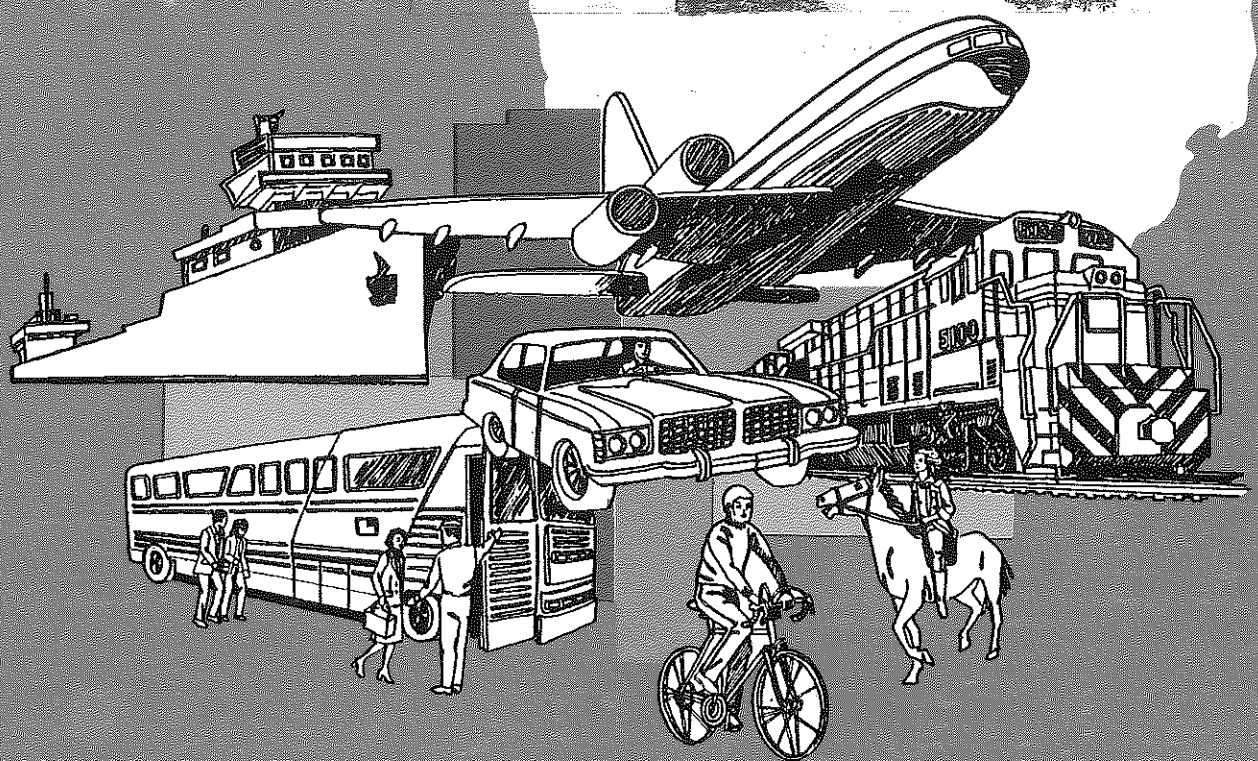


# Summary of MICHIGAN'S TRANSPORTATION NEEDS

## 1977 - 1989



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STATE OF MICHIGAN



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**DEPARTMENT OF TRANSPORTATION**

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JOHN P. WOODFORD, DIRECTOR

The Honorable William G. Milliken, Governor  
and  
Members of the State Legislature

Submitted herewith is the report "Summary of Michigan's Transportation Needs - 1977-1989." This report was prepared in compliance with Act 51, Public Acts of 1951, and is the state's first multi-modal transportation needs study. The study was under the direction of the Michigan Transportation Needs Study Committee which included, in addition to representatives of cities, counties, and the state, the Michigan Ports Association, the Michigan Association of Airport Executives, the Michigan Railroad Association, and the Michigan Public Transit Association.

The results contained herein reflect the serious issues associated with operating and maintaining our existing transportation systems and the urgency of examining new sources and methods of financing the maintenance and, where necessary, improvement of these systems.

It is the hope of the Transportation Needs Study Committee that this report will prove useful to the Executive and Legislative Branches of the state in assessing transportation needs in Michigan. The reactions to this assessment of needs will provide useful guidance to the Department of Transportation in prioritizing state transportation needs and producing the first state transportation plan.

Sincerely,

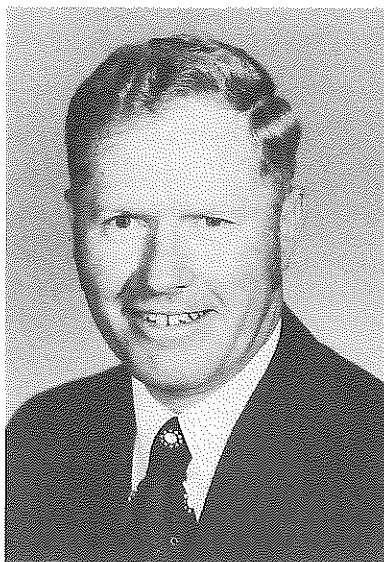
A handwritten signature in cursive script, appearing to read "John P. Woodford".

John P. Woodford, Chairman  
Michigan Transportation Needs  
Study Committee



*An Equal Opportunity Employer*

IN MEMORIAM



Charles J. Carroll, Jr.  
1931 - 1979

Assistant Deputy Director,  
Bureau of Transportation Planning,  
Michigan Department of Transportation

In recognition of the contribution of Charles J. Carroll, Jr. to the preparation of this report and to his skills and leadership in planning for Michigan's transportation systems.

Summary of  
**MICHIGAN'S**  
**TRANSPORTATION**  
**NEEDS**  
1977-1989

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# Transportation is the Lifestream of the State

## INTRODUCTION AND SUMMARY

*The movement of people . . . the transportation of freight . . . the docks and the rails . . . the airports and highways . . . this is transportation, and this is Michigan.*

During the 1970's, the public has become a concerned force in planning future transportation. Concern has focused on the impacts of transportation and the availability of transportation opportunities. Interest in special groups, such as the elderly, handicapped, and mobility-limited, has been joined with the traditional issues of public transportation, freight movement, and personal mobility. It is apparent that each segment of the state's transportation system serves as a vital link in Michigan's social and economic life support system. The problems and opportunities facing the delivery of these services as a balanced system of transportation are, however, complex and integrally related to crucial national issues.

In the mid-seventies, early warning signs began to focus on the world's energy economy and its interrelated impacts on the economy and the future quality of life. These events created policy confusion at the national level and forced states to reassess their approach to planning. Anticipating these rapidly changing events appears to be quite unrealistic. It is realistic, however, to develop a program to (1) assist state officials and legislators in responding to changing environments, (2) serve the public in evaluating transportation goals, needs, and priorities, and (3) support the development of the first State Transportation Plan in Michigan within two years.

Over the last several years, the increased interest in available services and the future of transportation has assumed new urgency. Increasing inflation rates and the prospect of reduced levels in the traditional funds for service improvements have created a climate of competition for future funds. As public responsibility for providing transportation continues to grow, the dollars required to meet these needs also grow; however, as inflation increases, the available real dollars for system maintenance and improvement decrease. And, finally, as energy conservation and environmental programs translate into increased auto efficiency and reduced gasoline consumption, the traditional sources of transportation funds shrink. Together these

trends set the stage for difficult choices and decisions. Needs, however, cannot

be prioritized until they are identifiable and available for review, analysis, and evaluation. The initiation of this first statewide multi-modal transportation needs assessment is the first real step in this direction.

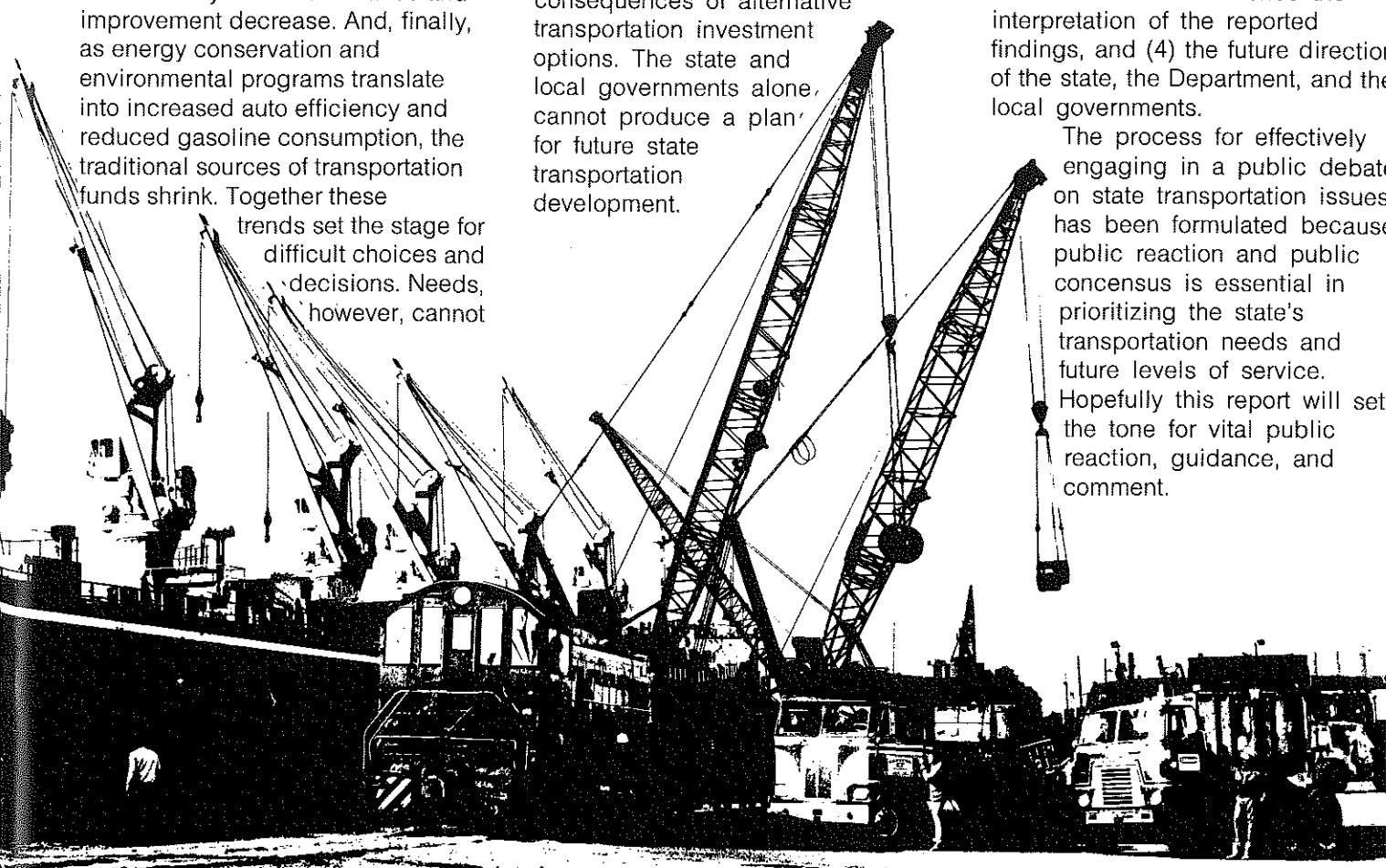
### **Purpose of the Report**

Michigan's transportation system is linked to external energy and economic issues which pervade the world. As such, decisions and choices require a full disclosure and discussion of the potential consequences of alternative transportation investment options. The state and local governments alone cannot produce a plan for future state transportation development.

Participation at all levels of government and industry, coupled with widespread public debate, is vital if we, as a state, are to respond to the challenges of the 1980's.

A major objective of this transportation study involves initiation of a public discussion of the state's levels of service and needs for aviation, non-motorized transportation, highways, roads and streets, public transportation, railroads, and commercial ports and harbors. The approach developed for this first phase study has been designed to provide the public with (1) the magnitude and distribution of the state transportation needs, (2) the transportation goals and study assumptions, (3) the transportation issues which will influence the interpretation of the reported findings, and (4) the future direction of the state, the Department, and the local governments.

The process for effectively engaging in a public debate on state transportation issues has been formulated because public reaction and public consensus is essential in prioritizing the state's transportation needs and future levels of service. Hopefully this report will set the tone for vital public reaction, guidance, and comment.



*Freight Transportation is a Fundamental Element of Michigan's Economy.*

inflation, the fixed expenditures increase to \$10.35 billion. The 1977 dollars for fixed expenditures increase to approximately \$11.79 billion when employing an annual inflation rate of 8 percent.

The needs identified in this first multi-modal needs assessment are directly dependent on the service

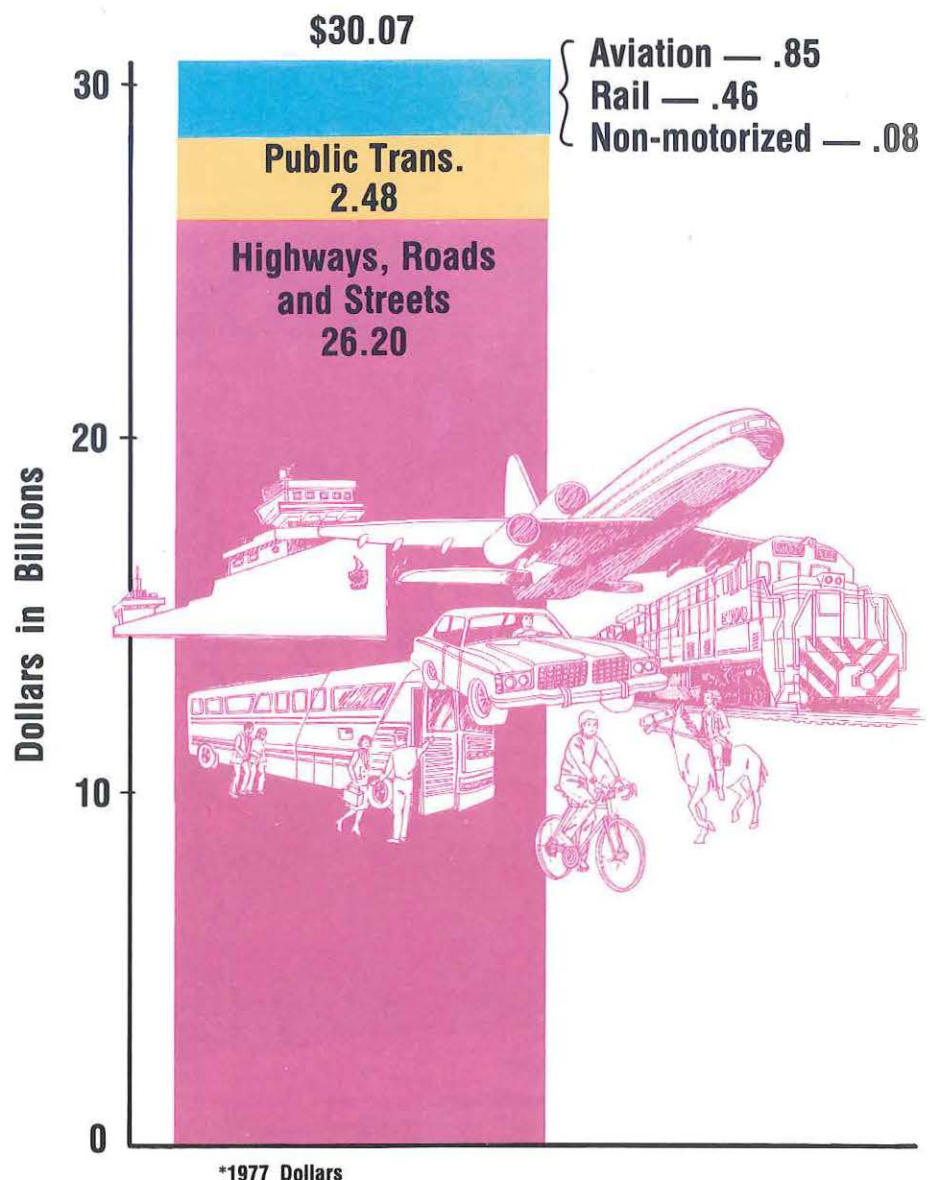
level assumptions selected for each mode. Evaluation of these service level assumptions, the relationship between modal goals and service level assumptions and the national and state issues which impact both goals and service levels will be required in future refinements of needs.

### State Transportation Needs

Transportation requirements for the future may be stated in terms of dollars. The objective stipulation of these requirements is referred to as the transportation needs assessment process. Simply put, transportation needs are the resources, expressed in dollars, required to maintain, operate, and/or improve systems to specified levels of service. In terms of 1977 dollars, the projected requirements for Michigan transportation systems, which require public assistance through 1989, are approximately \$30.07 billion. These needs include (1) \$26.2 billion for highways, roads, and streets, (2) \$2.48 billion for public transportation, (3) \$855 million for aviation, (4) \$456 million for rail freight, and (5) \$79 million for non-motorized transportation. Port and harbor needs are not available at this time.

The potential implications of the magnitude of funds required to maintain today's level of service are a critical finding. Over 24 percent of the identified needs are associated with maintaining the existing system. These needs, defined as "fixed expenditures," include the operations and maintenance of each of the state's modal systems at today's level of available service. In 1977 dollars, the needs for system operations and maintenance are approximately \$7.14 billion. The impact of inflation on these fixed expenditures may be appreciated when applying annual inflation rates of 6 percent and 8 percent through the 1980's. At 6 percent annual

## Michigan's Transportation Needs Requiring Public Financing (1977-1989)



## MAJOR FINDINGS

The findings of this first mandated multi-modal transportation needs study may be summarized as follows:

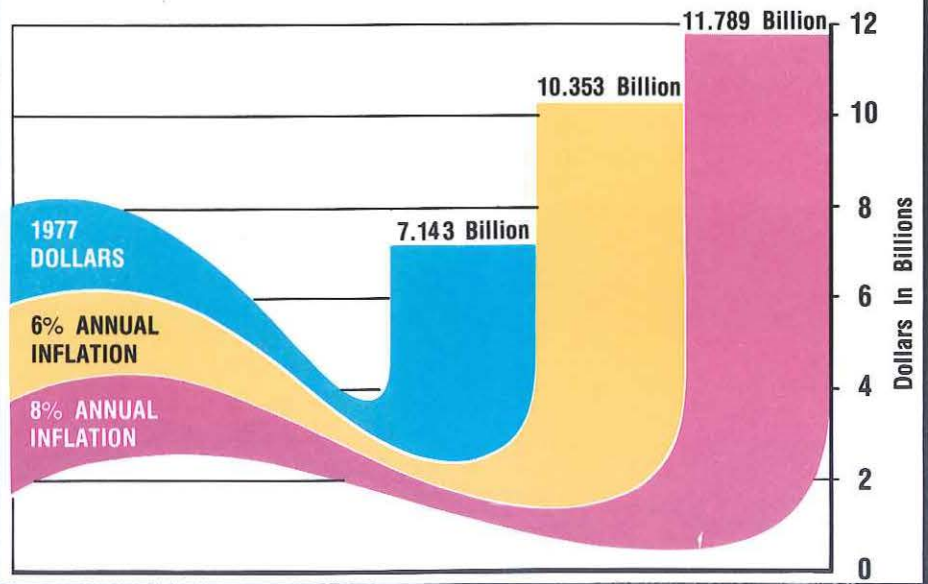
- Although the assumed state transportation goals are general, they establish an excellent frame of reference for the stipulation and development of modal goals and serve as the framework for service level analysis.

- As more attention is directed toward examining service level assumptions, the larger issues, such as the role of the state and the goals and aspirations of the public surface. These issues raise associated questions on how priorities should be analyzed and defined within the levels of available funding.

- During the traditional process, the translation of needs to fiscal requirements has been a separate activity, but this is no longer adequate. Prioritization of needs, continuing examination of transportation goals, and the analysis of measurable levels of service require the incorporation of a broad level of financial analysis within the needs assessment process.

- The two primary sources of revenue for the Michigan Transportation Fund are fuel and weight taxes. The yield from both of these tax sources will experience lesser rates of growth and absolute declines as the effects of already mandated and increasingly stringent energy conservation measures become clearer. It appears that the counter-balancing effect of increased vehicle miles of travel and increased registrations within the state will not offset the two downward trends.

## Effects Of Inflation On Transportation Operations And Maintenance Needs (Fixed Expenditures 1977-1989)



- The impact of inflation on the levels of funds and identified needs is a disturbing finding of this study. Between 1967 and 1977, the nation's consumer price index increased by 85 percent, while the index for highway improvements rose by over 133 percent.

- The results of an abbreviated financial analysis provide clear indication that the net impacts of inflation and funding sources will exert a significant influence on the prospects for preserving the state's existing transportation system.

- It is clear that the state transportation system is threatened by the simultaneous effects of continuing inflation and reduced sources of traditional funds. Either new mechanisms for funding both the maintenance and improvement of transportation systems must be found, or our collective expectations for the future must be reduced dramatically.

## State Transportation Needs Requiring Public Financing 1977-1989

OPERATIONS AND MAINTENANCE NEEDS  
7.143 BILLION DOLLARS\*



\*1977 Dollars



## **Major Observations**

- General consensus indicates that (1) inflation analysis must be included in needs analysis, (2) funds for transportation development are dramatically eroding in terms of real dollars, (3) transportation priorities must be established, (4) the maintenance of the existing system is in jeopardy, and (5) new sources, mechanisms and levels of public funding must be examined immediately.
- While the structure employed in the current process produces a reasonably developed universe of needs, it is clear that much additional effort is required to translate modal needs into system needs through modal trade-offs. Trade-offs among competing modes require a thorough understanding of public values, emerging issues, service level assumptions, fiscal requirements, and available resources.
- A number of questions appear as likely candidates during future analysis of transportation financing and needs prioritization. (1) How should multi-modal needs and priorities be defined within given resources? (2) If new sources of revenue are required, how should they be raised? (3) How can an inflation-resistant funding mechanism be provided?
- In the past, freight transportation analysis has been viewed as a key element in marketing and traffic management within the private sector. In recent years, however, a variety of events have impelled state and federal agencies to increase their activities in freight transportation. Future energy prices, trends in deregulation, and equipment shortages clarify the need to examine all modes involved in

freight and commodity distribution: rail, aviation, motor carriers, and waterborne carriers.

