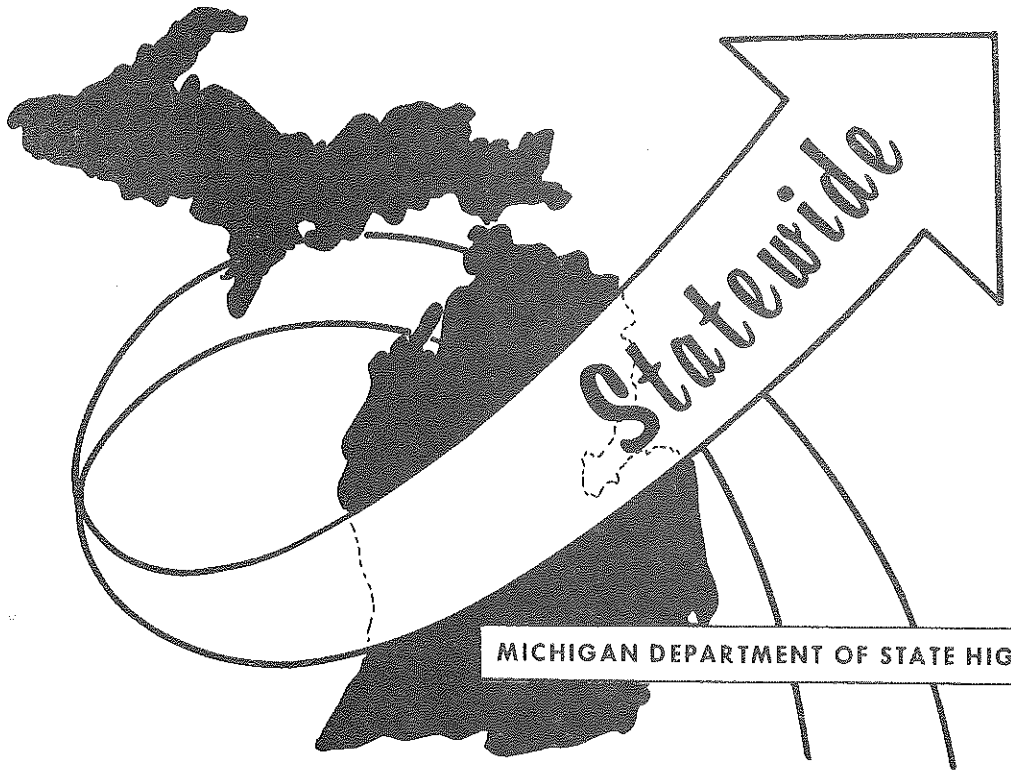
Statewide Transportation Analysis & Research

MICHIGAN'S STATEWIDE
TRANSPORTATION MODELING SYSTEM

CRISIS OR OPPORTUNITY: APPLICATION OF AN OPERATIONAL STATEWIDE TRANSPORTATION MODELING SYSTEM

STATEWIDE TRANSPORTATION
PLANNING PROCEDURES

REPORT NO. 16



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

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BUREAU OF TRANSPORTATION PLANNING

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APPLICATION OF AN OPERATIONAL STATEWIDE TRANSPORTATION MODELING SYSTEM

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INDIANAPOLIS, INDIANA
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ACTUAL APPLICATION OF AN OPERATIONAL STATEWIDE TRANSPORTATION MODELING SYSTEM

During the 70's, highway departments have experienced a rapid and dramatic change in relation to the responsibilities they previously were required to carry out as Figure 1 indicates.

