14,600	11,200	22,600	32,100
General Aviation Operations	75,300	74,100	141,000	218,600
Air Carrier Passengers	139,000	205,000	305,000	560,000
General Aviation Passengers	65,000	68,000 ¹	114,000	173,000

¹Estimated

FIGURE 5

GENERAL AVIATION
AIRCRAFT REGISTRATIONS
East Central Region
1968-1976

<u>County</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
Arenac	8	11	8	7	8	7	9	9	8
Bay	38	43	40	39	56	63	60	57	52
Clare	15	21	18	18	21	23	20	24	18
Gladwin	23	26	25	23	21	21	13	13	11
Gratiot	30	32	44	39	41	40	35	45	39
Huron	29	27	35	31	30	30	29	29	39
Iosco	19	19	21	23	16	23	24	25	20
Isabella	46	49	40	41	43	57	59	55	64
Midland	49	49	56	54	45	45	52	52	56
Ogemaw	4	5	9	12	12	12	11	10	12
Roscommon	15	14	18	16	17	23	22	23	23
Saginaw	96	111	107	89	95	103	119	133	131
Sanilac	45	50	53	48	45	51	53	46	59
Tuscola	<u>21</u>	<u>25</u>	<u>30</u>	<u>37</u>	<u>37</u>	<u>42</u>	<u>42</u>	<u>42</u>	<u>45</u>
TOTALS	438	482	504	477	487	540	548	563	577

FIGURE 6

AIRPORT CLASSIFICATION

	1973-77			1978-82			1983-92		
	1973-77	1978-82	1983-92	1973-77	1978-82	1983-92	1973-77	1978-82	1983-92
Alma	BT	BT	BT	*Marlette ⁴	GU	BT	BT	BT	BT
Bad Axe	GU	GU	BT	Merrill/Hemlock	BI	BII	BII	BII	BII
Bay City	GU	GU	GU	Midland	GU	GU	GU	GU	GU
Caro	BII	GU	GU	Mt. Pleasant	BT	BT	BT	BT	BT
Cass City	---	BI	BII	Omer ⁵	---	BII	GU	GU	GU
Chesaning/St. Charles ¹	GU	GU	BT	Pinconning ⁶	---	BII	BII	BII	BII
Clare ²	GU	GU	GU	Port Austin	BI	BI	BI	BI	BI
Croswell	BII	BII	GU	Roscommon	BI	GU	GU	GU	GU
East Tawas	GU	BT	BT	Saginaw (Tri-City)	AC	AC	AC	AC	AC
Vassar/Millington	BII	BII	BII	Saginaw (H.W. Browne) ⁵	GU	GU	GU	GU	GU
Gladwin	BT	BT	BT	Sandusky	BII	BII	GU	GU	GU
Harbor Beach/White Rock	---	BI	BII	Sebewaing	BII	BII	BII	BII	BII
Harrison ²	BI	BI	BI	South Branch	BI	BI	BI	BI	BI
Houghton	GU	GU	BT	Standish ⁴	BI	---	---	---	---
				West Branch	GU	GU	BT	BT	BT

¹ Results of a current Master Plan study indicate that a joint airport for this area cannot be located near St. Charles.
² A proposed Master Plan Study will analyze a joint airport for the Clare-Harrison-Farwell area.
³ Airport Master Plan study in process.
⁴ A new airport was recently constructed in Marlette.
⁵ Develop at Pinconning and Standish are dependent on the construction of a new airport at Omer.
⁶ Airport Master Plan study in process.

Michigan Airport System Plan are summarized as follows:

USERS

- Reduce travel time and costs for air travelers and shippers
- Expand recreational opportunities due to increased accessibility of recreation areas and wider opportunities for pleasure flying.

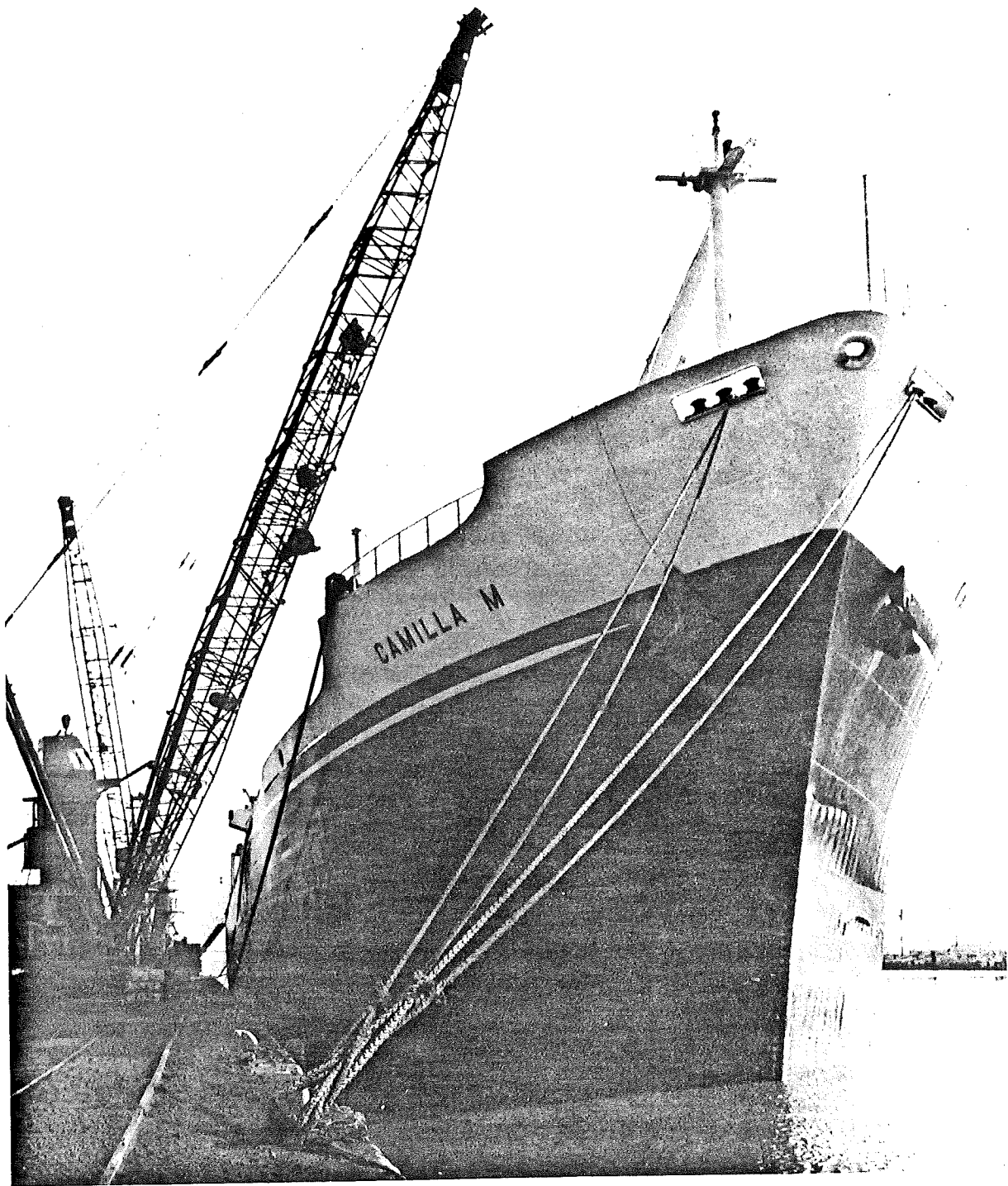
AIRLINES AND AIRPORT AUTHORITIES

- Improved safety and convenience of aircraft operations.

COMMUNITIES

- Enhance business and industrial growth in areas served both by air carrier and general aviation airports.
- Increase employment opportunities and tax base (from business and industrial growth).
- Improved emergency access to communities for medical supply and evacuation.





SECTION G

WATER TRANSPORTATION

Port development in the State of Michigan is associated with two specific types of activity: (1) Recreational Harbors and harbors of refuge, and (2) Commercial harbors. The responsibility for recreational harbors and harbors of refuge within state government is vested primarily in the Michigan Waterways Commission of the Department of Natural Resources. The overall planning responsibility for Commercial Harbors lies within the Michigan Department of Transportation.

Recreational harbors have been established along the Lake Huron and Saginaw Bay shorelines. These locations are depicted on the map on the facing page.

According to a U.S. Army Corps of Engineers Report, "Waterborne Commerce in the United States," four ports in the region reported shipping activity for 1976. Collectively, more than 4.4 million tons of waterborne commerce passed through these ports.

The Saginaw River from Bay City to Saginaw, is designated as an International seaport and is the most important port in the region. Freight traffic totaled 3,072,473 short tons in 1976. This represents 70% of all reported shipping activity for the region.

These ports presently interchange with other transportation modes serving East Central Michigan. With forecasted fuel shortages and increasing costs, water transportation may become increasingly important in transporting commodities.

COMMERCIAL AND RECREATIONAL HARBORS

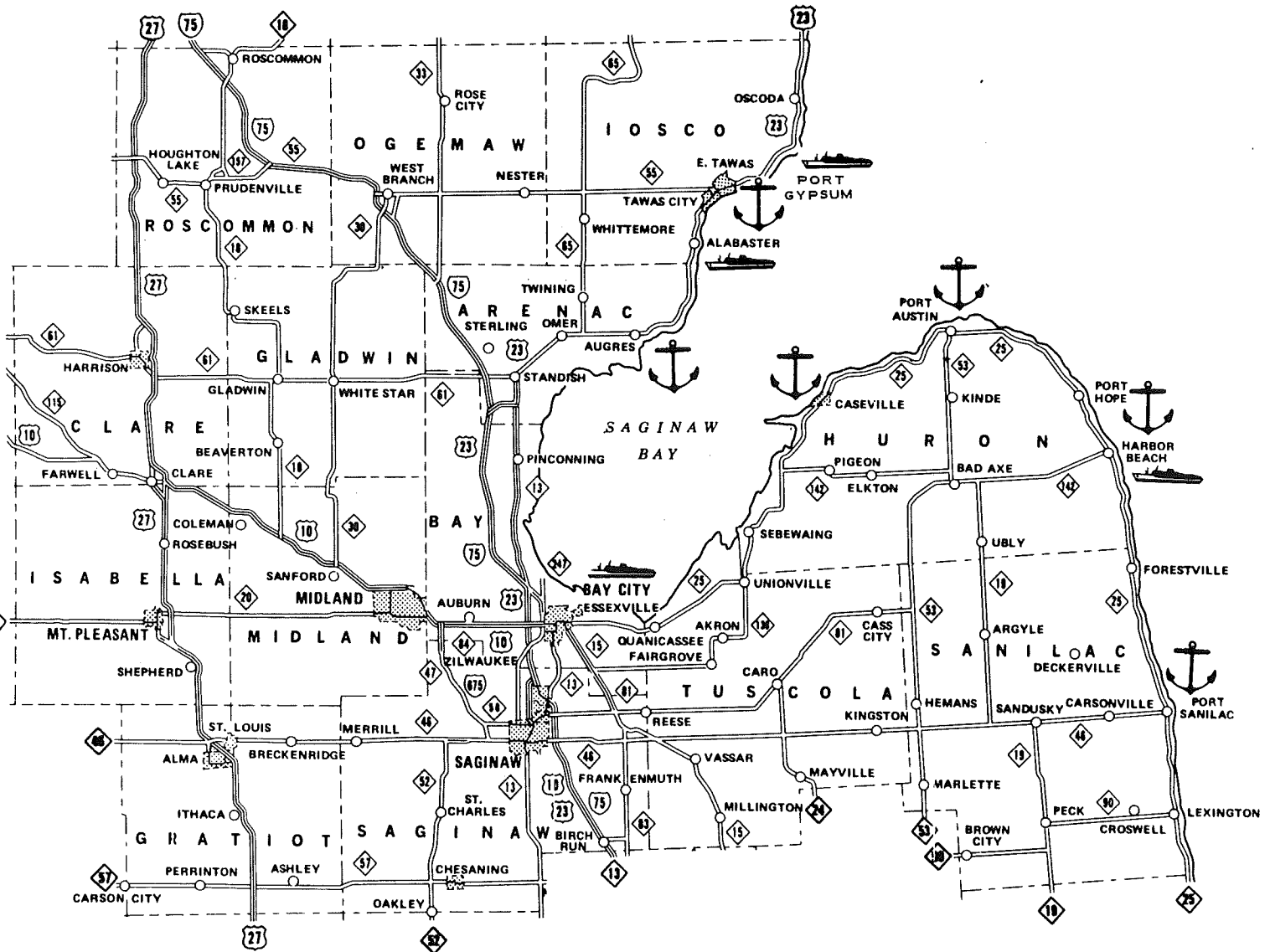
BACKGROUND

Region 7 is situated along the Southwest shore of Lake Huron and has approximately 267 miles of coastline. The most prominent water feature in the Region is Saginaw Bay, which is the largest indentation along the West shore of Lake Huron and extends to the very center of the Region. As a result of these geographical characteristics, water transportation is of great importance to East Central Michigan. Four harbors within the Region - Port Gypsum, Alabaster, Harbor Beach, and the Saginaw River - have facilities capable of serving large commercial ships. It is anticipated that by the year 2000, no additional harbors will be utilized for commercial shipping, with the exception of occasional commercial fishing with shallow draft vessels operating from recreational harbors. We will therefore limit our discussion to the four existing commercial harbors.

1. Port Gypsum (Port Tawas)

Port Gypsum is located in Iosco County approximately 2.5 miles south of Tawas City and is a private harbor operated by the National Gypsum Company. The port is used solely for the shipment of gypsum which is mined in open pits nearby. The loading facility consists of a conveyor system which transports the gypsum to a dock located 1,078 feet from the shore. A channel has been dredged from the deeper water of Lake Huron to the dock. The port is served by medium-sized Great Lakes vessels.

COMMERCIAL AND RECREATIONAL HARBORS



COMMERCIAL HARBORS 

RECREATIONAL HARBORS 

Figure 7 identifies tonnages shipped from Port Gypsum and numbers of vessels during the period 1962-1976. Traffic ranged from a low of 194,675 tons in 1962 to a high of 473,902 tons in 1976. During that period, a trend of increasing shipments is evident.

2. Alabaster

Alabaster is located in Iosco County approximately 5.5 miles south of Tawas City and is a private harbor operated by the United States Gypsum Company. Similar to the role of Port Gypsum, Alabaster is used solely for the shipment of gypsum which is mined nearby. The loading dock is located about 6,800 feet (2,073 meters) from shore and is connected to shore by an aerial tramway system which transports the gypsum. The dock is far enough offshore that the water is of sufficient depth to preclude the necessity of an artificial channel. The port is served by medium-sized Great Lakes vessels.

Figure 7 identifies tonnages shipped from Alabaster and numbers of vessels during the period 1962-1976. Traffic ranged from a low of 342,380 tons in 1970 to a high of 658,926 tons in 1973. During the period, shipments have varied significantly. A trend of slight increase may be identified, but adequate capacity is available to handle most increases.

3. Harbor Beach

Harbor Beach is located in Huron County approximately 60 miles north of Port Huron. Its

harbor is artificial and provides the only safe refuge for large vessels between Port Huron and Tawas Bay, a distance of about 119 miles. The harbor has been designated as a lake freighter harbor-of-refuge by the United States Government. The harbor was formed by the construction of breakwaters and dredging of channels. Commercial traffic consists of the receipt of coal by self-unloading lake vessels. Most of the coal is used by the Detroit Edison Company which operates an electric power generating plant on land adjacent to their dock. Hercules Incorporated, receives small volumes of coal for its waterfront industrial plant. The port is served by medium-sized Great Lakes vessels.

Figure 7 identifies tonnages received at Harbor Beach and numbers of vessels during the period 1962-1976. Traffic ranged from a low of 31,687 tons in 1964 to a high of 316,268 tons in 1970. A trend of increasing receipts during the 15 year period is evident.

4. Saginaw River

The Saginaw River is clearly the most important port in the East Central Michigan Region. The river is formed by the confluence of the Cass, Shiawassee, and Tittabawassee Rivers in Saginaw County and then flows in a Northerly direction for approximately 22 miles through Saginaw and Bay Counties until it meets Saginaw Bay. The lower 18 miles of the river are navigable for commercial vessels as a result of channel improvements by the United States Government. An entrance channel from the 27 foot contour in

Saginaw extends to the mouth of the river at an authorized depth to 27 feet. From the mouth, the channel is 26 feet deep for 0.4 miles upstream, then 25 feet deep to the Grand Trunk Railroad (formerly Penn Central) bridge in Bay City, then 22 feet deep to the turning

basin just below the Chessie System Railroad bridge in Saginaw. Other turning basins are located in Essexville, Bay City, and Carrollton.

Numerous dock facilities for handling a great variety of materials are located along the navigable portion of the Saginaw River. The U.S. Army Corps of Engineers has identified 44 separate facilities capable of docking commercial vessels, although not all of them are currently in use. There is a large variety in the composition of cargoes shipped on the Saginaw River. Traditionally, the principal materials have included cement, chemicals and petrochemicals, coal, fertilizers, general foreign cargo, grain, machinery, molasses, petroleum products, salt, sand, scrap metal, and stone. Vessels carrying these products include both medium-sized Great Lakes boats ("lakers") and foreign, ocean-going ships ("salties").

The freight traffic shown in Figure 8 for the Saginaw River identifies the freight traffic on the Saginaw River during the period 1962-1976. Total traffic ranged from a high of 7,243,283 tons in 1966 to a low of 2,705,330 tons in 1975. There has been a very clear trend toward decreasing traffic during recent years. A closer examination of the data is required

to fully understand the trend. During the past few years, major changes have occurred in the composition of Saginaw River traffic. For example, coal was a major commodity shipped on the river until recently (refer to Freight Traffic Figure 8). As recently as 1967, coal was the largest single commodity in terms of tonnage, destined primarily for the Consumers Power Company electric generating plant located at the mouth of the river. The plant now receives all its coal by unit train, thus eliminating the coal trade entirely. If we consider all non-coal commodities (also Figure 8), traffic has remained remarkably constant during the past 15 years.

Another change in shipping patterns has had an impact on the Saginaw River, although not as significant as coal in terms of tonnage. The foreign general cargo (as opposed to bulk cargo) trade has experienced a decline which resulted in the cessation of stevedoring service at the Dow Chemical Company dock in Bay City. Consequently, the number of foreign general cargo liners has declined.

Figure 9 identifies the 1976 commodity movements by major classification and by origin or destination - domestic, Canada, and overseas. Of the total tonnage for that year, 86 percent was domestic trade, 13 percent was Canadian trade, and 1 percent was overseas trade. It can be assumed that approximately 99 percent of the tonnage was moved by Great Lakes vessels and the remainder by ocean vessel.

FIGURE 7

COMMERCIAL WATERBORNE TRAFFIC AT PORT GYPSUM,
ALABASTER AND HARBOR BEACH, 1962-1976.^a

Year	Port Gypsum		Alabaster ^b		Harbor Beach ^b	
	Total Tonnage	Vessel Trips	Total Tonnage	Vessel Trips	Total Tonnage	Vessel Trips
1962	194,675	46	513,156	NA ^c	40,513	16
1963	283,790	68	454,284	96	45,166	20
1964	276,958	70	507,014	112	31,687	17
1965	NA	NA	NA	NA	39,566	NA
1966	NA	NA	NA	NA	41,346	NA
1967	302,930	69	510,334	NA	81,063	NA
1968	NA	NA	515,448	116	255,728	36
1969	312,747	32	485,105	59	237,163	NA
1970	311,223	31	342,380	34	316,268	NA
1971	339,226	32	513,020	51	124,380	20
1972	341,929	34	591,227	60	233,859	27
1973	404,859	38	658,926	90	201,260	25
1974	273,027	27	409,239	43	237,402	27
1975	382,132	36	NA	NA	283,011	28
1976	473,902	42	561,018	54	296,511	27
Mean Annual ^d	324,783	44	505,096	72	164,328	24

^aU.S. Army Corps of Engineers, Waterborne Commerce of the United States, Part 3: Waterways and Harbors, Great Lakes, 1962 through 1976.

^bExcludes small volumes of fish caught from shallow draft vessels.

^cData not available.

^dCalculated mean based upon years data available.

FIGURE 8
 FREIGHT TRAFFIC ON THE
 SAGINAW RIVER, 1962 - 1976

Year	Total Tonnage (Short Tons)	Coal Traffic (Short Tons)	Other commodities (Short Tons)
1962	5,041,897	2,108,699	2,933,198
1963	5,317,827	2,320,500	2,997,327
1964	5,874,886	2,524,542	3,350,344
1965	7,003,601	2,984,180	4,019,421
1966	7,243,288	3,270,792	3,972,496
1967	6,562,483	3,165,719	3,396,764
1968	5,228,842	1,653,181	3,575,661
1969	5,098,710	1,179,722	3,918,988
1970	4,616,434	1,566,838	3,049,596
1971	4,847,133	1,087,254	3,759,879
1972	4,386,273	646,936	3,739,337
1973	4,095,978	77,401	4,018,577
1974	4,180,076	364,219	3,815,856
1975	2,705,330	62,193	2,643,137
1976	3,072,473	0	3,072,473

SOURCE: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, Part 3: Waterways and Harbors - Great Lakes, Annual volumes 1962 through 1976.

FIGURE 9

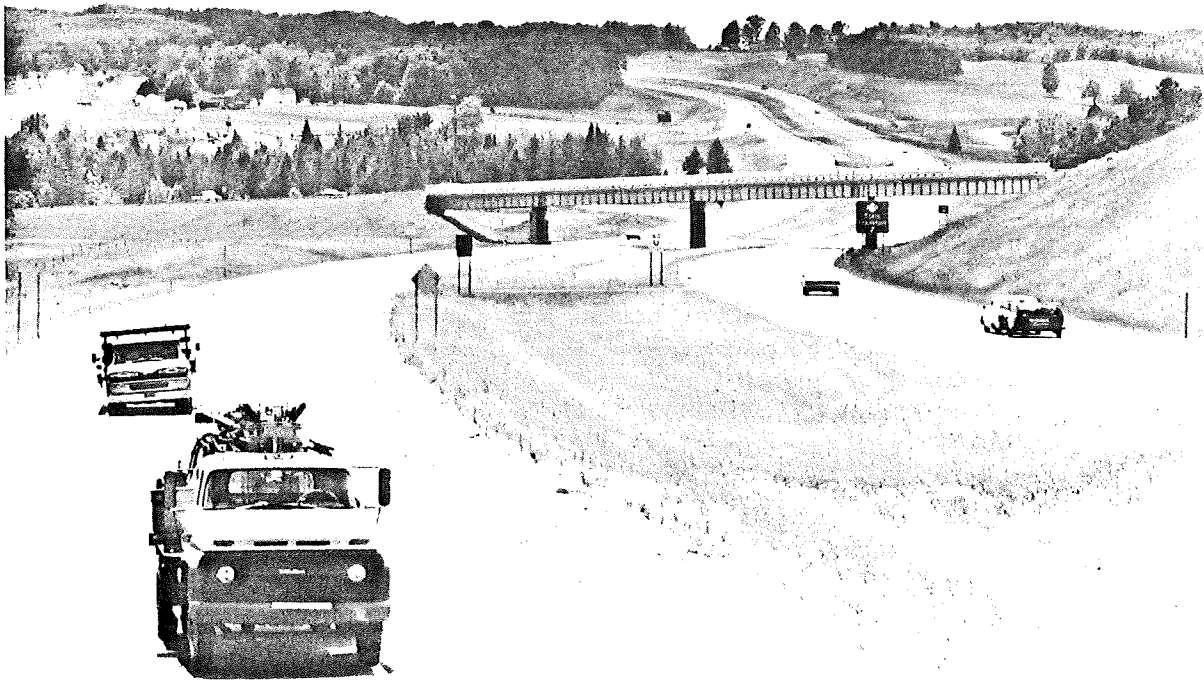
COMMODITIES SHIPPED ON THE SAGINAW RIVER, 1976^a.