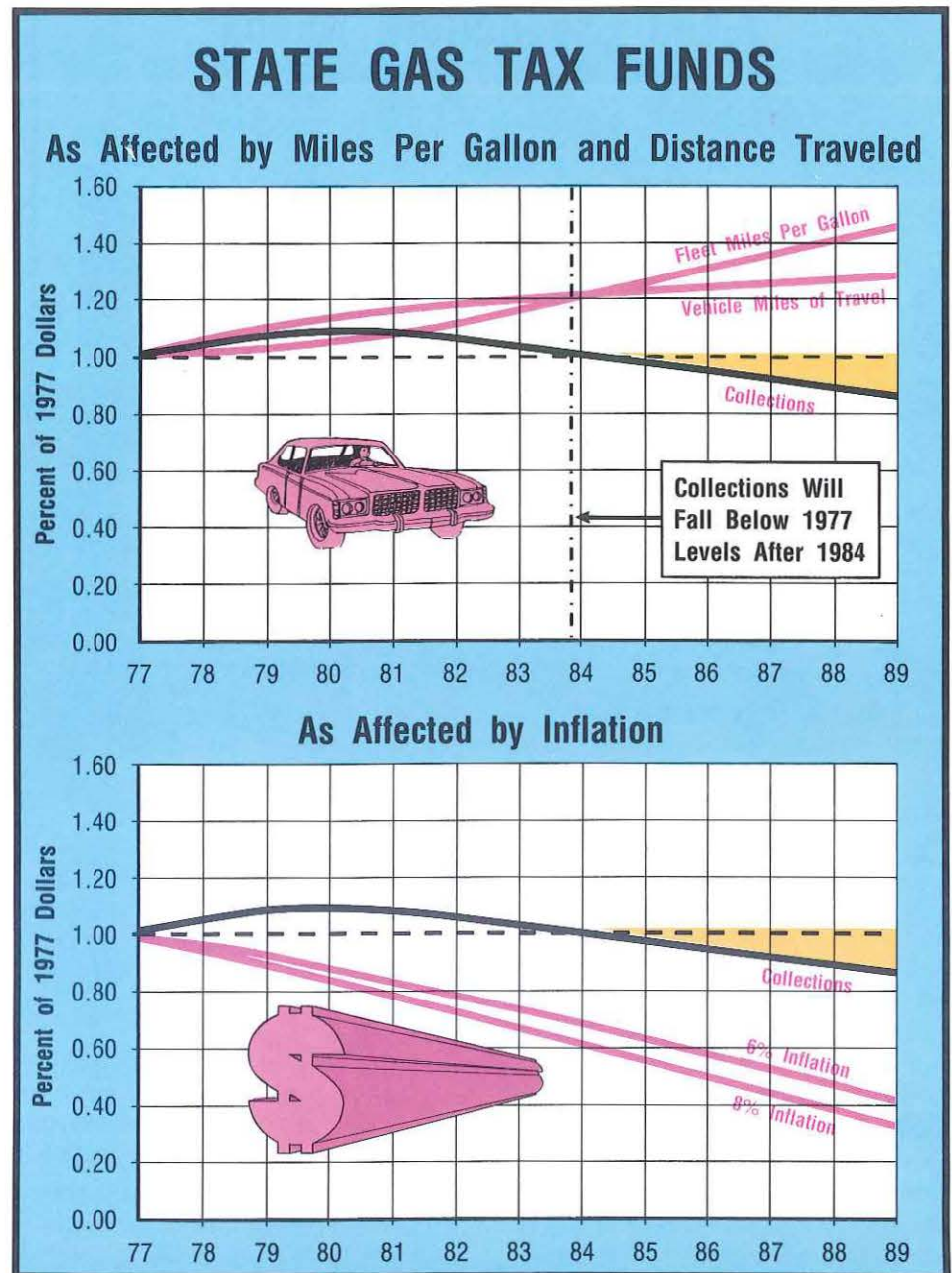
- Commodity analysis capability is being developed within the Department to permit the intermodal examination of freight transportation networks and needs. This approach will provide the insight necessary to more fully appreciate the functional roles of all modes in the state.
- The first multi-modal needs study has established the framework for future activity. The framework for continuing refinement is in place, and support research programs have been identified. In addition, the role and opportunities for public participation have been recognized, used, and clarified for the future.
- The mandates of the Transportation Needs Study Committee, established by Act 444, P.A. of 1978, and the role of that committee set the stage for significant improvement in the state's ability to react to the external forces which influence the development of Michigan's transportation system. Public reaction to this first assessment of non-prioritized modal needs, the needs assessment process employed, and the transportation goals and issues identified for public discussion will assist in this effort.

## Critical Issues

The many critical issues facing transportation disturb an increasing number of people in all walks of life. Linkages between national issues such as modal deregulation, inflation, fuel costs, and transportation funds have been identified in a limited context in this study. By their very nature, these issues cut to the core of the needs prioritization process, state policy development, and the development of a State Transportation Plan. The most significant of these issues are —

**ENERGY ECONOMY** — One of the major issues affecting Michigan, the United States, and, indeed, all nations is the world's energy economy. Although vast uncertainty is apparent, the trends and potential impacts on transportation funding are clear. As federal requirements for greater vehicle efficiency (and less weight) continue, the effects on traditional user-oriented taxes and fees will be felt. The mix of vehicles will change as more efficient vehicles take their place in the total fleet of private passenger vehicles, trucks, and buses. Energy conservation policies directed to motor-fuel price increases will force the transportation funding equilibrium out of balance and, as the declining growth rates in motor-fuel receipts become pronounced, emphasis will focus on preserving the transportation system.

**INFLATION** — A second major issue which faces local units of government, the state, and the nation is the prospect of increasing inflation. As inflation continues, the purchasing power of the funds available for transportation decreases. This trend is further complicated because, in the transportation sector, inflation rates have been consistently higher than general inflation over the last two decades — a trend that appears



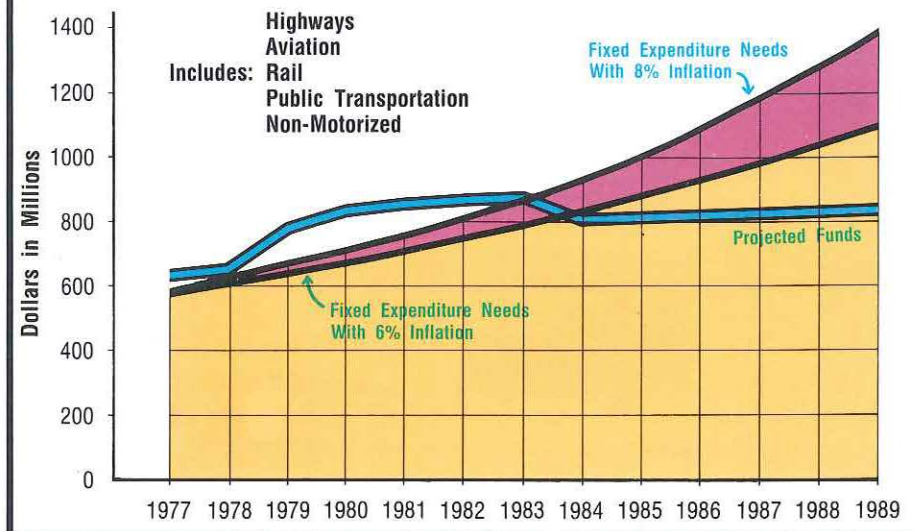
likely to continue. The problems in transportation planning and resource allocation are compounded because transportation capital costs and operation and maintenance costs differ by mode. Expected decreases in the real value of future revenues require a careful examination of each type of transportation needed to preserve and expand the services of the existing systems.

**FINANCING TRANSPORTATION** — Federal proposals which change the methods of planning and financing the nation's transportation system are under discussion. These proposals are directed to (1) stabilizing transportation funding, (2) increasing financial flexibility, and

(3) improving the ability of the state to meet changing transportation needs. The net effect of increased motor-vehicle fuel efficiency and inflation complicates the problems in evaluating competing public needs for transportation. Although much attention must be directed to the efficient use of existing resources, providing for system continuity, and seeking low cost alternatives, an examination of new mechanisms for financing transportation is a critical state and national issue.

These issues form the backdrop for problems to be addressed by the new State Transportation Needs Study Committee established under Act 444 of 1978.

## Fixed Expenditure Needs (Operations and Maintenance)



**Operations and Maintenance  
Requirements Will Increase  
Faster Than Available Funds.**

### Future Directions

Coincident with the Department's current needs assessment, a statutory requirement for a continuing and expanded transportation needs study has been passed as part of Act 444, P.A. of 1978. The statutory Needs Study Committee envisions a much broader perspective than the current Needs Study Committee. As stated in Act 444, "by a majority vote of the Needs Study Committee, the Committee shall report to the Governor, the State Transportation Commission, and the Legislature on the identified needs and priorities of transportation funding . . ." With this statutory change, the Committee becomes instrumental in developing fiscal policies for the distribution of state funds by mode.

The prioritization issues which the Needs Study Committee will address include (1) the respective roles of each mode, (2) the problems associated with revenue sources which, due to inflation, are declining in real dollars, and (3) a host of questions related to the transportation goals and policies of the state. Prioritization will involve specific examination of service level assumptions and linkages between modal goals and service levels. As the reviews of modal and state transportation goals progress, changes may be introduced which

will influence the service level assumptions and resultant needs.

The anticipated prioritization of needs should provide the perspective necessary to treat all elements of the state transportation system as a whole. This broadened base of responsibility, together with the lessons learned through this first multi-modal study, should further set the stage for significant improvements in the transportation planning process over the next decade.

One of the next steps in the study of state transportation needs is the preparation of a financial or fiscal analysis. This process will focus on a detailed analysis of the prioritized needs with respect to sources and levels of funding. It is within this process that an expanded analysis of system operations and maintenance costs, capital expenditures, and the impacts of improvement programming will be examined against federal, state, and local funding projections. The federal role in financing all modes of transportation has historically determined state transportation programs and the resultant levels of service. During the fiscal analysis, projections of federal funding will be examined to determine the levels of state and local funding required to meet future transportation requirements.

## Study Approach

Although the design of this study could have relied heavily upon the long history of traditional needs assessment, it was determined that a new study approach was required. Through a process of discussion and compromise, a study work program evolved for use by all study participants. Internal discussion was expanded to include the technical Modal Needs Subcommittees, which were organized to provide guidance to the development of modal needs, and the Transportation Needs Study Committee, which was established to direct the entire study. The program included a uniform series of steps to be addressed by each mode and the general principles to guide the complete study. Although there were many unforeseen issues, the work program served to establish a unified framework for multi-modal needs assessment.

The process called for a sequence of major work elements and over 150 specific tasks to be followed by each subcommittee. The new study ingredients included (1) the stipulation of state transportation goals and modal goals, (2) the specification of alternative service level assumptions, (3) the identification of critical statewide transportation issues, and (4) an abbreviated analysis of critical funding issues. These new study elements were incorporated into the traditional inventory development, deficiency analysis, and needs reporting tasks. Much has been accomplished during this study to identify techniques for addressing intermodal issues. These techniques will be refined in the continuing needs study.



## Organization of the Report

Throughout the study, it was recognized that the presentation of the study findings would be difficult. To facilitate the documentation of the study results, it was decided that the findings of the study process would be prepared under several levels of detail.

The first level, working memoranda and data, will remain within the Department as a reference base for responding to specific technical questions which may surface during study review.

The Transportation Needs Study Committee and the Modal Advisory Councils will be able to use the second level of study results, the technical report, as a technical compendium which will serve as the benchmark in (1) refining the process, (2) improving the needs estimates, and (3) developing a program to address issues associated with prioritizing the universe of identified needs.

The third level of study findings, "The Summary of Michigan's Transportation Needs" report, required significant thought and planning. It has been apparent throughout the study that there is much public interest in the expanded process and the critical national issues which exert pressure on Michigan's future transportation system. Although much of this report is directed toward financial findings, considerable attention has been devoted to describing the new process, identifying the problems which complicate the state's ability to plan and develop its transportation system, and providing the opportunity for expanded public review of the study results and findings. The report is organized to present (1) the framework of the study, (2) the identified modal needs, (3) the issues affecting the transportation needs, and (4) the future directions of the process.

# Emerging Issues Affect State Transportation

## FRAMEWORK GUIDING THE IDENTIFICATION OF NEEDS

Early in the design of this first multi-modal study, it became clear that a practical study and analysis framework was required. As a first step, it was apparent that transportation goals were needed to provide a framework against which to examine transportation needs. As a second step, it appeared that service level assumptions were required to serve as an effective way to examine the cost implications of present and future service.

Three other decisions, made in the initial phases of study design, set the course for this study. The first established the Transportation Needs Study Committee and six Modal Subcommittees to guide the needs analyses and to serve as a clearinghouse for discussions and recommendations. The second decision involved structuring a work program to assure uniformity among the many study activities with respect to analysis assumptions, ground rules, schedules, and review cycles. Opportunities were built into the program to (1) examine and refine the study assumptions, (2) identify study deficiencies, and (3) identify national issues which impact the state. The last decision resulted in incorporating an abbreviated financial analysis to help clarify the economic and financial issues which influence the interpretation of the identified needs.

## State Transportation Goals

The subcommittees served as a forum for reviewing modal issues and as advocates for highlighting particular issues associated with their modes. The Transportation Needs Study Committee served as a clearinghouse for reviewing modal subcommittee recommendations, a focal point for resolving technical issues, and a forum for discussing major study issues such as the transportation goals.

One major function of the committee structure was the design and development of the state's first set of transportation goals. The modal subcommittees developed the specific modal goals which established the framework for modal service level assumptions and the identification of modal needs. The Needs Study Committee developed the State Transportation Goals and reviewed and refined the six sets of modal goals.

**MISSION** — *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.*

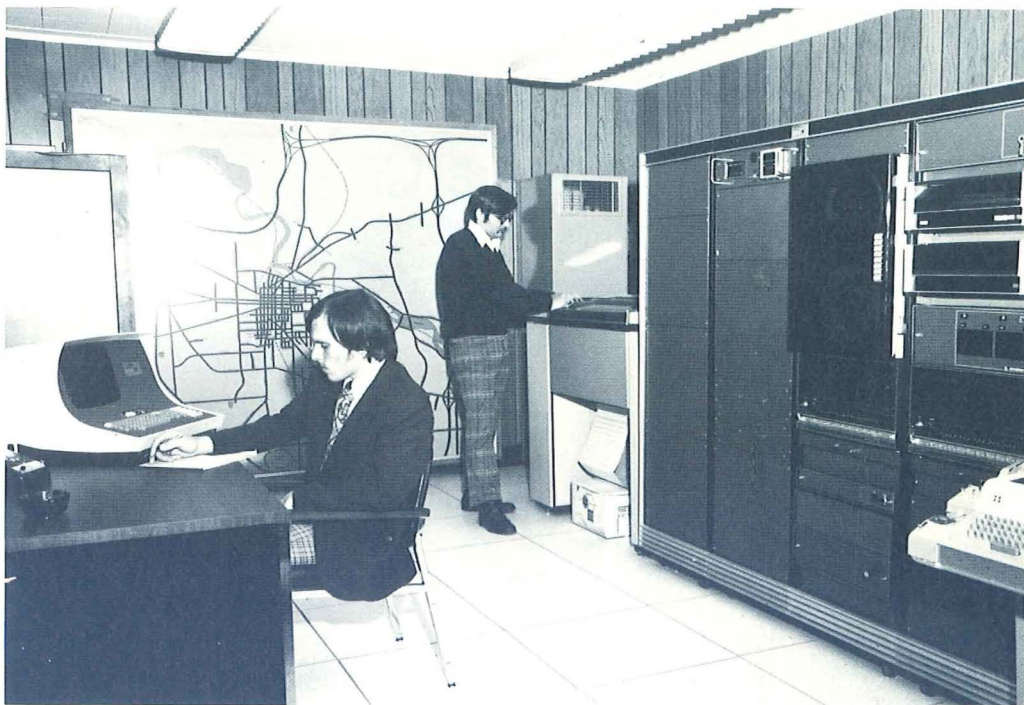
### GOALS

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

The above goals adopted as part of this study are, by definition, broad, qualitative statements which describe an aim or purpose and are both timeless and immeasurable. They have value, however, as a guide for future directions in state transportation planning and development and as a framework in developing modal goals and the

physical and service standards used to determine modal needs.

Each of the four goals responds to what may be termed a basic "value" of society: the first to *mobility*, the second to *safety*, the third to the totality of the human *environment*, and the fourth to the most *efficient* use of public funds.



### Service Levels as Targets

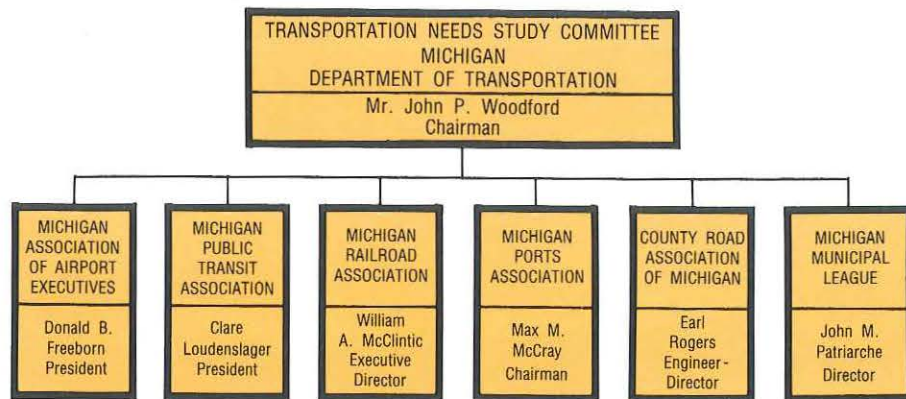
Major study emphasis focused on the development of the service level assumptions employed in the identification of needs. The technical staff developed a set of three levels of service assumptions for each mode to be reviewed and analyzed by the six modal subcommittees and the Transportation Needs Study Committee. Alternative levels of services were selected, encompassing foreseeable demands for service by the public. Each set of alternatives included the existing level of service as the "low" or minimum case. This conservative level was augmented with "medium" and "high" cases reflecting levels of improved service in terms of frequency of service, extent of service, and/or levels of state responsibility.

Many subcommittee level reviews were conducted in the development of the final target service level assumptions. The range of assumptions and the final selected

service level targets have to be, of necessity, considered as study assumptions—not state standards. As each modal subcommittee selected the range of service level assumptions appropriate for its mode, these assumptions were submitted to the Transportation Needs Study Committee for review and comment. Similarly, the final 1989 target service level study assumptions were submitted as recommendations to the Transportation Needs Study Committee for approval and use in the final needs identification.

This process served to structure the modal analyses and provide the framework for evaluating each mode. The procedure was specifically designed to ensure that the results of each modal analysis were not compared against one another in this phase of the study; however, comparative prioritization of needs is scheduled as the next phase in the expanded process.

## Transportation Needs Study Committee



- SERVICE LEVEL ANALYSIS APPROACH** — By incorporating present and future service level analysis in the identification of the needs, each mode was analyzed against current and future events — events which may influence the role of the mode within the state and/or influence the state's social and economic goals. As an example, aviation service requirements, based on service level projections, were included in the State Aviation Systems Plan. These projections were examined against the impacts of airline deregulation, anticipated changes in the air carrier marketplace, possible changes in the general aviation marketplace, and anticipated aviation legislation.

The study participants recognized the complexities of needs assessment in the expanded study. Many issues such as service duplication, measures of performance, methods and tools for service analysis, discontinuities in data bases, federal deregulation trends, and projected levels of funding emerged as candidates for future consideration and refinement.

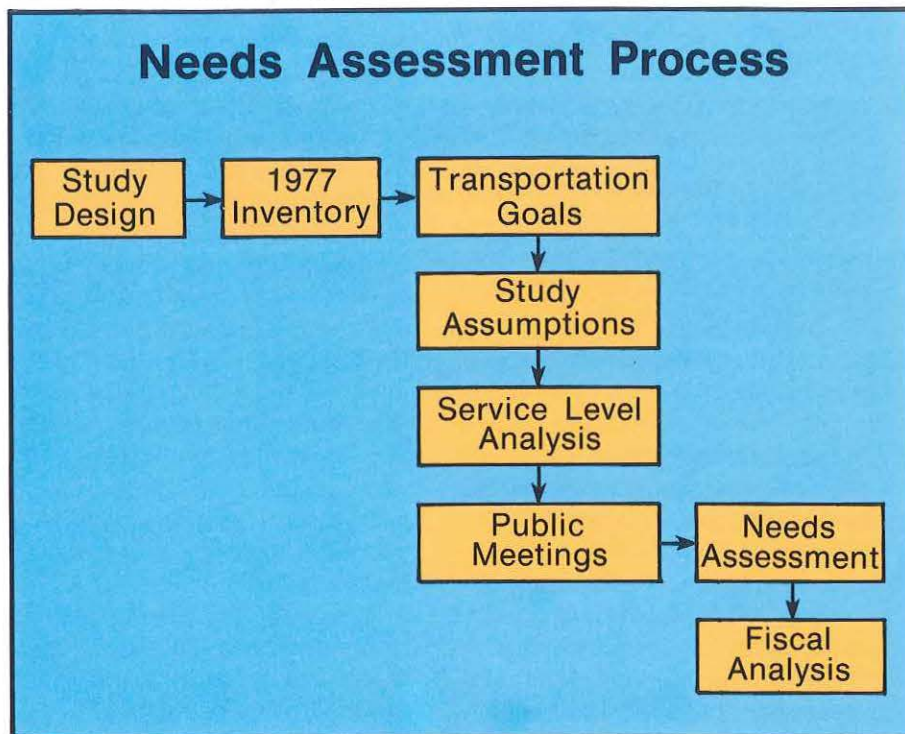
### Methods of Analysis

A two-track system was developed for the identification and analysis of transportation needs. The two tracks may be viewed as "technically oriented" and "policy oriented," although there were obvious junctures where both tracks merged. The study support staff was assigned a series of technically oriented tasks to provide the fundamental information necessary to estimate and analyze needs. Major technical tasks included (1) documenting historic modal trends, (2) developing an inventory of facilities and services as of January 1, 1977, (3) designing procedures and techniques for needs estimation, and (4) the estimating of needs. In parallel, the policy-oriented track was directed toward (1) stipulating state transportation goals and modal goals, (2) reviewing and selecting 1989 target service levels, (3) reviewing study procedures and tasks having policy implications, and (4) identifying critical issues impacting the interpretation of the financial needs.

Two separate technical approaches were used in developing total transportation needs. These two approaches were classified as the traditional Trend Analysis Approach and the new Service Level Analysis Approach.

- TREND ANALYSIS APPROACH** — Historic trends can be used in examining the growth of public demand for the services provided by each mode. They can also serve to isolate changes in modal demand and supply caused by

such phenomena as the energy crisis of 1973, disruptions in federal funding, and imposition of federal requirements which extend, delay, or terminate project approval and construction cycles. In general, there has been steady growth in demand for aviation and highway services. Public transportation is currently experiencing a resurgence, although the relative percentage of trips served remains quite small when compared to the private automobile. Rail freight transport has been in the process of gradual shrinkage. Non-motorized transportation has many new advocates; however, future demand is difficult to predict.



## Needs Study Organizational Structure



\*Resource Planning Associates

### Participation in the Process

During the design of the study, it was recognized that the identification of multi-modal transportation needs requires a broader base of participation than that traditionally associated with a single mode, since transportation services are provided by varied and diverse public and private interests. Similarly, the users of services include special interest groups, such as the elderly and handicapped, the automobile driver, the bicyclist and horseman, and the shipper and receiver of freight. To accommodate these varied interests, six modal

subcommittees, represented by more than seventy persons, were formed to serve as advisory groups to the Transportation Needs Study Committee.

To obtain further input from the general public and private agencies, four public meetings were held in September, 1978, at Southfield, Grand Rapids, Gaylord, and Marquette. The agenda focused on (1) the transportation goals, (2) an overview of the emerging modal issues, (3) the service level assumptions, and (4) an outline of the needs assessment process.

Although the results cannot be generalized to represent the entire population of Michigan, the majority favored (1) the transportation goals, (2) increased public participation in needs assessment, (3) top priority to the reconstruction and rehabilitation of existing highways, roads and streets, (4) use of service levels in determining needs, (5) state assistance to preserve intercity bus services, (6) public purchase of abandoned rail lines, and (7) financial participation by local rail users and communities in state-supported rail service projects.



# **Transportation Needs Set the Stage for Major Decisions**

## **STATE TRANSPORTATION NEEDS**

What is meant by Transportation Needs? This question has produced a considerable amount of philosophical and technical debate over the last decade and during the initial phases of this study. Simply put, transportation needs are the resource requirements, expressed in dollars, to provide specified levels of transportation services. With the acknowledgment of this definition, questions arose as how to best conduct Michigan's first statewide transportation needs study and how to report the findings. For this first phase study in statewide transportation needs analysis, it was concluded that the multi-modal approach was preferable to the functional or intermodal approach; therefore, the statewide needs were developed and reported by mode. Once agreement was reached on the general ground rules for needs identification, a number of other fundamental issues had to be addressed: How far into the future should one look to determine needs? How can a process be designed to ensure that reasonable needs are identified? And, finally, which modes should be included in this first study?

The first issue addressed involved the study time frame. For the purposes of this study, 1989 was selected as the target year for needs identification. This short 13-year time frame provides an opportunity to realistically examine the major impacts of energy, shifts in public values and interests, and the consistent erosion of the dollar's buying power. Although these forces are not controlled by the state, they exert increasing pressure on the needs of the state and future planning and funding policies.