CHANGING RESPONSIBILITIES

DEPARTMENT OF TRANSPORTATION

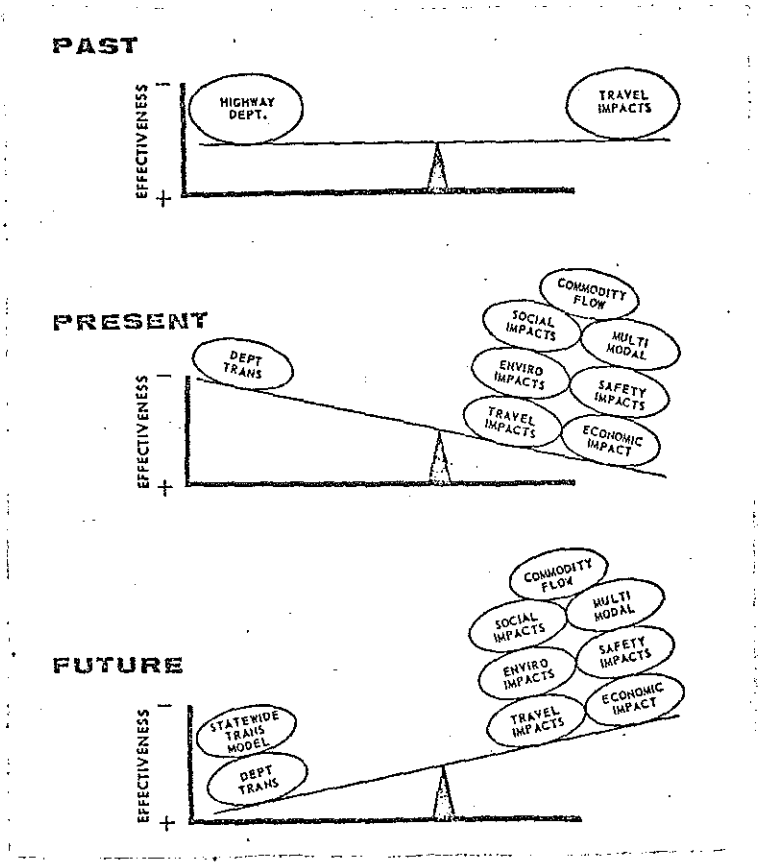


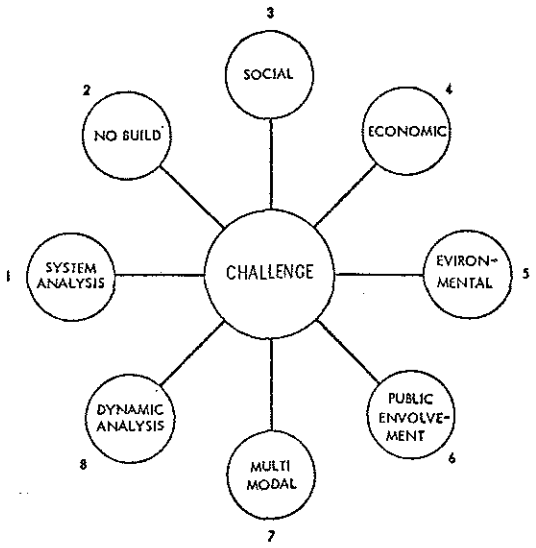
FIGURE 1

These additional responsibilities have caused many states to create departments of transportation in order to systematically address the task of developing balanced statewide multi-modal transportation system plans. During the decade of the 70's, each department of transportation is faced with basically the same challenge if they are to fulfill the responsibilities assigned them. These

basic challenges appear in Figure 2.

FIGURE 2

CHALLENGE OF THE 70's



The Michigan Department of State Highways and Transportation has systematically met an extensive portion of those challenges identified in Figure 2 through the development of an operational Statewide Transportation Modeling System. The modeling system developed within the Bureau of Transportation Planning has been useful becuase it is application oriented and is a realistic computer simulation of the elements in society that are related to transportation planning.

Michigan has put together the system appearing in Figure 3. Appendix A is a list of all the detailed system development reports which are available to those individuals interested in system operation details. The development and discussion of how this computer simulation process could meet the challenge identified in Figure 2 was presented in June, 1973, at AASHTO's National Conference