Commodity	Domestic Tonnage ^b	Canadian ^b Tonnage	Overseas ^b Tonnage	Total Tonnage ^b
Farm Products	24,180	182,747	4	206,931
Crude Petroleum	13,124	0	0	13,124
Non-metallic minerals ^c	2,230,720	70,506	0	2,301,226
Food Products	4,943	0	4,266	9,209
Basic Textiles	0	0	1,328	1,328
Pulp and Paper	0	0	79	79
Chemicals	105,414	30,256	25,334	161,004
Petroleum Products	164,721	5,211	0	169,932
Stone Products	82,187	114,186	0	196,373
Primary Metal Products	9,960	0	2,050	12,010
Non-electrical Machinery	0	0	1,237	1,237
Electrical Machinery	0	0	19	19
Miscellaneous Commodities	0	0	1	1
Total	2,635,249	402,906	34,318	3,072,473

^aU.S. Army Corps of Engineers, Waterborne Commerce of the United States, Part 3: Waterways and Harbors, Great Lakes, 1976.

^bAll figures represent short tons.

^cExcludes fuels, includes limestone and sand.



SECTION H

HIGHWAYS

One objective of this study is to improve Region 7's highway system. The approved State Highway Trunk-line Plan for the region will be used as the guide subject to detailed planning and engineering studies on the suggested improvements.

HOW THE DEPARTMENT BECAME INVOLVED

Defense and stage coach travel stimulated the first roads in Michigan. In fact, the first road of statewide importance was built around 1819 by the Army, and extended from Detroit to Saginaw. The demand for lumber gave further emphasis to road construction in order to move logs and lumber from regions not accessible by boat.

Many of the State's early roads were actually constructed along routes formerly used as overland Indian trails. Although the trails have long since disappeared, their replacement highways have remained. Some of these have evolved into such roads as US-12, I-94, I-96, I-75 and US-23. Thus, many of today's major state highways merely duplicate statewide travel patterns established long before the invention of the automobile.

From those early days, responsibility for the State's highways has shifted among several agencies. Townships assumed earliest responsibility, followed by a brief attempt of private enterprises to establish toll roads. Since monies collected were grossly inadequate to meet maintenance needs, and due to the expanding popularity of the automobile, the State Legislature allowed the establishment of County Road Commissions to develop and maintain

major roads. It soon became apparent that a state organization would be required to administer the more important trans-state highways. This led to legislation in 1905 establishing the State Highway Department.

Since that time, numerous events have led to the expansion of the highway system in Michigan. Accessibility to rural areas, national defense and sheer public demand for personal transportation have all contributed to expansion and improvement of the highway network.

DEPARTMENT'S FUNCTION

One of the Department's foremost functions is to provide sufficient right-of-way throughout the State to permit a reasonable level of accessibility. By virtue of these continuous strips of public land, essentially every area of the State is made accessible to the general public.

The Constitution and Statutes of the State of Michigan charge the Department with the responsibility for planning, designing and maintaining highway facilities. Construction, although supervised by the Department, is carried out by private contractors. This system of highways, now totals 9,468 miles (15,243 kilometers).

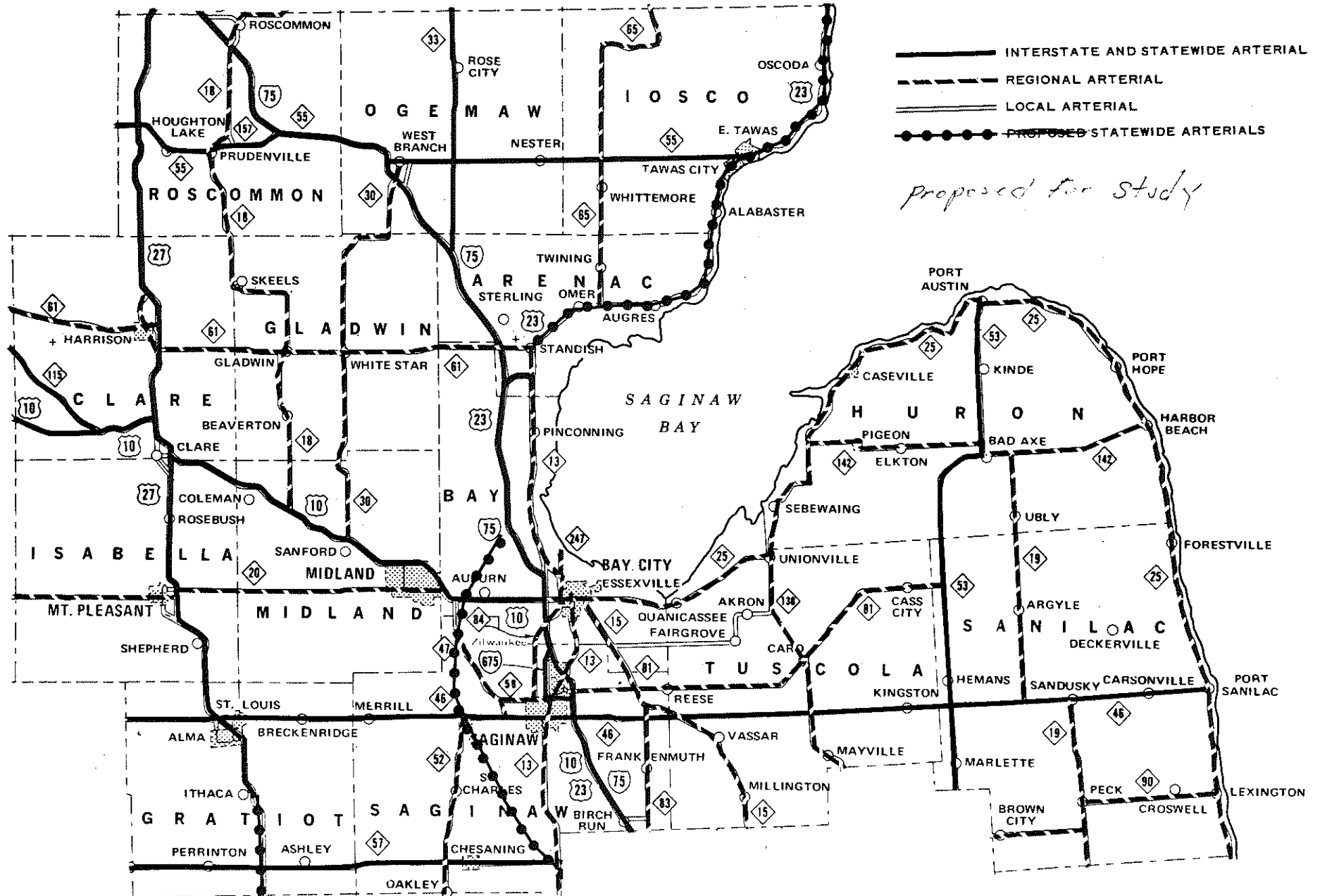
THE PURPOSE OF HIGHWAYS

Public highways in Michigan have two basic service functions:

1. Provide access to property.
2. Accommodate the movement of through traffic.

Local rural roads and local residential streets serve the first function and

Region 7 REGIONAL STATE TRUNKLINE HIGHWAY PLAN



major highways and freeways primarily serve the latter. Between these two extremes are a substantial number of highways, roads and streets that serve a dual function.

A major highway whose primary function is to accommodate long-distance traffic will often be designed with a limited number of access opportunities and with safety features commensurate with higher traveling speeds. Local residential streets, on the other hand, are designed with numerous access points for adjacent properties and often incorporate numerous curves and stops to discourage high speeds and through traffic.

HIGHWAY CLASSIFICATION

In order to properly plan and develop a state highway system, the Department has established a State Trunkline Highway Plan. This plan is a long range statewide guide for highway improvements and is developed utilizing among other things a process of functional classification.

Under this system, the primary function of the state's highways are identified by their grouping into four classifications: interstate arterials, other statewide arterials, regional arterials, and local arterials.

One of the aids to highway classification is a system of ranking cities or places which these highways connect. The socio-economic data evaluated for all places produces an ascending scale of classes representing marked differences in importance as attractors of traffic. The following exhibit indicates the classification of various highways and places in the East Central Region according to the current State Highway Trunkline Plan.

In addition to the identification of population centers, there are other factors considered, such as areas of major trip attraction or generation, travel desires, trip length and traffic volumes which together define a hierarchy of facilities which reflects their importance in handling of statewide, regional and local traffic.

It is important to note that numerous important and local streets and roads exist which are not shown in the map. This map is not intended to show all important roads, but only those under state jurisdiction or responsibility. Of all those roads, only the state trunklines are a major concern of this study. Emphasis is placed upon the major arterial routes. However, local road and street improvements, initiated by local government agencies, should be integrated with improvements resulting from this study.

DEPARTMENT'S NEW APPROACH

On November 16, 1977, Michigan's State Highway Commission approved a revised approach to highway development. The significance of this revision is to shift emphasis from new highway route development to management of the existing system. Reconstruction and rehabilitation of existing highways has become the top priority.

This does not mean, however, that expansion or relocation of existing highways will not be pursued. Where monitoring of the highway system clearly indicates a need, and where a detailed planning process defines that need, relocations of existing highways or addition of new highways may be undertaken.

HIGHWAY DEFICIENCIES

Within this framework, it is imperative that problem areas be carefully defined and analyzed to determine the degree of improvement necessary. Many miles of the State's system are considered deficient for various reasons. Some of these deficient sections can be remedied, however, with minimal improvements involving only the existing roadway. But a few areas exist where the problems go beyond the remedial benefits of minor reconstruction and will require additional laneage. Where these new lanes should be added to the existing facility or built on a new location is the concern of more detailed, project level, studies. The first step, and the concern of this study, is to determine where the major problem areas are located, and the degree of magnitude they represent.

The Department has conducted research in an effort to develop an impartial method of identifying highway deficiencies. The method currently used is a sufficiency rating. These ratings are used to evaluate individual segments of the entire highway system. This information indicates which sections will require attention within a given time period and their relative urgency.

The sufficiency rating (evaluation score) is comprised of four categories: surface, base, safety and capacity. Each section of highway is evaluated in terms of these categories and given a score, or rating, based upon its adequacy, or sufficiency. If a highway segment is rated below a predetermined level, it is considered critically deficient in that category. A segment of roadway can be rated critically deficient in one or more of the four categories.

The surface rating represents the adequacy of the surface and shoulders or curbs. This category is perhaps the most noticeable to the motorists because of its visibility. The year of construction or improvement, width and surface type, along with the condition and estimated surface life are also included in this category.

The base rating represents the adequacy of everything under the surface to support the surface. It considers the average base and soil conditions, taking into account the average drainage conditions.

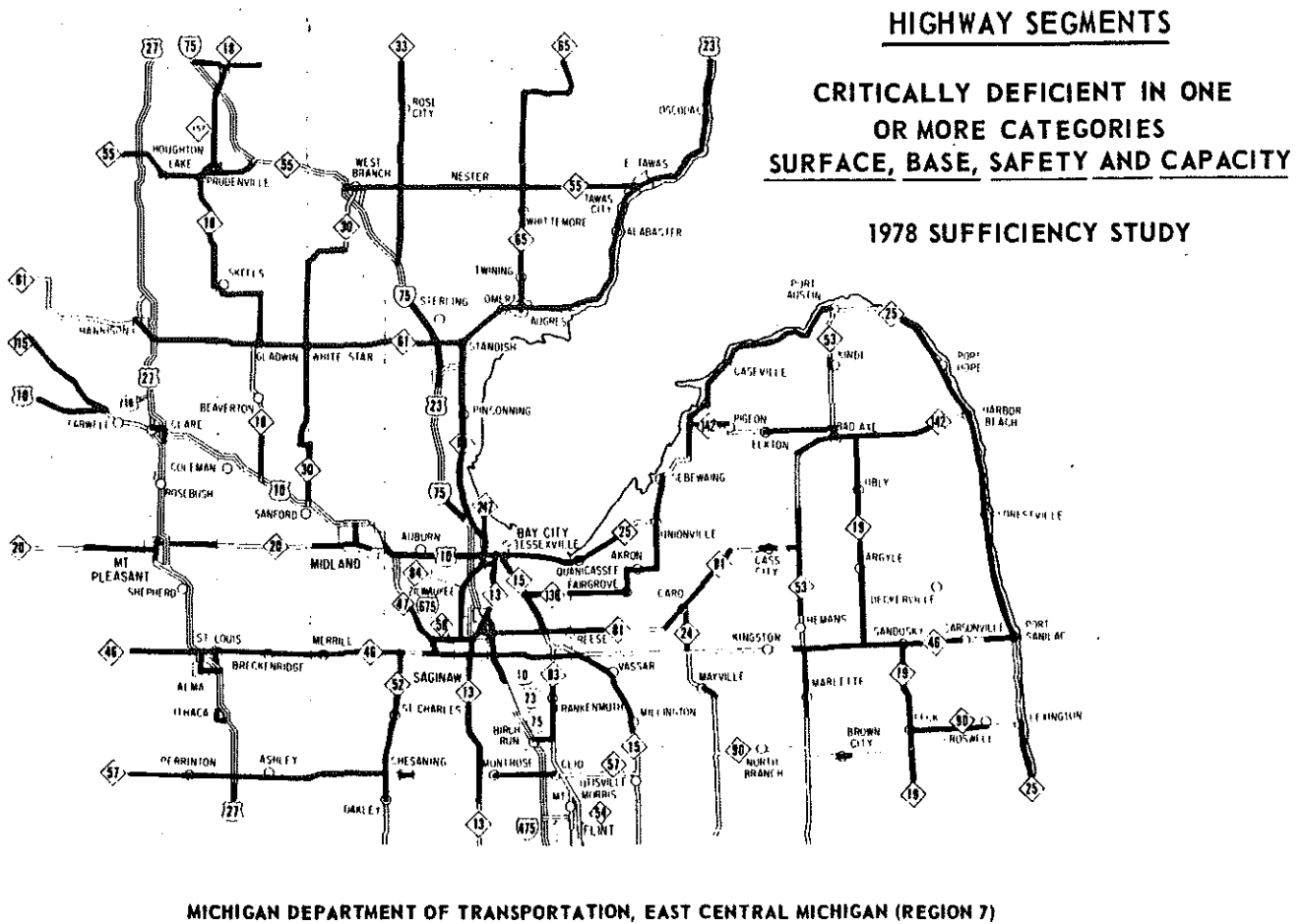
The safety rating calls attention to excessive or extraordinary conditions creating potential hazards. Existence of fixed objects (trees, utility poles, sign posts, abutments, etc.) in proximity to the pavement edge constitutes such a condition. Accident frequency, type and severity are also considered in this evaluation.

The capacity rating represents the ability of a section of roadway to carry existing volumes of traffic. Several factors used to determine this rating include: practical hourly capacity, sight restriction, lane width, amount of commercial traffic, and peak hour volumes.

The accompanying exhibits indicate the accident rates for 1977, and the combined sufficiency evaluation of the highways in Region 7. These evaluations are based upon existing and past conditions and traffic volumes. It is intended that these exhibits will help to determine where problems exist; where minor improvements are needed; and where more extensive, or major highway improvements, are required to eliminate critical deficiencies.

To accomplish this separation of major and minor improvement type, an attempt has been made to separate capacity deficient segments from all others. The main reason for this distinction is that capacity deficient highways sometimes require a major transportation improvement. And

major improvements usually become a controversial issue when the anticipated benefits and impacts are evaluated. Thus, it becomes important to identify these areas early in the planning process so that these issues can be resolved.





SECTION I

NON-MOTORIZED TRANSPORTATION

Background

The bicycle provides an inexpensive, energy efficient mode of transportation. Use of the bicycle as a supplement to the motorized methods of travel provides a major means of transportation and recreation for those too young to drive and for those who simply enjoy riding a bike.

The existing road system serves the cyclist as well as the motorist. Improvements can be made to the system so that it can better accommodate the mix of the motorized and non-motorized modes and increase the safety of the cyclist. Non-motorized improvements can take a variety of forms including; separate bicycle paths, bicycle lanes, paved shoulders, special bridges or bridge widenings, sewer grate replacement, and special signing and striping. In addition to these improvements to the road network, riding opportunities of a more recreational nature can be provided by using abandoned railroad lines and utility corridors for the development of multi-use recreational trails incorporating bicycling, horseback riding, and hiking.

The newly passed state transportation law requires that each road agency receiving Michigan Transportation Funds (from gasoline and license plate taxes) spend at least one percent of these funds each year for non-motorized facilities. The law also requires that each administering road agency prepare a 5-year program for the expenditure of available funds. Local input from bicyclists and other interested citizens is important to the development of these programs.

A number of issues should be addressed when considering the development of a local program including; the type of facilities that should be constructed, what use (commuter or recreational) should receive the most emphasis, and what type of system can be implemented within the limits of available revenues.

At this point in the study process it is too early to discuss specific programs or project locations. However, existing facilities, anticipated non-motorized demands, and the impact of the availability of energy and changes in population growth will be addressed.

Existing Facilities

The primary network for bicycle transportation is the existing street system. Many streets are considered safe for bicycling without any special improvements. This includes streets with low traffic volumes and adequate lane widths. Many urban and suburban residential streets fall in this category.

In rural areas, the higher speeds of motor vehicles pose additional problems for the bicyclist. Some rural roads are suitable for bicycling because of low traffic volumes. Of the 1,464 miles of state trunkline in the region, over 172 have traffic volumes low enough to permit safe riding with additional riding provided on paved shoulders. In addition, many miles of county roads also have low volumes. Long distance bicycling trips in rural areas should be planned in advance so that routes can be selected which have low traffic volumes or paved shoulders, and which have a minimum number of hills and curves.

Some special improvements have already been made in Region 7 to accommodate bicycle travel. The types of improvements include; special lanes, paved shoulders, signed routes, and sidewalk routes. A recently completed inventory of facilities in the Region shows 37.7 miles of existing facilities and 55.7 miles of proposed facilities.

The Effects of Population Growth and Energy Availability

It is difficult to assess the effects of population and energy on the non-motorized transportation mode. Little data is available on current bicycle usage or the actual number of bicycles, since they do not have to be registered.

Bicycle sales peaked in 1972-73 and, following a slight decline, have remained relatively constant. Bicycle manufacturers predict a steady growth in the industry with sales almost doubling by the end of the study period. Thus, it seems reasonable to assume that a moderate increase in bicycle use will occur as the population increases.

A restricted energy supply would also result in an increase in bicycle use for transportation. The bicycle is an inexpensive, fuel efficient means of travel and thus would be more likely to be used if gasoline were very expensive or not readily available. Many urban trips could be made by bicycle. In rural areas the potential for substitution for automobile trips is much less since most rural bicycle trips are recreational in purpose.

An increased use of the bicycle instead of the automobile in urban areas will reduce motorized traffic and parking demand. This would be the major impact of non-motorized

transportation on the total transportation system. Additional improvements specifically for non-motorized transportation would be required as a wider variety of trip destination developed. It is doubtful, however, that any capacity problems would develop on existing or future bicycle improvements.

It seems reasonable to predict that during the study period there will be moderate increases in bicycle useage particularly in urban areas. This trend will be accentuated by any significant population increase or restriction on fuel availability. The new state non-motorized program should lead to an increase in the number of special facilities built to accommodate bicycle travel. The location and types of facilities constructed must be based on sound planning and engineering principles and should be influenced by those segments of the public interested in bicycle transportation and in the overall regional transportation system.



SECTION J

PUBLIC TRANSPORTATION

Background

Public transportation in Michigan and the United States has recently emerged from a long period of steady decline. Ever since World War II, public transportation ridership has been steadily decreasing. This decrease was attributed mainly to a shift in travel habits in favor of the automobile and air line transportation modes. As transit ridership decreased, the corresponding loss in revenues forced many private and public transit operators to either reduce services or cease transit operations altogether. By the early 1970's, the only remaining public transit carriers operating in Region 7 were the intercity carriers and a marginal local service operated in Saginaw.

As a result of this condition, many low income, elderly, handicapped, and young persons experience a transportation disadvantage by not being able to gain reasonable access to community opportunities as employment, medical care, education, shopping and other basic human service needs. These same persons are either unable or cannot afford to own and operate an automobile. However, since the 1973-74 Mideast oil embargo, it has become apparent that future energy supplies may cause public transportation to take on a more active role for all of our society.

The Michigan Legislature passed Act 327 in 1972, Act 195 in 1975 and Act 140 in 1978 in recognition of these public transportation needs. These acts have provided new funding

sources for various public transportation improvements and directed the Michigan Department of Transportation to be the state agency responsible for administration of these programs.

One of the Department's objectives in developing public transportation plans is to insure that an adequate level of service will exist for both residents and visitors to the East Central Region. In most areas, this means developing an overall system of public transportation services that offer a balanced mixture of small metropolitan, urban and small urban, rural, regional and intercity service. The following information will illustrate how these services are presently operating in Region 7.

Local Public Transportation

Service Areas: Bay City, City of Saginaw

These are metropolitan communities which exceed fifty thousand in population. At the present, the two systems provide both fixed-route and demand response service to their respective communities. Fixed-route service is provided by 16-47 passenger buses operating on interconnecting routes, selected through high passenger demand areas. Buses operate on 15-60 minute headways with bus stops approximately two blocks apart. The demand response feature of transit service consists of 10-15 passenger vans operating to serve clients who are either not served by fixed-route systems or not able to utilize vehicles without lift-equipment. A person desiring dial-a-ride type service



simply telephones a dispatcher for a ride and is then picked up at the location indicated.

Urban and Small Urban Area Public Transportation

Service Areas: Midland, Mt. Pleasant, Alma, Gladwin

Urban communities are those ranging in population from five to fifty thousand people while small urban communities consist of from two to five thousand in size.

The service being offered in these communities is the dial-a-ride transportation (DART) system. In an effort to assist those communities interested in this type of service, the Department has established a Small Vehicle Program to fund the initial costs of implementing a DART system. (This program provides for a 2-year demonstration period during which the state pays for all capital and operating costs with the exception of a one thousand dollar local contribution.)

After the first year, the state continues to provide all capital

equipment and one-third of the operating costs. The remaining operating costs are provided through farebox revenues and local contributions. As a result of this program 24 communities throughout the state are now operating this service.

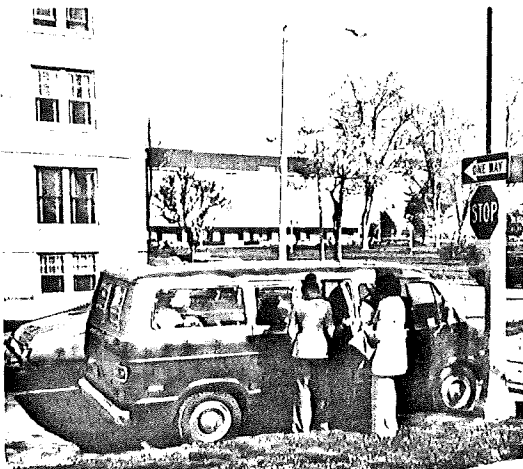
Rural Public Transportation

Service Area: Isabella County

A rural transit system is intended to provide a basic level of public transportation service to the villages and rural places within a county. The van-type vehicle is utilized and operated on a demand responsive (DART) basis. However, the service provided to rural areas is not usually as frequent as that provided in the urban and small urban areas. For example, some rural systems may provide service only one or two days a week with a 24-hour advance reservation required.