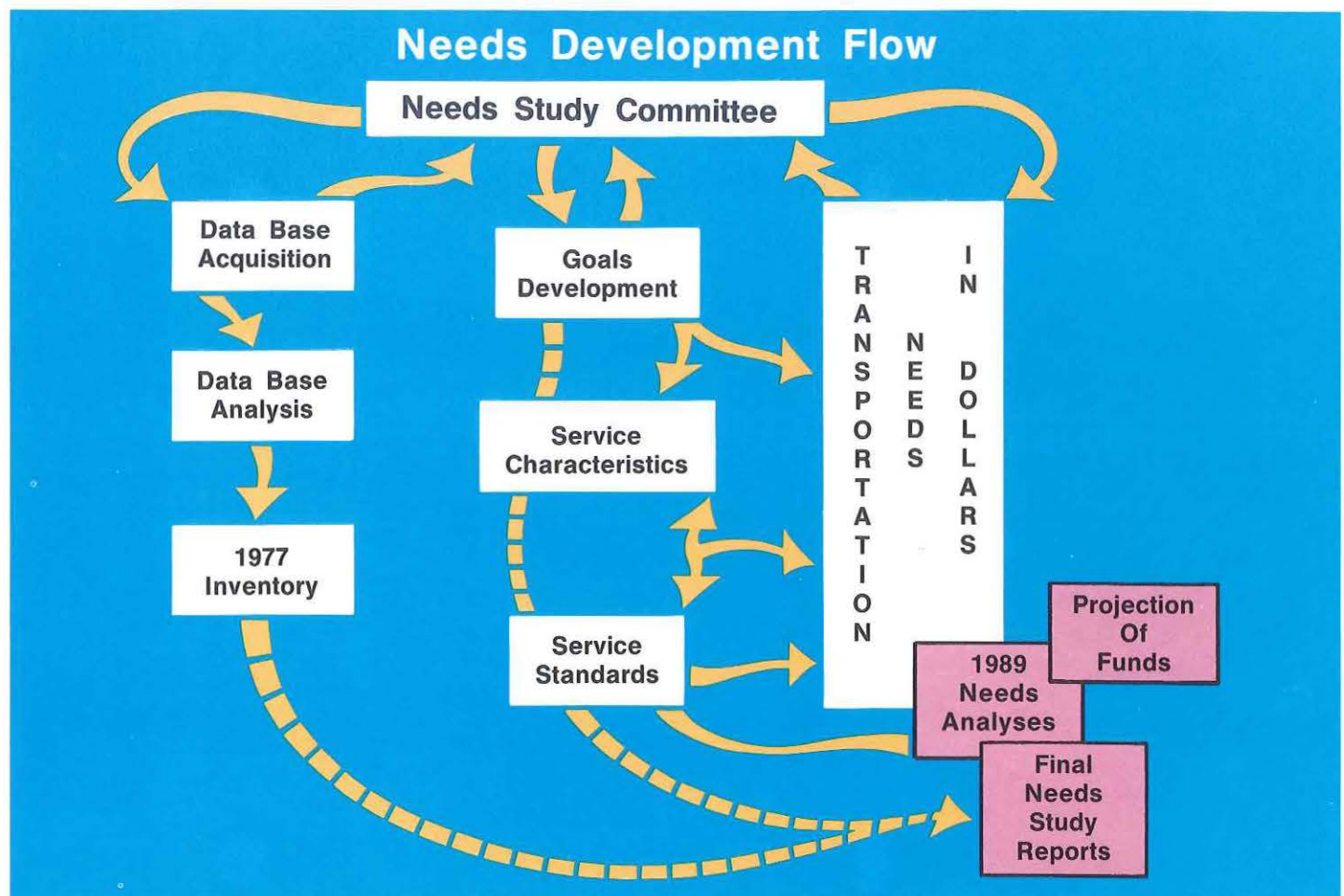
The second major issue concerned the needs identification approach or study process. A five-step process was developed early in 1977 for the conduct of the entire study to ensure, to the extent possible, that needs were identified on a reasonable basis. This five-point process included (1) goal specification, (2) service level analysis, (3) service level selection, (4) needs identification, and (5) needs analysis.

The third major issue was directed toward identifying those modes that should be included in the study. As far as the major modes are

concerned, the study includes (1) aviation, (2) highways, roads and streets, (3) non-motorized transportation, (4) public transportation, and (5) railroads. It should be noted that commercial port and harbor needs are not included. Although much effort was dedicated to a study of this mode, a variety of circumstances prevented its completion. Port and harbor needs will be available for inclusion as the study expands to address the entire issue of future freight and commodity movements. Private sector needs, such as private parking, pipelines, motor carriers,

taxicabs, and viable railroad facilities are not included in the financial need projections.

The background and historical information incorporated into this section of the report establish the backdrop for a better understanding of the state's transportation needs through 1989. We anticipate and look forward to comments and observations from large segments of the public and anticipate the opportunity to join in a continuing dialogue to expand perspectives, refine estimates, and prioritize needs.



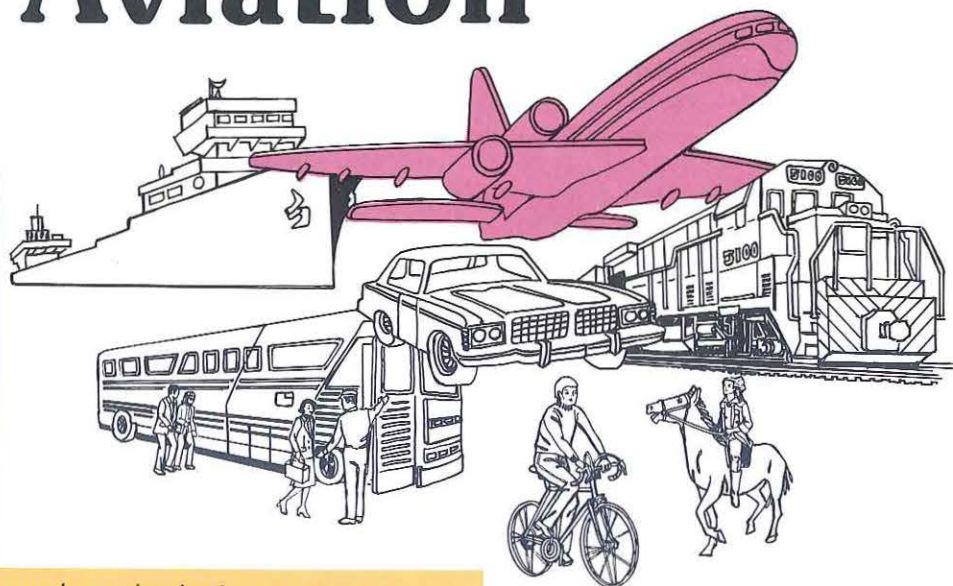
# Aviation

## MAJOR FINDINGS

■ Several key privately-owned, public-use airports face the prospect of closure due to rising property taxes and lack of funds to make necessary improvements. No federal or state funds are available to these airports as long as they remain privately-owned. The Department does, however, participate in funding acquisition of these privately-owned airports by local government bodies.

■ Within the last two years, Congress has passed laws that have substantially reduced the Civil Aeronautics Board's (CAB) regulatory authority over air cargo transportation. The CAB's authority over routes has been abolished, requirements for filing tariffs have been reduced, and controls of shipment rates have been significantly relaxed. Efforts on a national level to analyze the effects of deregulation have been underway, but only partial findings are available. Although air cargo in Michigan amounts to a very small percentage of total intercity tonnage moved, the value of goods moved is high compared to other modes.

■ Several of the 22 Michigan airports presently served with scheduled air carrier service may experience a reduction in or loss of



such service in the near future. Lack of sufficient demand to warrant continuation of existing service levels in the face of increasing operating costs has historically caused the aviation industry to reduce service. Today, deregulation may result in further service cutbacks in the level of air transportation service.

■ Considerable difficulty is encountered in upgrading the classification of a general aviation airport. Upgrading is necessary to qualify an airport for federal and state monies to finance improvements associated with the higher classification. The greatest difficulty occurs when attempting to upgrade an airport from General Utility to Basic Transport status, as the federal government requires detailed survey data regarding potential utilization by "critical" aircraft to substantiate the need for upgrading.

Michigan has supplied essential manufacturing skills and leadership for most of the 75 years of powered flight and has long been a significant user of aircraft, with flights beginning as early as 1915. The Michigan legislature established the Board of Aeronautics in 1929 in an effort to keep pace with aviation growth. Coupled with this action, an airport construction program was initiated, resulting in the creation of 20 landing fields in the lower and upper peninsulas. In the early 1930's, federal legislation increased the number of airports in Michigan to 89. In subsequent years, aircraft registration became a reality, aviation education programs were undertaken, and state monies became available for airport construction.

The Michigan State Airport System Plan (MSASP), published in 1974, was the cornerstone for the development of air carrier and general aviation airport needs. An update of the MSASP data included (1) deletion of completed and/or under-construction improvements, (2) the allocation of identified needs to the time-phase of the study, and (3) the translation of identified needs to a uniform dollar base. In addition, a program was initiated to examine several major assumptions inherent in the systems plan. These support analyses included (1) the specification of aviation system goals, (2) a re-examination of physical and service standards, (3) an analysis of air carrier service deficiencies, (4) a study of the potential impacts of service termination on small communities, (5) an identification of major aviation service issues, and (6) an examination of the impacts of

inflation on the sources of funds.

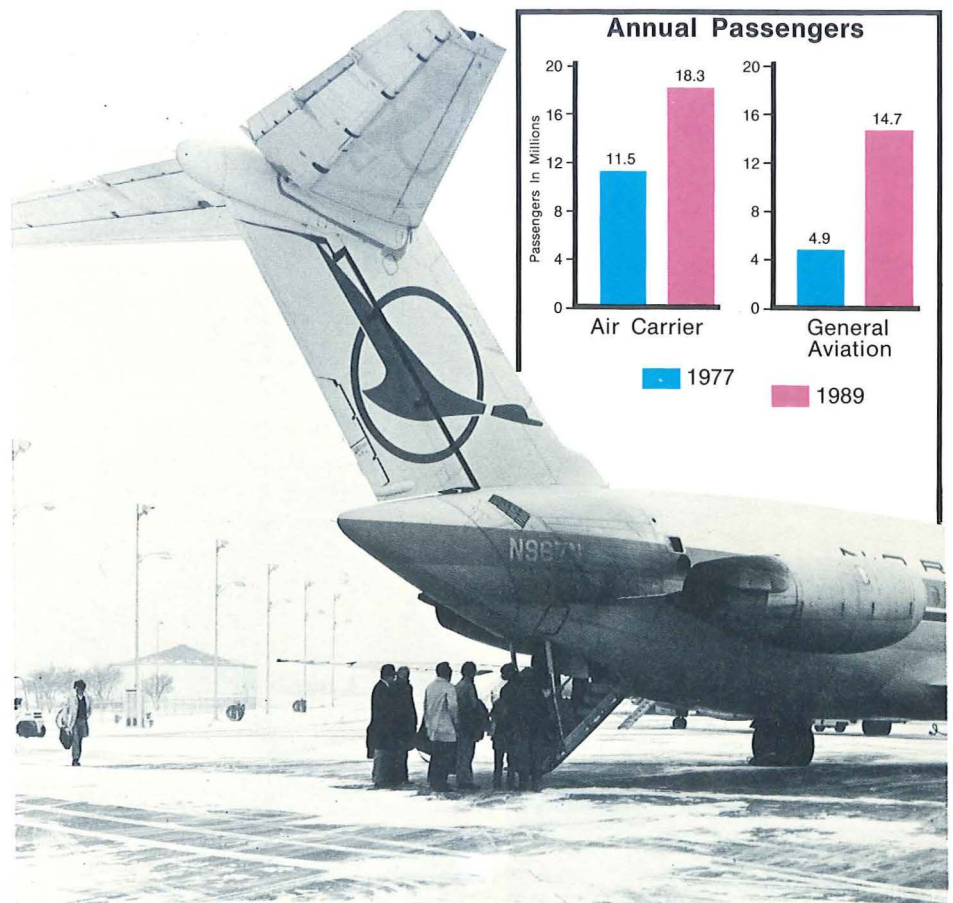
Aviation needs, through the period 1977-1989, were systematically arrayed under the traditional categories of air carrier airports and general aviation airports. Air carrier airports are those accommodating scheduled air transportation service performed by certificated route air carriers. A general aviation airport is one accommodating all civilian activity which is not part of scheduled air service. These general aviation airports are further classified into the following five sub-categories. Depending on the type of aircraft accommodated, these sub-categories are mainly determined by the length of the primary runway: (1) Basic Utility Stage I, (2) Basic Utility Stage II, (3) General Utility, (4) Basic Transport, and (5) General Transport.

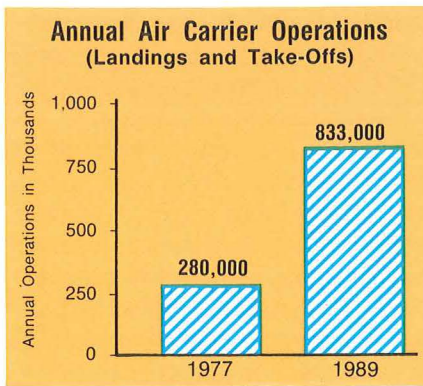
Since the projections of air carrier passengers developed for the Michigan State Airport System Plan, much has happened in the aviation industry. The fuel crisis adversely affected both air carrier and general aviation in 1974 and 1975 and may continue to have a negative impact

on aviation growth. On the other hand, the Airline Deregulation Act of 1978 continues to have a positive impact on passenger growth with an increase in the available routes and services. As a result, it is extremely difficult to anticipate the atmosphere in which airlines will find themselves during the next decade.

In 1977, the 126 MSASP airports in Michigan included 22 air carrier and 104 general aviation airports. By 1989, the number of airports needed is estimated at 182 (22 air carrier airports and 160 general aviation airports). These general aviation airports would range from small Basic Utility Facilities to jet-capable Basic Transport Airports.

By 1989, aviation needs in Michigan will include (1) improvements to 126 existing airports, (2) 56 additional airports, (3) 33 additional precision instrument landing systems, and (4) possible subsidies for scheduled commuter air service. The needs are based on the Michigan State Airport System Plan and the results of the Michigan Scheduled Air Service and Michigan Air Commuter Service studies.





No new air carrier airports are proposed through 1989; however, improvements at each of the existing air carrier airports will be needed. These improvements include land acquisition, runway lengthening and strengthening, airfield lighting, terminal modification and expansion, hangar construction, automobile parking areas and entranceway improvements, precision instrument landing systems, visual approach slope indicators, and runway end identifier lights.

The 1989 distribution of 22 air carrier airports provides each of Michigan's 14 planning and development regions with at least one air carrier airport and satisfies the aviation standard which states, "an air carrier airport should not be further than 60 minutes (surface travel time) from 90 percent of Michigan's population."

By 1989, there will be a need for 56 additional general aviation airports, increasing the number of general aviation airports from the present level of 104 to 160. About one-half of the additional facilities are existing airports which do not meet systems plan requirements and need modification. The remaining 25 to 30 airports are entirely new facilities.



Improvements for the existing 104 general aviation airports include land acquisition, runway lengthening and strengthening, airfield lighting, terminal construction, hangar construction, automobile parking areas and entranceway improvements, precision instrument landing systems, visual approach slope indicators, and runway end identifier lights. Criteria used to determine which airports should be in the MSASP were (1) sufficient aviation capacity in a given geographic area, (2) a reasonable geographic distribution of general aviation airports throughout Michigan, and (3) the general aviation airport classification and operational role.

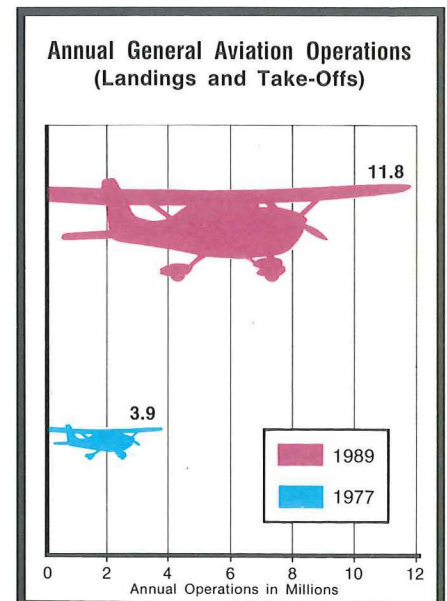
Application of these criteria results in a minimum of four general aviation airports in any one Michigan region, with an average of two per county. This assures meeting the general aviation standard which states, "a general aviation airport should not be further than 30 minutes from 90 percent of Michigan's population or 60 minutes from 100 percent of Michigan's population."

Instrumentation consists of navigational aids installed at an airport facility. Such instruments include visual approach slope indicators, runway end identifier lights, and Precision Instrument Landing Systems (PILS). The PILS may include one of the following systems: (1) Conventional VHF/UHF Instrument Landing System (ILS), (2) Interim Standard Microwave Landing System (ISMLS), or (3) Microwave Landing System (MLS).

Twenty-two Michigan airports have precision instrument landing systems, including 19 of the 22 air

carrier airports and three general aviation airports. By 1989, 33 additional precision instrument landing systems will be needed—three at air carrier and 30 at general aviation airports. The selection of airports to be equipped with PILS was based on the aviation standard which states, "all air carrier airports, plus all general aviation airports with runways 5,000 feet or more in length, should be equipped with precision instrument landing systems."

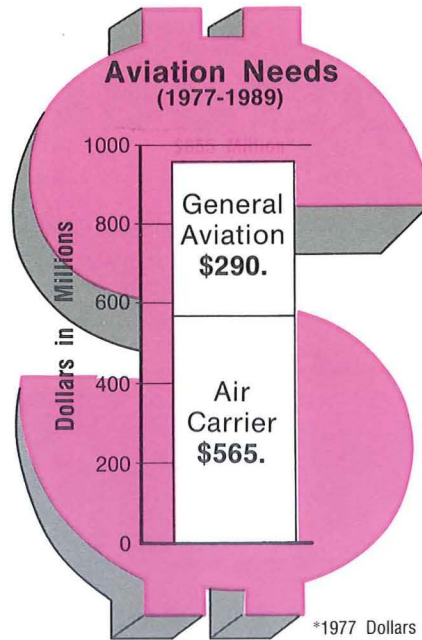
The total capital costs associated with the aviation needs are \$855.2 million, in 1977 dollars, and has been subdivided into three categories: airfield and related items, terminals, and approach aids. Airfield and related items include land acquisition costs, airfield paving and lighting, entrance roads, automobile parking areas, and fencing. Approach aids include visual approach slope indicators, runway end identifier lights, and precision instrument landing systems. Only capital costs are





identified in the statement of aviation needs, and those pertain only to providing or constructing airport facilities affixed to and part of the permanent property of an airport.

Operating costs have not been included in the aviation needs statement because (1) most airport operating and facility maintenance costs are borne by the airport and recovered through license, landing, and automobile parking fees plus hangar and tie-down rentals; (2) general aviation airport operating costs are paid by aircraft owners; and (3) a very small percentage of state and no federal monies are available to meet operating and maintenance costs at the present time. Although some units of government provide operating subsidies, they are not included in the needs.



*The effects of airline deregulation sometimes mean a disruption of service by larger air carrier aircraft. Commuter aircraft are increasingly filling some of the void left by the suspension of service by the larger air carriers throughout the United States. Commuter aircraft serve to transport passengers from smaller cities to the larger metropolitan airports.*

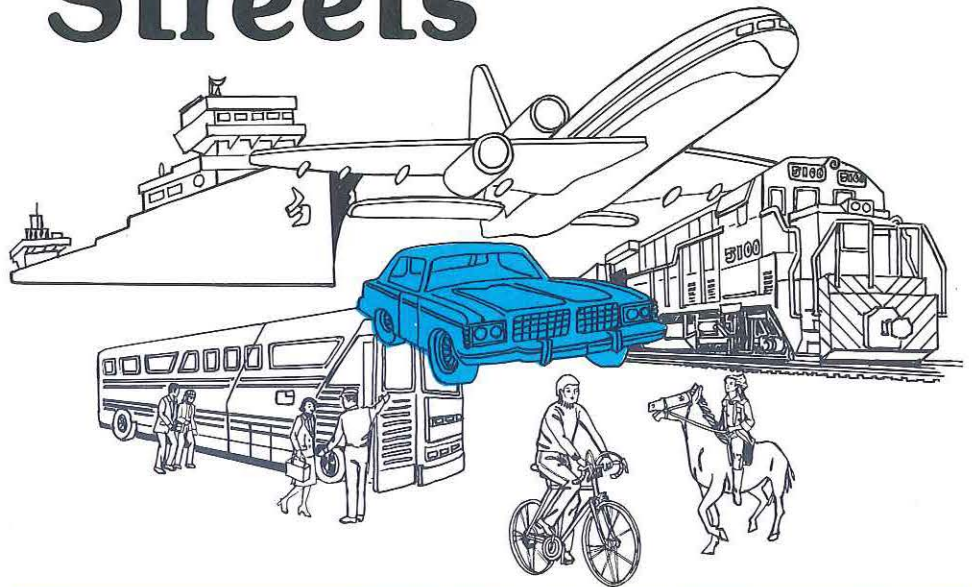
#### Final Observations

The aviation needs assessment process provides the opportunity to critically examine the existing data base, current issues impacting air transportation development, and potentials for improving the analytic capability of the Department. The existing 1974 MSASP was an appropriate and reasonable data framework for this study; however, future analyses and the needs prioritization process require improved up-to-date information.

The supplemental analyses, conducted as part of the study process, served to augment the available data base. These studies provide urgently required information on air carrier service, the potential impacts of air carrier deregulation on small communities, and the potential impacts of inflation on airport improvements. The Department is developing service level analysis models to assist in the near-term refinement of aviation needs. These models will be tailored to address critical issues facing aviation, to improve the information level for needs prioritization, and to provide transition data until the state aviation system plan is updated.



# Highways, Roads, and Streets



## MAJOR FINDINGS

- *The highway, road, and street system is deteriorating at a faster rate than the cities, counties, or state can fund capital expenditure improvements and maintenance of the system.*
- *The rate of deterioration is evidenced by the needs associated with system rehabilitation and restoration. Approximately 68 percent of the total system needs through 1989 are associated with maintaining and rehabilitating existing highways, roads, and streets.*
- *Approximately 23 percent of the total system needs are associated with providing additional lanes to meet traffic capacity needs.*
- *A comparatively small amount of the system needs is associated with new roads. Less than 9 percent of the total system needs is for new roads on new locations.*
- *The magnitude of the existing system deficiencies, categorized as backlog needs, indicates the rapid rate of system deterioration. Approximately 40 percent of the total needs through 1989 is associated with improvements needed today. Levels of funding and projected inflation aggravate the competition between backlog needs and projected needs.*
- *The problems of prioritizing highway, road, and street needs among identified improvements and between modes require a detailed analysis of all needs, of projected levels of public funding, and of new funding mechanisms.*

The historical development of highway, road, and street facilities has been a significant element in the orderly growth of Michigan, with constant demands for progressive expansion of road facilities to accommodate and aid in this growth. Responsibility for providing road facilities has undergone considerable change since the early 1800's and is now a shared function of three levels of government in Michigan—the state, counties, and municipalities.

The effective development of the state road system has been made possible through comprehensive planning and programming. Although the highway, road and street needs study has been integrated within the total statewide transportation needs study, the primary objective remains similar to the six studies completed since 1948—specifically, to determine the condition of the existing system; to identify needed improvements to the county, city, and state road systems; and to estimate the required resources to implement the needed improvements.

This study differs from previous needs analyses and cannot be directly compared with results of previous studies. Some of the differences include the following (1) the time period of this study was based on 13 years, versus 20 years in all previous studies, (2) a special analysis of operations and maintenance costs was conducted within the study, (3) appraisal procedures were limited to assume only *one* major construction improvement, (4) existing urban areas were based on the last census, instead of projected urban area boundaries, (5) design standards were reduced (e.g. reduced subdivision street standard from 30 feet with curbs, gutters, and closed drainage to 27 feet, surface only), and (6) the potential impacts of inflation on needs were analyzed.