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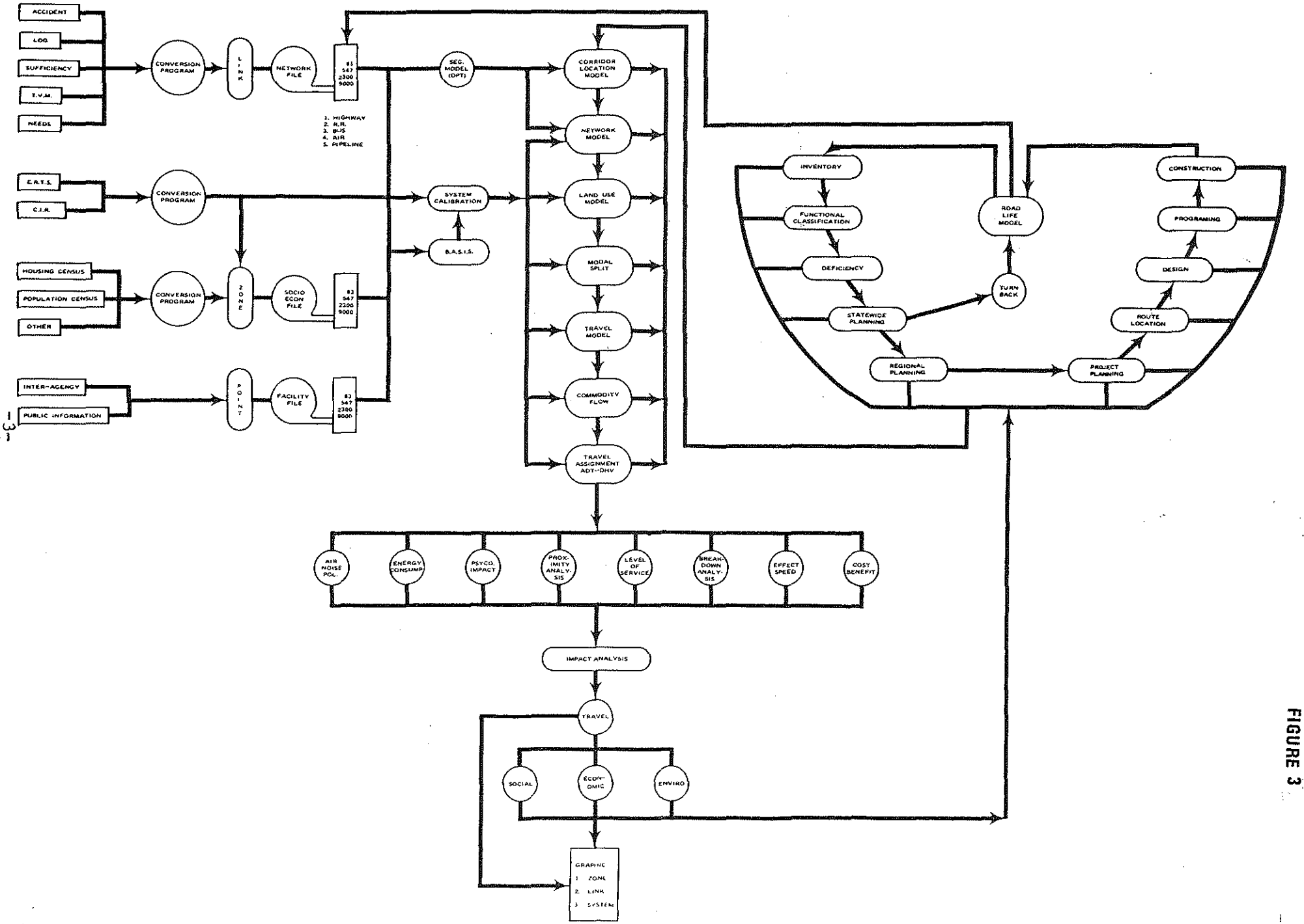

FIGURE 3

on Computer Technology. The presentation was entitled A Statewide Transportation Modeling System Effectively Meets the Transportation Challenge of the 70's.

During the last three years following that conference, the mood of management related to the application of computer simulation techniques in transportation planning is becoming quite negative as millions and millions of dollars pour into the development of systems similar to the one in Figure 3. Yet, very few of these systems have been used extensively in solving "day-to-day" problems. Therefore, it appears that system development exists for system development's sake. Frequently, management decisions are going against the use of computer simulation operations in the daily planning process. As a typical example, I quote from a document entitled The Statewide Transportation Plan: What's The Use, written by Clyde E. Pyers, Director, Division of Systems Planning and Development, Maryland Department of Transportation:

> At the outset, we quickly rejected an adaptation of the typical urban transportation planning methodology based upon sophisticated models and extensive data collection efforts as not being appropriate at the statewide level.

These decisions are tragic in that we personally feel they have been based only on a partial knowledge of what an operational Statewide Transportation Modeling System can effectively accomplish.