The Isabella County system has been in operation since June, 1974. There are four vans operating in the system, and serves approximately 2,100 passengers each month. Most of these trips are generated in the out-county rural areas for a wide variety of reasons. This rural system is financially assisted by the Department's small vehicle program. As of January 1, 1977, the Isabella County system and Mt. Pleasant system have been jointly operated as one agency.

There are several areas in the urban, small urban and rural categories which do not have public transportation service. In order to determine statewide



transportation needs, a methodology was developed from within the Mass Transportation Planning Section, MDOT to determine public transportation needs in all planning area types with the state. Figure 12 is a summary listing of public transportation needs by county in Region 7. The methodology developed for predicting needs determines three levels of service for the six planning area types, i.e., base, intermediate and high levels.

The statement of needs for Region 7 (Figure 12) should not be interpreted to mean that each county must have the number of vehicles shown nor that each county must have a system. What it shows is that if a county, small urban or urban community wanted to begin public transportation service, then, a reasonable expectation of number of vehicles, daily and monthly passengers and operating statistics can be predicted. A sample of those operating characteristics are listed in Figure 10.

Intercity Public Transportation

Service Areas: Urban areas within the region and state.

Intercity systems connect major urban areas of the region with the remainder of the state and nation. The intercity bus is designed for long distance travel and can comfortably seat 47 people. In addition to passenger service, these buses also offer package shipment service. Although intercity bus companies are privately owned,

their operations are regulated by the Michigan Public Service Commission. They are required to operate over specified highway routes and abide by their published time schedules.

There are six intercity carriers operating in the region. Of those, the four major carriers are Greyhound, Indian Trails, Mercury Bus Lines and North Star. The other two include Valley Coach and Delta Bus. Saginaw, Bay City and Midland are the major intercity bus stations in the region with 13 buses stopping in Saginaw per day, 10 in Bay City and 5 in Midland. In addition, these buses stop at several communities along their routes between major urban areas, shown in Figure 13.

The intercity bus industry in Michigan is experiencing a decline in ridership. It is recognized that this condition makes it difficult for some companies to consider service improvements when operating costs continue to increase. In order to assist their companies in reducing some costs, the Department has established a program that provides low interest loans to intercity bus companies to purchase new equipment. In addition, an intercity grant program also provides the intercity carrier flexibility to test new routes and schedules. Such demonstration programs are subsidized by the state for up to a two year period. The Department also has an Intercity Terminal Facilities Program to develop intercity bus terminals and to integrate, where possible, all available intercity and local public transportation services.

FIGURE 10

EXISTING PUBLIC TRANSPORTATION

Urban Public Transportation

	<u>Initiation Date</u>	<u>Vehicles</u>	<u>Monthly* Ridership</u>	<u>Average Weekday Ridership</u>
<u>Dial-A-Ride</u>				
Mt. Pleasant	3/74	7	6,131	255
Alma	6/75	4	5,153	219
Midland	12/75	13	11,959	482
Gladwin	5/75	3	3,331	153
 <u>Fixed-Route</u>				
Saginaw	4/74	18 ^{1/2}	43,651	1,984
Bay City	7/74	25 ^{2/2}	40,486	1,723

*Average for October, November and December 1977.

^{1/2} Operates 6 routes.

^{2/2} Operates 7 routes.

Rural Public Transportation

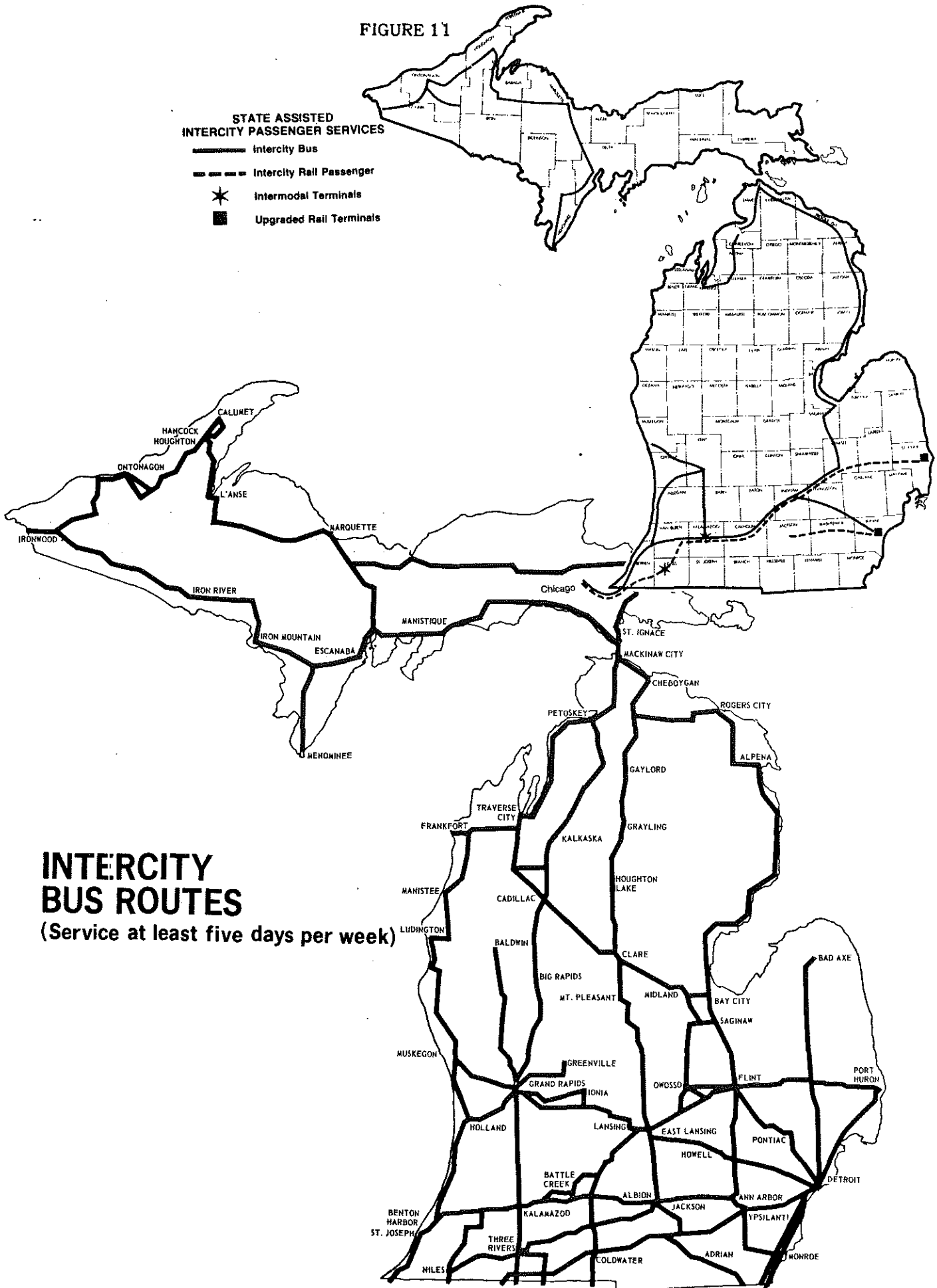
County-Wide
Dial-A-Ride

Isabella County	6/74	4	2,105	119
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FIGURE 11

STATE ASSISTED
INTERCITY PASSENGER SERVICES

- Intercity Bus
- - - - Intercity Rail Passenger
- ★ Intermodal Terminals
- Upgraded Rail Terminals



**INTERCITY
BUS ROUTES**
(Service at least five days per week)

SOURCE: The Official Bus Guide, August 1977

FIGURE 12

INTERCITY PUBLIC TRANSPORTATION

<u>Bus Lines (Year)</u>	<u>Round Trips Per Day</u>	<u>Days of Operation</u>	<u>Route</u>	<u>Communities Served</u>
Delta Bus Company (1966)	1	Wednesday	Mackinaw City to Bay City	Rose City, West Branch, Alger, Sterling, Standish, Pinconning, Linwood, Kawkawlin and Euclid Corners.
Greyhound (1924)	3	7	Sault Ste. Marie to Detroit	Houghton Lake, Harrison, Clare, Coleman, Sanford, Midland, Pinconning, Bay City, Saginaw, Bridgeport and Frankenmuth. One route also serves Oscoda, East Tawas and Omer.
Indian Trails (1922)	4	7	Saginaw to Flint Flint to Bay City	Saginaw, Flint and Bay City.
	3	7	Saginaw to Owosso	St. Charles, Chesaning and Oakley.
	1	Weekdays	Bad Axe to Detroit	Cass City, Deford, Wilmont, Kingston, Hemans, Lamotte Corners and Marlette.
	1	Sunday	Bad Axe to Detroit	Port Austin, Bad Axe, Cass City, Caro, Wahjamega, Watrousville and Vassar.
Mercury Bus Lines (1946)	2	Weekdays	Alma to Saginaw	Mt. Pleasant, Oil City, Midland, Freeland, Bay City. One return trip provides service to Hemlock, Merrill, Wheeler, Breckenridge and St. Louis.
North Star (1924)	2	7	Traverse City to Lansing	Clare, Mt. Pleasant, Alma, Ithaca.

FIGURE 12 (CONTINUED)

<u>Bus Lines. (Year)</u>	<u>Round Trips Per Day</u>	<u>Days of Operation</u>	<u>Route</u>	<u>Communities Served</u>
Valley Coach (1949)	1	Tuesday	Port Huron to Saginaw	Lexington, Croswell, Applegate, Carsonville, Sandusky, Elmer, Marlette, Mayville, Juniata, Vassar and Richville.



FIGURE 13

PREDICTED VEHICLES NEEDED AND RIDERSHIP

County	Number of Vehicles		Monthly Ridership		Average Weekday Ridership	
1. Arenac County	6	<u>6</u>	5,482	<u>5,482</u>	258	<u>258</u>
2. Bay County						
Bay City	35		207,672		8,653	
Auburn	1		1,869		79	
Rural	13	<u>49</u>	12,601	<u>222,142</u>	593	<u>9,325</u>
3. Clare County						
Clare	2		3,289		139	
Harrison	1		2,366		100	
Rural	8	<u>11</u>	7,863	<u>13,518</u>	370	<u>609</u>
4. Gladwin County						
Gladwin	1		2,579		109	
Rural	7	<u>8</u>	6,481	<u>9,060</u>	305	<u>414</u>
5. Gratiot County						
Alma	5		8,612		364	
Ithaca	1		2,129		90	
St. Louis	2		3,076		130	
Rural	7	<u>15</u>	7,353	<u>21,170</u>	346	<u>930</u>
6. Huron County						
Bad Axe	1		2,342		99	
Harbor Beach	1		1,869		79	
Sebewaing	1		1,869		79	
Rural	10	<u>13</u>	9,860	<u>15,940</u>	464	<u>721</u>
7. Iosco County						
East Tawas	1		2,579		109	
Tawas	1		1,869		79	
Rural	10	<u>12</u>	10,094	<u>14,542</u>	475	<u>663</u>
8. Isabella County						
Mount Pleasant	14		25,009		1,057	
Shepherd	1		1,869		79	
Rural	11	<u>26</u>	10,731	<u>37,609</u>	505	<u>1,641</u>
9. Midland County						
Midland	18		32,343		1,367	
Rural	11	<u>29</u>	10,604	<u>42,947</u>	499	<u>1,866</u>
10. Ogemaw County						
West Branch	1		2,579		109	
Rural	6	<u>7</u>	5,992	<u>8,571</u>	282	<u>391</u>

PREDICTED VEHICLES NEEDED AND RIDERSHIP (CONTINUED)

County	Number of Vehicles		Monthly Ridership	Average Weekday Ridership	
11. Roscommon County					
Roscommon	1		1,893		80
Rural	7	<u>8</u>	7,097	<u>8,990</u>	334
12. Saginaw County					
Saginaw	67		458,058		19,360
Chesaning	1		2,129		90
Frankenmuth	1		2,106		89
St. Charles	1		1,869		79
Rural	22	<u>92</u>	22,100	<u>486,262</u>	1,040
13. Sanilac County					
Croswell	1		1,869		79
Marlette	1		1,869		79
Sandusky	1		1,869		79
Rural	13	<u>16</u>	12,729	<u>18,336</u>	599
14. Tuscola County					
Caro	3		5,134		217
Cass	1		2,106		89
Millington	1		1,869		79
Vassar	2		2,839		120
Rural	17	<u>24</u>	16,979	28,927	799
		<u>316</u>		<u>933,496</u>	<u>40,030</u>

NOTE: Above predictions are based upon 1990 population estimates at the intermediate service level.

RIDESHARING

Ridesharing programs that encourage carpools and vanpools can provide a significant contribution to the fulfillment of transportation objectives. These objectives include the conservation of energy, reduction of peak period traffic congestion, improvement of air quality, the alleviation of parking problems, and the reduction of commuting costs. The conservation of our scarce energy resources is of paramount concern at the national, state, and local levels. Ridesharing programs offer the most potential of any transportation program for energy conservation. The average statewide occupancy for automobiles for commuting is 1.2 persons. If that average, for example, could be increased to 1.5 persons, there would be a savings of almost 22 million gallons of gasoline per month in Michigan alone.

Carpooling offers a tremendous potential for increasing vehicle occupancy given the more than five million private automobiles registered in Michigan. Vanpooling is a relatively new concept in providing work trip commuting service. The first Michigan vanpool program was initiated in 1975. As of May, 1979, the

number of employer sponsored vanpool programs had increased to nine with a large number of additional employers seriously considering implementing new programs. One of the vanpool programs is operated by the Michigan Department of Transportation for state employees.

The Michigan Legislature has formally assigned statewide ridesharing responsibilities to the Michigan Department of Transportation. The Michigan Department of Transportation and the regional planning agency are available to provide technical and promotional assistance in establishing ridesharing programs. Programs are available that match persons interested in vanpooling, carpooling, and public transportation. Ridesharing and public transportation activities must be encouraged and coordinated to provide an efficient mix of services that best meet the transportation needs of regional residents. A variety of combinations should be considered--carpools, vanpools, and public transportation depending upon the population of an area, its distance to major places, and transportation needs and possibilities for people in the cities, the small communities, and rural areas.



SECTION K

RAILROADS

The financial condition of the railroad industry in the Northeastern and Midwestern region of the United States has been cause for serious national concern. In Michigan and Region 7, deteriorating service, rising costs and the prospect of abandonment, has put the future of rail service in doubt.

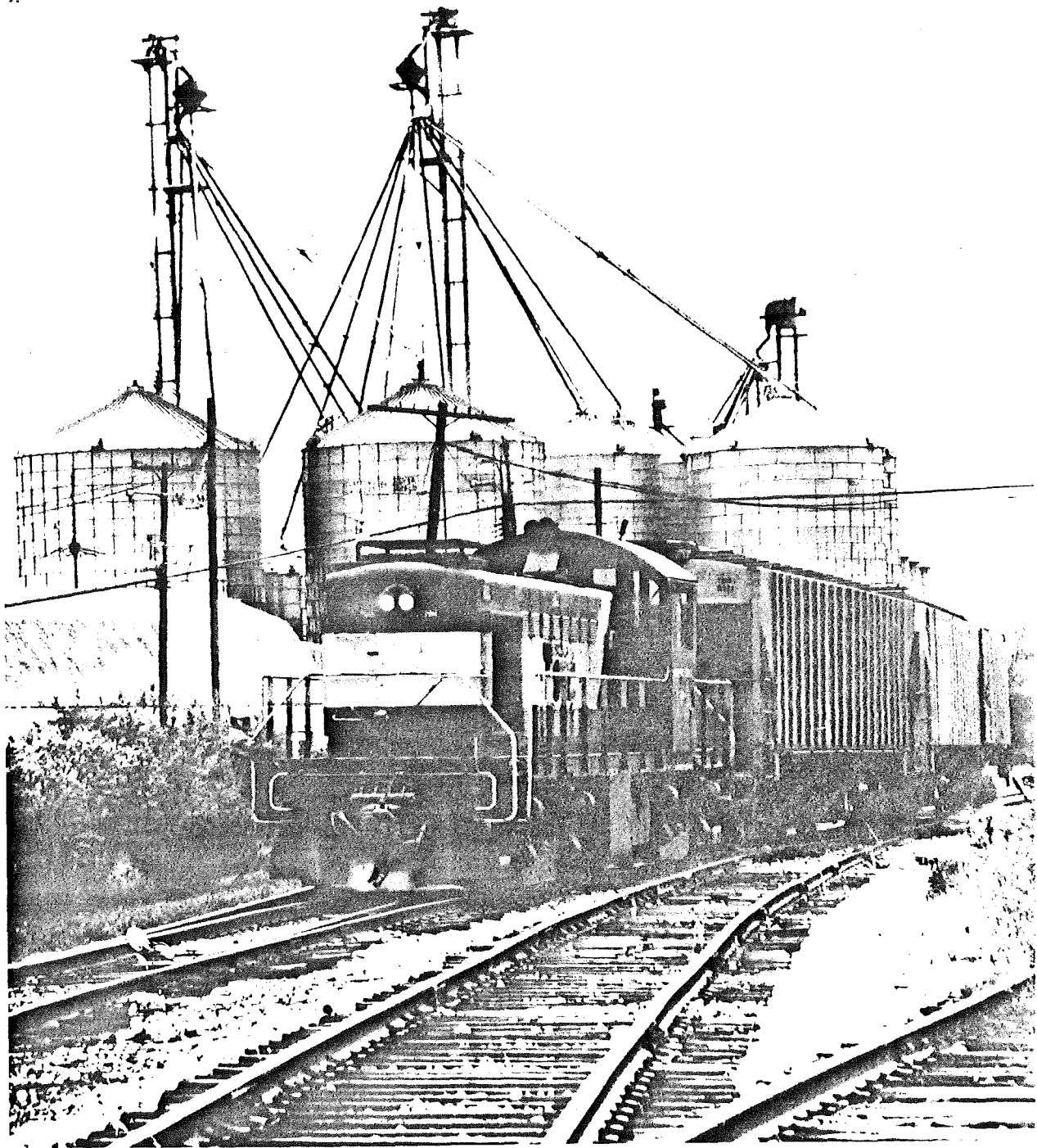
A review of the Existing Railroad System map on the facing page will show the existing railroad service in the Region. Service is provided by three solvent carriers, namely the Chessie System, Detroit and Mackinac Railway and Grand Trunk Western Railroad. The Penn Central and Ann Arbor railroads also operate trackage within the region, however, under the Rail Reorganization Act these lines have been deemed bankrupt and unreorganizable under traditional bankruptcy processes. Furthermore, the United States Railway Association, in their July 27, 1975 Final System Plan, did not include any Penn Central or Ann Arbor trackage within the Region in the ConRail System. Sections of this Penn Central trackage have since been acquired by the Grand Trunk Western Railroad and the Detroit and Mackinac Railway. The Grand Trunk Western Railroad and the State of Michigan have also purchased portions of the Ann Arbor Railroad. Former Ann Arbor trackage is being operated under contract to the State by a designated operator, Michigan Interstate. The former Penn Central track in Tuscola, Saginaw and lower Bay counties not acquired by Grand Trunk is operated under subsidy by a designated operator, Tuscola and Saginaw Bay Railway. Finally, former Penn Central trackage from Linwood to Sallings via Roscommon is being operated by the Detroit and

Mackinac Railway with subsidy provided by the State of Michigan. All rail service continuation subsidies are available through provisions of the Rail Revitalization and Regulatory Reform Act of 1976.

From the Existing Railroad System map it is evident that if adequate rail service to the region is to continue, subsidy programs, changes in ownership, and other innovative solutions will be required. Despite these efforts, limited abandonment may occur. In any case, additional, in-depth analyses will have to be made to determine how to provide adequate rail service in the region.

The Rail Planning Section of the Michigan Department of Transportation is currently revising the August, 1977 Annual Update of the Michigan Railroad Plan. This document was in response to Federal requirements and sets forth a state plan for continuation of rail service in the state and region. The acceptance of this Plan by the Federal Railroad Administration has qualified Michigan to receive rail service continuation subsidies that will allow continued operations over the bankrupt properties.

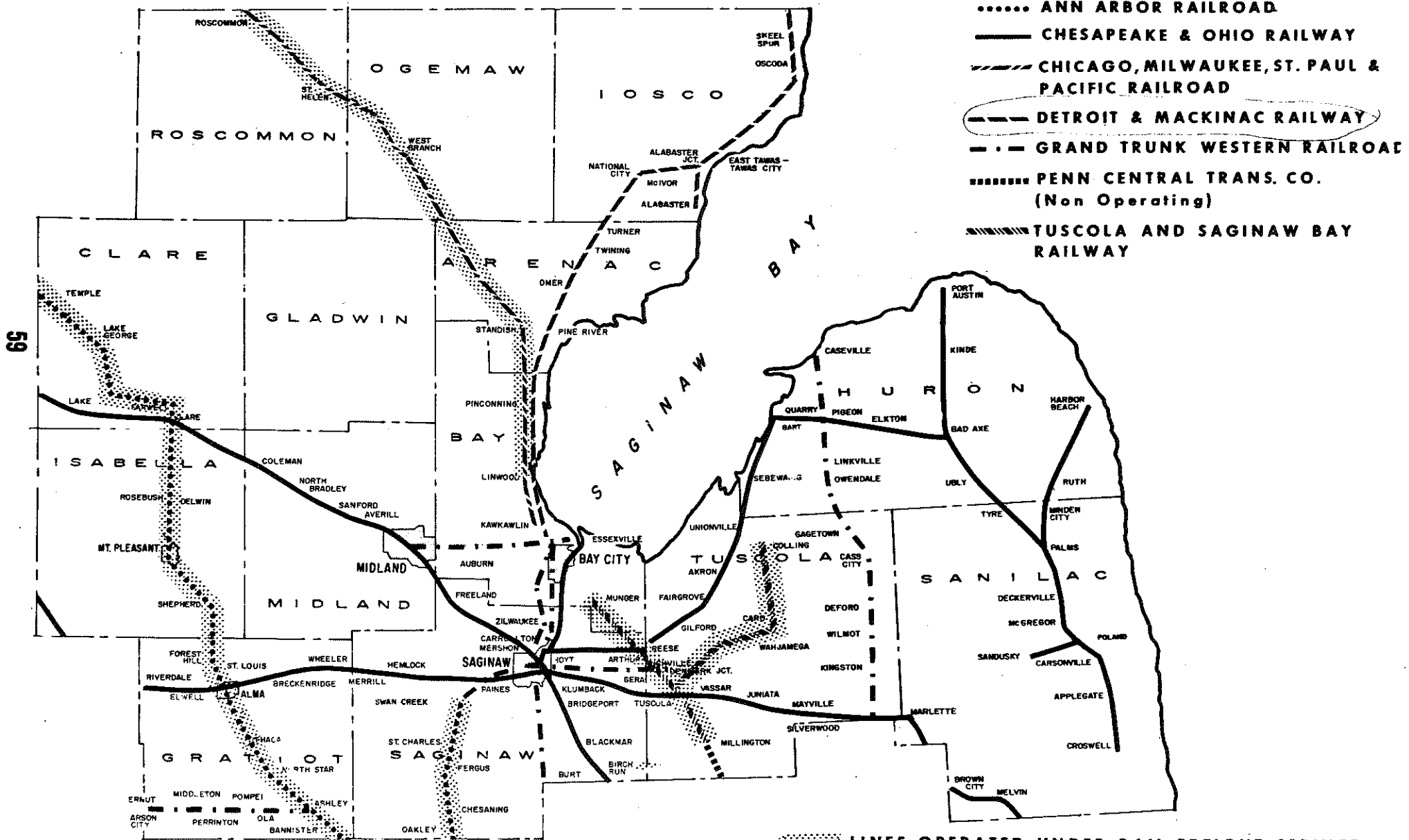
The objectives of this Regional Systems Study in agreement with the Michigan State Railroad Planning goals and in cooperation with the Rail Planning Section will address 1) which facilities should be retained, 2) which facilities should be upgraded, 3) what type of service should be provided, 4) what would be the costs. A wide range of alternatives will be considered in our attempt to answer these questions.