The grouping of highways, roads, and streets according to their predominant function and service in the overall network is called "functional classification". Roads may be grouped within three broad

## Summary of Capital Expenditure Needs By Functional Classification 1977 to 1989

(\$1,000's)

| Functional Classification | State Trunklines | County           |                  | City             |                  | Totals            |
|---------------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
|                           |                  | Primarys         | Locals           | Majors           | Locals           |                   |
| <b>Rurals</b>             |                  |                  |                  |                  |                  |                   |
| Statewide Arterials       | 1,248,016        | 60               | 128              | -                | -                | 1,248,204         |
| Regional Arterials        | 1,012,446        | 221,821          | 13,926           | 5,849            | -                | 1,254,042         |
| Local Arterials           | 192,076          | 1,188,684        | 71,814           | 61,009           | 62               | 1,513,645         |
| Principal Collectors      | 4,002            | 1,133,936        | 138,493          | 52,226           | -                | 1,328,657         |
| Secondary Collectors      | -                | 146,956          | 292,315          | 48,130           | 4,316            | 491,717           |
| Residential               | -                | -                | 381,059          | -                | 191,540          | 572,599           |
| Local Access              | -                | 14,084           | 2,337,023        | -                | 4,043            | 2,355,150         |
| Industrial/Commercial     | -                | 589              | 36,128           | 3,159            | 4,810            | 44,686            |
| <b>Subtotals</b>          | <b>2,456,540</b> | <b>2,705,130</b> | <b>3,270,886</b> | <b>170,373</b>   | <b>204,771</b>   | <b>8,808,700</b>  |
| <b>Urban</b>              |                  |                  |                  |                  |                  |                   |
| Statewide Arterials       | 2,857,132        | 12,329           | -                | 1,990            | 306              | 2,871,757         |
| Regional Arterials        | 1,091,603        | 217,315          | 6,072            | 84,820           | 230              | 1,400,040         |
| Metro-Area Arterials      | -                | 1,141,221        | 5,424            | 459,342          | 491              | 1,606,478         |
| Local Arterials           | 197,019          | 1,130,609        | 48,238           | 524,787          | 10,629           | 1,911,282         |
| Principal Collectors      | 1,416            | 251,121          | 87,345           | 533,285          | 39,716           | 912,883           |
| Secondary Collectors      | -                | 38,360           | 128,498          | 259,632          | 63,401           | 489,891           |
| Residential               | -                | -                | 663,048          | 112              | 1,201,645        | 1,864,805         |
| Local Access              | -                | 1,215            | 118,046          | 77               | 47,690           | 167,028           |
| Industrial/Commercial     | -                | 426              | 16,820           | 14,205           | 30,232           | 61,683            |
| <b>Subtotals</b>          | <b>4,147,170</b> | <b>2,792,596</b> | <b>1,073,491</b> | <b>1,878,250</b> | <b>1,394,340</b> | <b>11,285,847</b> |
| <b>Totals</b>             | <b>6,603,710</b> | <b>5,498,726</b> | <b>4,344,377</b> | <b>2,048,623</b> | <b>1,599,111</b> | <b>20,094,547</b> |

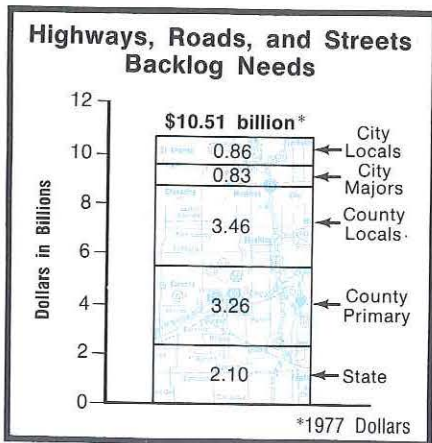
classifications: arterials, collectors, and local access roads. Arterials principally carry high volumes of traffic on relatively long trips; thus, their predominate characteristic is considered "mobility." On the other end of the classification range are the local access roads whose principal function is providing access to adjacent property. Between the arterial and local access systems lies the collector system whose function is to provide service between the other two systems and provide service between minor population and economic centers within the area. In an ideally classified network, arterials and collectors comprise about one third of the total mileage. The remaining two thirds is classified in the local access category.

Although the Michigan Department of Transportation was given the task of initially classifying the entire network of highways, roads, and streets, local road agencies were

asked to provide input for the study with recommendations for classification of their road systems where conditions had changed. A cooperative effort by state, county, and city road administrations resulted in identifying a statewide network of roads based on functional classification.

To establish capital expenditure needs, it was necessary to determine the condition of all existing facilities, what additions, if any, would be required, and at what cost. The inventory of highways, roads, and streets was used to determine the type and time of needed improvements. For each deficient section of road, total needs were determined by applying unit costs for each type of deficiency. Capital expenditure costs were developed for (1) right-of-way, (2) grading and drainage, (3) base and surface, (4) structures, (5) railroad grade crossing protection, and (6) miscellaneous.



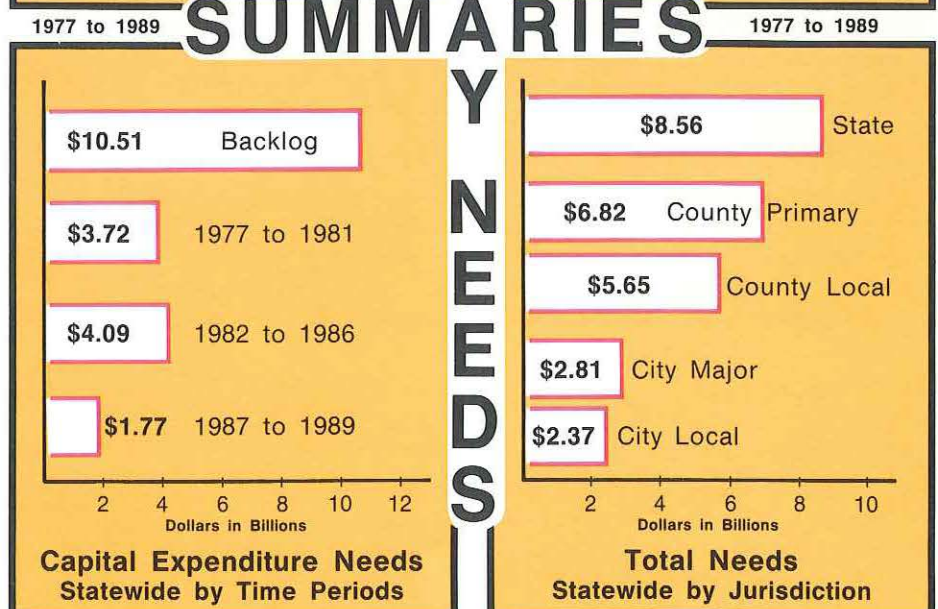
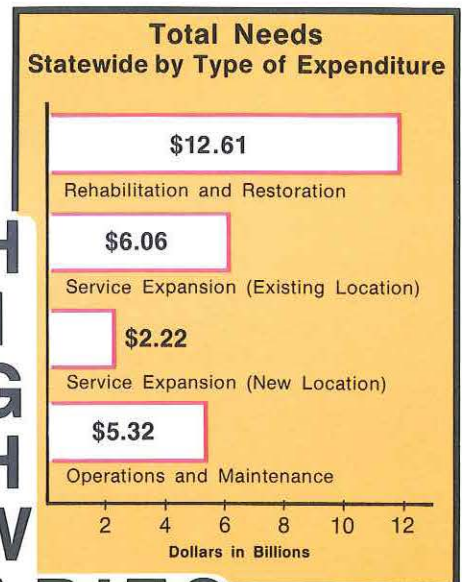


Capital expenditure needs were further categorized as (1) backlog, (2) rehabilitation and restoration, and (3) service expansion. Backlog needs represent that portion of capital expenditure needs which existed as of January 1, 1977; these required improvements would have been made if funds had been available. Rehabilitation and restoration needs represent that portion of the capital expenditure needs associated with restoring or rehabilitating the road surface or surface and base. Surface and base rehabilitation is indicated when inadequate capacity can be corrected through lane widening up to 12-foot lanes. The cost of rebuilding interchanges is included in this category.

The last category, service expansion needs, was further separated into two sub-categories — new location and added lanes. Service expansion (new locations) is that portion of capital expenditure needs attributable to completely new roads on new locations. Service expansion (added lanes) includes all costs associated with adding lanes within existing rights-of-way to increase capacity and the cost of expanded freeway system interchanges.

Perhaps the most significant cost category employed in the development of total road needs was Operations and Maintenance costs. In previous studies, maintenance and administrative costs were separate cost items. In this study, maintenance, administration, and capital outlay-equipment costs are grouped under the heading of

Operations and Maintenance costs. These costs were developed from past expenditures reported by the state, counties, and cities. The significance of Operations and Maintenance costs can best be appreciated when viewed against the projections of revenues and the inescapable realities of the effects of inflation.



## State Highway Needs

The statewide arterial system consists of principal arterials and other arterials which, in combination, serve all urbanized areas with populations in excess of 50,000. In southern Michigan, the principal arterial system represents the basic freeway network. In the northern areas of the state, these principal routes remain to be studied to determine appropriate design standards. The two levels of statewide arterial routes combine to form a system of highways to sustain most of the long distance travel throughout the state.

The principal arterial category consists of the Interstate Highway System and additional arterials required for statewide traffic mobility. The Interstate System provides direct service to all urban areas of 50,000 or more population and is based on criteria established by the federal government. The only purpose in segregating the Interstate Highway System is the special

criteria related to its establishment. These include the need to meet federal guidelines prior to being included in the system; in construction priorities; in proportionately higher federal participation; and in limited access design standards. Other statewide arterials expand on the service provided by the Interstate Highway System by extending direct and relatively unrestricted routings between other important population centers throughout the state.

Regional arterial highways provide the third level of state trunkline highway service. These routes are important to large regions of the state and provide service to district, area, and special interest centers. They collect and distribute traffic to and from the statewide arterial system and provide state service to geographical areas of the state not served by the higher classified highways.

The fourth level consists of a

limited number of other local arterials or collectors which provide state service to special interest centers such as parks and institutions.

Needs for state highways were based on an inventory and analysis of the 9,453-mile system. The inventory data from a current road sufficiency rating were supplemented by additional up-to-date information such as current traffic statistics and traffic expansion percentages to determine needed improvements on the existing highways.

There are presently 150 miles of seal coat surface and 3,653 miles of mixed bituminous over a flexible base on the state truckline system. The remaining 5,650 miles of state trunkline are either concrete or bituminous on rigid base. Pavement width is an important factor in determining adequacy of the state highway system. In order to minimize surface failures at the pavement edges and capacity deficiencies, surface widths should meet the minimum requirements of 12-foot-lane widths—especially on two-lane highways. Currently, 4,203 miles, or 44 percent of the total, do not meet this requirement.

During the 13-year study period, 7,115 miles, or 75 percent of the state highways, required improvement. Existing deficiencies and future capital expenditure needs amount to approximately \$6.60 billion. A total of \$1.76 billion of needs is associated with the interstate, while the other state truckline needs are \$4.84 billion. Approximately 32 percent of the total interstate and other state trunkline needs are for system rehabilitation and restoration.





### County Road Needs

By law, the county road network is divided into the county primary system and the county local system. The county primary system currently comprises about one-third of the total county road network. Roads of lesser importance are classified as the county local system and constitute the remaining two-thirds of the network.

The determination of needs on the county road system was based on January 1, 1977 inventory data submitted by the various County Road Commissions throughout the state. Seventy-eight of the 83 counties in the state submitted data for the study; data submitted in previous studies were used in lieu of updated information for the five non-participating counties. Analysis of county road inventory data

indicates the majority of roads are deficient when compared to design standards used in the study. Roadway deficiencies were measured in terms of (1) capacity or the ability of a road to carry traffic, (2) surface condition, (3) base condition — including drainage, or (4) a combination of the above. Deficiencies were based on the future functional classification of the roads and their ability to carry future traffic.

Bridge structure improvement needs were measured in terms of (1) load carrying ability, (2) condition, (3) width, (4) horizontal and vertical clearance, or (5) a combination of the above. These requirements were based on future functional classifications and projected traffic volumes of the road served. A bridge

structure, defined as any structure having a clear span length of 20 feet or greater, included (1) highway over water, (2) highway over highway, (3) highway over railroad, and (4) railroad over highway.

Railroad grade crossing needs were measured in terms of the type of crossing protection provided and were based on future functional classification and traffic volumes.

Capital expenditure needs on the county road system total \$9.84 billion for the 13-year period and constitute the major portion of the total. County primary needs are approximately \$5.50 billion while county local needs are \$4.34 billion. Of the total county road system needs, approximately 59 percent are associated with system rehabilitation and restoration.

Municipal street system needs were determined through an analysis of current inventory data submitted by 531 incorporated cities and villages. These data reflect the condition of the system as of January 1, 1977 and include roads, bridge structures, and railroad grade crossing protection.

The majority of the municipal street system requires improvements when compared to the design standards used for municipal street needs analysis. Deficiencies or needed improvements were based on the future functional classifications of the streets and their ability to serve estimated future traffic. These improvements were measured in terms of (1) capacity, (2) surface condition, (3) base condition, or (4) a combination of improvements.

Similar to the county road system, most of the needs are on the major streets, including the local arterial

and principal collector systems. For local city streets, the major needs occur on residential streets. Capital expenditure needs on the municipal street system total \$3.65 billion over the 13-year period.

City major street capital expenditure needs are approximately \$2.05 billion, while city local street needs are approximately \$1.60 billion. Of the total municipal street system needs, approximately 49 percent are associated with system rehabilitation and restoration. New subdivision streets are not included since it is anticipated they will be constructed by local developers.

### **Municipal Street Needs**

The municipal street system, by law, is divided into the city major system and the city local system. Streets of greatest importance to municipalities are classified within the city major system, representing approximately one-third of the total municipal road network. The city local system constitutes approximately two-thirds of the network.



## Total Highway, Road and Street Needs 1977 to 1989 (\$1,000's)

| System                 | Rehabilitation And Restoration* |            | Service Expansion |           |              |           | Operations And Maintenance | Totals     | Percent Of Total |
|------------------------|---------------------------------|------------|-------------------|-----------|--------------|-----------|----------------------------|------------|------------------|
|                        | Miles                           | Cost       | Added Lanes**     |           | New Location |           |                            |            |                  |
|                        |                                 |            | Miles             | Cost      | Miles        | Cost      |                            |            |                  |
| Interstate             | 327.90                          | 528,831    | 219.85            | 647,797   | 88.80        | 601,704   | 1,804,400                  | 8,557,259  | 32.6             |
| Other State Trunklines | 5,237.15                        | 2,223,857  | 1,249.90          | 1,894,103 | 328.95       | 856,567   |                            |            |                  |
| County Primary         | 21,909.64                       | 3,019,027  | 1,422.66          | 2,210,274 | 396.98       | 491,510   |                            |            |                  |
| County Local           | 56,889.16                       | 4,293,625  | 1,309.98          | 315,560   | 56.10        | 23,739    |                            |            |                  |
| City Major             | 4,035.69                        | 1,048,429  | 592.93            | 848,760   | 147.81       | 207,974   |                            |            |                  |
| City Local             | 11,421.27                       | 1,495,194  | 422.07            | 141,736   | 73.04        | 38,323    | 699,400                    | 2,374,653  | 9.1              |
| Totals                 | 99,820.81                       | 12,608,963 | 5,217.39          | 6,058,230 | 1,091.68     | 2,219,817 | 5,322,200                  | 26,209,210 | 100.0            |

\* Includes upgrading to additional width (less than 12') where rehabilitation is required. On Freeway, includes rebuilding of interchanges.

\*\* Includes rehabilitation of base, drainage, etc., where additional lanes (12' and greater) are required to meet traffic capacity needs. On Freeways, includes added or expanded interchanges, and additional lanes in existing right-of-way.

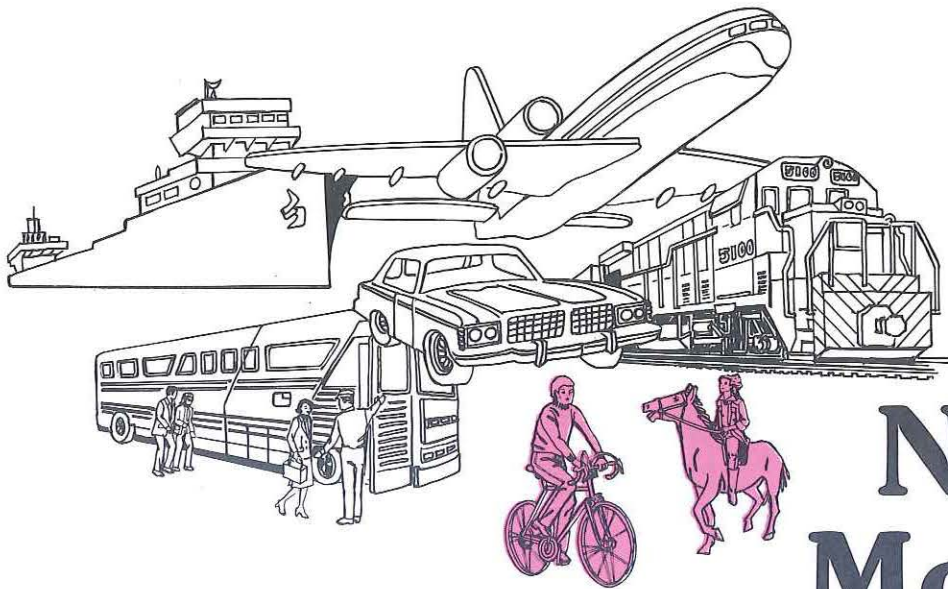
### Final Observations

The improved needs assessment process has produced a significant base of data and information for continued analysis, public comment, and needs prioritization. Although significant reductions in needs estimates have been achieved, the future is not bright.

The magnitude of highway, road, and street needs clearly indicates the existing system is deteriorating, as emerging events continue to limit available funds. Costs associated with maintaining the existing system grow rapidly as inflation erodes the buying power of limited resources. To compound the problem, changes in the level and predictability of gas tax revenues are appearing as the mix of vehicles moves toward federally mandated efficiency standards, the cost of gasoline

increases, and gasoline availability and distribution problems persist.

From a technical standpoint, the opportunities for refining the data base and improving analytic techniques appear difficult but easier than the decisions which must be made in prioritizing needs. Future refinements will be dedicated to developing a clear appreciation of the (1) distribution of the backlog needs, (2) implications of operation and maintenance requirements, and (3) potential impacts of motor carrier and rail deregulation on the integrity of the system. Specific attention must be directed toward (1) analyzing competing and potentially duplicative needs, (2) ensuring the state's maximum participation in federal programs, and (3) maintaining the existing system.



# Non-Motorized Transportation

## MAJOR FINDINGS

■ Michigan's urban street system provides the basic resource for development of a safe and efficient network for transportation and recreational bicycling. A network including low-volume streets, bicycle facility development on independent rights-of-way, and improvements to 1,135 miles of non-local urban streets would provide a high degree of mobility to urban bicyclists.

■ A 7,300 mile rural bicycling network consisting of designated roads and highways, abandoned railroad rights-of-way, and existing bicycle facilities would interconnect the 80 urban areas and 79 state parks.

■ Provision of bicycle facilities or roadway improvements to facilitate bicycle travel is but one means of encouraging bicycle use and reducing bicycle accidents. Improved bicycle safety training, motorist awareness, and law enforcement are also elements which need to be addressed in a comprehensive bicycle program

■ Linear horse trails can provide improved access between state horseback riding areas, from urban areas to these locations, and can supplement existing and proposed facilities administered by the Michigan Department of Natural Resources (DNR).

At the turn of the century, bicycling for transportation and recreation achieved popularity for one out of every eight Americans. In fact, many urban dwellers considered the bicycle essential transportation. With the introduction of the mass-produced automobile, bicycle use dramatically declined. However, this trend began to reverse and there were approximately 23 million bicycles in use nationally in 1960; by 1977 there were between 84 and 91 million.

The popularity of bicycling in Michigan parallels that of the national trend, with an estimated 3.5 to 4 million bicycles currently in use. Although there is no single reason for this resurgence of interest in bicycles, increased consciousness of physical fitness, the quality of the environment, and personal transportation economy are cited.

A 1971 survey of Michigan's horse industry conducted by the Michigan Cooperative Extension Service concluded that there were about 171,000 horses in the state. Forecasts indicate an increase of 229,000 by 1985. Assuming a uniform annual increase, there could be as many as 480,000 horses in Michigan by 1989. It can be estimated that approximately

300,000 of the forecasted 1989 horse population may be trail horses.

In 1972, the Michigan Legislature recognized the increasing popularity of non-motorized travel by enacting legislation requiring road agencies to consider the facility needs of bicyclists and horseback riders. Recent legislation (Act 444 of 1978) reinforces the intent of the previous law by requiring Michigan's road agencies to spend one percent of their allocations from the Michigan Transportation Fund for non-motorized transportation facilities, defined by an Attorney General's opinion as bicycling and horseback riding.

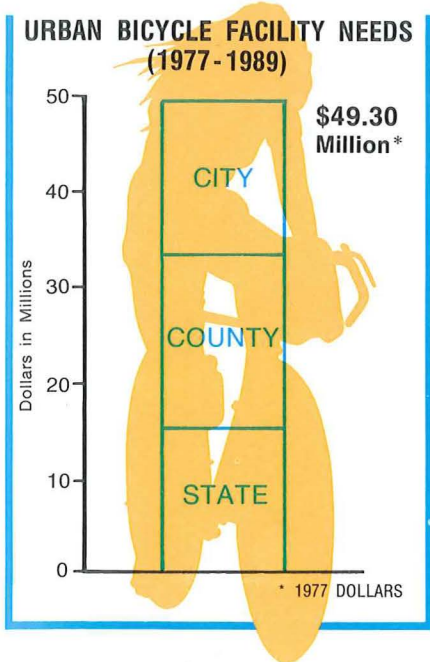
A major justification for increased attention to development of bicycle facilities is the increasing number of accidents occurring between bicycles and motor vehicles. Accidents increased from 2,588 in 1968 to a high of 4,883 in 1975, an increase of 89 percent; however, accidents have declined since then to 4,063 in 1977. The vast majority of these accidents resulted in personal injury and fatalities.

### **Urban Bicycle Needs**

The first element of the needs assessment process was to determine the extent of facility development and planning in Michigan. All cities and counties in Michigan were asked to provide bicycle facility and planning information as of January 1, 1977. Twenty-one cities and eighteen counties indicated they had developed bicycling facilities. A total of 443 miles of all classes of urban bicycling facilities was reported; however, facilities existing within parks or on college campuses were not inventoried.

At the present time, there is no clear-cut agreement among groups and individuals interested in bicycling as to what kind of improvements should be provided or where. Most design possibilities suggest, however, that additional road width is a common requirement. For study purposes, the concept of additional width was adopted as a uniform means of arriving at reasonable estimates of financial needs.





The present system of arterial and collector streets provides the greatest opportunity for the development of an urban bicycle system. These higher order streets provide transportation service to major activity centers, such as employment centers, shopping areas, schools and colleges, and recreational facilities. They provide the highest level of directness, mobility, and continuity within an urban area—characteristics valued as much by bicyclists as motorists. Improvements to the arterial-collector street system or within the travel corridors of these streets will receive primary emphasis in establishing a bicycle network. Of the 9,106-mile arterial-collector system, 3,923 miles meet the established traffic volume limits considered suitable for bicycle travel.

The remaining urban streets (5,183 miles) represent that portion of the network which requires improvement to facilitate bicycle travel. However improvement of the entire 5,183 miles, within the 13-year needs period, would prove to be unreasonably costly and of questionable value. Analysis of urban area plans suggests that something on the order of one-half of the arterial-collector street system would form a reasonable bicycling system. This system would include those streets with acceptable traffic

volumes as well as selected streets above these levels.

It is quite clear that the existing urban street system should receive primary emphasis in developing a viable bicycle network; however, there may be unique opportunities within specific urban areas for development of preferential bicycle facilities. These opportunities include abandoned railroad or utility rights-of-way, lake shores, river banks, or other areas where cross-flows of motorized traffic can be minimized and pedestrian traffic limited or prohibited. Although these needs cannot be precisely identified, an estimate of 5 percent of the identified urban bicycle facility needs was assumed for needs estimation.

Three alternative cases describing urban bicycle facility needs were evaluated to analyze future bicycle needs. The case selected by the Needs Study Committee translates to \$35.40 million for capital improvements, \$10.40 million for maintenance, and \$3.50 million for administrative costs through 1989.

### Rural Bicycle Needs

The rural road and highway system constitutes the basic rural bicycle network. Paved low-volume roads, improved roadway surfaces, and the paving of shoulders on high volume roads satisfies most recreational bicycle needs. This network can be augmented by bicycle facilities along abandoned railroads or utility rights-of-way, shore lines, river banks, and within the many parks in Michigan.