Additionally, a vast amount of literature dealing with the solution of the elements identified in Figure 2 are frequently untested theories as to how something should be done and not the results of extensive system application in the "work-a-day" world where the task of transportation planning must be accomplished. This contributes to negative feelings in that efforts such as these offer no help from management's viewpoint in "getting the job done". Admittedly,

the track record regarding model applications has not always been bright but Michigan's experience indicates that this can be changed.

The previously mentioned paper presented at the 55th Annual T.R.B. Meeting January, 1976, in Washington, D.C., identified eight areas that should be emphasized in the development of a statewide transportation plan. They are as follows:

1. A realistic plan based on available resources.
2. A plan that provides a systematic framework for project evaluation.
3. A comprehensive plan covering all operating and capital programs as well as the role of state government in transportation matters.
4. A flexible plan that is reviewed annually and responds quickly to change.
5. A plan that is clearly linked to the implementation and decision making process of the state.
6. A statewide plan that serves as an integrating force between the transportation plans of all levels of government.
7. A plan that pulls together in one document and explains the purpose of all the anticipated major actions and directions of state government concerning transportation and does not simply rely on abstract goals and objectives.
8. A plan that is developed and updated with adequate opportunity for input by other agencies, elected officials, private organizations, and the public at large.

These same eight elements could also be emphasized when developing regional plans. Therefore, the following discussion on the application of Michigan's system hopefully will serve as an actual example of how a modeling system will directly benefit the eight areas of emphasis identified above. This analysis will supply those responsible for management decisions related to the development of both statewide and regional transportation plans more of an idea as to the extensive benefits available through application of a Statewide Transportation Modeling System.

Michigan's Statewide Transportation Modeling System has already been used to develop and analyze the impact of four regional transportation plans involving as many as 32 alternate proposals. This evaluation also includes the application of many social and economic analysis models. The impact process dealt with analysis both in public and private citizen involvement sectors.

This system has also been applied within the Bureau of Transportation Planning on upward of 150 to 200 special projects over and above the previously discussed regional alternates. These are identified in Figure 4 and it should be noted that these cover all phases of the planning process.

Those individuals making decisions related to the application of modeling techniques should also be aware of the fact that the development of a Statewide Transportation Modeling System has additional benefits to be gained throughout a Department of Transportation as Figure 5 indicates. There, again, all of the projects identified in the second column of Figure 5 are actual "day-to-day" applications within the Department.

The development of an operational Statewide Transportation Modeling System has also created an interest in the development of a statewide multi-department data base on the part of other agencies. Again, Figure 6 is verification of the statement in that 11 other state departments use portions of the Statewide Transportation Modeling System data base and have contributed information towards its development. Upwards of 50 "daily" projects have been completed in the last 24 months that required interdepartmental analysis. It might also be pointed out that four of these agencies actually changed the method by which they collect data so as to take advantage of the benefits a computer transportation planning simulation process offers.