EXISTING RAILROAD SYSTEM

JUNE 1979

MICHIGAN RAILROADS



- ANN ARBOR RAILROAD
- CHESAPEAKE & OHIO RAILWAY
- CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD
- DETROIT & MACKINAC RAILWAY
- . - - GRAND TRUNK WESTERN RAILROAD
- PENN CENTRAL TRANS. CO. (Non Operating)
- ////// TUSCOLA AND SAGINAW BAY RAILWAY

LINES OPERATED UNDER RAIL FREIGHT SERVICE CONTINUATION CONTRACTS ADMINISTERED BY THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

SECTION L

SOCIAL, ECONOMIC, ENVIRONMENTAL CHARACTERISTICS OF REGION 7

The need for new or improved transportation facilities to be located in certain areas is a task that must be based on specific facts and assumptions. Knowledge of future population projections, economic situations, environmental conditions, and other variables is important in determining the need for new transportation facilities.

It is a well known fact that new land use development creates a need for new transportation facilities. The reciprocal point is also true.--New transportation facilities often stimulate new and different land use development.

The following sections highlight the social, economic, and environmental concerns which have the greatest affect on decision makers. These are the considerations that are foremost in the minds of those responsible for making decisions concerning the future of transportation in Michigan.

SOCIAL, ECONOMIC CHARACTERISTICS

POPULATION

The total population of the East Central Michigan Region in 1970 was 690,281, which represents a 15.6% increase over the 1960 figure of 596,890. This rate is greater than those of the state and nation, which grew by 13.4 percent and 11.8 percent respectively. The 1975 population was estimated to be 740,904 persons.

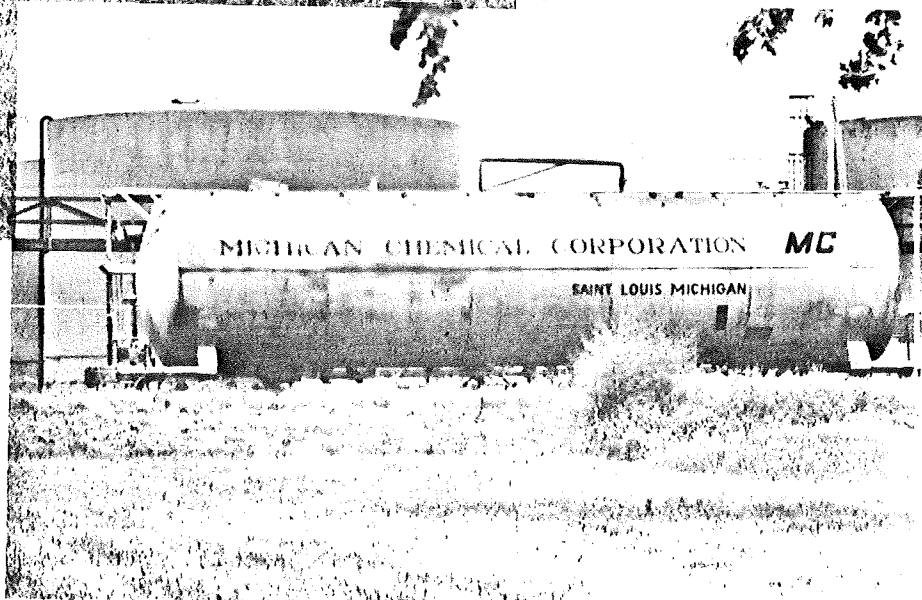
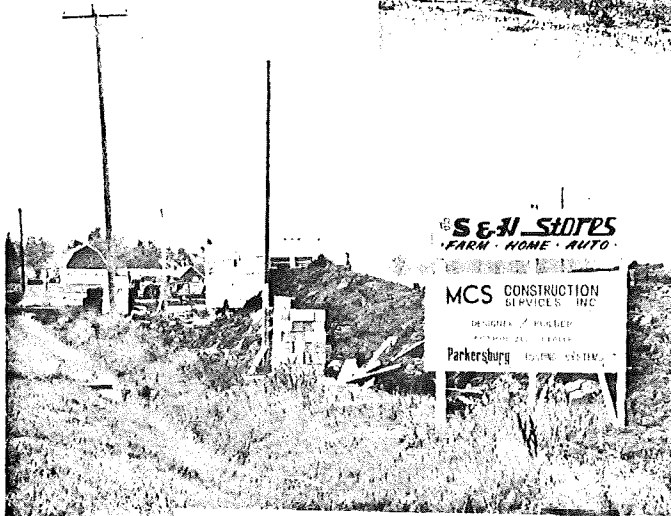
Population of the individual 14 counties ranged from a low of 9,892 in Roscommon County to a high of

219,743 in Saginaw County. The pie graph depicts each county's population relative to the population of the region.

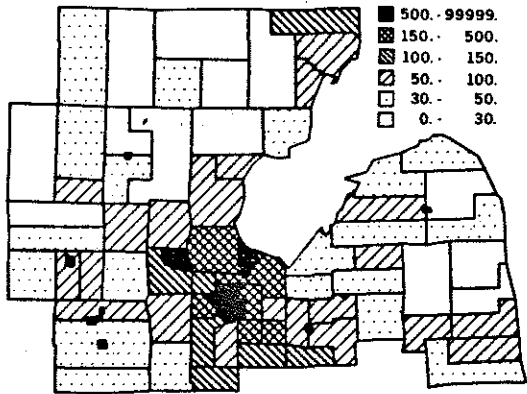
Between 1960 and 1970 all 14 counties experienced growth in population. Seven counties reflected increases exceeding 20 percent. Among these, five are located in the northern portion of the region where forests and recreational opportunities are in abundance. Iosco county's growth, however, has also been influenced by expansion of Wurtsmith Air Force Base. Midland and Isabella counties also exceeded the regional growth rate. The expansion of the Dow Chemical Complex in Midland and Central Michigan University in Mt. Pleasant were the primary factors influencing growth in their respective counties. The Bureau of the Census estimates that 740,904 persons lived in the region in 1975; and increase of 7.3 percent in 5 years.

In an effort to determine the affects of various population changes on the transportation and land use of the region, three different growth figures have been selected for simultaneous study. Essentially we have taken the growth figure expected for 1980 under the present growth rates and called that the low growth projection for Region 7 in the year 2000.

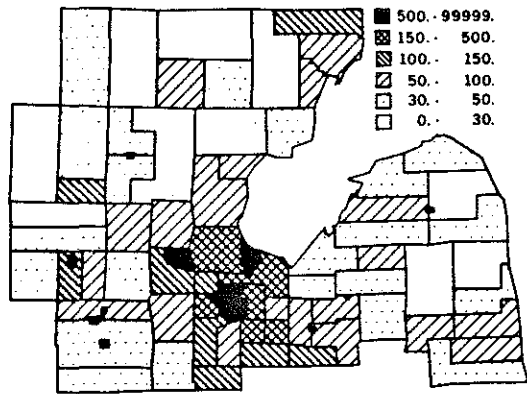
The 1990 figure then becomes the medium growth option and the 2000 forecast becomes the high growth option.



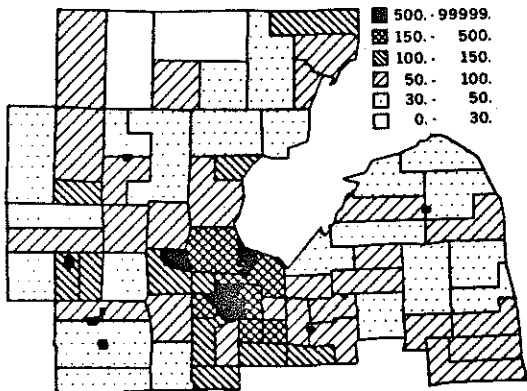
REGION 7 POPULATION DENSITY PERSONS PER SQUARE MILE



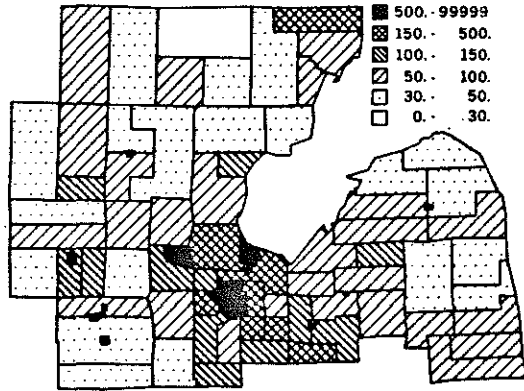
1975 REGION 7 TOTAL 740,000
STATE TOTAL 9,110,000



1980 REGION 7 TOTAL 777,000
STATE TOTAL 9,358,000



1990 REGION 7 TOTAL 857,000
STATE TOTAL 10,046,000

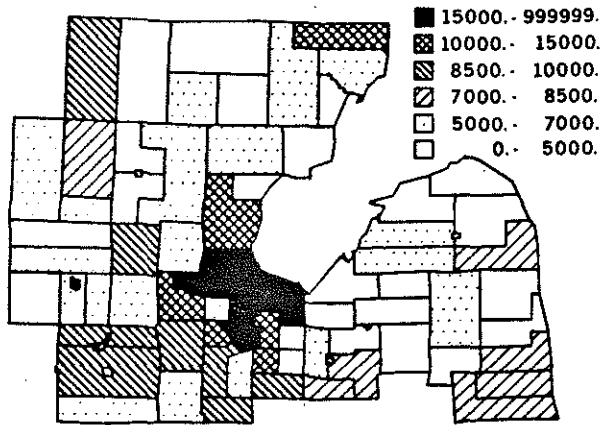


2000 REGION 7 TOTAL 914,000
STATE TOTAL 10,505,000

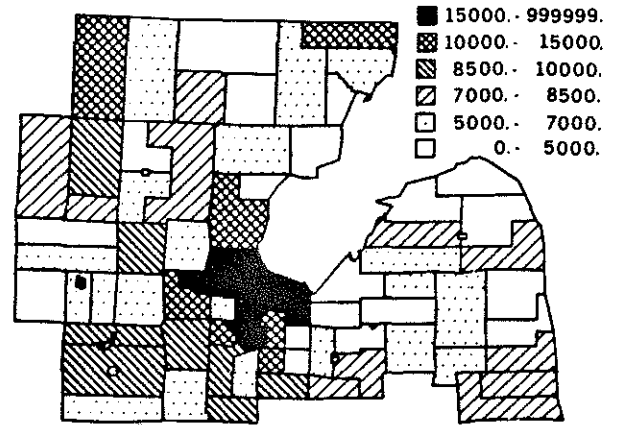
SOURCE:

GRAPHICS - MICHIGAN DEPARTMENT OF TRANSPORTATION
BASE DATA - MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

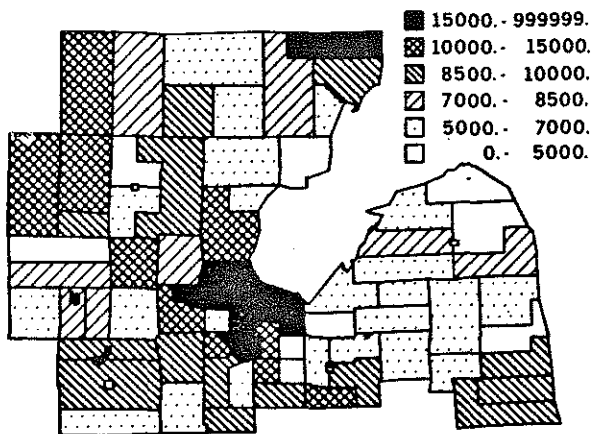
REGION 7 POPULATION DISTRIBUTION PER ZONE



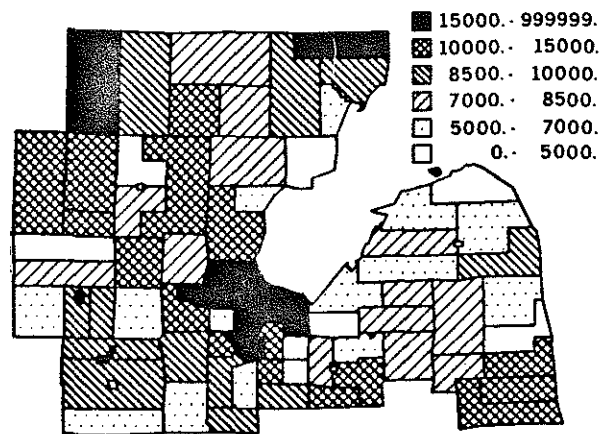
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STATE TOTAL 10,046,000



2000 REGION 7 TOTAL 914,000
STATE TOTAL 10,505,000

SOURCE:
GRAPHICS - MICHIGAN DEPARTMENT OF TRANSPORTATION
BASE DATA - MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

POPULATION

1950-2000

	1950	1960	1970	1980			1990		2000	
	1/	1/	1/	2/	3/	2/	3/	2/	3/	
Arenac	9,644	9,860	11,149	11,762	12,397	12,672	14,322	13,583	15,599	
Bay	88,461	107,042	117,339	126,866	123,928	141,113	126,649	154,358	130,245	
*Bay City	52,523	53,604	49,499	56,245	N/A	59,316	N/A	62,385	N/A	
Clare	10,253	11,647	16,695	18,166	25,797	20,079	36,484	21,989	46,127	
Gladwin	9,451	10,769	13,471	14,277	19,301	15,123	24,887	15,967	30,698	
Gratiot	33,429	37,012	39,246	42,651	39,902	46,480	40,771	50,410	41,184	
*Alma-St. Louis	11,688	12,786	13,891	15,326	N/A	16,977	N/A	18,628	N/A	
Huron	33,149	34,006	34,083	35,962	37,202	38,839	41,270	41,717	44,227	
Iosco	10,906	16,505	24,905	35,080	35,506	49,342	47,131	63,606	57,987	
Isabella	28,964	35,348	44,594	48,127	55,082	54,399	61,535	60,670	70,898	
*Mt. Pleasant	11,393	14,875	20,504	23,029	N/A	26,895	N/A	30,761	N/A	
Midland	35,662	51,450	63,769	75,946	67,865	90,173	69,744	104,402	71,784	
*Midland City	14,285	27,779	34,921	43,865	N/A	54,728	N/A	65,591	N/A	
Ogemaw	9,345	9,680	11,903	12,025	15,790	12,534	21,128	13,044	25,261	
Roscommon	5,916	7,200	9,892	10,913	17,755	12,391	27,060	13,870	35,200	
Saginaw	153,515	190,752	219,743	252,826	224,185	292,772	223,625	332,714	224,889	
*Saginaw City	92,918	98,265	91,849	99,915	N/A	110,155	N/A	120,394	N/A	
Sanilac	30,837	32,314	34,889	37,188	40,898	40,257	47,482	43,324	51,359	
Tuscola	38,258	43,305	48,703	52,739	53,447	57,938	58,734	63,137	63,200	
Region	497,790	596,890	685,341	774,528	769,055	884,112	840,822	992,791	910,458	

* City Projections from Statewide Population Projections (Goldberg) - 1966

1 U.S. Bureau of the Census

2 Statewide Population Projections (Goldberg) - 1966

3 Department of Management and Budget, Population Projections for the Counties of Michigan - 1974

The population density of the region was 79.3 persons per square mile in 1970, higher than the national average, but only one-half of the statewide average. Counties having the greatest density were: Saginaw, Bay and Midland with 211, 263 and 123 persons per square mile, respectively. Roscommon County, with 19 persons per square mile, was the most sparsely settled although peak recreational activities may increase this density tremendously.

The region is considerably more rural-oriented than the state or nation. Only 47% of the region's population reside in urban areas having population over 2500 persons, compared to approximately 75% for the state and nation. Urban counties, according to the U.S. Bureau of the Census, are Saginaw, Bay and Midland. The remaining counties are all classified as rural. Population by county and selected cities since 1950 can be found on the accompanying table.

POPULATION PROJECTIONS

Population analysis indicates that unless major unforeseen changes occur in the region, past growth trends will probably continue. The degree of growth in specific counties will vary, but the forecasts generally conclude:

- The recreational nature of the rural northern counties, such as Clare, Ogemaw and Roscommon counties, will influence continued present growth patterns. There is a large potential for population growth with the conversion of recreational dwellings to year-round dwellings.
- The population of agriculturally-oriented counties will remain stable or increase slightly.

- The cities of Bay City, Saginaw, and Midland are expected to grow very little, however, the surrounding townships and suburbs will likely continue growth similar to that experienced in recent years.

The population of an area, both present and future, is one of the primary factors to be considered in developing and evaluating transportation systems. The size, density and distribution of a population influences the quality and types of services which are required to satisfy travel demand within a geographic area. In the Regional Transportation Systems Study for East Central Michigan this relationship between population and transportation will be evaluated and impacts of alternative courses of action assessed.

A decline in the automobile industry due to the high cost of fuel or a dampening of the economy may result in a drastic population shift to states with better employment potential. These and other factors that may affect population projects must be constantly monitored to assure proper plan preparation for the future.



ECONOMY

The economic activity within a region is a major determinant of travel and the facilities required to accommodate it: Transportation systems should be developed which promote the efficient movement of materials and goods necessary for a strong and viable regional economy.

Bay, Saginaw and Midland counties, located in the Saginaw Valley, and containing the cities of Bay City, Saginaw, and Midland comprise the economic heart of the East Central Michigan Region. Activities consist chiefly of chemical and automobile-related manufacturing. In the thumb and southern counties agriculture dominates. The northern counties depend upon trade and tourism for their economic well-being.

Significant changes in major employment categories occurred in the region between 1960 and 1970. Workers involved in the agriculture, forestry, and fisheries sector dropped from 9.3% to 4.3% of the total employed. Those employed in mining also decreased. Persons working in construction, transportation, and utilities remained constant while those working in retail trade, services, and manufacturing, all increased.

Manufacturing now accounts for the largest employment category in the region. Some 35% of the total number of employed persons were involved in manufacturing in 1970, with nearly one-third of those employed in producing automobile parts and other transportation equipment. The services category was the next largest, employing approximately 30%. Trade accounted for 20% of the total employment, while construction activities employed 6%.

The region contains some of the state's richest agricultural land, and contributes heavily in making Michigan one of the leading agricultural states in the nation. Although only a small portion of the labor force is engaged in this activity, agriculture is an important facet to the region's economic health. While the industry is an important segment of the region's economy, if the trend toward larger farms and increased mechanization continues, fewer employment opportunities will be available.

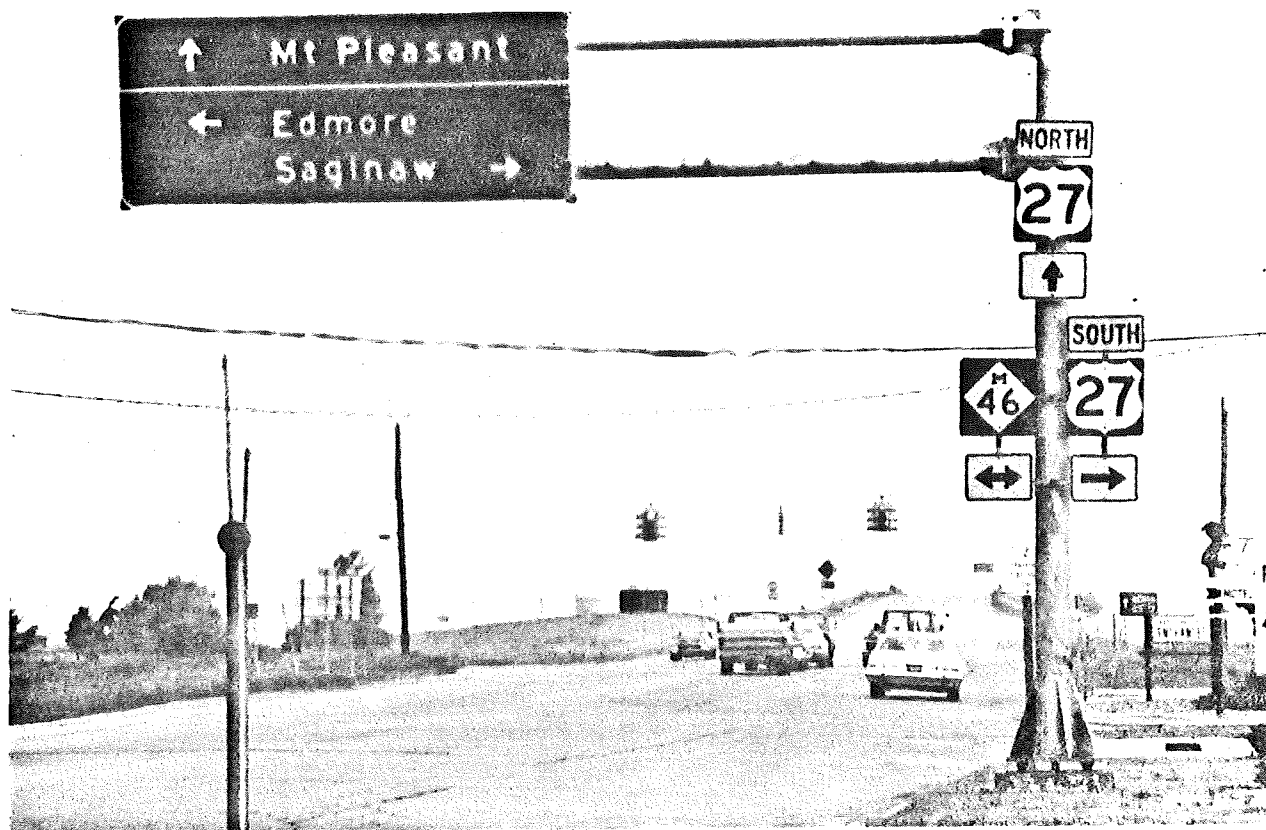
Mineral reserves in the region range from seemingly unlimited supplies of gypsum, sand, gravel, salt, and brine to a projected depletion of oil and gas supplies. Despite significant declines in some mineral production in recent years, economic and political events resulting from the recent recession and energy crunch may offer new hope for increases in exploration and production.

The overriding problem in the region, despite the strong industrial base and an abundance of jobs for skilled workers, is the relatively high unemployment rate. Seasonal fluctuations in agricultural and tourism related employment make it difficult to find year-round work for those living in outlying areas. These workers migrate to the industrialized urban areas and increase the pool of under-educated and unskilled labor already present there.

Increased vocational training, more opportunities for education, an expansion of the industrial base and a healthy economy are all required to ease the continual high unemployment in the region.

An efficient transportation system can have a positive impact on an area's economy. Raw materials may be transported more quickly or economically to the manufacturer, and the finished products to the market place. Improved accessibility to recreational areas may enable more people to take advantage of facilities and natural features located there.

The farmer would be able to get his harvest to market more easily. In the Regional Transportation Systems Study these and other effects of transportation on East Central Michigan's economy will be considered in the development and evaluation of various modal transportation alternatives.



ENVIRONMENTAL CONSIDERATIONS

The East Central Michigan Planning and Development Region (ECMPDR) is noted for its environmental diversity ranging from large forested tracts to expanses of highly productive agricultural land. Five of the 14 counties in this region, Clare, Gladwin, Iosco, Ogemaw and Roscommon are over 50 percent forested. Much of this forest land is either State or Federally owned and is available for a wide range of recreational activities including hunting, fishing and camping.

Agricultural use dominates in Bay, Gratiot, Huron, Isabella, Saginaw, Sanilac and Tuscola Counties where over 70 percent of the land is available for agricultural production. Overall, 60 percent of the 8,700 square miles of Region 7 has the potential for agricultural use.