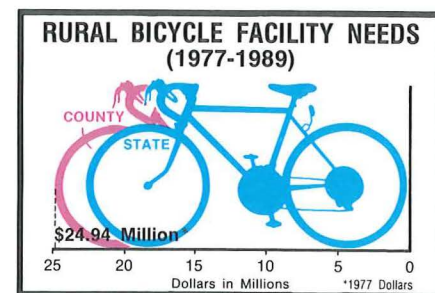
The existing rural highway system was analyzed to identify (1) roads and highways suitable for bicycling without improvement, (2) the extent of roadway improvement reported in the highway needs element, and (3) the quantity of roads and highways which should be improved to accommodate bicycling. According to the analysis, 44 percent of the state's rural roads and highways are paved and carry 2,000 motor vehicles or less on an average day. While localized conditions may prove otherwise, these roads are considered suitable for bicycling.

A bicycle network of 7,300 miles

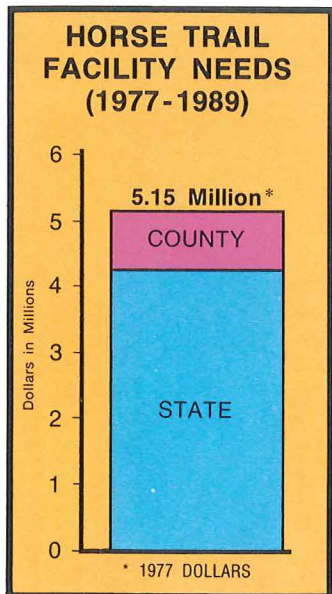


would be necessary to interconnect the 80 urban areas and 79 state parks. Additional analyses identified 503 miles of presently abandoned railroad right-of-way of 25 miles or greater in length and within an hour's drive of urban areas. The basic network would incorporate 425 miles of existing bicycle facilities, 395 miles of abandoned railroad right-of-way, and a shoreline route which would consist primarily of existing roads. A cross-state trail would emphasize the use of off-road right-of-way in the development of separate bicycling facilities. It would extend from Lake Michigan to near the Detroit Metropolitan area with extensions south to Lake Erie and north and east to Lake St. Clair.

The needs for rural bicycle facilities through 1989 include \$17.40 million for capital improvements, \$1.40 million for right-of-way, \$4.44 million for maintenance, and \$1.70 million for administration.







### Horse Trail Needs

The Department of Natural Resources has been the traditional state agency for satisfying horseback riding facility needs, while local recreational agencies have had the responsibility for provision of facilities at the local level. The Michigan Department of Transportation and local road agencies are, however, required by law to provide facilities for horseback riding, where possible. The Department of Natural Resources reports that a total of 185 miles of trail, presently under their jurisdiction is available for horseback riding. These are located at 11 state recreation areas, 2 state parks and 2 state game areas. In addition to these trails, a 253-mile hiking and horseback riding trail has been developed across the northern lower peninsula. Additionally, local areas in a 1976 DNR survey reported that 71 miles of horse trail facilities are under local jurisdiction. In all, 509 miles of horse trails exist in Michigan. These figures do not reflect the many areas of state and federal lands open to horseback riding.

The determination of service level assumptions for horse trail needs was based on the recognition that the DNR will continue to have primary responsibility for horse trail development, and that travel opportunities are within existing transportation corridors.

These existing corridors are

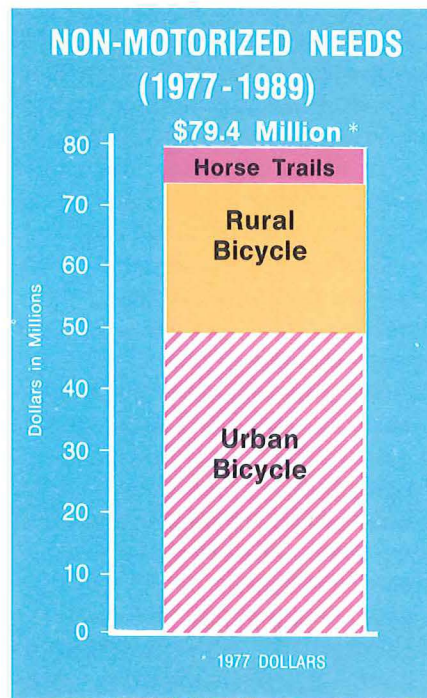
typically under the jurisdiction of road agencies and are linear in nature.

The primary opportunities for providing linear horse trail facilities would be along abandoned railroad rights-of-way and within the right-of-way of existing roads and highways.

Approximately 824 miles of railroad abandonments, 10 or more miles in length, are within an hour's drive of an urban area. Included in this figure are all abandonments, 25 miles in length, which may be developed as multi-use trails for both horsemen and bicyclists.

The Needs Study Committee determined that connecting links between urban areas, as well as between each horseback riding area, would be desirable when distances were of a reasonable length. These trail links would, for the most part, be developed within the right-of-way of the existing road and highway system. Analysis indicated that 320 miles of trail would be required to connect urban areas within 10 miles of a public horseback riding area and that 331 miles of trail would be required to interconnect public horseback riding areas within 20 miles of one another.

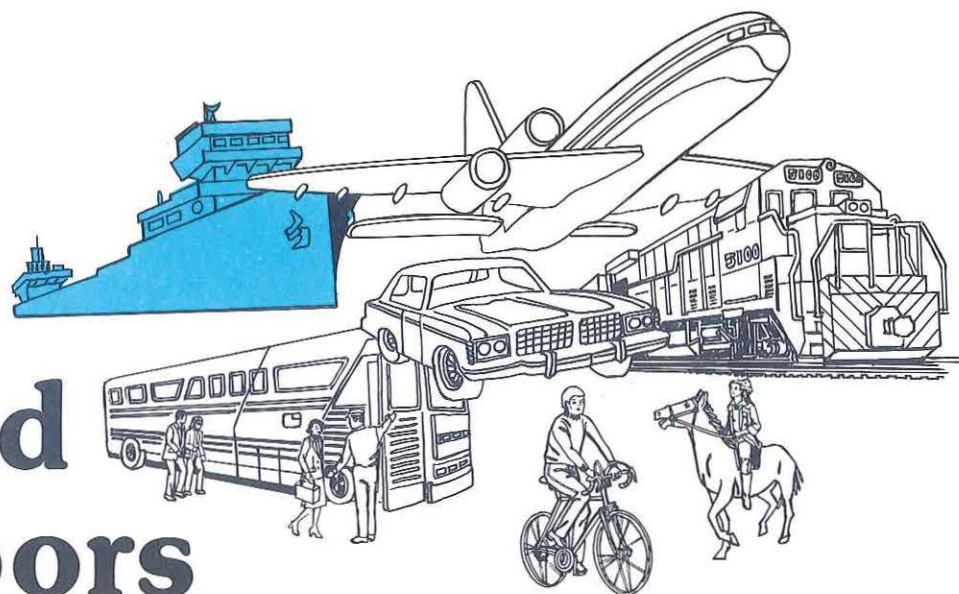
Horse trail facility needs through 1989 include \$1.68 million of capital improvements, \$2.23 million for right-of-way, \$1.08 million for maintenance, and \$0.16 million for administration.



### Final Observations

Significant effort is required to refine the assessment of non-motorized needs and develop comprehensive procedures for planning in the near term. This mode has only recently become significant in the state and across the nation. As such, fundamental research and the design of new analytic tools are of primary importance in improving our capability to respond to public interests and concerns. This first-step needs analysis sets the stage for informed public discussion of the many issues associated with non-motorized transportation.

# Ports and Harbors



## Historical Perspective

Water transportation has always played a basic role in the history of human and economic development. With the rise of cities, the improvement of natural harbors served to maintain access to necessary resources.

The era of industrialization, with its requirements for increasing amounts of energy and raw materials, made shipping even more essential to the development of a modern state. So central were the ports to the success of cities that, when port development began to conflict with other urban objectives, port authorities were established as regulatory agencies to protect the larger public interest. Later, the functions of public port authorities, as in many other states

and countries, were further increased to include ownership, construction, and operation.

Throughout the history of port institutions in the United States, the primary function of maritime ports has been to maximize the flow of commerce and to strengthen the economies of the regions served. Michigan's importance as an industrial, mining, farming, and tourist state is, in a large part, due to its favorable geographical location on four of the five Great Lakes. Historically, access to water transportation has provided the stimulus for economic development and the establishment of urban communities adjacent to commercial harbors.

## Michigan's Role

From 1881 to the present time, the State of Michigan has maintained a passive role in commercial harbor development, authorizing local communities to control their own destiny. Waterborne commerce through Michigan's commercial harbors has steadily increased during this century to a total of 86.5 million tons in 1972, valued at over one billion dollars. During this period of development, public port management has not kept pace. The state, in turn, has provided only minimal technical assistance and no statement of goals, needs, and objectives.

Studies and projections indicate a potential for increased waterborne commerce, and the Michigan Legislature has responded by authorizing state funds for port development. The Michigan Department of Transportation has the statutory authority to design a program for developing ports and waterborne commerce and is committed to develop and formulate policies, programs, plans, and specific recommendations for state and local governmental action.

increased investment in port facilities, harbor and channel improvements, and intermodal exchange facilities will be required.

The commercial harbors of Michigan face changing conditions that require coordinated assessment and planning. The ports are experiencing increased competition from ports of other regions. Limited shore land is desired for many non-port uses, and necessary back-up land for port activities is increasingly expensive and difficult

regional and national policies.

Despite these problems, many opportunities are available to ports. The advent of the container, with its intermodal flexibility, permits better integration with other transportation modes supporting port operations. Potential market areas are rapidly expanding and ports can capitalize on their areas of competitive advantage and competence.



A study entitled *Domestic Waterborne Shipping — Market Analysis*, published in 1974 by the U.S. Department of Commerce, Maritime Administration, projected growth of waterborne commerce on the Great Lakes to the year 2000. Applying the estimated increases to the 1972 base of commodity movement patterns through Michigan ports, a projected annual tonnage of 174.5 million tons valued at \$2.4 billion is possible before the end of the century. To reach this potential,

to obtain. Ship and shore technologies are changing, new markets are developing, and locating and securing port financing is increasingly difficult as capital investment and operating costs rise. Diverse and competing demands are being made on limited public funds, and energy required to operate ports is costly and sometimes scarce. Lastly, shifting public values highlight the necessity to coordinate port policies with those of adjacent urban areas, as well as with state,

Cooperation among ports in their planning activities results in effective investments which yield high rates of facility use. The return on investment, in turn, improves the ability of the ports to develop new sources of investment capital.

## EMERGING ISSUES

The recent developments and emerging issues which justify increased state involvement in port planning, administration, and development include:

■ *Changing federal policy will require substantial additional state and local financial participation in harbor improvement projects. The magnitude of the costs involved may effectively preclude such projects being undertaken in Michigan.*

■ *U.S. Public Law 91-611 requires the construction of diked disposal areas to contain polluted material from channel and harbor maintenance dredging. Local port communities are required to provide land for this purpose and provide necessary assurances of compliance as delineated by the federal government.*

■ *Limited federal resources and increased environmental concerns require the identification of priorities in new project proposals for harbor and channel improvements.*

■ *The Merchant Marine Act of 1970 stimulated a vessel replacement program on the Great Lakes, paralleling the world-wide trend toward larger vessels in the bulk commodity trades. The potential for changing trade patterns and for changing traditional port relationships to accommodate large vessel operations increases the demands for port planning.*

■ *The abandonment proposals for railroads and carferries can further change traditional port relationships and jeopardize the economy of local port communities.*

■ *The major Michigan harbors have, in recent years, reduced or eliminated their port development programs by local political decision or the lack of available local funds. Other commercial harbors never developed the local management structure to adequately resolve problems in port development.*

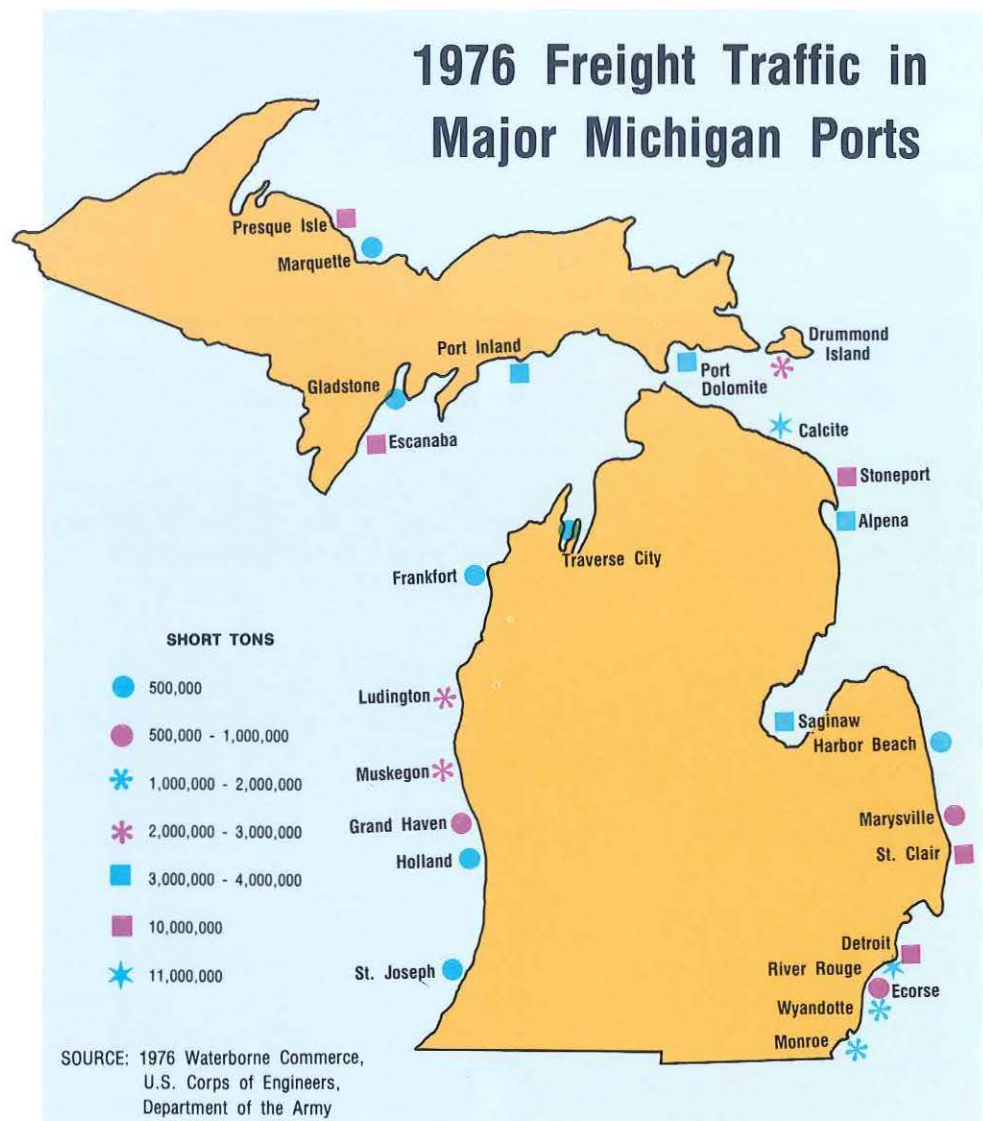
■ *The increased demands for energy-efficient water*

*transportation will complicate the planning for recreation, housing, and wildlife habitats. Coordinated land use planning is required to effectively manage the scarce land available for additional port development and operation.*

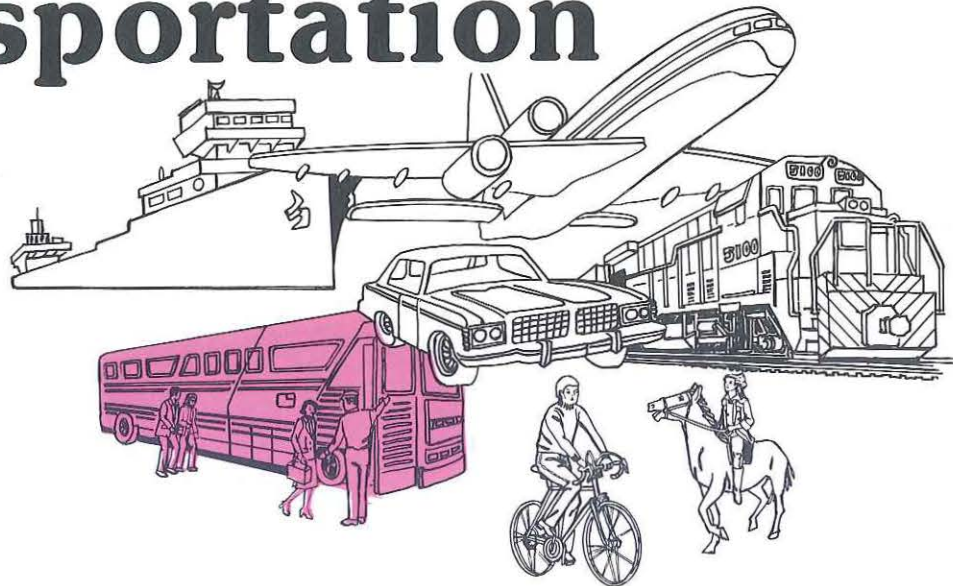
■ *The problem of rapid technological change in the marine industry, particularly containerization, requires added emphasis on intermodal interchange at and beyond the waterfront. Another recent change is the trend toward shipload carriage and away from common-carrier liners for many important commodities such as lumber, newsprint, semi-finished iron, steel, and automobiles. These so-called "neo-bulks" are the fastest growing element in world trade. The challenge presented by these developments has only*

*partially been met by Michigan ports.*

The purpose of our current ports and harbors needs study is to predict what may happen to waterborne commerce in the future, to assess changes in port technology, to quantify environmental problems, to recommend port improvements, and to evaluate the economic impact of alternative public investments. When completed, the analysis will provide a basis for future cooperative port development without restricting the opportunities of individual ports of the state to respond to changing market demands. It is anticipated that the analyses will further provide a base from which individual ports, or groups of ports, may continue their development in a cooperative and coordinated manner.



# Public Transportation

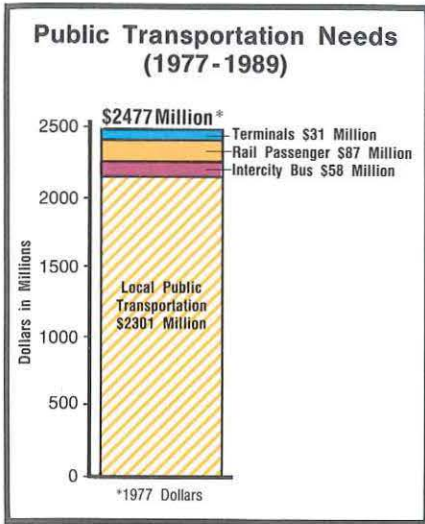


## MAJOR FINDINGS

- Since 1972, the level of state and federal public transportation support has increased dramatically. This support has resulted in a higher level of service and ridership in metropolitan areas and the initiation of service in many urban and rural areas.
- Intercity buses will continue to be the only mode of intercity public transportation providing comprehensive statewide service. At the same time, the financial condition of the intercity bus industry will continue to deteriorate, necessitating governmental assistance to continue or expand service.
- Continuing opportunities exist to coordinate intercity bus and rail passenger systems, to avoid duplication, and/or to upgrade service.

- Ridership projections indicate a need for rail passenger service in major travel corridors between metropolitan areas.
- Efficiencies in costs and service to the public can be enhanced by new or improved intermodal terminals to facilitate travel connections between local and intercity modes.
- Elderly, handicapped, low income, and other individuals who have no alternative mode choice for access to goods and services necessary for their physical or mental well-being require a basic level of local public transportation services.
- A high level of public transportation services can be justified in large metropolitan areas because of cost and energy efficiencies and other benefits relating to land use, traffic

- congestion relief, and the reduction of air and noise pollution. Conversely, a lower level of service oriented to meeting essential mobility needs is warranted in rural and small urban areas because these systems are relatively expensive from an economic and energy standpoint.
- Ridesharing programs can contribute significantly to the reduction of energy usage and vehicle congestion. Carpools and vanpools reduce public transportation vehicle and driver requirements needed to serve work trips.
- Significant cost efficiencies and higher levels of service can be achieved through coordination between, or consolidation of, transportation services provided by human service agencies and public transportation systems.



Public transportation, in Michigan as well as in the United States, is in a state of transition. It is emerging from a period of private ownership and declining ridership to one of public ownership and increasing ridership. There are also indications that long-term trends of increasing auto ownership and dispersed development patterns are slowing.

Social benefits from improved public transportation service are increasingly recognized. These benefits afford improvements in mobility opportunities for all citizens, preservation of scarce natural resources, and the potential for positive economic and land use impacts. Action has been taken at the state and federal level to expand local and intercity public transportation service. In 1971, the Michigan Legislature considered avenues by which state public transportation could become more viable and more effective in meeting citizen needs. In 1972, the legislature passed Act 327 which, for the first time, allowed highway-user taxes to be disbursed for public transportation purposes. Recent legislation continues in the effort to improve public transportation services by increasing state and federal funding sources.

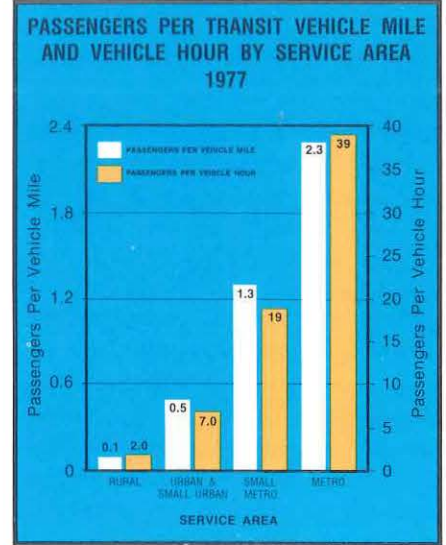
The three categories of public transportation analyzed in this study include local public transportation, intercity bus, and intercity rail passenger service. The total needs identified for these categories for the period 1977 - 1989 amount to \$2.48 billion.

## LOCAL PUBLIC TRANSPORTATION NEEDS

Five distinct planning area categories employed in the analysis of public transportation service - rural, small urban, small metropolitan, and metropolitan - were characterized by unique population range, population density, and mix of transit services. The selection of a level of service was the major determinate for each of the planning area categories when identifying and assessing public transportation needs.

Local public transportation needs were based on comprehensive service assumptions with respect to (1) essential transportation service for all elderly and handicapped persons, (2) cost efficiency, and (3) energy efficiency. A computerized model was developed to analyze various service level assumptions expressed in terms of daily vehicle hours of service per 1,000 population and to calculate 1989 capital and operating financial needs.

The modeling and analysis process included examining three alternative levels of service for communities within the rural, urban, and metropolitan area categories. These alternatives may be defined as (1) the "low" level of service



representing what typically exists at present, (2) the "medium" level of service representing a 50-100 percent increase in service over the "low" level, and (3) the "high" level of service representing a 100-300 percent increase over the "low" level.

The "medium" alternative was chosen as the basis for determining overall statewide public transportation needs; however, levels of service most appropriate for individual communities vary from the "low", to the "medium," to the "high" alternative. Selection of an alternative for actual service planning and implementation for

| PLANNING AREA TYPES AND DEFINITION COMPONENTS |  |                            |   |
|---|--|----------------------------|---|
| Area Type                                     | Population Range                                     | Population Per Square Mile | Transit Service Characteristics   |
| Metropolitan                                  | Over 1 million                                       | Over 6,000                 | Bus rapid transit (and possibly rail rapid transit); high level of fixed-route service and commuter service (commuter bus and rail); supplemental service such as demand-responsive and downtown circulation. |
| Small Metropolitan                            | 50,000 to 1 million                                  | 3,000 to 6,000             | Moderate to high level of fixed-route service and commuter service (generally commuter bus only); supplemental service such as demand-responsive and downtown circulation may exist.                          |
| Urban   | 5,000 to 50,000                                      | 1,500 to 3,000             | Low to moderate level of fixed-route service; high level of demand-responsive service.  |
| Small Urban                                   | 2,000 to 5,000                                       | 100 to 1,500               | No fixed-route service; moderate level of demand-responsive service (sometimes provided for portions of the day only).  |
| Rural   | Communities under 2,000 and all unincorporated areas | Less than 100              | Low level of fixed-route service and commuter service (generally commuter bus only); low to moderate level of demand-responsive service.  |

specific communities should be based, in large part, on the magnitude and composition of its mobility-limited population.