STATEWIDE TRANSPORTATION MODELING SYSTEM
APPLICATIONS WITHIN BUREAU

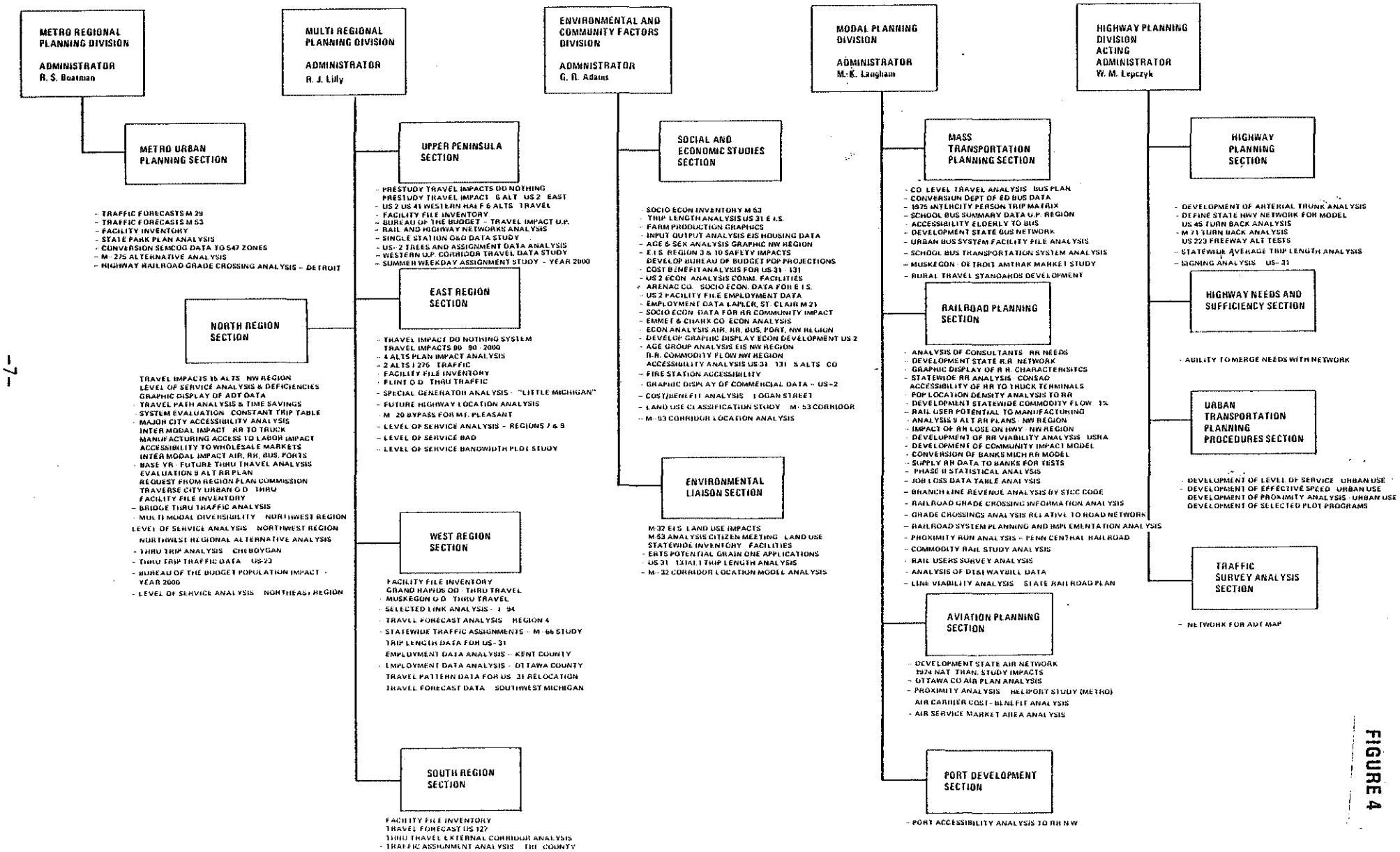

FIGURE 4

STATEWIDE TRANSPORTATION MODELING SYSTEM APPLICATION DEVELOPMENT WITHIN DEPARTMENT

MICHIGAN'S STATEWIDE TRANSPORTATION MODELING SYSTEM
DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION
(SEE DETAILS)

INFORMATION ACCESSIBILITY

WITHIN DEPARTMENT

- USE OF L D G DATA
- USE OF SUFFICIENCY DATA
- USE OF NEED DATA
- USE OF T V M DATA
- USE OF ACCIDENT DATA
- USE OF MAINTENANCE DATA
- USE OF ANY OTHER C S TYPE RECORD

OTHER DEPT

- CONVERTED DEPT OF ED DATA
- CONVERTED DEPT OF TREASURY DATA
- CONVERTED DEPT OF COMM DATA
- CONVERTED DEPT OF PUBLIC HEALTH DATA
- CONVERTED DEPT OF MENTAL HEALTH DATA
- CONVERSION OF STATE POLICE CRIME DATA
- CONVERSION OF SOCIAL SERVICES DATA

APPLICATIONS

BUREAU OF HIGHWAYS

- GRAPHIC DISPLAY OF DEER ACCIDENTS
- TRAINING CLASS ON FORECASTING
- ANALYSIS OF STATEWIDE INTER SECTION ACCIDENTS
- DEVELOPMENT OF INTERSECTION ACCIDENT GRAPHIC DISPLAY
- ACCIDENT RATE ANALYSIS FOR FIXED OBJECT & GUARD RAIL ACCIDENTS
- COMPUTER GRAPHICS FOR OVERHEAD SIGNING
- TRAFFIC ANALYSIS M 66