Geologically, the ECMPDR can be characterized as an area of hilly, glacial moraines in the western areas, which greatly contrast with the flat glacial lake plains in the east. Geological features of special environmental importance in the region include "high risk erosion areas", areas where the Michigan Department of Natural Resources (DNR) has found that erosion is causing recession of the bluffline at a rate of one foot per year or more. Sanilac County has more miles of shoreline designated by DNR as "high risk" than any other county on Lake Huron.

Proposed "environmental areas" are also located along shorelines in the ECMPDR. Such areas were determined by DNR on the basis of studies and surveys to be necessary for the preservation and maintenance of fish and wildlife. These areas are inhabited or frequented by coastal-dependent fish or wildlife

species during a portion of their lifecycle. Such areas usually extend no more than 1,000 feet landward of the ordinary high water mark. The 211 miles of proposed environmental areas of Lake Huron's 634 miles of shoreline occur principally on the shores of Saginaw Bay.

All counties within the ECMPDR are part of the Lake Huron watershed with the exception of western portions of Roscommon and Clare Counties. Runoff from these counties drains into Lake Michigan and southern and central portions of Sanilac County which drain into Lake St. Clair. Most streams draining the area are relatively short and have small drainage basins. The Saginaw River basin which drains to Saginaw Bay, is the largest basin in the region and the state consisting of over 6,200 square miles.

The ECMPDR has a few large lakes, many rivers and streams, extensive wetland areas surrounding Saginaw Bay, and swamps which extend between branches of the drainage system. Three particularly large lakes are found in Roscommon County: Houghton Lake, Higgins Lake and Lake St. Helen. Houghton Lake is 31.3 square miles in size and is the largest inland lake in Michigan.

The water quality of rivers and streams in the region is variable, ranging from excellent to substandard. Among the environmentally important rivers in the ECMPDR are those being studied for inclusion in State or National River Programs. The Michigan Natural Rivers Act (Act 231, P.A. 1970) provides a system for preserving or enhancing the broad range of values of Michigan streams. Included are water conservation and floodplain preservation; ecologic, historic and scenic values and those

values pertaining to fisheries and general recreation. The Natural Resources Commission has been given the authority to designate recreational, scenic or wild rivers. The Muskegon River, which begins in Roscommon and flows through Clare County and the Shiawassee River, which flows into Saginaw County, are currently under study for inclusion in the State program. The Cass River in Saginaw, Tuscola and Sanilac Counties, and the Rifle River in Arenac and Ogemaw Counties have been proposed for study. The AuSable River, which flows through Iosco County, is currently being studied for inclusion in the National Wild-Scenic River Program.

The most important water resource in the ECMPDR is Saginaw Bay, one of the most significant fish and wildlife habitat areas on the Great Lakes. The relatively shallow waters of the bay, which seldom exceed 60 feet in depth have the highest fishery productivity of the entire Lake Huron ecosystem. Saginaw Bay marsh areas where marsh grasses, reeds, sedges, rushes and cattails dominate, support large numbers of wildlife such as muskrat. These marsh areas are also part of an extensive waterfowl habitat complex, which reaches far out into the bay and consist of emergent vegetation and prime submerged feeding beds found in the shallow waters. During spring and fall, all portions of the Lake Huron shoreline are used by most of the shorebirds common to Eastern North America.

A number of critical nesting and migration areas have been identified in the East Central Region. Some of the areas provide stopover points for migrating waterfowl, shorebirds, perching birds and hawks. Others provide nesting sites for a variety of waterfowl, gulls, herons and terns.

Areas are numbered on the Environmental Features Map which are identified as important wildlife nesting sites. These areas include:

- 1) AuSable Point
- 2) Tawas Point
- 3) Point Lookout
- 4) Point AuGres
- 5) Tobico Marsh
- 6) Spoils Island
- 7) Fish Point
- 8) Lone Tree Island
- 8) Katechay Island Bay
- 8) Wildfowl Bay
- 8) Sand Point
- 8) Duck Island
- 8) Little Charity Island
- 8) Charity Island
- 9) Rush Lake
- 10) Port Austin Reef

The vegetative cover of the region once consisted of dense forests with vast acreages of white pine. Pines and northern hardwoods grew on the uplands and swamp hardwoods and conifers such as white cedar, grew in the low and bottom lands. Non-forested areas were scattered and included lake beaches, sand dunes near Lake Huron, Saginaw marsh areas, small acreages of open bogs, some open land on the drier sandy plains and those cleared by Indians for their villages and gardens. Extensive logging of the pines began in the mid-1800's, continued until about 1900, and was followed by cutting of the hardwoods. Forest fires were also responsible for destruction of much of the forest cover. The large areas of forest now found in the region are chiefly second-growth stands.

In the northern parts of the region, certain Jack Pine areas are inhabited by Michigan's bicentennial bird, the Kirtland's Warbler. Listed on the National and State lists of endangered species, the birds have been known

to nest in very limited areas in Michigan, including parts of Roscommon, Ogemaw and Iosco Counties. The U.S. Forest Service, U.S. Fish and Wildlife Service and the Michigan DNR are planning intensified management programs of benefit to the Kirtland's Warbler.

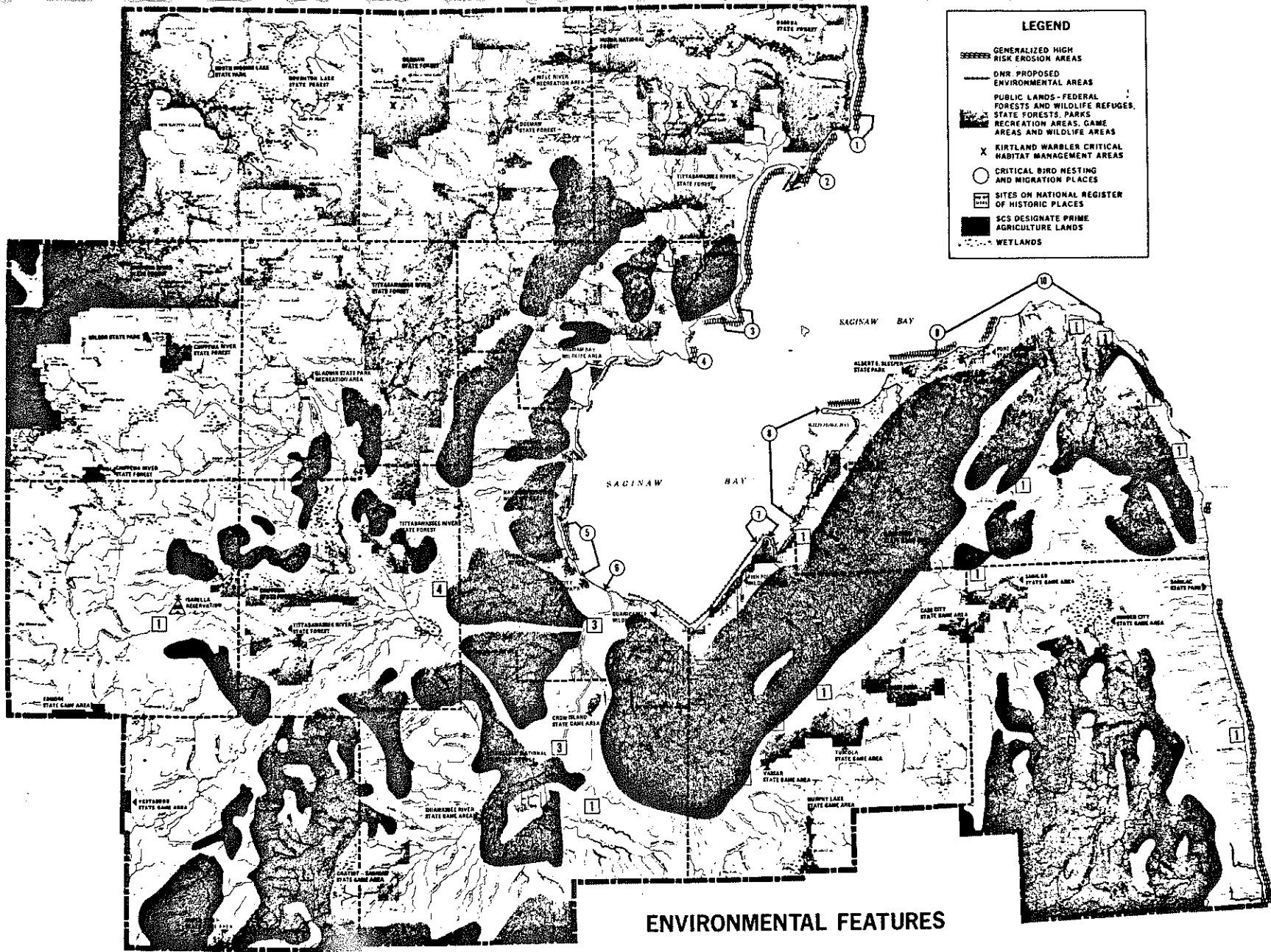
Another important species, the Bald Eagle, though not endangered, is considered threatened in Michigan. Known nesting sites of the Bald Eagle are located in Roscommon, Clare, Ogemaw and Saginaw Counties.

The forests, water and wildlife resources of the ECOMPDR, combined with the large areas of public land in the northern portion, provide varied recreational opportunities. In

addition to State and National forests, eight State parks, numerous private and public campground, State game areas and recreation areas are available for recreational use. The Houghton Lake area in Roscommon County is an extremely popular recreation area with numerous year round activities available.

Besides its natural environmental values, the East Central Michigan region has substantial resources of a historic and archaeological nature. Twenty-two sites listed on the National Register of Historic Places are found in the region, as are many other sites of State and local significance. Ten general locations of these sites are shown on the Environmental Features map.





ENVIRONMENTAL FEATURES

ENERGY

The question of energy availability is another important concern for mobile Americans. Whether vehicles will be available to move people from one place to another at a reasonable price is an important variable in determining the direction of future growth in the region.

If energy used to travel from home to work and back again continues to consume an increasing amount of a wage earners salary, that person may find it more economical to move closer to the job site. Moves such as this may cause a concentration of urban development and reverse or reduce the present urban sprawl pattern and thus curb the amount of energy needed to make work trips.

Higher energy costs and energy rationing might lead to increased use of van pools, car pools, mass transit, bus facilities, and other energy efficient modes of transportation. The American people obviously prefer individual vehicles as a mode of travel. Further, the free enterprise system will strive to develop personal vehicles that are more energy efficient. This knowledge plus the great deal of research being done in the area of battery technology, new fuels and fuel handling equipment such as hydrogen and hydrides, plus hybrid vehicles research, and new engine design may permit Americans to continue to use personal vehicles at today's rate and perhaps even higher rates.

If any new technology is found which permits personal vehicle use to be maintained or increased, this system study would still be usable but the emphasis may be changed to address the abundant energy supply.

At the time this report was written the conserved energy supply situation was beginning to occur with many government officials stating that the restricted energy situation was rapidly occurring.

The important note to make is that this study addresses those transportation problems that occur in every energy situation.

Energy Consumption

The graph on the following page shows the amount of gasoline usage projected for each of the three futures. These curves are based upon a mixture of vehicles expected to be operating in various future years. As time passes, older vehicles with poorer miles per gallon rating are expected to be retired. This means that the gasoline consumed by the vehicle fleet will decrease as time passes. This decrease will occur while the number of vehicles used increases. Gasoline consumption will also decrease as the vehicle miles of travel increases.

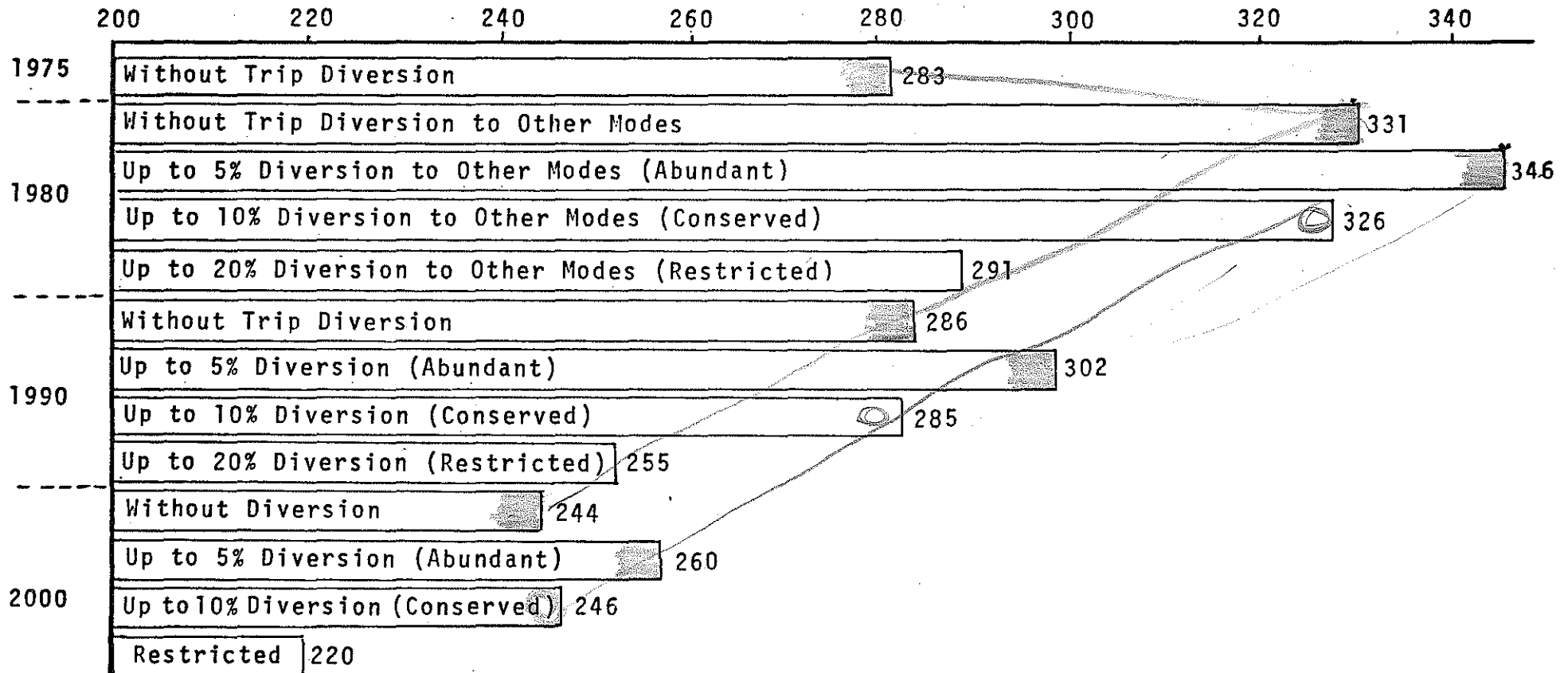


PROJECTED ANNUAL LIQUID FUEL CONSUMPTION

REGION 7

TRUNKLINE TRAVEL

GALLONS (MILLIONS)

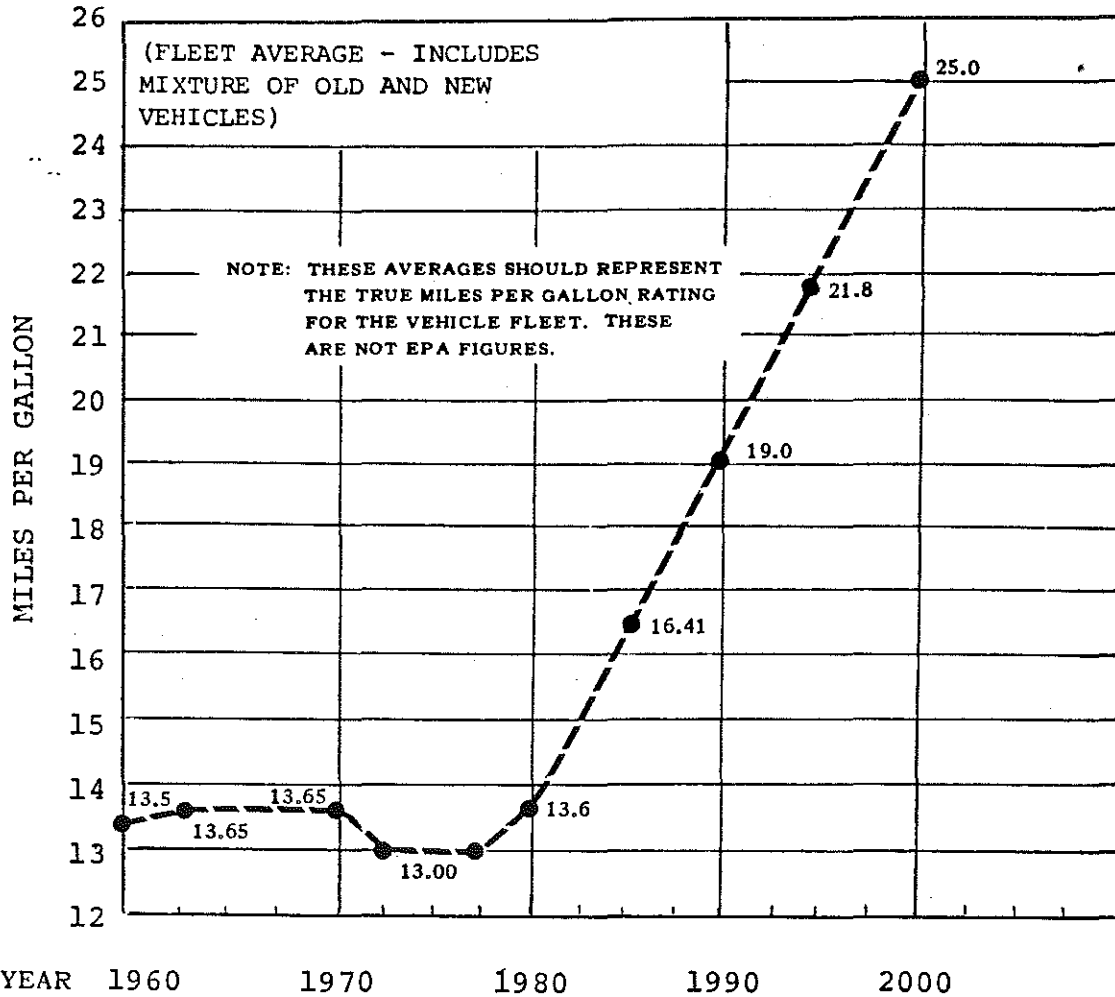


Note: Vehicle miles of travel increase in all futures. An increase in the miles per gallon on all vehicles operating on the system will result in a net reduction of fuel usage.

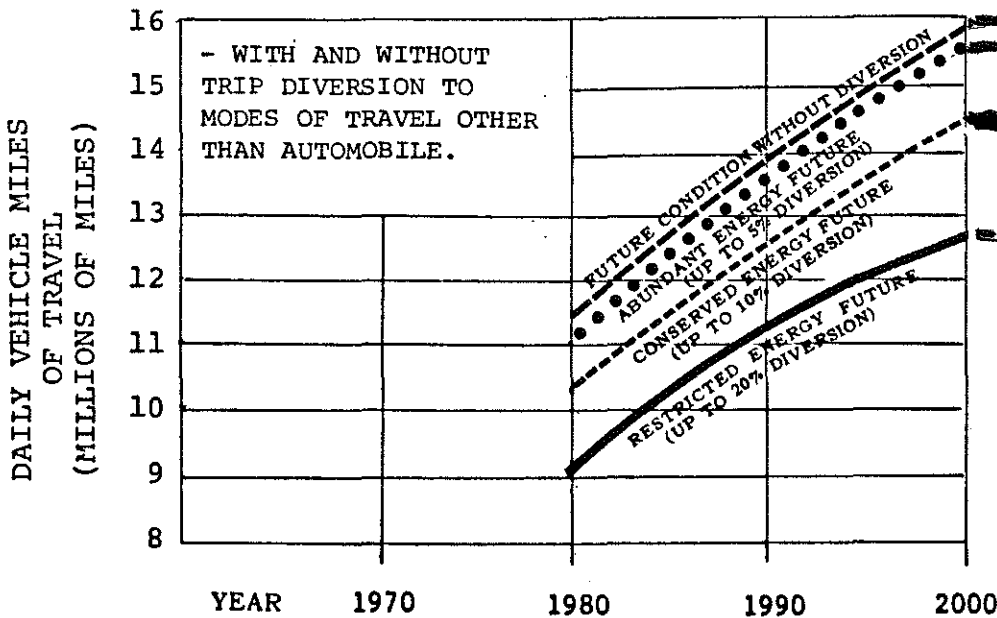
Without a diversion of trips to other modes the system is expected to experience higher levels of congestion which results in lower operating speeds and an overall reduction in fuel consumption.

Source: Michigan Department of Transportation/Bureau of Transportation Planning

STATEWIDE PROJECTED VEHICLE MILEAGE PER GALLON



REGION 7 PROJECTED TRAVEL



SOURCE: MICHIGAN DEPARTMENT OF TRANSPORTATION,
BUREAU OF TRANSPORTATION

AIR QUALITY

Air quality is a concern to both present and future generations. The question of whether the air in the future will be hazardous to life is a concern. For this reason the Michigan Department of Transportation has evaluated the affect of pollutants permitted by automotive equipment in the atmosphere of Region 7.

Concentrations of three gases were studied to determine how our air will be affected by transportation generated pollution. The gases studied are Carbon Monoxide, Nitrous Oxide, and Non-methane Hydrocarbons. The last two gases are of greatest concern because in sunlight, a complex chemical reaction takes place to form the smog we so often hear about as a danger to people with respiratory problems.

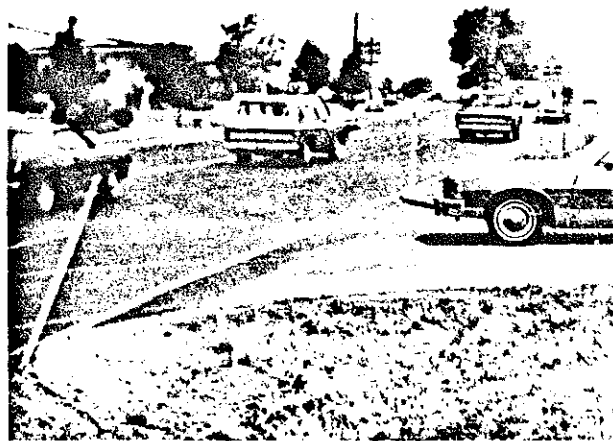
The gases studied were modeled using the U.S. Environmental Protection Agency (USEPA) forecast of mobile source pollution. Note should be made that air quality improves in future years. This improvement is a result of the USEPA requirements for increased fuel economy and vehicle emission control devices. Pollution was calculated to depict the total amount of pollution based upon the Kilograms of gases per square mile.

Basically, this model of mobile source pollution shows that the air will improve in quality by 1990 as a result of automotive pollution control devices and more energy efficient vehicles. In 2000, the air will not be as clean as it was in 1990 but it will not be as polluted as it is at the present time.

Viewed by itself, it appears air quality will improve in the future. However, an important point to realize is that the improvement in air quality, as a result of mobile emission control devices, may be used as a tool by decision makers to allow a new industry to move into an area where additional gases can be allowed to enter the atmosphere without causing local pollution levels to rise above the standard.