### Rural Public Transportation

Rural public transportation serves all unincorporated areas and communities with less than 2,000 population. In January 1977, there were a total of 7 rural systems utilizing 34 vehicles, serving 611 daily riders, and operating in twelve of the state's 83 counties. The average system requires 24-36 hour advance reservations and provides predominantly demand-responsive service with 2.0 vehicle hours of daily service per 1,000 persons residing in the rural area. The typical system carries 2.5 passengers per vehicle hour.

Approximately 2.9 million persons will reside in rural areas by 1989. Many of these individuals have no access to other modes and require public transportation service for essential trip purposes. Due to low population densities and long travel distances, the provision of public transportation service in these areas is both expensive and energy inefficient; therefore, a relatively low level of service is considered appropriate. In essence, public transportation in rural areas is oriented to fulfilling social needs and does not have significant impact on land use, population distribution, traffic congestion, air pollution, or energy conservation.

### Small Urban and Urban Public Transportation

Small urban and urban public transportation systems serve communities with a population density exceeding 100 persons per square mile. Populations range from 2,000 to 5,000 for the small urban category, and 5,000 to 50,000 for the urban category. The two planning area types were addressed together since system characteristics and standards are basically the same for both. As of January 1977, 2 small urban and 20 urban public transportation systems operated in Michigan. The growth in the number of systems is a direct result of the wide acceptance of the state's Dial-a-Ride Transportation (DART)



program. The average system requires a 30-minute response time, provides 2-3 vehicle hours of daily service per 1,000 persons, and carries 8.0 passengers per vehicle hour. As in rural systems, ridership serves a significant number of the elderly and the young.

The 191 communities in this type of planning area will include 1.3 million persons by 1989. The higher densities and shorter travel distances in these communities make public transportation service more energy efficient and cost effective than in rural areas. These systems are, like rural systems, primarily oriented to fulfilling social needs and do not have any significant impact on land use, population distribution, traffic congestion, air pollution, or energy conservation.

### Small Metropolitan Public Transportation

Small metropolitan systems serve urbanized areas with a population density of 3,000 to 6,000 persons per square mile within a population

range of 50,000 to 1 million. As of January 1977, there were 409 vehicles, serving a daily ridership of 58,000, operating in the state's 10 small metropolitan areas. The small metropolitan category includes the urbanized areas of Ann Arbor, Battle Creek, Bay City, Flint, Grand Rapids, Jackson, Kalamazoo, Lansing, Muskegon, and Saginaw. The small metropolitan systems provide an average of 1.8 daily vehicle hours of service per 1,000 population. The systems are predominately fixed-route in nature and provide peak/off peak headways of 15 and 30 minutes, respectively.

Service is provided for at least 11 hours per day and serves 30.0 passengers per vehicle hour. Approximately 70 percent of the population is within one-quarter mile of a route.

Unlike the rural, small urban, and urban systems, the elderly and young do not dominate ridership on small metropolitan transit systems. In comparison, only one-third of the ridership on small metropolitan

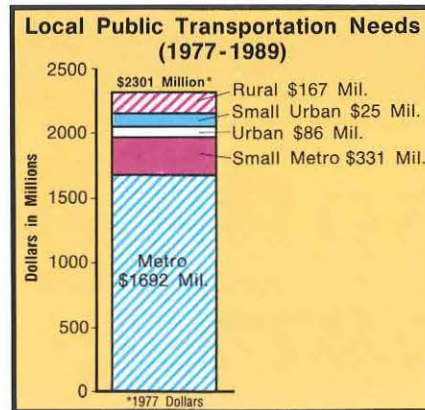
systems is elderly or young, as compared to the rural, small urban, and urban systems average of about 50 percent.

The 10 small metropolitan areas will include 2.1 million persons by 1989. All of these areas currently have public transportation service accommodating a wide variety of trip purposes and needs of both the mobility-limited and the general population. Public transportation in these areas can be increasingly cost and energy efficient. With improved land use planning and development controls, such transportation has the potential to contribute to the solution of traffic congestion problems in selected corridors.

### Metropolitan Public Transportation

Detroit is the only metropolitan area in Michigan. Public transportation is provided by two principal operating agencies—the Detroit Department of Transportation and the Southeast Michigan Transportation Authority (SEMTA). The existing metropolitan system basically consists of regional fixed-route bus service and a number of small community demand-responsive systems. In addition, commuter rail service is provided between Detroit and Ann Arbor and between Detroit and Pontiac.

The relatively high population densities and corridor volumes provide cost and energy efficient public transportation service. Service in southeast Michigan is the most cost effective in the state when measured on a cost-per-ride basis; however, the passenger volumes result in a high requirement for local, state, and federal assistance. A high level of fixed-route bus and rail service is projected for the area with supplemental features such as express bus, demand-responsive



systems, and downtown distribution systems.

The Southeast Michigan Transportation Authority (SEMTA) has overall responsibility, under Act 204 of the Public Acts of 1967, for planning, implementing, and operating public transportation services in southeast Michigan. SEMTA is nearing completion of an alternative analysis process to develop and evaluate alternative public transportation improvements for the region through 1989. All alternatives include a background system of (1) 1,262 buses providing local fixed-route bus service, (2) 195 buses providing express bus service in major travel corridors, (3) 444 small buses operating in Essential Transportation Service and Local Service Systems, (4) commuter rail service on three routes, and (5) a people-mover in the central business district.

In addition to the above elements, light rail service is anticipated in the Woodward Avenue Corridor. On April 3, 1979, SEMTA stated its preliminary preference for the system with a subsurface segment from downtown to the New Center area, an elevated segment from New Center to Six Mile Road, and an at-grade segment from Six Mile to Eight Mile

Road. The costs of the background system and the Woodward Avenue light rail alternative were assumed in the needs identification. The people-mover will provide frequent continuous service, short travel time and improved accessibility. People-mover stations will interface, where possible, with other transit modes entering the central business district.

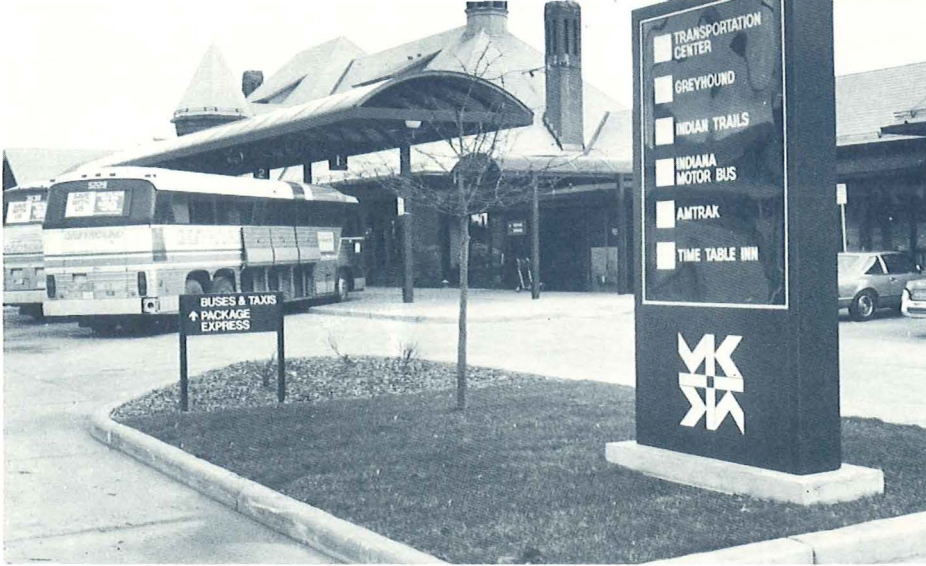
The resultant identified needs are based on the assumption that local public transportation would serve 100 percent of the 9.8 million Michigan residents forecasted for 1989 and would generate an annual ridership of 245 million persons. Total 1977-1989 local public transportation needs are estimated at \$891 million for capital investment and \$1,410 million for operating costs.

### Intercity Bus Needs

The intercity bus industry provides scheduled bus service connecting rural, urban, and metropolitan areas of the state and the nation. Intercity buses provide a comprehensive form of intercity public transportation and serve approximately 15,000 communities throughout the nation and 500 communities in Michigan. Virtually all urban areas over 5,000 population and most areas over 2,500 population are served on a daily basis. The 20 for-profit intercity bus companies in Michigan provide regular intercity bus services to accommodate longer distance trips. All routes in Michigan considered as potentials for intercity bus service were classified with respect to (1) average daily vehicle traffic, (2) trip distances, (3) existing intercity bus service, and (4) highway classification.

Intercity bus service standards were based on the continuing need to provide comprehensive statewide public transportation to all areas of





the state and to serve communities with over 2,000 persons. This system requires an increased level of governmental subsidy and/or assistance. The level of service would vary throughout the state with major travel corridors receiving the highest level of service. Although the service level assumptions employed in the identification of system needs are considered reasonable, the uncertainties associated with predicting intercity bus ridership require further evaluation.

Future intercity bus services must be carefully coordinated with existing and planned rail passenger services. Bus services play a major role in providing intercity public transportation on a statewide basis since rail services concentrate on the major travel corridors in southern Michigan.

Intercity bus needs were based on achieving the 1989 service targets selected by the Needs Study Committee. Total 1977-1989 needs assume that projects will be implemented in annual increments throughout the 13-year study period. The total 1977 - 1989 intercity bus needs of \$58.3 million include \$10.2 million for bus replacement and \$48.1 million for operating subsidies.

### **Intercity Rail Passenger Needs**

Intercity rail passenger service provides mobility within travel corridors connecting the major urban and metropolitan areas of the state and nation. The National Railroad Passenger Corporation, better known as Amtrak, was created in May 1971 to save and revitalize the nation's rail passenger network. Amtrak rail passenger service in Michigan

consists of three daily round trips between Detroit and Chicago, one daily round trip between Port Huron and Chicago, and one daily round trip between Jackson, Ann Arbor, and Detroit. A total of 15 Michigan communities have direct rail passenger service.

The Detroit-Chicago service is part of the Congressionally defined national rail passenger network operated and financed by Amtrak. Remaining services are provided by Amtrak under the provisions of Section 403(b) of the Rail Passenger Service Act of 1970, which authorized Amtrak to operate selected services at the request of a state. The costs of section 403(b) services are shared on a 50-50 basis between Amtrak and the state.

Rail passenger trains provide efficient intercity service and an intermediate level of service between that provided by intercity bus and air. By limiting service to

selected major travel corridors, it is possible to upgrade track and terminal facilities, provide a service capable of achieving significant travel time reduction, and reduce air pollution and highway congestion. Environmental benefits of rail passenger service are maximized by limiting service to those corridors having the highest ridership potential. Rail passenger trains can be cost efficient if ridership is sufficiently large due to their ability to carry additional passengers with little additional cost. The high costs associated with rail passenger service dictate that services be proposed only in major travel corridors possessing high ridership and revenue potential.

Thirteen rail corridors located throughout the state were analyzed to determine their potential for passenger service. The analysis considered travel demand, track conditions, past history, freight traffic conflicts, operating issues, and service to major traffic generators such as universities. Existing modal-split percentages were calculated for various trip distances and applied to alternative corridors. A ridership of at least 25-50 passenger miles per train mile was used as a criterion for each corridor.

A basic consideration in developing the rail passenger system was the level of service proposed by Amtrak on its Detroit-Chicago corridor. The most recent Amtrak Five Year Corporate



Plan (Fiscal Years 1978-1982) analyzed different service levels for three high potential corridors throughout the nation, including the Detroit-Chicago corridor. Nine alternative service levels based on combinations of three average speeds (50.7, 60.7, and 70.3 miles per hour) and three levels of daily round trips (3, 6, and 12) were included in the analysis.

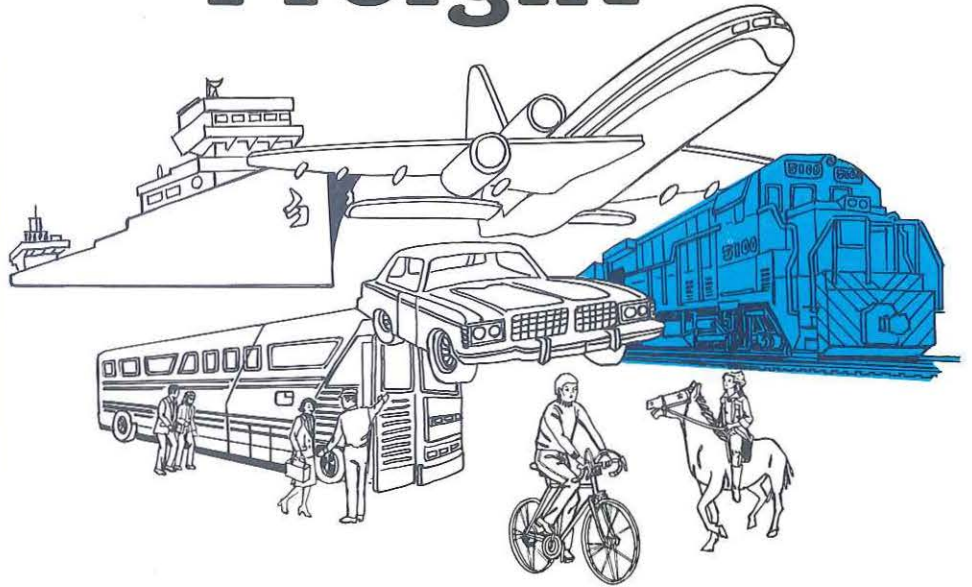
The identified target system which provides service to all major metropolitan areas, emphasizes a higher level of service to those metropolitan areas over 200,000 population (Detroit, Grand Rapids, Flint and Lansing) and is designed to feed the Detroit-Chicago Amtrak service. The higher level of service was assumed in corridors having the (1) highest ridership potential, (2) minimal projected subsidy requirements, and (3) environmental benefits. Annual ridership is expected to increase from 0.5 million in 1977 to 3.3 million in 1989.

Total 1977-1989 subsidy estimates assume that service improvements will be implemented in equal annual increments, and that all revenues from state supported services will accrue to the state. Total public financing for capital needs is estimated at \$40.30 million, and total operating subsidies are estimated at \$46.80 million.

### Final Observations

Information developed as part of the needs study process provides a basis for continuing analysis and refinement of public transportation needs and prioritization. At this juncture, the department has the capability to analyze the implications of a wide range of service level assumptions. Future attention will be directed toward (1) refining the analytic techniques, (2) securing public comment, and (3) developing multi-objective criteria for use in system prioritization.

# Railroad Freight



## MAJOR FINDINGS

- Michigan possesses an extensive and vital rail freight network. Seventy percent of this network is self-supporting.
- The remaining thirty percent of the state's rail network has been identified for future abandonment by private rail carriers.
- Despite substantial state funding for rail freight projects since 1976 and despite partial federal matching grants, additional public funding sources must be developed to ensure long-term revitalization of Michigan's rail network.

The role of state government in analyzing, evaluating, and supporting rail transportation has dramatically changed during the last five years. Although the railroads of the United States have been built, for the most part, by private enterprise, financial difficulties have caused the federal government and the states to become increasingly involved in a multitude of issues associated with preserving essential levels of rail service.

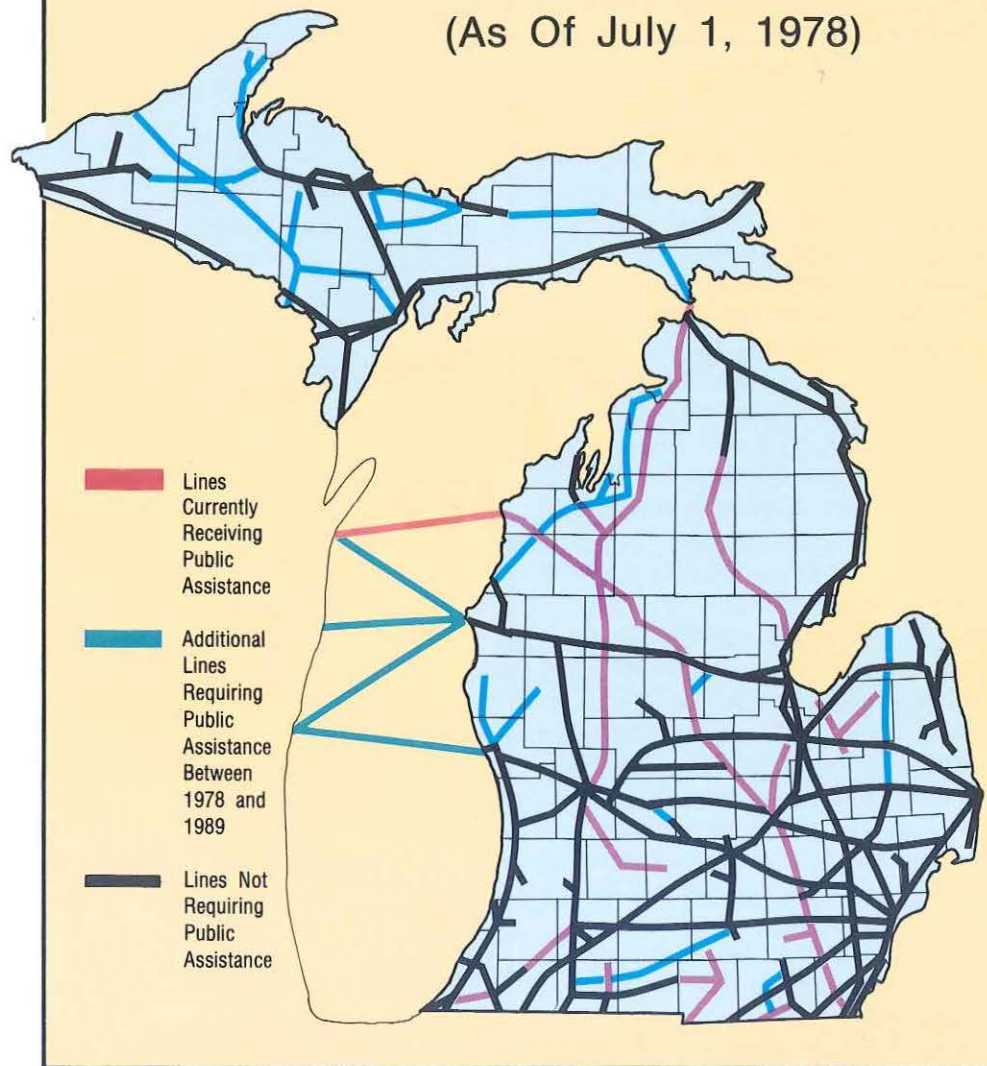
These essential levels of rail service are produced by 16,500 Michigan citizens who are employees of 32 railroads. In Michigan, rail is the dominant means of transporting manufactured products, carrying some 67 percent of the total ton-miles, as well as the products of agriculture.

The bankruptcies of eight railroads, two of which operated within Michigan, initiated a chain of events resulting in extensive federal and state government involvement in railroad transportation. It was determined, at the federal level, that a reduction of rail mileage would be necessary to reorganize bankrupt railroads. The Regional Rail Reorganization Act of 1973 (3R Act) provided monies to subsidize at the state and local level those jeopardized lines considered essential by the state. Initially the 3R Act affected only the Northeast and Midwest. With the passage of the Railroad Revitalization and Regulatory Reform Act of 1976 (4R Act), this program expanded to include all states in the rail service program and provide financial assistance and regulatory changes for railroads across the nation. Major provisions of the Act include (1) substantial direct and indirect financial aid to Conrail, Amtrak, and financially deteriorating private railroads, (2) a nationwide program of subsidies to continue previously unprofitable branchline operations, and (3) creation of the Northeast Corridor Improvement Project. Both acts provide that state governments analyze their rail systems and establish priorities for lines that should be retained under subsidy.

Many railroad companies and

## Michigan Railroad Network

(As Of July 1, 1978)



transportation analysts regard abandonment of light density rail lines as fundamental to rail plant rationalization and essential to improving transport efficiency and the financial condition of the railroads; however, loss of rail service adversely affects rail users and communities served by a line. When service is abandoned, industries dependent on rail either close, relocate, or adjust to new transportation costs. Communities in which such industries are located lose business activity, employment, and tax base. Expansion of present industries or location of new economic activity requiring rail service may be barred if a line is abandoned, forcing state and local governments to face additional outlays for roads and bridges to accommodate increased truck traffic.

The state's unique peninsular

geography forms the backdrop for discussing the three distinctive characteristics of Michigan's railroads.

First, Michigan has two different railroad systems not linked by a direct rail connection. The Lower Peninsula's traffic to the Chicago, Toledo, and Cincinnati gateways consists primarily of transportation equipment, bulk agricultural commodities, coal, chemical products, primary metal goods, and food products. The Upper Peninsula's system serves as an outbound rail route for metallic ores and pulpwood, and most of its traffic runs southerly to Wisconsin or lake ports.

Second, Michigan's two peninsulas drastically restrict direct overland rail connections with other states and Canada. As of July 1978, six carriers operated ten different

carferry routes. While the Great Lakes rail carferry routes play a major role in Michigan's railroad network, the ferries' extensive capital needs threaten the existence of this element of Michigan railroading.

Third, the state's peninsular geography inhibits growth of heavy density, transcontinental freight routes common in most Midwestern states. As such, a significant portion of Michigan's railroad activities involves the origination or termination of freight carloadings at terminals or switching points. Experience clearly indicates, however, that a railroad's financial viability suffers when transcontinental freight is not carried.

In recent years, many miles of railroad lines have been abandoned in Michigan, including two carferry operations between the Upper and Lower Peninsulas. This reduction process continues as evidenced by the eleven active abandonment applications on file with the Interstate Commerce Commission as of July 1, 1978, seeking to abandon approximately 322 rail route miles within Michigan and approximately 307 miles of Lake Michigan carferry routes. In addition, the state's Class I rail carriers recently submitted system diagram maps to the Interstate Commerce Commission indicating that another 471 miles of Michigan railroads will be "petitioned for abandonment" or discontinuance of service within the next three years. One hundred and twenty-seven miles were listed as "potentially subject to abandonment." Of particular concern is the Milwaukee Road's intent to abandon virtually all its trackage within Michigan. Should all pending and potential abandonments



affecting Upper Peninsula trackage be approved by the Interstate Commerce Commission, the peninsula would lose 540 miles, or 41 percent, of its railroad network. In addition, 895 land route miles are being operated with public funding in lieu of abandonment.

Despite the fact that 1,814 land route miles currently require public operating assistance or are in danger of abandonment, over 70 percent of the total system is solvent. These functionally classified basic and secondary rail networks provide the stability for Michigan's primary economic activities as well as the efficient flow of interstate and international through traffic. While no future expansion of either network is anticipated, except possibly in the Marquette iron ore range of the Upper Peninsula, there is also no forecast of significant service reduction. Interviews with these operators indicate adequate freight revenues and internal capital generation to operate and maintain these lines.

The remaining 30 percent of Michigan's rail network requires public assistance, since operating rail carriers do not believe sufficient traffic will be generated to warrant

expenditure of scarce capital resources from the private sector. These 1,814 miles of land routes, plus 379 miles of carferry routes, will experience service deficiencies unless public assistance for operation and capital investment can be provided. This mileage has, therefore, become the subject of our current detailed railroad needs analysis.

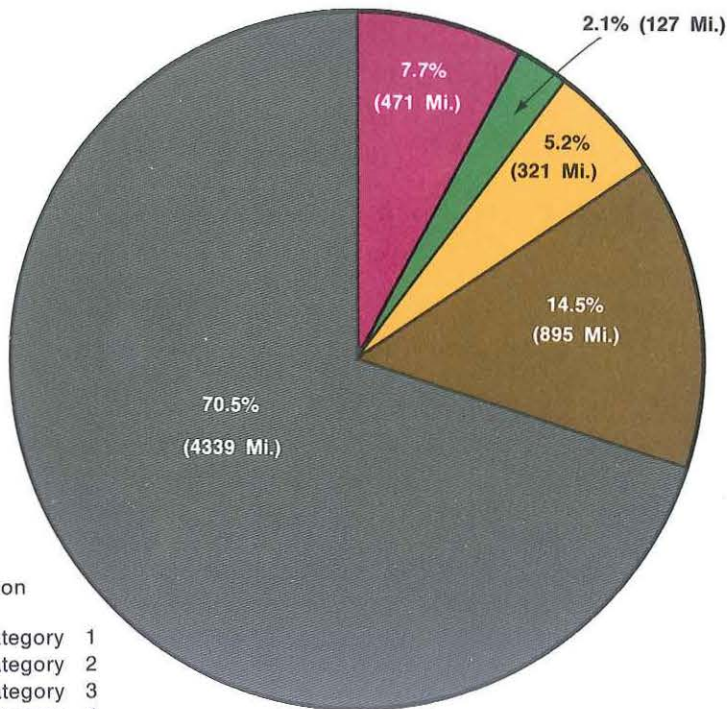
Most threatened mileage has been functionally classified into the state's "feeder network." These rail lines generate moderate quantities of rail-oriented commodities and feed into either the basic or secondary rail network. This network may be subdivided into industrial feeders in urbanized areas or rural agricultural feeders. Many Michigan feeder lines are viable and will experience traffic growth. Without adequate feeder lines some of the carriers' basic and secondary lines could not exist. Michigan has, however, considerable feeder trackage with low freight tonnage densities and deteriorating physical facilities and track structures. In particular, the rural agricultural feeders are likely to experience service deficiencies and abandonment by the current rail carriers.