BUREAU OF URBAN & PUBLIC TRANSPORTATION

- COUNTY LEVEL PERSON TRIPS FOR R R. PASSENGER ANALYSIS
- STATEWIDE TRIP DATA FOR INTER CITY BUS SCHEDULES
- SOCIO ECON DATA INVENTORY FOR DIAL A RIDE
- TRAVEL INVENTORY FOR AUTO TRAIN POTENTIAL
- STATEWIDE COMMODITY FLOW FOR FREIGHT PLAN
- GTW CROSSING ANALYSIS
- LAKE MICHIGAN FERRY ANALYSIS
- STATEWIDE RAIL NETWORK ANALYSIS
- STATEWIDE RAIL NETWORK ANALYSIS
- LAKE MICHIGAN FERRY - COST BENEFIT ANALYSIS
- RAIL FREIGHT TRAFFIC STUDY
- MARKET AREA ANALYSIS DIAL A RIDE
- AUTO TRAIN SERVICE PROXIMITY ANALYSIS
- SOCIO ECONOMIC ANALYSIS DIAL A RIDE
- RAIL ROUTING AND SHIPPERS ANALYSIS
- MULTI MODAL ANALYSIS DIAL A RIDE

BUREAU OF TRANSPORTATION PLANNING

(SEE DETAILS)

NATIONAL AND REGIONAL WORKSHOPS

- GUEST OF REGION NO. BECAUSE OF MICHIGAN'S EXTENSIVE WORK ON STATEWIDE MODELING - 8 STATES
- CO SPONSOR WITH FHWA IN REGION NO. 4 STATEWIDE MODEL WORKSHOP 7 STATES
- PRESENTED A PAPER AT ASHTO NATIONAL CONFERENCE ON COM PUTER TECHNOLOGY
- PRESENTED PAPER IN ANN ARBOR AT INTERNATIONAL SUMPOSIUM ON ERTS TECHNOLOGY
- SPEAKER AT ERTS IN MICHIGAN WORKSHOP FOR AIAA
- SPEAKER AT SUMPOSIUM ON APPLI CATIONS OF REMOTELY SENSED DATA IN NORTH CENTRAL U S
- SPEAKER FOR U S DEPT. OF INTERIOR'S WORKSHOP ON MODEL APPLICATIONS IN ANALYSIS OF OUTDOOR RECREATION
- A P P PRESENTATION ON STATEWIDE TRANSPORTATION PLANNING (INDIANAPOLIS)

SYSTEM DEVELOPMENT INFORMATION REQUESTS

UNITED STATES

- FLORIDA
- IDAHO
- ILLINOIS
- INDIANA
- IOWA
- KANSAS
- MASSACHUSETTS
- MICHIGAN
- MINNESOTA
- NEBRASKA
- NEW JERSEY
- NORTH CAROLINA
- PENNSYLVANIA
- TENNESSEE
- TEXAS
- WASHINGTON
- WASHINGTON, D C
- WISCONSIN

OTHER

- CANADA
- INDIA
- ISRAEL
- POLAND

UNIVERSITIES

- UNIVERSITY OF CALIFORNIA
- NORTHWESTERN UNIVERSITY ILLINOIS
- MICHIGAN STATE UNIVERSITY
- UNIVERSITY OF MICHIGAN
- WESTERN MICHIGAN UNIVERSITY
- UNIVERSITY OF MINNESOTA
- MISSISSIPPI STATE UNIVERSITY
- UNIVERSITY OF NEW MEXICO
- DUKE UNIVERSITY NORTH CAROLINA
- UNIVERSITY OF PENNSYLVANIA
- TEXAS A & M UNIVERSITY
- WASHINGTON UNIVERSITY