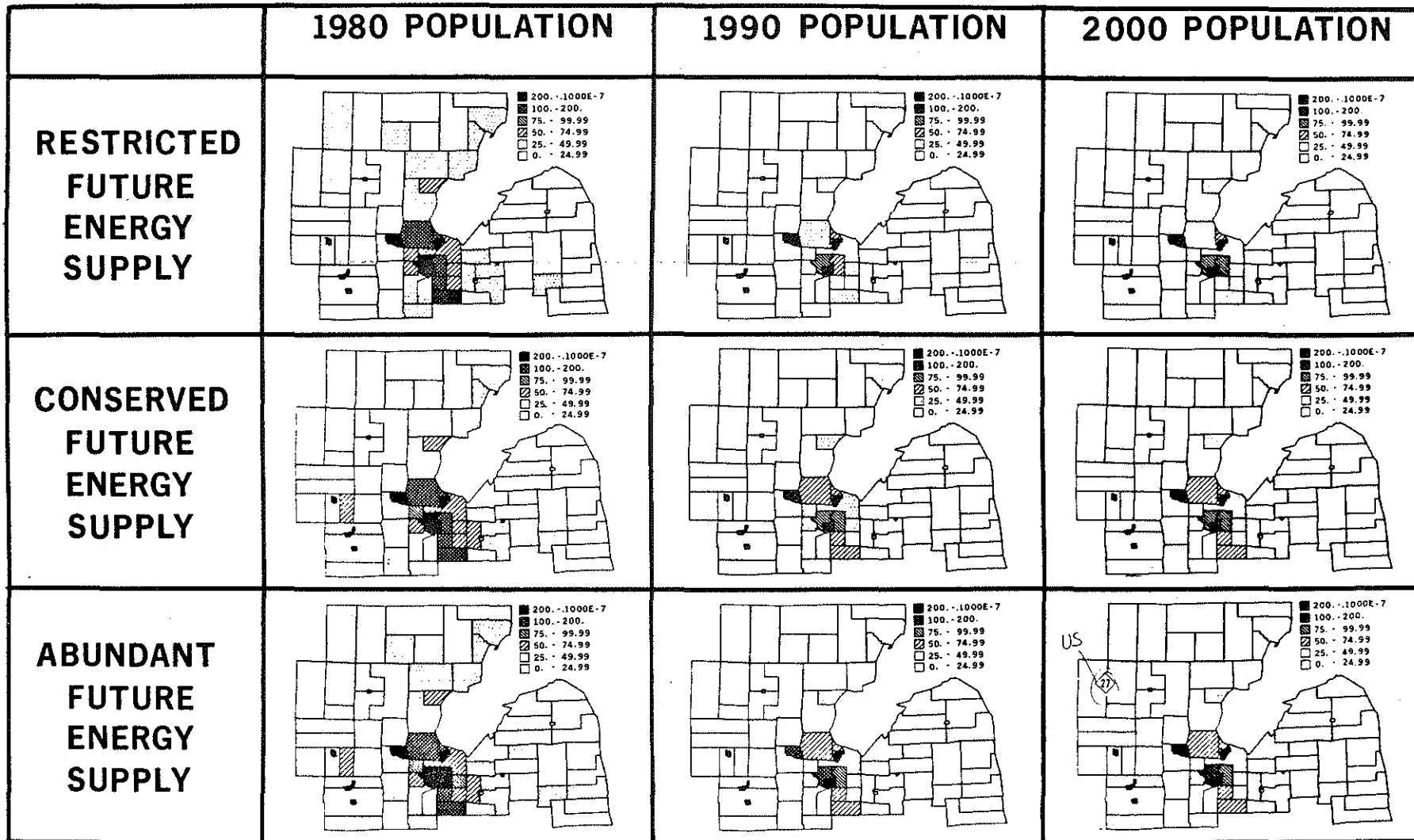
Projected mobile source air pollution levels are displayed for each of the nine futures and three different gases. These matrices reflect average pollution levels per traffic analysis zone and are not indicative of local problems that occur at irregular intervals.

Further, these maps reflect pollutants at the point of generation and do not take into account various prevailing air currents, or pollutants migrating from other states and regions.



REGION 7

PROJECTED AIR POLLUTION LEVELS CO(KGM/SQ.MI.)



NOTE: 1 1990 LEVELS ARE REDUCED AS A RESULT OF NEW VEHICLE EMISSION CONTROL DEVICES
 2 FIGURES REPRESENT KILOGRAMS PER SQUARE MILE PER DAY

REGION 7

PROJECTED AIR POLLUTION LEVELS

NON-METHANE HYDROCARBONS PER SQUARE MILE

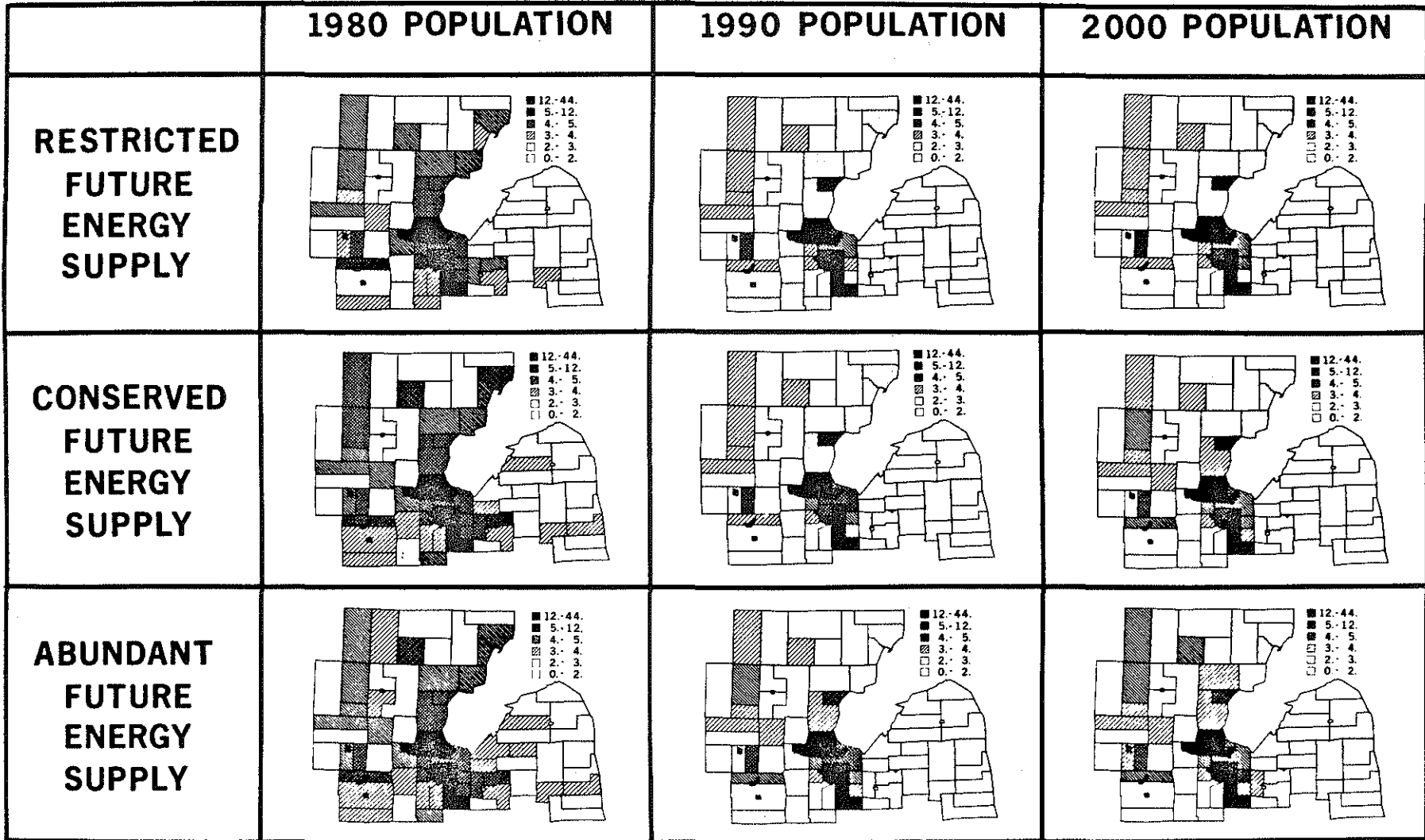
	1980 POPULATION	1990 POPULATION	2000 POPULATION
RESTRICTED FUTURE ENERGY SUPPLY			
CONSERVED FUTURE ENERGY SUPPLY			
ABUNDANT FUTURE ENERGY SUPPLY			

NOTE: 1 1990 LEVELS ARE REDUCED AS A RESULT OF NEW VEHICLE EMISSION CONTROL DEVICES
 2 FIGURES REPRESENT KILOGRAMS PER SQUARE MILE PER DAY

REGION 7

PROJECTED AIR POLLUTION LEVELS

NITROUS OXIDES PER SQUARE MILE



NOTE: 1 1990 LEVELS ARE REDUCED AS A RESULT OF NEW VEHICLE EMISSION CONTROL DEVICES
 2 FIGURES REPRESENT KILOGRAMS PER SQUARE MILE PER DAY



DISCUSSION OF ALTERNATIVE FUTURES (POPULATION VS. ENERGY)

A major objective of this study is to insure that an adequate regional transportation system is developed to meet current and future needs of Region 7. To accomplish this objective, the study team has recognized two principal factors that will significantly affect the character of future transportation systems. They are:

1. The availability of gasoline, and
2. The continuing changes in population.

NOTE: The Michigan Department of Transportation and the State of Michigan cannot control gasoline supplies or population development. The Department does have the means of forecasting the effects caused by changing gasoline availability and population levels.

ENERGY AVAILABILITY

The availability of fuels will define the costs and much of the character of future transportation services. Today, the fuel supplies appear to be stretched in an effort to meet current travel demands.

The possibility of reduced fuel supplies can have major effects on future transportation actions. Should we continue expanding the highway system? Should we be considering more transit options? Are we going to need additional airports or will the existing facilities be adequate? Should the railroads be permitted to abandon their service? Will the region's ports be involved in transporting western coal into the Midwest? It is because of these and other questions that the

study team has identified the "energy" issue as a central concern of future planning efforts.

GROWTH AND DEVELOPMENT

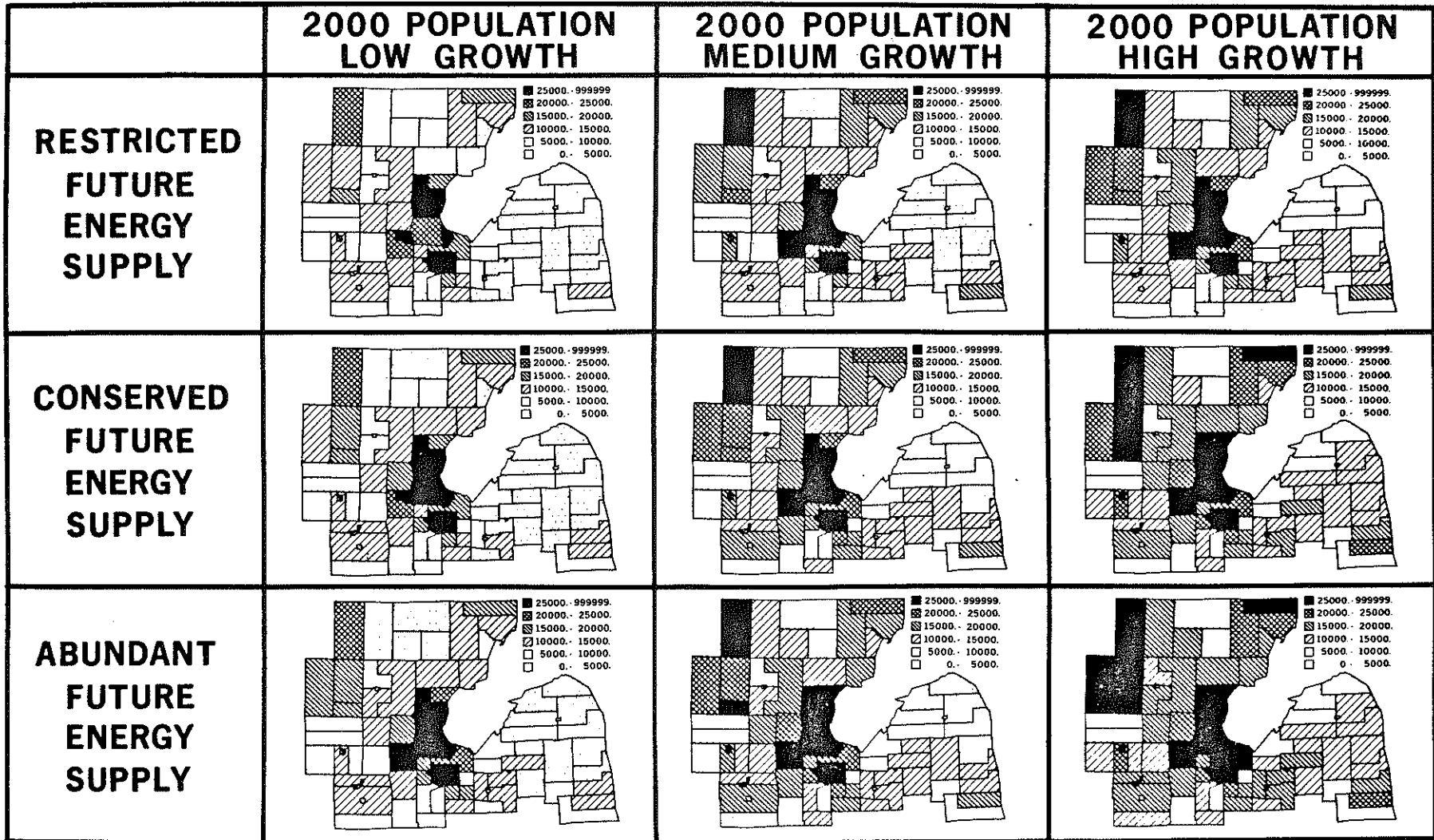
Changes in settlement patterns will also significantly define the character of the demand for future transportation services. These population shifts, including declining urban densities, suburbanization and rural migration, are often accompanied by changes in lifestyle. As communities begin to grow and develop, various social and economic activities require an increase in many public services. In order to accommodate this growth, some local communities are faced with the prospect of extending water, sewer, gas and electric power lines. In addition, some transportation systems will have to be expanded or improved to accommodate increased travel demand.

While some communities are experiencing "growing pains", others are struggling economically due to a lack of growth. Such areas are often characterized by a high unemployment rate, low tax base, low income, etc. Thus, in order to improve these conditions government assistance programs are often implemented to stimulate private investment. These programs provide the dollars for such facilities as industrial parks, port development, airport improvements, education and convention centers, plus low interest loans for various housing and industrial projects.

From an economic standpoint, an active community establishes a favorable business climate that can attract additional private investments. Socially, these investments can be beneficial by providing increased personal income and employment. In

REGION 7

TOTAL TRIP ENDS PER ZONE



NOTE: TRIP ENDS INCLUDE TRIPS THAT BEGIN AND/OR END IN THE SPECIFIC ZONE.

addition, a broader tax base can be used to support better educational and cultural facilities. However, from an environmental standpoint, an active community can sometimes cause significant increases in air and water pollution levels through haphazard growth. Land use changes can occur that may effect environmentally sensitive areas such as parks, forests, lakes and primary agricultural lands.

After many decades of disordered development, we are now witnessing a nationwide counter movement of public pressure that is attempting to check, if not reverse, past growth trends. Some communities are starting to fashion new master plans calling for a ceiling on future growth and prescribing precise definition of settlement patterns. In view of the potential for future energy shortages, these growth management policies may not only be a desirable option, they may also become a mandatory planning action. Therefore, the future of transportation development will also depend on the rate of growth that is permitted to occur.

FUTURE TRANSPORTATION DEVELOPMENT STRATEGY

Numerous factors, other than energy availability and population change, will influence the region's future transportation system needs. Economic conditions, governmental influence, incentive programs, available leisure time, and desirable lifestyles will all play an important part. Energy and population were selected as the dominant factors in determining the future.

GROWTH FUTURES

The study team has developed a planning strategy based on two dominant factors. It considered the possible occurrence of several future conditions based upon variations of energy supply and population growth.

The alternative energy supply futures are identified as "Abundant", "Conserved" and "Restricted". The population growth futures are described as "Low", "Medium" and "High". Combinations of these factors yield nine possible situations, or futures, which are conceptually illustrated on the matrix of sample futures.

Following is a brief explanation of the variations within the energy and growth futures.

Transportation facility development is directly related to the expected mobility requirements of current and future population levels. The 1970 Census established the region's year round resident population at 690,000 persons. Forecasts for the year 2000 were developed by the Michigan Department of Management and Budget (MDMB). The study team has established three possible growth levels as discussed in the Planning Techniques Section. These projections were used as a base for the various futures. The High Growth Future reflects the MDMB projection for the year 2000 A.D.:

HIGH GROWTH - This future assumes that the region's year 2000 population will reach approximately 914,000 persons, a 32.4% increase since 1970.

MEDIUM GROWTH - This future assumes that the region's year 2000 population will reach approximately 857,000 persons, a 24.2% increase since 1970.

LOW GROWTH - This future assumes that the region's year 2000 population will reach approximately 777,000 persons, a 12.6% increase since 1970.

Energy Futures

The study team found that defining three energy futures was a more difficult task. While fuel availability was considered the determining factor, both the fuel cost per gallon and cost per vehicle mile of travel will also certainly affect its future use. The three possible energy futures are described as follows:

ABUNDANT ENERGY - This future assumes that there is no energy shortage. Adequate fuels are available for transportation either through the discovery of new resources or through the development

of synthetic fuels. The single family vehicle (automobile) remains the dominant mode of transportation, reinforcing urban expansion. This future is most typical of recent past conditions reflecting today's relatively affluent suburban lifestyle.

CONSERVED ENERGY - This future assumes that energy shortages are a long term reality. Fuel conservation is stressed but still based on voluntary efforts. The price of fuel has risen significantly enough so that it begins to make a real impact on everyday driving habits. The automobile is still the dominant mode but certain trip purposes, like work trips, are shifting to car pools or public transit.

RESTRICTED ENERGY - This future assumes that energy for transportation purposes is in very critical supply. Gasoline rationing would be in effect. Strong government programs would be implemented to insure proper utilization of the various modal transportation systems. Public transit development would be very extensive.

ALTERNATIVE FUTURE PROJECTIONS

	2000 POPULATION LOW GROWTH	2000 POPULATION MEDIUM GROWTH	2000 POPULATION HIGH GROWTH
RESTRICTED FUTURE ENERGY SUPPLY	<u>MOST CONSERVATIVE FUTURE PROJECTION</u> 1	 2	PUBLIC TRANSIT WOULD BE MOST SUCCESSFUL IN THIS FUTURE 3 RAIL AND WATERBORNE TRANSPORTATION BECOME MORE COMPETITIVE IN THIS FUTURE
CONSERVED FUTURE ENERGY SUPPLY	 4	 5	 6
ABUNDANT FUTURE ENERGY SUPPLY	<u>THIS FUTURE MOST CLOSELY RESEMBLES CONDITIONS IN 1978</u> 7	 8	HIGHWAY IMPROVEMENTS WOULD BE NEEDED MOST IN THIS FUTURE 9 <u>MOST LIBERAL FUTURE PROJECTION</u>

A few examples are listed beneath each heading. These in no way represent the entire array of options available but should be helpful in associating a category with familiar improvement types.

It should be understood that these three categories of transportation improvements should not be considered interchangeable. Each is intended to satisfy a transportation problem of a certain magnitude except the maintenance or do-nothing alternative. Minor problems should be resolved with minor system improvements. Major problems should be resolved with improvement alternatives of greater proportions that will solve the problem.

The option of doing nothing always exists. This alternative would indicate that people have decided to accept or tolerate the impacts associated with this option.

The do nothing or maintenance option would be the proper recommendation for those areas not presently experiencing or anticipating existing or future transportation problems.

As an example, assume a highway transportation problem where the capacity of the existing right-of-way is clearly inadequate to meet existing and future traffic demands. No amount of work of the type under the category of "Minor System Improvements" will solve the problem because additional capacity is required. Therefore, those options should be ruled out as alternatives for further consideration. But, each of the highway options identified as "Major System Improvements" would become logical candidates for serious consideration.

Likewise, situations may exist where a minor highway capacity deficiency could be resolved by an "up-to-standard" two-lane roadway. Only improvement types, such as those listed under the "Minor System Improvements" category, should then be considered as alternatives to solve the problem.

The point is this - transportation problems should first be identified according to their magnitude. Then, only those options which could solve that particular problem should be considered as realistic alternatives. To seriously consider alternatives which involve either more or less than is conceivably needed would be irresponsible.

The following level of service matrix reflects the various levels of congestion that are expected during the design hour volume period for each highway link in Region 7. The number of bands indicates the average two way congestion level for each link.

At the time these matrices were prepared, this level of detail was the best that could be obtained. At the time this report was ready to be printed, refinements were being made which would allow the same information to be displayed for shorter sections of transportation links. Further, one way design hour level of service could be displayed for divided roadways.

These refinements are expected to show I-75 having crowded and unacceptable travel conditions from Genesee County to Bay County.