Interstate Commerce Commission system diagram maps were utilized to identify lines subject to current and/or future service deficiencies. Each year, railroad officials submit to the ICC detailed color-coded maps of their trackage describing currently subsidized line segments or those which are candidates for pending or potential abandonment.

Basic rail freight service standard assumptions were developed to measure the existing level of rail freight services on classified line

# Status of Michigan's Rail Freight Network

As of July 1, 1978



System Diagram Classification

- Category 1
- Category 2
- Category 3
- Category 4
- Category 5

NOTE: Includes land rail routes; carferry route mileages excluded.

## SYSTEM DIAGRAM CLASSIFICATION

| Category | Description  |
|----------|--|
| 1        | Lines carrier anticipates will be subject to an abandonment or discontinuance application within the next three years.       |
| 2        | Lines under study and potentially subject to abandonment application.  |
| 3        | Lines for which an abandonment or discontinuance application is currently pending before the Interstate Commerce Commission. |
| 4        | Lines being operated under the Rail Service Continuation Provisions of the 4R Act.   |
| 5        | All other lines.   |

segments. The primary objective was to identify minimum acceptable levels of rail service to communities along an endangered line demonstrating either profitability to its operator or social and/or economic benefits to communities. This benefit-cost approach is similar to the *Michigan Railroad Plan's* impact criteria justifying public assistance from the State of Michigan for continuation of rail service on a branch line that is subject to abandonment.

A primary goal established for the study was that a Michigan rail patron could depend upon (1) the prompt delivery of a required car type, (2) a minimization of damage to his freight while in transit, and (3) delivery of his shipment to its consignee within a reasonable time frame. While a minimum service frequency of one trip weekly was specified in cases of seasonal traffic demands such as found on some agricultural feeder lines, this minimum frequency was modified as appropriate.

While most lines met minimum service frequency standards, many displayed the reliability deficiencies associated with car supply. Although rail freight car supply is a national problem, it is compounded in Michigan due to the remoteness of lines from car distribution centers and the limited traffic generated by local shippers.

Most identified special needs relate to (1) maintaining safe operations at 10 miles per hour, (2) preventing excessive crew overtime and violations of the Federal Hours of Service Act, and (3) strengthening track structures to permit the movement of 100-ton loaded freight cars.

### Railroad Freight Needs

The individual deficiencies for each endangered line were aggregated for each category and quantified in 1977 dollars to produce a projected capital need for the 13-year study period. The annual operating subsidy estimates were developed to forecast the level of

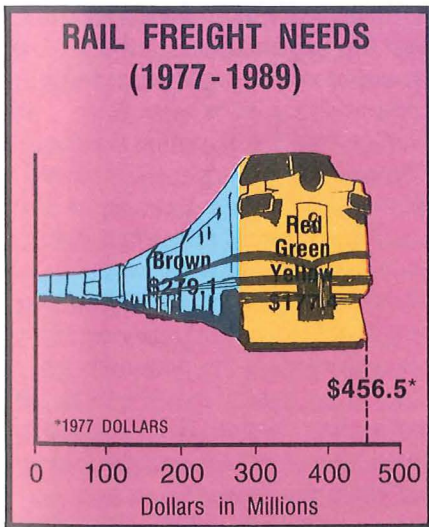
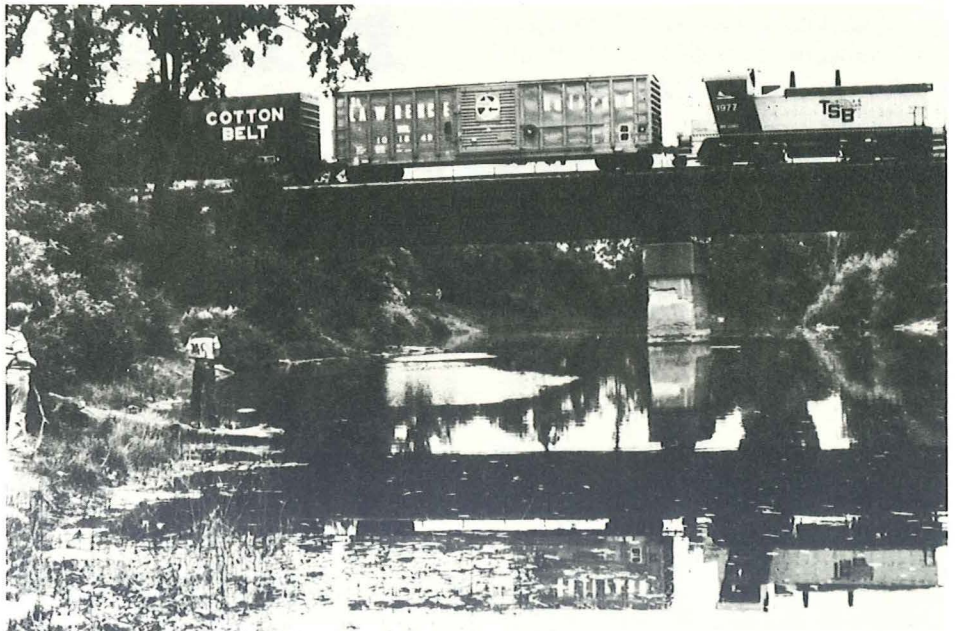
public assistance required to serve a line's continued operation.

Identified service deficiencies were used against a framework of potential future prospects for the industry through 1989 under three sets of assumptions. The "base case" assumed that only those rail freight lines currently covered by public assistance programs would continue receiving aid, and no expansion of the program would occur under any circumstances. This assumption was considered unrealistic given the extensive Michigan trackage which is subject to pending or potential abandonment proceedings.

Conversely, the "high case" assumption suggested all endangered lines within the state were subject to publicly financed capital improvements and annual operating subsidies. This implied all of the state's vulnerable rail network would be subject to substantial public control and remain in a subsidized status for the foreseeable future. This assumption was regarded as extreme, since research indicates that many of the potential abandonment candidates suffer from deferred maintenance rather than substantial operating deficits.

For study purposes, a middle or "intermediate case" assumption was selected as the most probable future. This assumption proposed a one-time capital expenditure to correct deferred maintenance and accomplish necessary track

strengthening on segments categorized as potential abandonments. Under this assumption, all pending abandonments and currently subsidized lines require both capital funding and operating assistance through 1989. This alternative appears justified from previous experience in that abandonment proceedings tend to destroy a line's remaining traffic base. As a result, several years of revitalized service



involving substantial operating subsidies are necessary to regain previously lost rail traffic. Recent federal legislation stresses pre-abandonment rehabilitation rather than post-abandonment operating subsidies and supports the use of the "intermediate case."

This "intermediate case" most closely reflects, however, current federal legislative policy and the *Michigan Railroad Plan*. Expressed

in 1977 dollars, a total need of \$456.5 million is projected through 1989. Future events will not precisely follow the "intermediate case."

Presently, public assistance for rail freight within Michigan is funded by state public transportation funds, limited bonding, and federal rail project grants authorized by federal legislation. State transportation officials believe current program financing can maintain the status quo (essentially the "base case" assumption) despite a gradual decline in federal funding under the new allocation formulas recently enacted in the Local Rail Service Assistance Act of 1978. This viewpoint assumes continuance of legislative support for rail freight public assistance and a healthy state economy; however, deficiencies under the "intermediate case" may require additional funding sources. Such sources could include (1) contributions from affected county and local governments, (2) financial participation from patrons on

endangered rail lines, and (3) funding from yet-to-be-established interstate regional transportation authorities.

The capital needs for highway grade crossing surfaces and protective devices and the establishment of grade separations for high density roads and streets are presented in the Highways, Roads, and Streets needs section.

#### **Final Observations**

Results of this element of the current needs assessment provide a framework for the continuing refinement and prioritization of the state's freight distribution needs. The Department feels current plans to examine the potential impacts of truck deregulation and continued rail deregulation will alter the needs analysis process. In addition to its ongoing rail system analysis, the Department expects that the results of commodity flow analysis will provide an opportunity to evaluate rail service within the perspective of total state freight distribution needs.

# Future Transportation is Faced With Uncertainty

## ISSUES AFFECTING THE ASSESSMENT OF NEEDS

Typical of all forecasting, there are several types of issues which can influence the credibility, accuracy, and usefulness of the findings. First, there are two major assumptions — transportation goals and service assumptions. If major goals are found to be subject to change, refinement, or dramatic shift, corresponding changes in service level assumptions may follow to alter the needs. In most cases, a wide range of service level assumptions can be developed which satisfy the spirit of modal and state transportation goals. Questions, of course, may arise as to whether the range of assumptions adequately represents the goals, whether the selected target assumptions are reasonable interpretations of public need, and whether these projections are realistic in terms of the available resources.

Issues associated with an increasingly uncertain future pose a second class of problems in forecasting. Recent experiences clearly indicate that many uncontrollable events influence the way we regard the future. For example, changes in the energy economy exert widespread influence on virtually all aspects of our lives. These dramatic shifts in the energy economy are not transpiring in isolation. They are operating in conjunction with the national goal for an improved environment and improved air quality. The national goal to conserve energy exerts dramatic pressures on the classic funding sources for transportation—specifically the motor fuel tax. These constraining pressures on forecasting have been further complicated by yet another phenomenon—the increasingly

uncertain inflation rate.

The net effect of these national forces dramatically impacts planning in all sectors of the economy—especially transportation planning agencies. In the past, a public agency relied on a rather stable profile of demand for improved services when projecting needs; however, it is now evident that the comparatively simple days of years past are gone, and the future course of transportation analysis will require careful examination of newly emerging national issues.

### **State Transportation Goals**

Society is increasingly faced with expanded goals. The traditional economic goals are valid and necessary but no longer sufficient to cover the expanding and often contradictory national goals. For example, the goal to reduce air pollution can set in motion a series of policies inconsistent with the objectives of those interested in expanding transportation facilities or service. This linkage becomes evident when the interim impacts are identified. The goal of reduced air pollution impacts the efficiency of automobiles, which then impacts fuel consumption, which, in turn, impacts fuel tax revenues. Air quality goals also affect plant expansion and relocations which, in turn, impact the patterns of freight movement and freight transportation needs.

Trade-offs within and/or between modal goals will be tested against other state goals and available transportation funds. A thoughtfully developed review of transportation goals will serve as valuable input to service analysis and needs prioritization in the future. Prioritization will involve specific examination of service level

assumptions and linkages between modal goals and service levels. As the reviews of modal and state transportation goals progress, changes may be introduced which will influence the service level assumptions.

### Service Level Assumptions

In the early stages of the study, the characteristics describing each mode were isolated. For example, public transportation services can be described in terms of such traditional characteristics as the number of vehicles, average speed, seating capacity, frequency of service, etc. There are, however, many other characteristics more difficult to measure, such as safety, environmental impacts, comfort, and perceived ride quality. One of the first steps in service level analyses was to establish an inventory of service characteristics; specifically, those dominant service characteristics which were quantifiable, easily understood, and directly related to primary cost categories. The second task involved identifying the linkages between service characteristics and service level assumptions. Models were designed to relate changes in certain assumptions, such as vehicle hours of service, to fleet size and costs.

Modal service level assumptions were tested throughout the study for (1) their validity in describing the future of a system, (2) the relationship between supply and demand, and (3) reasonableness. Special emphasis was directed to ensure that the "low" service level assumptions closely approximated the existing systems, and that the "medium" and "high" levels of service reflected improvements in service. The reported needs are based on one of the alternative levels of service referred to as the 1989 target level assumptions.

The state transportation needs identified for the period 1977-1989 directly relate to the service level assumptions employed throughout the study. As such, changes in the 1989 target level assumptions will alter the state's needs for equipment, facilities, and annual operating and

maintenance revenues. Further examination may result in the establishment of a different range of assumptions and may indicate an alternate target would better describe future service requirements. Other potential changes in the needs can be anticipated as service levels are examined on an intermodal basis. Examination of the potential impacts of the deregulation of rail and motor carriers may produce changes in modal service level assumptions. These changes may be expected to reflect efforts to reduce service duplication and impedances in the existing systems.

In summary, analysis of service level assumptions and the relationships between competing modes will be required in future needs analysis.

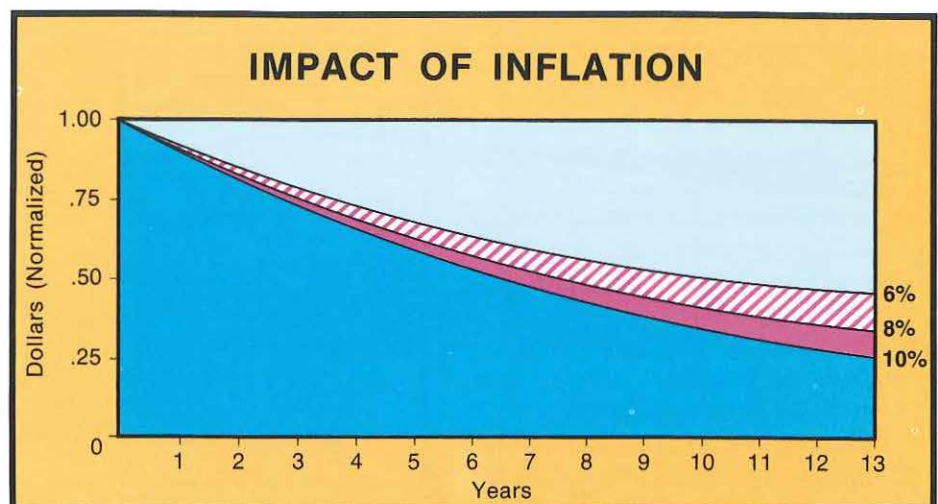
### Impacts of Inflation

It is increasingly clear that the issue of national inflation can no longer be considered unrelated to needs assessment. Past highway needs studies, calculated in base year dollars, provided a rough indication of total needs and enabled comparison of needs among state highways, county roads, and municipal streets. It was always assumed that identified needs served as a representative and rather stable inventory for planning and programming purposes; however, in the last few years some disturbing observations with regard to the magnitude of the needs, the size of the current deficiencies, and impacts of inflation on these needs began to

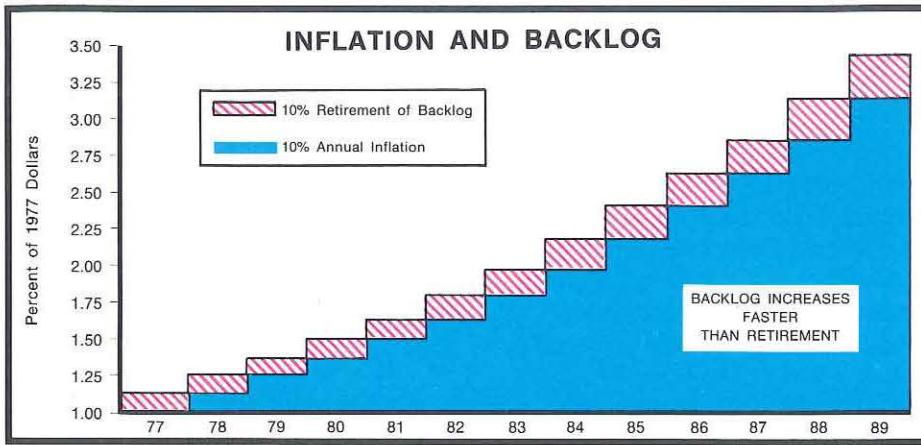
surface as critical issues.

Recent trends in inflation and the increasingly clear relationship between energy and inflation have forced those engaged in public policy to reconsider the inflation issue and its impact on the future of transportation. As a national issue, the potential impacts of inflation receive wide-spread attention and debate. Differences of opinion exist, however, on which inflation rates to assume, how to apply them, and the problems associated with expanding the traditional needs assessment process. Despite these differences, a general consensus indicates that (1) inflation analysis must be included in needs analysis, (2) funds for transportation development are dramatically eroding in terms of real dollars, (3) transportation priorities must be established, (4) the maintenance of the existing system is in jeopardy, and (5) new sources, mechanisms, and levels of public funding must be examined immediately.

There are two obvious ways of viewing the impact of inflation. One approach is to inflate the needs to reflect one or more assumptions about inflation over the next decade, and the other approach is to deflate the real dollar purchasing power of projected funds. Although both produce identical mathematical results, the inflation of transportation needs poses a severe problem, namely, which needs are assumed as potentials for retirement and which are postponed to another time period and subsequently inflated. This issue is especially obvious







when one examines the backlog highway, road, and street needs. Minor shifts in the assumed annual percent of backlog highway needs retirement and annual inflation rate assumptions dramatize the potential impacts of inflation on the future cumulative backlog.

An abbreviated financial analysis was conducted within this first phase study to support the future activities of the Transportation Needs Study Committee and of the Department staff in needs prioritization and financial analyses. The impacts of inflation were addressed through an abbreviated financial analysis of projected operation and maintenance needs referred to as Fixed Expenditure Needs.

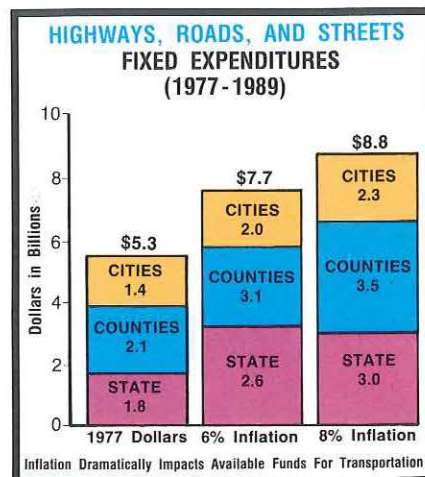
### Financial Analysis

There are a number of factors which contribute to the deepening crisis in the ability of state and local agencies to adequately respond financially to the continuing increases in travel demand. At the state level, the newly created Michigan Transportation Fund, previously the Motor Vehicle Highway Fund, is the primary source of financing for highways, roads, streets, and comprehensive transportation programs. At the federal level, the Highway Trust Fund and general fund appropriations are important sources of funding for state and local transportation programs. The U.S. Department of Transportation provides other funds through the Federal Railroad Administration, Federal Aviation Administration, and the Urban Mass Transportation Administration.

The two primary sources of

revenue for the Michigan Transportation Fund are fuel and weight taxes. The yield from fuel taxes will experience lesser rates of growth and absolute declines as the effects of already mandated and increasingly stringent energy conservation measures take effect. The fuel efficiency of motor vehicles, on an overall basis, will improve substantially over the next decade which will mean less revenue per mile per vehicle at a given tax rate. To achieve increased fuel efficiency, the weight of vehicles, on an overall basis, will decrease substantially over the next decade, and the result will be less revenue per vehicle at a given weight tax rate. It appears that the counter-balancing effect of increased vehicle miles of travel and increased registrations within the state will not offset the downward trend in tax revenues.

In any discussion of needs, it is most important to understand that all categories of needs are not equal; there are definite priorities in expenditures of revenues. The



highest expenditure priorities are the debt service requirements for bonds already issued and those programs mandated at the federal and state levels. For example, the highest priority construction program at the federal level and the largest construction program at the state level is the state trunkline program for the National System of Interstate and Defense Highways. State legislation also mandates certain construction programs. In 1956, legislation was enacted which required that not less than 35 percent of the state trunkline construction funds be expended for construction on the Interstate System and a number of other identified routes on the state trunkline system. Further, the legislation accompanying the increase in fuel taxes in 1973 required that the total increase in funds for state trunklines, as a result of that legislation, be expended for the construction and reconstruction of certain identified routes under state jurisdiction.

The next highest priority are the fixed expenditures needs; i.e., expenditures required to maintain and operate the existing system. Using the highways, roads, and streets needs as an example, the operation and maintenance needs (Fixed Expenditure Needs) over the 13-year period have been estimated at a minimum of \$7.7 billion assuming an annual inflation rate of six percent.

The next priority for expenditure on the trunkline system is for federally-aided and wholly state financed safety programs. The balance of federal-aid and state funds, a certain portion of which are required to match the federal-aid, is then available for construction on the rest of the trunkline system.

The financial analysis included in the expanded needs study was directed primarily to an examination of system maintenance and operation. Analysis of the fixed expenditure needs through the decade of the eighties was conducted in two parts. The first element was directed to a projection of the funds available for allocation to the operation and maintenance of

on the consumption of fuel. An annual projection of vehicle fleet (auto, truck, and bus) miles-per-gallon was developed from national projections available from a number of published sources. These nationwide projections were employed in the state projections as a baseline, although it is clear that the mix of vehicles, in terms of their age, tends to be newer in Michigan. This baseline conservative assumption may have to be re-examined as vehicle efficiency improvements are integrated within the Michigan fleet, and the impacts of energy conservation begin to take full effect. The net result is that the increases in travel are totally offset

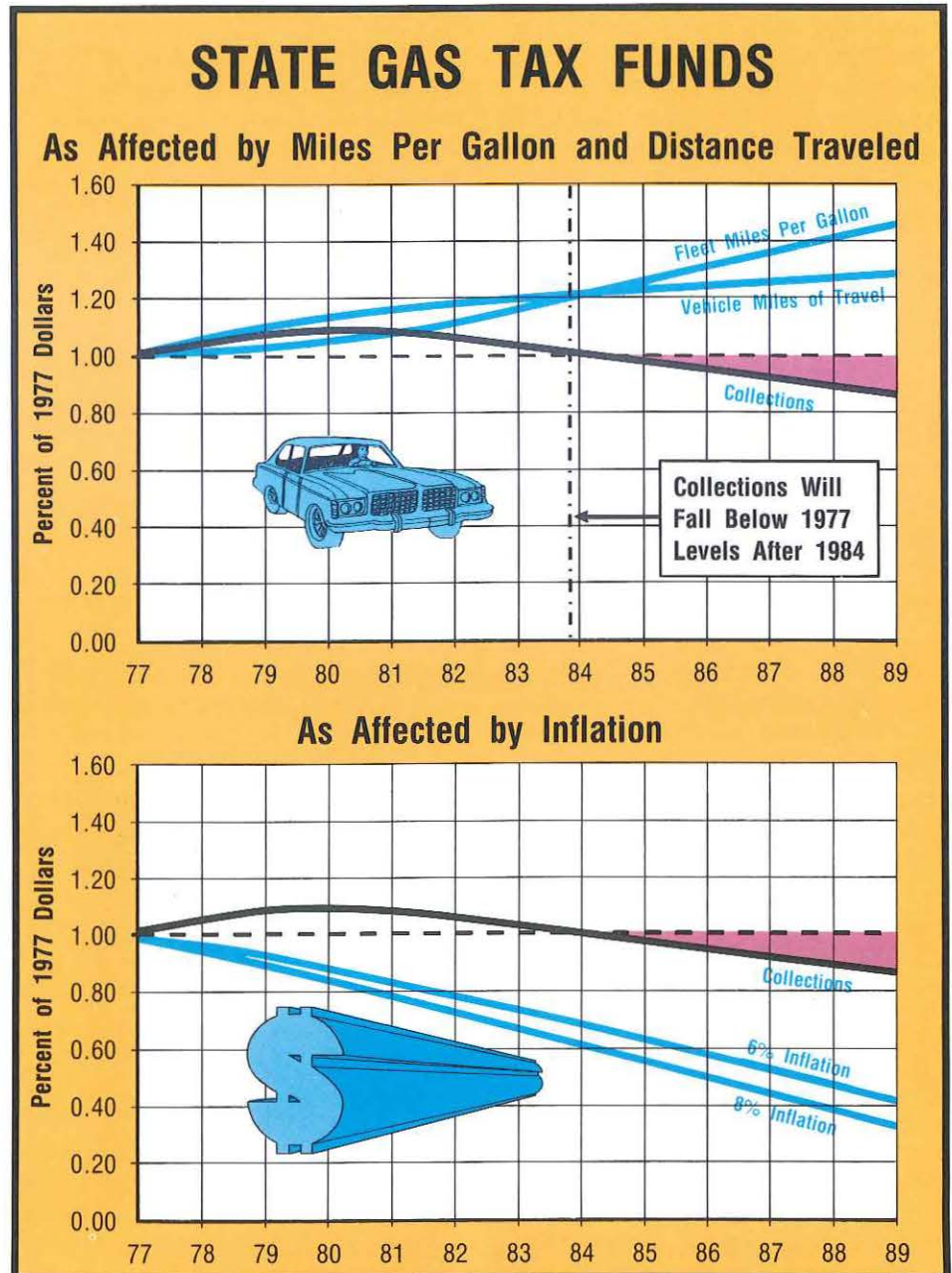
by reduced fleet fuel consumption in 1983-1984.