FIGURE 5

STATEWIDE TRANSPORTATION MODELING SYSTEM
APPLICATION AND DEVELOPMENT

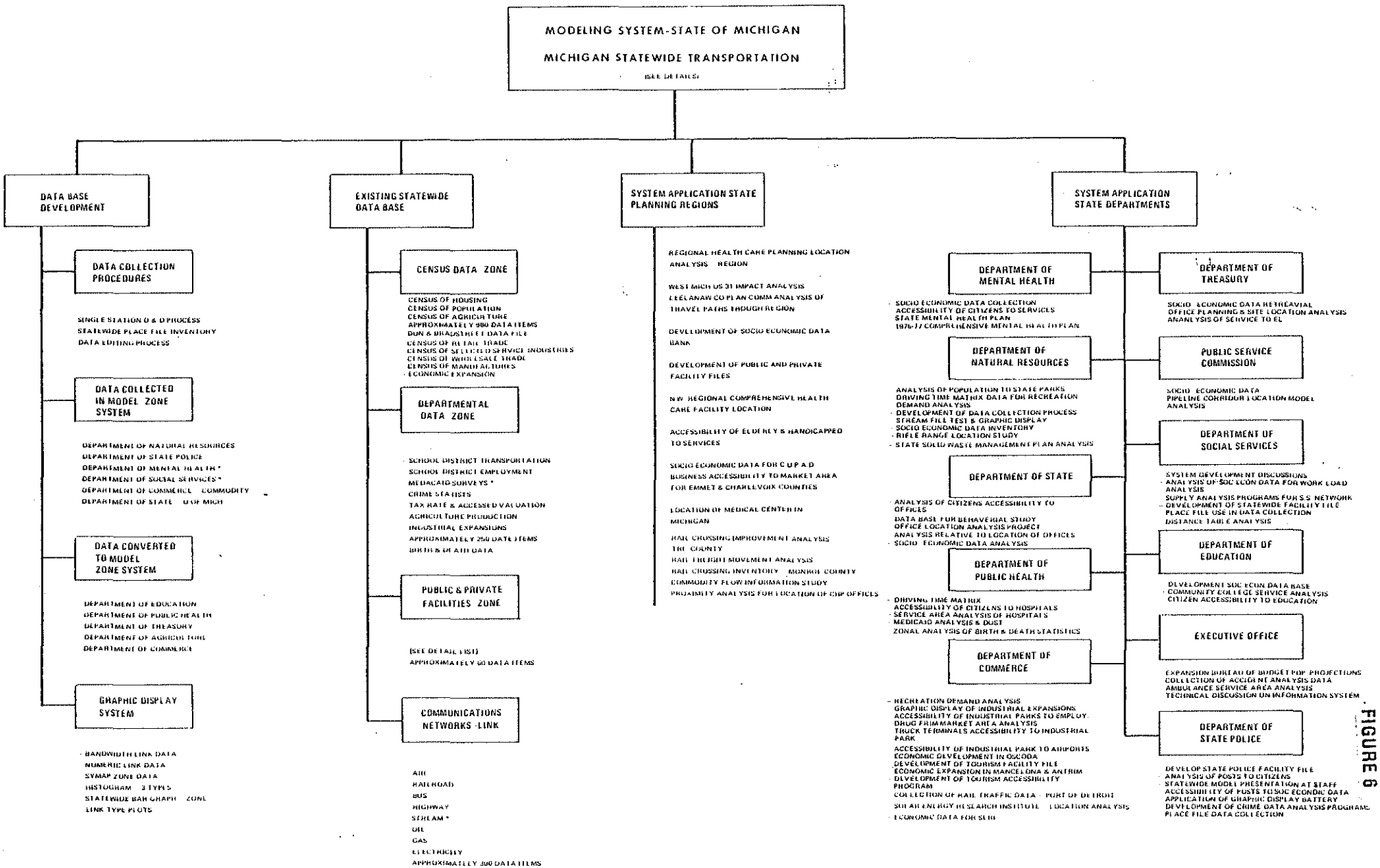

FIGURE 6

The benefits of the development of a Statewide Transportation Modeling System are actually very extensive as Figures 4-6 indicate. Time has not been taken in this report to discuss each of these applications, but the reviewer should note how many of the applications apply directly to the eight areas of emphasis identified by Mr. Pyers as necessary for successful development of a state transportation plan. Finally, prominent men in the transportation planning field continually admit that both statewide and regional planning are becoming technically more complex, must be updated rapidly, and deal with all people and organizations. All of these difficulties come at a time when financing is also more restricted. It is for this reason we feel the development of a statewide transportation plan and the related analysis must be defined around a basic transportation modeling system if a state or regional organization is to carry out its responsibility efficiently.