LEVEL OF SERVICE



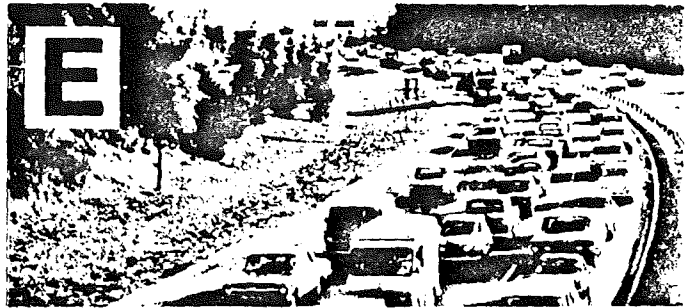
A
NO RESTRICTION ON OPERATING SPEED



D
APPROACHING UNSTABLE FLOW -
LITTLE FREEDOM TO MANEUVER



B
STABLE FLOW - FEW SPEED
RESTRICTIONS



E
UNSTABLE FLOW - LOWER SPEED -
SOME STOPS



C
STABLE FLOW - HIGHER VOLUMES -
RESTRICTED SPEED and LANE CHANGING



F
FORCED FLOW OPERATION AT LOW
SPEEDS - MANY STOPS

REGION 7

LEVELS OF SERVICE

LEGEND	1, 2 And 3 Lines	Good Travel Conditions
	4 And 5 Lines	Crowded Travel Conditions
	6 Or More Lines	Unacceptable Travel Conditions

	2000 POPULATION LOW GROWTH	2000 POPULATION MEDIUM GROWTH	2000 POPULATION HIGH GROWTH
RESTRICTED FUTURE ENERGY SUPPLY			
CONSERVED FUTURE ENERGY SUPPLY			
ABUNDANT FUTURE ENERGY SUPPLY			

NOTE: 1 THESE SERVICE LEVELS REFLECT DESIGN HOUR VOLUMES AND DESIGN HOUR VOLUME CAPABILITIES
 2 CIRCLED AREAS ARE BEING STUDIED SEPARATELY UNDER A COMPREHENSIVE, COOPERATIVE AND CONTINUING TRANSPORTATION PLANNING PROGRAM

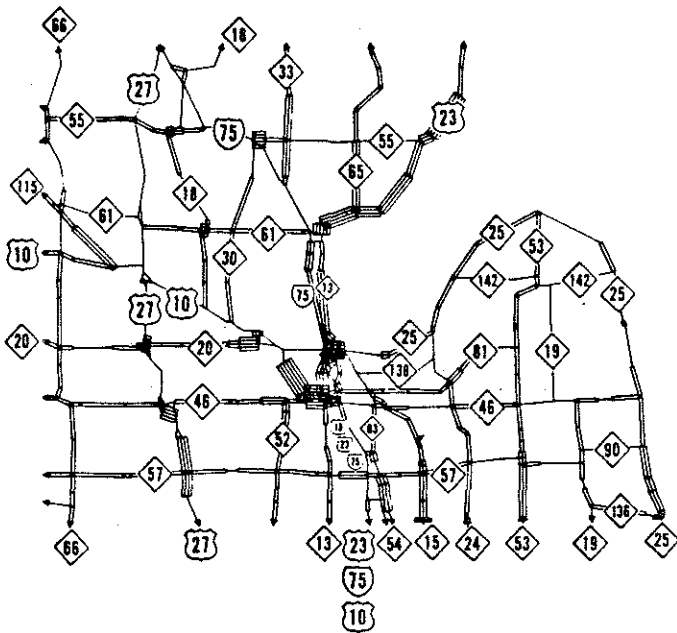
Level of Service

REGION 7 LEVELS OF SERVICE

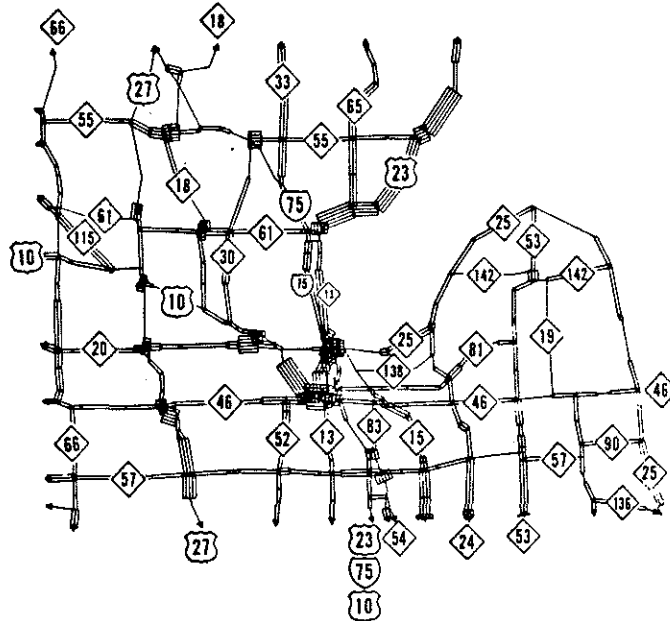
1 LINE = A
2 LINES = B
3 LINES = C } GOOD TRAVEL CONDITIONS

4 LINES = D
5 LINES = E
6 LINES = F } CROWDED TRAVEL CONDITIONS
UNACCEPTABLE TRAVEL CONDITIONS

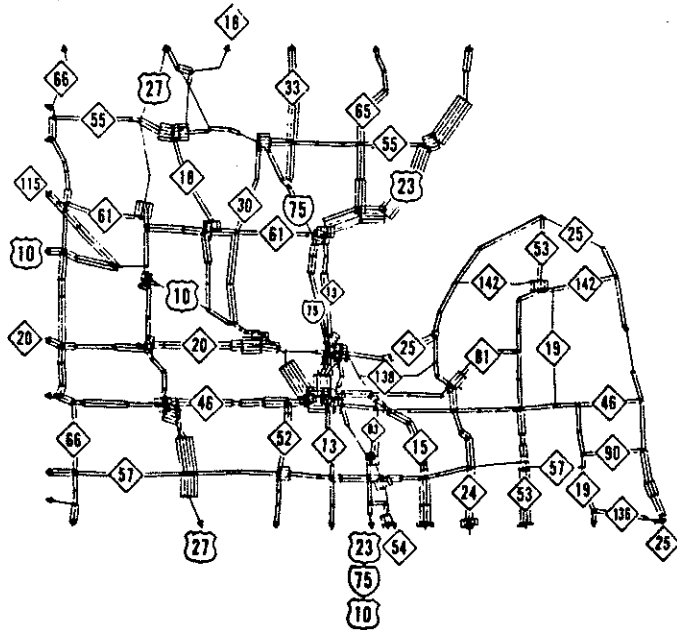
1975
EXISTING LEVELS OF SERVICE



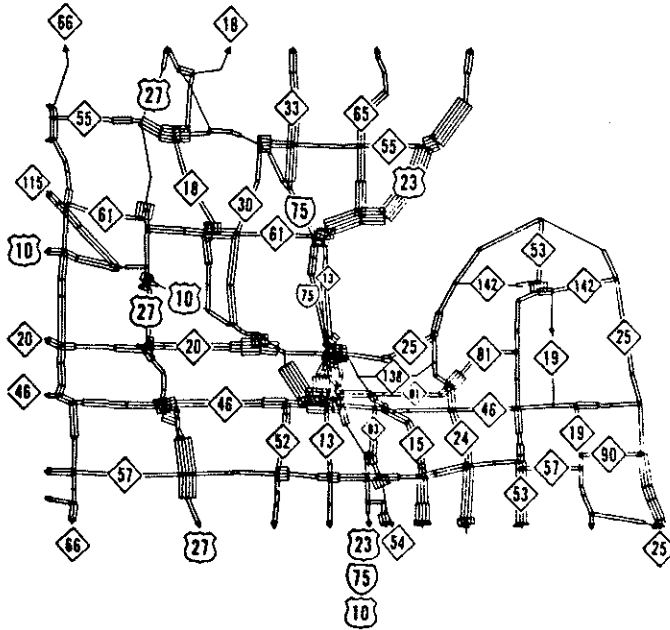
1980
LEVELS OF SERVICE



1990
LEVELS OF SERVICE



2000
LEVELS OF SERVICE



NOTE: THESE LEVEL OF SERVICE PLOTS DO NOT REFLECT ANY MODAL SPLIT TO OTHER FORMS OF TRANSPORTATION

SECTION N

STUDY FINDINGS

Numerous conclusions have been reached during the course of this study. Obviously, they vary considerably in the degree to which they could affect transportation related decisions. While many of these findings are stated previously. Others are less obvious. Therefore, the study team has attempted to objectively state some of those findings which are felt to be most pertinent to the choices before us. It is hoped that they will serve to highlight the major phases of the study and focus attention on the decisions that must be made.

The study findings include:

1. The East Central Region is predominantly rural, with major concentrations of population and economic activity located in several areas including, but not limited to Bay City, Midland, Mt. Pleasant, Saginaw, Alma, Clare, Tawas, Caro, Bad Axe, and St. Louis.
2. The region is undergoing considerable change, being one of the faster growing areas in the state and country.
3. Natural environmental features provide a wealth of recreational, industrial, and commercial value to the entire state, contributing significantly to the economic base of the region.
4. Travel in the region reflects recreational interests, surging on weekends during summer months.
5. Existing transportation facilities are experiencing varying degrees of deficiencies, a situation which is expected to worsen if remedial action is not taken.
6. Energy and growth are two key variables in determining existing and future transportation needs.
7. Using energy and growth as variables produces a wide range of multi-modal transportation networks, each related to a particular future condition.
8. Numerous transportation system deficiencies occur in each future situation.
9. Some system deficiencies are common to all future situations.
10. There are basically two options to consider in dealing with these existing and future deficiencies:
 - a) Do something to correct system deficiencies
 - b) Maintain the existing system (Do Nothing)
11. Generally air quality affected by mobile pollution sources will improve considerably between 1980 and 1990. In the year 2000, air quality affected by mobile pollution sources is expected to decrease slightly but it will be better than the 1975 and 1980 air quality.

Specific Report Findings

Highways

1. The US-23 corridor from M-61 to Oscoda shows a level of service in D and E all nine futures, which is poor for rural trunkline routes.
2. I-75 from Flint to Bay City will be operating at a level of service D and E in all nine futures.
3. Intersection or spot level of service problems occur at the junctions of several state trunklines in all nine futures, including I-75 and M-55, M-18 and M-61, M-61 and US-23, M-53 and M-142, US-27 and M-46.
4. Accident rates are highest on rural two lane highways with opposing traffic.
5. Sub area transportation studies should be continued in the Bay City and Saginaw metropolitan areas.
6. A sub area study of Midland's entire system of interchanges with US-10 is warranted.
7. An analysis of developing congestion on M-83 from I-75 to M-15 through Frankenmuth should be continued as a sub area study.
8. Methods of separating pedestrian and trunkline traffic in Frankenmuth should be studied in detail.
9. Caro should be established as a sub area study to evaluate methods of alleviating congestion and accident problems on the trunkline route to the thumb.

10. If energy supplies remain abundant, corridor studies will be needed on M-15, M-20, M-25, M-24, M-33, M-46 and M-55.
11. Sub area studies may be needed as problems arise in Mt. Pleasant, Alma, Clare, Harrison, Standish, West Branch, and other communities with through trunkline service.

Aviation

1. Tri City Airport improvements are scheduled to extend the runways, taxiways, improve lighting facilities, and relocate instrument landing equipment.
2. Roscommon County - Conservation airport needed improvements include a seal coat on the existing runway, runway lighting, beacons, and windcones.
3. Vassar - Millington - Construction of a new airport is recommended for this area.

Public Transportation

1. Countywide Dial-a-Ride systems are recommended for initiation in each of the 14 counties in Region 7.
2. Intercity bus service is recommended for continuation and improvement using Department of Transportation's low interest loans, demonstration grant programs, and terminal construction grant programs.

Railroads

1. Rail service continuation is recommended for all routes in Region 7 until detailed plans are developed for the rail system.
2. Preparation of a detailed freight movement plan is needed to establish the true costs and benefits of various rail service routes.

Non-Motorized

Construction of new non-motorized facilities is recommended for areas that demonstrate a need. These would be areas where a new link is needed to supplement a non-motorized system or a local plan.

It is recommended that non-motorized projects be constructed in conjunction with highway projects or independently as funds are available.

Port Facilities

The Michigan Department of Transportation is prepared to provide manpower and matching funds (with legislative approval) to port authorities.

Two or more governmental bodies may form a port authority to stimulate economic development through the use of its water resources.

Improvement of commercial harbors is recommended to provide a stimulus to business.

Improvements proposed for Aviation, Public Transportation, Non-Motorized Ports, and Railroads are those necessary to either complete or maintain certain minimum standards and service requirements established by either Congress, the State Legislature, or the Michigan Department of Transportation.

In many cases the recommended improvements will have the purpose of providing alternate transportation opportunities for the movement of people and goods. In other cases the improvements are recommended to provide mobility for elderly and handicapped individuals who normally would be home bound. Other improvements are recommended to provide a stimulus for industry and commerce. Sometimes all these improvements may appear to be unneeded or unwanted when viewed by people whose primary means of transportation may be an automobile. However, all are viewed as necessary and important by the people, industry, and government they help.

SECTION O

POST PUBLIC HEARING PROCESS

The record will be kept open for a period of ten days after the public hearing. The 10-day period is to allow individuals an opportunity to enter written comments on the record.

Once all of the testimony is received by the Department, the study team will evaluate the comments and prepare a list of recommendations for the Director. The Director will then evaluate these recommendations and issue a final report.

The final report will include a list of corridors to be studied in detail. The report may also recommend that immediate action be taken to alleviate new problems discovered through the public hearing process.

Once the final report is completed, a series of public meetings and news releases will be made. These releases will be to advise the general public about the priorities finally established by the Michigan Department of Transportation.

Appendix

TRUNKLINE CLASSIFICATION

To properly plan and develop the total state trunkline highway system, it is essential to determine what functions each segment of highway is to perform in the completed plan. Therefore, all routes have been analyzed and classified according to their predominate function. It is also necessary and helpful to evaluate the socio-economic data of all places and to rank them in an ascending scale of classes representing marked differences in importance as attractors of traffic. Five of these classes, containing some 150 places more or less, are considered as warranting state trunkline service. These classes are: (1) Metropolitan Centers, (2) Regional Centers, (3) District Centers, (4) Area Centers, and (5) Special Interest Centers. Special mention must be made of the Detroit Metropolitan Area. It is more than a Metropolitan Area, or City, but must be considered as a region embracing other cities of economic importance, and, as such, is recognized as a National Metropolitan Area.

Classes 1, 2, 3, and 4 places are considered of sufficient importance from the statewide viewpoint to warrant direct state trunkline service. The specifics of such direct service are to be determined through the development of individual plans. Class 5 places are considered to warrant proximity service, and, therefore, do not require direct connection to a bypassing route.

The Interstate System in Michigan forms the backbone of the statewide arterial system, although there are additional routes throughout the state which are of equal importance. The Interstate System serves all urbanized areas of over 50,000 population and connects with four points of entry with Canada: Sault

Ste. Marie, Port Huron, and the Windsor Tunnel and the Ambassador Bridge in Detroit.

In addition to the Interstate System, the Michigan Legislature has identified specific routes and provided specific funds for their development to facilitate statewide travel. To provide a complete statewide arterial system, the Interstate System and the other specially identified routes must be augmented with other routes that are also designated as statewide arterials. Many of these routes are of equal importance with those of the other two groups. This total system should be so designed and located as to accommodate most long distance trips throughout the state. Directness of travel between major destinations should be a foremost consideration in determining the final location of these highways.

The two principal criteria used in selecting the statewide arterial system were: (1) All places classified in categories 1 and 2 (the major traffic attractors) should be interconnected, and (2) All geographic areas of the state should be within a reasonable distance of this system. Business routes serving Class 1 and Class 2 places are considered an integral part of this system.

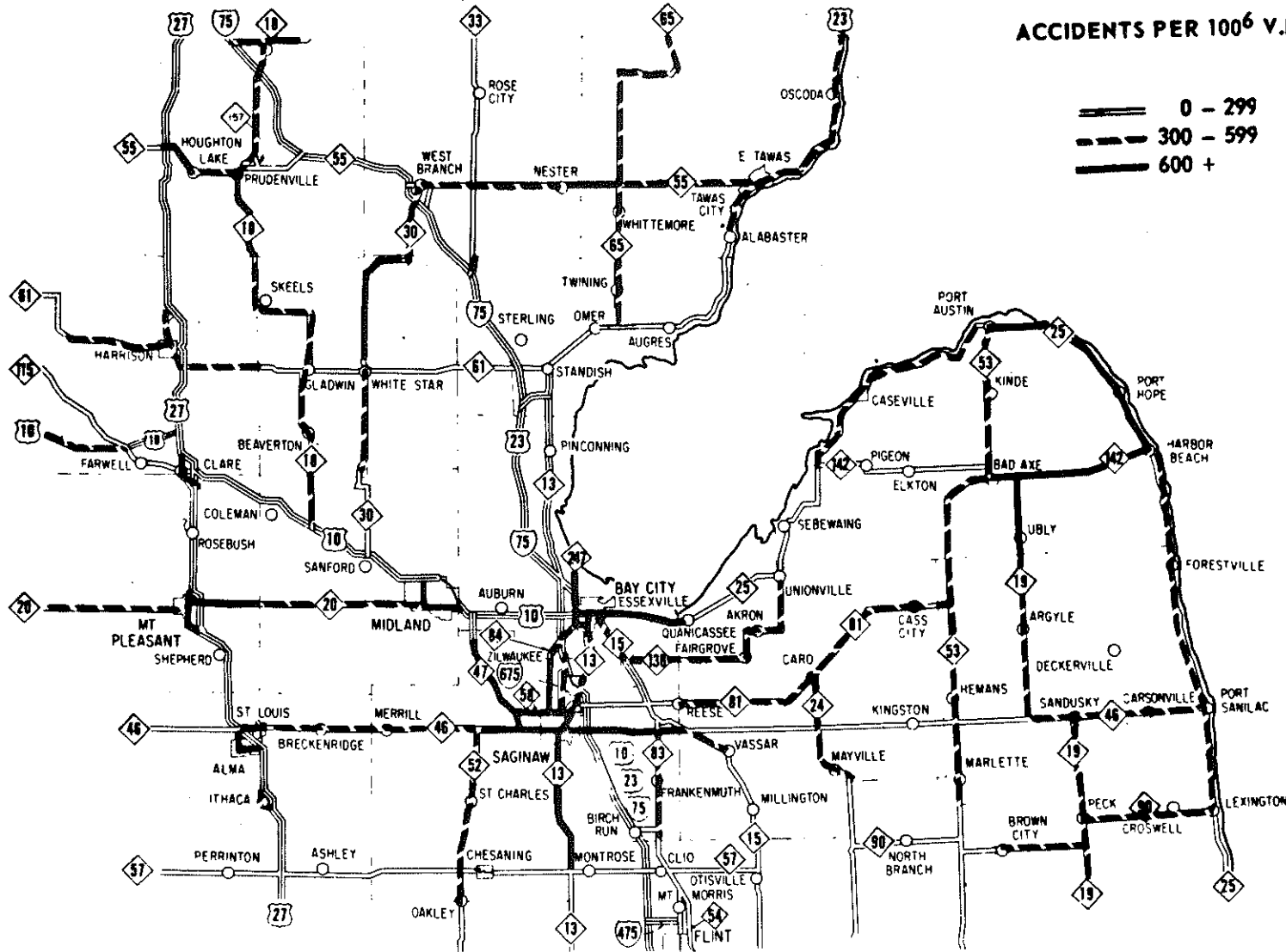
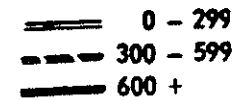
Regional arterials have primarily regional, rather than statewide significance, and serve primarily the places classified in categories 3 and 4. Combined with the statewide arterial system, the regional arterials, for the most part, complete the state's obligation to provide a statewide highway system. The primary function of the regional arterials is to extend state trunkline highway service to the lower levels of classified places by serving as rural connectors between these communities, connecting

them with the statewide arterial system, or by serving as business routes.

The fourth and last category is the other state trunkline local arterial

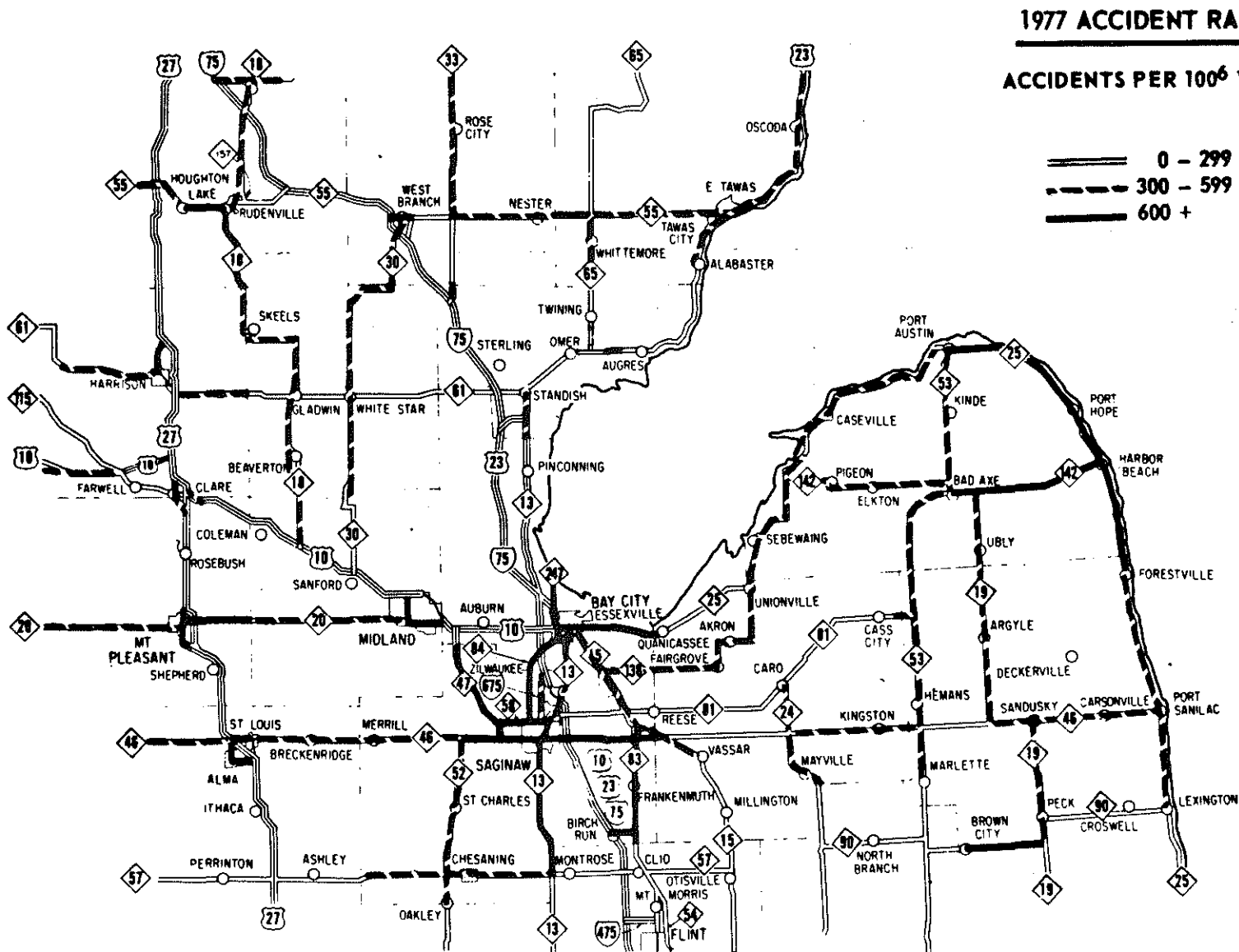
and connector highways included in the plan. These routes serve the special interest centers (category 5) such as state parks and institutions or are included on the system because of their scenic qualities.