● **FIXED EXPENDITURE NEEDS** — Projections of the needs to maintain and operate the existing system were separated from the total projected needs for highways, roads, and streets, public transportation, railroad freight, aviation, and non-motorized transportation. Highway fixed expenditures include state, county, and city costs of road maintenance, capital equipment replacement, and administration. Railroad fixed expenditures are those costs associated with the current subsidy program. Public transportation needs include the operation of the existing systems and

all modes. This projection was further separated into an estimate of state funds and federal funds available for all modes. The second element was directed to a specific assessment of fixed expenditure needs for each mode. These needs were separated from the total state needs which included both capital and operations and maintenance funding requirements. Comparison of the projected funds and projected fixed expenditure needs was made to clarify the relationship between available funds and the needs associated with maintaining the existing system.

The following presents a brief description of the assumptions used in the projection of funds, the aggregation of fixed expenditure needs, and the comparison of these needs with available funds.

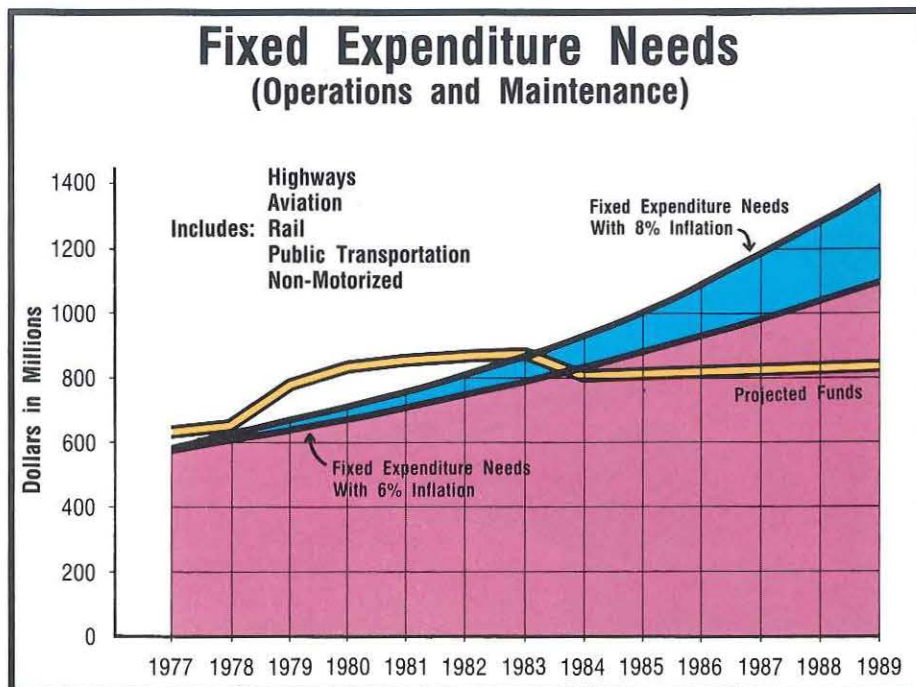
● **PROJECTION OF FUNDS** — Funds available from state gas tax revenues were analyzed to reflect both projected increases in miles of travel and changes in the number of miles per gallon for the projected fleet. Projections of increased travel were based on historic projections of travel, on increases in registration, and on demographic characteristics. It was assumed that travel patterns will be impacted little by potential increases in the cost of gasoline over the next decade. This conservative assumption may require re-evaluation over the next four years. The translation of increased travel to gasoline consumption would, prior to dramatic increases in vehicle efficiency, produce increased sources of gas tax funds. Energy conservation and emission reduction targets for the automobile will, however, have a significant impact



the replacement of vehicles necessary to maintain the existing fleet. Aviation needs include those funds necessary to maintain the present level of service and safety at the state's airports. Finally, the costs to maintain the non-motorized system are analogous to the highway fixed expenditure needs. Fixed expenditure needs were translated into a set of annual requirements for comparison with available funds. For the purpose of comparing annual needs and available revenues, two inflation assumptions were selected—6 percent and 8 percent. Although projection of future inflation is at best a speculation, the two rates assumed appear reasonable on an annual basis for abbreviated analysis. Recent inflation trends which have exceeded 8 percent will hopefully moderate over the next decade to an average rate within the assumed range.

● **PROJECTED COMPARISON** — Projected revenue sources for fixed expenditures were developed from state gas and weight tax and from federal funds for maintaining the existing rail, aviation, public transportation and non-motorized systems. It was assumed that (1) general funds for public transportation would be available through 1983, (2) the two-cent gas tax increase would remain in effect, (3) the weight tax would not be increased, and (4) existing state legislation would remain unchanged. The motor vehicle transportation fund has been adjusted to include those net revenues available for distribution. The funds and the annual needs were aggregated as totals to dramatize the net effect of the projections.

The results of the abbreviated financial analysis provide clear indication that the net effect of inflation will exert a significant influence on the prospects for preserving the state's existing transportation system. These findings further support the premise that financial analyses must be integrated within the continuing process of needs refinement and prioritization.



# Major Decisions Call for Improved Processes

## BEYOND THE PRESENT NEEDS ASSESSMENT

This first multi-modal needs study is in response to the mandate by the State Legislature that needs assessment be broadened to include all modes of transportation. In many respects that mandate has clarified the fact that traditional methods and procedures require improvements. Identification of these improvements, directions for future analysis, and critical planning issues have been an important product of this first phase study.

### **Future Directions and Requirements**

Coincident with the Department's current needs assessment, a statutory requirement for a continuing and expanded transportation needs study has been passed as part of Act 444, Public Acts of 1978. The statutory Needs Study Committee envisions a much

broader perspective than the current Needs Study Committee. As stated in Act 444, "by a majority vote of the Needs Study Committee, the Committee shall report to the Governor, the State Transportation Commission, and the Legislature on the identified needs and priorities of transportation in the State, and shall recommend, if the Committee considers it necessary, alterations of formulas for transportation funding . . ." With this statutory charge, the Committee becomes instrumental in developing fiscal policies for the distribution of state funds by mode. The thrust of the statutory Needs Study Committee will be directed toward assuring that the needs identification process reflects the major social, economic, and environmental interests within the state, and that equity among

these often conflicting interests is enhanced. Advocacy for individual modes will be provided through the advisory councils established by the same legislation.

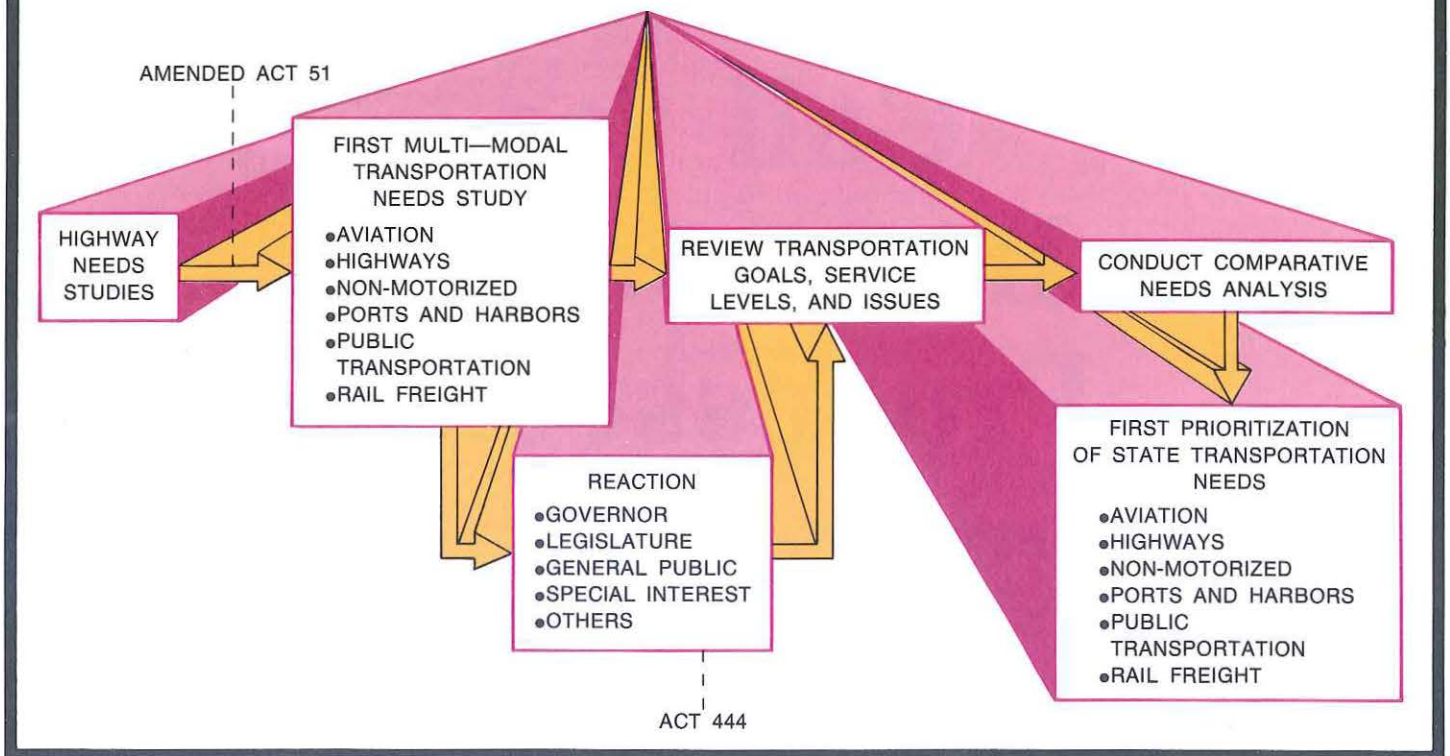
The prioritization issues which the Needs Study Committee will address include (1) the respective roles of each mode, (2) the problems associated with revenue sources which, due to inflation, are declining in real dollars, and (3) a host of questions related to the transportation goals and policies of the state. The anticipated prioritization of needs should provide the perspective necessary to treat all elements of the state transportation system as a whole. This broadened base of responsibility, together with the lessons learned through this first multi-modal study, should further set the stage for significant improvements in transportation planning over the next decade.

### **Major Needs Assessment Issues**

Recent events have become critical to the economic stability and growth of the country and have accelerated the recognized need for new policies, directions, and perspectives in transportation planning. Effective transportation planning will increasingly depend on the development of a much broader base of analysis than was required in the past and, of necessity, will incorporate external forces which threaten the state.

Nothing so vividly highlights the need to refine state transportation planning and analysis as the changes experienced in the world's energy economy and the recent and projected impacts of inflation, both of which are outside the immediate influence of the state. Although growth in opportunities for mobility will clearly remain a fundamental state goal, priority must shift to more effective use of existing systems rather than investment in new or expanded systems. Focusing on the integration of various modes of transportation, on the selective improvements in service, and on the elimination of service redundancy appear to be rational responses to the emerging national energy and

# Needs Study In Perspective



economic issues.

New and expanded perspectives reflecting energy and economic realities will influence (1) the way in which transportation needs are identified, (2) the procedures and organizational structures for developing and implementing plans, and (3) the way in which transportation revenue needs are identified and analyzed.

Some of the major issues to be addressed as the needs study process continues will include:

● **EXPANDING THE NEEDS ANALYSIS FRAMEWORK** — As more attention is directed toward examining service level assumptions, the larger issues, such as the role of the state and the goals and aspirations of the public, will surface. These issues will, in turn,

raise associated questions on how priorities should be analyzed and defined within the levels of available funding. Although there are many ways to prioritize needs, the problem will focus on developing a framework which (1) reflects public concerns and values, (2) recognizes intermodal trade-off potentials, (3) provides useful input to the planning process, and (4) reflects external forces such as energy, regulatory reform, and inflation.

During the traditional process, the translation of needs to fiscal requirements has been a separate activity, but this is no longer adequate. Prioritization of needs, continuing examination of transportation goals, and the analysis of measurable levels of service require the incorporation of a

broad level of financial analysis within the needs assessment process. Spiraling inflation costs and the coincident requirement for motor vehicle fuel efficiency are seriously eroding the revenues earmarked for transportation. These constraints place an added burden on the prioritization of needs and highlight the need for financial analysis. A number of questions appear as likely candidates during future analysis of transportation financing and needs prioritization, including (1) How should multi-modal needs and priorities be defined within given resources? (2) If new sources of revenue are required, how should they be raised? (3) How can an inflation-resistant funding mechanism be provided?



● **DEVELOPING  
MULTI-OBJECTIVE ANALYSIS  
CRITERIA** —

On any given program, it has become almost a rule of thumb to expect policy pronouncements to indicate that the purpose of the program is to provide increased services and to generate the greatest benefits to the largest possible number of beneficiaries at the lowest possible cost. Such policy statements do not, however, provide rational benchmarks for appraising program effectiveness. Careful examination of most such statements uncovers all types of conflicting goals; therefore, trade-offs among goals must be considered to determine program priorities. Public concern is increasingly focusing on the composition of output and on concern for human welfare and equity in public affairs rather than on net increases in aggregate standards of living. One characteristic of a wealthy society is

the reorientation of basic values, many of which have been transferred into policy decisions having far-reaching impacts on public spending patterns. The principal areas of increased concern include (1) equity or fairness in distributing the costs and benefits of public projects, (2) environmental impacts, (3) regional economic development, (4) human well-being, and (5) specialized concerns in transportation, such as safety and land use.

While the structure employed in the current process produces a reasonably developed universe of needs, it is clear that much additional effort is required to translate modal needs into system needs through modal trade-offs. Trade-offs among competing modes require a thorough understanding of public values, emerging issues, service level assumptions, fiscal requirements, and available

resources. Multi-criteria analysis capability is fundamental to the continuing expansion and refinement of the needs analysis process.

● **DEVELOPING COMMODITY  
FLOW ANALYSIS CAPABILITY** —

In the past, freight transportation analysis has been viewed as a key element in marketing and traffic management within the private sector. States relied on competitive market forces and private enterprise to define, develop, and provide freight transportation services. The role of government was relegated to improving freight transport availability and services through regulatory controls. In recent years, however, a variety of events have impelled state and federal agencies to increase their activity in freight transportation. Future energy prices, trends in deregulation, and equipment shortages clarify the need to examine all modes involved in freight and commodity



distribution—rail, aviation, motor carriers, and waterborne carriers. Each of these modes has its particular problems and, in the past, the tendency has been to try to examine each of them separately. The public agencies that regulate or invest in each mode are not coordinated at either the federal or state levels and a massive void exists in policy development. The resulting economic inefficiencies from this restricted perspective have been a burden to the economy of the state and have created distortions in freight and commodity movements. Commodity flow analysis is concerned with the movement of raw materials, agricultural goods, and manufactured products. The methodology focuses principally on interregional traffic flows and

available transport systems. Commodity analysis capability is being developed within the department to permit the intermodal examination of freight transportation networks and needs. This approach will provide the insight necessary to more fully appreciate the functional roles of all freight distribution modes in the state.

● **INCORPORATING THE PRIVATE SECTOR IN NEEDS ANALYSIS** —

A fundamental future issue in transportation needs assessment lies in the determination of the public-private interface; i.e., what should be the public role in private sector transportation analysis, planning, and development. The conflicts between private and public interests in transportation policy and planning activities are complex

because the dividing line between their activities is increasingly unclear as transportation deregulation continues. Guidelines agreed upon a decade ago become irrelevant today due to the financial crises in some of the nation's railroads, impending motor carrier deregulation, and basic shifts in public and private attitudes toward government involvement in transportation activities. The issue in defining the boundaries of public vs. private interests in transportation policy assumes an added importance due to the increased focus on public spending alternatives and the effectiveness of these alternatives in meeting public needs.

## APPENDIX A

### MODAL SUBCOMMITTEES MEMBERSHIP LIST

#### AVIATION

Cryderman, Sam F.  
Michigan Department of Transportation  
Ramsey, James D.  
Michigan Department of Transportation  
Gehman, William E.  
Michigan Department of Transportation  
Edwards, Allen, F., Jr.  
National Pilots Association  
Ion, Robert E.  
W. K. Kellogg Regional Airport  
Langham, Murray K.  
Michigan Department of Transportation  
Mellman, Edward A.  
Michigan Department of Transportation  
Poloskey, Donald L.  
Wayne County Road Commission  
Rinehart, John C.  
Ann Arbor Municipal Airport  
Shook, Robert  
Republic Airlines  
Hohman, Charles W., Jr.  
Marquette County Airport  
Chalnick, Nathan  
Detroit City Airport

#### PORTS AND HARBORS

Cryderman, Sam F.  
Michigan Department of Transportation  
Kellogg, James C.  
Michigan Department of Transportation  
Langham, Murray K.  
Michigan Department of Transportation  
Goodman, Edward  
Michigan Department of Transportation  
Cook, Joseph V.  
Michigan Department of Transportation  
Fisher, Roger  
Eastern U.P. Transportation Authority  
Hewitt, Ronald  
Michigan Municipal League  
Davis, William  
Michigan Municipal League  
Dunn, James  
Michigan Public Transit Association  
Larson, Robert A.  
Wayne County Road Commission  
Frederick, Paul F.  
City of Muskegon  
McCray, Max M.  
Michigan Ports Association

#### HIGHWAYS, ROADS AND STREETS

Cryderman, Sam F.  
Michigan Department of Transportation  
McCarthy, Gerald J.  
Michigan Department of Transportation  
Mastin, Richard C.  
Michigan Department of Transportation  
Lilly, Richard J.  
Michigan Department of Transportation  
Meager, Joseph H.  
Ontonagon County Road Commission  
Larson, Robert A.  
Wayne County Road Commission  
Larkin, Herbert O.  
Kalamazoo County Road Commission  
Rogers, Earl F.  
Michigan County Road Association  
Bruce, Robert M.  
City of East Lansing  
Collins, Godfrey W.  
City of Coldwater  
BeBlaise, Anthony W.  
City of Flint  
Hicks, Robert  
City of Detroit  
Jeff, Gloria J.  
Southeastern Michigan Trans. Authority  
Lebovic, Thomas  
Southeastern Michigan Trans. Authority

#### PUBLIC TRANSPORTATION

Cryderman, Sam F.  
Michigan Department of Transportation  
Kellogg, James C.  
Michigan Department of Transportation  
Langham, Murray K.  
Michigan Department of Transportation  
DeRose, Frank  
Michigan Department of Transportation  
Rudnick, J.J.  
Michigan Department of Transportation  
Roach, James L.  
Michigan Department of Transportation  
Boos, William  
Michigan Motor Bus Association  
Dunn, James  
Michigan Public Transit Association  
Heppler, Gerald W.  
City of St. Joseph  
Kidney, Nancy  
Macomb Essential Transportation Service  
Loudenslager, Clare  
Capital Area Transportation Authority  
Brown, Cleveland  
Southeastern Michigan Trans. Authority  
Neipling, Joseph E.  
City of Pontiac  
Swets, Donald H.  
City of Kalamazoo  
Van Roekel, Paul  
Oakland County Road Commission  
Zimmerman, Harry  
Manistee County Council on Aging  
Gregg, Myrtle  
Commission on Handicapper Concerns

#### NON-MOTORIZED

Cryderman, Sam F.  
Michigan Department of Transportation  
McCarthy, Gerald J.  
Michigan Department of Transportation  
Lilly, Richard J.  
Michigan Department of Transportation  
Kirkbride, Robert  
Michigan Department of Transportation  
Mastin, Richard C.  
Michigan Department of Transportation  
Lott, George  
Michigan Department of Transportation  
Ataman, Tarik  
Michigan Department of Transportation  
Neff, Gregory  
Michigan-Indiana League of American  
Wheelmen  
Backus, Robert R.  
City of Lansing  
Rees, Gerald  
Non-Motorized Transportation  
Advisory Board  
Burchfield, William  
Ingham County Road Commission  
Wicks, Forrest  
Department of Natural Resources  
McCloskey, Patricia  
United Michigan Horseman  
Bekkering, George  
United Michigan Horseman

#### RAILROAD FREIGHT

Cryderman, Sam F.  
Michigan Department of Transportation  
Langham, Murray K.  
Michigan Department of Transportation  
O'Doherty, John  
Michigan Department of Transportation  
Glavin, William  
Grand Trunk Western Railroad Company  
Pinkerton, Charles, III  
Detroit and Mackinac Railway Company  
Clay, Charles H.  
Soo Line Railroad Company  
Mason, Donald L.  
City of Cadillac  
Park, Ron  
Consolidated Rail Corporation  
Kellogg, James C.  
Michigan Department of Transportation  
Goodman, Edward  
Michigan Department of Transportation  
Riel, Donald  
Michigan Department of Transportation  
Weisman, Michael H.  
Detroit, Toledo, and Ironton  
Railroad Company  
Rice, F.R., Jr.  
Chessie System  
Newton, Louis M.  
Norfolk and Western Railway Company  
Morrissey, William E.  
DOW Chemical



## APPENDIX B

### MODAL GOALS

#### AVIATION

- Provide a reasonable level of aviation service to all Michigan citizens, visitors, and commerce.
- Promote the personal safety of air travelers.
- Maximize economic benefits through aviation program investments.
- Minimize environmental impacts in the planning, development, and operation of airport facilities.

#### HIGHWAYS, ROADS AND STREETS

- Develop a highway transportation system which will provide accessibility to existing and anticipated patterns of development throughout the state and effectively serve existing and projected travel demands.
- Develop a functional statewide highway transportation system which will provide for appropriate types and levels of highway service commensurate with the needs of the various areas and activities in the state.
- Alleviate traffic congestion and reduce travel time.
- Provide for increased travel safety.
- Provide a system which is both economical and efficient, satisfying all other objectives at the lowest possible cost.
- Coordinate highway planning with land use planning for the development and preservation of resources.
- Develop a system which is compatible with the aesthetic qualities of the landscape.
- Develop a system which is integrated with other modes of transportation. Attention should be given to existing and planned terminal locations and their expected levels of activity.

#### NON-MOTORIZED

- Make bicycling safer through the provision of bicycle facilities and improvements to appropriate public streets and roads.
- Promote the use of bicycle transportation for utilitarian purposes by improving bicycle accessibility and mobility.
- Encourage the use of bicycle transportation for recreational purposes by developing long-distance touring routes and routes of shorter duration to and through aesthetically pleasing areas.
- Provide recreational horseback riding opportunities in cooperation with other state and local agencies.

#### PORTS AND HARBORS

- Provide and maintain an efficient commercial harbor system to meet the needs of Michigan's economic structure.
- Promote fiscal integrity, stability, and efficiency within the commercial harbor system.
- Minimize environmental and social impacts resulting from port improvements or expansion.
- Improve safety and pollution controls in harbor areas.

#### PUBLIC TRANSPORTATION

- Provide a reasonable level of public transportation service for all Michigan citizens.
- Maximize economic benefits through public transportation investments.
- Maximize positive environmental impacts achievable through the provision of public transportation service.

#### RAILROAD FREIGHT

- Provide and maintain an adequate and efficient railroad network within Michigan and maintain links to the Regional and National Networks.
- Promote financial viability, stability, and efficiency within the Michigan Railroad System.
- Minimize adverse social, environmental, and economic impacts resulting from changes in railroad service.