1976 ACCIDENT RATES ACCIDENTS PER 100⁶ V.M.T.

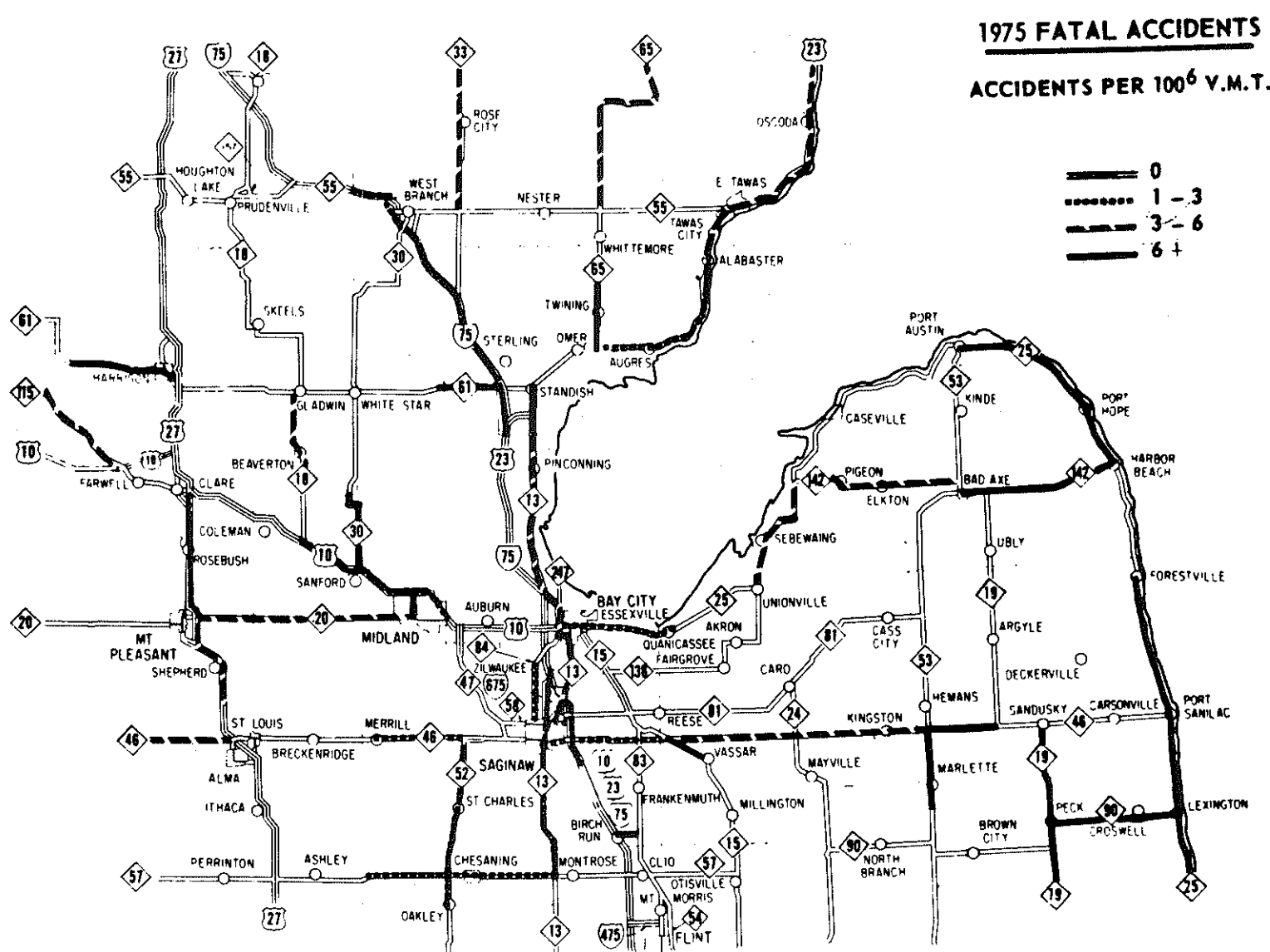


MICHIGAN DEPARTMENT OF TRANSPORTATION, EAST CENTRAL MICHIGAN (REGION 7)

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MICHIGAN DEPARTMENT OF TRANSPORTATION, EAST CENTRAL MICHIGAN (REGION 7)



MICHIGAN DEPARTMENT OF TRANSPORTATION, EAST CENTRAL MICHIGAN (REGION 7)

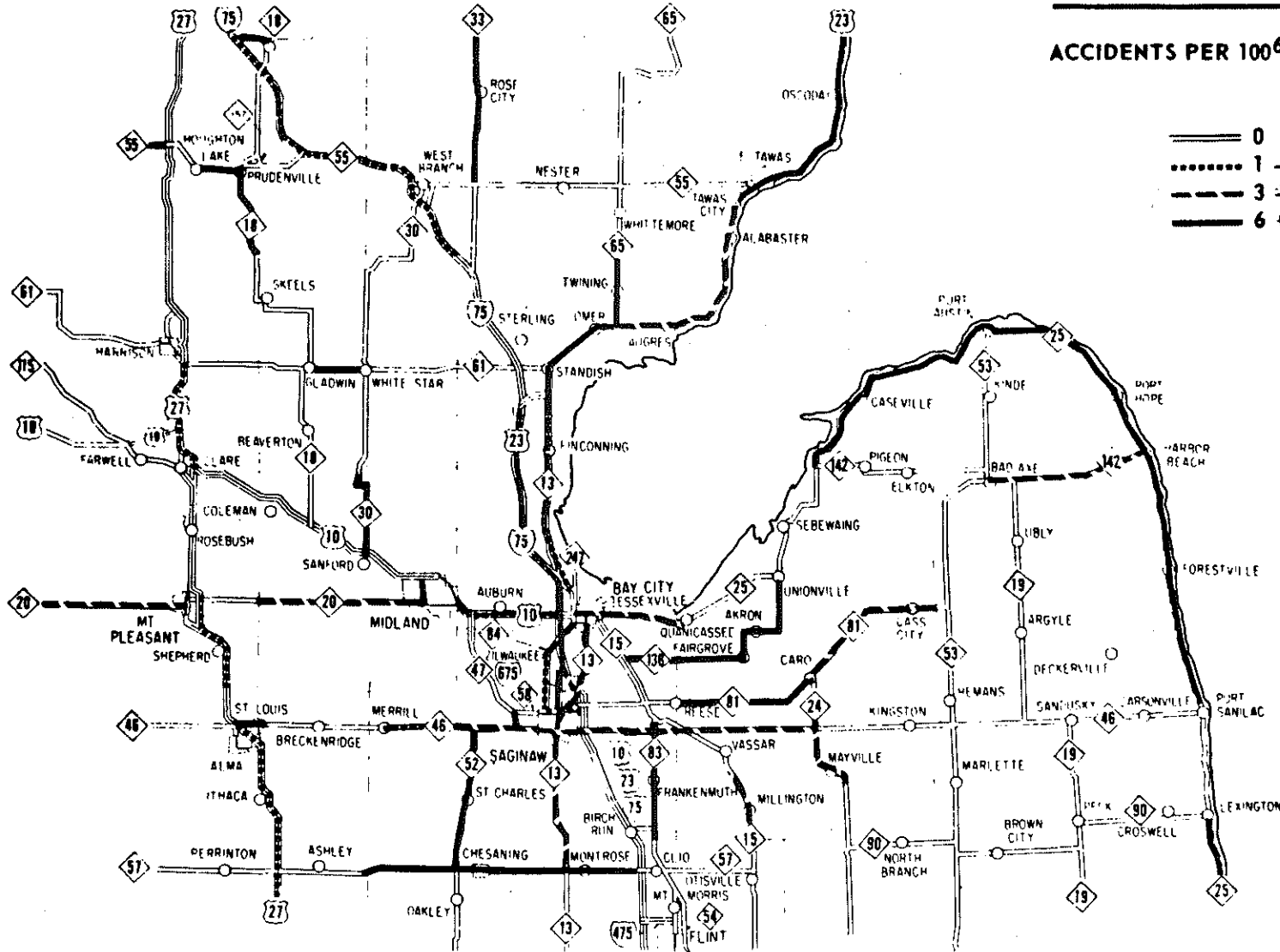
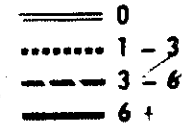


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1976 FATAL ACCIDENTS

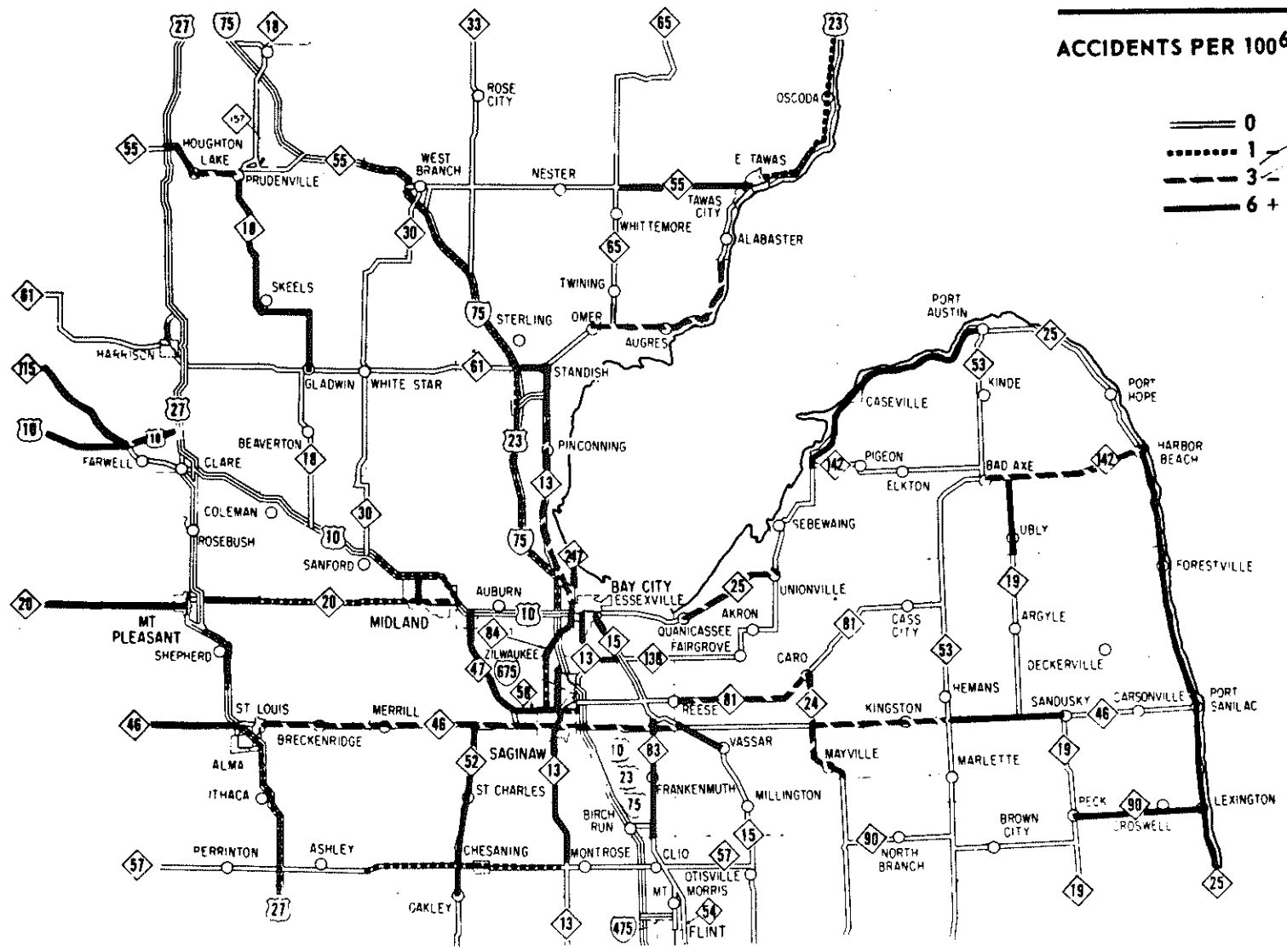
RATE

ACCIDENTS PER 100⁶ V.M.T.



MICHIGAN DEPARTMENT OF TRANSPORTATION, EAST CENTRAL MICHIGAN (REGION 7)

1977 FATAL ACCIDENTS *RATE*
ACCIDENTS PER 100⁶ V.M.T.



MICHIGAN DEPARTMENT OF TRANSPORTATION, EAST CENTRAL MICHIGAN (REGION 7)

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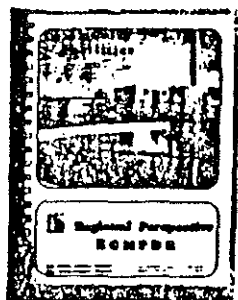
Saginaw River Port Inventory.
Karnes, Larry. (Author and Staff Contact). 1979.

Socio-Economic Inventory and Projections. Sygo, Jim and Raven, Dale. (Authors and Staff Contacts). 1977.

Wastewater Facilities Inventory.
Raven, Dale and Sygo, Jim. (Editors and Staff Contacts). 1977.

Water Quality Inventory and Environmental Water Quality Relationships.
Raven, Dale and Sygo, Jim. (Editors and Staff Contacts). 1977.

Water Supply and Conveyance Facilities. Goergen, Thomas. (Author and Staff Contact). 1977.



Policy and Plan Documents

Purpose:

These documents provide formal guidelines for future governmental decisions. Emphasis is placed on goals, policies, objectives, or programs. Background material concerning issues, trends and resources may be included, but not to the extent present in Inventory documents.

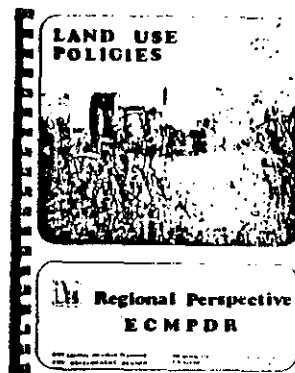
Additional Bibliographic Information: Unless otherwise noted, these reports were developed and published by the ECMPDR staff. Prior to 1977, regional reports were published in Essexville, MI. Publications after that date come from the Saginaw, MI office.

Alternative Institutional Plans.
Raven, Dale and Sygo, Jim. (Editors and Staff Contacts). Ernst and Ernst. 1977.

Coastal Zone Area Report. Goergen, Thomas. (Author and Staff Contact). ECMPDR. 1975.

Comprehensive Law Enforcement and Criminal Justice Plan. Warren, Dennis. (Author). Thorne, Robert. (Staff Contact). 1976.

Much Ado About Something. Mersman, Jon. (Author). Schroeder, Tom. (Staff Contact). 1975.



Overall Economic Development Program. Lichty, Jeff and Henck, Pat. (Authors). Joe Burks. (Staff contact). 1976.

Regional Perspective, ECMPDR:

Housing Plan. Ward, Charlys. (Author and Staff Contact). 1978.

Land Use Policies. Schroeder, Thomas. (Author and Staff Contact). 1978.

Summary to the Housing Plan. Ward, Charlys. (Author and Staff Contact). 1978.

Selected 208 Plan. Raven, Dale and Sygo, Jim. (Editors and Staff Contacts). Chester Engineers. 1978.

Water Quality Goals and Plan Selection Criteria. Sygo, Jim and Raven, Dale. (Editors and Staff Contacts). Chester Engineers. 1977.

Maps

Regional reports often include maps as a means of illustrating the topics and trends discussed in the text. Over the years, the Region has accumulated a vast stock of base and thematic maps. The maps are available in a variety of scales (or sizes), and on an array of media (mylar, paper, acetate, etc.). The following discussion does not begin to describe the numbers and kinds of maps we have available, but it does provide a representative listing of those that are most useful.

Regional/County Base Maps:

Purpose: These maps provide the base upon which other kinds of data (population, recreation facilities, agricultural lands) can be plotted.

Highway Planning Survey Maps - show Federal and State highways, primary county roads, counties, townships, sections, cities and villages, major water features. Available in several scales. Source: Michigan Department of Transportation. 1. Individual Counties (several sizes), 2. Planning Districts (one size), 3. Region (several sizes).

CHPDR Townships - shows townships boundaries, and the cities of Saginaw, Midland and Bay City. Available with and without unit names. Several sizes.

Regional Location Map - shows cities, counties, and major transportation

routes. Available with and without water features, variety of sizes.

USGS Topographic Quadrangles - Regional coverage in black and white, at scales of 1:24,000 and 1:250,000. 1. Quadrangles, 2. By county.

City/Village Base Maps:

Purpose: These maps provide the base upon which other kinds of data can be plotted. The base maps show a community's boundaries, street systems, and major water features.

Regional Report Maps:

Purpose: Regional Inventory, Policy and Plan documents have included over 100 different maps portraying a variety of data. The following list is a selection of the maps originally produced for reports which are available in the office on 11x17 paper. A complete bibliography of maps in Regional reports is also available.

Essential Agricultural Lands, 1978.

Areas of Environmental Concern I: State and Federally Owned Lands, 1978.

Areas of Environmental Concern II: Wetlands, Wildlife Flooding Areas, Trout Streams, and Natural Rivers, 1978.

Areas of Environmental Concern III: Floodplains and High Risk Erosion Areas, 1978.

Areas of Environmental Concern IV: Historic and Archeologic Sites, 1978.

Michigan Oil and Gas Fields, 1973.

Land Use Policy Considerations, 1978.

Local Units of Government.

East Central Region: Population of Cities and Villages, 1975.

1970-2000 Projected Population Change

Forested Areas.

Generalized Surface Formations, 1955.

Major Drainage Basins.

Topographic Features.

Airports, 1976.

Average Daily Vehicle Traffic, 1976.

Highways - Trunklines, Primary Roads Local Roads.

Port Facilities on the Saginaw River, Michigan.

Railroad Facilities.

State Trunklines.

Prime and Essential Agricultural Lands. Comprehensive Studies Division. Jenkins, Marilla and Schroeder, Thomas (Authors and staff contacts). Saginaw, 1979. Definition and maps of regional prime and essential agricultural lands.

Changes in Zoning Enabling Legislation-Comprehensive Studies Division, Jenkins, Marilla and Schroeder, Thomas, (Compilation and Staff Contacts). Saginaw, 1979. Lists latest changes in zoning law for townships, counties, and city villages. Map.

Planning Assistance Series

Purpose:

These documents are designed for local decision-makers with the goal of helping them understand the reasons, rationale and responsibilities of planning. The orientation is practical, minimizing jargon and complex methodologies, and emphasizing a "how to" approach.

A-B-C's of Community Planning. Sears Roebuck & Co. 1962. Reprinted by ECPDR with their permission. Schroeder, Thomas P. (Editor and Staff Contact). 1978.

Local Planning Groups. Schroeder, Thomas P. (Author and Staff Contact) ECPDR Saginaw 1978

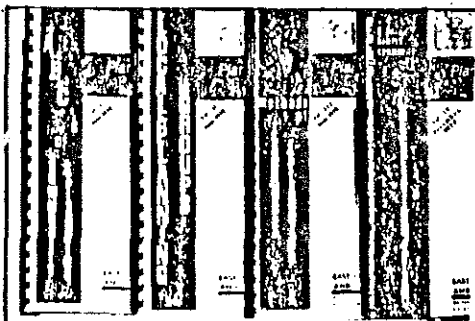
Methods of Land Use Planning. Schroeder, Thomas and Jenkins, Marilla. (Authors and Staff Contacts) ECPDR. Saginaw. 1978.

Recreation Plans. Northwest Michigan Regional Planning Commission. Reprinted by ECPDR with their permission. Jenkins, Marilla and Schroeder, Thomas. (Editors and Staff Contacts) 1978.

Impacts and Options

Purpose:

Impacts and Options is a monthly inclusion in the ECPDR Newsletter. Its intent is to present discussions of current policies, issues, programs, and problems, in more depth than a newspaper/newsletter article allows. Emphasis is generally placed on the possible "impacts" of federal, state, regional, and local programs and policy formulation.



Comprehensive Policies Project. Schroeder, Thomas (Author and staff contact). Saginaw, 1979.

ECPDR Comprehensive Policies. Schroeder, Thomas (Author and staff contact). Saginaw, 1979.

Michigan's Energy Conservation Plan. Jenkins, Marilla. (Author and Staff Contact). Saginaw, MI. 1978.

Partnership for Future Growth. Schroeder, Thomas (Author and staff contact). Saginaw, 1979.

Planning Requirements for Land and Water Conservation Fund Grants. Jenkins, Marilla. (Author and Staff Contact). Saginaw. 1978.

Public Act 116: Preservation of Agricultural Land. Jenkins, Marilla. (Author and Staff Contact). Saginaw. 1978.

USDA's Draft Land Use Policies. Jenkins, Marilla. (Author and Staff Contact). Saginaw. 1978.



Newsletter

Purpose:

This monthly publication presents; updates on program activities, proceedings of commission meetings, new activities and requirements, notification of public hearings and meetings, etc. in a newspaper format. The current mailing list includes over 1,500 interested citizens, libraries, legislators and public officials. Interested persons can be placed on the mailing list by contacting the regional office.

ECMPDR Newsletter. Findlay, Don. (Editor and Staff Contact). Monthly publication. Saginaw, MI.

Brochures

Purpose:

Regional brochures provide a one page summary of program areas. They generally include an explanation of what the program is intended to do, a description of the funding source, and a description of the area's product.

East Central Michigan Planning and Development Region: The Region. Findlay, Don. (Staff Contact). Essexville.

Economic Development: The Region's Role. Henck Pat. (Author) Joanne

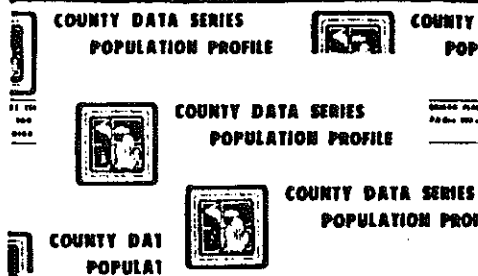
Jay. (Staff Contact). Saginaw. 1978.

Organization and Function: ECMPDR. Findlay, Don. (Staff Contact). Essexville. 1976.

Regional Perspective: Comprehensive Studies. Schroeder, Thomas and Ward, Charlys. (Staff Contacts). Essexville. 1976.

Transportation. Karnes, Larry (Staff Contact). Essexville. 1976.

W.A.T.E.R. Program. Sygo, Jim (Staff Contact). Essexville. 1976.



County Data Series

Purpose:

County data sheets provide information on counties and their minor civil divisions. Much of the information is already available in the regional inventory documents. The data sheets present information in a more compact, easily referable form than the regional documents. An explanation of the information and its relationship to current issues is not included.

Population Profile. Comprehensive Studies Division. Schroeder, Thomas and Jenkins, Marilla. (Compilation and Staff Contacts). Saginaw. 1978. For each of the region's 14 counties: 1) Age Distribution, 2) Enumeration Districts: Map, Population and Housing Counts, 3) Education, 4) Population Projections, 5) Population Trends, 6) Racial Distribution.

Regional Information Bulletin

Purpose:

Regional Information Bulletins provide data for the 14 county region, usually on a township basis. These bulletins present information in a more compact, easily referable form than regional documents or census reports.

1970 Housing and Population. Comprehensive Studies Division. Schroeder, Thomas P. (Compilation and Staff Contact). Delta College. 1973. Regional: population, births, deaths, migration. Maps.

1975 Estimated Population and 1974 Per Capita Income. Comprehensive Studies Division. Jenkins, Marilla and Schroeder, Thomas. (Compilation and Staff Contacts). Saginaw. 1978. Regional: 1) population; 1970, 1973 and 1975, 2) per capita money income; 1969, 1972 and 1974, 3) map of ECMPDR townships; Percent Population Change 1970-1975.

Inventory Documents

Purpose:

These documents inventory regional resources, identify trends, and discuss issues. They are formal and usually technical in nature, with emphasis placed on thorough presentation and explanation of data.

Additional Bibliographic Information: Unless otherwise noted, these reports were developed and published by the ECOMPDR staff. Prior to 1977, regional reports were published in Essexville, MI. Publications after this date come from the Saginaw, MI based office.

Alternative Structural and Non-Structural Factors. Sygo, Jim and Raven, Dale. (Editors and Staff Contacts). Chester Engineers. 1977.

Alternative Structural and Non-Structural Plans and Their Consequences. Sygo, Jim and Raven, Dale. (Editors and Staff Contacts). 1977.

Areas of Particular Concern in the Coastal Zone. Goergen, Thomas. (Author and Staff Contact). June, 1976.

Assessment of Current Water Quality Conditions and Factors Responsible For Those Conditions. Sygo, Jim and Raven, Dale. (Editors and Staff Contacts). Chester Engineers. 1976.

Economic Analysis For Highways. Robley (P466) Winfrey, 1966, International Textbook Co., The Holdon Craftsman Inc., Scranton, Pa.

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Baseline Facilities, Waste Load, and Residual Projections. Raven, Dale and Sygo, Jim. (Editors and Staff Contacts). 1977.

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Detailed Plan of Study for 208 Water Quality Management Plan. Chester Engineers. Sygo, Jim. (Staff Contact). 1975.

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Institutional System Inventory. Sygo, Jim and Raven, Dale. (Editors and Staff Contacts). Ernst and Ernst. 1977.

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Population Projections. Raven, Dale. (Author and Staff Contact). 1976.

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Public Participation in the Water Quality Management Program. Findlay, Don. (Author and Staff Contact). November, 1978.

Regional Perspective (ECOMPDR):

Analysis of Housing Needs. Ward, Charlys. (Author and Staff Contact) 1976.

Community Facilities. Schroeder, Thomas. (Author and Staff Contact). 1976.

Housing Constraints. Ward, Charlys. (Author and Staff Contact). 1976.

Housing Inventory. Ward, Charlys. (Author and Staff Contact). 1975.

Land Use Analysis. Naphin, Rosemary. (Author). Jenkins, Marlia. (Staff Contact). 1976.

Land Use Inventory. Naphin, Rosemary. (Author). Jenkins, Marlia. (Staff Contact). 1975.

Mineral Resources. Schroeder, Thomas P. (Author and Staff Contact). 1976.

Natural Elements. Schroeder, Thomas P. (Author and Staff Contact). 1976.

Pattern of the Past. Naphin, Rosemary. (Author). Jenkins, Marlia. (Staff Contact). 1975.

Population. Schroeder, Thomas P. (Author and Staff Contact). 1976.

Recreation Facilities. Schroeder,